ARRISTA
Technologies Inc.

Test Report:
ATEMC000025

Applicant:
Arrista Technologies Inc.
5-55 Henlow Bay
Winnipeg, MB, CA
R3Y 1G4

Equipment Under Test (EUT):
AMPS / PCS / TDMA / CDMA
Cellular Signal Amplifier

MODEL:
AT498

FCC ID:

IN ACCORDANCE WITH:
FCC PART 22, SUBPART H;
FCC PART 24, SUBPART E
CELLULAR BAND REPEATERS

TEST LAB PERSONNEL:

Test Performed by:	Date	Signature
Paul Eberling, CNA	**August 8, 2002**	
Brent Griffiths	**August 8, 2002**	

APPROVALS:

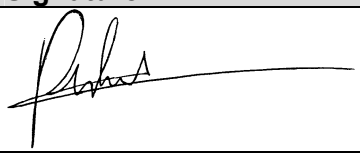
Date	Name	Title	Signature
October 21, 2002	Roman Wroczynski	Director Development & Test	

Table of Contents

Table of Figures

1. GENERAL INFORMATION

1.1. PURPOSE

This document details the results of the following tests performed by Arrista Technologies Inc. (Arrista) on June 15, 2002 – July 30, 2002 on the AT498 Dual Band Cellular Signal Amplifier for Arrista Technologies Incorporated.

1.2. TEST METHODOLOGY

Arrista performed these tests on a production sample of the product for the purpose of demonstrating compliance with FCC Part 22, Subpart H and Part 24 Subpart E. The conducted and radiated emissions testing were performed according to methods of ANSI C63.4:1992. This test report related only to the item(s) tested.

1.3. TEST EQUIPMENT LIST

All test equipment calibrations are NIST traceable to national standards. All calibration data can be made available on request

Table 1.3: Radiated Test Equipment

Description	Manufacture	Model Number	Last Cal Date	Cal Interval
EMI Receiver	Dynamic Sciences	DSI-2020	04/02/2002	Annual
Turntable and Mast Controller	EMCO	2090	N/A	N/A
Coaxial Cable	Sucoflex	106A	08/02/2001	Annual
Antenna Mast	EMCO Mini-Mast	2075-2	N/A	N/A
Horn Antenna (1-18GHz)	EMCO	3115	08/03/2001	Annual
Bilog EMC Antenna (30-2000MHz)	Schaffner-Chase	CBL61112B	07/20/2001	Annual
Metal Top Turntable	EMCO	2081-2.03	N/A	N/A
3m Semi-Anechoic Chamber	EMC Test Systems	N/A	05/30/2000	Bi-Annual
Desktop Computer	Dell Optiplex	GX110	N/A	N/A
6 dB Attenuator	Hewlett-Packard	6dB	N/A	N/A
Spectrum Analyzer	Agilent	HPE4407B	04/30/2002	Annual
Audio PAL/NTSC/Audio Signal Generator	Tektronics	TSG 95	N/A	N/A
Directional Coupler	Weinschel	1538RA-20	N/A	N/A
Amplifier 10-4200MHz	Mini-Circuits	ZHL-42W	N/A	N/A
Signal Generator (9kHz to 3200MHz)	Hewlett Packard	8648C	07/04/2001	Bi-Annual

1.4. EQUIPMENT UNDER TEST DESCRIPTION

The E.U.T. is sold under the following trade name:

AT498

The AT498 is a Bi-directional dual band cellular signal amplifier providing amplification of cellular transmit and receive signals for improved in-vehicle mobile telephone use. Designed for use with mobile cellular dual mode telephones, the signal amplifier reduces problems with signal fades and dropped calls while improving voice quality, service range and access. The signal amplifier enhances the performance of in-vehicle cradle mounted mobile handsets, resulting in wider coverage, less signal fades between buildings in urban environments, and increased coverage when traveling in rural areas. This product is designed to operate with CDMA, TDMA, AMPS and PCS signals from cellular service providers in the 824 to 894MHz and 1850 to 1990MHz cellular bands. The amplifier is designed to work with a variety of cradles and hands-free systems.

The product has two RF coaxial connection interfaces, one to an external antenna (not sold with the product) and the other the to the cell phone side, see Figure 1.1. In addition, the unit provides for a DC power connection through a fused 3-amp 18 AWG cable, which can be connected to a automobile DC power distribution system, a green LED indicates when power is applied to the unit.

The EUT's input connects to an FCC approved cellular device (CDMA, TDMA, AMPS) to increase the cellular device's power output up to a maximum leveled output of 3 Watts output (800MHz band) with typical mobile antenna and 2 Watts output (1900MHz band) with typical dual band mobile antenna. Further, the signal amplification provided by the amplifier receive circuitry is appropriately optimized for network operation with the intent of avoiding false hand-offs when a vehicle moves between cell sites.

1.5. GENERAL EQUIPMENT SPECIFICATION

1.5.1. POWER SUPPLY SPECIFICATIONS

Input Voltage:	10 to 30 V DC
Input Current:	2 Amps max

1.5.2. TRANSMITTER (800 MHZ BAND)

Frequency Range:	824 – 849 MHz
Tunable Bands:	Not Applicable
Necessary Bandwidth:	Not Applicable
Type of Modulation:	Not Applicable
Internal/External Data Source:	Not Applicable
Emission Designator:	F9W, F8W, F1D
Output Impedance:	50 Ohms
RF Power Output (rated):	Single, leveled, up to 3 Watts
Number of Channels:	Not Applicable
Duty Cycle:	Continuous, Linear Class A
Channel Spacing:	Not Applicable
Band Selection	Duplexer

1.5.3. RECEIVER (800 MHZ BAND)

Frequency Range:	869 – 894 MHz
Tunable Bands:	Not Applicable
Necessary Bandwidth:	Not Applicable
Type of Modulation:	Not Applicable
Local Oscillator:	Not Applicable
1st IF:	Not Applicable
2nd IF:	Not Applicable

1.5.4. TRANSMITTER (1900 MHZ BAND)

Frequency Range:	1850-1910 MHz
Tunable Bands:	Not Applicable
Necessary Bandwidth:	Not Applicable
Type of Modulation:	Not Applicable
Internal/External Data Source:	Not Applicable
Emission Designator:	F1D
Output Impedance:	50 Ohms
RF Power Output (rated):	Single, leveled, up to 2 Watts
Number of Channels:	Not Applicable
Duty Cycle:	Continuous, Linear Class A
Channel Spacing:	Not Applicable
Band Selection	Duplexer

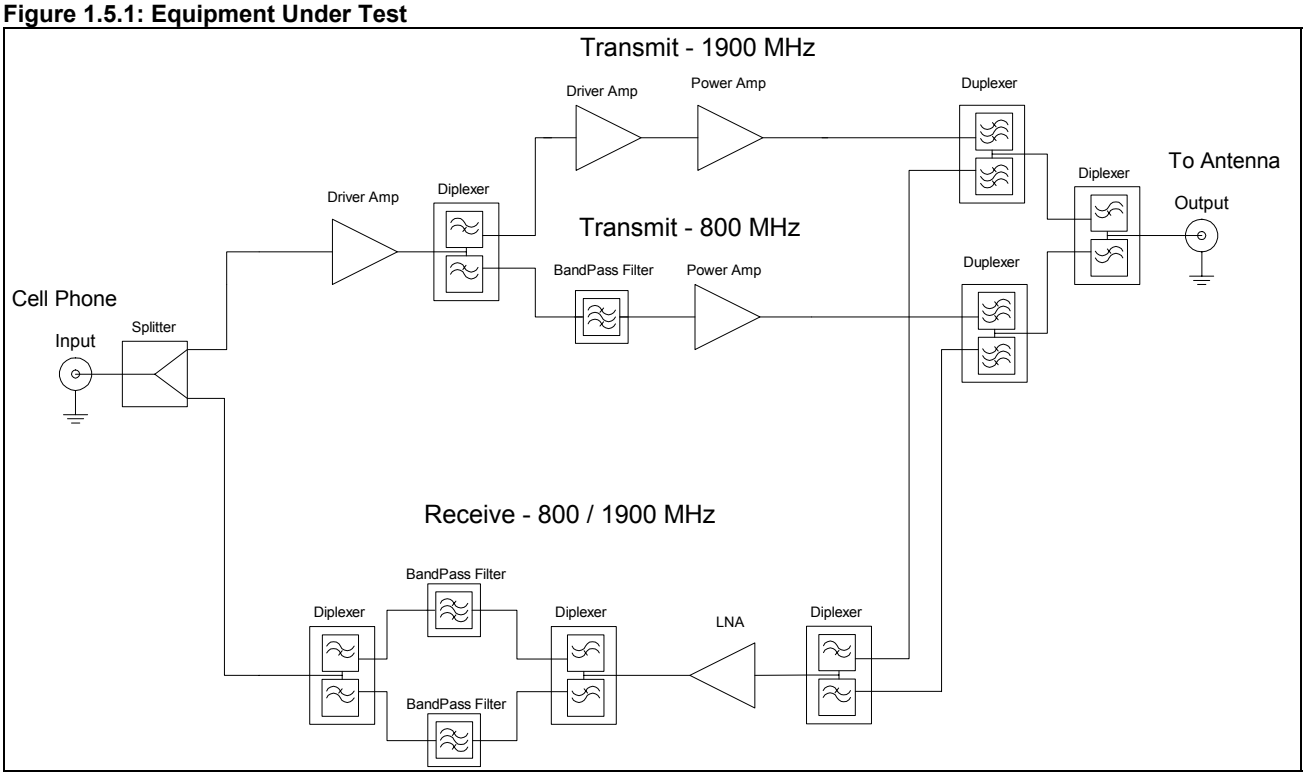
1.5.5. RECEIVER (1900 MHZ BAND)

Frequency Range:	1930-1990 MHz

Tunable Bands:	Not Applicable
Necessary Bandwidth:	Not Applicable
Type of Modulation:	Not Applicable
Local Oscillator:	Not Applicable
1st IF:	Not Applicable
2nd IF:	Not Applicable

1.5.6. EUT FUNCTIONAL BLOCK DIAGRAM

Figure 1.5.1: Equipment Under Test



1.6. TEST RESULT SUMMARY

Testing was performed using procedures or criteria contained in the regulatory documents and standards specified below.

Figure 1.6.1: Results Summary

NAME OF TEST	FCC PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	2.1046(a) 22.913(a) 24.232(b)	Mobile spec; 7W ERP 2W e.i.r.p.	 1.82 W 0.97 W	Complies
Emissions Limitations: AMPS/TDMA	2.1049(c) 22.917(d) 24.238(a)	Mask	Plots	Complies
Emissions Limitation: CDMA	2.1049(c) 22.917(d) 24.238(a)	Mask	Plots	Complies
Occupied Bandwidth: AMPS/TDMA/CDMA	N/A	N/A	Plots	N/A
Conducted Spurious Emission at Antenna Terminals	2.1051 22.917(d) 24.238(a)	 -13dBm -13dBm	 -17.2dBm, -27.9dBm	Complies
Radiated Field Strength of Spurious Emissions	2.1053 22.917(d) 24.238(a)	 -13dBm -13dBm	Plots, Tables	Complies
Frequency Tolerance	22.355 24.235	1.5ppm 1.5ppm	N/A	N/A

Notes:

(1) Since the EUT does not contain modulation circuitry, modulation testing was not performed.

(2) Since the EUT is not designed to generate or translate frequencies, and only amplifies the signal it receives, frequency stability was not tested.

1.7. DEVIATIONS

The following deviations from, additions to, or exclusions from the test specifications have been made:

None

1.8. TEST SCHEDULE DESCRIPTION

Testing was performed using the procedures and requirements of CFR 47 Part 2 for type acceptance.

1.8.1. RF POWER OUTPUT

For transmitters other than SSB, ISB and controlled carrier radiotelephone, the power output shall be measured at the RF output terminals with electrical characteristics of the RF load attached.

1.8.2. EMISSIONS LIMITATION & OCCUPIED BANDWIDTH

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean power radiated are equal to 0.5 percent of the total mean power radiated by the given emission.

1.8.3. CONDUCTED SPURIOUS EMISSIONS AT ANTENNA TERMINALS

The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminal when properly loaded with a suitable artificial antenna.

1.8.4. RADIATED FIELD STRENGTH OF SPURIOUS EMISSIONS

Measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal condition of installation and power.

1.9. TEST FACILITIES DESCRIPTION

1.9.1. INTERNAL FACILITIES

Arrista Product Compliance & Test (PCT) laboratory is located at 5-55 Henlow Bay, Winnipeg, Manitoba, Canada at Arrista main facility. The laboratory has test equipment for Electromagnetic Compatibility (EMC) testing i.e. ESD, EFT, Surge, and radiated emissions.

The PCT Laboratory is registered with the FCC and has submitted the information required by Section 2.948 of the FCC Rules for measuring devices. Test equipment used to perform all measurements listed in paragraph 1.3 of this test report.

1.9.2. RADIATED EMISSIONS TEST SITE

Radiated emissions testing was performed in Arrista's semi-anechoic 3m test chamber.

The site consists of a 28'x 20'x 20' shielded chamber with absorptive materials on the walls and ceiling. The floor of the chamber is a raised conductive ground plane and

includes a 2 m conductive top turntable. The measuring antenna is mounted on a non-conductive mast, which can be raised between 1 to 4 meters. Measurement equipment is located in the adjacent control room which is a 12' x 12' x 8' shielded structure.

2. TEST RESULTS

2.1. RF POWER OUTPUT

Test Type:	RF Output Power
FCC Para No.:	2.1046, 22.913, 24.232
Tested By:	Brent Griffiths
Date:	June 20, 2002

2.1.1. SPECIFICATION REQUIREMENT:

According to § 22.913 (a); The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to § 24.232 (b); The of Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

2.1.2. MEASUREMENT PROCEDURE:

The peak power at EUT antenna terminals is measured using the Advantest spectrum analyzer/tracking generator. See Appendix Figure A-1 for test set-up. Power output of multiple carriers is not measured as the EUT is designed to amplify a single carrier.

2.1.3. TEST RESULTS:

Complies

2.1.4. MEASUREMENT DATA:

Table 2.1:RF Power Output

Freq (MHz)	SA Reading (dBm)	Cable (dB)	Attenuation (dB)	Result (dBm)	Output Power (W)	Limit (W) ERP
824	31.8	Corrected	Corrected	30.62	1.15	7.0 ERP
836.5	32.6	Corrected	Corrected	31.33	1.36	7.0 ERP
849	29.4	Corrected	Corrected	30.64	1.16	7.0 ERP
1850	29.1	Corrected	Corrected	29.09	0.81	2.0 eirp
1880	29.9	Corrected	Corrected	29.87	0.97	2.0 eirp
1910	27.7	Corrected	Corrected	27.70	0.59	2.0 eirp

Note:
Attenuation of cable and attenuator is corrected automatically by spectrum analyzer correction function.

2.1.5. PLOT DATA

Figure 2.1.1: Power Output; Frequency 824.0 MHz

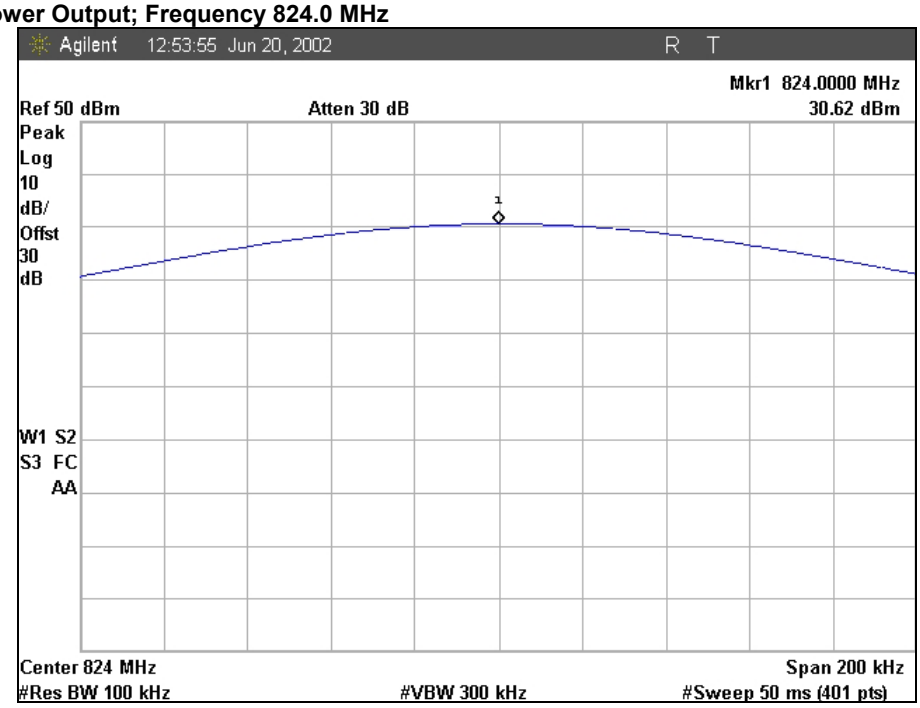


Figure 2.1.2: Power Output; Frequency 836.5 MHz

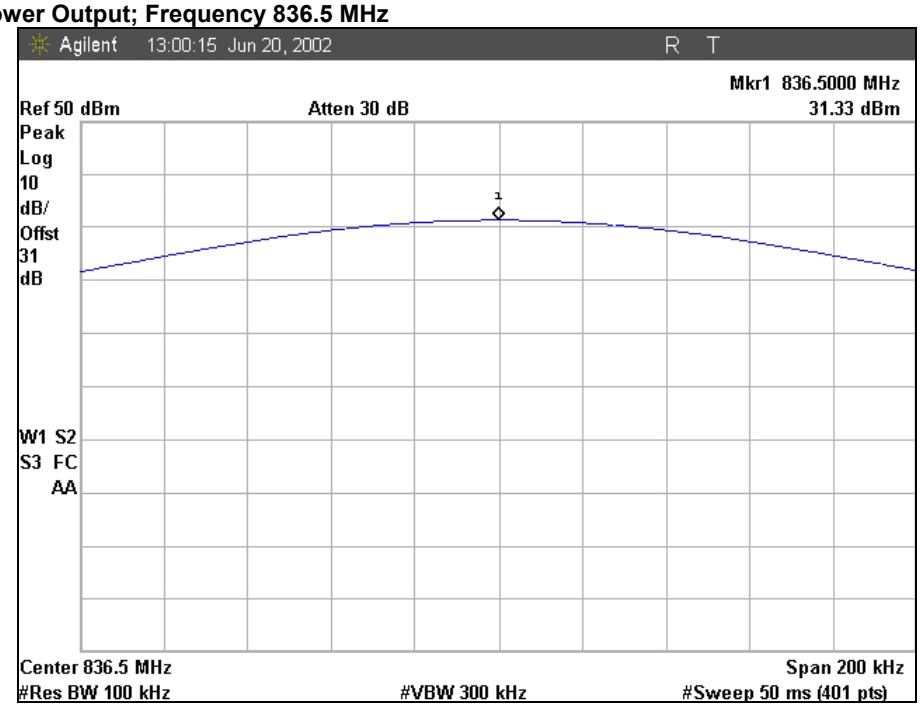


Figure 2.1.3: Power Output; Frequency 849.0 MHz

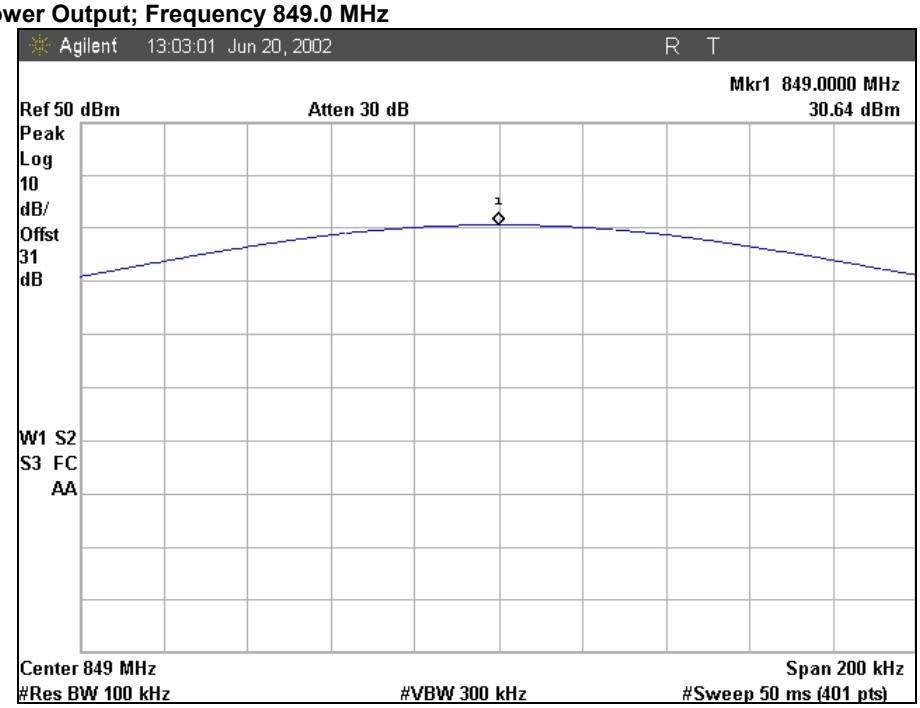


Figure 2.1.4: Power Output; Frequency 1850 MHz

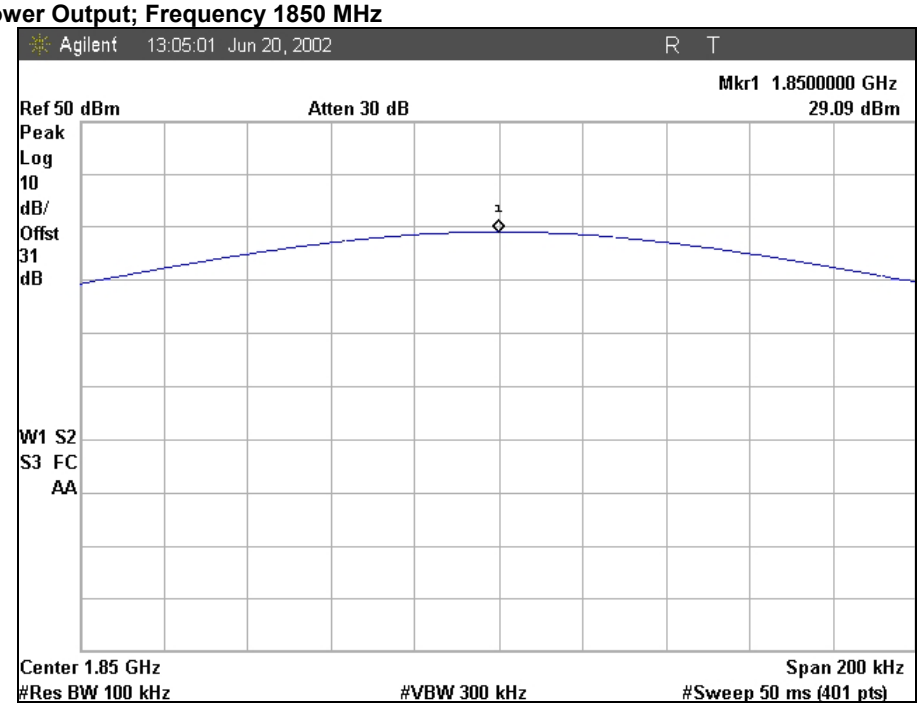


Figure 2.1.5: Power Output; Frequency 1880 MHz

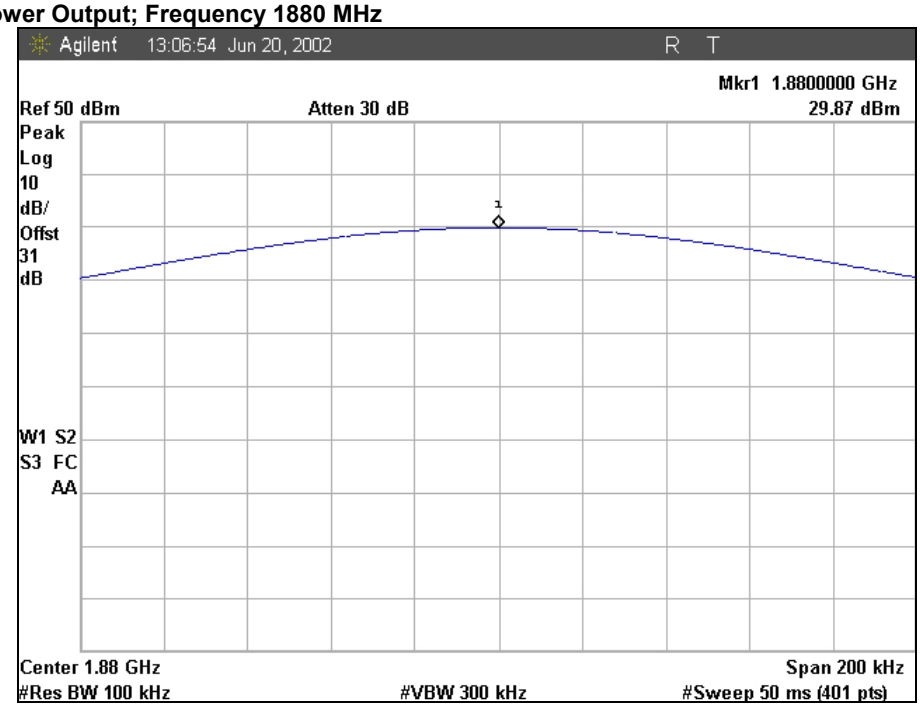
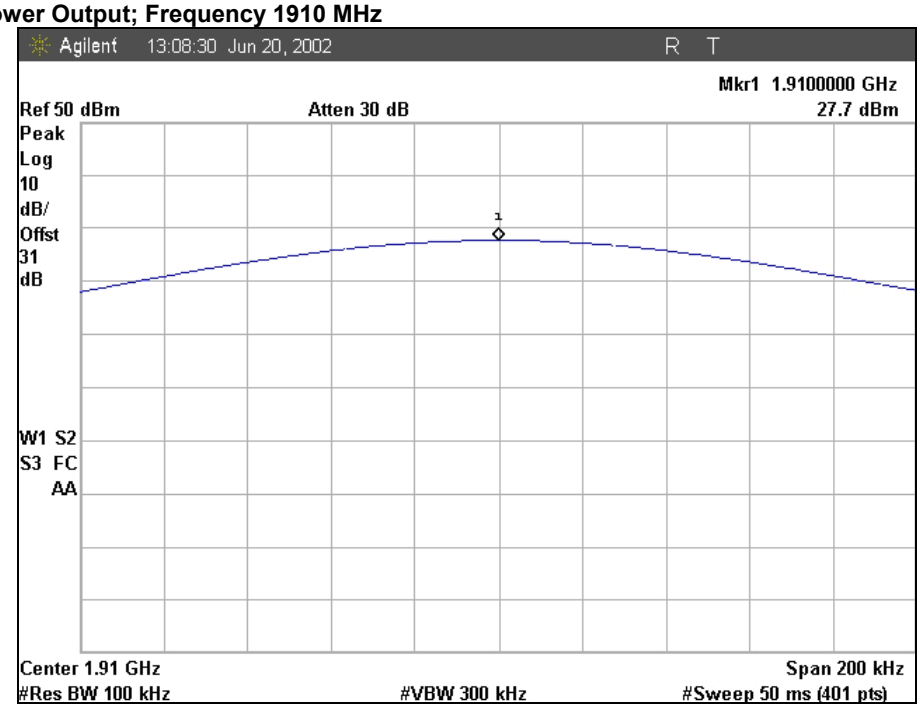


Figure 2.1.6: Power Output; Frequency 1910 MHz



2.2. EMISSIONS LIMITATIONS FOR CELLULAR

Test Type:	Emissions Limits for Cellular (AMPS/TDMA)
FCC Para No.:	2.1049(c), 22.917 (d)
Tested By:	Brent Griffiths
Date:	June 20, 2002

2.2.1. SPECIFICATION REQUIREMENT:

According to §22.917 (d) For F1D emissions, the mean power of emissions must be attenuated below the mean power of the un-modulated carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz: at least 26 dB
(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz:at least 45 dB
(3) On any frequency removed from the carrier frequency by more than 90 kHz and up to the multiple of the carrier frequency, at least 60 dB or 43 + 10 log (P) dB, whichever is the lesser attenuation.

2.2.2. MEASUREMENT PROCEDURE:

A single FM modulated tone was used to demonstrate it operability in AMPS and TDMA cell systems. A signal generator was setup to provide a CW tone modulated with a 2.5kHz and +/-5 kHz deviation signal. The signal generator output was verified on a spectrum analyzer as shown. The signal generator output was then connected to the EUT cell phone coaxial interface connector. See Appendix A, Figure A-1 for test set-up

Agilent Spectrum Analyzer Settings:
RBW: 1kHz
VBV: 300Hz
Span: 200 kHz
Sweep: 5 sec
Mask: Cell F1D

Input Signal Characteristics:
HP 8648C Signal Generator
TektronicsTSG95 Signal Generator
Tone FM frequency: 2.5kHz@ +8dBu

Deviation: ± 5kHz.

2.2.3. TEST RESULTS:

Complies

2.2.4. MEASUREMENT DATA:

As can be seen from the following plots, the EUT has not distorted the input signal, and the measured emissions are in accordance to section 22.917 (d) (1), (2), (3). Attenuation at 20kHz of center up to 45kHz is greater than 26dB. From 45kHz to 90kHz the attenuation is greater than 45dB. For emissions removed above 90kHz the attenuation is greater than at least 60 dB or 43 + 10 log (P) dB, whichever is the lesser attenuation.

AMPS/TDMA Validation

Figure 2.2.1: TDMA Input; 836.5 MHz

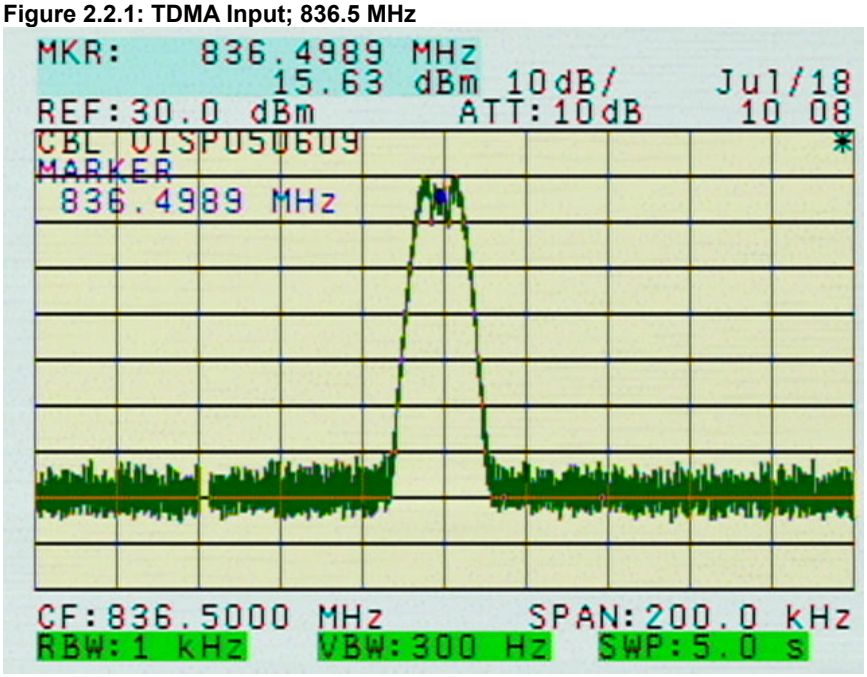
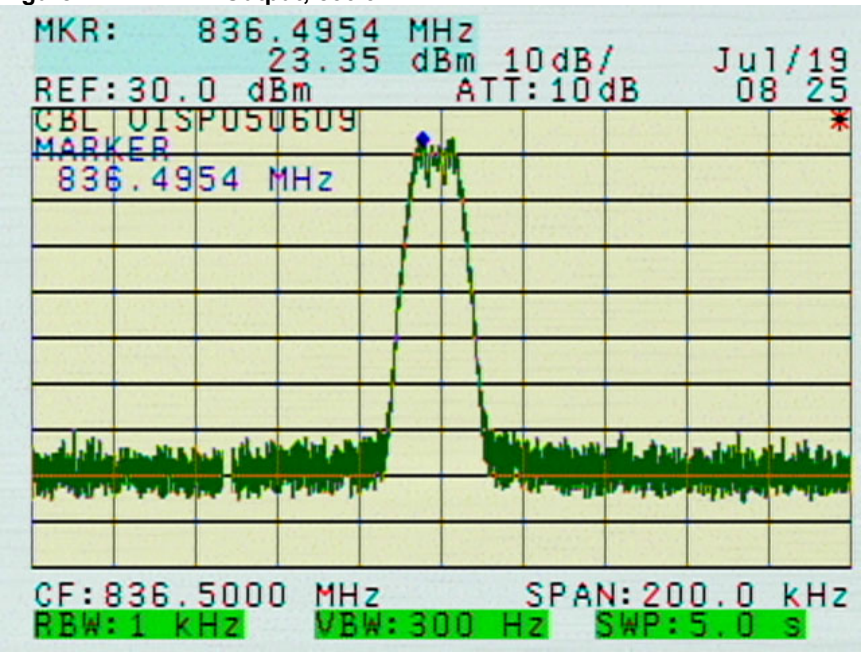


Figure 2.2.2: TDMA Output; 836.5MHz



2.3. EMISSIONS LIMITATIONS FOR CELLULAR CDMA

Test Type:	Emissions Limits for Cellular (CDMA)
FCC Para No.:	2.1049(c), 24.238(a)
Tested By:	Brent Griffiths
Date:	June 20, 2002

2.3.1. SPECIFICATION REQUIREMENT:

According to §24.238 (a) On any frequency outside a licensee's frequency block the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB.

2.3.2. MEASUREMENT PROCEDURE:

A single FM modulated tone was used to demonstrate it operability in CDMA cell systems. A signal generator was setup to provide a CW tone modulated with a 2.5kHz and +/-5 kHz deviation signal. The signal generator output was verified on a spectrum analyzer as shown. The signal generator output was then connected to the EUT cell phone coaxial interface connector. See Appendix A, Figure A-1 for test set-up

Agilent Spectrum Analyzer Settings:
RBW: 1MHz
VBV: 300Hz
Span: 200 kHz
Sweep: 5 sec
Mask: Cell F1D

Input Signal Characteristics:
HP 8648C Signal Generator
TektronicsTSG95 Signal Generator
Tone FM frequency: 2.5kHz@ +8dBu
Deviation: ± 5kHz.

2.3.3. TEST RESULTS:

Complies

2.3.4. MEASUREMENT DATA:

As can be seen from the following plots, the EUT has not distorted the input signal, and the measured emissions are in accordance to section 22.238 (a). Attenuation is greater than 43 + 10 log (P) dB.

Figure 2.2.3: TDMA Input; 1880 MHz

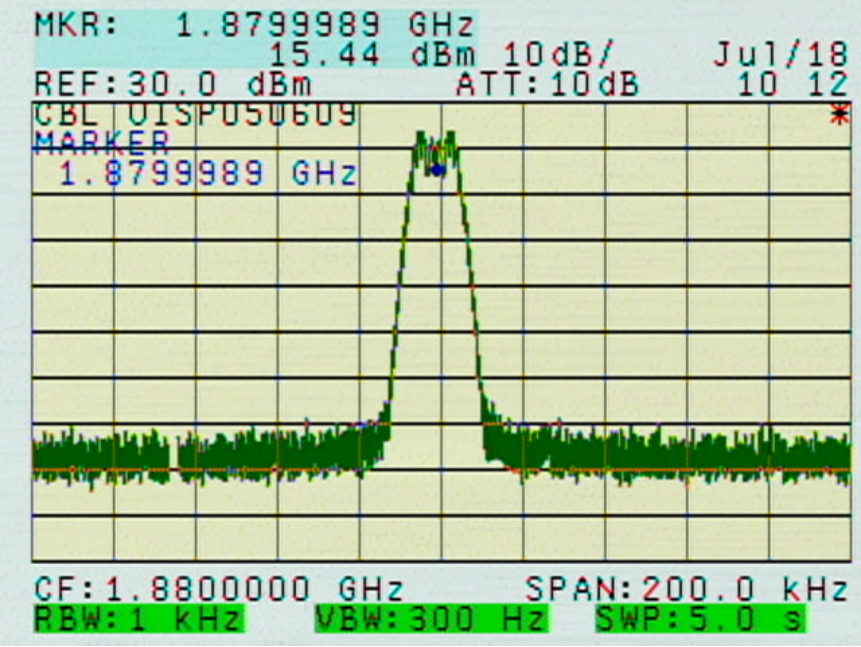
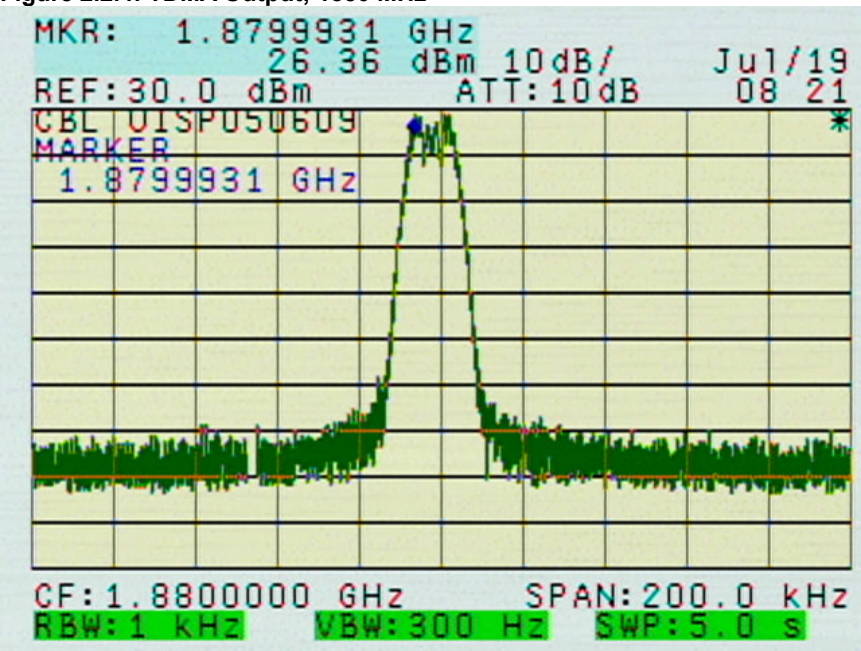


Figure 2.2.4: TDMA Output; 1880 MHz



2.4. CDMA OCCUPIED BANDWIDTH (DIGITALLY MODULATED SOURCE)

Test Type:	CDMA Occupied Bandwidth (Digital Modulation)
FCC Para No.:	Not Applicable
Tested By:	Brent Griffiths
Date:	July 20, 2002

2.4.1. SPECIFICATION REQUIREMENT:

Not Applicable

2.4.2. MEASUREMENT PROCEDURE:

A Motorola StarTac (FCC ID # IHDTSVA1 EE3) phone was used as a signal source to stimulate the EUT. The StarTac phone was mounted in a hands free automobile cradle DHF HANDSFREE model # N07110-HFCIC, the cradle output was connected to the EUT. The cradle unit incorporates a microphone interface allowing the user to communicate with the cell phone while driving.

A call was initiated on the StarTac phone utilizing the 800 MHz band; an audio signal generator (TSG95) was used to supply an audio tone to the cradles microphone interface that was then modulated by the StarTac. The non–amplified transmitted output spectrum of the phone/cradle is shown in Figure 2.3.1, showing the CDMA occupied bandwidth of a CDMA channel. Next, the cell phone/cradle output was connected to the EUT's cell phone coaxial interface connector, the resulting display of occupied bandwidth at the EUT antenna coaxial connector is shown Figure 2.3.2. See Figure A-2 of Appendix A for test set-up.

A call was initiated on the StarTac phone utilizing the 1900 MHz band; an audio signal generator (TSG95) was used to supply an audio tone to the cradles microphone interface that was then modulated by the StarTac. The non–amplified transmitted output spectrum of the phone/cradle is shown in Figure 2.3.3, showing the CDMA occupied bandwidth of a CDMA channel. Next, the cell phone/cradle output was connected to the EUT's cell phone coaxial interface connector, the resulting display of occupied bandwidth at the EUT antenna coaxial connector is shown Figure 2.3.4. See Figure A-2 of Appendix A for test set-up.

Advantest Spectrum analyzer settings:
RBW: 300kHz
VBW: 300kHz
Span: 5MHz

Sweep: 500 ms
Mask: Not applicable

Input signal characteristics:
TSG95: 2kHz tone@ +8dBu +/-5KHz deviation
The cell phone CDMA signal RF output level into the EUT is set by the cell network that the cell phone initiated communications.

2.4.3. TEST RESULTS:

Complies

2.4.4. MEASUREMENT DATA:

As can be seen from the amplified output, that EUT has not distorted the CDMA input signal, and has amplified it by approximately by 20 dB (as this is small signal gain of the EUT). This test was performed using an in service cell network and at no time during testing did the network drop the call.

Figure 2.4.1: CDMA Input Signal; 836.5 MHZ

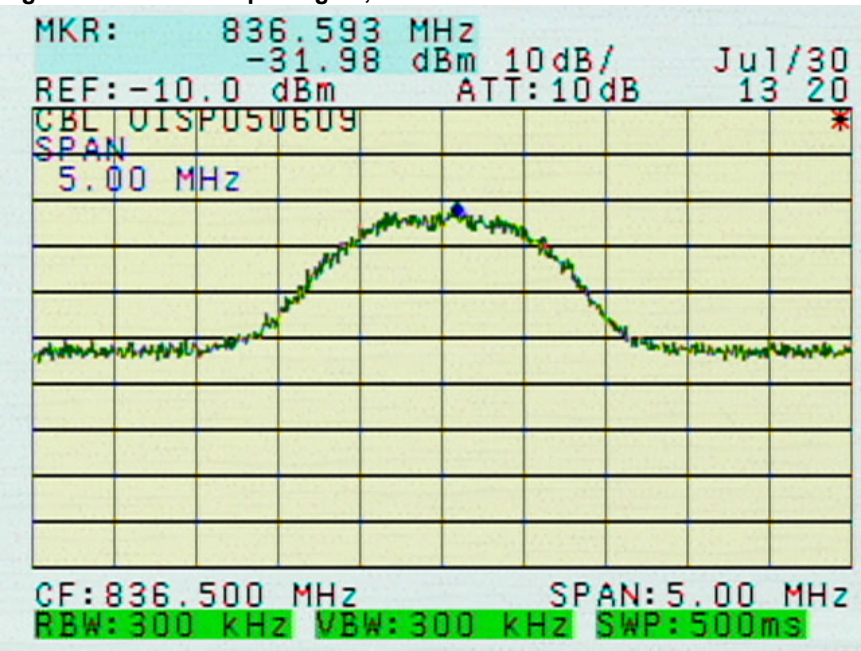


Figure 2.3.2: CDMA Output Signal; 836.5 MHz

Figure 2.3.3: CDMA Input Signal; 1880 Mhz

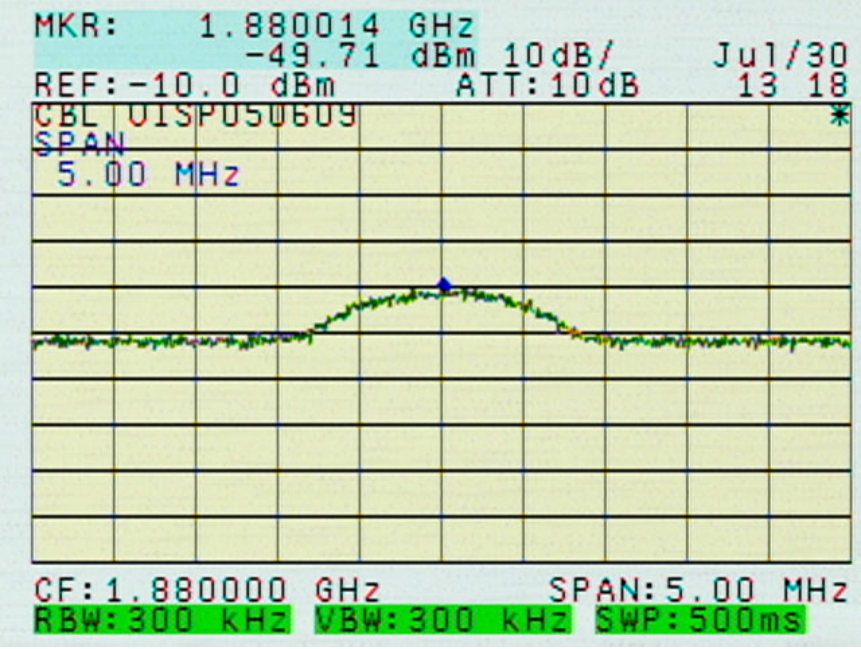
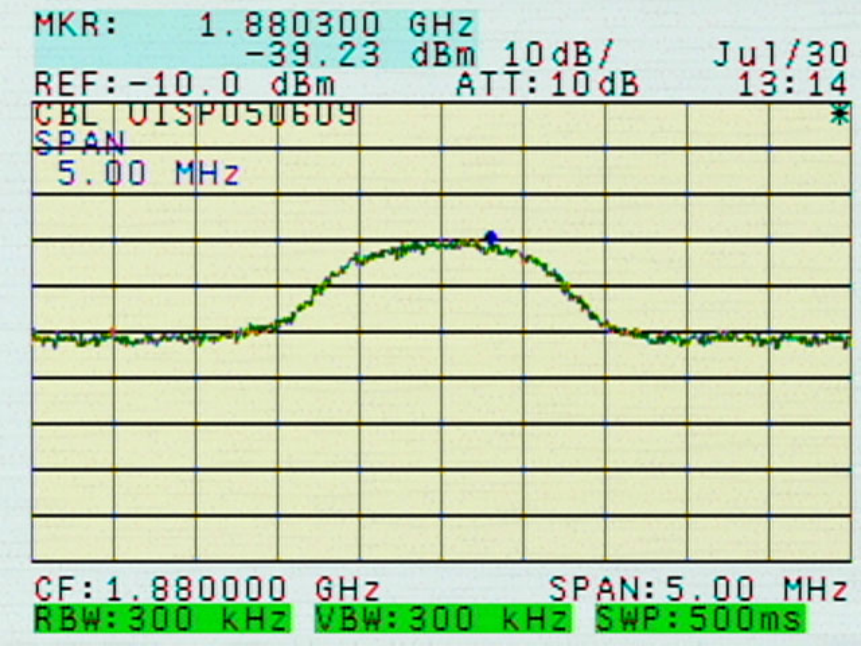


Figure 2.3.4: CDMA Output Signal; 1880 MHz



2.5. CONDUCTED SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Type:	Spurious Emissions at Antenna Terminals
FCC Para No.:	2.1051(e), 22.917(d), 24.238(a)
Tested By:	Brent Griffiths
Date:	June 20, 2002

2.5.1. SPECIFICATION REQUIREMENT:

§ 2.1051 (e) *Out of band emissions.* The mean power of emissions must be attenuated below the mean power of the un-modulated carrier (P) on any frequency twice or more than twice the fundamental frequency by: at least 43+10 log P dB.

§22.917 (d) For F1D emissions, the mean power of emissions must be attenuated below the mean power of the un-modulated carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency, at least 60 dB or 43 + 10 log (P) dB, whichever is the lesser attenuation.

§24.238 (a) On any frequency outside a licensee's frequency block the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB.

2.5.2. MEASUREMENT PROCEDURE; (824 -849 MHZ RANGE):

A signal generator providing a CW tone at 824, 836.5 and 849Mhz was connected to the EUT cell phone coaxial interface connector. The output of the EUT was connected to a spectrum analyzer and the emissions spectrum of the EUT was measured from 30MHz to the 10th harmonic of the fundamental of the CW input signal. See Figure A-1 of Appendix A for test set-up

Agilent Spectrum Analyzer Settings:
RBW: 300kHz < 1GHz, 1MHz > 1GHz
VBW: various
Bandwidth of measurement: 30MHz to 9GHz
Span: various
Sweep: 2 sec

Mask: Cell F1D

Input Signal Characteristics:
CW Frequency: 824, 836.5 and 849 MHz
CW Power Level: RF level input of the signal to produce maximum EUT output through Mini-Circuits amplifier. See Figure A-1 in Appendix A for test set-up.

Spur limit is defined in the following formula:

$$Po - (43 + 10\log P) \quad [1]$$

Using the measured values the limit is calculated below:

$$32.6 - [43 + 10\log(Po \text{ in Watts})] = -13.0 \quad [2]$$

2.5.3. TEST RESULTS; (824 -849 MHz RANGE):

Complies

2.5.4. MEASUREMENT DATA; (824 -849 MHz RANGE):

Table 2.4.1: TMDA/AMPS: 824.0 – 849.0 MHz

Frequency Harmonic	824.0 Mhz MHz	SA (dBm)	Cable Loss (dB)	Attenuator (dB)	Result	Limit	Margin
2	1648.0	-24.3	corrected	corrected	-24.3	-13.0	11.3
3	2472.0	-34.7	corrected	corrected	-34.7	-13.0	21.7
4	3296.0	-57.5	corrected	corrected	-57.5	-13.0	44.5
5	4120.0	-40.8	corrected	corrected	-40.8	-13.0	27.8
6	4944.0	-55.3	corrected	corrected	-55.3	-13.0	42.3
7	5768.0	-57.8	corrected	corrected	-57.8	-13.0	44.8
8	6592.0	-58.9	corrected	corrected	-58.9	-13.0	45.9
9	7416.0	-56.9	corrected	corrected	-56.9	-13.0	43.9
10	8240.0	-58.4	corrected	corrected	-58.4	-13.0	45.4

Frequency Harmonic	836.5 Mhz MHz	SA (dBm)	Cable Loss (dB)	Attenuator (dB)	Result	Limit	Margin
2	1673.0	-18.8	corrected	corrected	-18.8	-13.0	5.8
3	2509.5	-36.2	corrected	corrected	-36.2	-13.0	23.2
4	3346.0	-53.2	corrected	corrected	-53.2	-13.0	40.2
5	4182.5	-43.7	corrected	corrected	-43.7	-13.0	30.7
6	5019.0	-45.3	corrected	corrected	-45.3	-13.0	32.3
7	5855.5	-56.5	corrected	corrected	-56.5	-13.0	43.5
8	6692.0	-57.2	corrected	corrected	-57.2	-13.0	44.2
9	7528.5	-54.3	corrected	corrected	-54.3	-13.0	41.3
10	8365.0	-55.4	corrected	corrected	-55.4	-13.0	42.4

Frequency Harmonic	849.0 Mhz MHz	SA (dBm)	Cable Loss (dB)	Attenuator (dB)	Result	Limit	Margin
2	1698.0	-17.2	corrected	corrected	-17.2	-13.0	4.2
3	2547.0	-38.4	corrected	corrected	-38.4	-13.0	25.4
4	3396.0	-43.2	corrected	corrected	-43.2	-13.0	30.2
5	4245.0	-41.7	corrected	corrected	-41.7	-13.0	28.7
6	5094.0	-45.3	corrected	corrected	-45.3	-13.0	32.3
7	5943.0	-56.0	corrected	corrected	-56.0	-13.0	43.0
8	6792.0	-52.9	corrected	corrected	-52.9	-13.0	39.9
9	7641.0	-54.2	corrected	corrected	-54.2	-13.0	41.2
10	8490.0	-54.9	corrected	corrected	-54.9	-13.0	41.9

2.5.5. MEASUREMENT PROCEDURE; 1850 – 1910 MHz RANGE:

A signal generator providing a CW tone at 1850, 1880 and 1910 Mhz was connected to the EUT cell phone coaxial interface connector. The output of the EUT was connected to a spectrum analyzer and the emissions spectrum of the EUT was measured from 30MHz to the 10th harmonic of the fundamental of the CW input signal. See Figure A-1 of Appendix A for test set-up

Agilent Spectrum Analyzer Settings:
RBW: 300 kHz < 1 GHz, 1 MHz > 1 GHz
VBW: various
Bandwidth of measurement: 1 GHz to 20 GHz
Span: various
Sweep: 2 sec
Mask: Cell F1D

Input Signal Characteristics:
CW Frequency: 1850, 1880 and 1910 Mhz
CW Power Level: RF level input of the signal to produce maximum EUT output through Mini-Circuits amplifier. See Figure A-1 in Appendix A for test set-up.

Spur limit is defined in the following formula:

$$Po - (43 + 10\log P) \quad [3]$$

Using the measured values the limit is calculated below:

$$29.9 - [43 + 10\log(Po \text{ in Watts})] = -13.0 \quad [4]$$

2.5.6. TEST RESULTS; 1850 – 1910 MHz RANGE:

Complies

2.5.7. MEASUREMENT DATA; 1850 – 1910 MHz RANGE:

Table 2.4.1: CDMA: 1850.0 – 1910.0 MHz

Frequency	1850.0 Mhz						
Harmonic	MHz	SA (dBm)	Cable Loss (dB)	Attenuator (dB)	Result	Limit	Margin
2	3700.0	-35.5	corrected	corrected	-35.5	-13.0	22.5
3	5550.0	-46.8	corrected	corrected	-46.8	-13.0	33.8
4	7400.0	-50.2	corrected	corrected	-50.2	-13.0	37.2
5	9250.0	-48.8	corrected	corrected	-48.8	-13.0	35.8
6	11100.0	-54.7	corrected	corrected	-54.7	-13.0	41.7
7	12950.0	-50.8	corrected	corrected	-50.8	-13.0	37.8
8	14800.0	-46.8	corrected	corrected	-46.8	-13.0	33.8
9	16650.0	-52.9	corrected	corrected	-52.9	-13.0	39.9
10	18500.0	-49.9	corrected	corrected	-49.9	-13.0	36.9

Frequency	1880.0 Mhz						
Harmonic	MHz	SA (dBm)	Cable Loss (dB)	Attenuator (dB)	Result	Limit	Margin
2	3760.0	-45.3	corrected	corrected	-45.3	-13.0	32.3
3	5640.0	-28.6	corrected	corrected	-28.6	-13.0	15.6
4	7520.0	-49.5	corrected	corrected	-49.5	-13.0	36.5
5	9400.0	-46.3	corrected	corrected	-46.3	-13.0	33.3
6	11280.0	-45.3	corrected	corrected	-45.3	-13.0	32.3
7	13160.0	-47.6	corrected	corrected	-47.6	-13.0	34.6
8	15040.0	-46.8	corrected	corrected	-46.8	-13.0	33.8
9	16920.0	-51.8	corrected	corrected	-51.8	-13.0	38.8
10	18800.0	-52.7	corrected	corrected	-52.7	-13.0	39.7

Frequency	1910.0 Mhz						
Harmonic	MHz	SA (dBm)	Cable Loss (dB)	Attenuator (dB)	Result	Limit	Margin
2	3820.0	-27.9	corrected	corrected	-27.9	-13.0	14.9
3	5730.0	-36.2	corrected	corrected	-36.2	-13.0	23.2
4	7640.0	-47.9	corrected	corrected	-47.9	-13.0	34.9
5	9550.0	-36.5	corrected	corrected	-36.5	-13.0	23.5
6	11460.0	-55.4	corrected	corrected	-55.4	-13.0	42.4
7	13370.0	-42.8	corrected	corrected	-42.8	-13.0	29.8
8	15280.0	-32.8	corrected	corrected	-32.8	-13.0	19.8
9	17190.0	-43.3	corrected	corrected	-43.3	-13.0	30.3
10	19100.0	-47.2	corrected	corrected	-47.2	-13.0	34.2

2.6. FIELD STRENGTH OF EMISSIONS

Test Type:	Emissions Limits for Cellular F1D emissions mask (AMPS/TDMA)
FCC Para No.:	22.917 (d), 24.238(a)
Tested By:	Paul Eberling
Date:	June 20, 2002

2.6.1. SPECIFICATION REQUIREMENT:

The mean power of emissions must be attenuated below the mean power of the un-modulated carrier on any frequency twice or more than twice the fundamental emission by at least 43 + 10 log P. This is equivalent to –13 dBm absolute power.

2.6.2. MEASUREMENT PROCEDURE:

The EUT is placed in a 3-meter semi anechoic chamber on a wooden table resting on the metal turntable. The EUT is stimulated by a CW tone from a signal generator at three discrete frequencies for each mode of operation. More specifically, 824, 836.5 and 849 MHz respectively for the 824 – 849 MHz range and 1850, 1880, 1910 MHZ respectively for the 1850 – 1910 MHz range.

The EUT is not designed with an integral antenna nor sold with one, thus for this test, the EUT's output antenna interface coaxial connector is terminated into a coaxial cable with a 50 ohm load attached to it.

The EUT's radiated field strength emissions is measured from 30MHz to the tenth harmonic of the CW input signal. A CISPR 16 compliant receiver is used to for scans between 30MHz to 2GHz. A spectrum analyzer is used for measurements above 2GHz. A calculation follows to convert the spec limit power level (i.e.-13dBm) to an E field measurement limit. See Figure A-3 of Appendix A for test set-up

Calculation of field strength limit corresponding to a power limit of –13dBm

An example of attenuation requirement of 43 + 10 Log P is equivalent to –13 dBm ($5x10^{-5}$ Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

$$GP/4\pi R^2 = E^2/120\pi \qquad [5]$$

For emissions $\leq$ 1 GHz:

G = 1.64 (Dipole Gain)
P = 10^{-5} Watts (Maximum spurious output power)
R = 3m (Measurement Distance)

$$E = 0.016533 \text{ V/m} = 84.4 \text{ dBµV/m } @3m \quad [6]$$

For emissions >1 GHz:

G = 1 (Isotropic Gain)
P = 1 x 10^{-5} Watts (Maximum spurious output power)
R = 3m (Measurement Distance)

$$E = 84.4 - 20 \text{ Log} = 82.3 \text{dBµV/m } @3m \quad [7]$$

DSI Receiver/Agilent Spectrum Analyzer Settings:
RBW: 120kHz @ f< 1GHz, 1MHz @ f > 1GHz
VBW: various
Bandwidth of measurement: 30MHz to 9GHz
Span: various

Input signal characteristics:
CW RF level input of the signal to produce maximum EUT leveled output
CW Frequencies: 824.0, 836.5, 849.0, 1850.0, 1880.0, 1910.0 MHz

2.6.3. TEST RESULTS:

Complies

2.6.4. MEASUREMENT DATA; 824 – 849 MHz RANGE:

Data was collected using carrier frequencies of 824, 836.5, and 849MHz for measurements below 1GHz. Data for measurements taken using a carrier frequency of 836.5MHz are displayed in following plots. Additional data can be supplied upon request. Measurements above 1GHz are recorded in the following tables, at 824, 836, and 849MHz. Above frequencies of 1 GHz only harmonic emissions were measurable, all non harmonic spurious emissions were not measurable, as they were below the noise floor of the instrument.

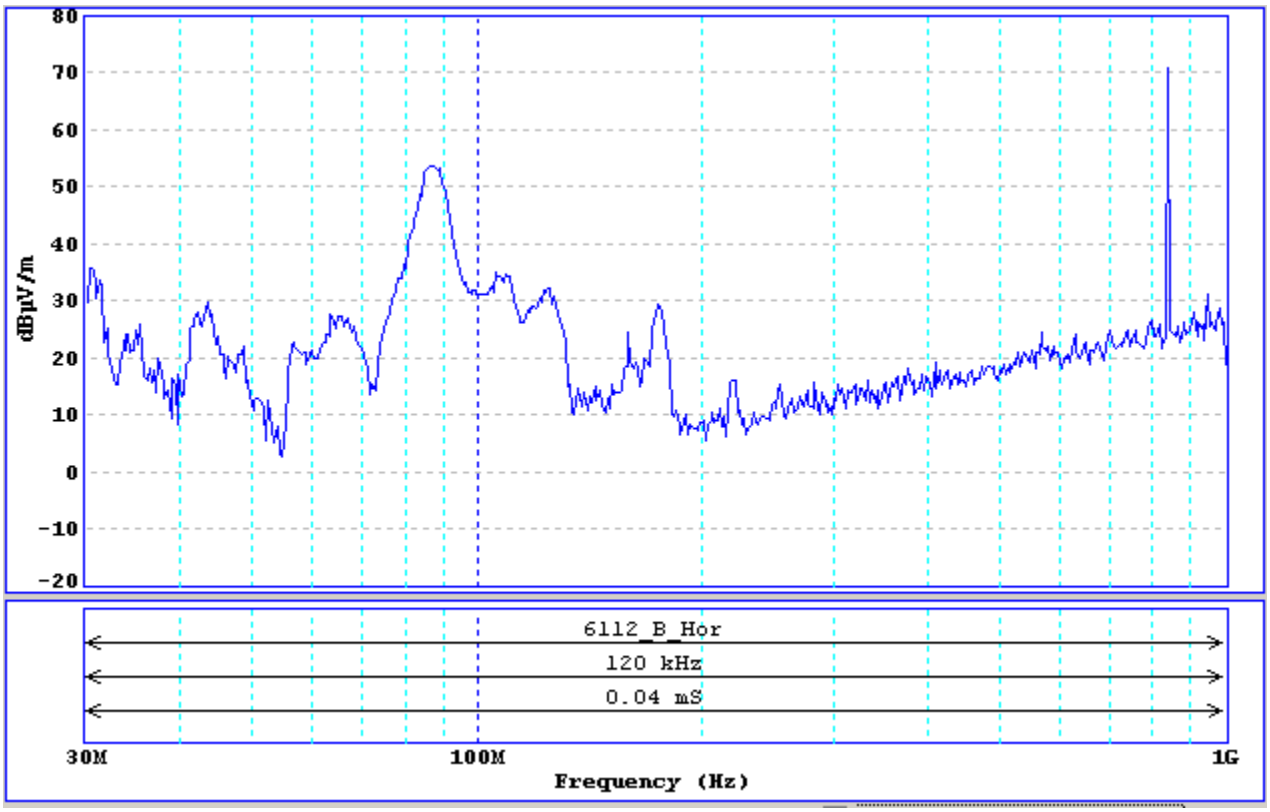
Equipment Under Test is configured as per **Fig 9(c) Test Configuration – Tabletop**

Equipment Radiated Emissions in **ANSI C63.4-1992**.

See Tables and Plot Data below:

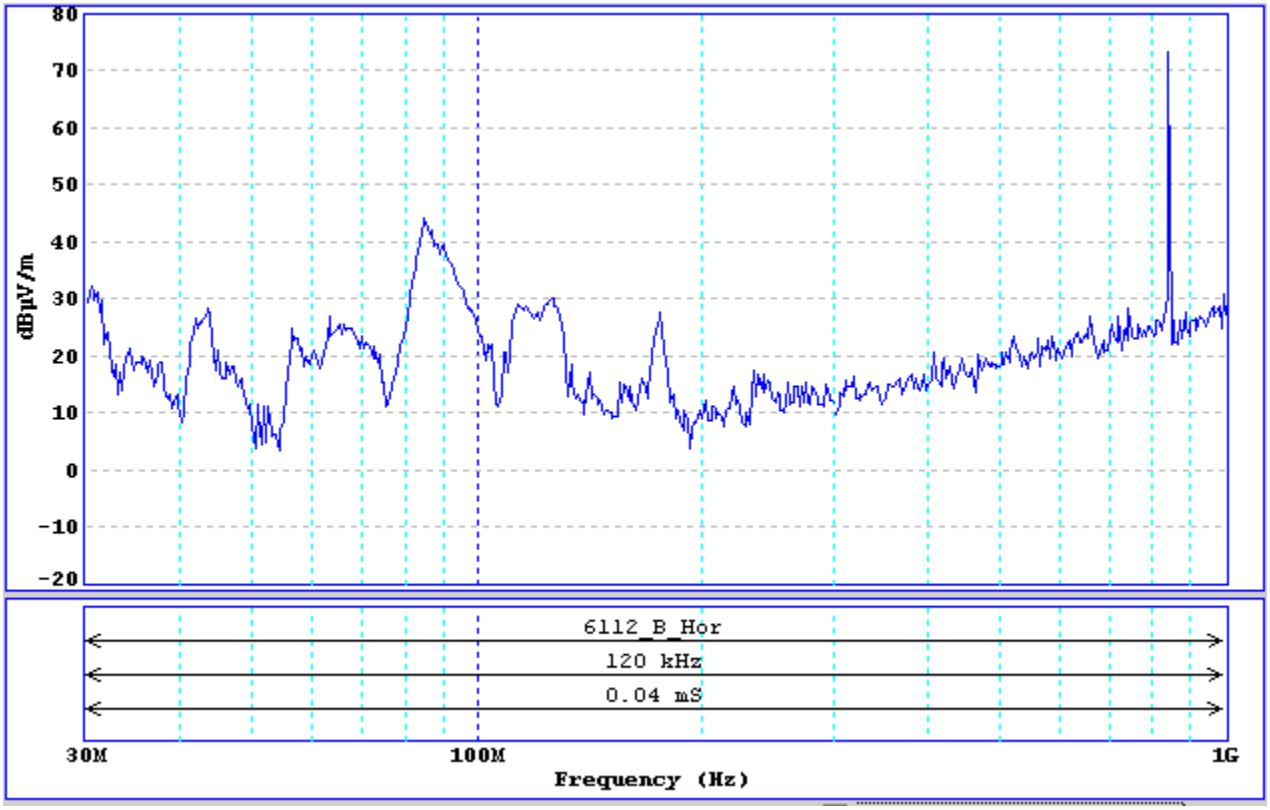
2.6.4.1. HORIZONTAL 0 DEGREES

Model:	AT498
Scan Polarization:	Horizontal
Antenna Height:	150cm
Turntable Position:	0 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



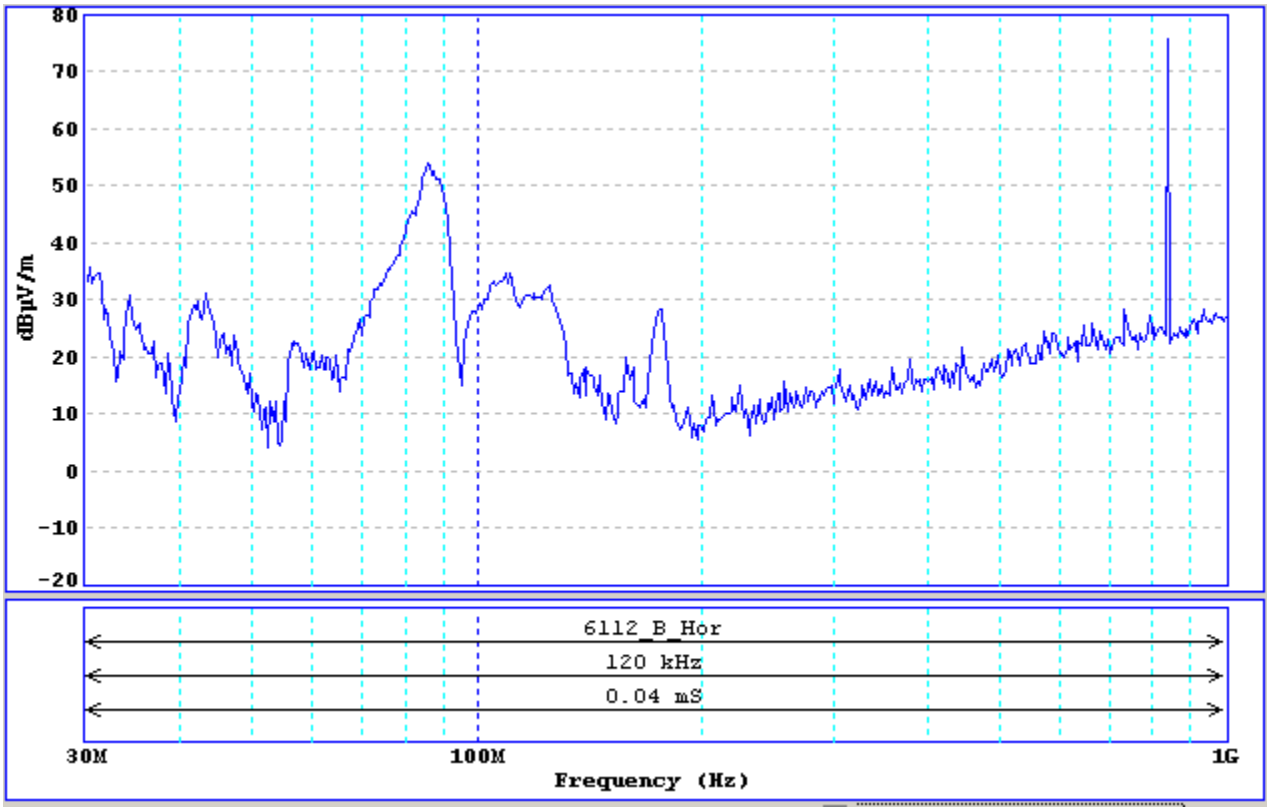
2.6.4.2. HORIZONTAL 90 DEGREES

Model:	AT498
Scan Polarization:	Horizontal
Antenna Height:	150cm
Turntable Position:	90 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



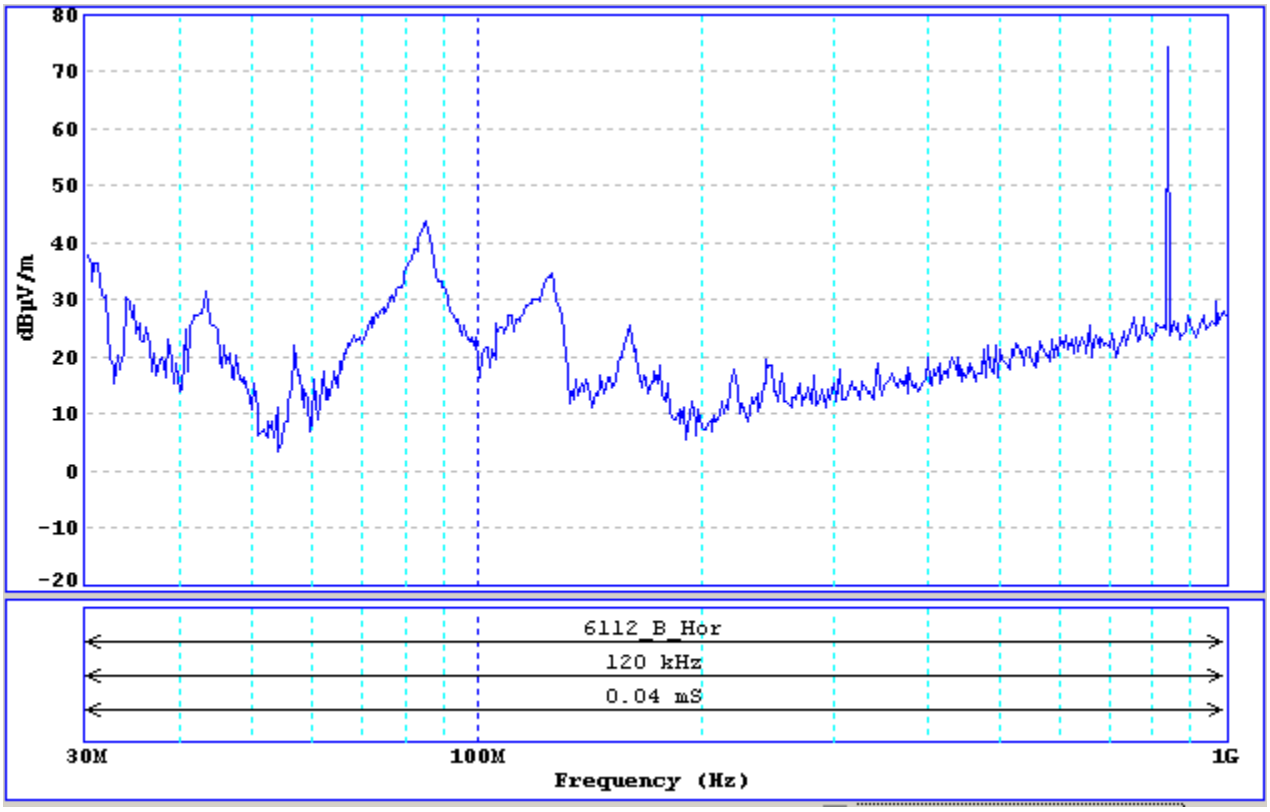
2.6.4.3. HORIZONTAL 180 DEGREES

Model:	AT498
Scan Polarization:	Horizontal
Antenna Height:	150cm
Turntable Position:	180 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



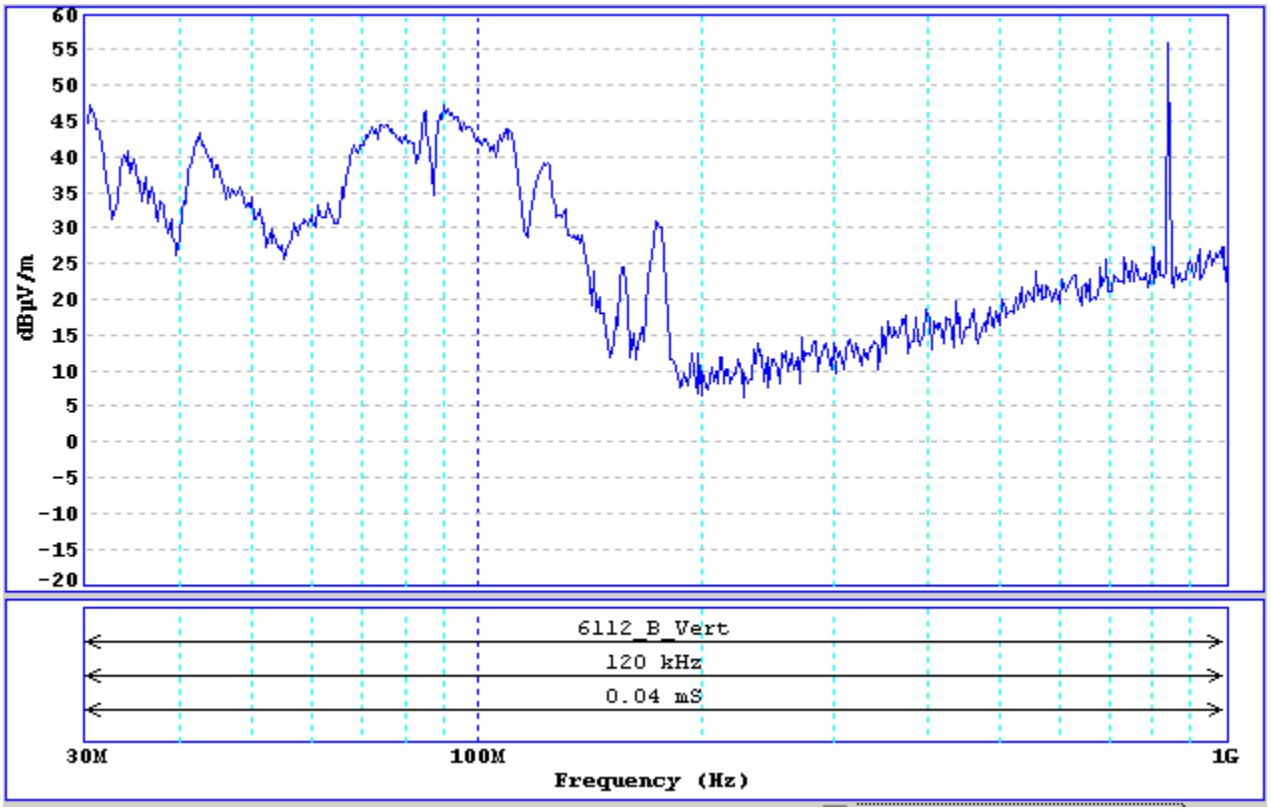
2.6.4.4. HORIZONTAL 270 DEGREES

Model:	AT498
Scan Polarization:	Horizontal
Antenna Height:	150cm
Turntable Position:	270 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



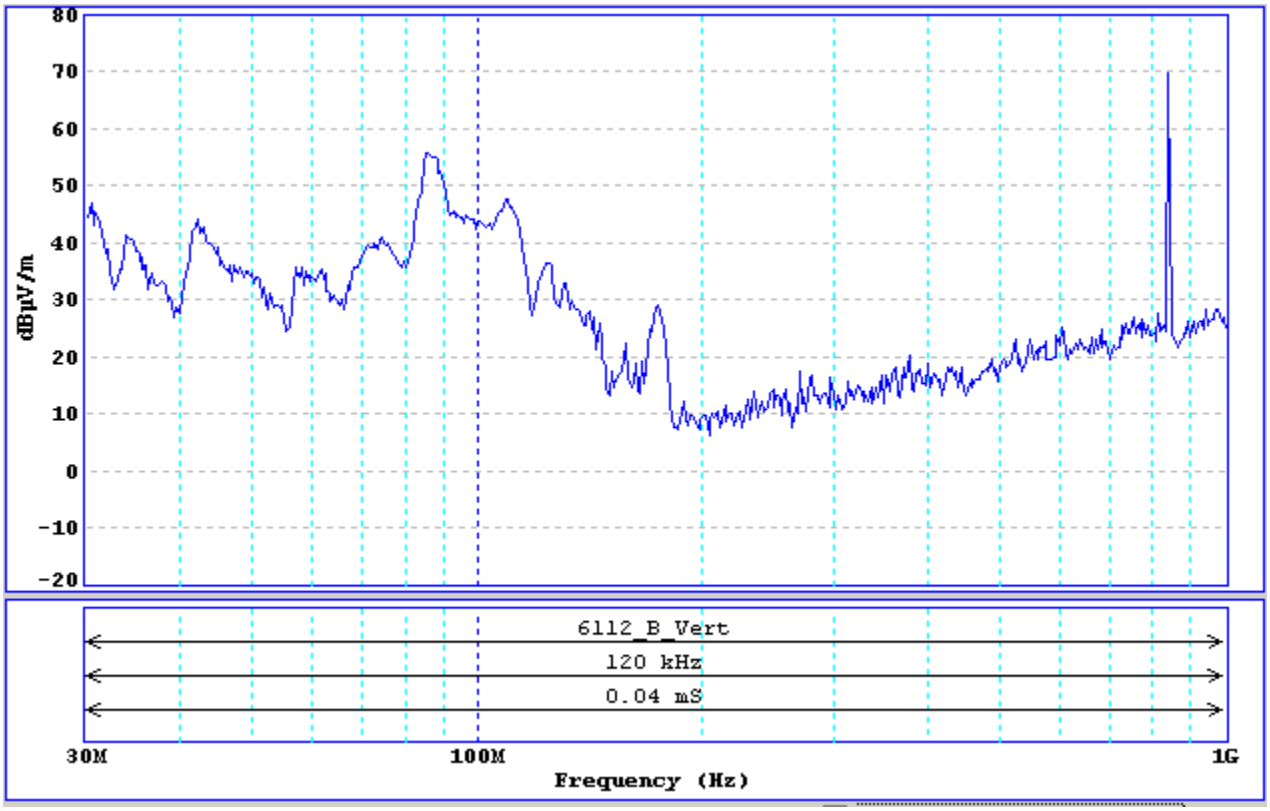
2.6.4.5. VERTICAL 0 DEGREES

Model:	AT498
Scan Polarization:	Vertical
Antenna Height:	150cm
Turntable Position:	0 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



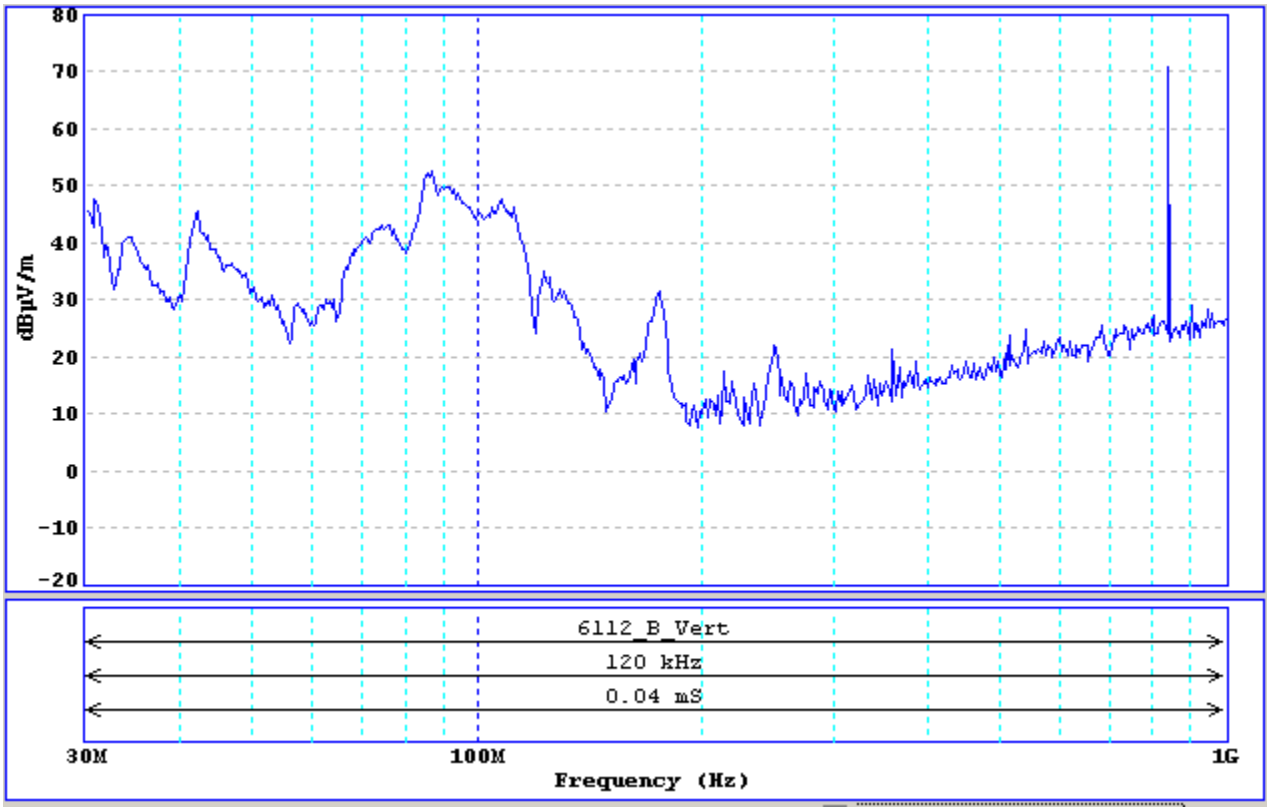
2.6.4.6. VERTICAL 90 DEGREES

Model:	AT498
Scan Polarization:	Vertical
Antenna Height:	150cm
Turntable Position:	90 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



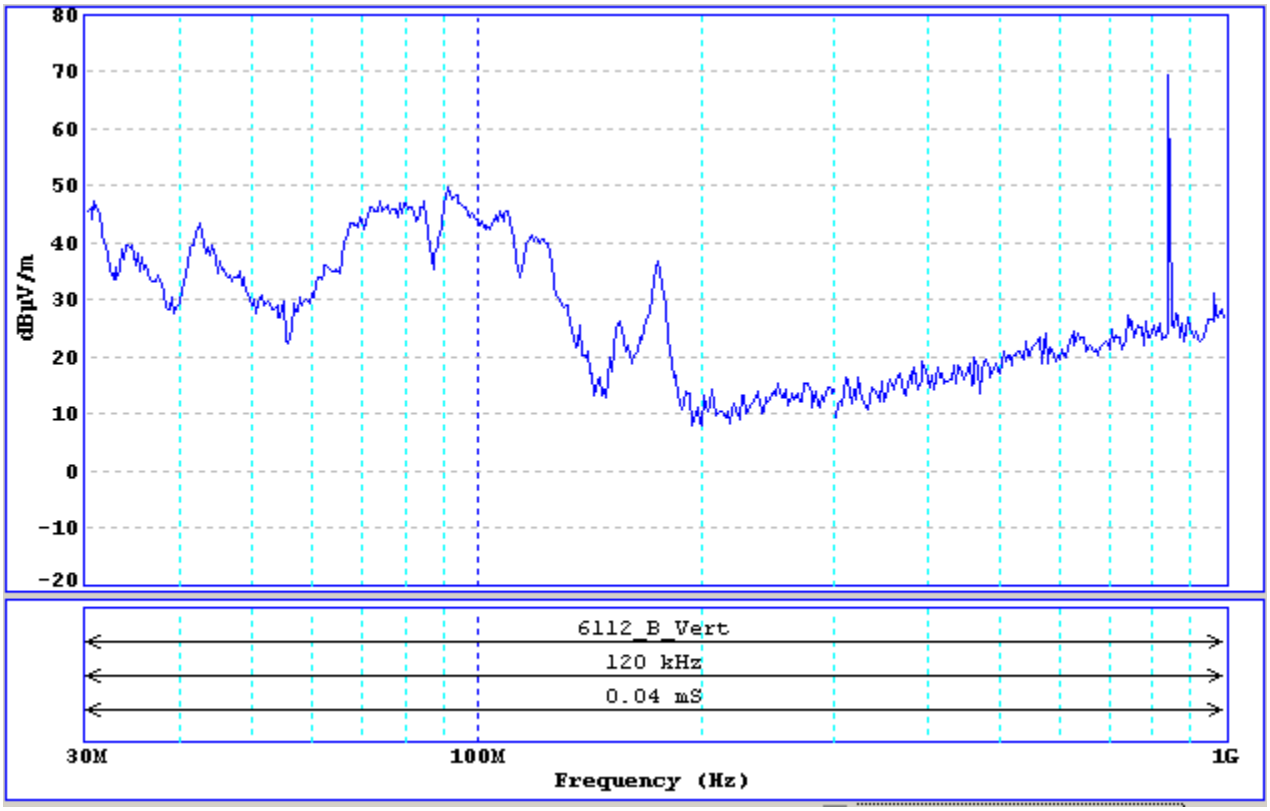
2.6.4.7. VERTICAL 180 DEGREES

Model:	AT498
Scan Polarization:	Vertical
Antenna Height:	150cm
Turntable Position:	180 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



2.6.4.8. VERTICAL 270 DEGREES

Model:	AT498
Scan Polarization:	Vertical
Antenna Height:	150cm
Turntable Position:	270 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



2.6.5. MEASUREMENT DATA; 1850 – 1910 MHZ RANGE:

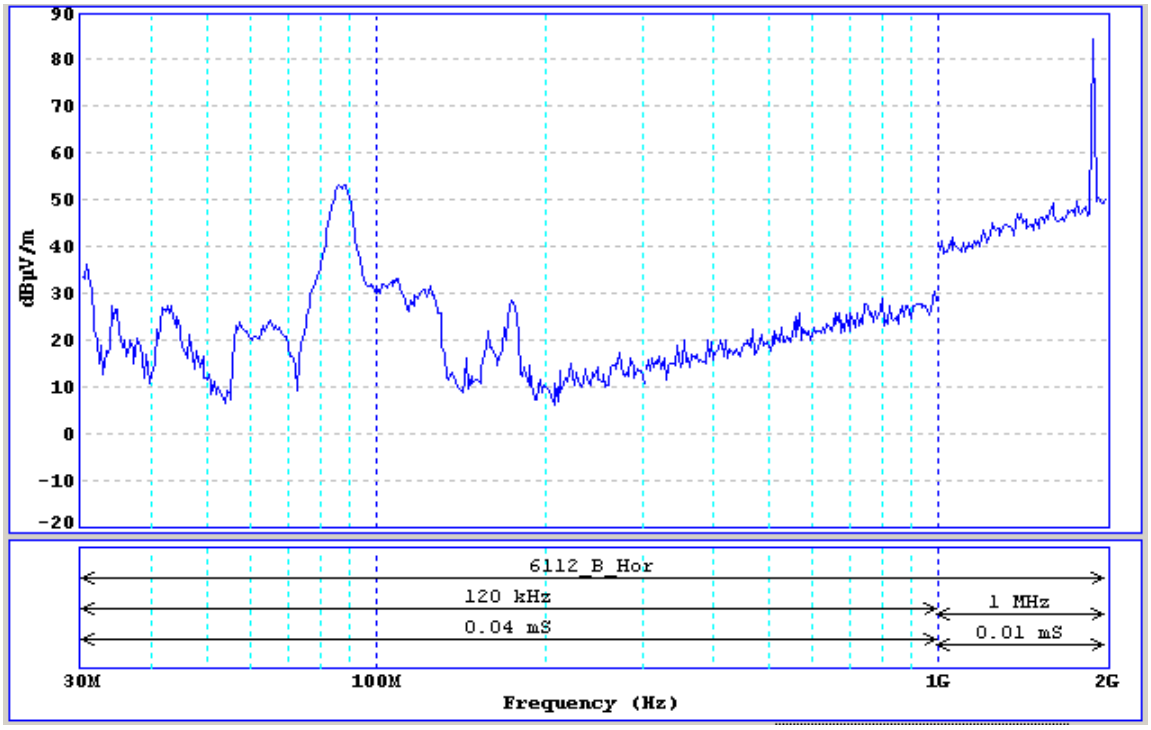
Data was collected using carrier frequencies of 1850, 1880, and 1910 MHz for measurements below 2GHz. Data for measurements taken using a carrier frequency of 1880 MHz are displayed in following plots. Additional data can be supplied upon request. Measurements above 2 GHz are recorded in the following tables, at 824, 836, and 849MHz. Above frequencies of 2 GHz only harmonic emissions were measurable, all non harmonic spurious emissions were not measurable, as they were below the noise floor of the instrument.

Equipment Under Test is configured as per **Fig 9(c) Test Configuration – Tabletop Equipment Radiated Emissions** in **ANSI C63.4-1992**.

See Tables and Plot Data below:

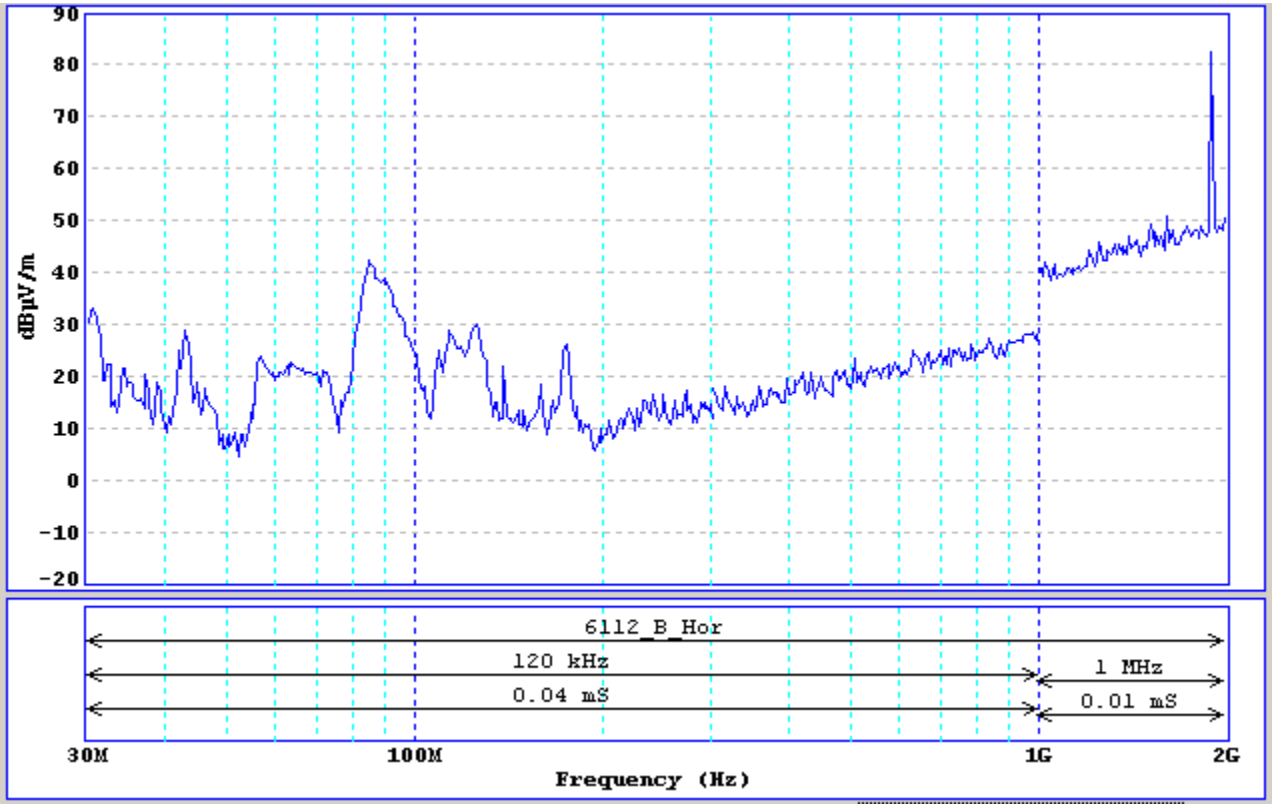
2.6.5.1. HORIZONTAL 0 DEGREES

Model:	AT498
Scan Polarization:	Horizontal
Antenna Height:	150cm
Turntable Position:	0 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



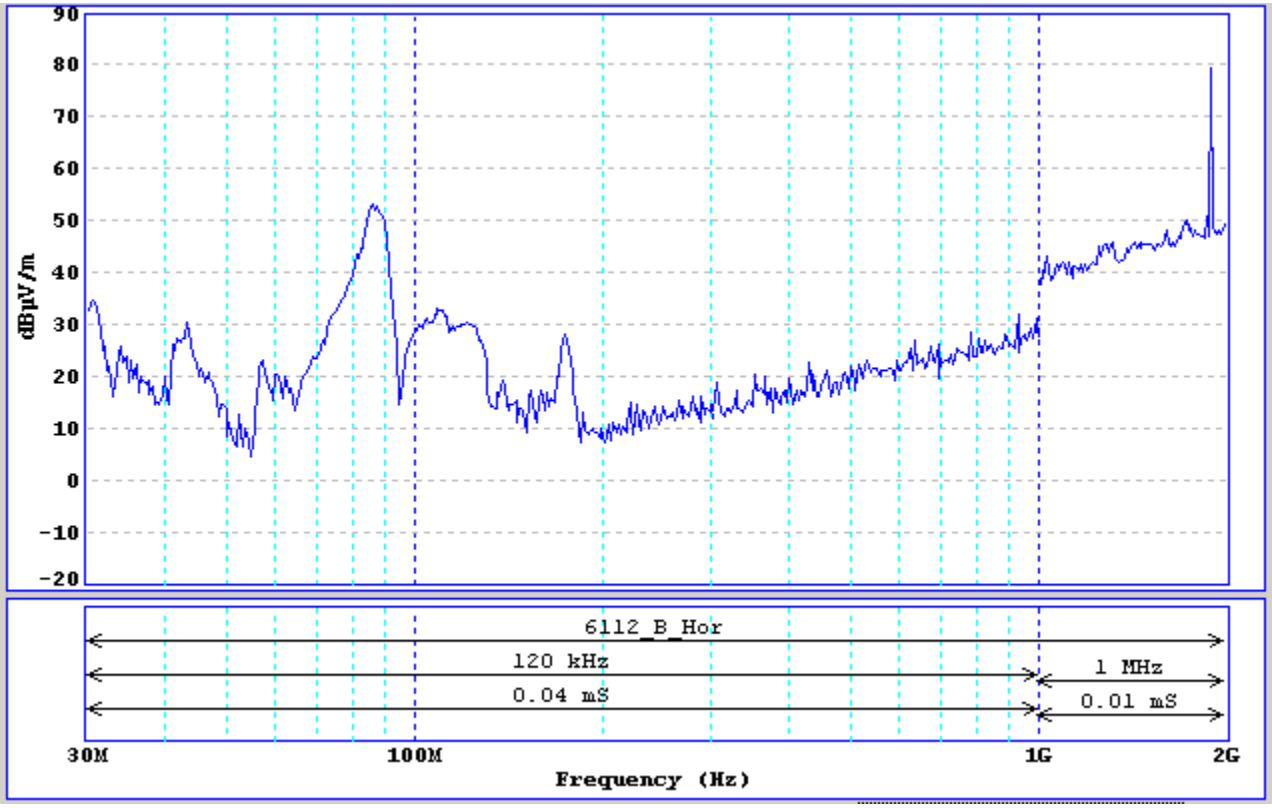
2.6.5.2. HORIZONTAL 90 DEGREES

Model:	AT498
Scan Polarization:	Horizontal
Antenna Height:	150cm
Turntable Position:	90 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



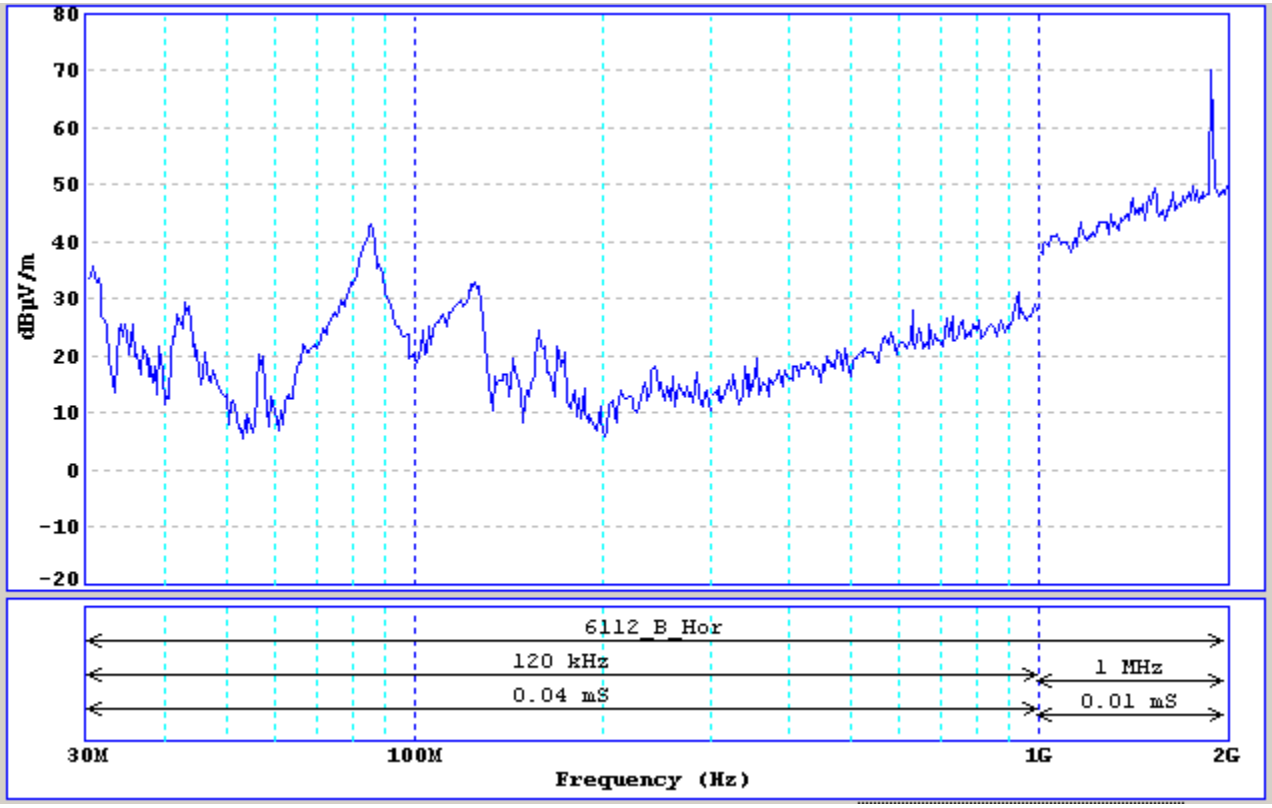
2.6.5.3. HORIZONTAL 180 DEGREES

Model:	AT498
Scan Polarization:	Horizontal
Antenna Height:	150cm
Turntable Position:	180 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



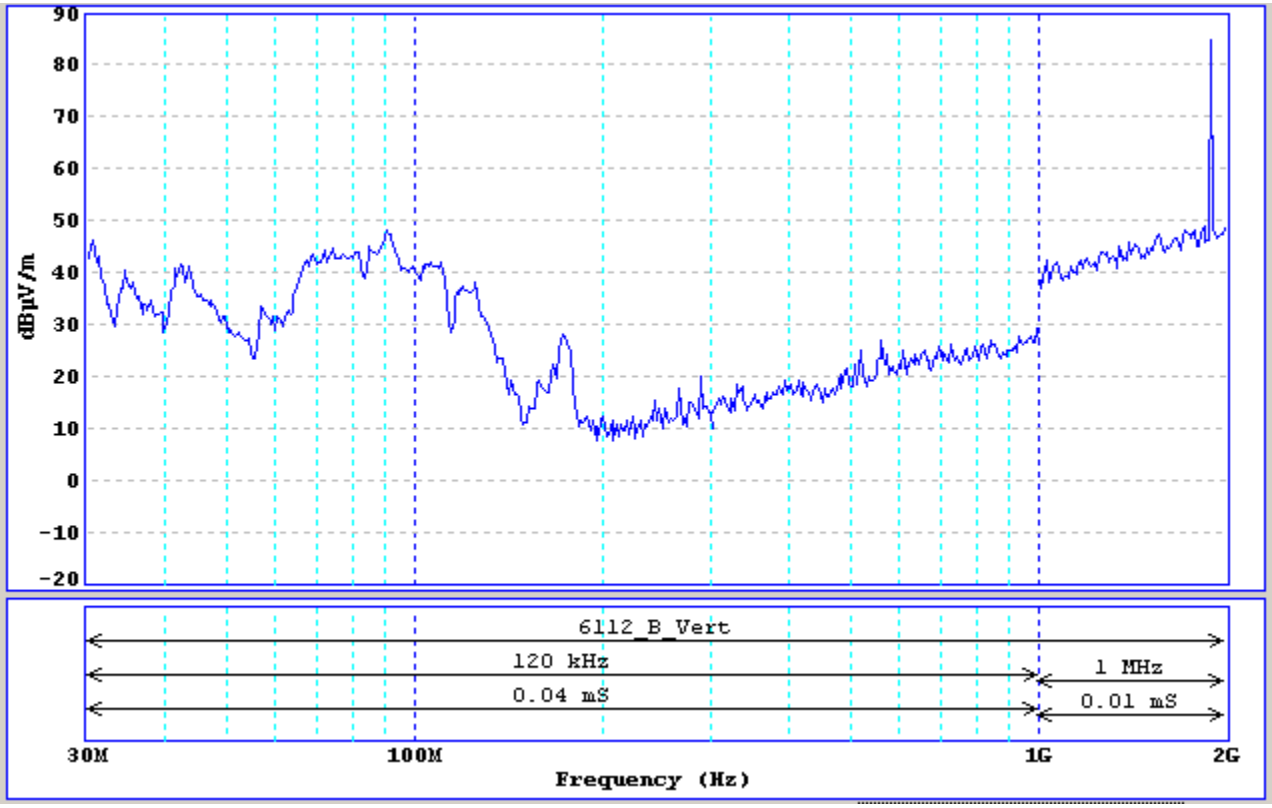
2.6.5.4. HORIZONTAL 270 DEGREES

Model:	AT498
Scan Polarization:	Horizontal
Antenna Height:	150cm
Turntable Position:	270 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



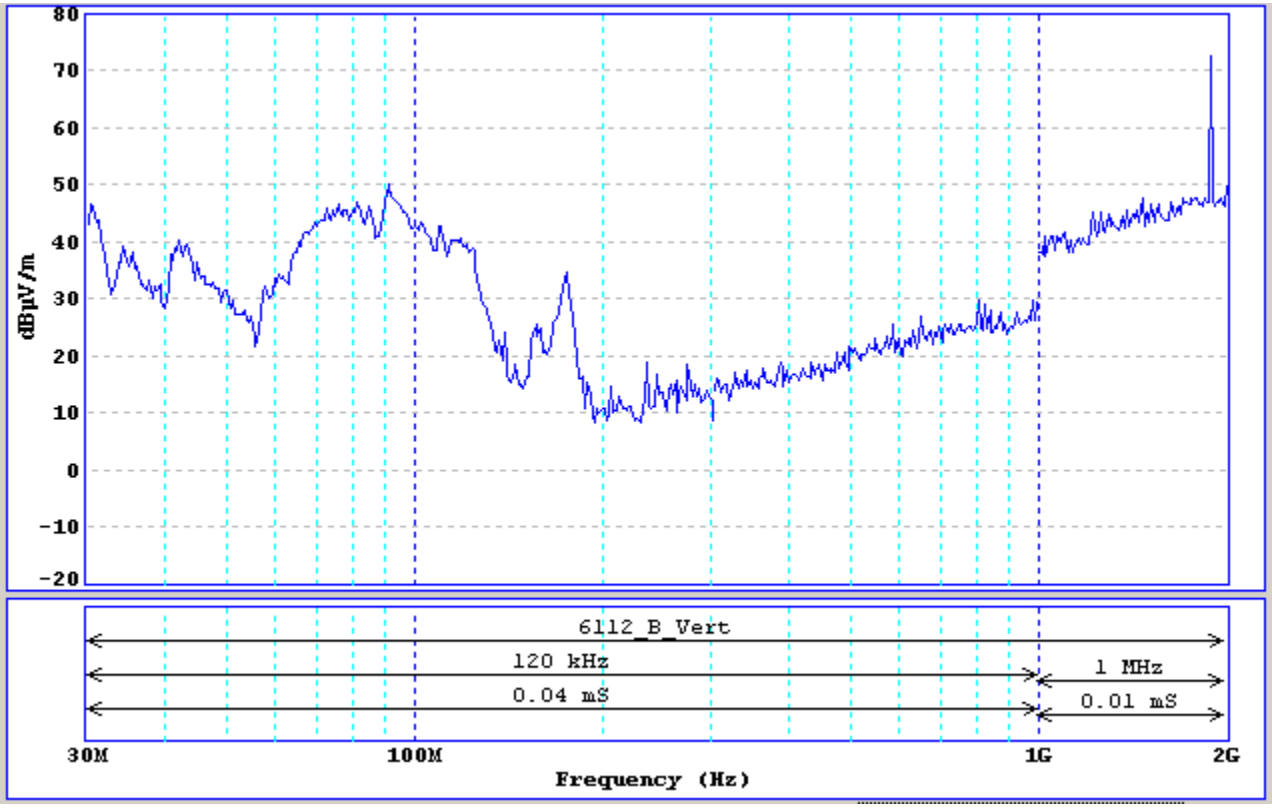
2.6.5.5. VERTICAL 0 DEGREES

Model:	AT498
Scan Polarization:	Vertical
Antenna Height:	150cm
Turntable Position:	0 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



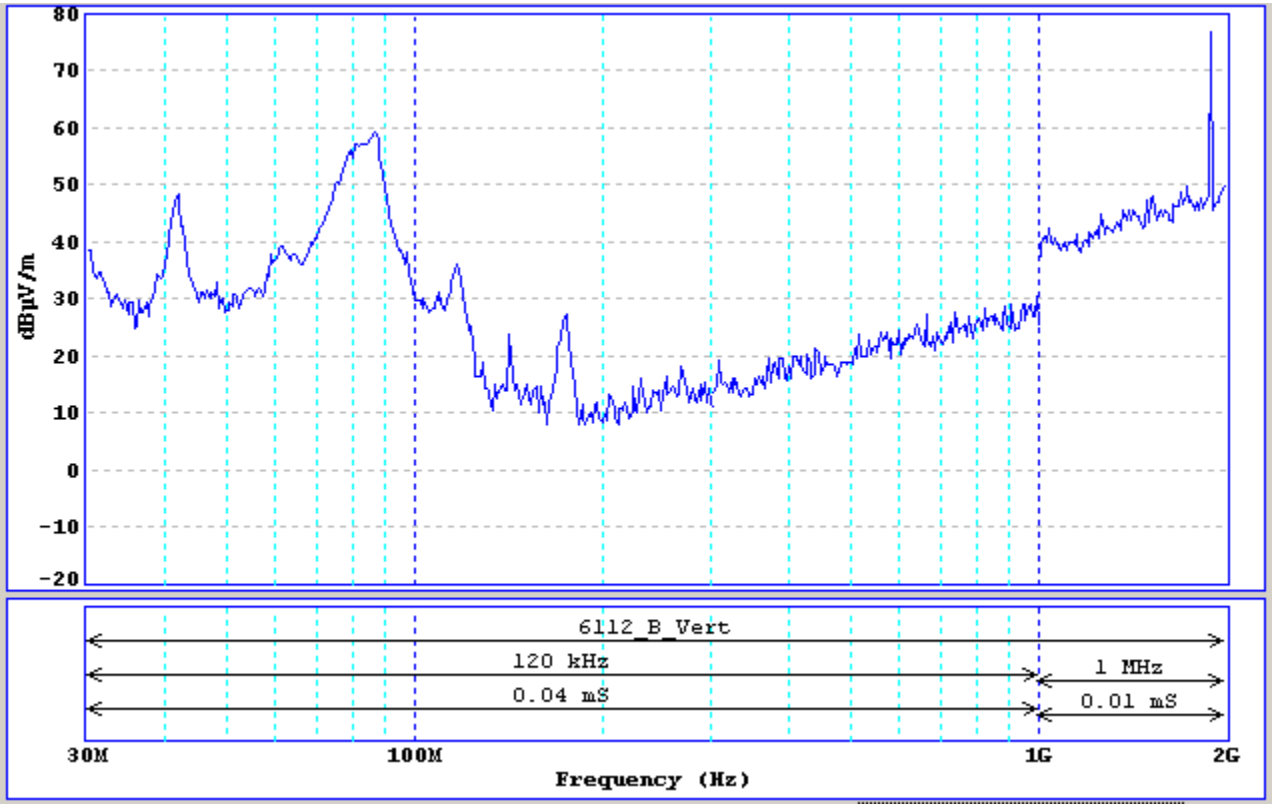
2.6.5.6. VERTICAL 90 DEGREES

Model:	AT498
Scan Polarization:	Vertical
Antenna Height:	150cm
Turntable Position:	90 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



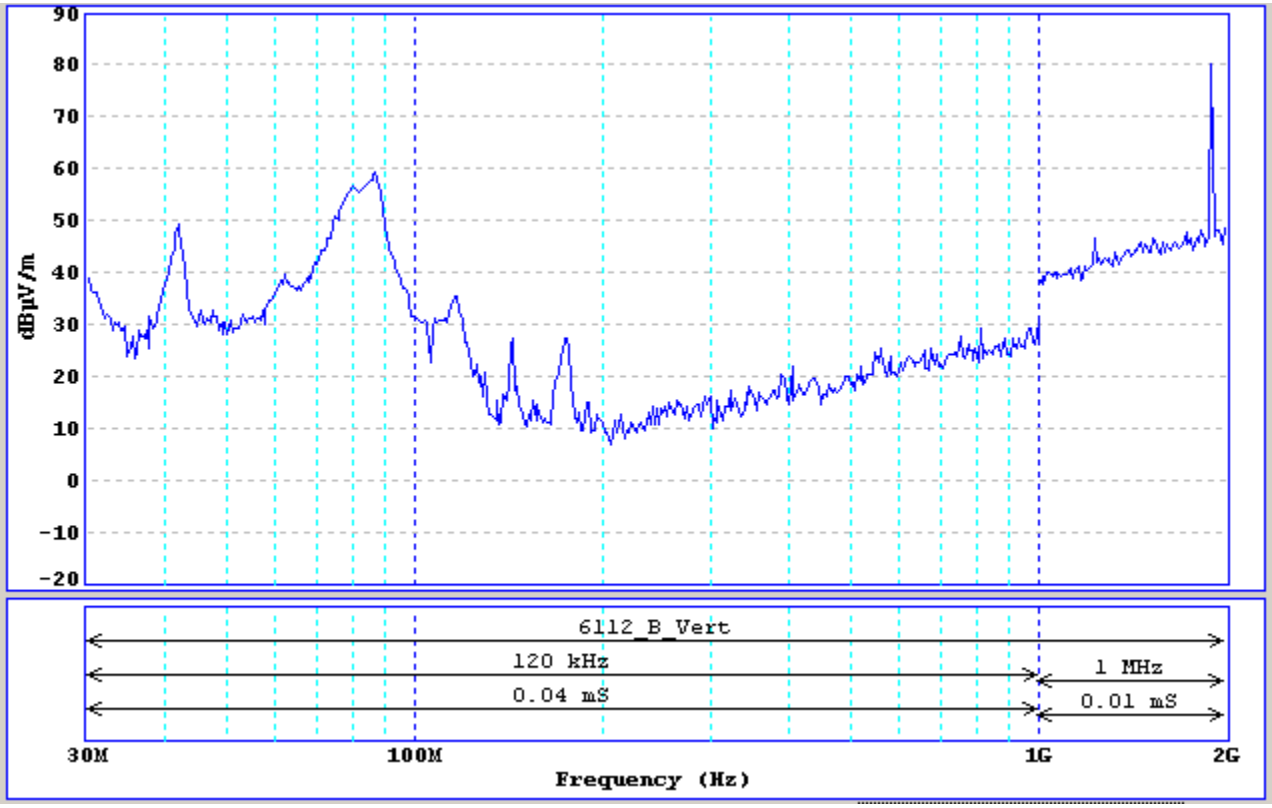
2.6.5.7. VERTICAL 180 DEGREES

Model:	AT498
Scan Polarization:	Vertical
Antenna Height:	150cm
Turntable Position:	180 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



2.6.5.8. VERTICAL 270 DEGREES

Model:	AT498
Scan Polarization:	Vertical
Antenna Height:	150cm
Turntable Position:	270 degrees
Detector Type:	Peak
Voltage Supply:	13.8 VDC



2.6.5.9. HARMONIC EMISSIONS 1GHz – 10GHz (824MHz)

Test Type:	Field Strength of Radiated Emissions
FCC Para No.:	2.1053, 22.917
Frequency	824 MHz
Detector Type	Peak
Voltage Supply	13.8 Vdc
Tested By:	Paul Eberling
Date:	July 8, 2002

Table 2.5.5.9: Harmonic Emissions; 824 MHz

Fundamental: 824

Harmonic	MHz	TT Pos(deg)	Ant Pos(m)	Polar	Ant Corr(dB/m)	Cable Corr(dB)	Rec Sig(dBuV)	Corr Amp(dBuV/m)	Limit(dBuV/m)	Margin(dB)
2nd	1648	119	1.31	H	26.9	2.00	27.8	56.7	82.2	25.5
	1648	157	2.40	V	26.7	2.00	24.2	52.9	82.2	29.3
3rd	2472	0	1.50	H	30.4	2.50	17.2	50.1	82.2	32.1
	2472	0	1.50	V	30.4	2.50	17.2	50.1	82.2	32.1
4th	3296	0	1.50	H	32.8	2.83	25.2	60.8	82.2	21.4
	3296	0	1.50	V	32.6	2.83	25.2	60.6	82.2	21.6
5th	4120	0	1.50	H	34.4	3.34	25.9	63.6	82.2	18.6
	4120	0	1.50	V	34.4	3.34	26.2	63.9	82.2	18.3
6th	4944	0	1.50	H	35.1	3.67	27.2	66.0	82.2	16.2
	4944	0	1.50	V	35.3	3.67	26.5	65.5	82.2	16.7
7th	5768	0	1.50	H	36.9	3.83	27.1	67.8	82.2	14.4
	5768	0	1.50	V	36.9	3.83	27.1	67.8	82.2	14.4
8th	6592	0	1.50	H	36.3	4.00	26.9	67.2	82.2	15.0
	6592	0	1.50	V	36.3	4.00	27.2	67.5	82.2	14.7
9th	7416	0	1.50	H	38	4.34	30.6	72.9	82.2	9.3
	7416	0	1.50	V	38	4.34	29.6	71.9	82.2	10.3
10th	8240	0	1.50	H	37.7	4.84	29.1	71.6	82.2	10.6
	8240	0	1.50	V	37.5	4.84	30.3	72.6	82.2	9.6

2.6.5.10. HARMONIC EMISSIONS 1GHz – 10GHz (836.5MHz)

Test Type:	Field Strength of Radiated Emissions
FCC Para No.:	2.1053, 22.917
Frequency	836.5 MHz
Detector Type	Peak
Voltage Supply	13.8 Vdc
Tested By:	Paul Eberling
Date:	July 8, 2002

Table 2.5.5.10:Harmonic Emissions; 836.5 MHz

Fundamental: 836

Harmonic	MHz	TT Pos(deg)	Ant Pos(m)	Polar	Ant Corr(dB/m)	Cable Corr(dB)	Rec Sig(dBuV)	Corr Amp(dBuV/m)	Limit(dBuV/m)	Margin(dB)
2nd	1672	114.8	1.21	H	26.9	2.00	30.8	59.7	82.2	22.5
	1672	48.8	1.36	V	26.7	2.00	31.6	60.3	82.2	21.9
3rd	2508	0	1.50	H	30.4	2.50	17.6	50.5	82.2	31.7
	2508	0	1.50	V	30.4	2.50	17.4	50.3	82.2	31.9
4th	3344	0	1.50	H	32.8	2.83	26.0	61.6	82.2	20.6
	3344	0	1.50	V	32.6	2.83	26.5	61.9	82.2	20.3
5th	4180	0	1.50	H	34.4	3.34	26.0	63.7	82.2	18.5
	4180	0	1.50	V	34.4	3.34	25.6	63.3	82.2	18.9
6th	5016	0	1.50	H	35.1	3.67	25.6	64.4	82.2	17.8
	5016	0	1.50	V	35.3	3.67	25.3	64.3	82.2	17.9
7th	5852	0	1.50	H	36.9	3.83	26.0	66.7	82.2	15.5
	5852	0	1.50	V	36.9	3.83	26.3	67.0	82.2	15.2
8th	6688	0	1.50	H	36.3	4.00	26.2	66.5	82.2	15.7
	6688	0	1.50	V	36.3	4.00	26.3	66.6	82.2	15.6
9th	7524	0	1.50	H	38	4.34	28.4	70.7	82.2	11.5
	7524	0	1.50	V	38	4.34	28.2	70.5	82.2	11.7
10th	8360	0	1.50	H	37.7	4.84	28.5	71.0	82.2	11.2
	8360	0	1.50	V	37.5	4.84	28.3	70.6	82.2	11.6

2.6.5.11. HARMONIC EMISSIONS 1GHz – 10GHz (849MHz)

Test Type:	Field Strength of Radiated Emissions
FCC Para No.:	2.1053, 22.917
Frequency	849 MHz
Detector Type	Peak
Voltage Supply	13.8 Vdc
Tested By:	Paul Eberling
Date:	July 8, 2002

Table 2.5.5.11: Harmonic Emissions; 849 MHz

Fundamental: 849

Harmonic	MHz	TT Pos(deg)	Ant Pos(m)	Polar	Ant Corr(dB/m)	Cable Corr(dB)	Rec Sig(dBuV)	Corr Amp(dBuV/m)	Limit(dBuV/m)	Margin(dB)
2nd	1698	192	2.31	H	26.9	2.00	23.4	52.3	82.2	29.9
	1698	203	1.94	V	26.7	2.00	22.7	51.4	82.2	30.8
3rd	2547	0	1.50	H	30.4	2.50	18.4	51.3	82.2	30.9
	2547	0	1.50	V	30.4	2.50	17.4	50.3	82.2	31.9
4th	3396	0	1.50	H	32.8	2.83	26.4	62.0	82.2	20.2
	3396	0	1.50	V	32.6	2.83	27.5	62.9	82.2	19.3
5th	4245	0	1.50	H	34.4	3.34	27.4	65.1	82.2	17.1
	4245	0	1.50	V	34.4	3.34	27.3	65.0	82.2	17.2
6th	5094	0	1.50	H	35.1	3.67	27.7	66.5	82.2	15.7
	5094	0	1.50	V	35.3	3.67	27.6	66.6	82.2	15.6
7th	5943	0	1.50	H	36.9	3.83	27.6	68.3	82.2	13.9
	5943	0	1.50	V	36.9	3.83	27.2	67.9	82.2	14.3
8th	6792	0	1.50	H	36.3	4.00	29.6	69.9	82.2	12.3
	6792	0	1.50	V	36.3	4.00	30.0	70.3	82.2	11.9
9th	7641	0	1.50	H	38	4.34	30.9	73.2	82.2	9.0
	7641	0	1.50	V	38	4.34	30.8	73.1	82.2	9.1
10th	8490	0	1.50	H	37.7	4.84	30.4	72.9	82.2	9.3
	8490	0	1.50	V	37.5	4.84	30.2	72.5	82.2	9.7

2.6.5.12. HARMONIC EMISSIONS 1GHz – 10GHz (1850MHz)

Test Type:	Field Strength of Radiated Emissions
FCC Para No.:	2.1053, 24.238
Frequency	1850 MHz
Detector Type	Peak
Voltage Supply	13.8 Vdc
Tested By:	Paul Eberling
Date:	July 8, 2002

Table 2.5.5.12: Harmonic Emissions; 1850 MHz

Harmonic	MHz	TT Pos(deg)	Ant Pos(m)	Polar	Ant Corr(dB/m)	Cable Corr(dB)	Rec Sig(dBuV)	Corr Amp(dBuV/m)	Limit(dBuV/m)	Margin(dB)
2nd	3700	0	1.50	H	32.8	3.00	28.2	64.0	82.2	18.2
	3700	0	1.50	V	32.6	3.00	27.6	63.2	82.2	19.0
3rd	5550	0	1.50	H	36.2	3.83	27.2	67.2	82.2	15.0
	5550	0	1.50	V	35.9	3.83	27.0	66.7	82.2	15.5
4th	7400	0	1.50	H	38.0	4.67	29.8	72.5	82.2	9.7
	7400	0	1.50	V	38.0	4.67	30.4	73.1	82.2	9.1
5th	9250	0	1.50	H	40.0	5.00	29.8	74.8	82.2	7.4
	9250	0	1.50	V	40.0	5.00	29.8	74.8	82.2	7.4
6th	11100	0	1.50	H	39.7	5.50	29.3	74.5	82.2	7.7
	11100	0	1.50	V	40.1	5.50	29.7	75.3	82.2	6.9
7th	12950	0	1.50	H	40.4	6.10	31.5	78.0	82.2	4.2
	12950	0	1.50	V	40.7	6.10	30.8	77.6	82.2	4.6
8th	14800	0	1.50	H	42.6	6.30	32.7	81.6	82.2	0.6
	14800	0	1.50	V	42.7	6.30	32.7	81.7	82.2	0.5
9th	16650	0	1.50	H	40.8	6.70	32.1	79.6	82.2	2.6
	16650	0	1.50	V	40.5	6.70	32.1	79.3	82.2	2.9
10th	18500	0	1.50	H	42.1	7.20	32.5	81.8	82.2	0.4
	18500	0	1.50	V	42.0	7.20	32.5	81.7	82.2	0.5

2.6.5.13. HARMONIC EMISSIONS 1GHz – 10GHz (1880MHz)

Test Type:	Field Strength of Radiated Emissions
FCC Para No.:	2.1053, 24.238
Frequency	1880 MHz
Detector Type	Peak
Voltage Supply	13.8 Vdc
Tested By:	Paul Eberling
Date:	July 8, 2002

Table 2.5.5.13: Harmonic Emissions; 1880 MHz

Harmonic	MHz	TT Pos(deg)	Ant Pos(m)	Polar	Ant Corr(dB/m)	Cable Corr(dB)	Rec Sig(dBuV)	Corr Amp(dBuV/m)	Limit(dBuV/m)	Margin(dB)
2nd	3760	0	1.50	H	32.8	3.00	28.8	64.6	82.2	17.6
	3760	0	1.50	V	32.6	3.00	28.0	63.6	82.2	18.6
3rd	5640	0	1.50	H	36.2	3.83	27.7	67.7	82.2	14.5
	5640	0	1.50	V	35.9	3.83	27.0	66.7	82.2	15.5
4th	7520	0	1.50	H	38.0	4.67	30.2	72.9	82.2	9.3
	7520	0	1.50	V	38.0	4.67	29.7	72.4	82.2	9.8
5th	9400	0	1.50	H	40.0	5.00	28.9	73.9	82.2	8.3
	9400	0	1.50	V	40.0	5.00	29.2	74.2	82.2	8.0
6th	11280	0	1.50	H	39.7	5.50	29.7	74.9	82.2	7.3
	11280	0	1.50	V	40.1	5.50	29.2	74.8	82.2	7.4
7th	13160	0	1.50	H	40.4	6.10	31.4	77.9	82.2	4.3
	13160	0	1.50	V	40.7	6.10	30.8	77.6	82.2	4.6
8th	15040	0	1.50	H	42.6	6.30	31.6	80.5	82.2	1.7
	15040	0	1.50	V	42.7	6.30	32.1	81.1	82.2	1.1
9th	16920	0	1.50	H	40.8	6.70	32.9	80.4	82.2	1.8
	16920	0	1.50	V	40.5	6.70	32.5	79.7	82.2	2.5
10th	18800	0	1.50	H	42.1	7.20	31.7	81.0	82.2	1.2
	18800	0	1.50	V	42.0	7.20	31.3	80.5	82.2	1.7

2.6.5.14. HARMONIC EMISSIONS 1GHz – 10GHz (1910MHz)

Test Type:	Field Strength of Radiated Emissions
FCC Para No.:	2.1053, 24.238
Frequency	1910 MHz
Detector Type	Peak
Voltage Supply	13.8 Vdc
Tested By:	Paul Eberling
Date:	July 8, 2002

Table 2.5.5.13: Harmonic Emissions; 1910 MHz

Harmonic	MHz	TT Pos(deg)	Ant Pos(m)	Polar	Ant Corr(dB/m)	Cable Corr(dB)	Rec Sig(dBuV)	Corr Amp(dBuV/m)	Limit(dBuV/m)	Margin(dB)
2nd	3820	0	1.50	H	32.8	3.00	27.3	63.1	82.2	19.1
	3820	0	1.50	V	32.6	3.00	27.4	63.0	82.2	19.2
3rd	5730	0	1.50	H	36.2	3.83	27.0	67.0	82.2	15.2
	5730	0	1.50	V	35.9	3.83	26.9	66.6	82.2	15.6
4th	7640	0	1.50	H	38.0	4.67	30.3	73.0	82.2	9.2
	7640	0	1.50	V	38.0	4.67	30.6	73.3	82.2	8.9
5th	9550	0	1.50	H	40.0	5.00	29.8	74.8	82.2	7.4
	9550	0	1.50	V	40.0	5.00	29.8	74.8	82.2	7.4
6th	11460	0	1.50	H	39.7	5.50	30.0	75.2	82.2	7.0
	11460	0	1.50	V	40.1	5.50	29.9	75.5	82.2	6.7
7th	13370	0	1.50	H	40.4	6.10	32.9	79.4	82.2	2.8
	13370	0	1.50	V	40.7	6.10	32.8	79.6	82.2	2.6
8th	15280	0	1.50	H	42.6	6.30	32.7	81.6	82.2	0.6
	15280	0	1.50	V	42.7	6.30	32.8	81.8	82.2	0.4
9th	17190	0	1.50	H	40.8	6.70	32.4	79.9	82.2	2.3
	17190	0	1.50	V	40.5	6.70	32.3	79.5	82.2	2.7
10th	19100	0	1.50	H	42.1	7.20	31.5	80.8	82.2	1.4
	19100	0	1.50	V	42.0	7.20	31.5	80.7	82.2	1.5

3. APPENDIX A: TEST SET-UP DIAGRAMS

Figure A-1: Set-up for Output Power, MASK and Conducted Emissions Testing

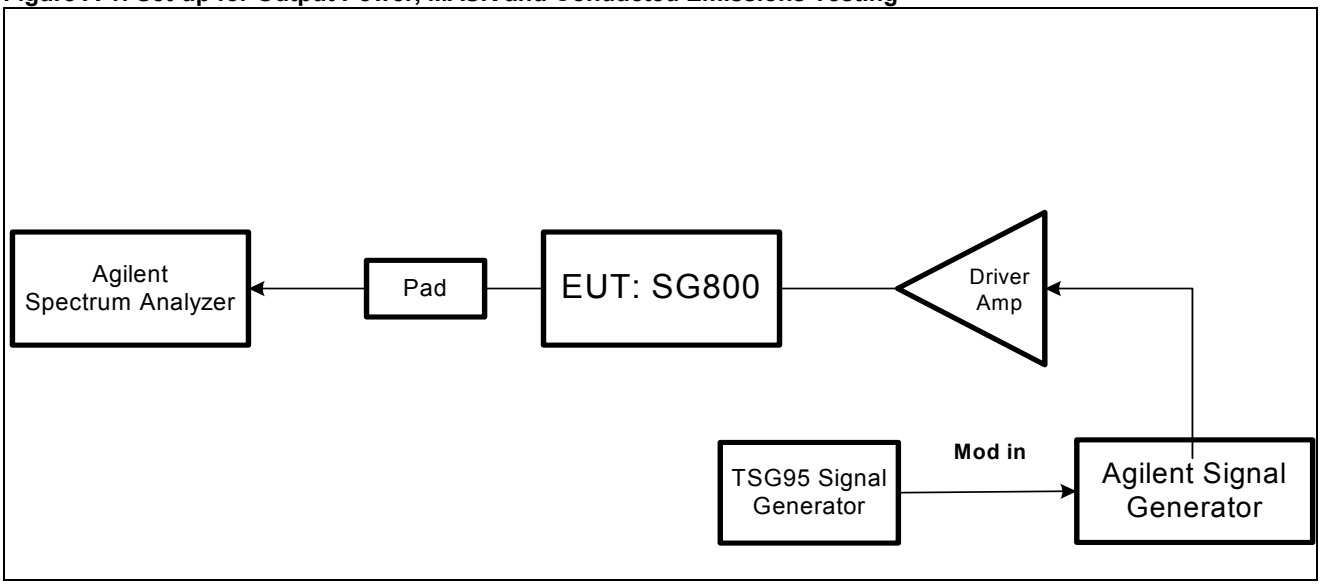


Figure A-2: Set-up for CDMA Occupied Bandwidth Test

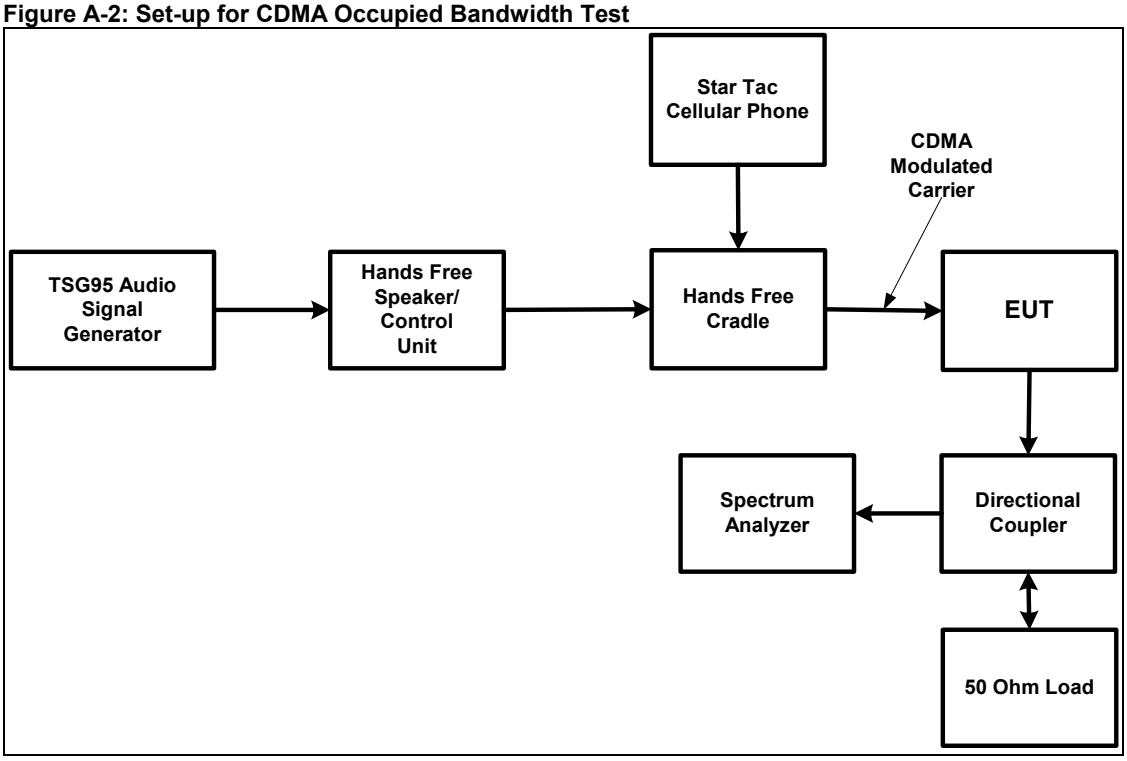
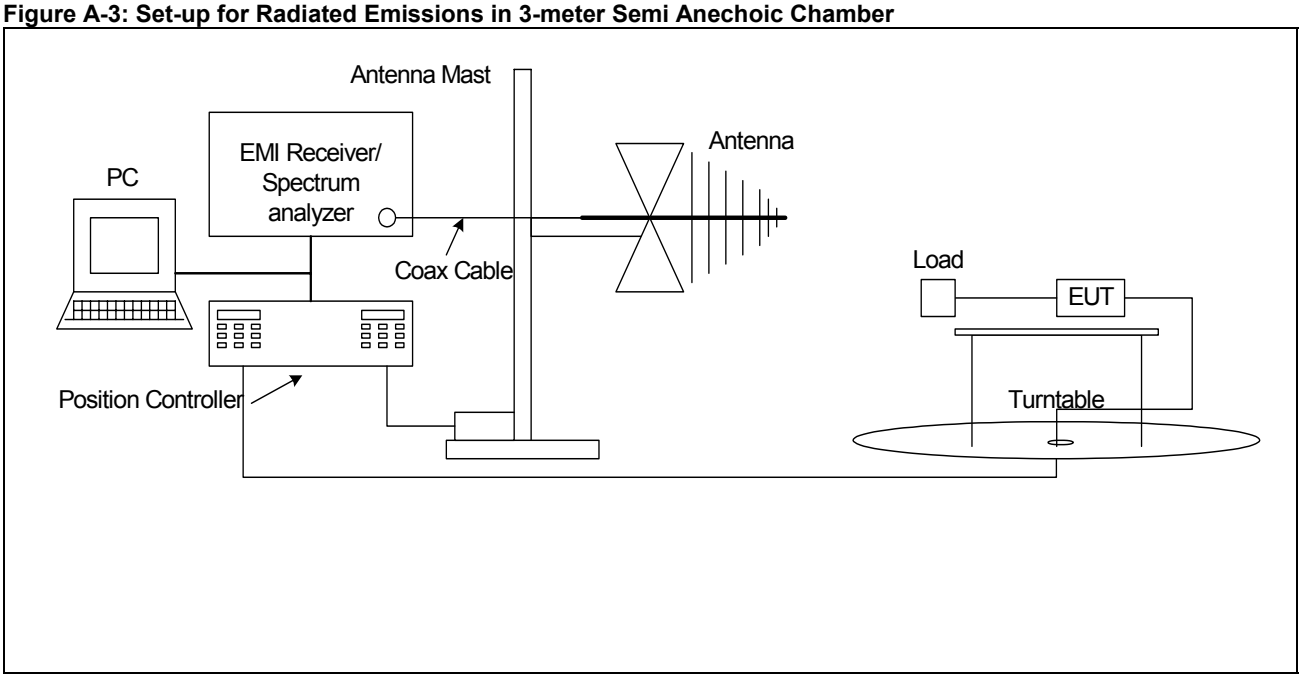
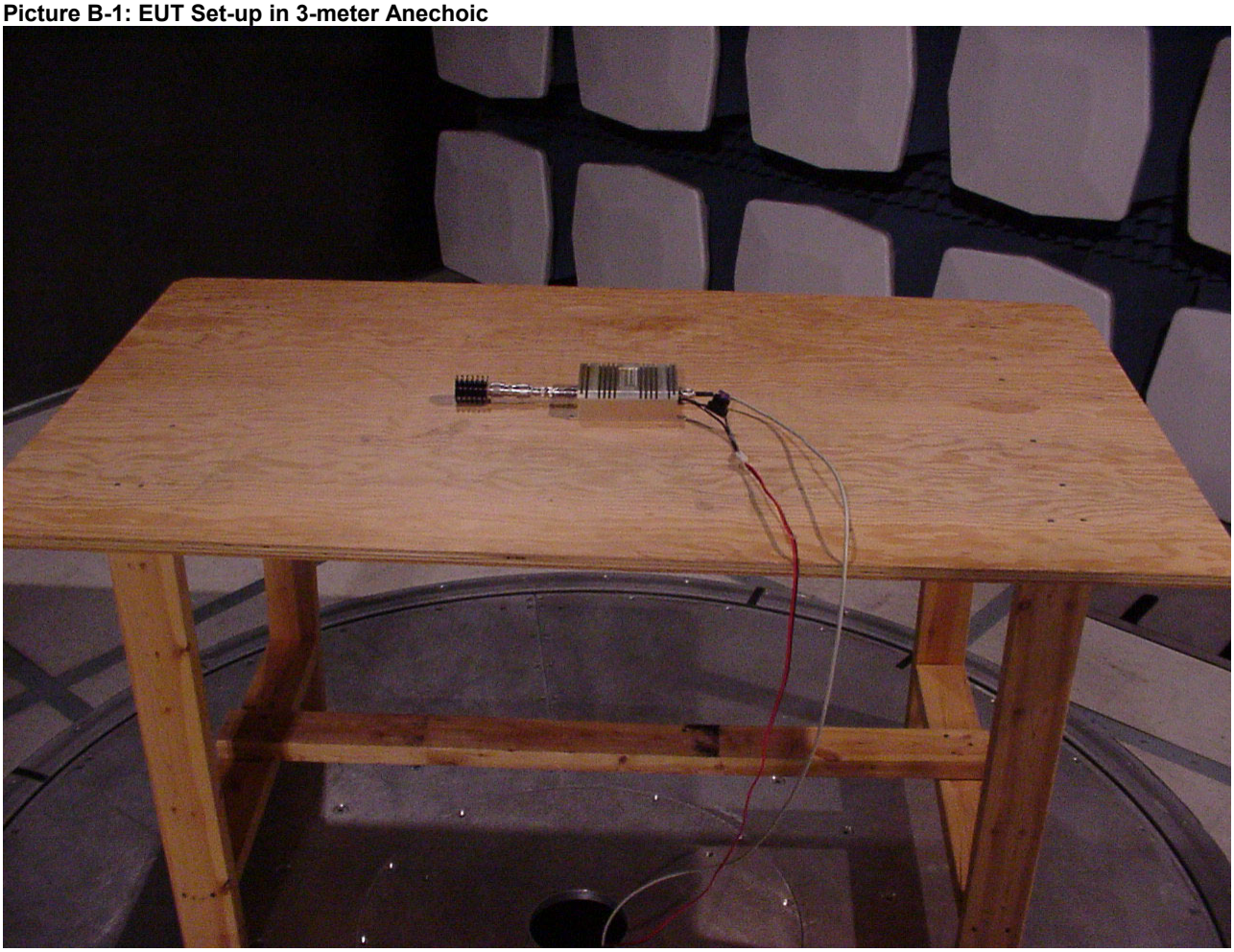


Figure A-3: Set-up for Radiated Emissions in 3-meter Semi Anechoic Chamber

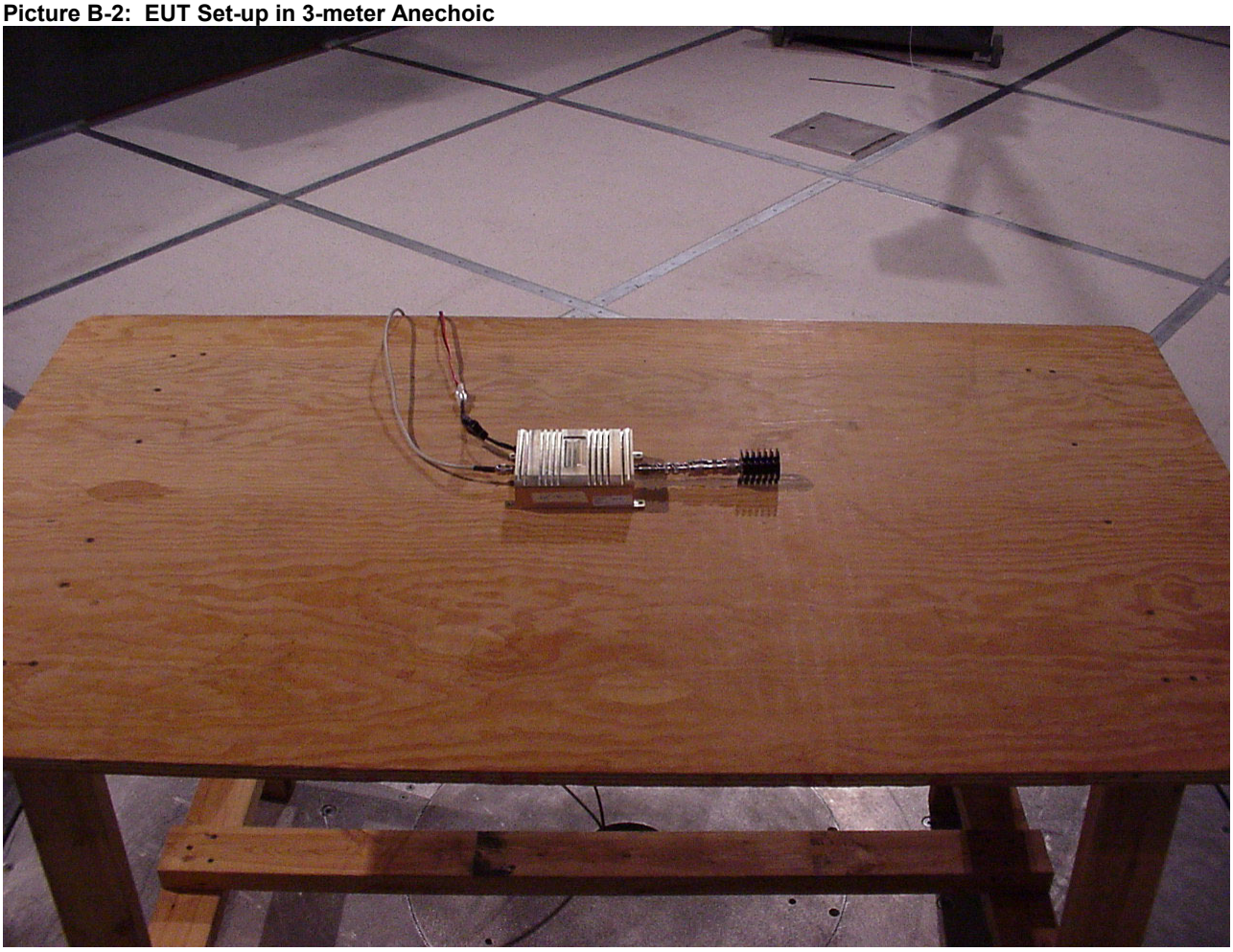


4. APPENDIX B: PICTURES OF EUT

Picture B-1: EUT Set-up in 3-meter Anechoic



Picture B-2: EUT Set-up in 3-meter Anechoic



Picture B-3: EUT Set-up for Bench Top, Conducted Emissions, Power Output Testing.