

**Addendum Test Report  
to the report #30392832, 03/28/03**

**Report Number: 30748873  
Project Number: 3074887  
April 29, 2005**

Testing performed on the

**Hiper XT with UHF, GMS and Bluetooth modules  
Model Number: 01-860801-03  
FCC ID: LCB-860801  
to  
FCC Part 15 Subpart C**

for  
**Topcon Positioning Systems, Inc.**



A2LA Certificate Number: 1755-01

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## 1.0 Introduction

This report is intended to show of compliance of the Hiper XT, model **01-860801-03** to the requirements of FCC Part 15.247 Specification.

As declared by the Applicant, the Bluetooth module with integrated antenna, used in the model **01-860801-03**, is identical (unmodified) to the module used in the Hiper+, Model: 01-840801-01, which has been certified (FCC ID: LCB-840801). Therefore, the following test results from the original Application are applicable to the model **01-860801-03**:

TEST	REFERENCE	RESULTS
Output Power, EIRP	15.247(b)(1)	Complies
20 dB Bandwidth	15.247(a)(1)	Complies
Min. Channel Separation	15.247(a)(1)	Complies
Min. Hopping Channels	15.247(a)(1)	Complies
Average Channel Occupancy Time	15.47(a)(1)	Complies
Out-of-band Antenna Conducted Emission	15.247(c)	Complies

Since the Bluetooth module is installed in a new host, the only following tests have been performed:

- radiated emissions in the restricted bands,
- AC line-conducted emissions.

## 2.0 Summary of Tests

TEST	REFERENCE	RESULTS
Radiated Emission in Restricted Bands	15.247(c), 15.205	Complies
AC Conducted Emission	15.207	Complies

### 3.0 General Description

#### 3.1 Product Description

The Equipment under Test (EUT), model: 01-860801-03 is a dual-frequency GPS+ receiver with UHF modem, GSM module, and Bluetooth module

##### Overview of the Bluetooth module

<b>Manufacturer &amp; Model of Spread Spectrum Module</b>	USI Bluetooth Module, UB1-1111
<b>Type of Transmission</b>	Spread Spectrum, Frequency Hopping
<b>Rated RF Output</b>	1 mW
<b>Frequency Range</b>	2402-2480 MHz
<b>Number of Channel(s)</b>	79
<b>Modulation Type</b>	GFSK
<b>Data Rate</b>	1 Mbps
<b>Antenna(s) type &amp; Gain</b>	Omnidirectional Dipole, 0.5 dBi
<b>Antenna Requirement</b>	The antenna is a fixed internal module

#### 3.2 Related Submittal(s) Grants

None.

#### 3.3 Test Methodology

Radiated and AC Line conducted emissions measurements were performed according to the procedures in ANSI C63.4 (1992). Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Data Sheet**" of this Application. All other measurements were made in accordance with the procedures described in DA 00-705.

#### 3.4 Test Facility

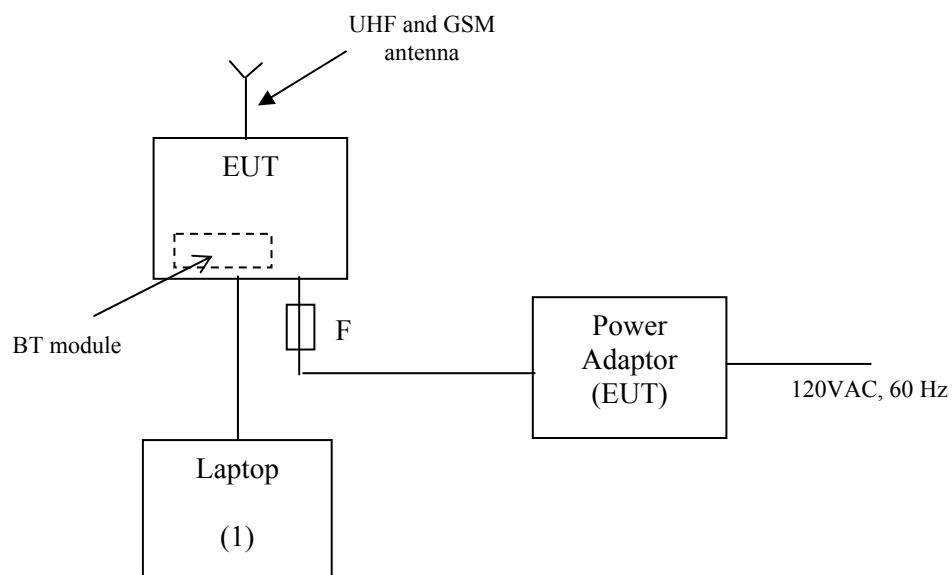
Then radiated emission test site and conducted measurement facility used to collect the data is site 1 located in Menlo Park, California. This test facility and site measurement data have been fully placed on file with the FCC.

## 4.0 System Test Configuration

### 4.1 Support Equipment

Item #	Description	Model No.	Serial No.
1	Compaq Laptop	Armada	7933CY570157

### 4.2 Block Diagram of Test Setup



<b>S</b> = Shielded	<b>F</b> = With Ferrite
<b>U</b> = Unshielded	<b>m</b> = Length in Meters

#### 4.3 Justification

For radiated emission measurements the EUT is placed on a plastic table. The EUT is attached to peripherals and they are connected and operational (as typical as possible). The EUT is wired to transmit full power. During testing, all cables are manipulated to produce worst-case emissions.

#### 4.4 Software Exercise Program

The EUT exercise program used during radiated and conducted testing was “Survey-Pro for Ranger” which exercised the various system components in a manner similar to a typical use.

#### 4.5 Mode of Operation During Test

The EUT was setup in test mode. With hopping disabled, the EUT was setup to transmit continuously at the lowest, middle, and highest channels (frequencies).

#### 4.6 Modifications Required for Compliance

No modifications were installed by Intertek Testing Services during compliance testing in order to bring the product into compliance (Please note that this list does not include changes made specifically by Topcon prior to compliance testing).

## 5.0 Transmitter Radiated Emissions in Restricted Bands

FCC 15.247 (c), 15.205

### 5.1 Procedure

Radiated emission measurements were performed from 30 MHz to 25,000 MHz. Spectrum Analyzer Resolution Bandwidth is 100 kHz or greater for frequencies 30 MHz to 1000 MHz, 1 MHz - for frequencies above 1000 MHz.

The EUT is placed on a plastic turntable. The signal is maximized through rotation. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. All readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance.

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

### 5.2 Field Strength Calculation

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

$$FS = RA + AF + CF - AG$$

Where FS = Field Strength in dB( $\mu$ V/m)

RA = Receiver Amplitude (including preamplifier) in dB( $\mu$ V)

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

Assume a receiver reading of 52.0 dB( $\mu$ V) is obtained. The antennas factor of 7.4 dB(1/m) and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dB( $\mu$ V/m). This value in dB( $\mu$ V/m) was converted to its corresponding level in  $\mu$ V/m.

$$RA = 52.0 \text{ dB}(\mu\text{V})$$

$$AF = 7.4 \text{ dB}(1/\text{m})$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$FS = 52.0 + 7.4 + 1.6 - 29.0 = 32 \text{ dB}(\mu\text{V}/\text{m})$$

$$\text{Level in } \mu\text{V}/\text{m} = \text{Common Antilogarithm } [(32 \text{ dB}\mu\text{V}/\text{m})/20] = 39.8 \mu\text{V}/\text{m}$$

### 5.3 Test Result

<b>Tested By:</b>	DC
<b>Test Date:</b>	April 13, 2005

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

The field strength at the Band-edge frequencies was calculated as  $E_F = E_o - \Delta$ .

Where:

$E_F$  = Field Strength of Band-edge Frequency

$E_o$  = Field Strength of Fundamental Frequency

$\Delta$  = Delta between the levels of emissions at Fundamental Frequency and at Band-edge Frequency

The EUT passed the test by 2.7 dB.

Test Result										
FCC Part 15.247 Radiated Emission in Restricted Bands										
Temperature: 20.5 C						Topcon Positioning Systems Inc.				
Humidity: 43.0 %						Model: 01-860801-03				
Test distance = 1 m										
Test date: April 13, 2005										
Frequency	Polarity	Detector	SA reading	Cable loss	Pre- amp gain	Ant. factor	D.C.F	Field Strength	Limit	Margin
MHz			dB(uV)	dB	dB	dB(1/m)	dB	dB(uV/m)	dB(uV/m)	dB
Tx, @ 2.402 GHz										
4804.0	V	Peak	44.0	5.0	35.8	34.9	-9.5	38.6	74.0	-35.4
4804.0	V	Aver	36.2	5.0	35.8	34.9	-9.5	31.8	54.0	-22.2
Tx, @ 2.440 GHz										
4880.0	V	Peak	46.0	5.0	35.8	34.9	-9.5	40.6	74.0	-33.4
4880.0	V	Aver.	42.0	5.0	35.8	34.9	-9.5	36.6	54.0	-17.4
7320.0	V	Peak	47.8	6.0	35.4	37.7	-9.5	46.6	74.0	-27.4
7320.0	V	Aver	40.3	6.0	35.4	37.7	-9.5	39.1	54.0	-14.9
Tx, @ 2.480 GHz										
4960.0	V	Peak	43.4	5.0	35.8	34.9	-9.5	38.0	74.0	-36.0
4960.0	V	Aver	35.0	5.0	35.8	34.9	-9.5	29.6	54.0	-24.4
7440.0	V	Peak	46.0	6.0	35.4	37.7	-9.5	44.8	74.0	-29.2
7440.0	V	Aver	35.6	6.0	35.4	37.7	-9.5	34.4	54.0	-19.6

- a) RBW = 1 MHz, VBW = 1 MHz - for peak measurements  
 RBW = 1MHz, VBW = 1 KHz - for average measurements
- b) All other emissions not reported are noise floor which is at least 6 dB below the limit

Radiated Emission in Restricted Bands at the band-edge frequencies  
(measured using the “delta” method)

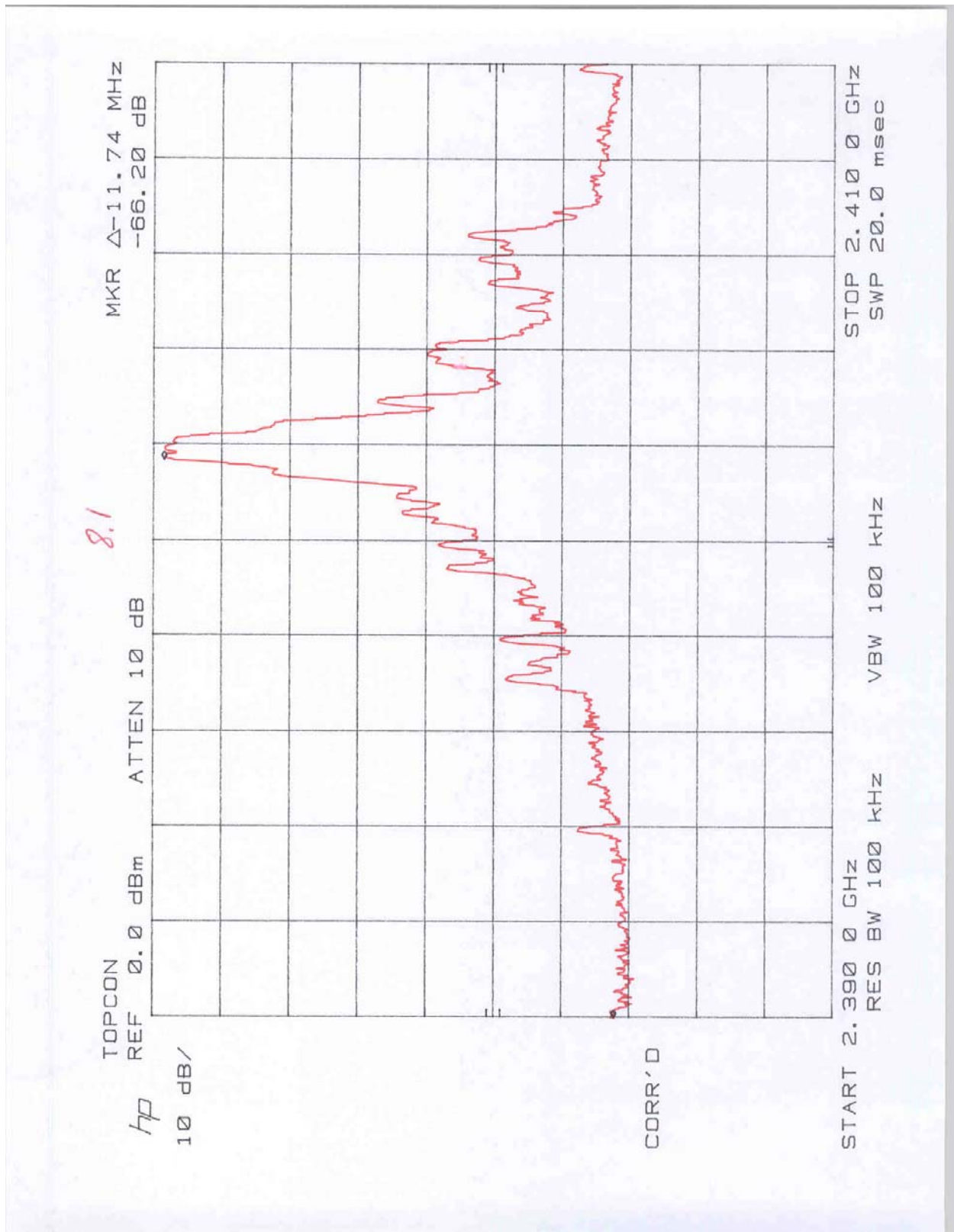
Frequency MHz	Polarity	Detector	SA reading dB(uV)	Cable loss dB	Pre- amp gain dB	Ant. factor dB(1/m )	Field Strength at 3 m dB(uV/m)	Limit at 3 m dB(uV/m)	Margin dB
2402.0	V	Aver.	65.6	4.7	0	30.5	101.5	-	-
2310 -2390							101.5 - 55.8=45.7*	54	-8.3
2480.0	V	Aver.	65.2	4.7	0	30.5	101.2	-	-
2483.5 - 2500							101.2 - 49.9=51.3**	54	-2.7

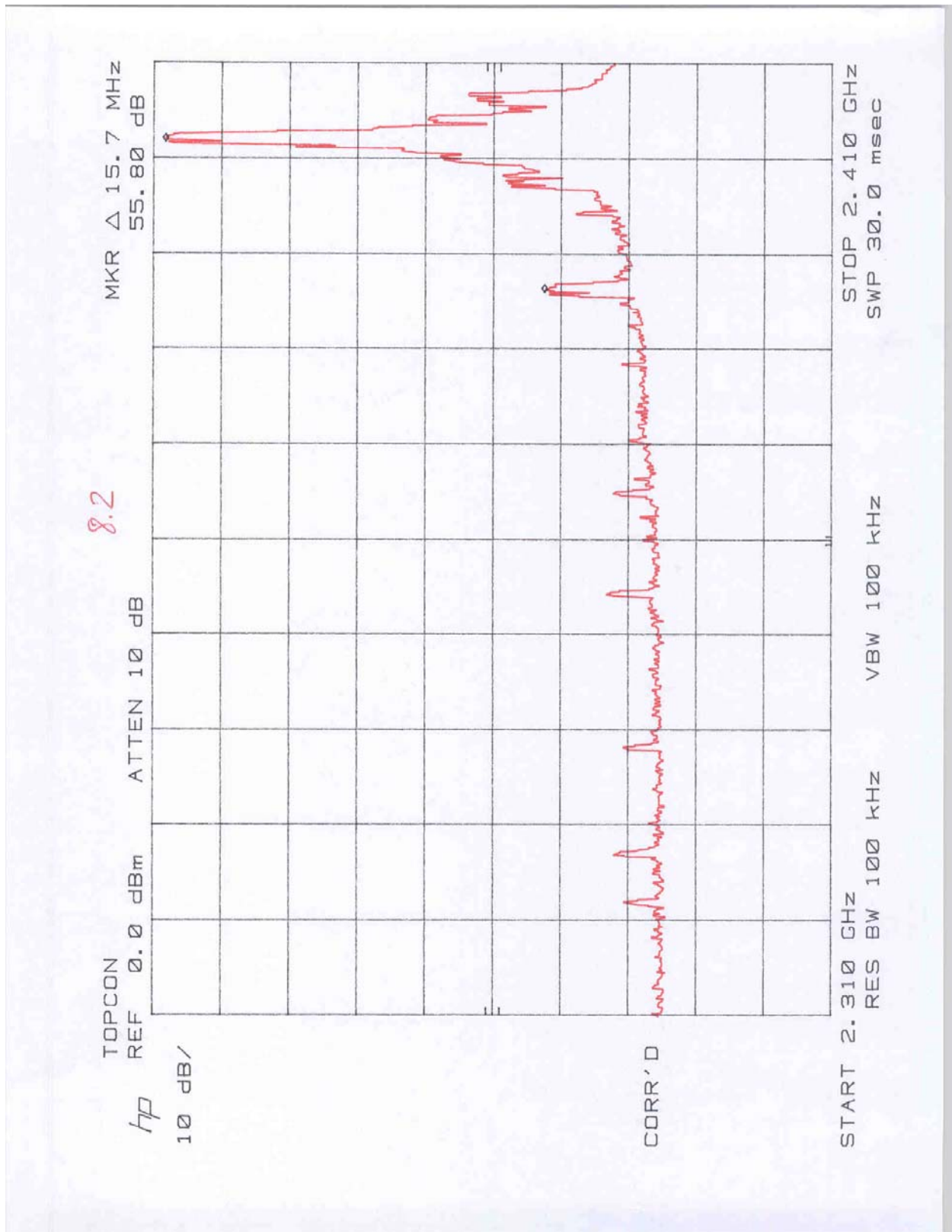
\* delta = 55.8 dB is obtained from plot 8.2

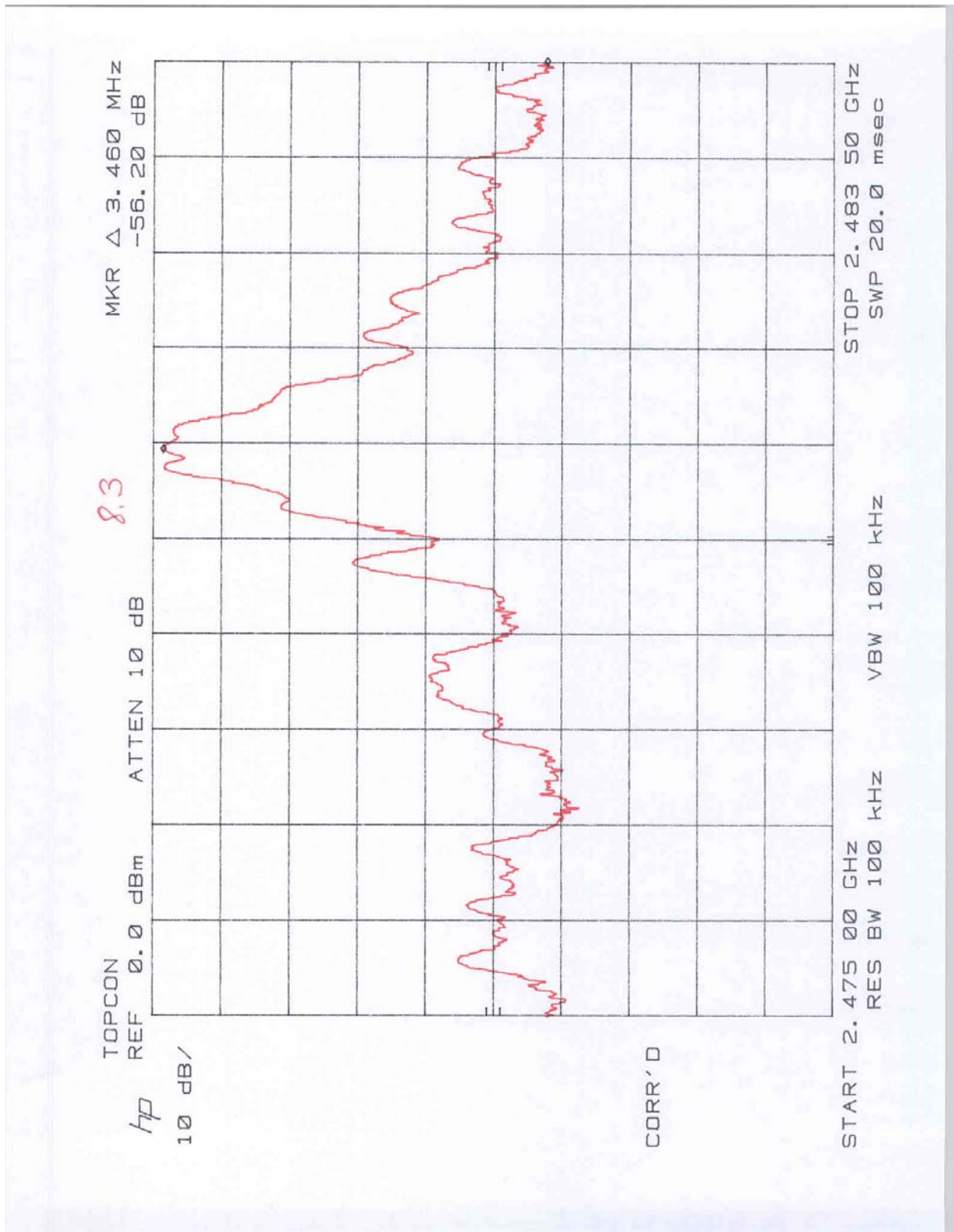
\*\* delta = 49.9 dB is obtained from plot 8.3

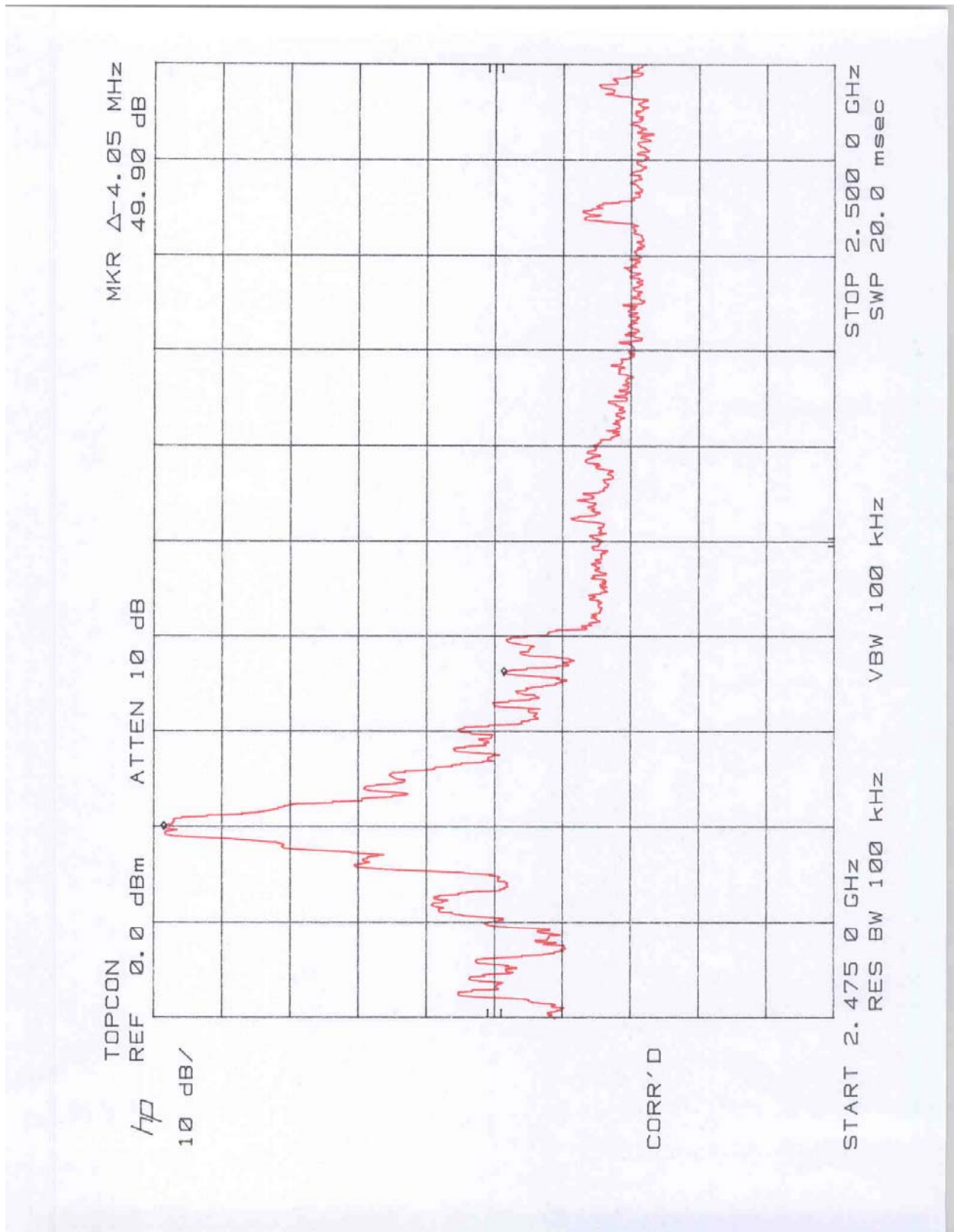
These plots have been extracted from the original test report/application FCC ID: LCB-840801.

Since the peak-to-average ratio is less than 10 dB, the worst-case emissions at the band-edge frequencies is for average detection mode.



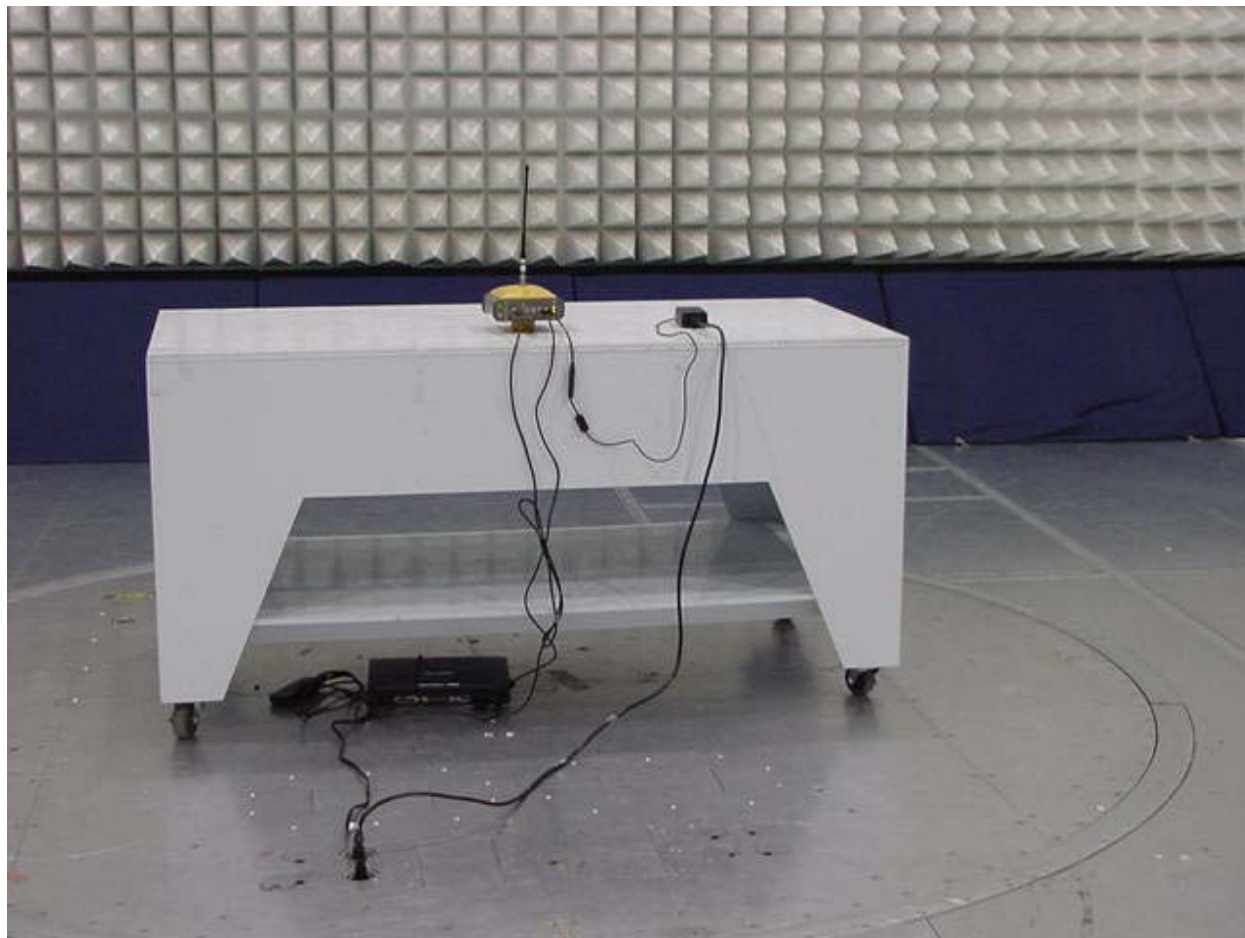






5.4 Configuration Photographs

**Radiated Emission Test Setup**



## 6.0 AC Line Conducted Emission

FCC 15.207:

### 6.1 AC Line Conducted Emission Limits

CISPR 22 Class B AC Line-Conducted Emissions		
Frequency (MHz)	Limits (dB $\mu$ V)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56 decreases linearly with the logarithm of the frequency	56 to 46 decreases linearly with the logarithm of the frequency
0.50 to 5.0	56	46
5 to 30.0	60	50

*Note: The lower limit shall apply at the transition frequency.*

### 6.2 Procedure

AC line conducted emission test was performed according the ANSI C63.4 standard. The EUT was connected to AC Line through the LISNs.

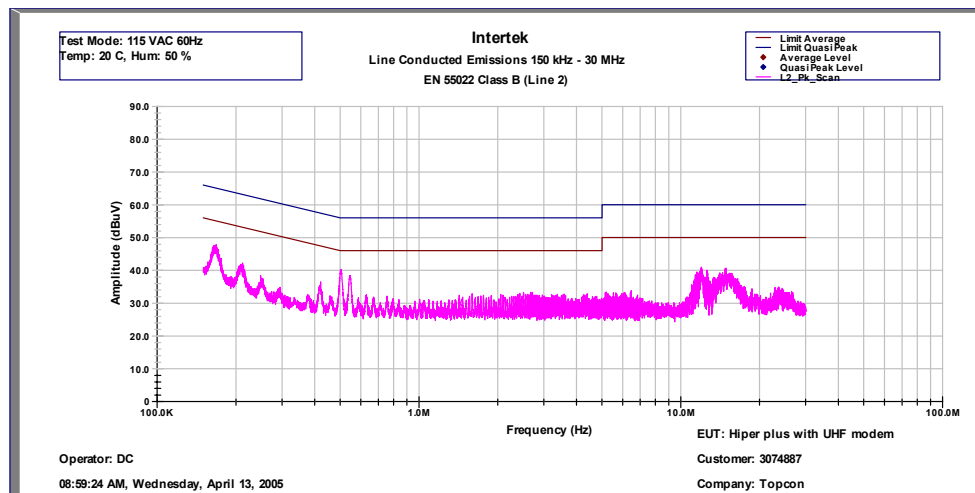
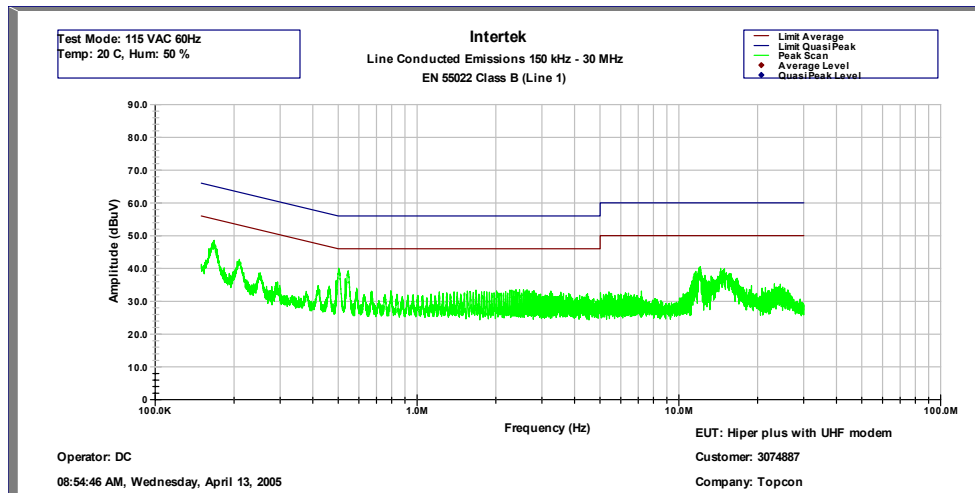
### 6.3 Test Result

<b>Tested By:</b>	DC
<b>Test Date:</b>	April 13, 2005

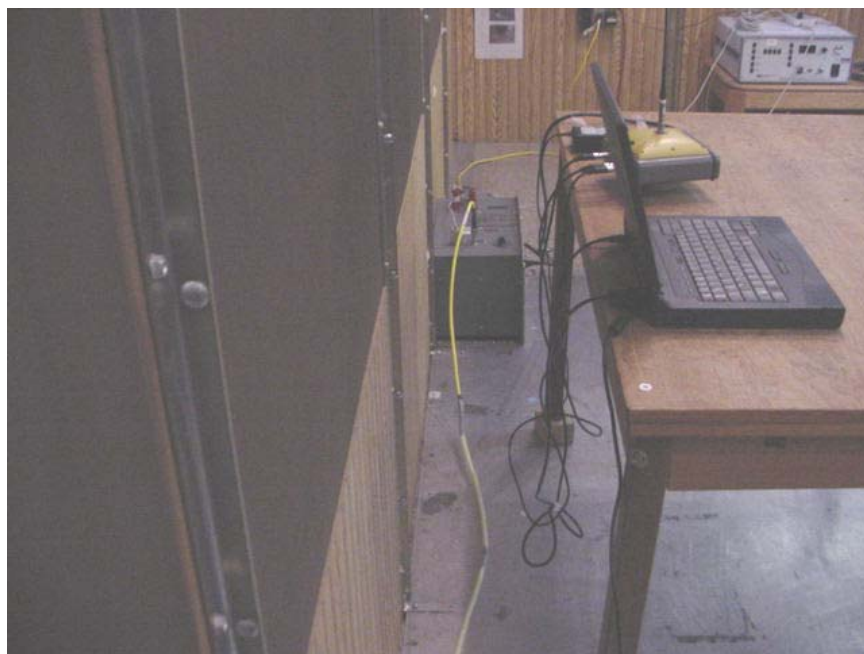
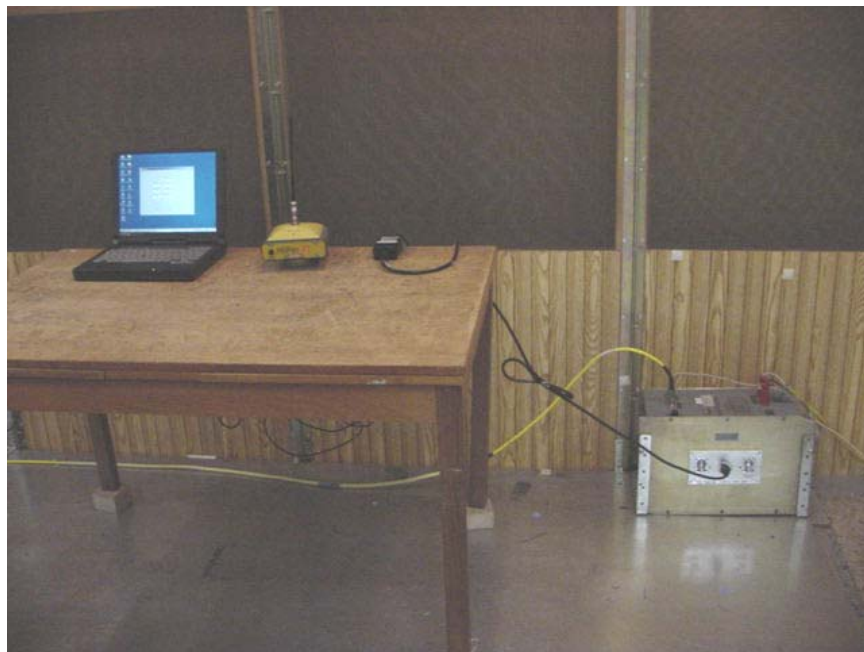
The MAP-HP met the conducted disturbance requirements of CISPR 22 Class B. The test results are located on the following page(s).

A complete scan was made from 0.15 MHz to 30 MHz.

<b>Results:</b>	<b>Complies</b> by 6 dB at 0.5 MHz
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#### 6.4 Test Configuration Photographs



## 7.0 List of Test Equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
BI-Log Antenna	EMCO	3143	9509-1164	12	08/04/05
Horn Antenna	EMCO	3115	9170-3712	12	6/18/05
Horn Antenna	EMCO	3160-09	Not Labeled	#	#
Pre-Amplifier	Sonoma Inst.	310	185634	12	4/25/05
Pre-Amplifier	Miteq	AMF-4D-001180-24-10P	799159	12	4/25/05
Pre-Amplifier	CTT	ALO/400-8023	47526	12	4/25/05
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	9/10/05
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	9/10/05
Spectrum Analyzer	Rohde & Schwarz	FSP40	036612004	12	9/15/05
Spectrum Analyzer w/8650 QP Adapter	Hewlett Packard	8568B	1912A0053 2521A01021	12	12/10/05
LISN	FCC	FCC-LISN-50-50-M-H	2012	12	04/15/05

# No Calibration required

**8.0 Document History**

<b>Revision/ Job Number</b>	<b>Writer Initials</b>	<b>Date</b>	<b>Change</b>
1.0 / 3066809	DC	October 28, 2004	Original document