Tranzeo EMC Labs Inc.
19473 Fraser Way
Pitt Meadows, B.C.
V3Y 2V4

Arcom
Cybertracker
EMC Test Report

6 January 2006

Report Number: TRL060106.1

Bruce Balston, EMC Engineer

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Revision History

Table of Contents

1.0   General Information

1.1   EUT Description

Product Name	Wireless Network Adapter
Company Name	Tranzeo Wireless Technologies inc.
Model No.	TR-5a-NC; TR-5a-19C
Rated RF Output Power	Adjustable, 19 dBm MAX
Frequency Range	806-825 MHZ, 896-902 MHz
Number of Channels	IDEN network specification
Transmit Rate	iDEN network specification
Type of Modulation	QAM modulation
Antenna Type	Integrated, Internal
Antenna Gain	0 dBi Max
Product Software	Custom firmware
Test Software	IO200 RFTester application
Operator Channel Selection	none
Power Adapter	Sunny SYS1298-1812-W2
	Input: AC 100-240V, 50-60 Hz
	Output: DC 12 V, 1500 mA
	Serial: SYS1298-1812

Product samples tested:

Manufacterer	Model No.	Serial No.
Arcom	Cybertracker iDEN	60010071500110246-00006

In the Ports application, the Cyber Tracker will be used to track tractor-trailer trucks as they move around commercial ports. The Cyber Tracker will be placed inside the vehicle as it enters the port and will use an inbuilt GPS module and iDEN modem to wirelessly transmit information regarding the vehicles speed, location, etc. back to an administrator station.

The tests were performed on production sample models to demonstrate compliance with FCC Part 2, and Part 90.

1.2   Operational Description
This information is contained in an attached document.

1.3   EUT Testing Configuration
The EUT was tested in the following modes:

1) Standby/Receive mode: In this mode the EUT beacons at the lowest possible rate while searching for a client with which to establish communication.

2) Continuous Tx mode: In this mode the EUT transmits a constant modulated carrier at the selected frequency.

1.4   EUT Modifications

No modifications were necessary for this unit to comply with FCC Part 2 and Part 90.

1.5   Overview of Test Results

FCC 2.1033(c)(3) USER'S MANUAL
The necessary information is contained in a separate document.

FCC 2.1033 (c)(4) TYPE OF EMISSIONS
FCC 90: 25KW2D

FCC 2.1033 (c)(5) FREQUENCY RANGE
FCC 90: 806-825 MHZ, 896-902 MHz

FCC 2.1033 (c)(6) OPERATING POWER
29 dBm Conducted Output Power

FCC 2.1033 (c)(7) MAXIMUM POWER RATING
20 dBw Conducted Output Power

FCC 2.1033 (c)(8) DC VOLTAGES
The EUT is battery powered.

FCC 2.1033 (c)(9) TUNE-UP PROCEDURE
The necessary information is contained in a separate document.

FCC 2.1033(c)(10) SCHEMATICS AND CIRCUITRY DESCRIPTION
The necessary information is contained in a separate document.

FCC 2.1033(c)(11) LABEL AND PLACEMENT
The necessary information is contained in a separate document.

FCC 2.1033(c)(12) SUBMITTAL PHOTOS
The necessary information is contained in a separate document.

FCC 2.1033 (c)(13) MODULATION INFORMATION
The necessary information is contained in a separate document.

1.6   Test Facilities

19473 Fraser Way
Pitt Meadows, B.C.
V3Y 2V4

Phone: (604) 460-4453
Fax: (604) 460-6005

FCC registration number: 960532
Industry Canada Number: 5238A

1.7   Test Equipment

Manufacturerer	Model	Description	Serial Number	Cal Due Date
Hewlett Packard	85650A	Quasi Peak Adapter	2043A00187	13-Aug-06
Hewlett Packard	8566B	Spectrum Analyzer	2637A04169	7-Feb-06
Hewlett Packard	85685A	Preselector	3010A1095	7-Feb-06
Sunol Sciences	SM46C	Turntable	051204-2	N/R
Sunol Sciences	Custom	Mast Motor	TREML0001	N/R
Sunol Sciences	JB3	Antenna	A042004	05-May-06
Sunol Sciences	DRH-118	Antenna	A052804	02-Jun-06
FCC	FCC-LISN-50-25-2	LISN	105	02-Jun-06
Wavetek	8501	Power Meter	45-00218	27-Jul-06
Wavetek	17266	Power Detector	1509315	27-Jul-06
Hewlett Packard	11970A	Harmonic Mixer	2332A00886	N/R
Hewlett Packard	11975A	Amplifier	2517A00949	N/R
Rohde & Schwarz	FSP40	Spectrum Analyzer	100184	24-Aug-2006
Rohde & Schwarz	NRP-Z22	Power Meter	100055	02-Aug-2006
LR Technologies	SD-302	Environmental Chamber	8826	N/R

1.8   Test System Details

The unit is a stand-alone battery powered device with an integrated antenna. No other auxiliary equipment was used in the test setup.

1.9   Test Results

The Cybertracker complies with FCC Part 90.

2.0   Conducted Emissions

2.1   Test Standard

FCC Part 15 Subpart C Section 15.207a

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

2.2   Test Limits

requency (MHz)	Maximum Level (dBuV) Quasi-Peak	Maximum Level (dBuV) Average
0.15-0.50	66-56 (Log Delta)	56-46 (Log Delta)
0.50-5.00	56	46
5.00-30.0	60	50

2.3   Test Setup

The EUT is exercised using test software. It is configured to transmit a continuously modulated carrier and tested on the lowest, middle and highest frequencies of each frequency band.

Only worst case data is shown below.

2.3.1   Test Setup Block Diagram
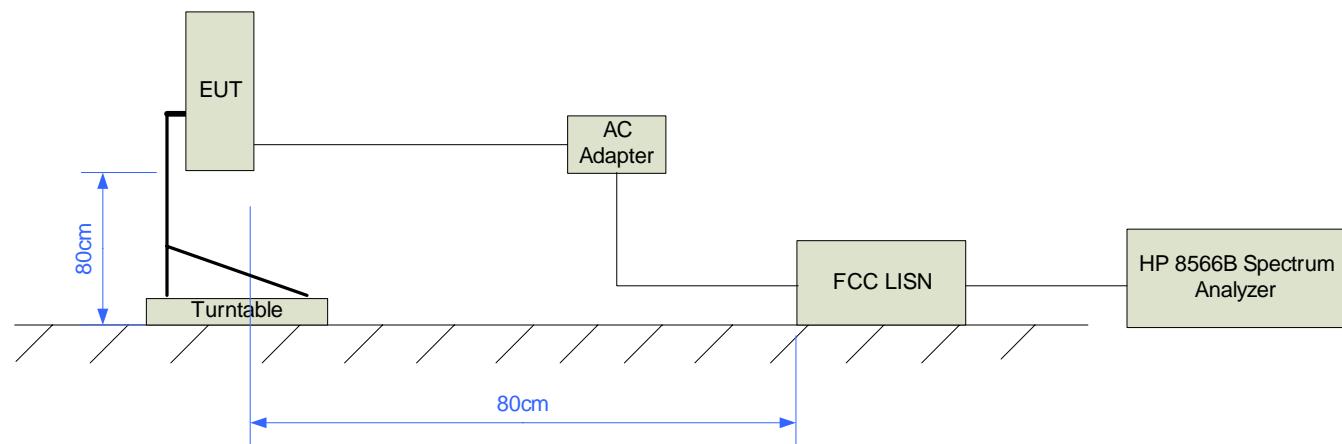
Note: The unused LISN terminal is terminated with a 50 Ohm terminator.

2.4   Test Results

Line

Freq in MHz	Meter dBµV	Factors	Corr	Spec	Margin	RType	Polar
0.174	-3.0	2.0	-1.0	54.8	-55.8	Ave	Line
0.175	55.1	2.0	57.1	64.7	-7.6	Peak	Line
0.204	30.3	2.0	32.3	53.5	-21.2	Ave	Line
0.208	52.8	2.0	54.8	63.3	-8.5	Peak	Line
0.549	43.7	2.0	45.7	46.0	-0.3	Peak	Line
0.551	36.6	2.0	38.6	46.0	-7.4	Ave	Line
0.565	1.8	2.0	3.8	46.0	-42.2	Ave	Line
0.567	42.9	2.0	44.9	46.0	-1.1	Peak	Line
0.676	13.7	2.0	15.7	46.0	-30.3	Ave	Line
0.686	42.9	2.0	44.9	46.0	-1.1	Peak	Line
0.873	43.0	2.0	45.0	46.0	-1.0	Peak	Line
0.876	22.2	2.0	24.2	46.0	-21.8	Ave	Line

Neutral

Freq in MHz	Meter dBµV	Factors	Corr	Spec	Margin	RType	Polar
0.157	-60.0	2.0	-58.0	55.6	-113.6	Ave	Neutral
0.161	60.8	2.0	62.8	65.4	-2.6	Peak	Neutral
0.171	51.6	2.0	53.6	54.9	-1.3	QP	Neutral
0.178	53.5	2.0	55.5	64.6	-9.1	QP	Neutral
0.179	61.1	2.0	63.1	64.5	-1.4	Peak	Neutral
0.181	53.6	2.0	55.6	64.4	-8.8	QP	Neutral
0.182	3.2	2.0	5.2	54.4	-49.2	Ave	Neutral
0.182	3.2	2.0	5.2	54.4	-49.2	Ave	Neutral
0.189	61.1	2.0	63.1	64.5	-1.4	Peak	Neutral
0.197	48.6	2.0	50.6	53.8	-3.2	QP	Neutral
0.199	13.0	2.0	15.0	53.6	-38.6	Ave	Neutral
0.204	52.7	2.0	54.7	63.4	-8.7	Peak	Neutral
0.416	47.3	2.0	49.3	57.5	-8.2	Peak	Neutral
0.417	43.0	2.0	45.0	47.5	-2.5	QP	Neutral
0.421	15.8	2.0	17.8	47.4	-29.6	Ave	Neutral
0.548	43.1	2.0	45.1	46.0	-0.9	Peak	Neutral
0.548	36.9	2.0	38.9	46.0	-7.1	Ave	Neutral
0.549	40.5	2.0	42.5	46.0	-3.5	QP	Neutral

3.0 RF Output Power

3.1 Test Standard

§ 90.635 Limitations on power and antenna height.

(a) The effective radiated power and antenna height for base stations may not exceed 1 kilowatt (30 dBw) and 304 m. (1,000 ft.) above average terrain (AAT), respectively, or the equivalent thereof as determined from the Table. These are maximum values, and applicants will be required to justify power levels and antenna heights requested.

(b) The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

3.2 Test Limits

As a mobile station, the maximum output power of the transmitter is 100 watts

3.3 Test Setup

The EUT is exercised using test software. It is configured to transmit a continuously modulated carrier and tested on the lowest, middle and highest frequencies of each frequency band.

This test is performed with a modified unit. The antenna is disconnected and a cable is connected to the antenna port. The device is then connected directly to the spectrum analyzer using an appropriate attenuator.

3.3.1 Test Setup Block Diagram
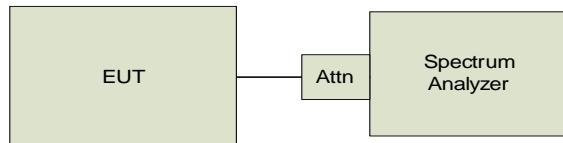
3.4 Test Results

Output Power

Frequency (MHz)	Reading (dBm)	Limit (dBm)	Margin (dB)	Result
806.06	28.77	50	-21.23	PASS
824.99	28.70	50	-21.30	PASS
896.02	28.47	50	-21.53	PASS
901.98	28.72	50	-21.28	PASS

4.0 Field Strength of Spurious Emissions

4.1 Test Standard

90.691 Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 $Log_{10}(f/6.1)$ decibels or $50 + 10 Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

4.2 Test Limits

82.3 dBuV out of band radiated emissions limit (3m).

4.3 Test Setup

The EUT is exercised using test software. It is configured to transmit a continuously modulated carrier and tested on the lowest, middle and highest frequencies of each frequency band. Only worst case data is shown below.

Pretesting at a 1m measurement distance was performed above 1 GHz. The antenna was scanned around all sides of the EUT. Frequencies of interest were identified and final measurements performed at a 3m measurement distance.

Measurements above 1 GHz were taken with RBW, VBW = 1 MHz.

All emissions within 20 dB of the limit were measured using the substitution method.

4.3.1   Test Setup Block Diagram
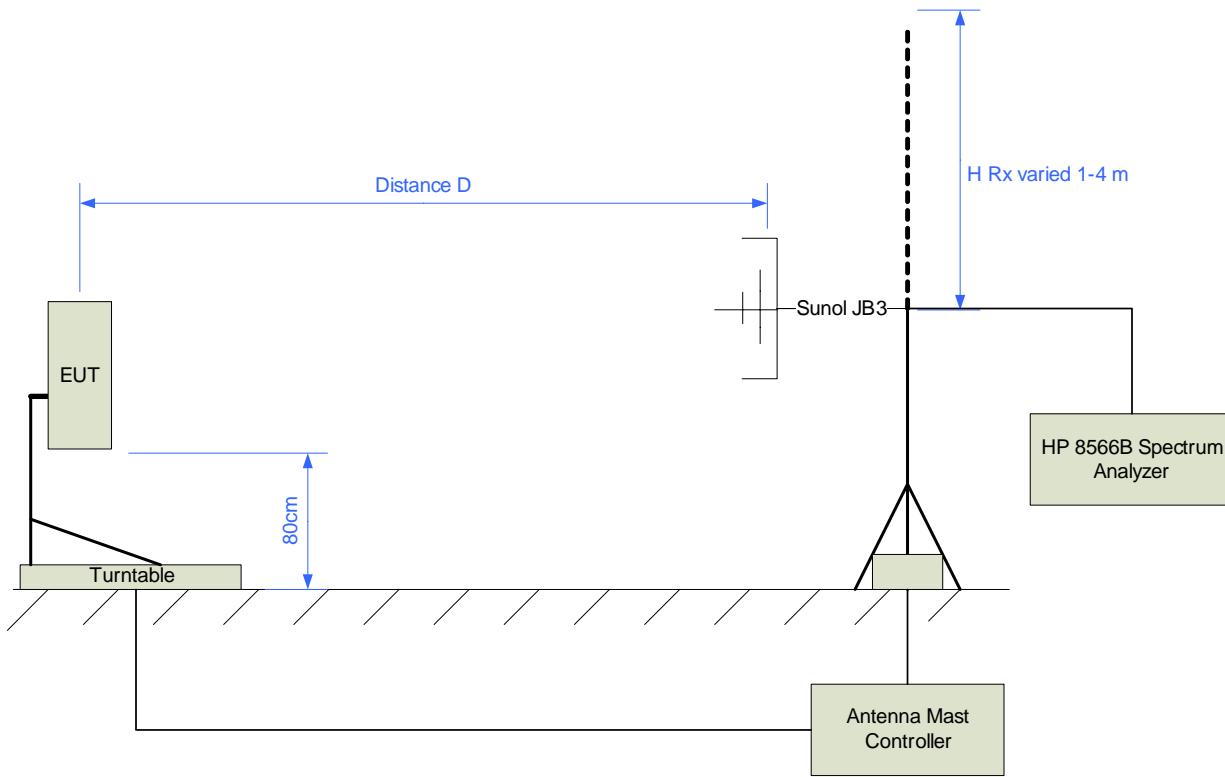
Note: Measurements below 1 GHz were performed with the Sunol JB3 antenna. Measurements above 1 GHz were performed with the Com-Power AHA-118 antenna. The measurement distance was 3m

4.4   Test Results

Freq in MHz	Meter dBµV/m	Factors	Field Strength (dBuV)	Signal Strength (dBm)	Spec (dBm)	Margin dB	RType	Polar
1612.225	46.3	32.9	79.2	-16.1	-13.0	-3.1	Peak	Horiz
1649.875	46.2	32.9	79.1	-16.2	-13.0	-3.2	Peak	Horiz
1803.973	45.2	32.9	78.1	-17.2	-13.0	-4.2	Peak	Horiz
2418.155	40.5	37.5	78	-17.3	-13.0	-4.3	Peak	Horiz
2474.940	40.6	38.1	78.7	-16.6	-13.0	-3.6	Peak	Horiz
2705.963	40.6	38.1	78.7	-16.6	-13.0	-3.6	Peak	Horiz

3m measurement distance

Nov-22-2005   15:16:31 FCC P90 Rad 3m Plot 1
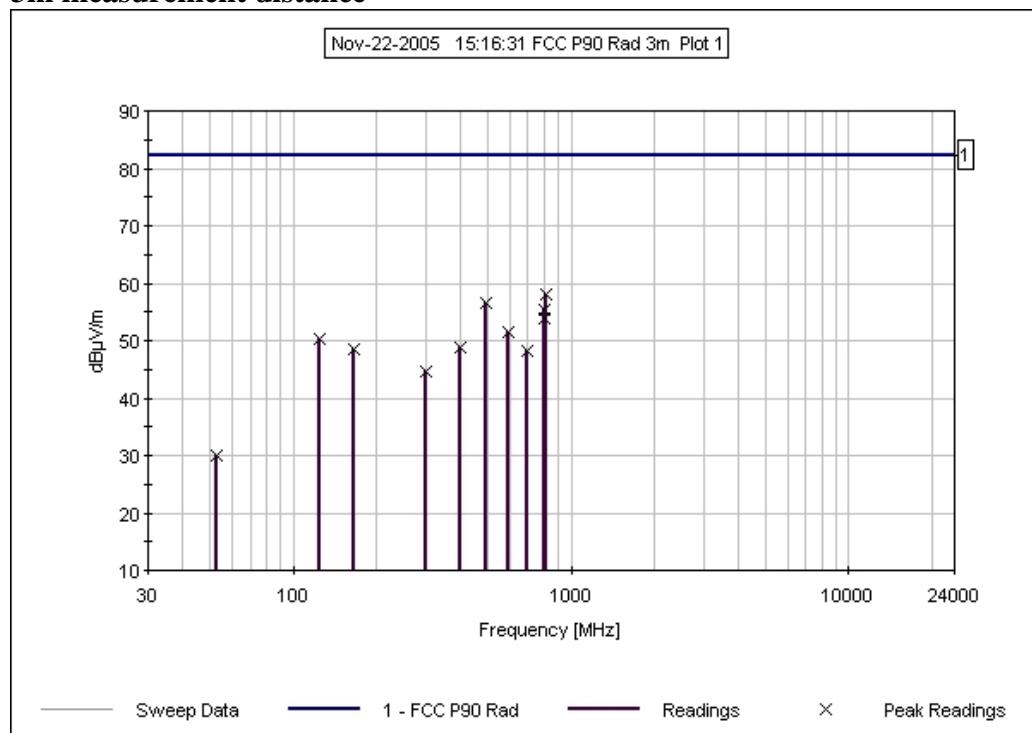
1m Measurement distance

Please note that the top trace in the following plots is taken with RBW=1Mhz and VBW=1MHz at a distance of 1 meter. The bottom trace is present for measurement confidence. Final measurements were performed at 3m using the substitution method where necessary.

```
                                    * RBW  100 kHz   Marker 2 [T1 ]
                                      VBW  100 kHz            74.86 dBµV
    Ref   155 dBµV         * Att   0 dB   * SWT 1 s      1.791587500 GHz

                                              Marker 1 [T1 ]
                                                     126.63 dBµV
    140                                          895.300000000 MHz   B
1 PK  1                                        Marker 3 [T1 ]
VIEW  ▼                                                81.03 dBµV
    120                                           2.687875000 GHz
2 AV *
VIEW                                                                  TDF
    100

         D1 84 dBµV              3
    80                           2
                   D2 64 dBµV

    60

    40

    20

    0

    Start 700 MHz              930 MHz/              Stop 10 GHz
```
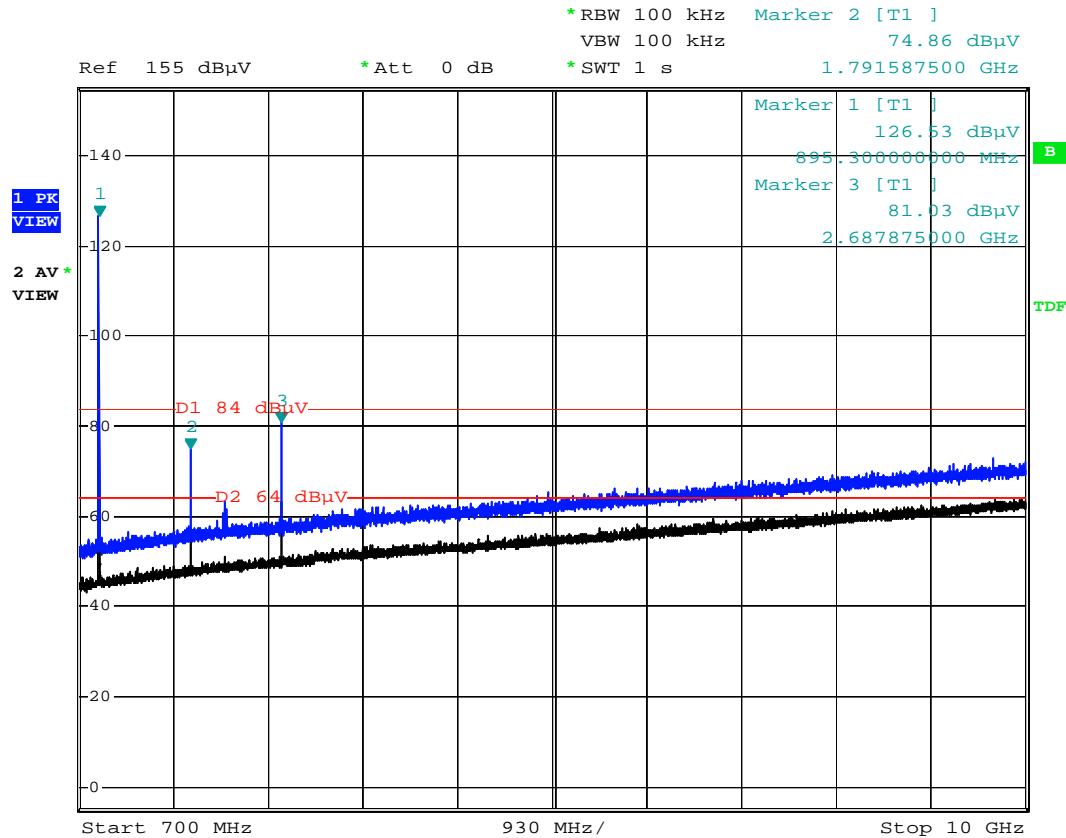
Arcom CyberTracker Spurious RE1m 896M

Date: 21.NOV.2005 13:31:49

Note: In the above plots, only emissions associated with the EUT are marked.

5.0   Transmitter Conducted Harmonic and Spurious Emissions

5.1   Test Standard
90.691   Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 $Log_{10}(f/6.1)$ decibels or $50 + 10 Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

5.2   Test Limits
-20 dBm conducted emission limit.

5.3   Test Setup
Because the unit is fitted with an integrated antenna, only radiated spurious measurements were performed. Please see section 4.

5.3.1   Test Setup Block Diagram – Conducted Measurements (Harmonics)
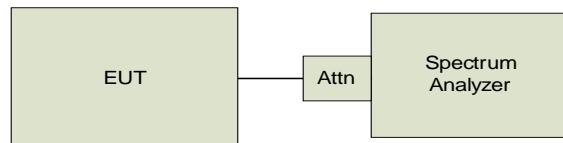
5.4 Test Results

Because the unit is fitted with an integrated antenna, only radiated spurious measurements were performed. Please see section 4.

6.0   Emission Masks

6.1   Test Standard
90.691   Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 $Log_{10}(f/6.1)$ decibels or $50 + 10 Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

6.2   Test Limits
FCC Part 90.691 Emission Mask.

6.3   Test Setup
This is a radiated measurement performed at a measurement distance of 3m.

The EUT is exercised using test software. It is configured to transmit a continuously modulated carrier and tested on the lowest and highest frequencies of each frequency band. Only worst case data is shown below.

As per section 90.210, the emission mask is evaluated relative "to the total power contained in the channel bandwidth" in the case of a device which cannot produce an un-modulated carrier.

6.3.1   Test Setup Block Diagram
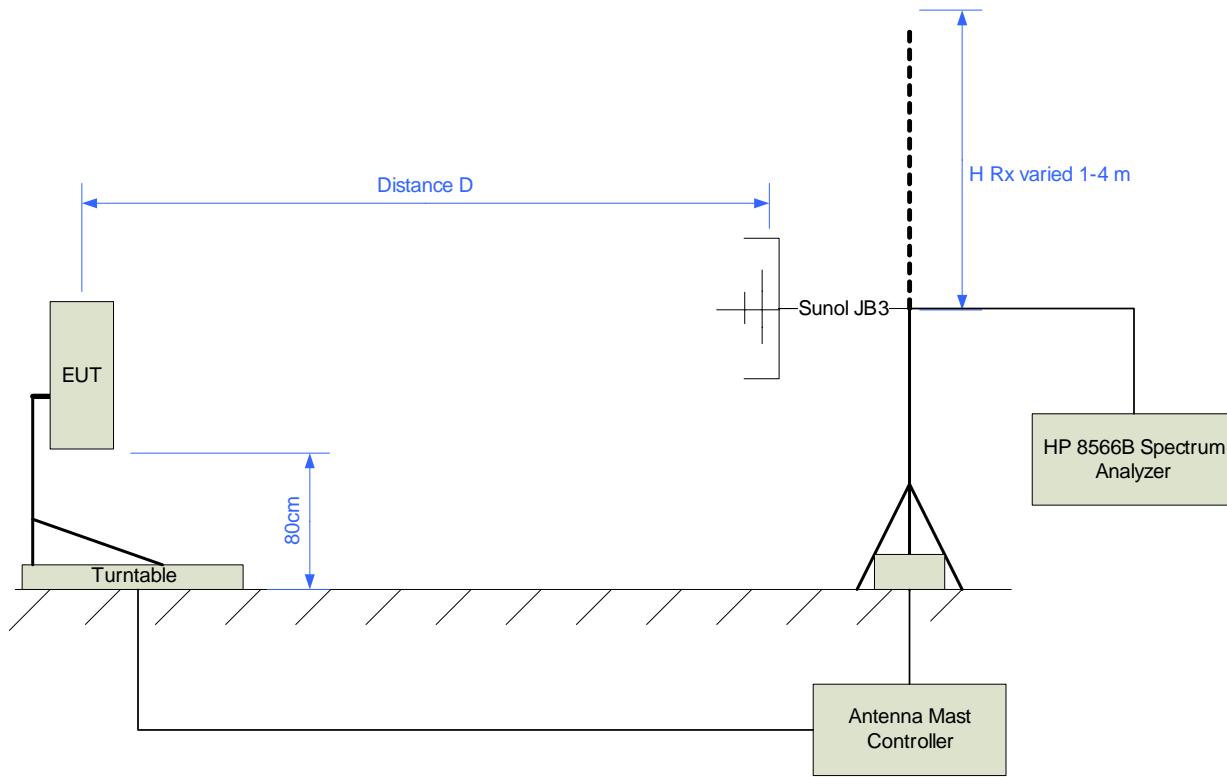
6.4   Test Results
806 MHz

824 MHz

898 MHz

902 MHz
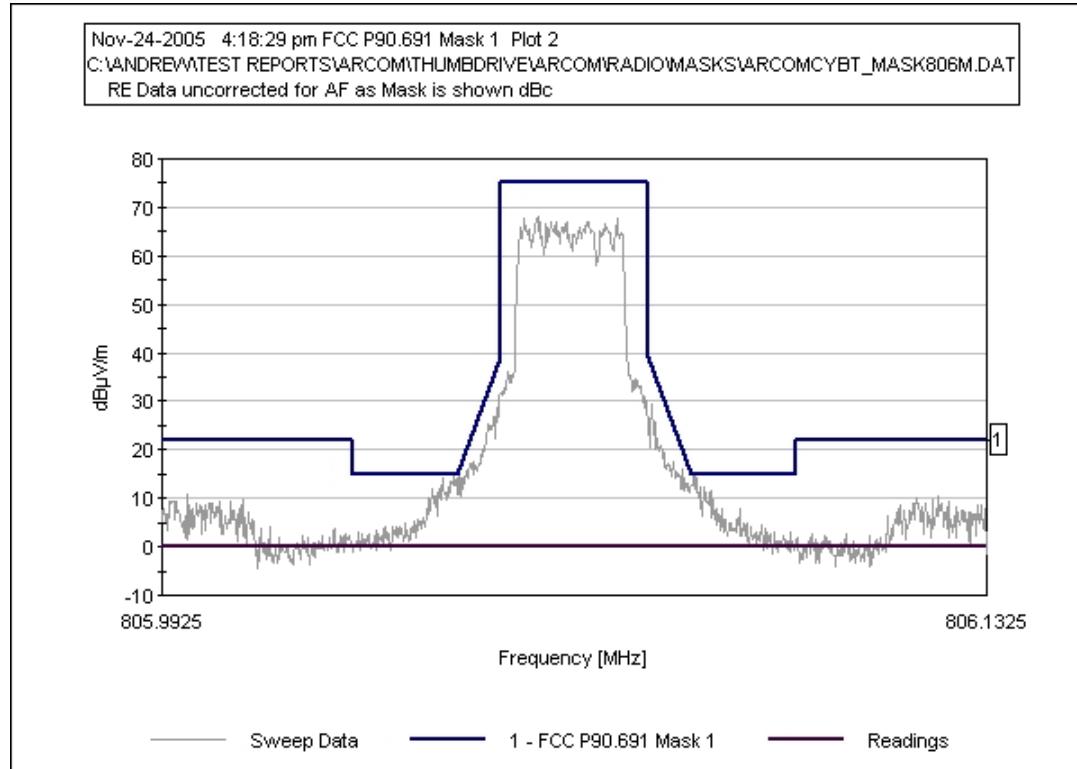
Nov-24-2005 4:54:57 pm FCC P90.691 Mask 902M Plot 4
C:\ANDREW\TEST REPORTS\ARCOM\THUMBDRIVE\ARCOM\RADIO\MASKS\ARCOMCYBT_MASK902M.DAT
  RE Data uncorrected for AF as Mask is shown dBc

(dBµV/m vs Frequency [MHz], range 901.911255 to 902.05125)

Sweep Data   1 - FCC P90.691 Mask 902M   Readings
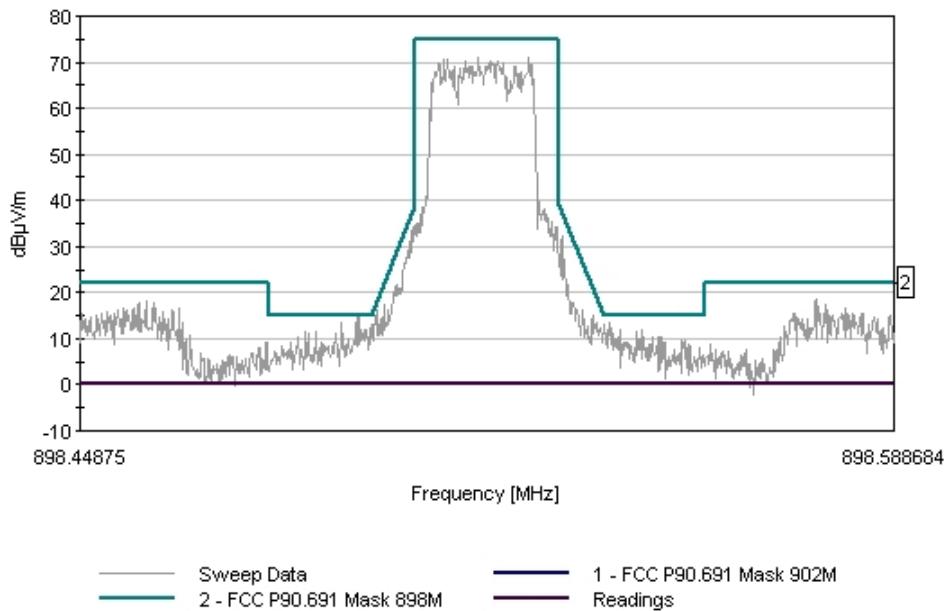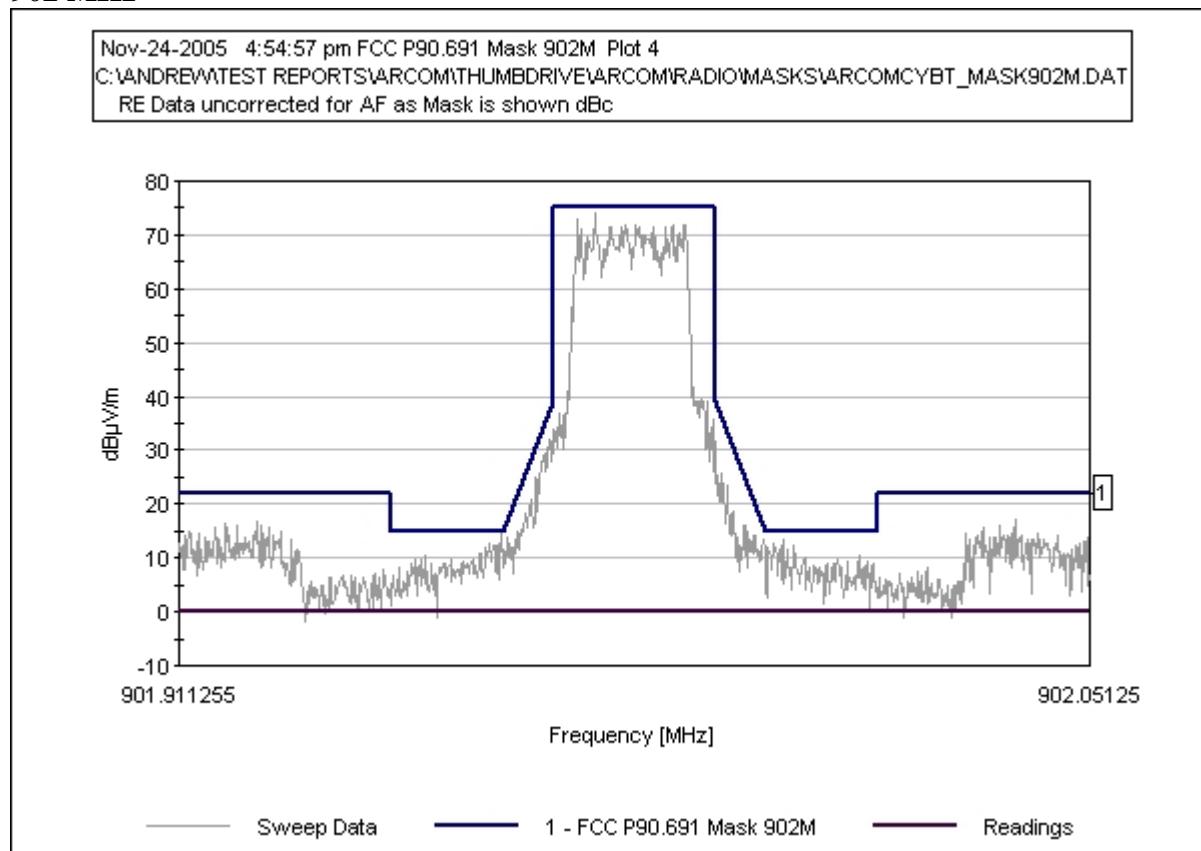
7.0 Frequency Stability

7.1 Test Standard

(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

```
                    Minimum Frequency Stability
                      [Parts per million (ppm)]
---------------------------------------------------------------------
                                              Mobile stations
                                           -------------------
                                Fixed and   Over 2     2 watts
         Frequency range (MHz)    base       watts     or less
                                stations    output     output
                                            power       power
---------------------------------------------------------------------
Below 25..............................  1,2,3 100      100        200
25-50                                        20         20         50
72-76.................................        5      ........       50
150-174...............................  5,11 5       \6\ 5     4,6 50
216-220...............................       1.0    ........        1.0
220-222 \12\..........................       0.1       1.5         1.5
421-512...............................  7,11,14 2.5   \8\ 5    \8\ 5
806-809...............................  \14\ 1.0       1.5         1.5
809-824...............................  \14\ 1.5       2.5         2.5
851-854...............................       1.0       1.5         1.5
854-869...............................       1.5       2.5         2.5
896-901...............................  14 0.1         1.5         1.5
902-928...............................       2.5       2.5         2.5
902-928 \13\..........................       2.5       2.5         2.5
929-930...............................       1.5    ........   ........
935-940...............................       0.1       1.5         1.5
1427-1435.............................  \9\ 300       300         300
Above 2450 \10\.......................  ..........  ........   ........
---------------------------------------------------------------------
```

7.2 Test Limits
As specified above, the maximum permissible temperature drift is 1.5 ppm

7.3 Test Setup
The EUT is exercised using test software. It is configured to transmit a continuously modulated carrier and tested on the lowest and highest frequencies of each frequency band. Only worst case data is shown below.

The EUT is tested over both voltage and temperature variations. Voltage variation is over the manufacturer's specified operating range.

7.3.1   Test Setup Block Diagram
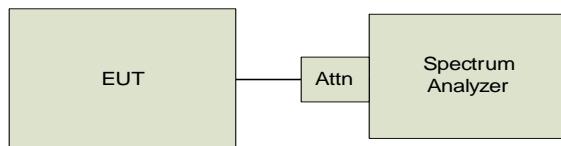
7.4   Test Results

V	Temp C	Freq (MHz)	F1 (MHz)	F2 (MHz)	(F1+F2)/2 (MHz)	Deviation (kHz)	Limit (kHz)	Drift (ppm)
nom	-30	806.06250	806.09145	806.03145	806.061450	-1.050	1.209	-1.30
nom	-20	806.06250	806.09145	806.03195	806.061700	-0.800	1.209	-0.99
nom	-10	806.06250	806.09105	806.03175	806.061400	-1.100	1.209	-1.36
nom	0	806.06250	806.09195	806.03155	806.061750	-0.750	1.209	-0.93
nom	10	806.06250	806.09085	806.03295	806.061900	-0.600	1.209	-0.74
nom	20	806.06250	806.09155	806.03145	806.061500	-1.000	1.209	-1.24
nom	30	806.06250	806.09185	806.03165	806.061750	-0.750	1.209	-0.93
nom	40	806.06250	806.09165	806.03175	806.061700	-0.800	1.209	-0.99
nom	50	806.06250	806.09135	806.03185	806.061600	-0.900	1.209	-1.12

V	Temp C	Freq (MHz)	F1 (MHz)	F2 (MHz)	(F1+F2)/2 (MHz)	Deviation (kHz)	Limit (kHz)	Drift (ppm)
nom	-30	824.98750	825.01610	824.95690	824.986500	-1.000	1.237	-1.24
nom	-20	824.98750	825.01630	824.95650	824.986400	-1.100	1.237	-1.36
nom	-10	824.98750	825.01640	824.95700	824.986700	-0.800	1.237	-0.99
nom	0	824.98750	825.01730	824.95620	824.986750	-0.750	1.237	-0.93
nom	10	824.98750	825.01610	824.95700	824.986550	-0.950	1.237	-1.18
nom	20	824.98750	825.01670	824.95660	824.986650	-0.850	1.237	-1.05
nom	30	824.98750	825.01700	824.95640	824.986700	-0.800	1.237	-0.99
nom	40	824.98750	825.01660	824.95660	824.986600	-0.900	1.237	-1.12
nom	50	824.98750	825.01630	824.95650	824.986400	-1.100	1.237	-1.36

V	Temp C	Freq (MHz)	F1 (MHz)	F2 (MHz)	(F1+F2)/2 (MHz)	Deviation (kHz)	Limit (kHz)	Drift (ppm)
nom	-30	896.01875	896.04755	895.98785	896.017700	-1.050	1.344	-1.30
nom	-20	896.01875	896.04765	895.98775	896.017700	-1.050	1.344	-1.30
nom	-10	896.01875	896.04780	895.98803	896.017913	-0.837	1.344	-1.04
nom	0	896.01875	896.04815	895.98745	896.017800	-0.950	1.344	-1.18
nom	10	896.01875	896.04755	895.98815	896.017850	-0.900	1.344	-1.12
nom	20	896.01875	896.04735	895.98805	896.017700	-1.050	1.344	-1.30
nom	30	896.01875	896.04775	895.98845	896.018100	-0.650	1.344	-0.81
nom	40	896.01875	896.04755	895.98795	896.017750	-1.000	1.344	-1.24
nom	50	896.01875	896.04715	895.98845	896.017800	-0.950	1.344	-1.18

V	Temp C	Freq (MHz)	F1 (MHz)	F2 (MHz)	(F1+F2)/2 (MHz)	Deviation (kHz)	Limit (kHz)	Drift (ppm)
nom	-30	901.98125	902.00995	901.95025	901.980100	-1.150	1.353	-1.43
nom	-20	901.98125	902.01035	901.95035	901.980350	-0.900	1.353	-1.12
nom	-10	901.98125	902.01030	901.95020	901.980250	-1.000	1.353	-1.24
nom	0	901.98125	902.01065	901.94985	901.980250	-1.000	1.353	-1.24
nom	10	901.98125	902.01045	901.95085	901.980650	-0.600	1.353	-0.74
nom	20	901.98125	902.00995	901.95045	901.980200	-1.050	1.353	-1.30
nom	30	901.98125	902.01005	901.95075	901.980400	-0.850	1.353	-1.05
nom	40	901.98125	902.00945	901.95065	901.980050	-1.200	1.353	-1.49
nom	50	901.98125	902.01035	901.95015	901.980250	-1.000	1.353	-1.24

8.0   99% Occupied Bandwidth

8.1   Test Standard

§ 90.209   Bandwidth limitations.

```
                    Standard Channel Spacing/Bandwidth
------------------------------------------------------------------------
                                      Channel
                                      spacing      Authorized
            Frequency band (MHz)       (kHz)     bandwidth (kHz)
------------------------------------------------------------------------
Below 25 \2\................................
25-50.......................................    20             20
72-76.......................................    20             20
150-174.....................................  \1\7.5    1 3 20/11.25/6
216-2205....................................    6.25       20/11.25/6 \5\
220-222.....................................    5              4
406-512 \2\.................................  \1\ 6.25   \13\ 20/11.25/6
806-809/851-854.............................   12.5           20
809-824/854-869.............................   25             20
896-901/935-940.............................   12.5          13.6
902-928 \4\.................................
929-930.....................................   25             20
1427-14325..................................   12.5          12.5
2450-2483.52 \2\............................
Above 2500 \2\..............................
------------------------------------------------------------------------
```

90.645   Permissible operations.

(h) Up to 10 contiguous 896–901/935–940 MHz band channels as listed in §90.617 may be combined for systems requiring more than the normal single channel bandwidth. If necessary, licensees may trade channels amongst themselves in order to obtain contiguous frequencies. Notification of such proposed exchanges shall be made to the appropriate frequency coordinator(s) and to the Commission by filing an application for license modification.

8.2   Test Limits

The occupied bandwidth determines the parameters of the emission mask. **In the frequency range of 896-902 MHz, the device combines 2 contiguous channels as per 90.645(h).**

8.3   Test Setup

The EUT is exercised using test software. It is configured to transmit a continuously modulated carrier and tested on the lowest, middle and highest frequencies of each frequency band. Only worst case data is shown below.

The occupied bandwidth is measured using the N dB down function of the spectrum analyzer.

8.3.1 Test Setup Block Diagram

8.4 Test Results


```
                                    *RBW 300 Hz      Marker 1 [T1 ]
                                     VBW 1 kHz                  -5.54 dBm
        Ref   11.8 dBm      *Att   40 dB   *SWT 100 s      806.069900000 MHz
```
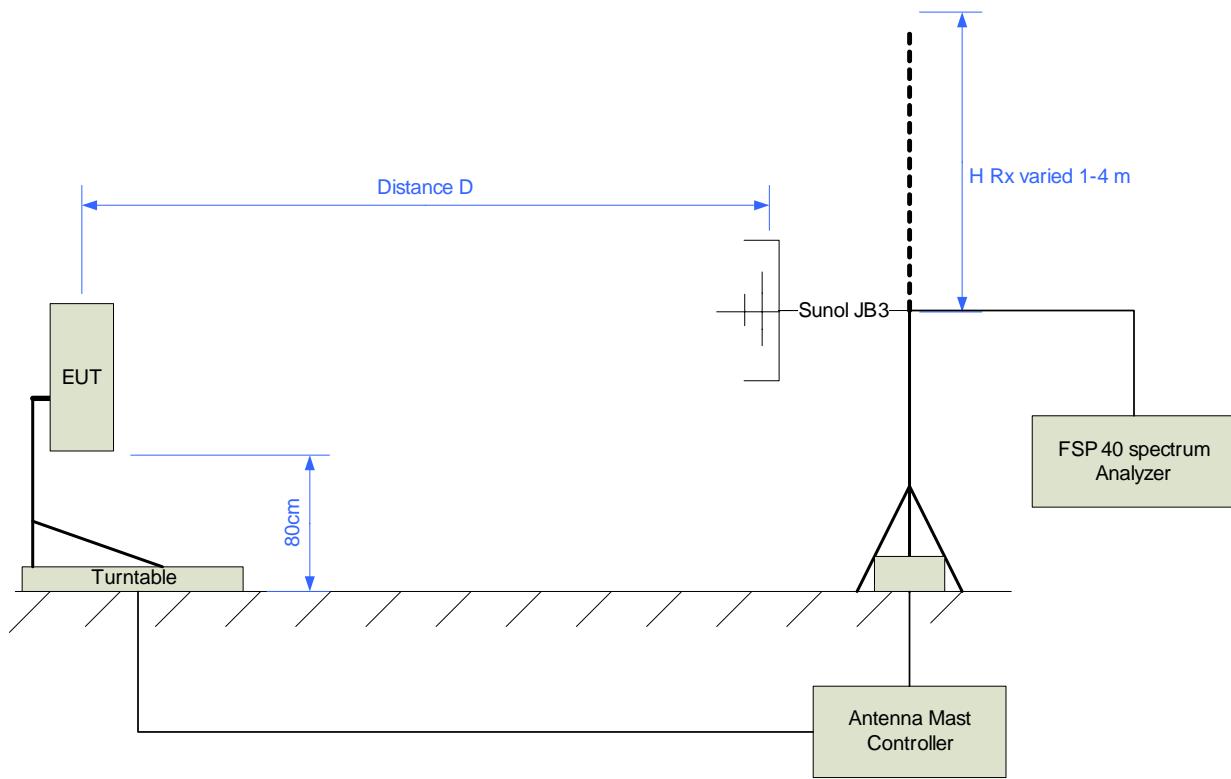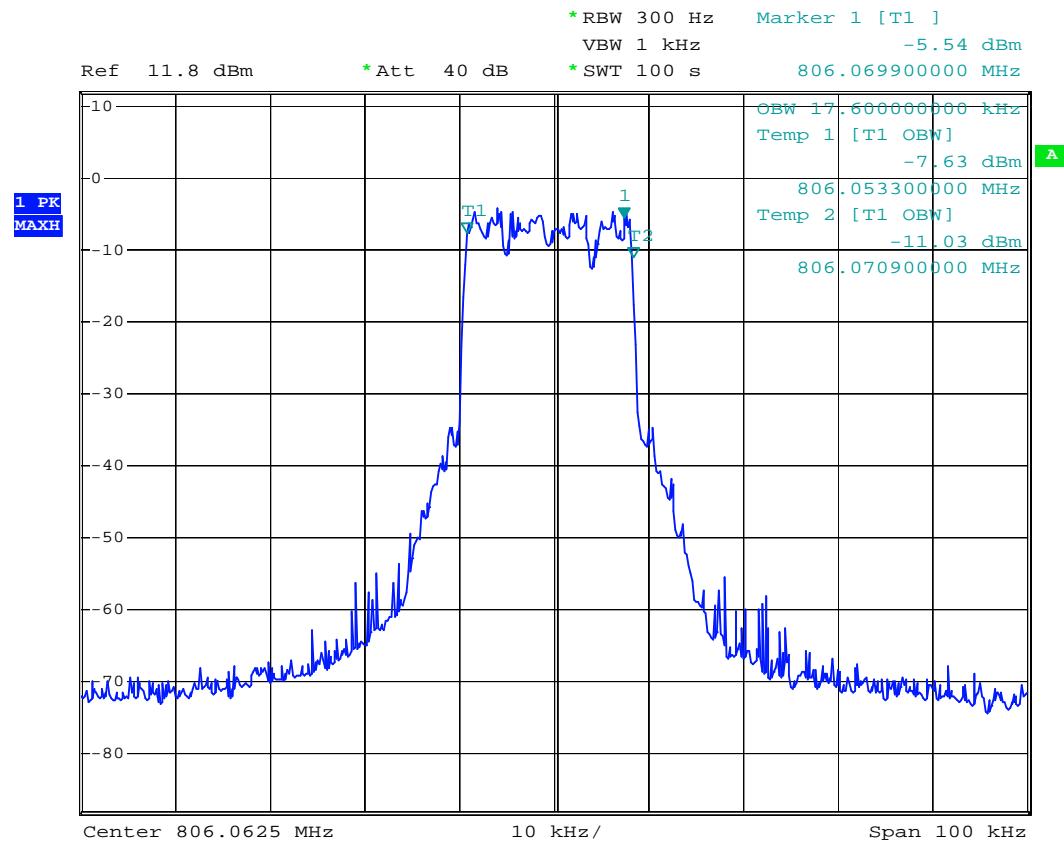
Arcom CyberTracker Occupied Bandwidth CE   806.0625M

Date: 17.FEB.2006 10:06:09

Occupied Bandwidth: 17.6 KHz

```
 *RBW 300 Hz     Marker 1 [T1 ]
  VBW 1 kHz                    -5.21 dBm
 *SWT 100 s        824.993900000 MHz
```

Ref 9.6 dBm   *Att 40 dB

OBW 17.600000000 kHz
Temp 1 [T1 OBW]
                     -12.21 dBm
           824.978100000 MHz
Temp 2 [T1 OBW]
                     -10.30 dBm
           824.995700000 MHz

Center 824.9875 MHz   10 kHz/   Span 100 kHz
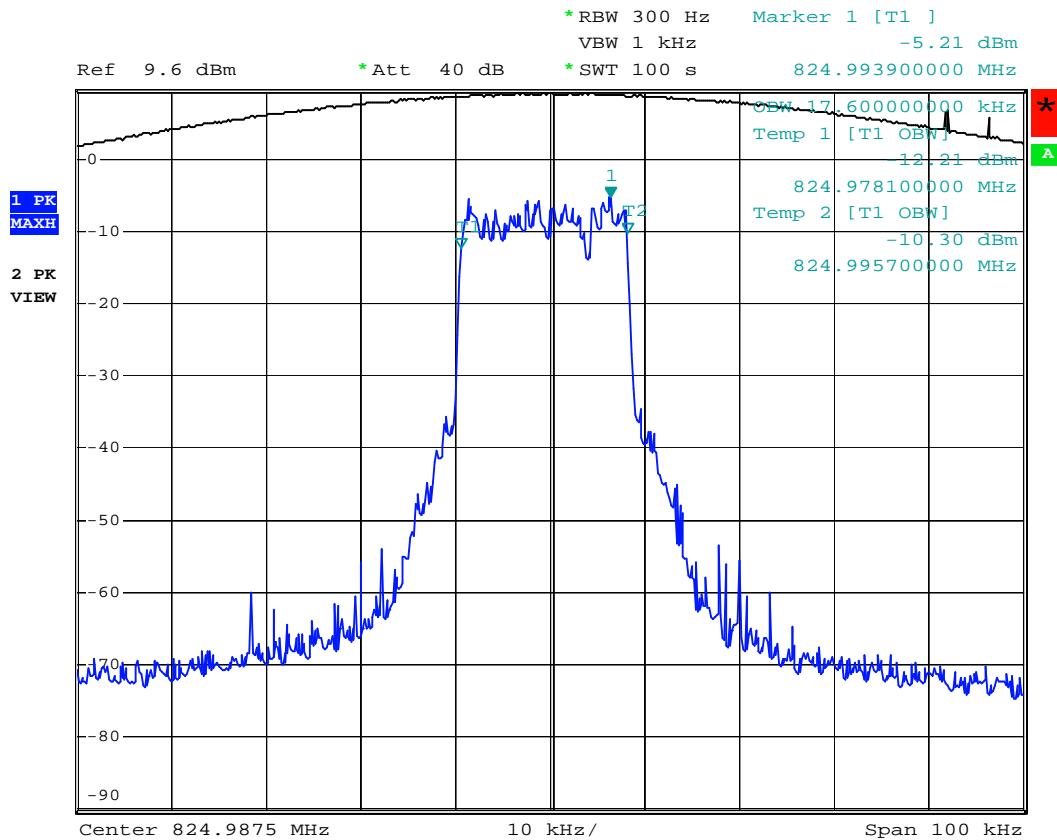
Arcom CyberTracker Occupied Bandwidth CE 824.9875M

Date: 17.FEB.2006 10:12:35

## Occupied Bandwidth: 17.6 KHz
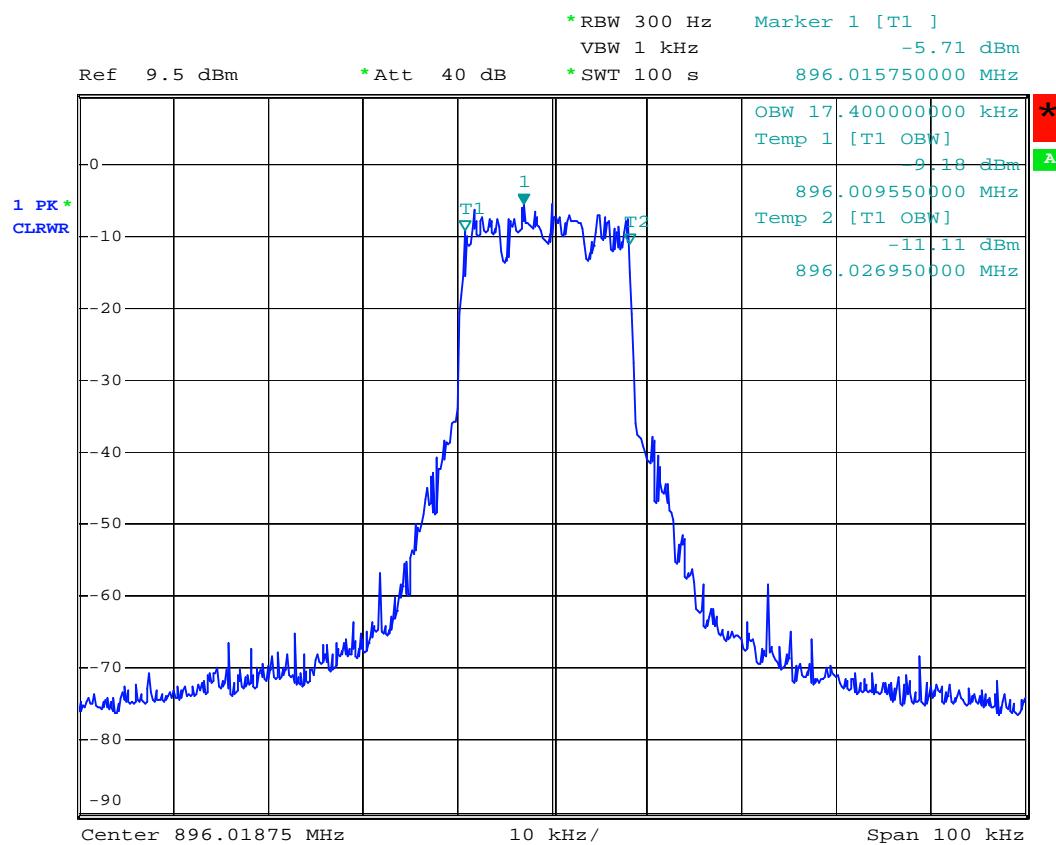
Arcom CyberTracker Occupied Bandwidth CE   896.01875M

Date: 17.FEB.2006   10:17:25

Occupied Bandwidth: 17.6 KHz

```
* RBW 300 Hz      Marker 1 [T1 ]
  VBW 1 kHz                    -7.44 dBm
Ref  9.5 dBm        * Att  40 dB   * SWT 100 s      901.980050000 MHz
```
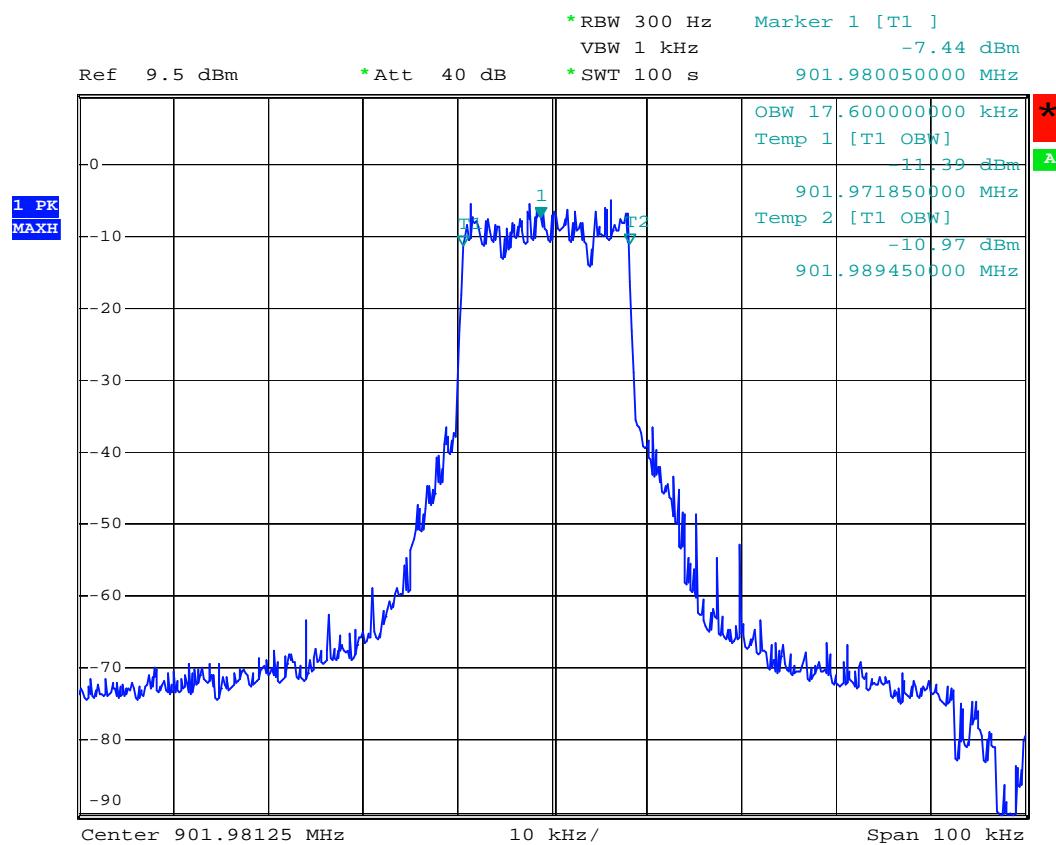
Arcom CyberTracker Occupied Bandwidth CE 901.98125M

Date: 17.FEB.2006 10:25:42

Occupied Bandwidth: 17.6 KHz

9.0 RF Exposure Evaluation

FCC 1.1310 states the criteria listed in the table below shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter. Further information on evaluating compliance with these limits can be found in the FCC's OST/OET Bulletin Number 65, ``Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radiofrequency Radiation.''

Frequency Range (MHZ)	Electric Field Strength (V/m)	Magnetic Field Strength (A/M)	Power Density (mW/cm^2)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

9.1 Transmission Formula

Friis transmission formula: $Pd = (P_{out}*G)/(4* \pi*r^2)$ Where

Pd = power density in mW/cm^2
P_{out} = output power to antenna in mW.
G = gain of antenna in the direction of interest relative to an isotropic radiator.
R = the distance between the observation point and the center of the radiator in cm.

Pd is the limit of MPE, 1mW/cm^2. If we know the maximum gain of the antenna and the total power input to the antenna we can calculate the distance r where the MPE limit is reached.

9.2 EUT Operating Condition

SAR testing information is contained in a separate document.

9.3 RF exposure evaluation distance calculation

SAR testing information is contained in a separate document.

10.0   Test Photos

Conducted emissions test setup

Radiated emissions test setup