Engineering and Testing for EMC and Safety Compliance

CERTIFICATION APPLICATION REPORT
FCC PART 24

Test Lab:	Applicant:
Rhein Tech Laboratories, Inc. Phone: 703-689-0368 360 Herndon Parkway Fax: 703-689-2056 Suite 1400 Web: www.rheintech.com Herndon, VA 20170 Contact: ATCBINFO@rheintech.com	UTStarcom, Inc. Phone: 732-452-4473 33 Wood Avenue South Fax: 732-767-5274 3rd Floor Iselin, NJ 08830 USA Contact: Bill Aranguren (warangur@utstar.com)

FCC ID:	O6Y-UT611	**TEST REPORT DATE:**	May 31, 2005
PLATFORM:	Transmitter	**RTL WORK ORDER NUMBER:**	2005072
MODEL:	UT611	**RTL QUOTE NUMBER:**	QRTL05-096

American National Standard Institute:	ANSI/TIA-603-B-2002
FCC Classification:	PCB – Licensed Base Station for Part 24
FCC Rule Part(s):	Part 24: Personal Communications Services Subpart E – Broadband PCS
Digital Interface Information:	Digital Interface was found to be compliant

Frequency Range (MHz)	Power (W)	Frequency Tolerance (ppm)	Emission Designator
1880.15-1909.85	0.170	2.5	268KDXW

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards. Furthermore, there was no deviation from, additions to, or exclusions from, the FCC Part 2, FCC Part 15, FCC Part 24, ANSI C63.4 and ANSI/TIA-603-B-2002.

Signature: _____ Date: May 31, 2005

Typed/Printed Name: Desmond Fraser Position: President

Report #: 2005072 Rev 0.01

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1 GENERAL INFORMATION

1.1 SCOPE

FCC Rules Part 24(E) Personal Communications Services – Broadband PCS

All measurements contained in this application were conducted in accordance with the FCC Rules and Regulations CFR47 and ANSI/TIA-603-B-2002 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

1.2 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

1.3 RELATED SUBMITTAL(S)/GRANT(S)

This is a new certification application. The digital interface and receiver were investigated and found compliant. A DoC report is on file for the circuitry subject to DoC.

2 EQUIPMENT INFORMATION

2.1 JUSTIFICATION

To complete the test configuration required by the FCC, the transmitter was software-controlled by the manufacturer to operate in a continuous mode. The final data was taken as a substitution measurement. The device is provided with an external antenna connector. EIRP measurement is provided to support the RF exposure requirements for the antennas listed in this application filing.

2.2 EXERCISING THE EUT

The UT611 is a portable telephone designed to link to a PHS phone network which transmits at a frequency within the range 1880.15 MHz – 1909.85 MHz. Three channels were investigated: 1880.15 MHz, 1895.15 MHz, and 1909.85 MHz, in three orthogonal planes, with the receiving antenna in both horizontal and vertical polarities, from 1 meter to 4 meters in height.

2.3 MODIFICATIONS

No modifications were necessary for compliance. There were no deviations from the test standards(s) and/or methods.

2.4 TEST SYSTEM DETAILS

The test sample was received on April 15, 2005. The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system, are shown in the following table.

TABLE 2-1: EQUIPMENT UNDER TEST (EUT)

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
Phone	UTStarcom	UT611	PSID:118239202	O6Y-UT611	NA	16613
Phone	UTStarcom	UT611	PSID:118239007	06Y-UT611	NA	16614
5.2VDC/600mA AC Adapter/Charger	UTStarcom	S526005A	CY170449	N/A	1.7m unshielded power	16615
5.2VDC/320mA AC Adapter/Charger	UTStarcom	S523205A	CY040405	N/A	1.8m unshielded power	16616
Battery	UTStarcom	HZSL033450E	20050228	N/A	NA	16618
4.2VDC Battery	UTStarcom	HZSL033450E	20050221	N/A	NA	16619

2.5 CONFIGURATION OF TESTED SYSTEM

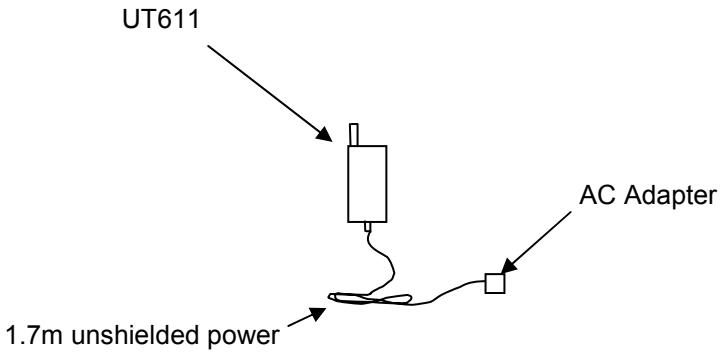


FIGURE 1: CONFIGURATION OF TESTED SYSTEM

3 DC VOLTAGES AND CURRENTS - PART §2.1033(C)(8)

The DC voltages applied to, and DC currents into, the several elements of the final radio frequency amplifying device for normal operation over the power range.

3.1 DC VOLTAGES AND CURRENTS DATA

TABLE 3-1: DC VOLTAGES AND CURRENTS DATA

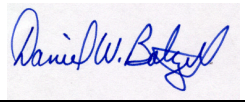
	Typical
Voltage (DC)	4.2
Current (mA)	28.8

3.2 DC VOLTAGES AND CURRENTS TEST EQUIPMENT

TABLE 3-2: DC VOLTAGES AND CURRENTS TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901350	Meterman	33XR	Multimeter	N/A	7/21/05

TEST PERSONNEL



Daniel W. Baltzell		May 1, 2005
EMC Test Engineer	Signature	Date Of Test

4 RF POWER OUTPUT - §2.1046

4.1 ANSI/TIA-603-B-2002, SECTION 2.2.17 TEST PROCEDURE

Substitution method.

4.2 EFFECTIVE ISOTROPIC RADIATED POWER LIMITS - §24.232(B) TEST PROCEDURE

Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

4.3 EFFECTIVE ISOTROPIC RADIATED POWER TEST DATA §2.1046

TABLE 4-1: RADIATED POWER DATA - §2.1046 – WHIP ANTENNA

Channel	Test Detector	Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)
206	Pk	1880.15	79.3	20.9	6.1	7.1	21.9	0.155
1	Pk	1895.15	79.6	20.8	6.3	7.1	21.6	0.145
50	Pk	1909.85	78.1	21.5	6.4	7.2	22.3	0.170

Notes: Pk = Peak Detector

EIRP Measurements by Substitution Method.

The EUT was placed on a turntable 3 meters from the receive antenna. The field of maximum intensity was found by rotating the EUT approximately 360° and changing the height of the receive antenna from 1 to 4 meters. The field strength was maximized using a calibrated spectrum analyzer using a 1 MHz resolution bandwidth for each channel being tested, and adjusted to a peak and average level using a power meter attached at the end of the receive antenna. A double ridge horn antenna was substituted in place of the EUT. The horn antenna was fed by a signal generator and adjusted until the previous level was attained. This level was recorded and was further corrected by subtracting the cable loss from the signal generator to the transmit antenna and adding the horn gain.

i.e., Sg – CL + Gn = EIRP (dBm)

Sg = Signal Generator Level (dBm)
CL = Cable Loss (dB)
Gn = Transmitting horn antenna gain (dBi)

4.4 RF POWER TEST EQUIPMENT

TABLE 4-2: RF POWER TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20 MHz - 2 GHz)	2648	9/20/05
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	8/11/05
900928	Hewlett Packard	83752A	Synthesized Sweeper (0.01 - 20 GHz)	3610A00866	9/5/05
900814	Electro-Metrics	EM-6961 (RGA-60)	Double Ridged Guide Antenna (1 - 18 GHz)	2310	2/17/06
901184	Agilent Technologies	E4416A	EPM-P Power Meter, single channel	GB41050573	8/2/05
901186	Agilent Technologies	E9323A (50MHz-6GHz)	Peak & Average Power Sensor	US40410380	8/2/05

TEST PERSONNEL

Daniel W. Baltzell		May 1, 2005
EMC Test Engineer	Signature	Date Of Test

5 OCCUPIED BANDWIDTH - §2.1049; NECESSARY BANDWIDTH §2.202 (OCCUPIED BANDWIDTH) – PART 24.238(B) (EMISSION BANDWIDTH)

Channel 50 was found to be the worst case and is shown below.

Type of Emission: DXW

Necessary bandwidth designator derived from measurement of emission bandwidth (-26 dB) (268 kHz): 268KDXW

Occupied Bandwidth (99% Power Bandwidth) - Compliance with the emission masks

5.1 TEST PROCEDURE

ANSI/TIA-603-B-2002, section 2.2.11

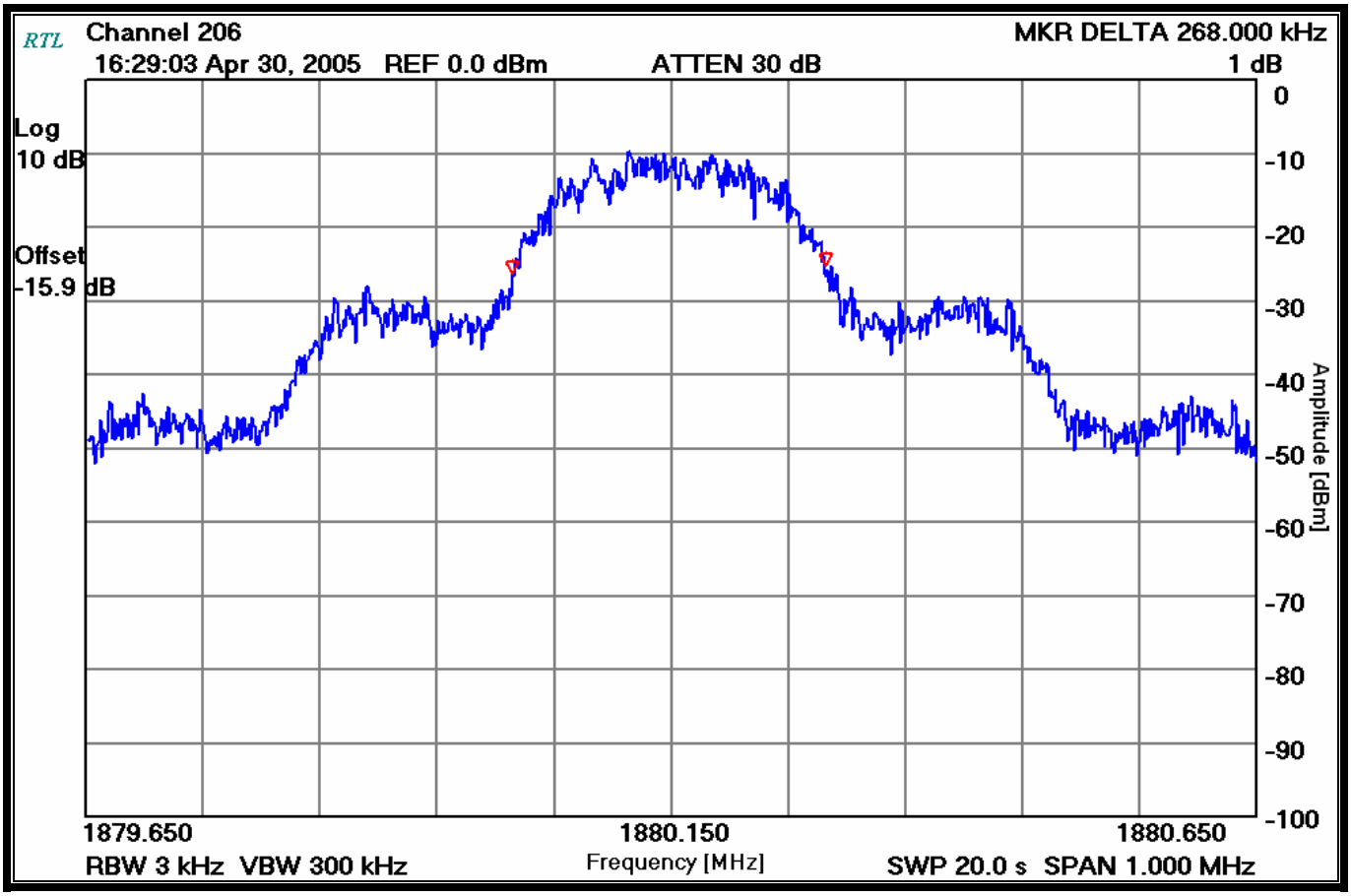
Device with digital modulation: operation to its maximum extent

Note: Reference level is average conducted power measurement.

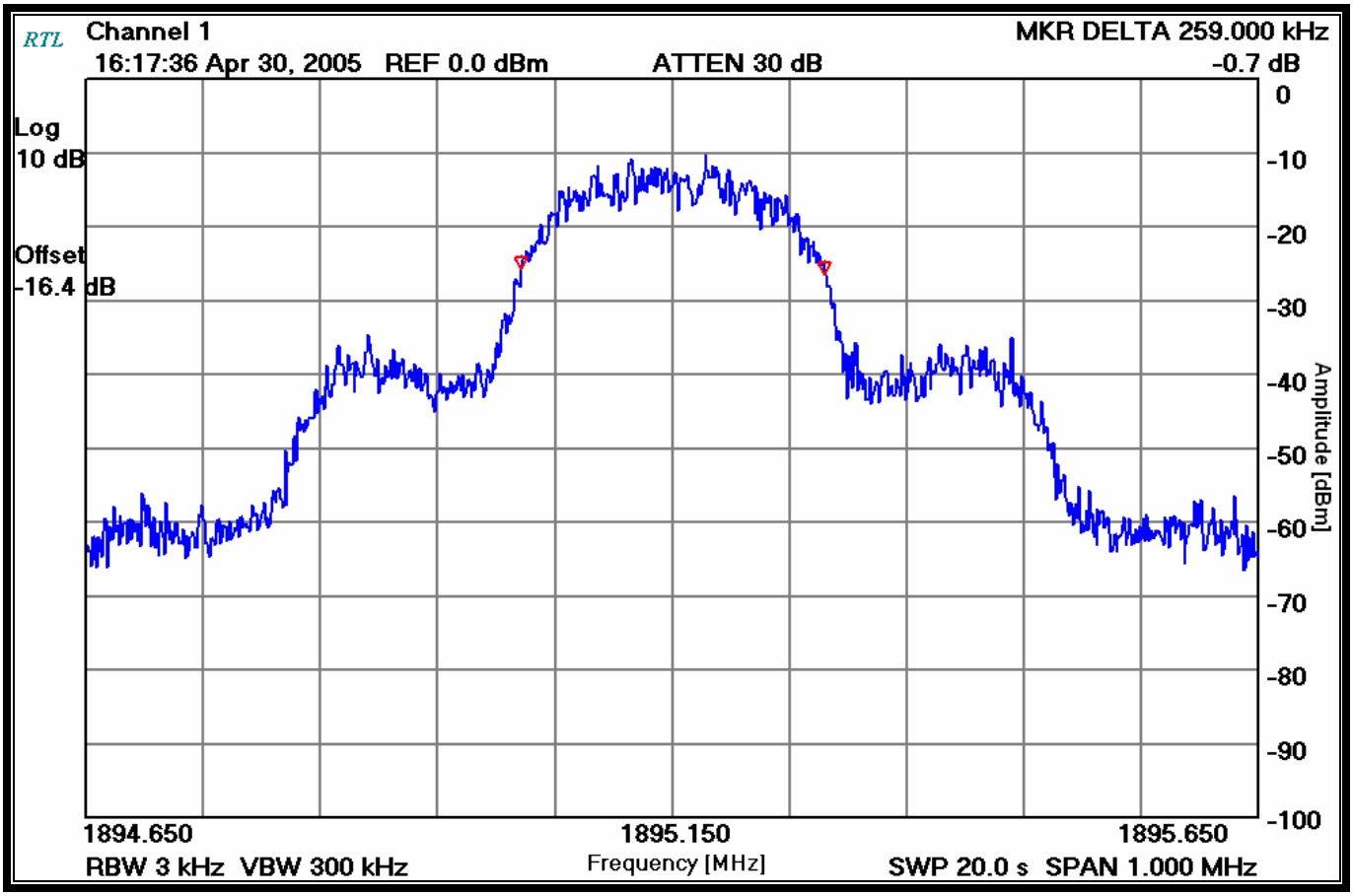
5.2 OCCUPIED BANDWIDTH TEST DATA

Channel 206: Occupied Bandwidth = 268 kHz
Channel 1: Occupied Bandwidth = 259 kHz
Channel 50: Occupied Bandwidth = 262 kHz

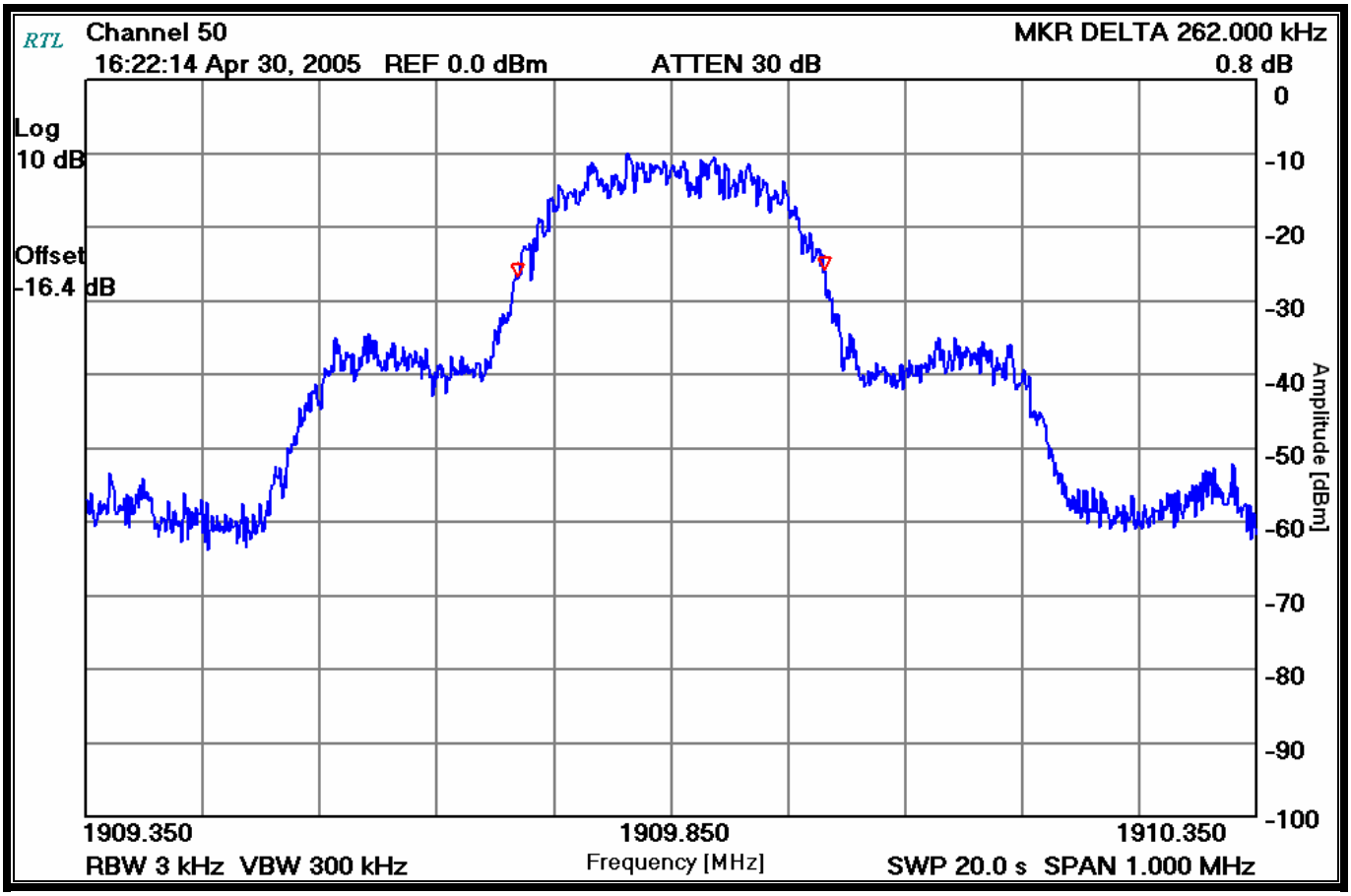
PLOT 5-1: OCCUPIED BANDWIDTH (-26 DB) CHANNEL 206 - 1880.15 MHZ



PLOT 5-2: OCCUPIED BANDWIDTH (-26 DB) CHANNEL 1 - 1895.15 MHZ



PLOT 5-3: OCCUPIED BANDWIDTH (-26 DB) CHANNEL 50 – 1909.85 MHZ



TEST PERSONNEL

Daniel W. Baltzell		April 30, 2005
EMC Test Engineer	Signature	Date Of Test

5.3 OCCUPIED BANDWIDTH TEST EQUIPMENT

TABLE 5-1: OCCUPIED BANDWIDTH TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz – 22 GHz)	3138A07771	6/23/05

6 RADIATED SPURIOUS AND HARMONIC EMISSIONS - §2.1053

6.1 RADIATED SPURIOUS AND HARMONIC EMISSIONS - §2.1053

Substitution method. The EUT was terminated with a 50 ohm termination and placed on a turntable 3 meters from the receive antenna. The field of maximum intensity was found by rotating the EUT approximately 360° and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A double ridge horn antenna was substituted in place of the EUT. The horn antenna was fed by a signal generator and adjusted until the previous level was attained. The signal generator level was recorded. It was further corrected by subtracting the cable loss from the signal generator to the dipole and adding the horn gain. The worst case average channel test data is provided.

6.2 FIELD STRENGTH OF SPURIOUS RADIATION TEST DATA - §2.1053

Operating Frequency (MHz): 1880.15
Channel: 206
Measured EIRP (dBm): 21.9
Modulation: DXW
Distance (m): 3
Limit (dBc): 34.9

TABLE 6-1: FIELD STRENGTH OF SPURIOUS RADIATION TEST DATA – 1880.15 MHZ, CHANNEL 206

Frequency (MHz)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)	Corrected Level (dBc)	Margin (dB)
3760.300	-31.6	8.3	8.0	53.8	-18.9
5640.450	-46.1	1.5	8.7	60.8	-25.9
7520.600	-42.5	1.4	9.7	56.1	-21.2
9400.750	-36.4	1.3	10.3	49.3	-14.4
11280.900	-36.4	2.0	10.7	49.6	-14.7
13161.050	-27.6	12.4	12.5	49.4	-14.5

Operating Frequency (MHz): 1895.15
Channel: 1
Measured EIRP (dBm): 21.6
Modulation: DXW
Distance (m): 3
Limit (dBc): 34.6

TABLE 6-2: FIELD STRENGTH OF SPURIOUS RADIATION TEST DATA – 1895.15 MHZ, CHANNEL 1

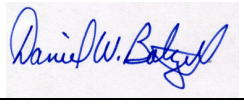
Frequency (MHz)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)	Corrected Level (dBc)	Margin (dB)
3790.300	-30.7	8.3	8.0	52.6	-18.0
5685.450	-44.6	1.3	8.7	58.8	-24.2
7580.600	-42.7	1.2	9.8	55.7	-21.1
9475.750	-36.9	1.4	10.5	49.4	-14.8
11370.900	-38.0	2.5	10.7	51.4	-16.8
13266.050	-27.4	2.3	12.7	38.6	-4.0

Operating Frequency (MHz): 1909.85
Channel: 50
Measured EIRP (dBm): 22.3
Modulation: DXW
Distance (m): 3
Limit (dBc): 35.3

TABLE 6-3: FIELD STRENGTH OF SPURIOUS RADIATION TEST DATA – 1909.85 MHZ, CHANNEL 50

Frequency (MHz)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)	Corrected Level (dBc)	Margin (dB)
3819.700	-29.0	8.3	8.0	51.6	-16.3
5729.550	-44.4	1.4	8.7	59.4	-24.1
7639.400	-42.9	1.4	10.0	56.6	-21.3
9549.250	-37.1	1.6	10.6	50.4	-15.1
11459.100	-37.9	2.0	10.7	51.5	-16.2
13368.950	-26.8	2.0	12.8	38.3	-3.0

TEST PERSONNEL



Daniel W. Baltzell		May 1, 2005
EMC Test Engineer	Signature	Date Of Test

6.3 RADIATED SPURIOUS TEST EQUIPMENT

TABLE 6-4: RADIATED SPURIOUS TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20 MHz - 2 GHz)	2648	9/20/05
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	5/5/05
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	8/11/05
900928	Hewlett Packard	83752A	Synthesized Sweeper (0.01 - 20 GHz)	3610A00866	9/5/05
900814	Electro-Metrics	EM-6961 (RGA-60)	Double Ridged Guide Antenna (1 - 18 GHz)	2310	2/17/06
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	5/20/07
900321	EMCO	3161-03	Horn Antennas (4 - 8,2 GHz)	9508-1020	5/20/07
900323	EMCO	3160-7	Horn Antennas (8,2 - 12,4 GHz)	9605-1054	5/20/07
900356	EMCO	3160-08	Horn Antenna (12.4 - 18 GHz)	9607-1044	5/20/07
900325	EMCO	3160-9	Horn Antennas (18 - 26.5 GHz)	9605-1051	5/20/07
901231	IW Microwave Products	KPS-1503-2400-KPS	High frequency RF cables	240"	9/1/05
901232	IW Microwave Products	KPS-1503-2400-KPS	High frequency RF cables	240"	9/1/05
901235	IW Microwave Products	KPS-1503-360-KPS	High frequency RF cables	36"	9/1/05
901242	Rhein Tech Labs	WRT-000-0003	Wood rotating table	N/A	Not Required
900878	Rhein Tech Labs	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required

7 BAND EDGE COMPLIANCE - PART 24.238

7.1 TEST PROCEDURE:

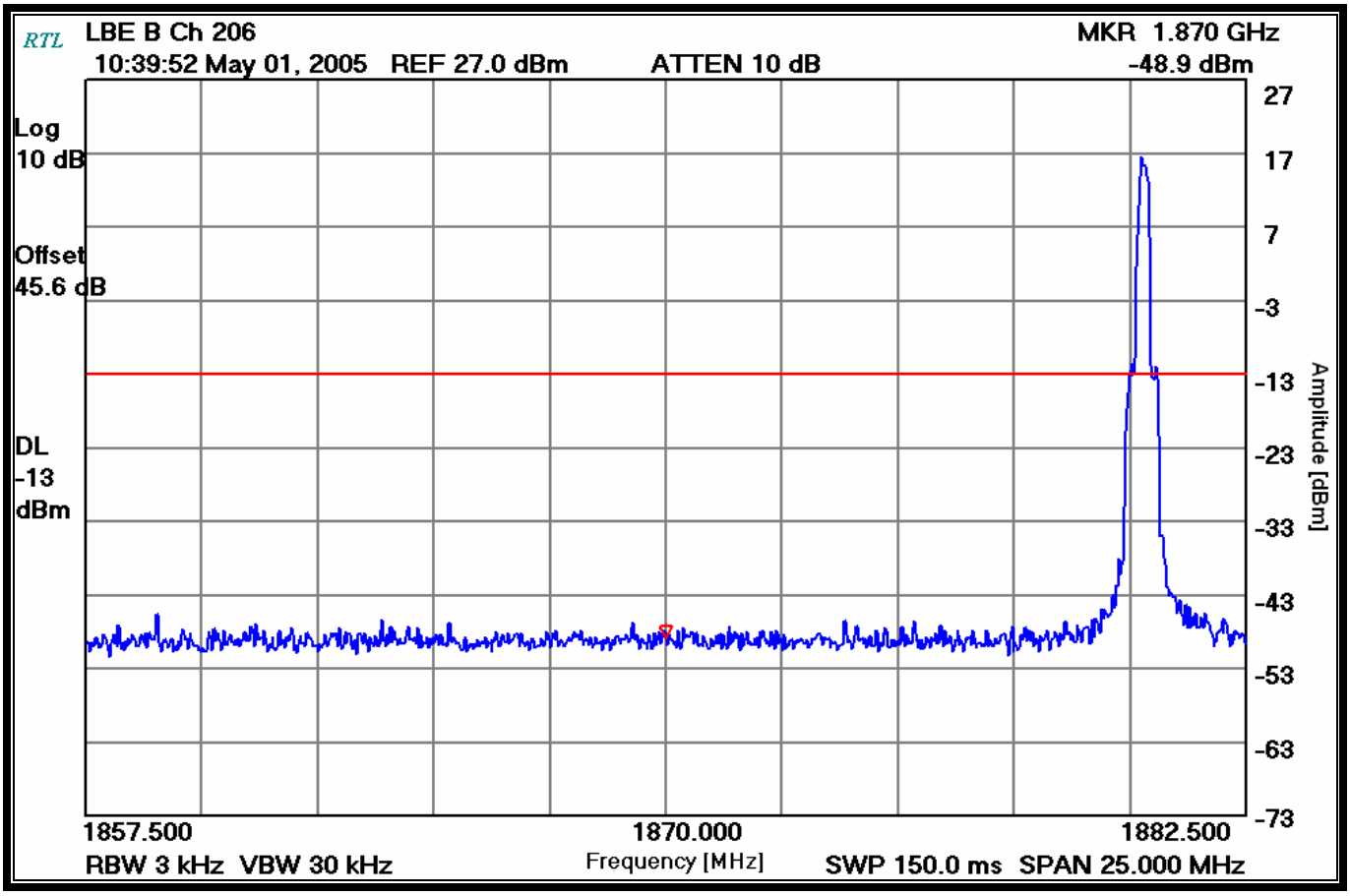
Delta Marker Method: The resolution of the spectrum analyzer is adjusted to 1% of the emission bandwidth after the reference level is adjusted to the EIRP level using a resolution and video bandwidth of 1 MHz. The frequency is centered on the band edge of interest with a span capable of showing the peak; a delta-to-peak is performed with the display line set at –13 dBm (43+10LogP).

7.2 BAND EDGE TEST DATA

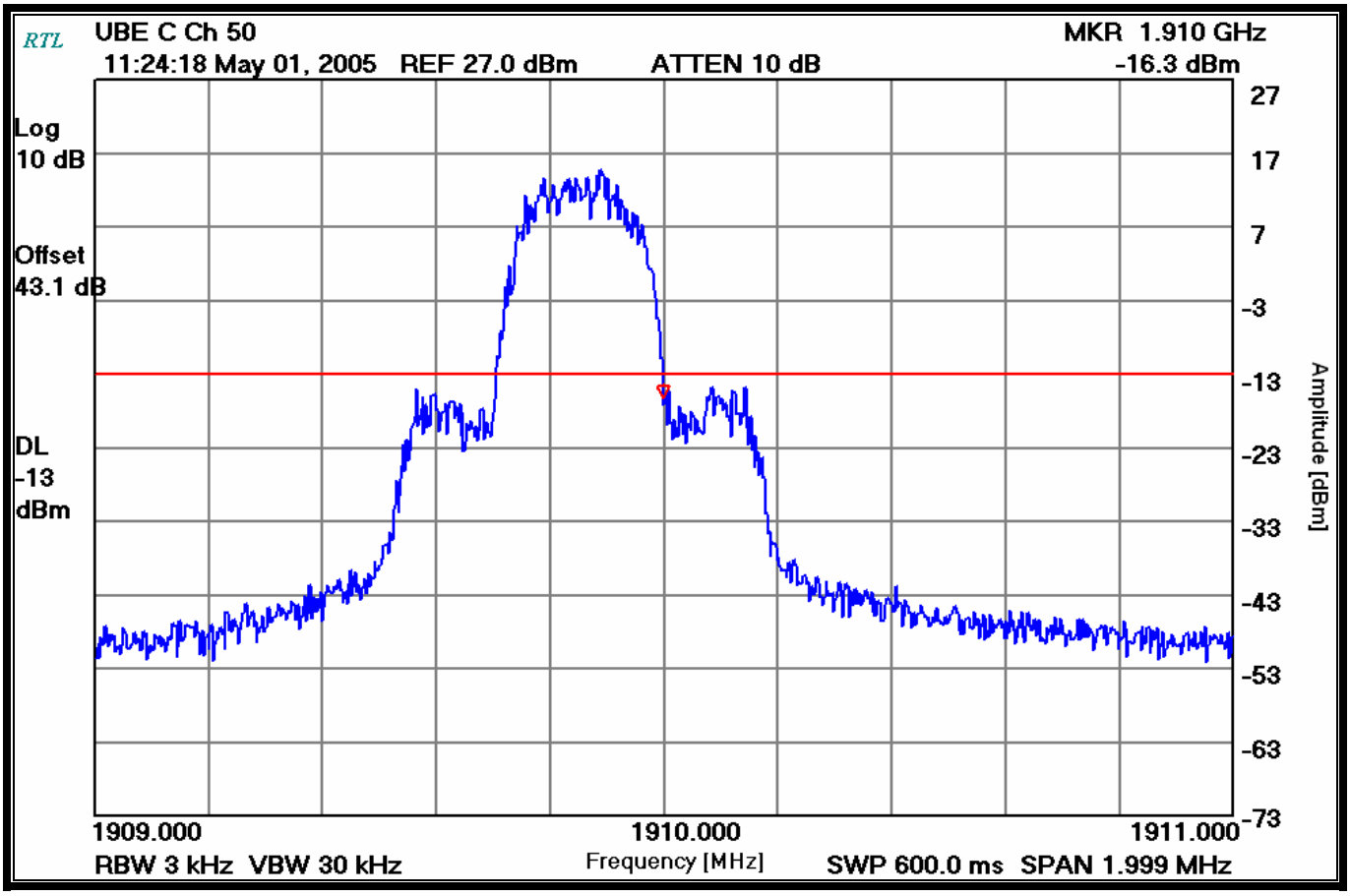
TABLE 7-1: BAND EDGE COMPLIANCE TEST DATA

Frequency (MHz)	Spurious at Block Edge (dBm)	Limit (dBm)	Margin (dB)
1870.00	-48.9	-13.0	-35.9
1910.00	-14.8	-13.0	-1.8

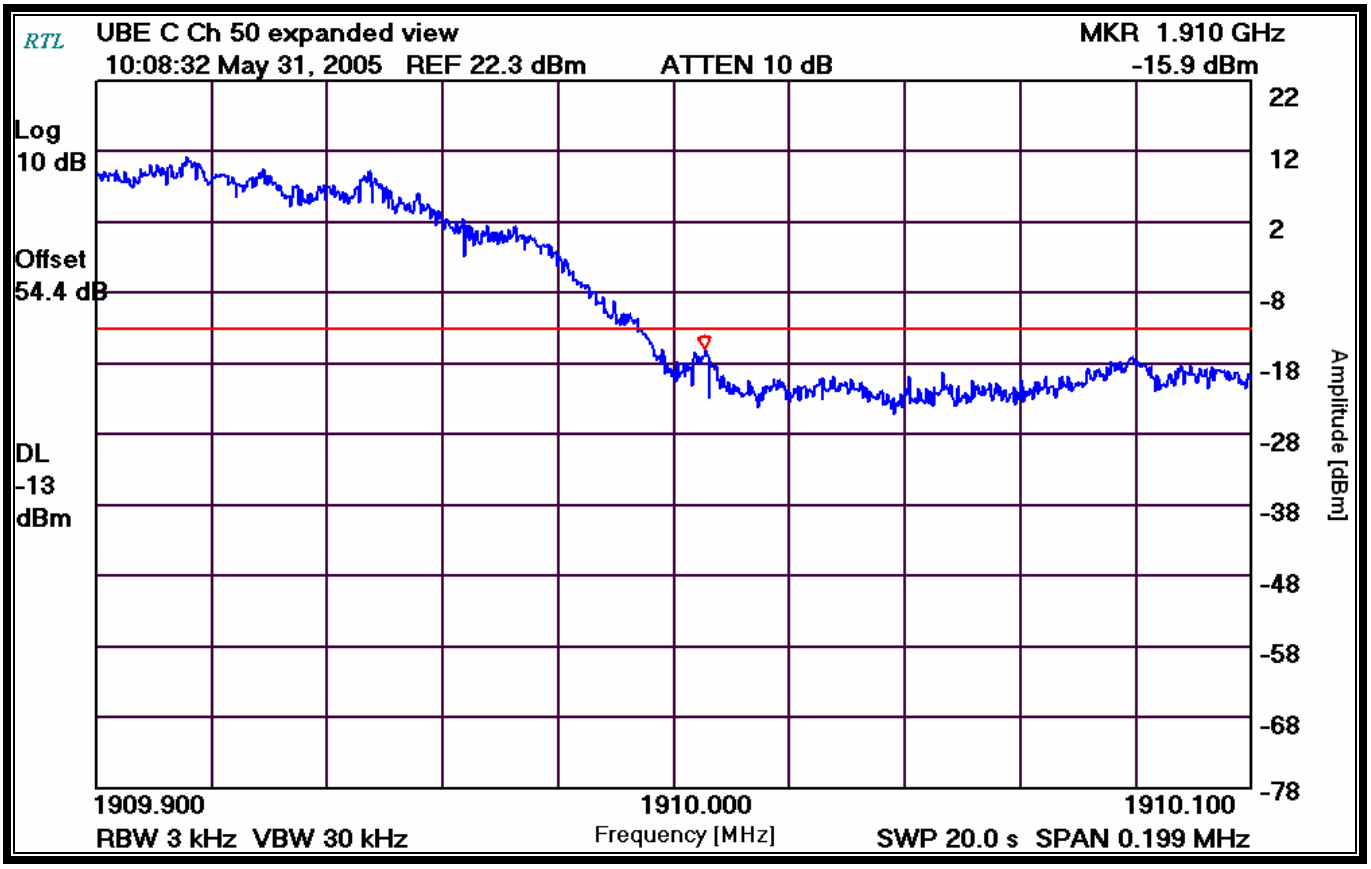
PLOT 7-1: LOWER BAND EDGE BLOCK B



PLOT 7-2: UPPER BAND EDGE BLOCK C



PLOT 7-3: UPPER BAND EDGE BLOCK C - EXPANDED VIEW



TEST PERSONNEL

Daniel W. Baltzell		May 1 & 31, 2005
EMC Test Engineer	Signature	Dates Of Test

7.3 BAND EDGE TEST EQUIPMENT

TABLE 7-2: BAND-EDGE TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20 MHz - 2 GHz)	2648	9/20/05
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	8/11/05

8 FREQUENCY STABILITY/TEMPERATURE VARIATION - §2.1055

The frequency stability and RF power, measured at the antenna connector, are plotted against supply voltage variations and temperature variations at the highest power levels for each modulation type. All measurements are made at the center of the frequency band.

8.1 MEASUREMENT METHOD

The frequency stability of the transmitter was measured by:

1. Temperature: The temperature was varied from -30°C to +50°C at intervals no more than 10°C throughout the temperature range using an environmental chamber. A period of time sufficient to stabilize all of the components in the equipment shall be allowed prior to each frequency measurement.
2. Primary Supply Voltage: The primary supply voltage was varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied. The EUT was tested down to the battery endpoint.

8.2 TIME PERIOD AND PROCEDURE

1. The carrier frequency of the transmitter was measured at room temperature (25°C to provide a reference).
2. The equipment was subjected to a “soak” at -30°C without any power applied.
3. After the “soak” at -30°C, the measurement of the carrier frequency of the transmitter was accomplished after applying power to the transmitter.
4. Frequency measurements were made at 10°C intervals up to +50°C, then back to room temperature. A minimum period of 30 minutes was provided to allow stabilization of the equipment at each temperature level.

8.3 FREQUENCY STABILITY - §24.235

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

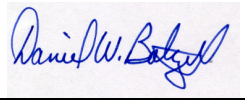
8.4 FREQUENCY STABILITY TEST DATA - §2.1055

Operating Frequency (MHz): 1895.15
Channel: 1
Reference Voltage (VDC): 4.2
Deviation Limit (ppm): 2.5

TABLE 8-1: TEMPERATURE FREQUENCY STABILITY DATA - §2.1055

Temperature	Frequency Measured (MHz)	Ppm
-30	1895.149537	-0.24
-20	1895.150575	0.30
-10	1895.149650	-0.18
0	1895.149425	-0.30
10	1895.149700	-0.16
20	1895.150000	0.00
30	1895.149475	-0.28
40	1895.149525	-0.25
50	1895.149600	-0.21

TEST PERSONNEL



Daniel W. Baltzell		May 1, 2005
EMC Test Engineer	Signature	Date Of Test

PLOT 8-1: TEMPERATURE FREQUENCY STABILITY DATA - §2.1055

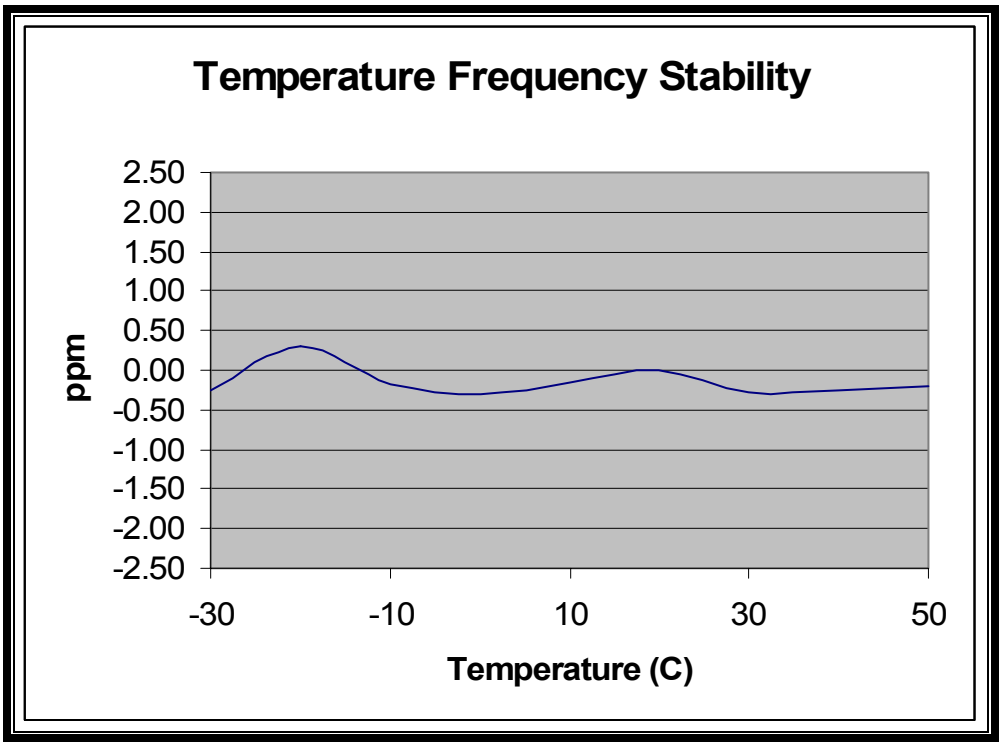


TABLE 8-2: VOLTAGE FREQUENCY STABILITY DATA - §2.1055

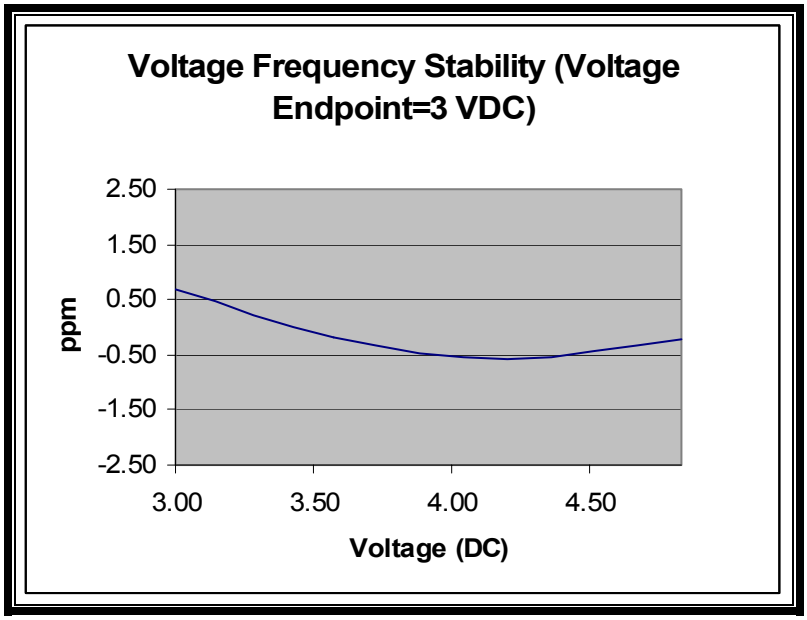
Battery endpoint = 3 VDC

Voltage	Frequency Measured (MHz)	Ppm
3.00	1895.151312	0.69
3.57	1895.149675	-0.17
4.20	1895.148887	-0.59
4.83	1895.149600	-0.21

TEST PERSONNEL

Daniel W. Baltzell		May 1, 2005
EMC Test Engineer	Signature	Date Of Test

PLOT 8-2: VOLTAGE FREQUENCY STABILITY



TEST PERSONNEL

Daniel W. Baltzell		May 1, 2005
EMC Test Engineer	Signature	Date Of Test

8.5 FREQUENCY STABILITY TEST EQUIPMENT

TABLE 8-3: FREQUENCY STABILITY TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
900946	Tenney Engineering, Inc	TH65	Temperature Chamber	11380	2/4/06
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	8/11/05
901350	Meterman	33XR	DMM	N/A	7/21/05

9 CONCLUSION

The data in this measurement report shows that the UTStarcom, Inc. Model # UT611, FCC ID: O6Y-UT611, complies with the applicable requirements of Parts 2 and 24 of the FCC Rules.