Engineering and Testing for EMC and Safety Compliance

TYPE CERTIFICATION REPORT

UTStarcom, Inc.
33 Wood Avenue South
3rd Floor
Iselin, NJ 08830
732-767-5263 (Scott Black)

MODEL: UTS-708J

FCC ID: O6YUTS-708J

January 10, 2001

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 1999	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 1999	§15.109: RADIATED EMISSIONS LIMITS
PART 24 (E): 1998	PERSONAL COMMUNICATIONS SERVICES – BROADBAND PCS
ANSI C63.4-1992	STANDARD FORMAT MEASUREMENT/TECHNICAL REPORT PERSONAL COMPUTER AND PERIPHERALS
ANSI/TIA/EIA603- 1992	LAND MOBILE FM OR PM COMMUNICATIONS EQUIPMENT MEASUREMENT AND PERFORMANCE STANDARDS
ANSI/TIA/EIA 603-1-1998	ADDENDUM TO ANSI/TIA/EIA 603-1992

FCC Rules Parts	Frequency Range	Output Power (W)	Freq. Tolerance	Emission Designator
24(E)	1895-1910 MHz	0.102 EIRP	5 ppm	273KDXW

REPORT PREPARED BY:

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Document Number: 2001013

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UTStarcom

Federal Communications Commission
Equipment Authorization Branch
7435 Oakland Mills Road
Columbia, Maryland 21046

July 4, 2000

Re: Agent's Authorization Letter

To Whom It May Concern:

I, Gerald S. Soloway as Vice President of Engineering of UTStarcom, Inc., of 33 Wood Avenue South, 3rd Floor, Iselin, NJ 08830, do hereby authorize, until further notice, Rhein Tech Laboratories, Inc. (RTL), 360 Herndon Parkway, Suite 1400, Herndon, Viginia 20170, to act on our behalf in dealings before the Federal Communications Commission with respect to all matters relating to equipment authorizations under Title 47 CFR. This authorization includes, but is not limited to, the signing of Form 731.

I certify that no party (as defined in 47 CFR 1.2002) to this application, including myself, is subject to a denial of federal benefits, that include FCC benefits, pursuant to section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C., 853A.

Submitted By:

Gerald S. Soloway
Vice President, Engineering
UTStarcom, Inc.

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1 GENERAL INFORMATION

The following Report of a Type Certification is prepared on behalf of ***UTStarcom, Inc.*** in accordance with the Federal Communications Commissions and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was the ***UTS-708J; FCC ID: O6YUTS-708J***. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47 and ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. 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.

1.1 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

1.2 RELATED SUBMITTAL(S)/GRANT(S)

This is an original application report.

2 CONFORMANCE STATEMENT

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. 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 15.109 and FCC Part 24(E) Certification methodology.

Signature:________________ Date: January 16, 2001

Typed/Printed Name: Bruno Clavier Position: Vice President of Operations (NVLAP Signatory)

Signature: ________________ Date: January 16, 2001

Typed/Printed Name: Daniel W. Baltzell Position: Test Engineer

Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 200061-0.

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

3 TESTED SYSTEM DETAILS

Listed below is the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

3.1 COMPONENTS

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
PHONE	UTSTARCOM, INC.	UTS-708-J	A09P0017B6D8	N/A	N/A	012924
PHONE	UTSTARCOM, INC.	UTS-708-J	A0BG0017F52D	N/A	N/A	012925

3.2 CONFIGURATION OF TESTED SYSTEM

4 CONDUCTED EMISSIONS

4.1 CONDUCTED MEASUREMENT

N/A

The device is battery operated.

5 RADIATED EMISSIONS

5.1 RADIATED MEASUREMENT

Before final measurements of radiated emissions were made on the open-field three-meter range, the EUT was scanned indoors at a three-meter distance in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three-meter, open-field test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations.

Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.

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:

FI(dBuV/m) = SAR(dBuV) + SCF(dB/m)
FI = Field Intensity
SAR = Spectrum Analyzer Reading
SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

SCF(dB/m) = - PG(dB) + AF(dB/m) + CL(dB)

SCF = Site Correction Factor
PG = Pre-amplifier Gain
AF = Antenna Factor
CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(uV/m) = 10^{FI(dBuV/m)/20}$$

For example, assume a signal at a frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is -11.5 dB/m. The actual radiated field strength is calculated as follows:

49.3 dBuV - 11.5 dB/m = 37.8 dBuV/m

$$10^{37.8/20} = 10^{1.89} = 77.6 \text{ uV/m}$$

5.3 PART 2.1046 (A) RF POWER OUTPUT: RADIATED – EIRP PART 24.232

5.3.1 TEST PROCEDURE

Substitution Method: ERP

The EUT was setup at an antenna to EUT distance of 3 meters on an open area test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane.

The physical arrangement of the EUT and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations.

The worst-case, maximum radiated emission was recorded and used as reference for the ERP measurement.

The EUT was then replaced by an ½wave dipole antenna and polarized in accordance with the EUT's antenna polarization. The ½wave dipole antenna was connected to a RF signal generator with a coaxial cable.

The search antenna height, and search antenna polarity was set to levels that produced the maximum reading obtained in step 3. The signal generator was adjusted to a level that produced the radiated emission level obtained in step 3.

The signal generator level was recorded and corrected by the power loss in the cable between the generator and the antenna and further corrected for the gain of the substitution antenna used relative to an ideal ½wave dipole antenna. The signal generator corrected level is the ERP level

CALCULATION METHOD: EIRP

$$P_{Watt} = \frac{E_{v/m}{}^{2} \times d_{m}{}^{2}}{30}$$

5.3.2 TEST DATA

Settings:

- Peak 80mW delivered to antenna
- Antenna: built-in with a 2.4 dBi gain
- radiated power measurements performed at a 3 meter distance

Frequency (MHz)	Emission Level* (dBuV)	Site Factor (dB/m)	Emission Level (dBuV/m)	Calculated ERP (mW)	Calculated EIRP (mW)
Channel 1					
1895.15	79.6	35.7	115.3	62.0	101.7
Channel 25					
1902.35	78.8	35.9	114.7	54.0	88.5
Channel 50					
1909.95	77.2	36.2	113.4	40.0	65.6

*Measurement accuracy is +/- 1.5 dB

5.3.3 TEST EQUIPMENT

Spectrum Analyser HP8566B
Antenna BiLog Chase 6112L

6 BAND-EDGE COMPLIANCE - PART 24.229 AND PART 24.238

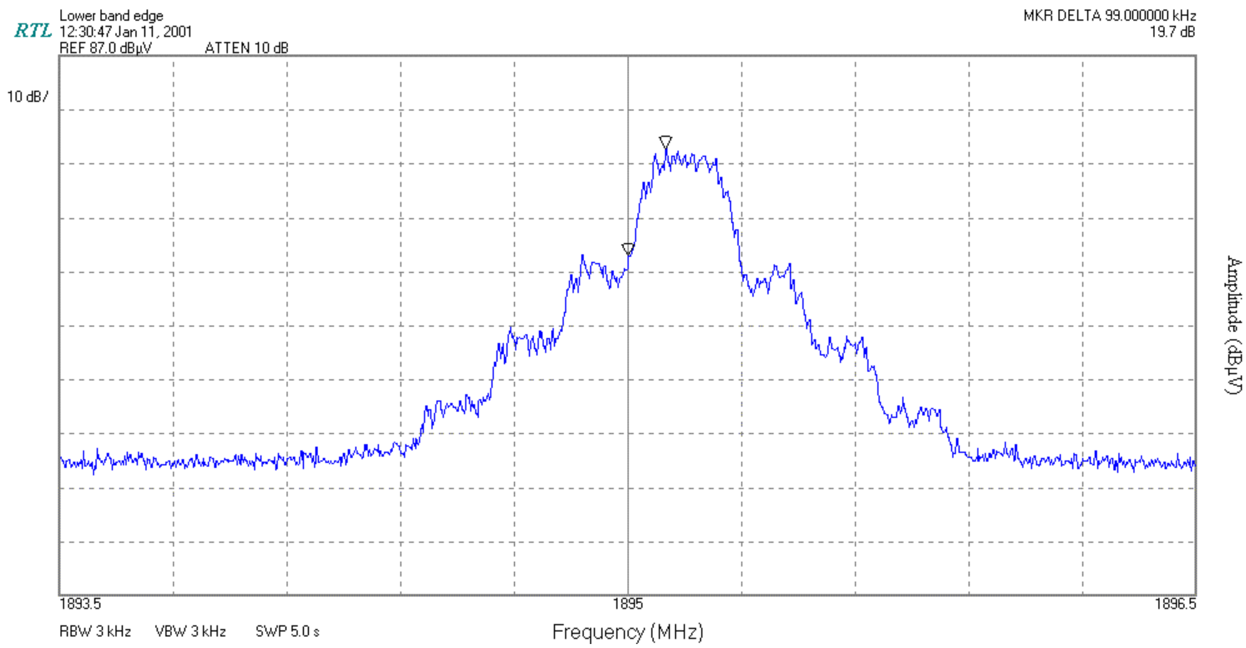
6.1 TEST PROCEDURE:

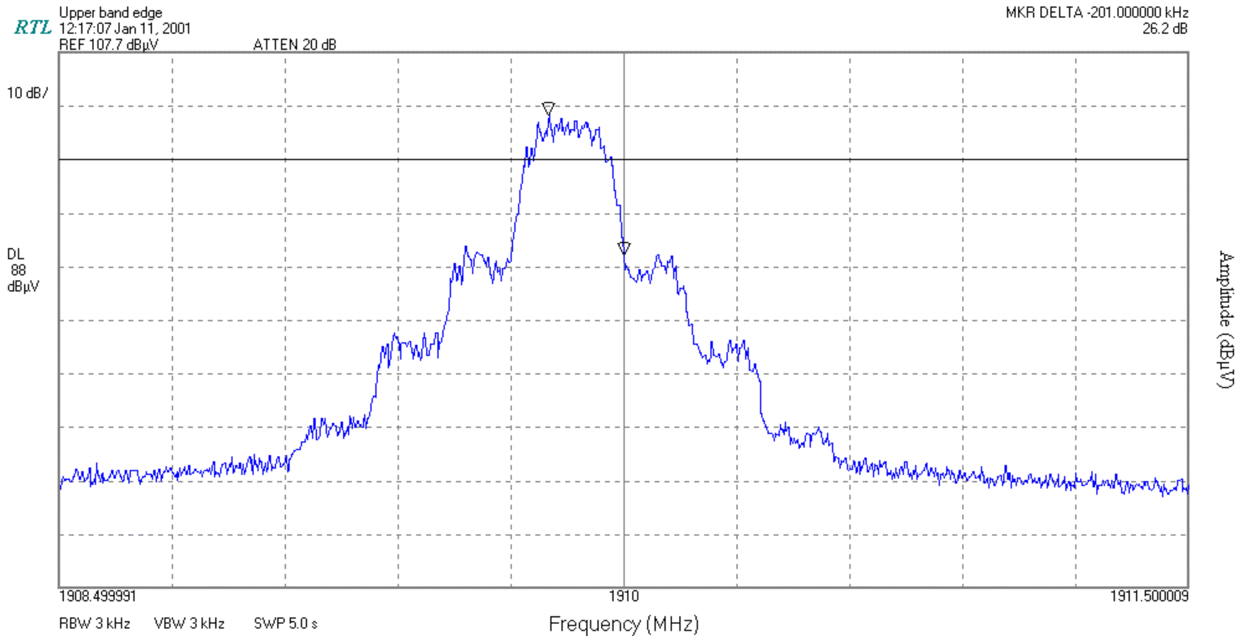
Delta Marker method

6.2 TEST DATA

The emission levels at the band edges are found to be below 82.2 dBuV/m EIRP.

Lower Band Edge (68.8 -19.7) – 82.2 = -33.1 dB
Upper Band Edge (69.5 -26.2) – 82.2 = -38.9 dB





6.3 TEST EQUIPMENT

Spectrum Analyser HP8566B
Antenna BiLog Chase 6112L

7 FCC RULES AND REGULATIONS PART 2 §2.1053 (A): FIELD STRENGTH OF SPURIOUS RADIATION – PART 24.238

7.1 TEST PROCEDURE

ANSI C63.4-1992

The transmitter is set in continuous transmitting mode and modulated with pseudo random data using the internal software.

Refer to section "Radiated Measurement" in this report for further information.

7.2 TEST DATA

The worst-case emissions test data are shown. The magnitude of emissions, attenuated more than 20 dB below the FCC limit, does not need to be recorded.

Channel 25; 1902.35 MHz

Frequency (MHz)	Emission level* (dBuV)	Correction Factor (dB/m)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
3804.750*	44.3	19.1	63.4	82.2	-18.8
3804.750	33.2	19.1	52.3	82.2	-29.9
5707.125*	38.8	19.9	58.7	82.2	-23.5
5707.125	38.8	19.9	58.7	82.2	-23.5
7609.500*	35.7	17.3	53.0	82.2	-29.2
7609.500	27.5	17.3	44.8	82.2	-37.4
9511.875	NF**				
11414.250	NF**				
13316.625	NF**				
15219.000	NF**				
17121.375	NF**				
19023.750	NF**				

* Peak detector per Part 24.238
**NF: Noise Floor

7.3 TEST EQUIPMENT

Antenna:	CHASE CBL6112	s/n 2099
Amplifier:	HP8449B	s/n 3008A00505
Spectrum analyzer:	HP8564E	s/n 3943A01719
RF Signal Generator	HP8648C	s/n 3537A01741
Synthesized Sweeper	HP83752A	s/n 3610A00846

8 FCC RULES AND REGULATIONS PART 2 §2.1049 (C) (1): OCCUPIED BANDWIDTH – PART 24.238

OCCUPIED BANDWIDTH (99% POWER BANDWIDTH) - COMPLIANCE WITH THE EMISSION MASKS

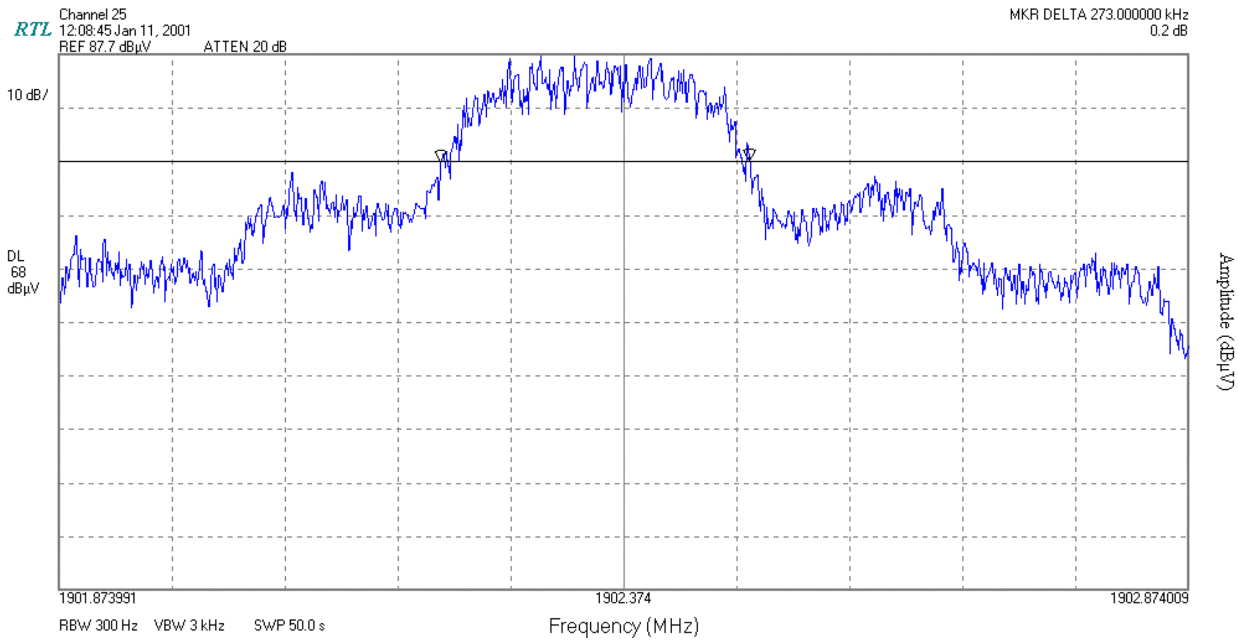
8.1 `TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.11

Device with digital modulation: operation to its maximum extent

8.2 TEST DATA

CHANNEL 25: OCCUPIED BANDWIDTH = 273 KHZ



8.3 TEST EQUIPMENT

Spectrum Analyzer HP8564E s/n 3943A01719

9 FCC RULES AND REGULATION PART 2 §2.1055: FREQUENCY STABILITY – PART 24.235

9.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.2

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

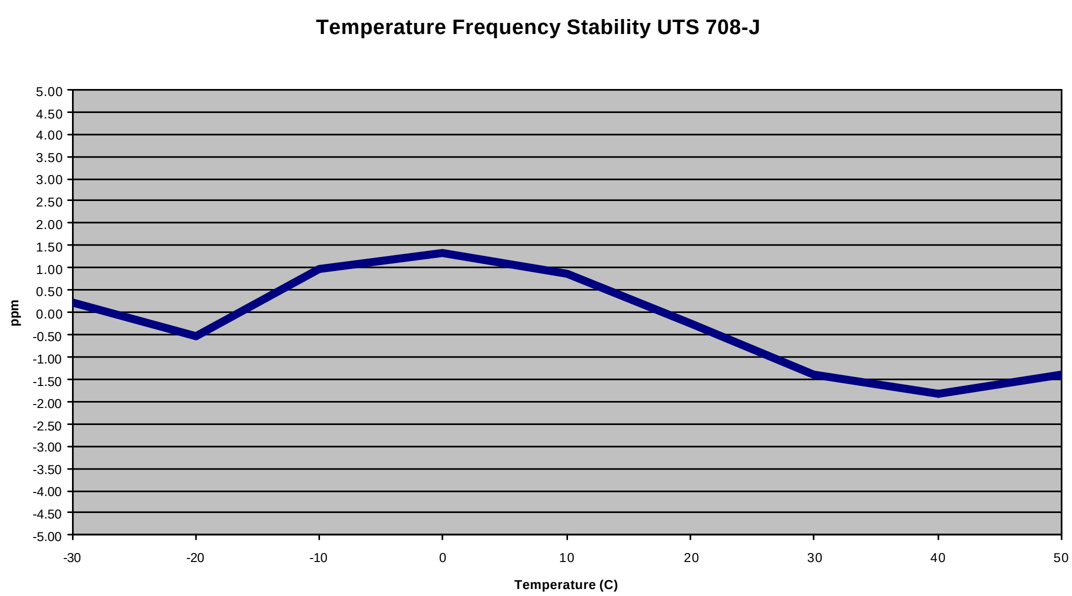
The EUT was evaluated over the temperature range -30°C to +50°C.

The temperature was initially set to -30°C and a 2-hour period was observed for stabilization of the EUT. The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10 degrees centigrade through the range. A ½ an hour period was observed to stabilize the EUT at each measurement step and the frequency stability was measured within one minute after application of primary power to the transmitter.
Additionally, the power supply voltage of the EUT was varied from 85% to 115% of the nominal battery voltage.

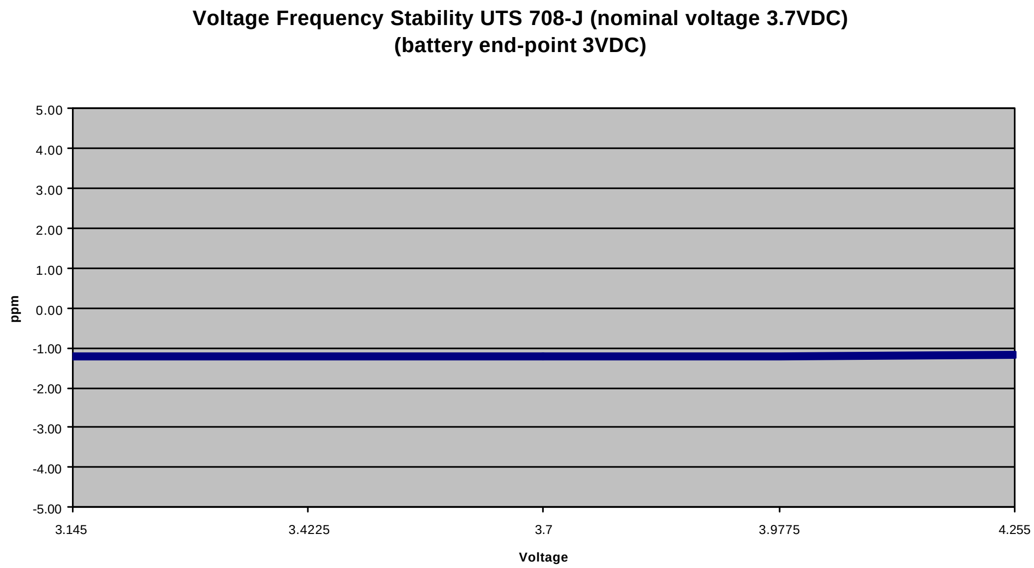
The worst-case test data are shown.

9.2 TEST DATA

9.2.1 FREQUENCY STABILITY/FREQUENCY VARIATION (-1.82 PPM AT 40C WORST CASE)



9.2.2 FREQUENCY STABILITY/VOLTAGE VARIATION (-1.23PPM WORST CASE)



9.3 TEST EQUIPMENT

Temperature Chamber	Tenney TH65	s/n 11380
Frequency Counter	HP8901A (Frequency Mode)	s/n 2545A04102

10 RECEIVER DATA

Temperature: 59°F, Humidity: 62%

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
38.394	Qp	V	0	1.0	25.0	-15.4	9.6	40.0	-30.4
160.002	Qp	V	90	1.0	25.1	-17.2	7.9	43.5	-35.6
262.398	Qp	V	0	1.0	25.9	-14.3	11.6	46.0	-34.4
473.601	Qp	V	30	1.0	20.9	-8.1	12.8	46.0	-33.2
614.397	Qp	V	0	1.0	22.3	-5.4	16.9	46.0	-29.1
844.802	Qp	V	0	1.0	21.5	-3.6	17.9	46.0	-28.1
1658.400	Av	V	240	1.0	37.5	3.4	40.9	54.0	-13.1

11 FCC RULES AND REGULATIONS PART 1.1307, 1.1310, 2.1091, 2.1093: RF EXPOSURES COMPLIANCE

Please see separate SAR Test Reports.