Engineering and Testing for EMC and Safety Compliance

TYPE CERTIFICATION REPORT
(BROADBAND PCS)

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

MODEL: UTS-708SY

FCC ID: O6YUTS-708SY

October 3, 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
RSS-133 (Rev. 1): November 1999	2 GHZ PERSONAL COMMUNICATIONS SERVICES
RSS-102 (Issue 1): September 1999	EVALUATION PROCEDURE FOR MOBILE AND PORTABLE RADIO TRANSMITTERS WITH RESPECT TO HEALTH CANADA'S SAFETY CODE 6 FOR EXPOSURE OF HUMANS TO RADIO FREQUENCY FIELDS

Frequency Range	Output Power (W)	Freq. Tolerance	Emission Designator
1893.65-1909.95 MHz	0.0161 EIRP	3 ppm	217KDXW

REPORT PREPARED BY:

EMC test Engineer: Daniel Baltzell
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Document Number: 2001244

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1 GENERAL INFORMATION

The following Report of a Type Certification for a broadband PCS 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-708SY; FCC ID: O6YUTS-708SY***. 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

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
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Frequency Range	Output Power (W)	Freq. Tolerance	Emission Designator
1893.65-1909.95 MHz	0.0161 EIRP	3 ppm	217KDXW

We, 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 15.109, FCC Part 24(E), ANSI/TIA/EIA 603, ANSI/TIA/EIA 603-1, Canada RSS-133 Certification methodology.

Signature: 

Date: October 3, 2001

Typed/Printed Name: Bruno Clavier

Position: Vice President of Operations
(NVLAP Signatory)

Signature: 

Date: October 3, 2001

Typed/Printed Name: Daniel W. Baltzell

Position: Test Engineer

NVLAP *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 EQUIPMENT TEST CONFIGURATION INFORMATION

TABLE 3-1: EQUIPMENT UNDER TEST (EUT)

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
PHONE	UTSTARCOM, INC.	UTS-708SY	N/A	N/A	N/A	13634
PHONE	UTSTARCOM, INC.	UTS-708SY	N/A	N/A	N/A	13633

TABLE 3-2: EXTERNAL COMPONENTS USED IN TEST CONFIGURATION

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
BATTERY CHARGER	SANYO	PHS-CHJ80	A99-0223JP	N/A	UNSHIELDED CABLE	13630

3.2 EQUIPMENT TEST CONFIGURATION

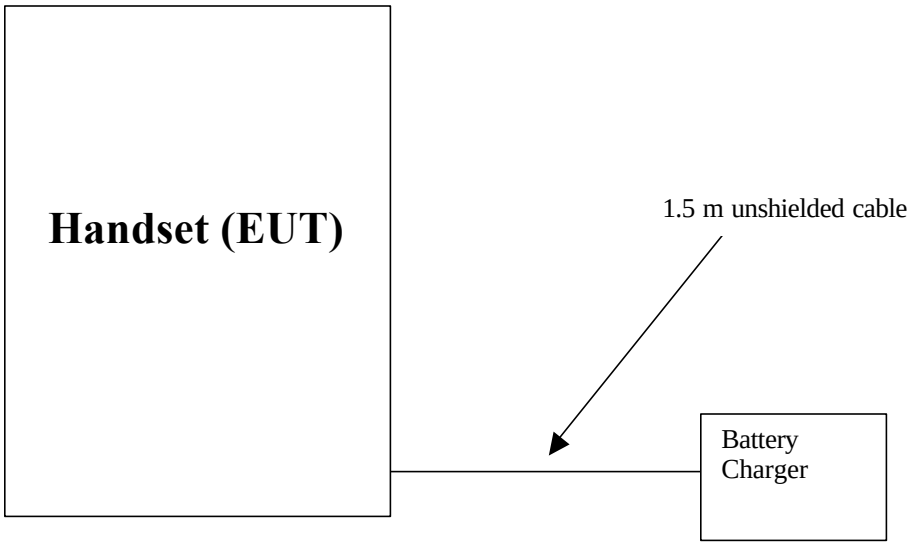


FIGURE 3-1:CONFIGURATION OF TESTED SYSTEM

4 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(dBì V/m) = SAR(dBì V) + 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:

$$FI(\text{ì V/m}) = 10^{FI(\text{dB ì V/m})/20}$$

For example, assume a signal at a frequency of 125 MHz has a received level measured as 49.3 dBì V. 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 dBì V - 11.5 dB/m = 37.8 dBì V/m

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

5 CONDUCTED AND RADIATED EMISSIONS MEASUREMENT INFORMATION – FCC PART 15

5.1 CONDUCTED MEASUREMENT

The EUT is operated with a battery. Power lines conducted emissions were measured when the radio was in transmit mode and while using a battery charger AC/DC powered from the mains.

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm / 50 ì H Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 400 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 400 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from 450 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

5.2 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.

6 PART 2 §2.1046 (A) RF POWER OUTPUT: RADIATED – EIRP PART 24.232 (RSS-133 §6.2)

6.1 TEST PROCEDURE

Method: EIRP

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 EIRP measurement.

The EUT was substituted with an antenna used to transmit a signal to match the level of the spectrum analyzer and associated receiving equipment. The level in units of dBm from the signal generator was corrected for cable loss and transmitting antenna gain and converted to mW, which is the final EIRP measurement.

6.2 TEST DATA

TABLE 6-1: PART 2.1046 (A) RF POWER OUTPUT: RADIATED – EIRP PART 24.232

Settings:

- 10mW delivered to antenna
- Antenna: built-in with a 2.14 dBi gain
- radiated power measurements performed at a 3 meter distance

Frequency (MHz)	Signal Generator Level (dBm)	Correction Factor (dB)	Corrected Signal Generator Level (dBm)	EIRP (mW)
Channel 251				
1893.65	5.8	5.5	11.3	13.4
Channel 25				
1902.35	5.5	5.5	11.1	12.5
Channel 50				
1909.95	6.6	5.5	12.1	16.1

*Measurement accuracy is +/- 1.5 dB

TEST PERSONNEL:

DANIEL BALTZELL — TEST TECHNICIAN/ENGINEER

SIGNATURE

OCTOBER 3, 2001 — DATE OF TEST

TABLE 6-2: TEST EQUIPMENT USED FOR TESTING (RADIATED – EIRP RF POWER OUTPUT)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771
900154	Compliance Design Inc,	Roberts Dipole	Adjustable Elements Dipole Antenna (30-1000MHz)	-

7 FCC PART 2 §2.1049 (C) (4): NECESSARY BANDWIDTH (OCCUPIED BANDWIDTH) – PART 24.238 (B) (EMISSION BANDWIDTH)

Type of Emission: DXW

Necessary bandwidth designator derived from measurement of occupied bandwidth (217kHz): 217KDXW

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

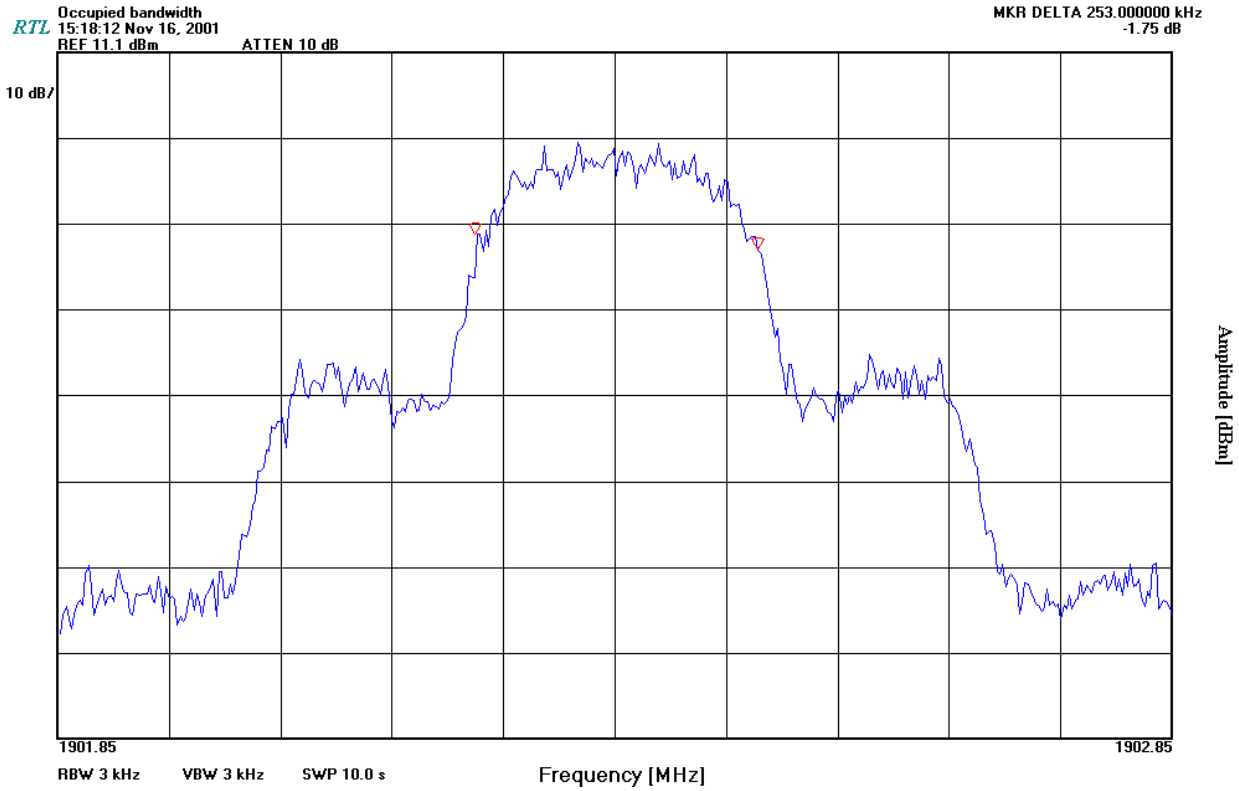
7.1 TEST PROCEDURE

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

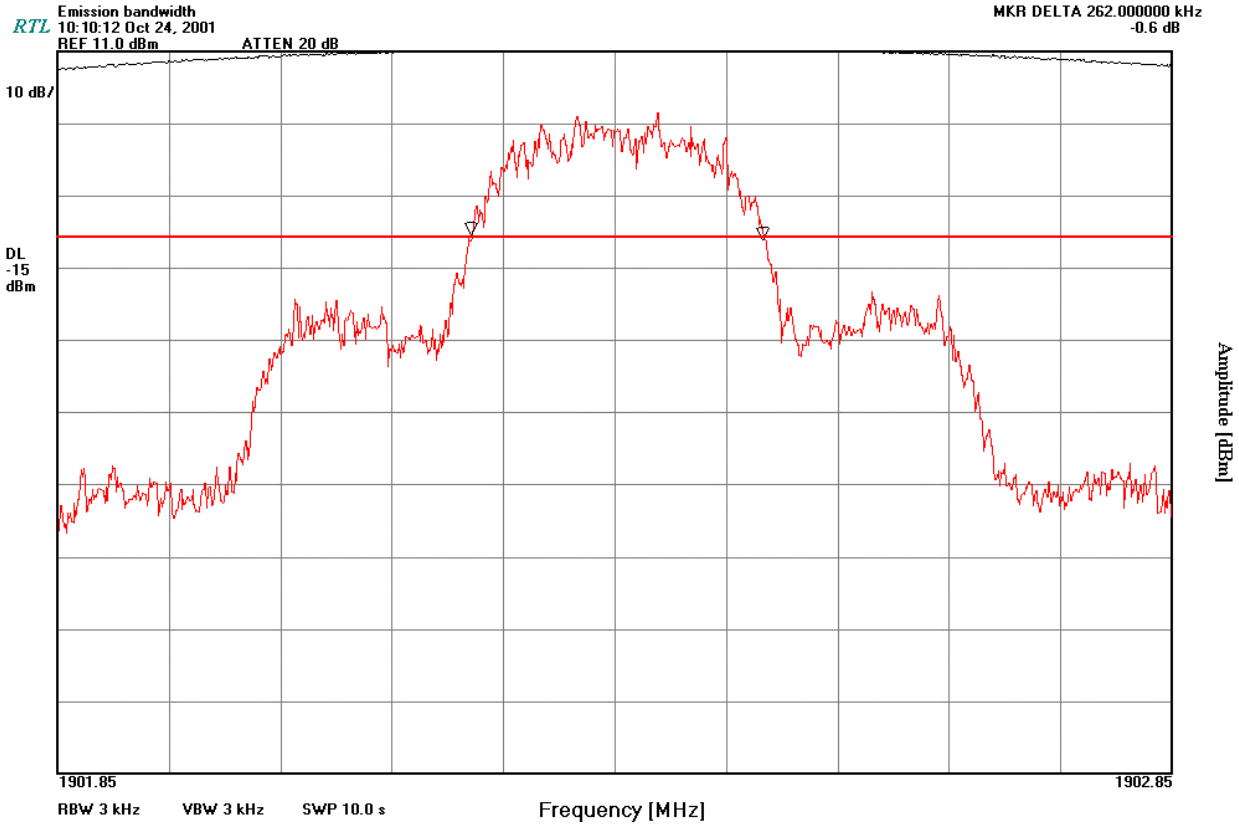
Device with digital modulation: operation to its maximum extent

7.2 TEST DATA

PLOT 7-1: CHANNEL 25: OCCUPIED BANDWIDTH = 253 KHZ



PLOT 7-2: CHANNEL 25: EMISSION BANDWIDTH = 262 KHZ



TEST PERSONNEL:

DANIEL BALTZELL		OCTOBER 24, 2001/NOVEMBER 16, 2001
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

TABLE 7-1: TEST EQUIPMENT USED FOR TESTING (OCCUPIED BANDWIDTH)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719

8 FCC PART 2 §2.1053 (A): FIELD STRENGTH OF SPURIOUS RADIATION – PART 24.238

8.1 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.

8.2 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.

TABLE 8-1: FIELD STRENGTH (CHANNEL 251; 1893.65 MHZ; 11.3 DBM EIRP)

Frequency (MHz)	Signal Generator Level (dBm)	Correction Factor (dB)	Corrected Level (dBc)	Limit (dBc)	Margin (dB)
3787.300*	-36.0	4.9	42.4	24.3	-18.1
5680.950*	-58.9	5.4	64.8	24.3	-40.5
7574.600	<-60.0				
9468.250	<-60.0				
11361.900	<-60.0				
13255.550	<-60.0				
15149.200	<-60.0				
17042.850	<-60.0				
18936.500	<-60.0				

* Peak detector per Part 24.238

TEST PERSONNEL:

DANIEL BALTZELL		OCTOBER 3, 2001
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

TABLE 8-2: FIELD STRENGTH (CHANNEL 25; 1902.35 MHZ; 11.0 DBM EIRP)

Frequency (MHz)	Signal Generator Level (dBm)	Correction Factor (dB)	Corrected Level (dBc)	Limit (dBc)	Margin (dB)
3804.700*	-38.8	4.1	45.7	24.0	-21.7
5728.050*	-59.0	5.2	64.8	24.0	-40.8
7637.400*	<-60				
9546.750	<-60				
11456.100	<-60				
13365.450	<-60				
15274.800	<-60				
17184.150	<-60				
19093.500	<-60				

* Peak detector per Part 24.238

TEST PERSONNEL:

DANIEL BALTZELL
TEST TECHNICIAN/ENGINEER

SIGNATURE

OCTOBER 3, 2001
DATE OF TEST

TABLE 8-3: FIELD STRENGTH (CHANNEL 50; 1909.95 MHZ; 12.1 DBM EIRP)

Frequency (MHz)	Signal Generator Level (dBm)	Correction Factor (dB)	Corrected Level (dBc)	Limit (dBc)	Margin (dB)
3819.90*	-38.8	4.1	46.8	25.1	-21.7
5729.85*	-61.2	5.2	68.1	25.1	-43.0
7639.80	<-60				
9549.75	<-60				
11459.70	<-60				
13369.65	<-60				
15279.60	<-60				
17189.55	<-60				
19099.50	<-60				

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

TEST PERSONNEL:

DANIEL BALTZELL — TEST TECHNICIAN/ENGINEER

SIGNATURE

OCTOBER 3, 2001 — DATE OF TEST

TABLE 8-4: TEST EQUIPMENT USED FOR TESTING (FIELD STRENGTH)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
900791	Schaffner@Chase	CBL6112	Anetenna (25MHz – 2GHz)	2099
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1-26.5 GHz)	3008A00505
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719
900917	Hewlett Packard	8648C	Synthesized. Signal Generator (9 KHz to 3200 MHz)	3537A01741
900928	Hewlett Packard	83752A	Synthesized Sweeper, 0.01 to 20 GHz	3610A00866

9 FCC PART 2 §2.1055: FREQUENCY STABILITY – PART 24.235 (RSS-133 §7)

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.

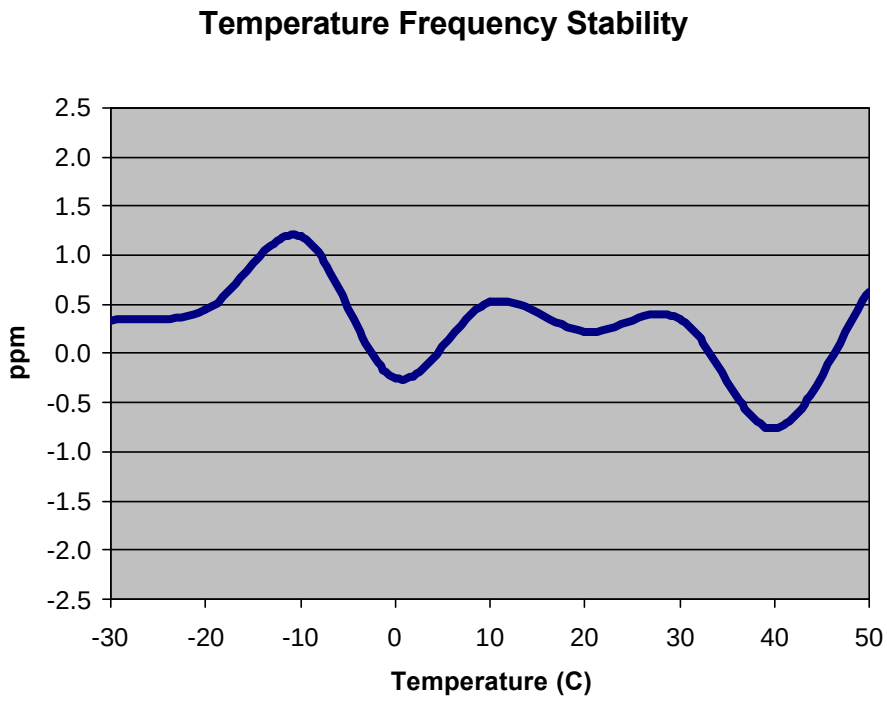
The worst-case test data are shown.

9.2 TEST DATA

TABLE 9-1: FREQUENCY STABILITY/FREQUENCY VARIATION

Temperature (C)	Frequency Measured (MHz)	ppm
-30	1902.350643	0.3
-20	1902.350838	0.4
-10	1902.352270	1.2
0	1902.349520	-0.3
10	1902.351000	0.5
20	1902.350423	0.2
30	1902.350678	0.4
40	1902.348549	-0.8
50	1902.351202	0.6

PLOT 9-1: FREQUENCY STABILITY/FREQUENCY VARIATION (1.2 PPM AT -10C WORST CASE)



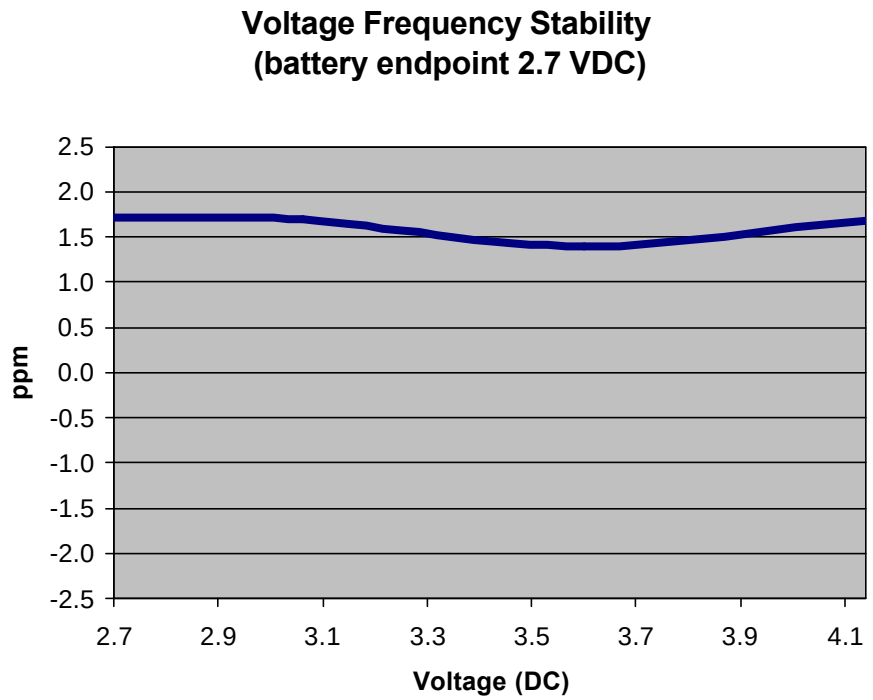
TEST PERSONNEL:

DANIEL BALTZELL		OCTOBER 3, 2001
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

TABLE 9-2: FREQUENCY STABILITY/VOLTAGE VARIATION

Voltage (VDC)	Frequency Measured (MHz)	ppm
2.7	1902.353272	1.7
3.06	1902.353214	1.7
3.6	1902.352653	1.4
4.14	1902.353205	1.7

PLOT 9-2: FREQUENCY STABILITY/VOLTAGE VARIATION (1.7 PPM WORST CASE)



TEST PERSONNEL:

DANIEL BALTZELL
TEST TECHNICIAN/ENGINEER

SIGNATURE

OCTOBER 3, 2001
DATE OF TEST

TABLE 9-3: TEST EQUIPMENT USED FOR TESTING (FREQUENCY STABILITY)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380
901055	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2545A04102

10 FCC PART 15 §15.107 (A) CONDUCTED EMISSIONS

10.1 CONDUCTED EMISSIONS: CHANNEL 25 1902.35 MHZ

10.1.1 TEST DATA WITH BATTERY CHARGER

TABLE 10-1: CONDUCTED EMISSIONS (CLASS B LIMITS) NEUTRAL SIDE (LINE 1)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBì V)	Site Correction Factor (dB)	Emission Level (dBì V)	Limit (dBì V)	Margin (dB)
0.454	Pk	41.1	0.8	41.9	48.0	-6.1
0.566	Pk	38.9	0.7	39.6	48.0	-8.4
0.906	Pk	35.4	0.7	36.1	48.0	-11.9
1.176	Pk	33.0	0.9	33.9	48.0	-14.1
1.608	Pk	29.9	1.0	30.9	48.0	-17.1
7.235	Pk	17.6	2.1	19.7	48.0	-28.3
12.580	Pk	17.5	2.7	20.2	48.0	-27.8

TABLE 10-2: CONDUCTED EMISSIONS (CLASS B LIMITS) HOT SIDE (LINE 2)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBì V)	Site Correction Factor (dB)	Emission Level (dBì V)	Limit (dBì V)	Margin (dB)
0.542	Pk	33.7	0.7	34.4	48.0	-13.6
0.650	Pk	31.3	0.7	32.0	48.0	-16.0
0.759	Pk	36.8	0.8	37.6	48.0	-10.4
0.868	Pk	35.4	0.7	36.1	48.0	-11.9
1.176	Pk	33.4	0.9	34.3	48.0	-13.7
1.284	Pk	30.8	0.9	31.7	48.0	-16.3
1.608	Pk	29.8	1.0	30.8	48.0	-17.2
7.405	Pk	17.7	2.1	19.8	48.0	-28.2
11.520	Pk	18.2	2.5	20.7	48.0	-27.3

TEST PERSONNEL:

DANIEL BALTZELL		OCTOBER 3, 2001
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

TABLE 10-3: TEST EQUIPMENT USED FOR TESTING (CONDUCTED EMISSIONS)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
900931	HP	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771
900070	Solar		LISN	

11 FCC PART 15 §15.109 (A) RADIATED EMISSIONS (RSS-133 §9)

TABLE 11-1: RADIATED EMISSIONS (RECEIVER DATA) TEMPERATURE: 59°F, HUMIDITY: 62%

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBì V)	Site Correction Factor (dB/m)	Emission Level (dBì V/m)	Limit (dBì V/m)	Margin (dB)
76.800	Qp	V	145	1.0	41.7	-22.9	18.8	40.0	-21.2
84.000	Qp	V	270	1.0	34.4	-21.8	12.6	40.0	-27.4
120.000	Qp	V	145	1.0	36.8	-15.6	21.2	43.5	-22.3
132.000	Qp	V	145	1.0	32.8	-15.5	17.3	43.5	-26.2
144.000	Qp	H	145	1.8	33.2	-16.9	16.3	43.5	-27.2
194.400	Qp	V	245	1.0	28.9	-18.0	10.9	43.5	-32.6
287.991	Qp	V	245	1.0	30.5	-14.2	16.3	46.0	-29.7
506.391	Qp	V	145	1.0	26.4	-8.1	18.3	46.0	-27.7
1328.820	Av	V	145	1.0	37.5	0.4	37.9	54.0	-16.1
1508.820	Av	V	225	1.0	38.2	2.3	40.5	54.0	-13.5

TEST PERSONNEL:

DANIEL BALTZELL — TEST TECHNICIAN/ENGINEER

SIGNATURE

OCTOBER 3, 2001 — DATE OF TEST

TABLE 11-2: TEST EQUIPMENT USED FOR TESTING (RADIATED EMISSIONS)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771
900999	HP	8596EM Analyzer	Spectrum Analyzer (9KHz - 12.5GHz)	3826A00144
901053	Schaffner@Chase	CBL6112B	Bilog antenna (20 MHz - 2 GHz)	2648
900321	EMCO	3161-03	Horn Antennas (4-8,2GHz)	9508-1020
900323	EMCO	3161-03	Horn Antennas (4-8,2GHz)	9508-1020
900772	Electro Metrics	RGA 60	Horn Antenna	2310
900889	HP	85685A	RF Preselector for HP 8566B or 8568B (20Hz-2GHz)	3146A01309
900800	EMCO	3301B	Active monopole antenna (30 Hz – 50 MHz)	9809-4071

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12 BAND-EDGE COMPLIANCE - PART 24.229 AND PART 24.238 (RSS-133 §6.3)

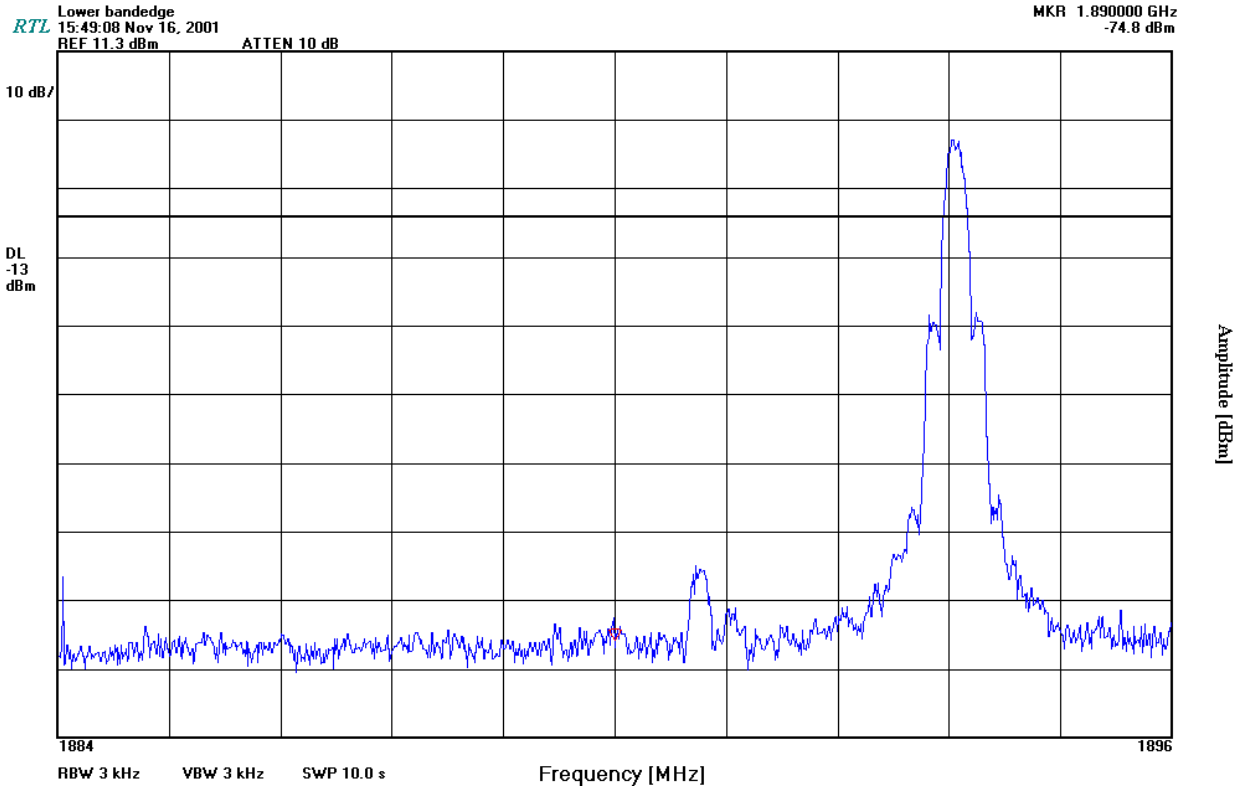
12.1 TEST PROCEDURE:

Radiated Measurement

12.2 TEST DATA

The emission levels at the band edges are found to be compliant. The measurement was a radiated method, the following plots show the reference level as was measured using the substitution method to obtain EIRP

PLOT 12-1: LOWER BAND EDGE



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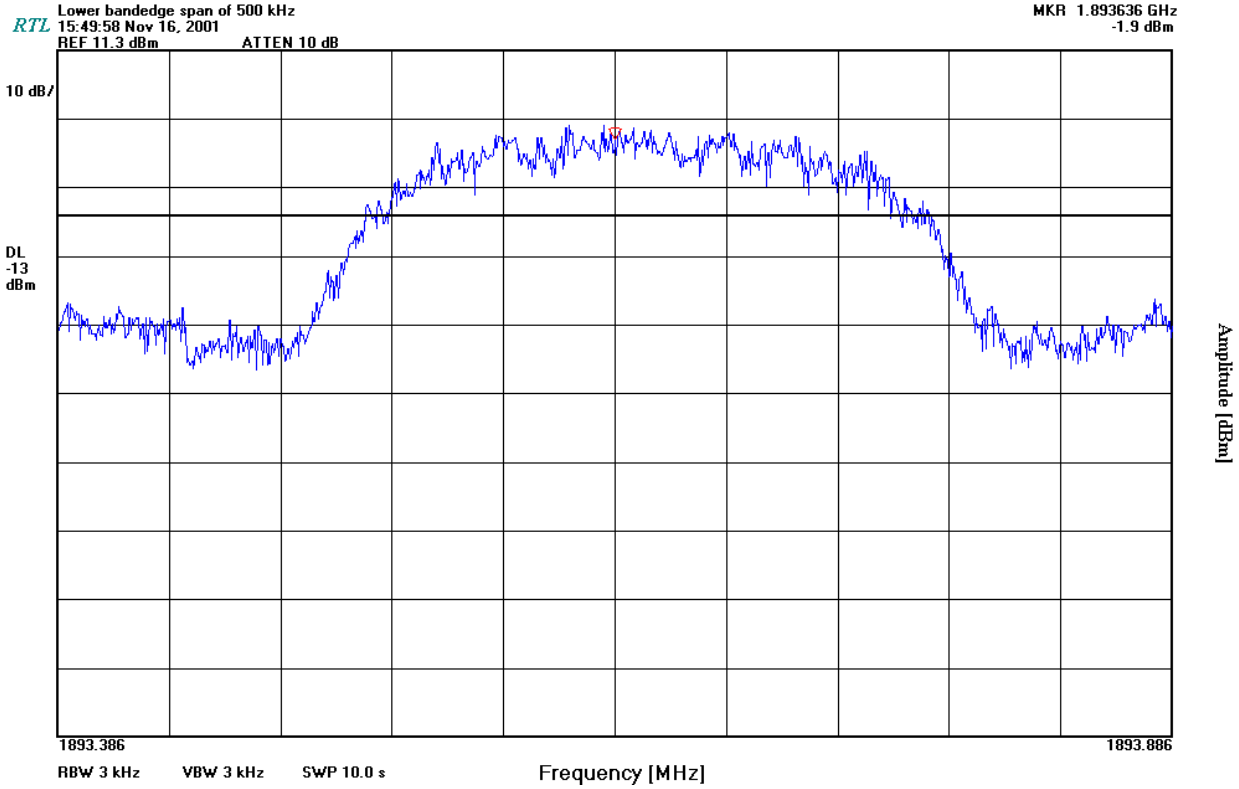
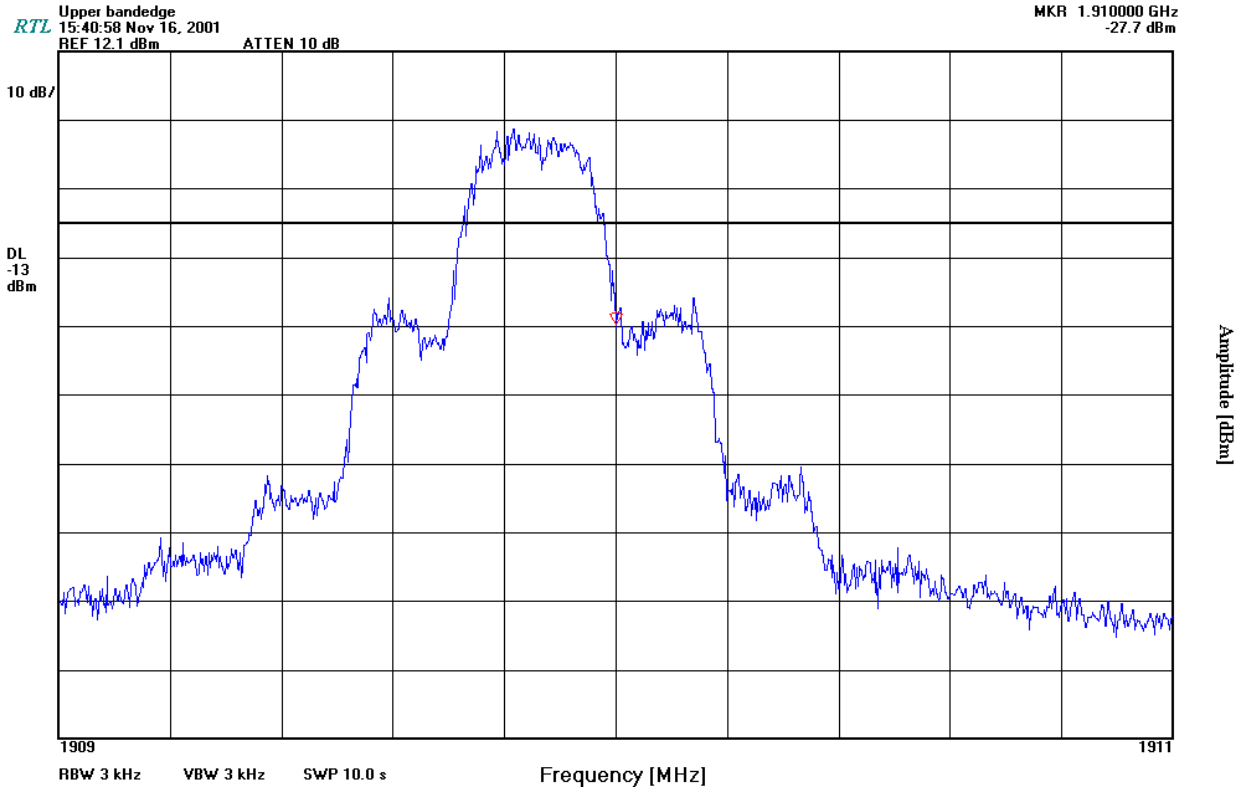
Plot 12-2: Lower Band Edge with same settings except span of 500 kHz



TEST PERSONNEL:

DANIEL BALTZELL		NOVEMBER 16, 2001
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

PLOT 12-3: UPPER BANDEDGE



TEST PERSONNEL:

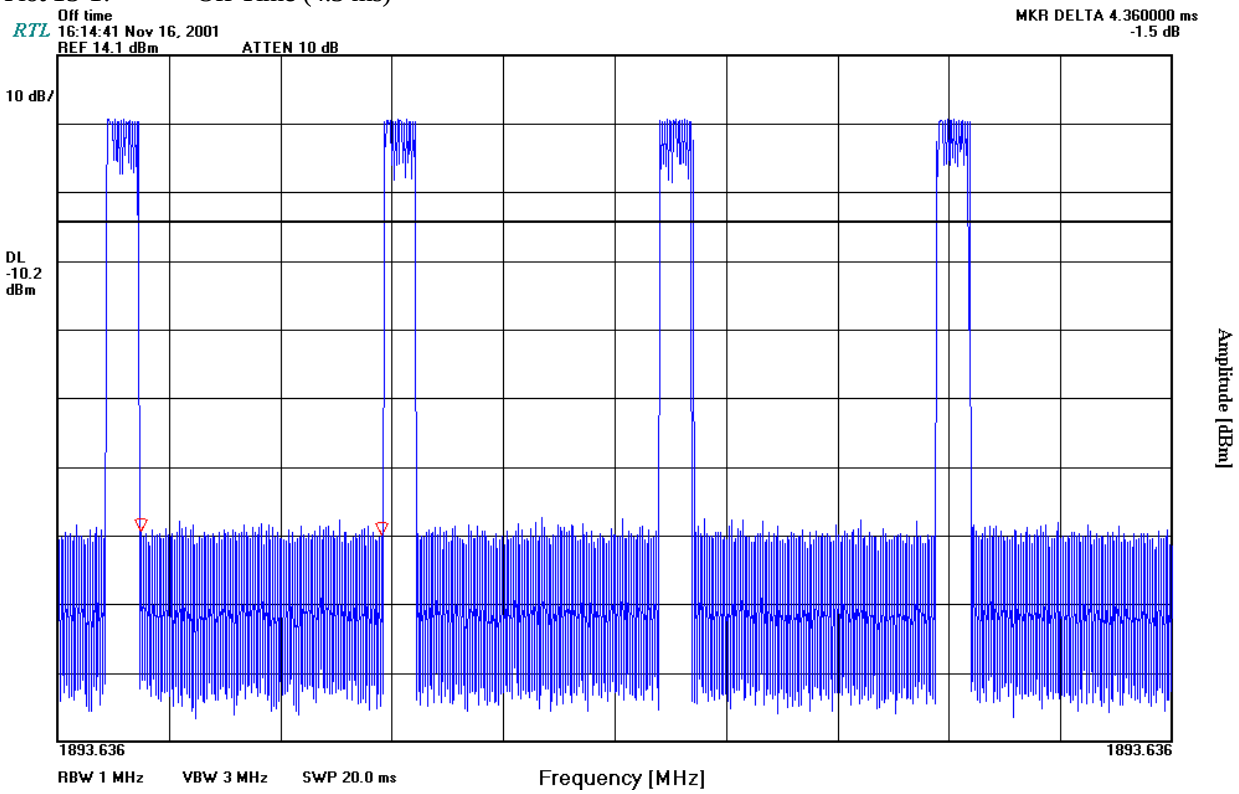
DANIEL BALTZELL		NOVEMBER 16, 2001
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

TABLE 12-1: TEST EQUIPMENT USED FOR TESTING (BANDEDGE)

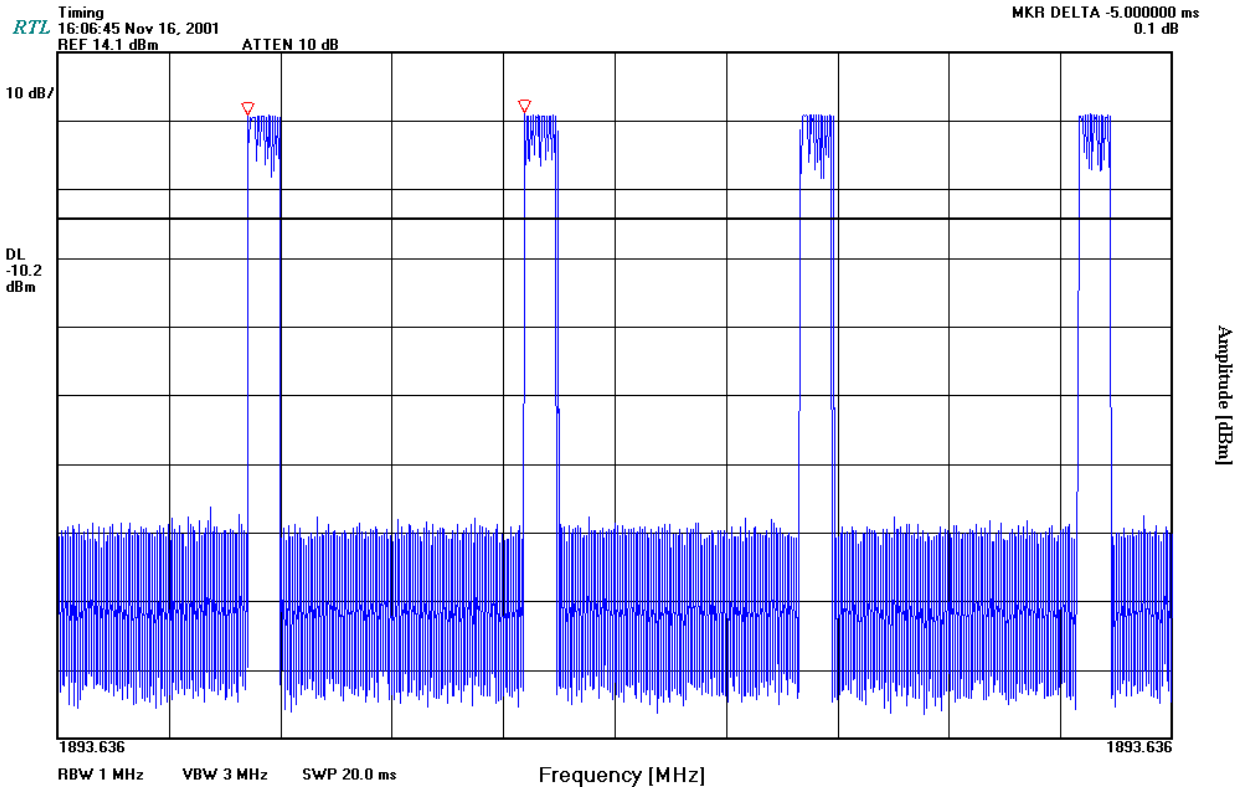
RTL Asset #	Manufacturer	Model	Part Type	Serial Number
900931	HP	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771
900791	Schaffner - Chase	CBL6112	BiLog Atenna (25MHz – 2GHz)	2099

13 PLOTS OF TRANSMITTER TIMING INFORMATION

Plot 13-1: Off Time (4.3 ms)



Plot 13-2: Timing (5 ms)



Plot 13-3: Pulse width (560 us)