Engineering and Testing for EMC and Safety Compliance

CERTIFICATION APPLICATION REPORT
FCC PART 90

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	AMCO Automated Systems, LLC Phone: 919-250-5700 203 Rogers Lane Fax: 919-250-5439 Raleigh, NC 27610 Contact: Steve Bragg Email: steve.bragg@us.amcoas.com

FCC ID:	G8JHHI01	**TEST REPORT DATE:**	May 16, 2005
MODEL # / NAME:	52808G505 / Hand Held Interrogator	**RTL WORK ORDER:**	2004234
EQUIPMENT TYPE:	Transmitter/Receiver	**RTL QUOTE NUMBER:**	QRTL04-417

FCC Classification:	☒ TNB – Licensed Non-Broadcast Station Transmitter
FCC Rule Part(s):	Part 90: Private Land Mobile Radio Services

Frequency Range (MHz)	Conducted Antenna Port Output Power (W)	Frequency Tolerance (PPM)	Emission Designator
451.355	1	5	6K00A3D

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. Modifications were made to the equipment during testing in order to achieve compliance with these standards and are outlined in the modification section 2.3. Furthermore, there was no deviation from, additions to or exclusions from the FCC Part 2, FCC Part 90, ANSI C63.2, ANSI/TIA-603-B-2002 and ANSI/TIA/EIA 603-1 and ANSI/TIA-603.

Signature: ______________________ Date: May 16, 2005

Typed/Printed Name: Desmond A. Fraser Position: President

Signature: Date: May 16, 2005

Typed/Printed Name: Daniel Baltzell Position: Test Engineer

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1 GENERAL INFORMATION

1.1 SCOPE

FCC Rules Part 90 (Subpart K): This subpart sets forth special requirements applicable to the use of certain frequencies or frequency bands.

All measurements contained in this application were conducted in accordance with the FCC Rules and Regulations CFR47 Part 90 and ANSI/TIA/EIA603-B-2002 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards. The measurement instrumentation conforms to the ANSI C63.2; 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 C63.2).

1.3 RELATED SUBMITTAL(S)/GRANT(S)

This is an original application for Certification. A DoC report is on file for the receiver section and digital interface for the EUT.

2 EQUIPMENT INFORMATION

2.1 TEST SYSTEM DETAILS

The test sample was received on January 12, 2005. The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system are:

TABLE 2-1: EQUIPMENT UNDER TEST (EUT)

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
Handheld Interrogator Module	AMCO Automated Systems, LLC	N/A	N/A	G8JHHI01	0.1m shielded antenna	16427
Handheld Interrogator Module	AMCO Automated Systems, LLC	N/A	N/A	N/A	0.1m shielded antenna	16428
Antenna	CMET	SH-55	N/A	G8JHHI01	N/A	16426
DAPBase (Charger)	DAP Technologies	UC840	26358569U846	N/A	N/A	16429
Microflex	DAP Technologies	CY1967	N/A	N/A	N/A	16430
12V AC Adapter	Baknor	57DT-12-2000	C5810	N/A		16431

2.2 WORST CASE CONFIGURATION OF TESTED SYSTEM

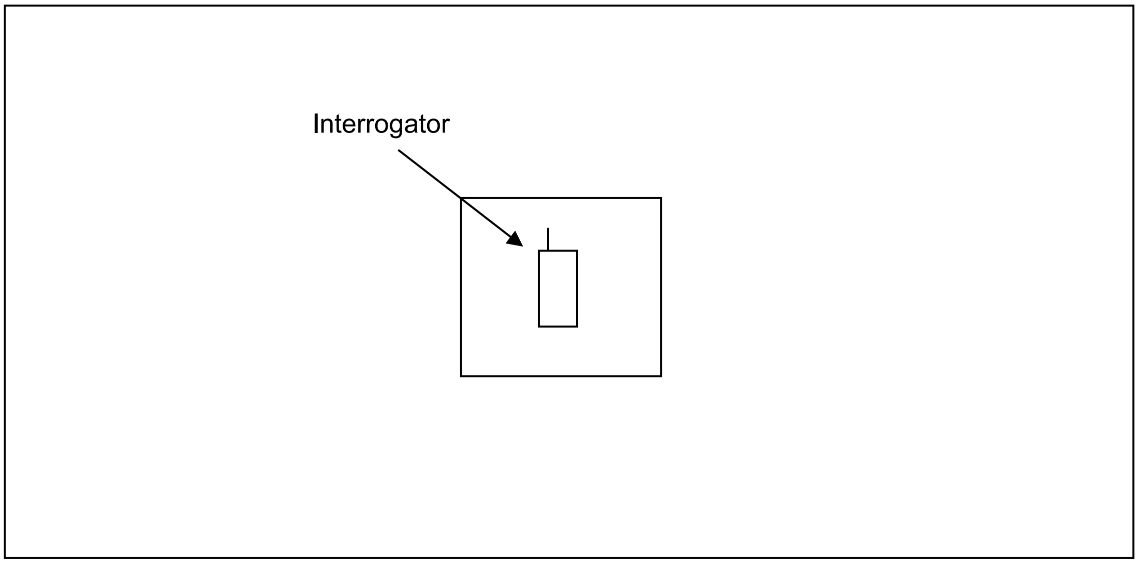


FIGURE 2-1: WORST CASE CONFIGURATION OF SYSTEM UNDER TEST

2.3 MODIFICATIONS

In order to lower radiated spurious emissions to attain passing results, a 2pF capacitor was added in parallel to the existing resistor on the antenna.

3 FCC PART 2.1033(C)(8); DC VOLTAGES AND CURRENTS

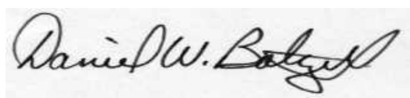
The DC voltages applied to and DC currents into the several elements of the final radio frequency amplifying device for normal operation over the power range were:

7.4 volts @ 770mA

TABLE 3-1: TEST EQUIPMENT USED FOR TESTING VOLTAGE AND CURRENTS

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901247	Wavetek	DM25XT	Multimeter	40804098	3/3/05

TEST PERSONNEL:



Dan Baltzell		January 17, 2005
Test Engineer	Signature	Date Of Test

4 RF POWER OUTPUT - §2.1046

4.1 EFFECTIVE RADIATED POWER (ERP); ANSI/TIA/EIA-603-2002, SECTION 2.2.17.2 TEST PROCEDURE

ERP 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 degrees 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 100 kHz resolution bandwidth and 1 MHz video bandwidth. A Roberts dipole antenna was substituted in place of the EUT. The dipole 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 gain of transmit antenna relative to an ideal half-wave dipole.

i.e., Sg – CL + Gn = ERP (dBm)

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

4.2 ERP POWER OUTPUT TEST EQUIPMENT

TABLE 4-1: ERP POWER TEST EQUIPMENT

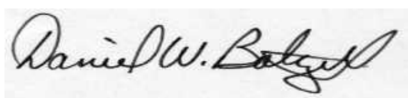
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20 MHz - 2 GHz)	2648	9/20/05
901184	Agilent Technologies	E4416A	EPM-P Power Meter, Single Channel	GB41050573	8/2/05
901356	Agilent Technologies	E9323A	Power Sensor	31764-264	9/10/05
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	6/23/05
900154	Compliance Design	Roberts Dipole	Adjustable Elements Dipole Antenna (30 – 1000 MHz)	N/A	10/6/05
900917	Hewlett Packard	8648C	Synthesized. Signal Generator (9 kHz - 3200 MHz)	3537A01741	7/6/05
901235	IW Microwave Products	KPS-1503-360-KPS	High frequency RF cables	36"	9/1/05
900352	Werlatone	C1795	Directional Coupler, 100 watt (1 - 1000 MHz)	4067	7/1/2005

4.3 ERP POWER DATA - §2.1046

TABLE 4-2: ERP POWER DATA

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	ERP (W)
451.355	94.5	25.8	0.2	-0.5	25.1	0.324

TEST PERSONNEL:



Dan Baltzell		May 16, 2005
Test Engineer	Signature	Date Of Test

4.4 CONDUCTED ANTENNA PORT; ANSI/TIA/EIA-603-2002, SECTION 2.2.1 TEST PROCEDURE

Connect the equipment as illustrated below. Measure the transmitter output power during the defined duty cycle. The EUT was connected to a coaxial attenuator having a 50 Ω load impedance.

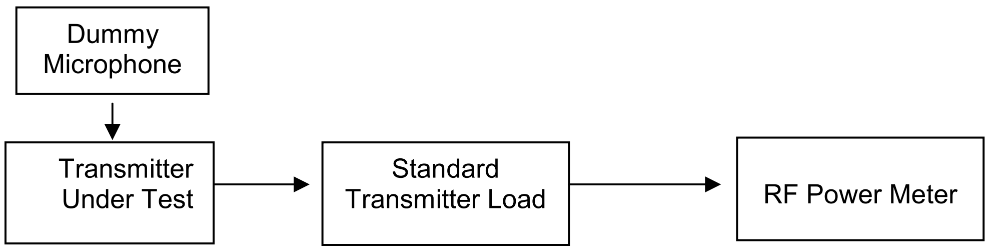


FIGURE 4-1: ILLUSTRATION OF EQUIPMENT CONNECTION

4.5 CONDUCTED ANTENNA PORT POWER OUTPUT TEST EQUIPMENT

TABLE 4-3: CONDUCTED ANTENNA PORT POWER OUTPUT TEST EQUIPMENT

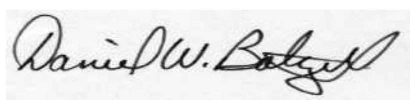
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901184	Agilent Technologies	E4416A	EPM-P Power Meter, single channel	GB41050573	8/2/05
901186	Agilent Technologies	E9323A	Peak & Average Power Sensor (50 MHz – 6 GHz)	US40410380	8/2/05

4.6 CONDUCTED ANTENNA PORT POWER OUTPUT TEST DATA

TABLE 4-4: CONDUCTED ANTENNA PORT POWER OUTPUT TEST DATA - HIGH POWER

Frequency (MHz)	Power Measured (dBm)	Power (Watt)
451.355	30	1

TEST PERSONNEL:



Dan Baltzell		January 12, 2005
Test Engineer	Signature	Date Of Test

5 OCCUPIED BANDWIDTH - §2.1049

5.1 OCCUPIED BANDWIDTH - §2.1049 TEST PROCEDURE

The antenna output terminal of the EUT was connected to the input of a 50 ohm spectrum analyzer through a matched 10 dB attenuator. The radio transmitter was operating at maximum output power with and without internal data modulation. 100% of the in-band modulation was below the specified mask.

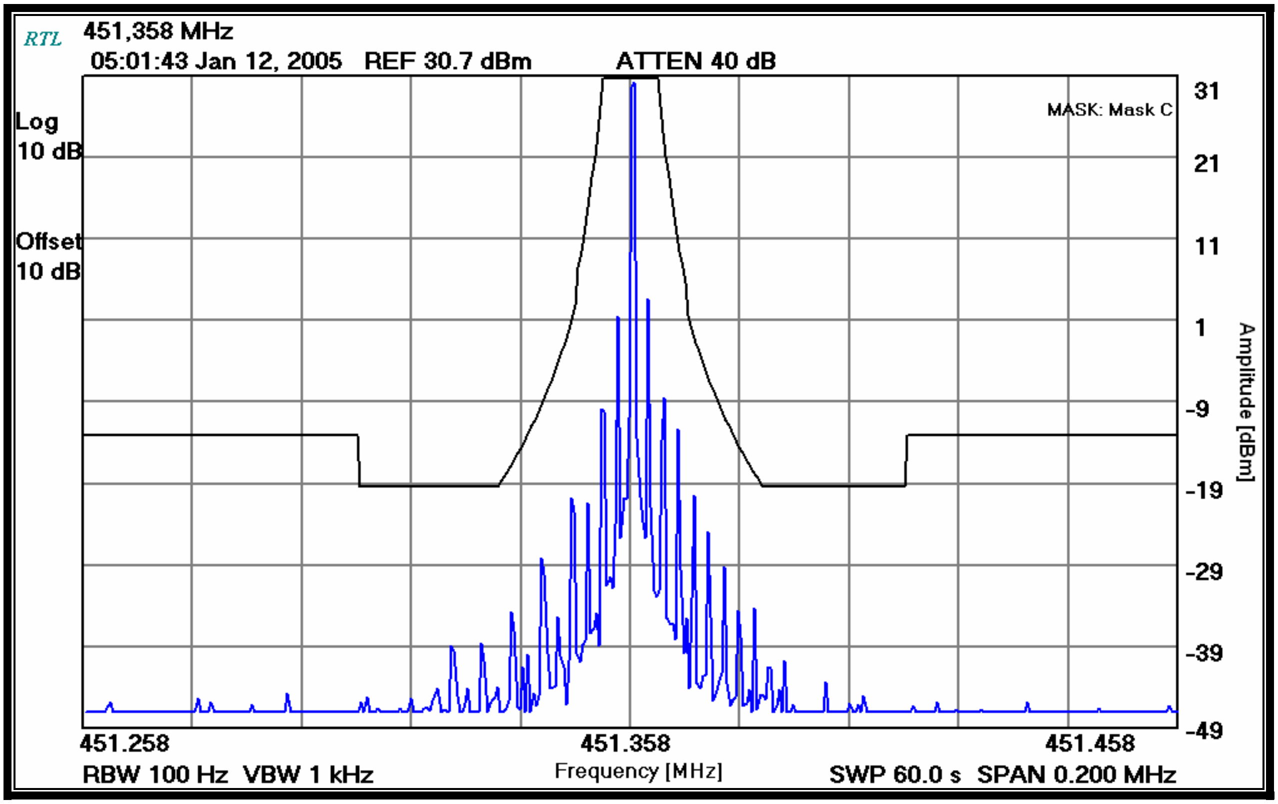
5.2 OCCUPIED BANDWIDTH TEST EQUIPMENT

TABLE 5-1: OCCUPIED BANDWIDTH TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	6/23/05
901140	Weinschel Corp.	47-10-34 DC-18GHz	Attenuator, 50W 10dB	BK6203	5/13/05
900927	Tektronix	ASG 100	Audio Signal Generator	B03274 V2.3	3/3/05

5.3 OCCUPIED BANDWIDTH TEST DATA

PLOT 5-1: MASK C



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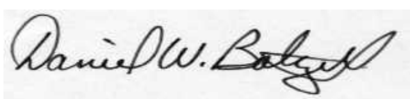


Dan Baltzell		January 12, 2005
Test Engineer	Signature	Date Of Test

6 SPURIOUS EMISSIONS AT ANTENNA TERMINAL - §2.1051

6.1 SPURIOUS EMISSIONS AT ANTENNA TERMINAL - §2.1051 TEST PROCEDURE

The level of the various conducted spurious frequencies was measured by means of a calibrated spectrum analyzer. The antenna output terminal of the EUT was connected to the input of a 50 Ω spectrum analyzer through a matched 10 dB attenuator and notch filter. The transmitter was operating at maximum power.

6.2 SPURIOUS EMISSIONS AT ANTENNA TERMINAL TEST EQUIPMENT

TABLE 6-1: SPURIOUS EMISSIONS AT ANTENNA TERMINAL TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	6/23/05
901132	Par Electronics	806-902	UHF Notch Filter (25W)	N/A	5/13/05

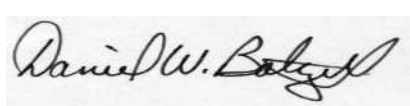
6.3 CONDUCTED SPURIOUS EMISSIONS TEST DATA

TABLE 6-2: CONDUCTED SPURIOUS EMISSIONS (CHANNEL 1 AT 451.355 MHZ)

Operating Frequency (MHz): 451.355
Measured Conducted Power (dBm): 30
Modulation: Analog
Limit (dBc): 50 (50+10LogP)

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Notch Filter Insertion Loss (dB)	Corrected Spectrum Analyzer Level (dBc)	Margin (dB)
902.710	-41.1	1.5	69.6	-19.6
1354.065	-43.3	0.6	72.7	-22.7
1805.420	-46.3	1.4	74.9	-24.9
2256.775	-53.8	1.0	82.8	-32.8
2708.130	-51.2	1.4	79.8	-29.8
3159.485	-59.9	0.7	89.2	-39.2
3610.840	-50.9	0.8	80.1	-30.1
4062.195	-61.9	19.1	72.8	-22.8
4513.550	-63.4	5.5	87.9	-37.9

TEST PERSONNEL:



Dan Baltzell		January 24, 2005
Test Engineer	Signature	Date Of Test

7 RADIATED SPURIOUS AND HARMONIC EMISSIONS - §2.1053

7.1 RADIATED SPURIOUS AND HARMONIC EMISSIONS - §2.1053

A receiving antenna located 3 meters from the turntable received any signal radiated from the transmitter and its operating accessories. The receiving antenna was varied from 1 to 4 meters.

ERP Measurements by Substitution Method:

The EUT was placed on a turntable 3 meters from the receive antenna with the transmitter transmitting into a non-radiating load. The field of maximum intensity was found by rotating the EUT 360 degrees in all 3 orthogonal axes, 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. An antenna was substituted in place of the EUT. This antenna was fed by a signal generator, and the input level adjusted to the same field strength level as the EUT. The conducted power from the signal generator was recorded. The level was checked at the antenna input using a splitter to verify no impedance mismatch and corrected. The signal generator level was further corrected by subtracting the connecting cable loss, and further corrected with the transmitting antenna gain referenced to a ½ wave dipole measurement.

The spectrum analyzer was set to the following settings: Quasi-peak below 1 GHz (120 kHz RBW/VBW); Average above 1 GHz (1MHz RBW/10 Hz VBW), sweep speed auto.

7.2 RADIATED SPURIOUS TEST EQUIPMENT

TABLE 7-1: RADIATED SPURIOUS TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20 MHz - 2 GHz)	2648	9/20/05
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz - 12.8 GHz)	3826A00144	9/8/05
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 (2.0 - 4.0 GHz)	9804-1044	5/20/07
900321	EMCO	3161-03	Horn antenna (4.0 - 8.2 GHz)	9508-1020	5/20/07
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	5/5/05
900154	Compliance Design	Roberts Dipole	Adjustable Elements Dipole Antenna (30 - 1000 MHz)	N/A	10/6/05
900352	Werlatone	C1795	Directional Coupler, 100 watt (1 - 1000 MHz)	4067	7/1/2005
901341	Narda Microwave Corp.	3003-20-40	Coaxial Directional Coupler (2 - 4 GHz)	2	7/1/2005
901342	Narda Microwave Corp.	3044-10	Coaxial Directional Coupler (4 - 8 GHz)	901	7/1/2005
901345	Narda Microwave Corp.	3002-30	Coaxial Directional Coupler (0.95 - 2 GHz)	20032	7/1/2005

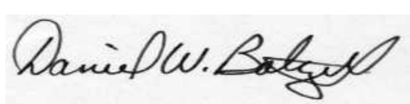
7.3 RADIATED SPURIOUS EMISSIONS TEST DATA - §2.1053

Operating Frequency (MHz): 451.355
Measured Conducted Power (dBm): 30
Modulation: Analog narrowband
Distance (m): 3
Limit (dBc): 50 (50+10LogP)

TABLE 7-2: RADIATED SPURIOUS EMISSIONS DATA §2.1053

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Level (dBc)	Margin (dB)
169.257	70.7	-55.2	0.3	0.0	85.5	-35.5
197.466	60.5	-66.8	0.2	-0.4	97.4	-47.4
225.676	72.5	-53.4	0.5	-0.6	84.5	-34.5
253.885	63.2	-61.2	0.2	-0.5	91.9	-41.9
282.095	72.9	-51.7	0.2	-0.6	82.5	-32.5
310.305	74.4	-52.0	0.4	-0.5	82.9	-32.9
338.514	84.5	-40.5	0.3	-0.3	71.1	-21.1
366.723	69.9	-57.1	0.3	-0.5	87.9	-37.9
394.933	61.7	-65.9	0.3	-0.6	96.8	-46.8
423.142	54.9	-76.0	0.4	-0.6	107.0	-57.0
451.355	95.8	16.3	0.2	-0.5	14.4	35.6
479.561	50.0	-80.4	0.5	-0.5	111.4	-61.4
902.710	78.8	-36.3	0.5	-1.1	67.9	-17.9
1354.065	73.6	-29.9	0.6	3.2	57.3	-7.3
1805.420	59.4	-41.2	0.6	4.8	67.0	-17.0
2256.775	41.8	-39.5	1.0	5.0	65.5	-15.5
2708.130	49.3	-29.5	1.1	5.6	55.0	-5.0
3159.485	50.2	-31.1	1.1	6.2	56.0	-6.0
3610.840	44.7	-30.6	1.5	5.9	56.2	-6.2
4062.195	38.3	-33.5	1.0	6.0	58.5	-8.5
4513.550	32.3	-40.1	1.3	7.0	64.4	-14.4

TEST PERSONNEL:



Daniel Baltzell		January 24, 2005
Test Engineer	Signature	Date Of Test

8 FREQUENCY STABILITY / TEMPERATURE VARIATION - §2.1055

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 27°C to provide a reference).
2. The equipment was subjected to a three hour “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 made within a three-minute interval 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 one hour was provided to allow stabilization of the equipment at each temperature level.

8.3 FREQUENCY TOLERANCE

The minimum frequency stability shall be 5ppm.

8.4 FREQUENCY STABILITY TEST EQUIPMENT

TABLE 8-1: FREQUENCY STABILITY TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900946	Tenney Engineering, Inc	TH65	Temperature Chamber with Humidity	11380	2/3/05
901247	Wavetek	DM25XT	Multimeter	40804098	3/3/05
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	8/11/05

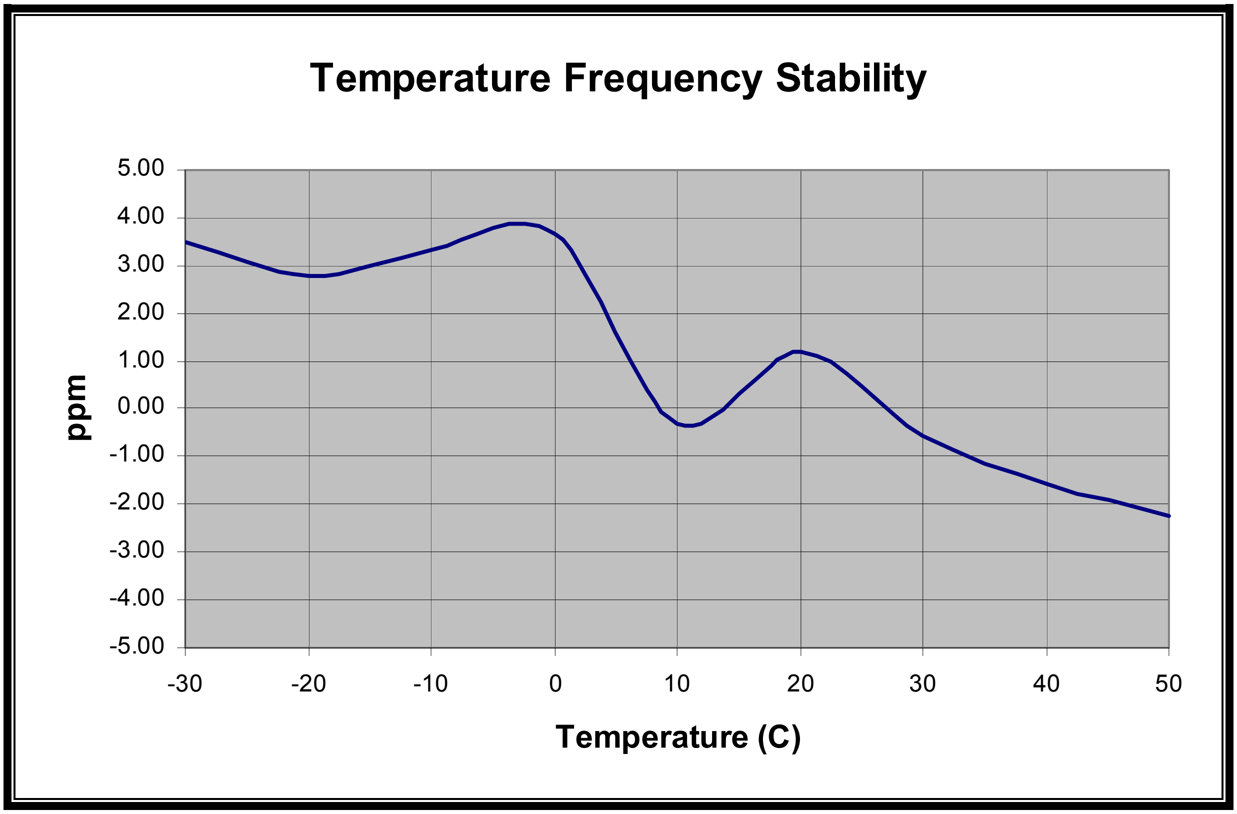
8.5 FREQUENCY STABILITY TEST DATA - §2.1055

Operating Frequency (MHz): 451.355
Reference Voltage: 7.4 VDC
Deviation Limit: 5 PPM

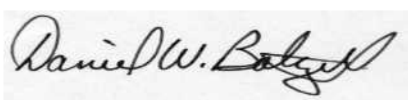
TABLE 8-2: FREQUENCY STABILITY DATA - §2.1055: TEMPERATURE

Temperature (ºC)	Measured Frequency (MHz)	ppm
-30	451.356579	3.50
-20	451.356263	2.80
-10	451.356507	3.34
0	451.356651	3.66
10	451.354867	-0.29
20	451.355529	1.17
30	451.354749	-0.56
40	451.354283	-1.59
50	451.353999	-2.22

PLOT 8-1: TEMPERATURE FREQUENCY STABILITY - §2.1055



TEST PERSONNEL:

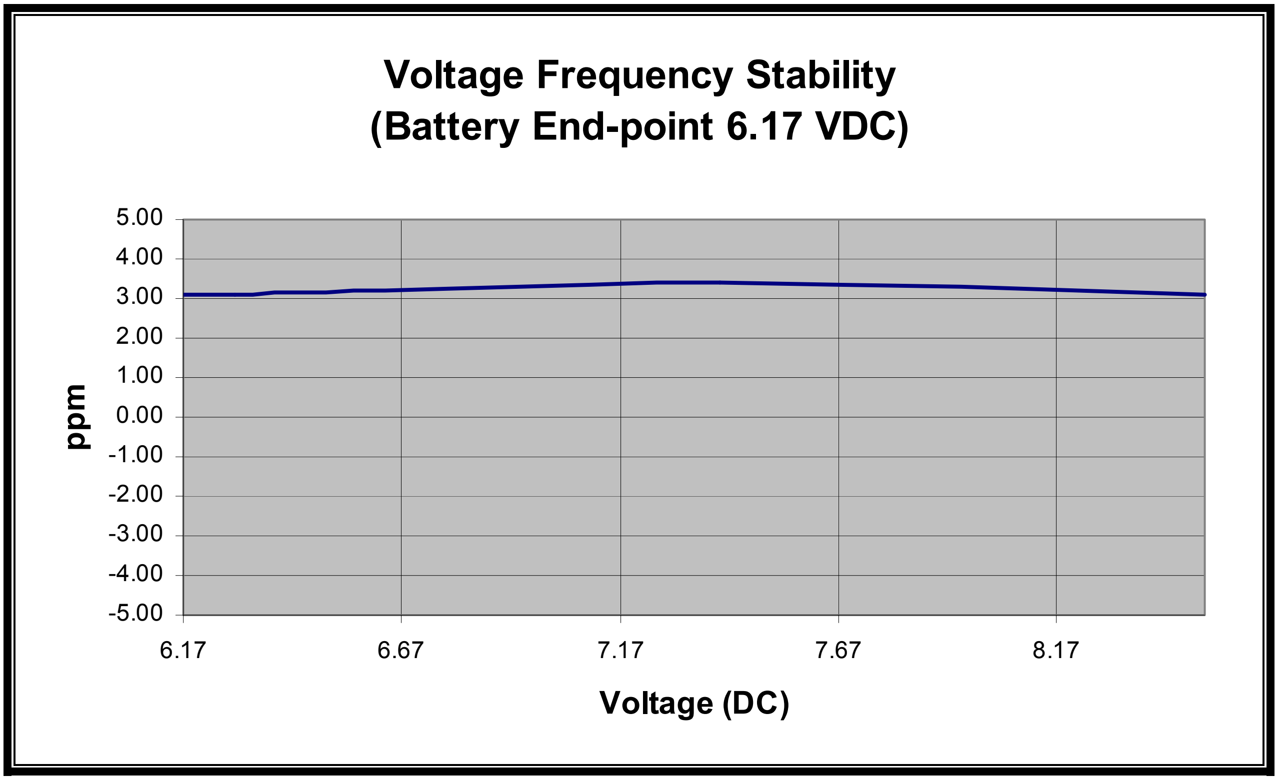


Dan Baltzell		January 13, 2005
Test Engineer	Signature	Date Of Test

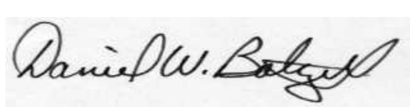
TABLE 8-3: VOLTAGE STABILITY DATA - §2.1055: VOLTAGE

Voltage (DC)	Measured Frequency (MHz)	ppm
6.17 (battery end-point)	451.356920	3.08
6.29	451.356920	3.08
7.40	451.357054	3.38
8.51	451.356930	3.10

PLOT 8-2: VOLTAGE FREQUENCY STABILITY - §2.1055



TEST PERSONNEL:



Dan Baltzell		January 17, 2005
Test Engineer	Signature	Date Of Test

9 FCC PART 90 §90.214: TRANSIENT FREQUENCY BEHAVIOR

9.1 TRANSIENT FREQUENCY BEHAVIOR TEST PROCEDURE

ANSI/TIA-603-B-2002 section 2.2.19

9.2 TRANSIENT FREQUENCY BEHAVIOR LIMITS

TABLE 9-1: REQUIREMENTS FOR EUT WITH 25 KHZ CHANNEL SPACING

Time Intervals (*)(**)	Maximum Frequency Difference (***)	150-174 MHz	421-512 MHz
t1(****)	± 25 kHz	5.0 mSec	10.0 mSec
t2	± 12.5 kHz	20.0 mSec	25.0 mSec
t3(****)	± 25 kHz	5.0 mSec	10.0 mSec

TABLE 9-2: REQUIREMENTS FOR EUT WITH 12.5 KHZ CHANNEL SPACING

Time Intervals (*)(**)	Maximum Frequency Difference(***)	150-174 MHz	421-512 MHz
t1(****)	± 12.5 kHz	5.0 mSec	10.0 mSec
t2	± 6.25 kHz	20.0 mSec	25.0 mSec
t3(****)	± 12.5 kHz	5.0 mSec	10.0 mSec

(*) t_{on} is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.
t_1 is the time period immediately following t_{on}.
t_2 is the time period immediately following t_1.
t_3 is the time period from the instant when the transmitter is turned off until t_{off}.
t_{off} is the instant when the 1 kHz test signal starts to rise.
(**) During the time from the end of t_2 to the beginning of t_3, the frequency difference must not exceed the limits specified in §90.213.
(***) The difference between the actual transmitter frequency and the assigned transmitter frequency.
(****) If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

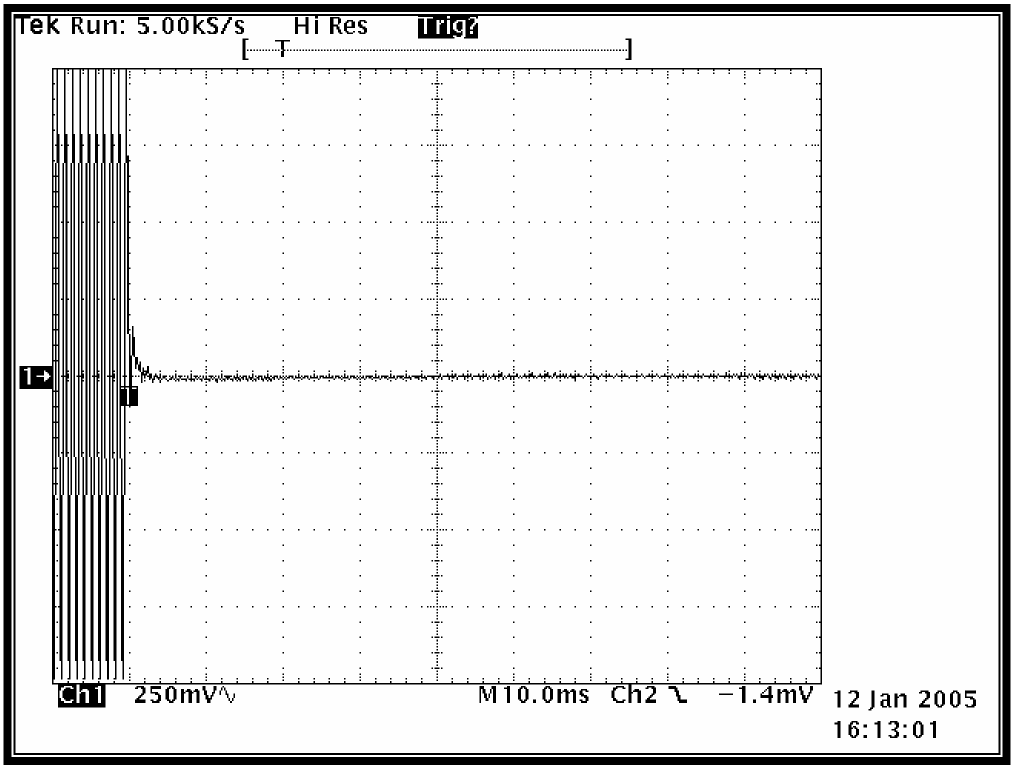
Maximum frequency difference between time T2 and T3: Calculation for 451.355 MHz
The frequency stability is required to be 5 PPM.
4 div. on scope represents 12.5 kHz for narrow band channel.
Therefore, 451.355 MHz times 5 PPM times +/- 4 Divisions divided by 12.5 kHz equals +/-0.722 division.
0.722 division corresponds to 2.257 kHz.

TABLE 9-3: TRANSIENT FREQUENCY BEHAVIOR TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900917	Hewlett Packard	8648C	Synthesized Signal Generator (9 kHz - 3200 MHz)	3537A01741	7/6/05
901118	Hewlett Packard	HP8901B	Modulation Analyzer (150 kHz – 1300 MHz)	2406A00178	7/7/05
900561	Tektronix	TDS540A	Oscilloscope	B020129	3/25/05
901214	Hewlett Packard	HP8471D	Detector	2952A19822	5/13/05
900352	Werlatone	C1795	Directional Coupler, 100 watt (1 - 1000 MHz)	4067	7/1/2005
901138	Weinschel Corp.	48-40-34 DC-18GHz	Attenuator, 100W 40dB	BK5883	5/13/05
901140	Weinschel Corp.	47-10-34 DC-18GHz	Attenuator, 50W 10dB	BK6203	5/13/05

9.3 TRANSIENT FREQUENCY BEHAVIOR TEST DATA

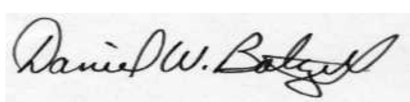
PLOT 9-1: ON TIME



<u>Carrier ON time:</u>
Power: 1 W rated
451.355 MHz NB (12.5 kHz)
RF Signal Generator: Modulation 12.5 kHz deviation

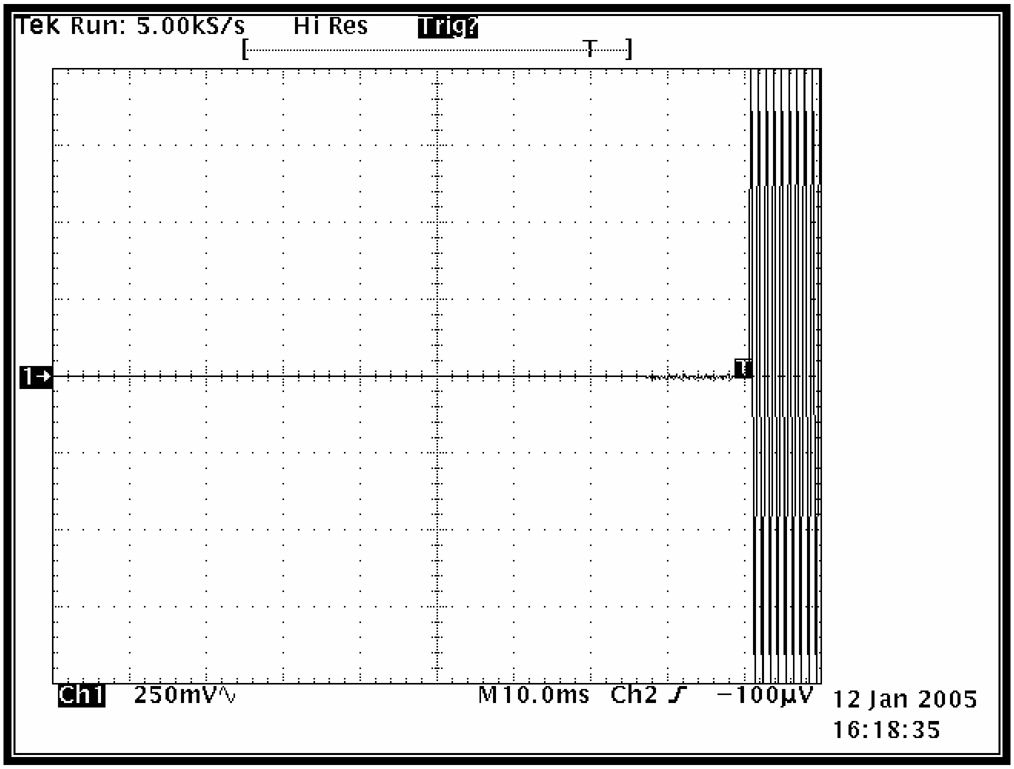
Timebase: 10 ms/div
Trigger: On negative edge of Ch 2, level –1.4 mV
Ch 1: 250mV/div, Probe 1.000:1
Vertical scale: +/-4 div. corresponds to +/-12.5 kHz

TEST PERSONNEL:



Daniel Baltzell		January 12, 2005
Test Engineer	Signature	Date Of Test

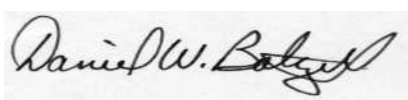
PLOT 9-2: OFF TIME



Carrier OFF time:
Power: 1 W rated
451.355 MHz NB (12.5 kHz)
RF Signal Generator: Modulation 12.5 kHz deviation

Timebase: 10 ms/div
Trigger: On positive edge of Ch 2, level 100uV
Ch 1: 250mV/div, Probe 1.000:1
Vertical scale: +/- 4 div. corresponds to +/-12.5 kHz

TEST PERSONNEL:



Daniel Baltzell		January 12, 2005
Test Engineer	Signature	Date Of Test

10 FCC PART 2.202: NECESSARY BANDWIDTH AND EMISSION BANDWIDTH

Type of Emission: A3D

Necessary Bandwidth and Emission Bandwidth Calculation

The 12.5 kHz Analog Modulation Bandwidth = 6K00A3D

Calculation:

Max modulation (M) in kHz: 1
Max deviation for (D) in kHz for (12.5 kHz channel spacing): 2
Constant factor (K): 1
B_n = 2xM+2xDK = (2x1) + (2x2x1) = 6 kHz

11 CONCLUSION

The data in this measurement report shows that the AMCO Automated Systems, LLC. Model # 52808G505, Model Name: Hand Held Interrogator, FCC ID: G8JHHI01, complies with all the requirements of Parts 2 and 90 of the FCC Rules.