

EMISSIONS TEST REPORT

Report Number: 3173184BOX-001c

Project Number: 3173184

Testing performed on the

Wireless Multi-meter/Receiver

Model: EX540

To

FCC Part Subpart C, Section 15.249

FCC Part 15, Subpart B

RSS-210 Issue 7 June 2007 Annex A2.9

RSS-GEN Issue 2 June 2007

ICES 003:1997, Class B

For


Extech Instruments Corp

Test Performed by:
Intertek – ETL SEMKO
70 Codman Hill Road
Boxborough, MA 01719

Test Authorized by:
Extech Instruments Corp
285 Bear Hill Road
Waltham, MA 02454

Prepared by: 
Vathana Ven

Date: 08/07/2009

Reviewed by: 
Jeff Goulet

Date: 08/10/09

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1.0 Job Description

1.1 Client Information

This EUT has been tested at the request of:

Company: Extech Instruments Corp
285 Bear Hill Road
Waltham, MA 02454
Contact: Roger Mavrides
Telephone: (781) 890-7440 ext. 152
Fax: (781) 890-7864
Email: roger.mavrides@extech.com

1.2 Equipment Under Test

Equipment Type: Wireless Multi-meter/Receiver
Model Number(s): EX540
Serial number(s): 08057712, 09019062/ BOX0902041147-003
Manufacturer: Extech Instruments Corp
EUT receive date: 02/04/09, 04/29/09
EUT received condition: Production unit was received with no visible damage.
Test start date: 02/11/2009
Test end date: 04/29/2009

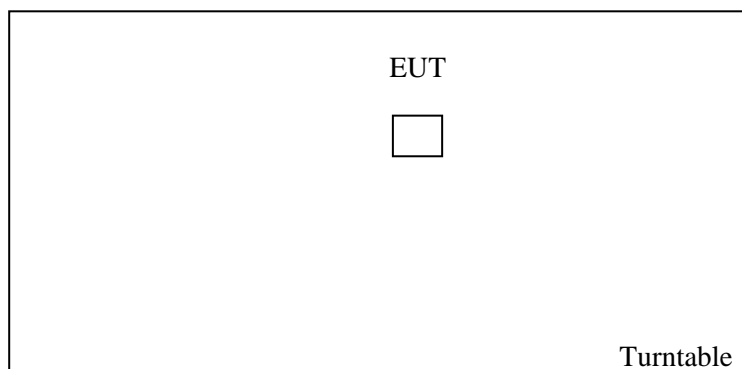
1.3 Test Plan Reference: ANSI 63.4C, RSS-210 Issue 7 June 2007 Annex A2.9, RSS-GEN Issue 2 June 2007, ICES 003:1997, Class B

1.4 Test Configuration:

1.4.1 EUT Voltage Range:

9Volts Battery

1.4.2 Block Diagram:



1.4.3 Cables:

None

1.4.4 Support Equipment:

None

1.5 Mode(s) of Operation:

The EUT was programmed to transmit modulated signal continuously.

1.5a EUT Cycle Time:

Continuous

2.0 Test Summary

TEST STANDARD		RESULTS	
FCC Part 15, Subpart C FCC Part 15, Subpart B RSS-210 Issue 7 June 2007 Annex A2.9 RSS-GEN Issue 2 June 2007 ICES 003:1997, Class B			
SUB-TEST	TEST PARAMETER	COMMENT	
§ 15.249(a), A2.9(1) – Fundamental Field Strength	902–928 MHz: The field strength of emission within this band shall not exceed 50 (millivolts/meter) or 94 (dBuV/m) at a distance of 3 meters	Pass	
§ 15.249(a), A2.9(1) – Harmonics Field Strength	The field strength of harmonics shall not exceed 0.5 (millivolts/meter) or 54 (dBuV/m) at a distance of 3 meters	Pass	
§ 15.249(d), A2.9(2) – Spurious Field Strength	Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the Table 2 limits, whichever is the lesser attenuation.	Pass	
Receiver spurious Emissions	Below Class B limits	Pass	
AC Line-Conducted Emissions	Below Class B limits	Pass	
20 dB Bandwidth	No limit		

REVISION SUMMARY – The following changes have been made to this Report:

<u>Date</u>	<u>Project No.</u>	<u>Project Handler</u>	<u>Page(s)</u>	<u>Item</u>	<u>Description of Change</u>
08/07/09	3173184	Vathana Ven	1	1	Changed the company name

3.0 Sample Calculations

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:

$$FS = RA + AF + CF - AG$$

Where

- FS = Field Strength in dB μ V/m
- RA = Receiver Amplitude (including preamplifier) in dB μ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

RA = 52.0 dB μ V
 AF = 7.4 dB/m
 CF = 1.6 dB
 AG = 29.0 dB
 FS = 32 dB μ V/m

$$\text{Level in } \mu\text{V/m} = [10(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

The following is how net line-conducted readings were determined:

$$NF = RF + LF + CF + AF$$

Where NF = Net Reading in dB μ V

- RF = Reading from receiver in dB μ V
- LF = LISN Correction Factor in dB
- CF = Cable Correction Factor in dB
- AF = Attenuator Loss Factor in dB

To convert from dB μ V to μ V or mV the following was used:

$$UF = 10^{(NF / 20)} \text{ where UF = Net Reading in } \mu\text{V}$$

Example:

$$NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 \text{ dB}\mu\text{V}$$

$$UF = 10^{(49.1 \text{ dB}\mu\text{V} / 20)} = 254 \mu\text{V/m}$$

3.1 Measurement Uncertainty

Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes.

The expanded uncertainty ($k = 2$) for radiated emissions from 30 to 1000 MHz has been determined to be:

± 3.5 dB at 10m, ± 3.8 dB at 3m

The expanded uncertainty ($k = 2$) for mains conducted emissions from 150 kHz to 30 MHz has been determined to be:

± 2.6 dB

The expanded uncertainty ($k = 2$) for telecom port conducted emissions from 150 kHz to 30 MHz has been determined to be:

± 3.2 for ISN and voltage probe measurements

± 3.1 for current probe measurements

3.2 Site Description

Test Site(s): 1&2

Our OATS are 3m and 10m sheltered emissions measurement ranges located in a light commercial environment in Boxborough, Massachusetts. They meet the technical requirements of ANSI C63.4-2003 and CISPR 22:1993/EN 55022:1994 for radiated and conducted emission measurements. The shelter structure is entirely fiberglass and plastic, with outside dimensions of 33 ft x 57 ft. The structure resembles a quonset hut with a center ceiling height of 16.5 ft.

The testing floor is covered by a galvanized sheet metal groundplane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with a 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets are screwed in place with stainless steel, round-head screws every three inches. Site illumination and HVAC are provided from beneath the ground reference plane through flush entry ports, the port covers are electrically bonded to the ground plane.

A flush metal turntable with 12 ft. diameter and 5000 lb. load capacity (12,000 lb. in Site 3) is provided for floor-standing equipment. A wooden table 80 cm high is used for table-top equipment. The turntable is electrically connected to the ground plane with three copper straps. The straps are connected to the turntable at the center of it with ground braid. The copper strap is directly connected to the groundplane at the edges of the turntable. The turntable is located on the south end of the structure and the antennas are mounted 3 and 10 meters away to the north. The antenna mast is a non-conductive with remote control of antenna height and polarization. The antenna height is adjustable from 1 to 4 meters.

All final radiated emission measurements are performed with the testing personnel and measurement equipment located below the ground reference plane. The site has a full basement underneath the turntable where support equipment may be remotely located. Operation of the antenna, turntable and equipment under test is controlled by remote controls that manipulate the antenna height and polarization and with a turntable control. Test personnel are located below the ellipse when measurements are performed, however the site maintains the ability of having personnel manipulate cables while monitoring test equipment. Ambient radiated emissions are 6 dB or more below the relevant FCC emission limits.

AC mains power is brought to the equipment under test through a power line filter, to remove ambient conducted noise. 50 Hz (240 VAC single phase), 60 Hz power (120 VAC single phase, 208 VAC three phase), and 60 Hz (480 VAC three phase) are available. Conducted emission measurements are performed with a Line Impedance Stabilization Network (LISN) or Artificial Mains Network (AMN) bonded to the ground reference plane. A removable vertical groundplane (2 meter X 2 meter area) is used for line-conducted measurements for table top equipment. The vertical groundplane is electrically connected to the reference groundplane.

Test Results: Pass

Test Standard: § 15.249(a), RSS-210 Issue 7 June 2007 A2.9(1)

Test: Fundamental Field Strength

Performance Criterion: Not Applicable

Test Environment:

Environmental Conditions During Testing:	Ambient (°C):	19	Humidity (%):	37	Pressure (hPa):	1019
Pretest Verification Performed	Yes		Equipment under Test:	EX540		
Test Engineer(s):	Vathana Ven		EUT Serial Number:	09019062		

Maximum Test Disturbance Parameters: Emissions below § 15.249(a), A2.9(1) limits.

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	02/17/2010
2	ANTENNA	EMCO	3142	9711-1224	12/12/2009
3	3 Meter In floor cable for site 2	ITS	RG214B/U	S2 3M FLR	02/20/2010
4	4 Line Digital Barometer *	Mannix	0ABA116	SAF313	05/29/2009

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	3/07/07 Revision

Test Details:

Test Point	Standard Limit (as published)	Compliance Level	Pass/Fail	Comment
Around the EUT	Specified limits	Below specified limits	Pass	None

Test Results:

Fundamental Field Strength Special Radiated Emissions

Company: Extech Instruments Corp
 Model #: EX540
 Serial #: 09019062
 Engineers: Vathana Ven
 Project #: 3173184
 Standard: FCC Part 15 Subpart C 15.249/RSS-210
 Receiver: R&S FSEK-30 (ROS001)/R&S ESCI (ROS002)
 PreAmp: PRE9 03-27-09.txt
 Antenna & Cables: N Bands: N, LF, HF, SHF
 Antenna: LOG3 V3m 12-12-09.txt LOG3 H3m 12-12-09.txt
 Cable(s): S2 3M FLR 09-23-09.txt NONE.
 Barometer: SAF313
 Location: Site 2
 Date(s): 04/29/09
 Temp/Humidity/Pressure: 19 deg. C 37% 1019 mB
 Limit Distance (m): 3
 Test Distance (m): 3
 PreAmp Used? (Y or N): N Voltage/Frequency: Battery Frequency Range: 914.945 MHz
 Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Average Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
PK	V	914.990	47.8	22.7	4.2	0.0	0.0	74.7	114.0	-39.3	120/300 kHz
AVG	V	914.990	47.2	22.7	4.2	0.0	0.0	74.1	94.0	-19.9	120/300 kHz

FCC IC Harmonic?

Test Results: Pass

Test Standard: § 15.249(a)(d), RSS-210 Issue 7 June 2007 Annex A2.9, RSS-GEN Issue 2 June 2007, ICES 003:1997, Class B

Test: Harmonics/Spurious Field Strength

Performance Criterion: Not Applicable

Test Environment:

Environmental Conditions During Testing:	Ambient (°C):	18/19	Humidity (%):	27/37	Pressure (hPa):	1015/1019
Pretest Verification Performed	Yes		Equipment under Test:	EX540		
Test Engineer(s):	Vathana Ven		EUT Serial Number:	09019062		

Maximum Test Disturbance Parameters: Emissions below § 15.249(a)(d), A2.9(1) and A2.9(2) limits.

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	Verified
2	ANTENNA	EMCO	3142	9701-1116	12/02/2009
3	ANTENNA	EMCO	3142	9711-1224	12/12/2009
4	4 Line Digital Barometer *	Mannix	0ABA116	SAF313	05/29/2009
5	40 GHz Cable	Megaphase	TM40-K1K1-80	7030802 002	06/05/2009
6	Spectrum Analyzer	Agilent	E7405A	US40240205	08/21/2009
7	3 Meter In floor cable for site 1	ITS	RG214B/U	S1 3M FLR	09/08/2009
8	3 Meter in floor cable for site 3	ITS	RG214B/U	S3 3M FLR	09/17/2008
9	40GHz Cable	Megaphase	TM40-K1K1-197	7030801 001	06/05/2009
10	100MHz-40GHz Preamp	MITEQ	NSP4000-NFG	1260417	04/03/2010
11	HORN ANTENNA	EMCO	3115	9602-4675	10/13/2009
12	1GHz High Pass Filter	Reactel, Inc	7HS-1G/10G-S11	06-1	10/15/2009

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	3/07/07 Revision

Test Details:

Test Point	Standard Limit (as published)	Compliance Level	Pass/Fail	Comment
Around the EUT	Specified limits	Below specified limits	Pass	None

Test Results:

Radiated Emissions From 30-1000MHz

Radiated Emissions

Company: Extech Instruments Corp
 Model #: EX540
 Serial #: 8057712
 Engineers: Vathana Ven
 Project #: 500129017
 Standard: FCC Part 15 Subpart C 15.249/RSS-210/ICES 003
 Receiver: R&S FSEK-30 (ROS001)/R&S ESCI (ROS002)
 PreAmp: PRE9 03-27-09.txt
 Antenna & Cables: N
 Bands: N, LF, HF, SHF
 Antenna: LOG1 12-02-2009 V3.txt LOG1 12-02-2009 H3.txt
 Cable(s): S1 3m Floor 09-08-09.txt NONE.
 Barometer: BAR2
 Location: Site 1
 Date(s): 02/09/09
 Temp/Humidity/Pressure: 18 deg. C 27% 1015 mB
 Limit Distance (m): 3
 Test Distance (m): 3
 PreAmp Used? (Y or N): N
 Voltage/Frequency: Fresh Battery
 Frequency Range: 30 MHz - 1 GHz
 Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
QP	V	30.000	-7.0	16.9	0.6	0.0	0.0	10.5	69.5	-59.0	120/300 kHz
QP	V	150.000	-1.0	8.8	1.4	0.0	0.0	9.2	43.5	-34.3	120/300 kHz
QP	V	250.000	3.3	12.7	1.9	0.0	0.0	17.9	46.0	-28.1	120/300 kHz
QP	V	350.000	-3.0	15.2	2.2	0.0	0.0	14.4	46.0	-31.6	120/300 kHz
QP	V	600.000	7.5	19.3	3.0	0.0	0.0	29.8	46.0	-16.3	120/300 kHz
QP	V	900.000	-3.0	23.2	3.8	0.0	0.0	24.0	46.0	-22.0	120/300 kHz

FCC

IC

Harmonic?

Noise Floor

Noise Floor

RB

RB

Noise Floor

Noise Floor

Noise Floor

Noise Floor

Test Results Continued:

Radiated Emissions From 1-10GHz

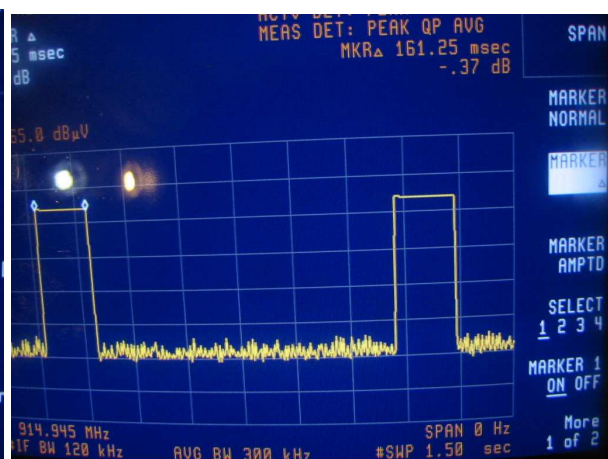
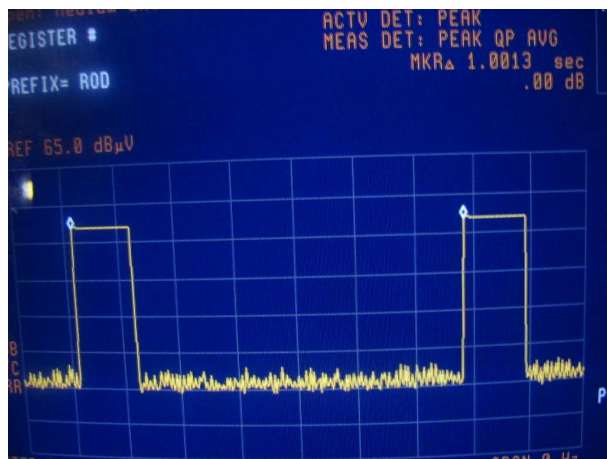
Company: Extech Instruments Corp				Antenna & Cables: HF				Bands: N, LF, HF, SHF						
Model #: EX540				Antenna: Horn2 V3m 10-13-09.txt				Horn2 H3m 10-13-09.txt						
Serial #: 09019062				Cable(s): MEG001.txt				8148601001 12-10-2009.txt						
Engineers: Vathana Ven				Location: Site 2		Barometer: SAF313		REA003						
Project #: 3173184		Date(s): 04/29/09												
Standard: FCC Part 15 Subpart C 15.249/RSS-210, ICES 003				Temp/Humidity/Pressure: 19 deg. C 37% 1019 mB										
Receiver: R&S FSEK-30 (ROS001)/R&S ESCI (ROS002)		Limit Distance (m): 3												
PreAmp: PRE9 03-27-09.txt		Test Distance (m): 3												
PreAmp Used? (Y or N): Y		Voltage/Frequency:		Battery		Frequency Range: 1-10 GHz								
Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)														
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW														
Detector	Ant. Pol.	Frequency	Reading	Antenna Factor	Cable Loss	Pre-amp Factor	Average Factor	Net	Limit	Margin	Bandwidth			
Type	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB		FCC	IC	Harmonic?
PK	V	1829.944	52.0	26.9	5.2	29.1	15.0	39.9	74.0	-34.1	1/3 MHz			
AVG	V	1829.944	45.8	26.9	5.2	29.1	0.0	48.7	54.0	-5.3	1/3 MHz			
PK	H	2744.906	51.0	29.2	6.5	29.2	15.0	42.5	54.0	-11.5	1/3 MHz	RB	RB	
AVG	H	2744.906	41.8	29.2	6.5	29.2	0.0	48.3	54.0	-5.7	1/3 MHz	RB	RB	
PK	V	3660.050	44.9	31.5	7.7	29.2	15.0	39.8	54.0	-14.2	1/3 MHz	RB	RB	
AVG	V	3660.050	36.0	31.5	7.7	29.2	0.0	45.9	54.0	-8.1	1/3 MHz	RB	RB	
PK	V	4575.095	46.9	32.3	8.7	29.3	15.0	43.6	54.0	-10.4	1/3 MHz	RB	RB	
AVG	V	4575.095	35.2	32.3	8.7	29.3	0.0	46.9	54.0	-7.1	1/3 MHz	RB	RB	
PK	V	5490.090	48.9	34.0	9.7	29.1	15.0	48.5	74.0	-25.5	1/3 MHz			
AVG	V	5490.090	35.2	34.0	9.7	29.1	0.0	49.8	54.0	-4.2	1/3 MHz			
PK	V	6404.970	41.0	34.1	10.6	28.7	15.0	42.0	74.0	-32.0	1/3 MHz			
AVG	V	6404.970	31.4	34.1	10.6	28.7	0.0	47.4	54.0	-6.6	1/3 MHz			
PK	V	7311.871	31.6	35.9	11.5	28.4	0.0	50.6	54.0	-3.4	1/3 MHz	RB	RB	Noise Floor
AVG	V	7311.871	20.5	35.9	11.5	28.4	0.0	39.5	54.0	-14.5	1/3 MHz	RB	RB	Noise Floor
PK	V	8235.230	37.2	37.0	12.3	28.0	15.0	43.5	54.0	-10.5	1/3 MHz	RB	RB	
AVG	V	8235.230	26.8	37.0	12.3	28.0	0.0	48.1	54.0	-5.9	1/3 MHz	RB	RB	
PK	V	9149.468	26.7	37.7	13.1	27.6	0.0	49.9	54.0	-4.1	1/3 MHz	RB	RB	Noise Floor
AVG	V	9149.468	18.0	37.7	13.1	27.6	0.0	41.2	54.0	-12.8	1/3 MHz	RB	RB	Noise Floor

Note: A maximum average factor of 15 dB was applied to Maxh PK readings to get AVG readings.

Average Factor Calculation:

Average Factor = $20 \cdot \log(161.25 \text{ msec} / 1001.3 \text{ msec})$

Average Factor = -15dB



Radiated Emissions Setup Photo 1



Radiated Emissions Setup Photo 2



Radiated Emissions Setup Photo 3



Test Results: Pass

Test Standard: FCC Part 15, Subpart B, RSS-GEN Issue 2 June 2007, ICES 003:1997, Class B

Test: Receiver Spurious Emissions

Performance Criterion: Not Applicable

Test Environment:

Environmental Conditions During Testing:	Ambient (°C):	18	Humidity (%):	27	Pressure (hPa):	
Pretest Verification Performed	Yes		Equipment under Test:	EX540 (Receiver)		
Test Engineer(s):	Vathana Ven		EUT Serial Number:	BOX0902041147-003		

Maximum Test Disturbance Parameters: Emissions below Class B limits.

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	Verified
2	ANTENNA	EMCO	3142	9701-1116	12/02/2009
3	HORN ANTENNA	EMCO	3115	9602-4675	10/13/2009
4	3 Meter In floor cable for site 1	ITS	RG214B/U	S1 3M FLR	09/08/2009
5	40GHz Cable	Megaphase	TM40-K1K1-197	7030801 001	06/05/2009
6	40 GHz Cable	Megaphase	TM40-K1K1-80	7030802 002	06/05/2009
7	100MHz-40GHz Preamp	MITEQ	NSP4000-NFG	1260417	04/03/2010
8	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	12/01/2009
9	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	02/17/2010

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	3/07/07 Revision

Test Details:

Test Point	Standard Limit (as published)	Compliance Level	Pass/Fail	Comment
Around the EUT	Specified limits	Below specified limits	Pass	None

Test Results:

Radiated Emissions

Company: Extech Instruments Corp
 Model #: EX540 (Receiver)
 Serial #: BOX0902041147-003
 Engineers: Vathana Ven
 Project #: 3173184
 Date(s): 02/11/09
 Standard: FCC Part 15 Subpart B/ICES 003, Class B
 Receiver: R&S FSEK-30 (ROS001)/R&S ESCI (ROS002)
 PreAmp: PRE9 03-27-09.txt
 PreAmp Used? (Y or N): N
 Antenna & Cables: N Bands: N, LF, HF, SHF
 Antenna: LOG1 12-02-2009 V3.txt LOG1 12-02-2009 H3.txt
 Cable(s): S1 3m Floor 09-08-09.txt NONE
 Barometer: BAR2
 Location: Site 1
 Temp/Humidity/Pressure: 18 deg. C 27% 1015 mB
 Limit Distance (m): 3
 Test Distance (m): 3
 Voltage/Frequency: Fresh Battery
 Frequency Range: 30 MHz - 1 GHz
 Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
QP	V	46.730	10.0	9.4	0.7	0.0	0.0	20.2	40.7	-20.5	120/300 kHz
QP	V	86.100	25.7	7.7	1.0	0.0	0.0	34.4	40.7	-6.3	120/300 kHz
QP	V	113.988	22.0	7.5	1.3	0.0	0.0	30.9	43.5	-12.6	120/300 kHz
QP	V	128.430	13.5	6.7	1.4	0.0	0.0	21.5	43.5	-22.0	120/300 kHz
QP	V	188.980	15.0	9.9	1.5	0.0	0.0	26.4	43.5	-17.1	120/300 kHz
QP	V	195.400	26.4	10.6	1.5	0.0	0.0	38.5	43.5	-5.0	120/300 kHz
QP	H	314.350	15.0	14.6	2.2	0.0	0.0	31.8	46.0	-14.2	120/300 kHz
QP	H	464.970	11.3	17.5	2.7	0.0	0.0	31.5	46.0	-14.5	120/300 kHz

FCC IC Harmonic?
 RB RB
 RB RB

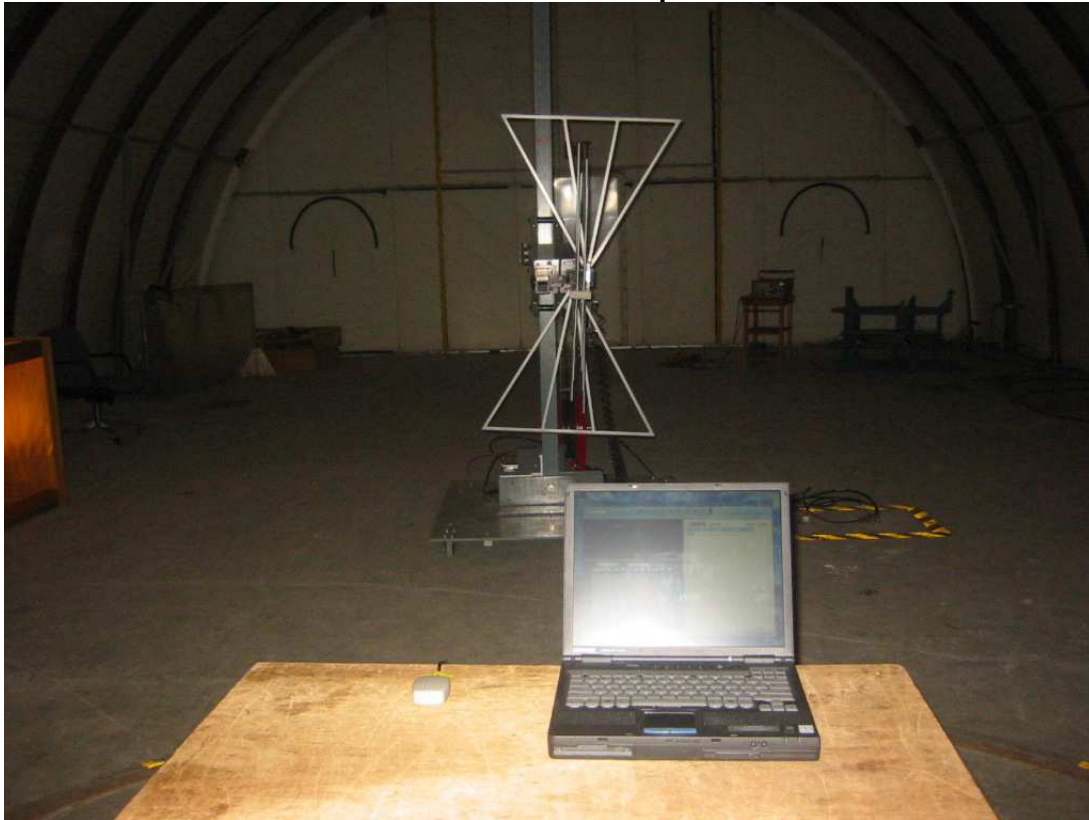
Radiated Emissions

Company: Extech Instruments Corp
 Model #: EX540 (Receiver)
 Serial #: BOX0902041147-003
 Engineers: Vathana Ven
 Project #: 3173184
 Date(s): 02/11/09
 Standard: FCC Part 15 Subpart B/ICES 003, Class B
 Receiver: R&S FSEK-30 (ROS001)/R&S ESCI (ROS002)
 PreAmp: PRE9 03-27-09.txt
 PreAmp Used? (Y or N): Y
 Antenna & Cables: HF Bands: N, LF, HF, SHF
 Antenna: Horn2 V3m 10-13-09.txt Horn2 H3m 10-13-09.txt
 Cable(s): MEG001.txt MEG004.txt
 Barometer: BAR2
 Location: Site 1
 Temp/Humidity/Pressure: 18 deg. C 27% 1015 mB
 Limit Distance (m): 3
 Test Distance (m): 3
 Voltage/Frequency: Fresh Battery
 Frequency Range: 1 - 10 GHz
 Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

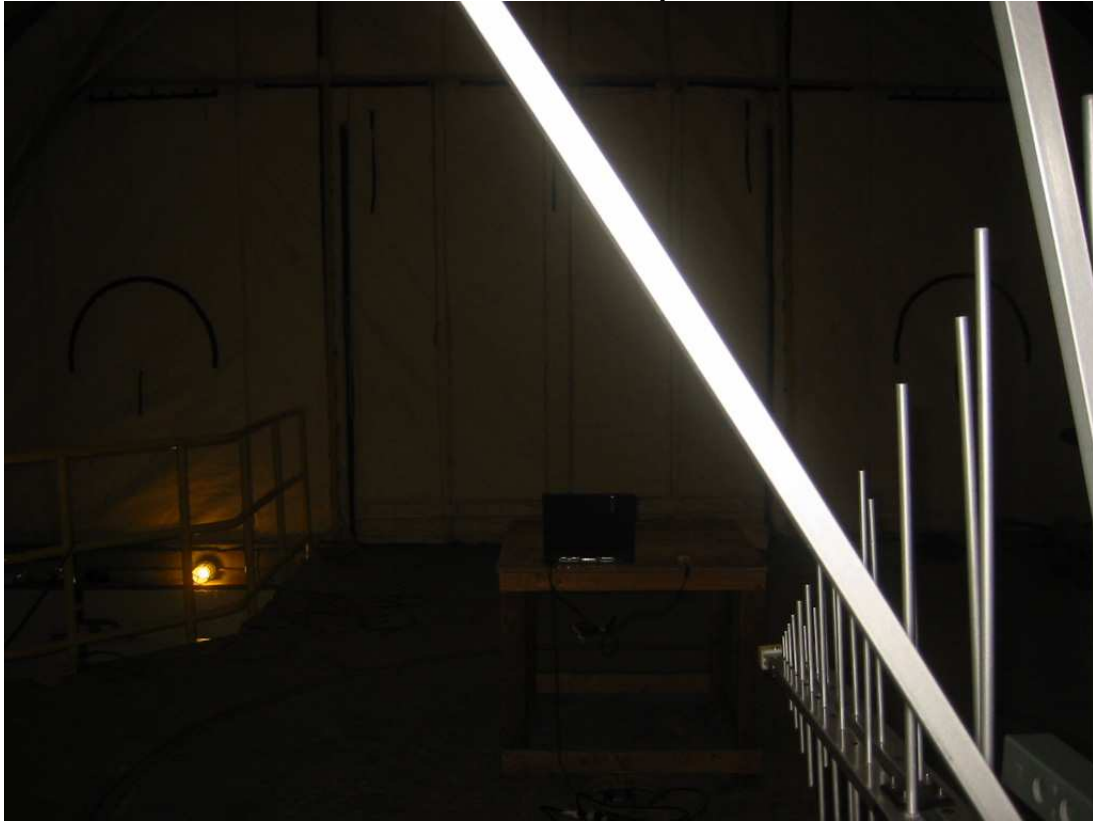
Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
AVG	V	1493.737	39.0	25.6	3.2	29.1	0.0	38.7	54.0	-15.3	1/3 MHz
AVG	V	1527.429	28.4	25.7	3.3	29.1	0.0	28.2	54.0	-25.8	1/3 MHz
AVG	V	1593.061	30.0	26.0	3.3	29.1	0.0	30.2	54.0	-23.8	1/3 MHz
AVG	V	1693.262	29.6	26.3	3.4	29.1	0.0	30.2	54.0	-23.8	1/3 MHz

FCC IC Harmonic?
 RB RB
 RB RB
 RB RB

Radiated Emissions Setup Photo 1



Radiated Emissions Setup Photo 2



Test Results: Pass

Test Standard: FCC Part 15, Subpart B, RSS-GEN Issue 2 June 2007, ICES 003:1997, Class B

Test: AC Line-Conducted Emissions

Performance Criterion: Emissions must be below Class B limits

Test Environment:

Environmental Conditions During Testing:	Ambient (°C):	18	Humidity (%):	27	Pressure (hPa):	
Pretest Verification Performed	Yes		Equipment under Test:	EX540 (Receiver)		
Test Engineer(s):	Vathana Ven		EUT Serial Number:	BOX0902041147-003		

Maximum Test Disturbance Parameters: Readings below specified Class B limits.

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	Verified
2	LISN, 50uH, .01 - 50MHz, 24A	Solar Electronics	9252-50-R-24-BNC	941713	10/06/2009
3	CABLE, BNC/BNC	Alpha	RG58B/U	CBL310E	03/12/2010
4	Attenuator, 10dB	Mini Circuits	10dB, 50 ohm	DS12	03/04/2009
5	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	02/17/2010

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	3/07/07 Revision

Test Results:

Conducted Emissions

Company: Exttech Instruments Corp
 Model #: EX540 (Receiver)
 Serial #: BOX0902041147-003
 Engineer(s): Vathana Ven
 Project #: 3173184
 Standard: FCC Part 15 Subpart B, Class B
 Barometer: BAR2
 Temp/Humidity/Pressure: 18 deg. C 27% 1015 mB
 Voltage/Frequency: 120Vac/60 Hz
 Frequency Range: 0.150-30 MHz
 Receiver: R&S ESCI (ROS002)
 Cable: CBL310E 3-4-09.cbl
 LISN 1: LISN11 [1] 10-06-09.txt
 LISN 2: LISN11 [2] 10-06-09.txt
 LISN 3: NONE
 LISN 4: NONE
 Attenuator: DS12 03-04-09.txt
 Net is the sum of worst-case lisn, cable, & attenuator losses, and initial reading, factors are not shown
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor; Bandwidth denoted as RBW/VBW

Detector Type	Frequency MHz	Reading Line 1 dB(uV)	Reading Line 2 dB(uV)	Reading Line 3 dB(uV)	Reading Line 4 dB(uV)	Net dB(uV)	QP Limit dB(uV)	Margin dB	Bandwidth
QP	0.153	23.9	24.0			34.3	65.8	-31.6	9/30 kHz
QP	0.338	21.0	20.0			31.3	59.3	-28.0	9/30 kHz
QP	0.476	16.0	16.0			26.3	56.4	-30.1	9/30 kHz
QP	6.141	13.0	13.0			23.5	60.0	-36.5	9/30 kHz
QP	8.663	6.2	6.0			16.9	60.0	-43.1	9/30 kHz
QP	25.690	11.4	13.0			24.1	60.0	-35.9	9/30 kHz

Detector Type	Frequency MHz	Reading Line 1 dB(uV)	Reading Line 2 dB(uV)	Reading Line 3 dB(uV)	Reading Line 4 dB(uV)	Net dB(uV)	Average Limit dB(uV)	Margin dB	Bandwidth
AVG	0.153	2.8	3.0			13.3	55.8	-42.6	9/30 kHz
AVG	0.338	2.3	-2.8			12.6	49.3	-36.7	9/30 kHz
AVG	0.476	0.5	0.5			10.8	46.4	-35.6	9/30 kHz
AVG	6.141	8.2	8.0			18.7	50.0	-31.3	9/30 kHz
AVG	8.663	-4.0	-3.0			7.6	50.0	-42.4	9/30 kHz
AVG	25.690	5.0	5.4			16.5	50.0	-33.5	9/30 kHz

Notes:

AC Line-Conducted Emissions Setup Photos



Test Results: No limit

Test Standard: RSS-210 Issue 7 June 2007 Annex A2.9

Test: 20 dB Bandwidth

Performance Criterion: Not Applicable

Test Environment:

Environmental Conditions During Testing:	Ambient (°C):	19	Humidity (%):	37	Pressure (hPa):	1019
Pretest Verification Performed	Yes		Equipment under Test:	EX540		
Test Engineer(s):	Vathana Ven		EUT Serial Number:	09019062		

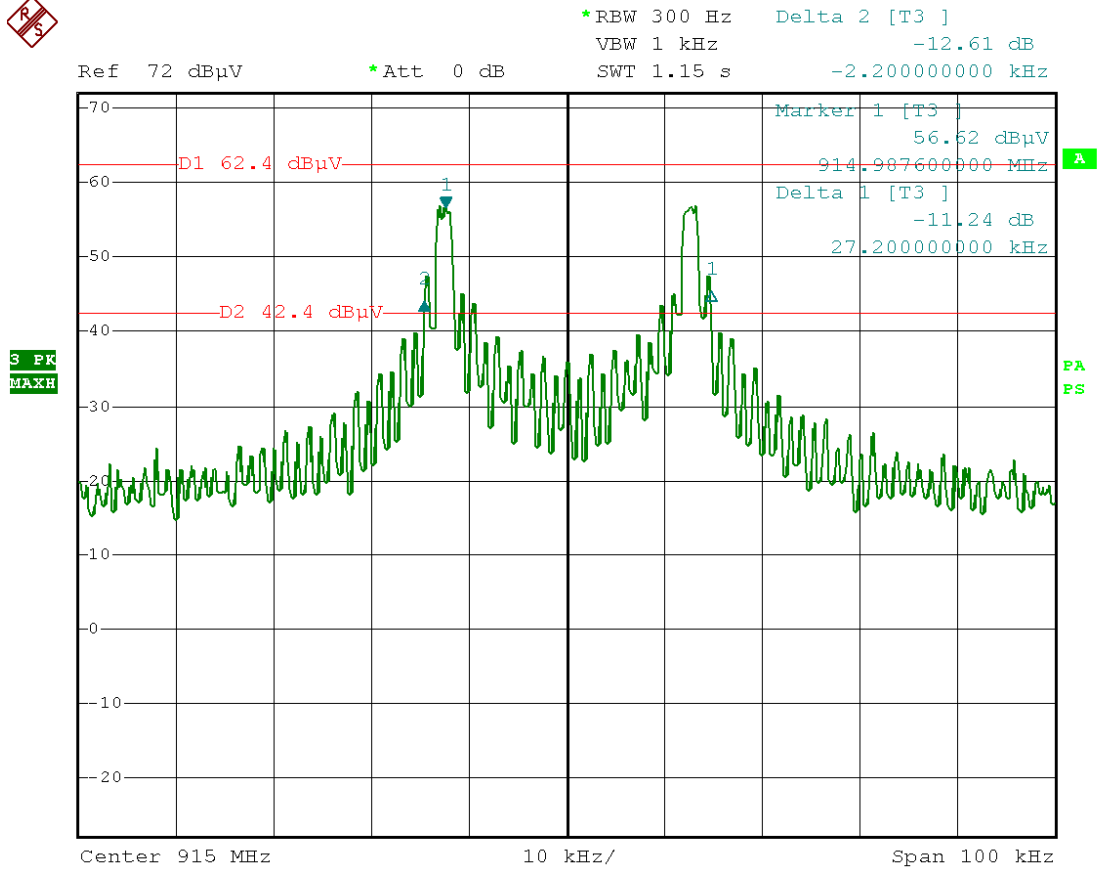
Maximum Test Disturbance Parameters: No limit

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	ANTENNA	EMCO	3142	9711-1224	12/12/2009
2	3 Meter In floor cable for site 2	ITS	RG214B/U	S2 3M FLR	02/20/2010
3	4 Line Digital Barometer *	Mannix	0ABA116	SAF313	05/29/2009
4	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	RS002	11/26/2008

Test Details:

Test Point	Standard Limit (as published)	Compliance Level	Pass/Fail	Comment
Fundamental Frequency	No limit	No limit	No limit	None



Date: 29.APR.2009 15:04:32

Note: Referenced 20dB bandwidth was measured to be 29.2 kHz