

DATE: 11 May 2010

I.T.L. (PRODUCT TESTING) LTD.
FCC Radio Test Report
for
Card Guard Scientific Survival Ltd.

Equipment under test:

CG-6108 ACT – 3 Lead

FG-00084

Written by: 

A. Moses, Documentation

Approved by: 

A. Moses, Test Engineer

Approved by: 

I. Raz, EMC Laboratory Manager

This report must not be reproduced, except in full, without the written permission of I.T.L. (Product Testing) Ltd.

This report relates only to items tested.

Measurement/Technical Report for Card Guard Scientific Survival Ltd.

CG-6108 ACT – 3 Lead

FG-00084

FCC ID: YB8ACT1ACT3

This report concerns: Original Grant:

Class I Change:

Class II Change:

Equipment type: Frequency hopping Spread Spectrum

Limits used:

47CFR15 Section 15.247

Measurement procedure used is ANSI C63.4-2003.

Application for Certification
prepared by:

Ishaishou Raz
ITL (Product Testing) Ltd.
Kfar Bin Nun
D.N. Shimshon 99780
Israel
e-mail: Sraz@itl.co.il

Applicant for this device:
(different from "prepared by")

Benny Tal
Card Guard Scientific Survival Ltd.
2 Pekeris St.
Rehovot 76100
Israel
Tel: +972- 8 - 948 - 4000
Fax: +972- 8 - 948 - 4040
e-mail: btal@cardguard.com

TABLE OF CONTENTS

1. GENERAL INFORMATION	5
1.1 Administrative Information.....	5
1.2 List of Accreditations	6
1.3 Product Description	7
1.4 Test Methodology.....	7
1.5 Test Facility	7
1.6 Measurement Uncertainty	7
2. SYSTEM TEST CONFIGURATION	8
2.1 Justification.....	8
2.2 EUT Exercise Software	8
2.3 Special Accessories	8
2.4 Equipment Modifications	8
2.5 Configuration of Tested System.....	8
3. NUMBER OF HOPPING FREQUENCIES	10
3.1 Test Specification	10
3.2 Test Procedure.....	10
3.3 Results table.....	15
4. CHANNEL FREQUENCY SEPARATION	16
4.1 Test Specification	16
4.2 Test procedure	16
4.3 Results table.....	17
4.4 Test Instrumentation Used	18
5. RADIATED POWER OUTPUT	19
5.1 Test Specification	19
5.2 Test procedure	19
5.3 Results Calculation.....	20
5.4 Test Equipment Used.....	21
6. DWELL TIME ON EACH CHANNEL	22
6.1 Test Specification	22
6.2 Test Procedure.....	22
6.3 Test Results	22
6.1 Results.....	24
6.2 Test Equipment Used.....	24
7. 20 DB BANDWIDTH	25
8. BAND EDGE	28
8.1 Test procedure	28
8.2 Results table.....	29
8.3 Test Equipment Used.....	30
9. RADIATED EMISSION, 9 KHZ – 30 MHZ	31
9.1 Test Specification	31
9.2 Test Procedure	31
9.3 Measured Data.....	31
9.4 Test Instrumentation Used, Radiated Measurements	32
9.5 Field Strength Calculation	32
10. SPURIOUS RADIATED EMISSION 30 – 25000 MHZ	33
10.1 Test Specification	33
10.2 Test Procedure.....	33
10.3 Test Data.....	34
10.4 Test Instrumentation Used, Radiated Measurements	41
10.5 Field Strength Calculation 30 – 1000 MHz	42
11. ANTENNA GAIN/INFORMATION	43

12. R.F EXPOSURE/SAFETY CALCULATION	44
13. APPENDIX B - CORRECTION FACTORS	45
13.1 Correction factors for CABLE	45
13.2 Correction factors for CABLE	46
13.3 Correction factors for CABLE	47
12.6 Correction factors for LOG PERIODIC ANTENNA	48
13.4 Correction factors for LOG PERIODIC ANTENNA	49
13.5 Correction factors for BICONICAL ANTENNA	50
13.6 Correction factors for Double-Ridged Waveguide Horn	51
13.7 Correction factors for Horn Antenna	52
13.8 Correction factors for Horn Antenna	53
13.9 Correction factors for ACTIVE LOOP ANTENNA	54

1. General Information

1.1 Administrative Information

Manufacturer: Card Guard Scientific Survival Ltd.

Manufacturer's Address: 2 Pekeris St., Rabin Science Park
Rechovot
Israel
Tel: 08-9484000
Fax: 08-9484044

Manufacturer's Representative: Tomer Levy

Equipment Under Test (E.U.T.): CG-6108 ACT – 3 Lead

Equipment Model No.: FG-00084

Equipment Serial No.: 0908630876

Date of Receipt of E.U.T.: 01.03.10

Start of Test: 01.03.10

End of Test: 11.03.10

Test Laboratory Location: I.T.L (Product Testing) Ltd.
Kfar Bin Nun,
ISRAEL 99780

Test Specifications: FCC Part 15 Subpart C

1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), IC File No.: 46405-4025; Site No. IC 4025B-1.
6. TUV Product Services, England, ASLLAS No. 97201.
7. Nemko (Norway), Authorization No. ELA 207.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

1.3 Product Description

The ACT-3L CG-6108 system is comprised of the ACT-3L CG-6108 Continuous ECG Monitor and Arrhythmia Detector and transmitter with a software application, configured to process and transmit the ECG recordings. The ACT-3L CG-6108 is designed for self-testing by patients at home and for analyses by medical professionals at a remote Monitoring Center.

The ECG signals are transmitted via Bluetooth to the handheld device. The ECG events are then wirelessly transmitted from the handheld device to the Center for analysis. The handheld device is equipped with shared memory used to record the signal received from the sensor and to allow pre- and post processing options through the use of this memory in a dual memory loop configuration, both running in parallel. One loop is auto-triggered, with programmable thresholds that starts recording based on specific rhythms and arrhythmias detected, or manually activated by the patient. The second, and longer, recording loop is controlled remotely to provide the physician with more information, when requested by the Center.

The handheld device automatically transmits the recorded ECG, via its cellular link, to the Center. When cellular service is unavailable the ACT can transmit via landline telephone using a Bluetooth modem.

1.4 Test Methodology

Radiated testing were performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing September 06, 2009). I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Radiated Emission

The Open Site complies with the ± 4 dB Normalized Site Attenuation requirements of ANSI C63.4-2003. In accordance with Paragraph 5.4.6.1 of this standard, this tolerance includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies.

2. System Test Configuration

2.1 Justification

Radiated emission screening was performed in 3 orthogonal orientations. The worst case orientation was the vertical position.

In order to operate in fixed frequencies, the E.U.T. was connected to a laptop connected to an interface board. A software command was sent to the E.U.T. to operate in fixed frequencies.

2.2 EUT Exercise Software

The EUT exercise software has been developed using the CSR's TRUE TEST libraries to operate the internal test functions implemented by CSR's Bluetooth stack.

2.3 Special Accessories

An SPI interface board, connected to a laptop was used to operate the E.U.T. in fixed frequencies.

2.4 Equipment Modifications

No modifications were needed in order to achieve compliance

2.5 Configuration of Tested System

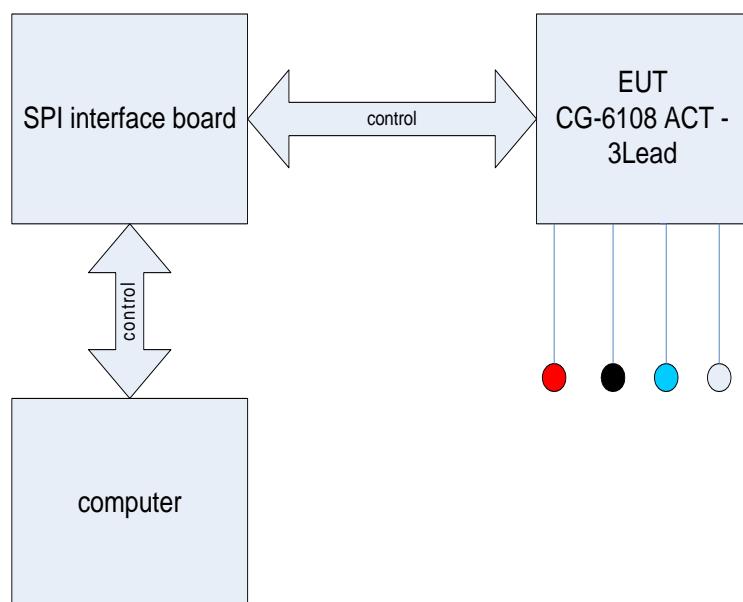


Figure 1. Configuration of Tested System Fixed frequency



Figure 2. Configuration of Tested System Frequency Hopping

3. Number of Hopping Frequencies

3.1 ***Test Specification***

F.C.C., Part 15, Subpart C Section 15.247(a)(1)(iii)

3.2 ***Test Procedure***

The E.U.T. was set to hopping mode.

The spectrum analyzer was set to the following parameters:

Span: Every 40 MHz Frequency

Band of Operation: 2402-2481 MHz

RBW: 100kHz

VBW: 300kHz

Detector Function: Peak

Trace: Maximum Hold

The number of hopping frequencies is $21+20+19+19 = 79$ (See plots).

Number of Hopping Frequencies

E.U.T Description CG-6108 ACT – 3 Lead

Type FG-00084

Serial Number: 0908630876

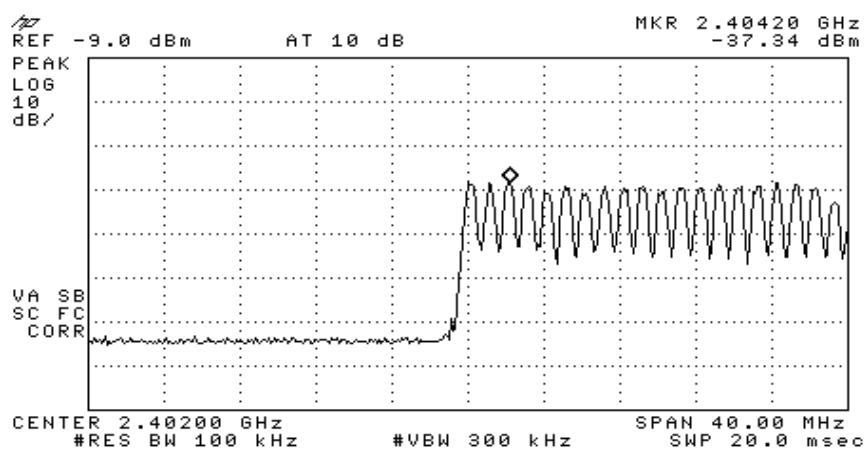


Figure 3. 2402 GHz

Number of Hopping Frequencies

E.U.T Description CG-6108 ACT – 3 Lead

Type FG-00084

Serial Number: 0908630876

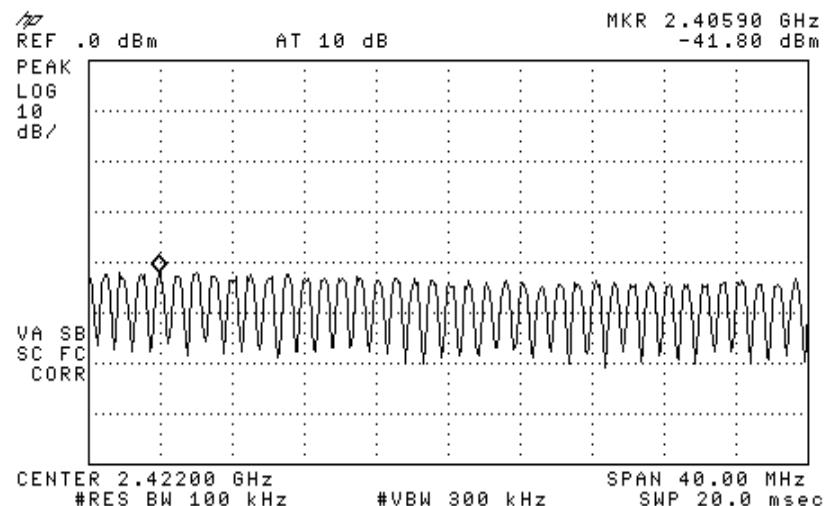


Figure 4. 2.422 GHz

Number of Hopping Frequencies

E.U.T Description CG-6108 ACT – 3 Lead
Type FG-00084
Serial Number: 0908630876

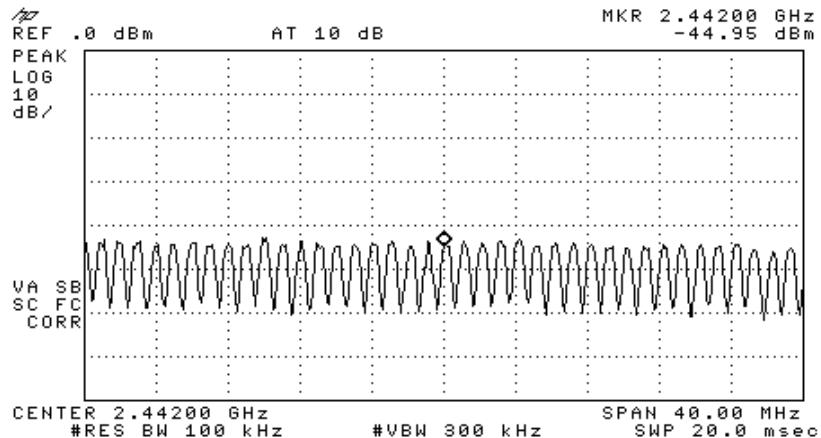


Figure 5. 2.442 GHz

Number of Hopping Frequencies

E.U.T Description CG-6108 ACT – 3 Lead
Type FG-00084
Serial Number: 0908630876

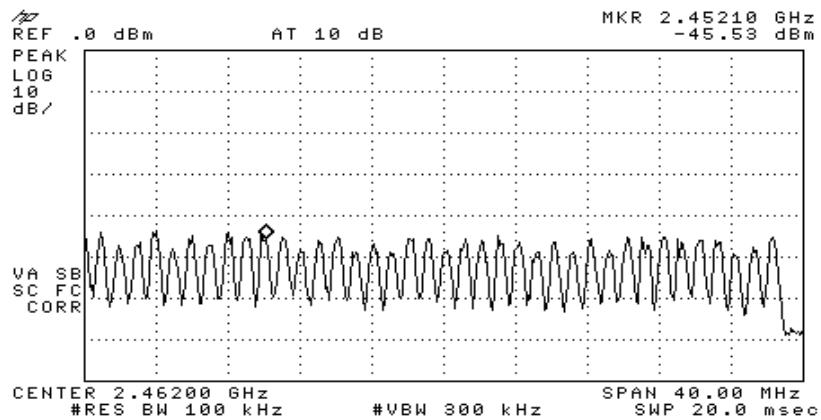


Figure 6. 2.462 GHz

3.3 Results table

E.U.T. Description: CG-6108 ACT – 3 Lead

Model No.: FG-00084

Serial Number: 0908630876

Specification: FCC Part 15, Subpart C, 15.247(a)(1)(iii)

Band1 = 2402 – 2422 (MHz) =21

Band2 = 2422 – 2442 (MHz) = 20

Band3 = 2442 – 2462 (MHz) = 19

Band4 = 2462 – 2481 (MHz) = 19

Number of Hopping Frequencies	Specification
79	>75

Figure 7 Number of Hopping Frequencies

TEST PERSONNEL:

Tester Signature: A. Moses Date: 11.05.10
 Typed/Printed Name: A. Moses

3.4 Test Instrumentation Used

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3313U00346	March 10, 2010	1 year

4. Channel Frequency Separation

4.1 Test Specification

Specification: FCC Part 15, Subpart C, 15.247(a) (1)

4.2 Test procedure

The E.U.T. was set to hopping mode.

The spectrum analyzer was set to the following parameters:

Span: 2 MHz

RBW: 10kHz

VBW: 10kHz

Detector Function: Peak

Trace: Maximum Hold

The marker delta function to determine the separation between the peaks of the adjacent channels was used.

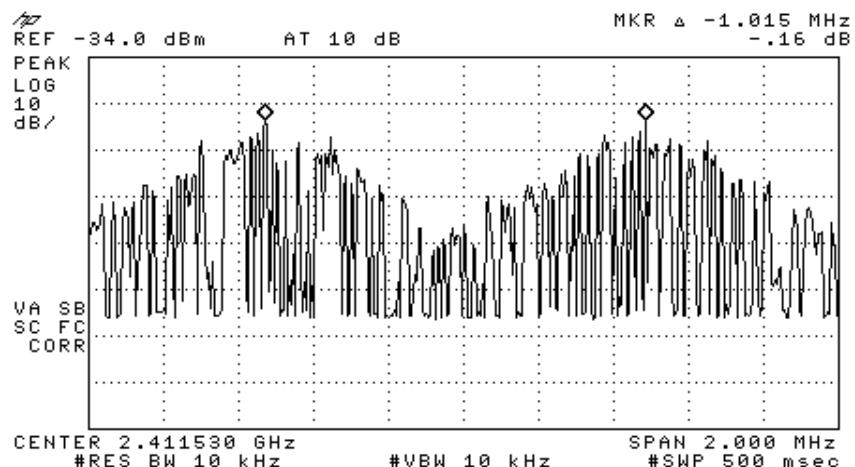


Figure 8. 2.4115 GHz.

4.3 Results table

E.U.T. Description: CG-6108 ACT – 3 Lead
Model No.: FG-00084
Serial Number: 0908630876
Specification: FCC Part 15, Subpart C, 15.247(a) (1)

Channel Frequency Separation (kHz)	Specification (kHz)	Margin (kHz)
1015	>810	205

Figure 9 Channel Frequency Separation

JUDGEMENT: Passed by 2 05kHz

TEST PERSONNEL:

Tester Signature:  Date: 11.05.10
Typed/Printed Name: A. Moses

4.4 **Test Instrumentation Used**

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8564E	3313U00346	March 10, 2010	1 year

5. Radiated Power Output

5.1 Test Specification

F.C.C. Part 15, Subpart C: 15.247(b)

5.2 Test procedure

The E.U.T was placed on a non-metallic table, 0.8 meters above the ground plane, on a remote-controlled turntable in the OATS. The test distance was 3 meters.

The transmitter unit operated with normal modulation. The EMI receiver was set to 1 MHz resolution BW. The EUT was set up as shown in Figure 3, and its proper operation was checked.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

The E.U.T. was tested in three operating channels and frequencies (1 (2.402 GHz); 8 (2.441 GHz); 14 (2.480 GHz)).

Radiated output power levels were measured at selected operation frequencies and the results were converted to power level according to the formula as shown below:

$$P = \frac{(E_{V/m} \times d)^2}{(30 \times G)} \text{ [W]}$$

The E.U.T. was tested at 2402, 2441, and 2480 MHz with GFSK (Gaussian Frequency Shift Keying)- modulation.

5.3 Results Calculation

E.U.T. Description: CG-6108 ACT – 3 Lead

Model No.: FG-00084

Serial Number: 0908630876

Specification: F.C.C. Part 15, Subpart C

Frequency (MHz)	Pol	E (db μ V/ m)	E (V/m)	Antenna Gain (dBi)	Antenna Distance (m)	Calculated Results (mW)	Limit (W)	Margin (mW)
2402.00	V	90.2	0.032	4.1	3	0.12	1	999.88
2402.00	H	87.5	0.023	4.1	3	0.06	1	999.94
2441.0	V	88.3	0.026	4.1	3	0.08	1	999.92
2441.0	H	87.3	0.023	4.1	3	0.06	1	999.94
2480.0	V	85.3	0.018	4.1	3	0.038	1	999.962
2480.0	H	89.4	0.029	4.1	3	0.1	1	999.90

JUDGEMENT: Passed by 999.96 mW

TEST PERSONNEL:

Tester Signature: A. Moses Date: 11.05.10

Typed/Printed Name: A. Moses

5.4 **Test Equipment Used.**

Radiated Maximum Power Output

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Receiver	HP	85422E	3906A00276	November 10, 2009	1 year
RF Section	HP	85420E	3705A00248	November 10, 2009	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253	January 29, 2009	2 years

Figure 10 Test Equipment Used

6. Dwell Time on Each Channel

6.1 Test Specification

FCC Part 15, Section 15.247(a)(1)(iii)

6.2 Test Procedure

The E.U.T. was tested in radiated mode using the substitutional antenna. The spectrum analyzer was set to 100 kHz RBW and 100 kHz VBW.

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

6.3 Test Results

The E.U.T met the requirements of the FCC Part 15, Section 15.247(a)(1)(iii).

Additional information of the results is given in *Figure 13* to *Figure 12*.

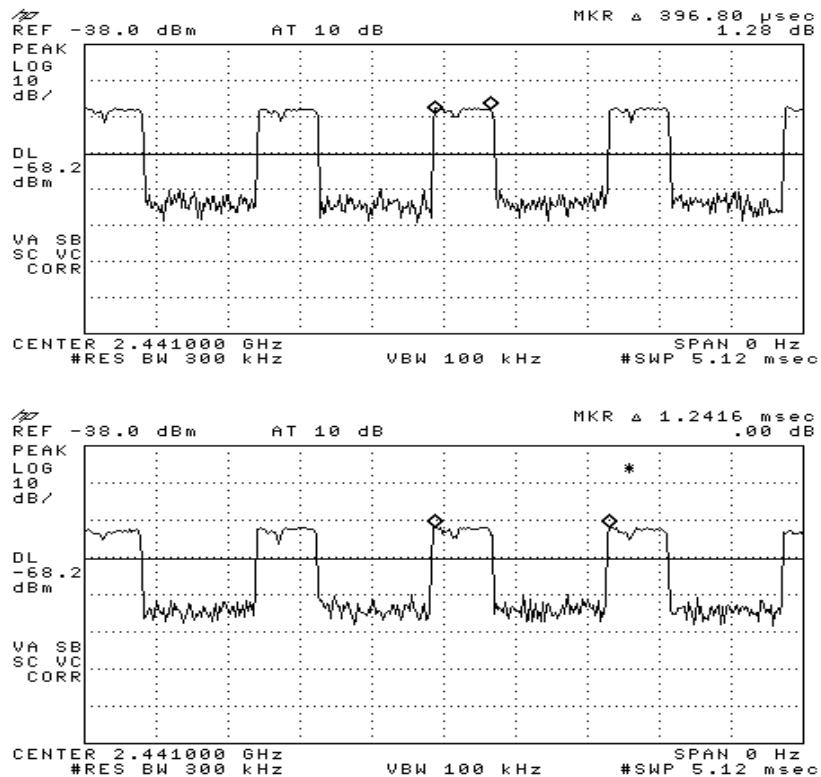


Figure 13 — T=1.2msec, Ton=0.4msec, D.C=33%

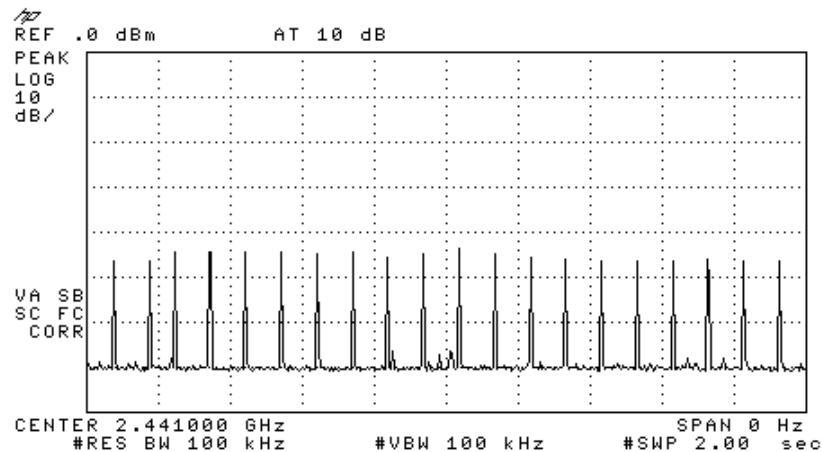


Figure 11 — Number of channels in 2 sec. =20

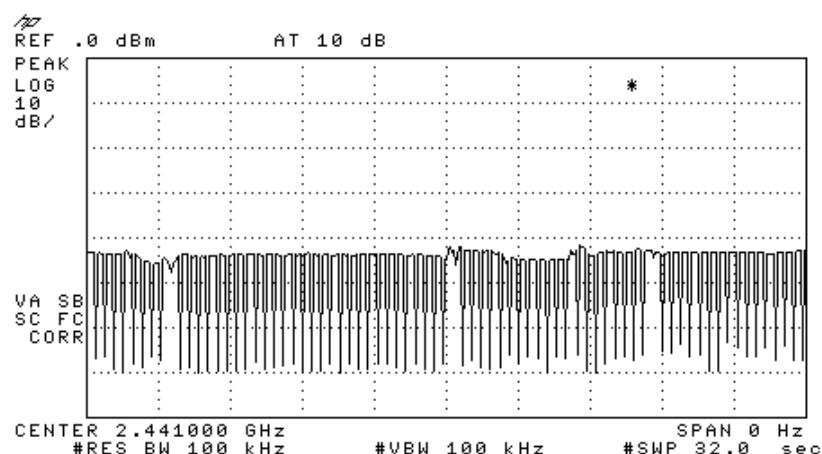


Figure 12 — Dwell time at 2.441GHz

[$32/2=16$, $20 \times 16 = 320$, $320 \times 0.4\text{msec} = 0.128\text{ sec}$, spec=0.4 sec]

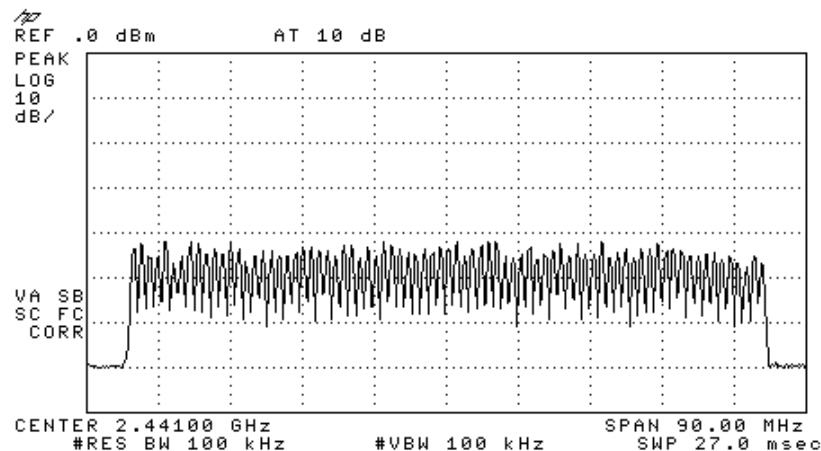


Figure 13 — Entire 79 Channels Display

6.1 *Results*

E.U.T. Description: CG-6108 ACT – 3 Lead
 Model No.: FG-00084
 Serial Number: 0908630876
 Specification: F.C.C. Part 15, Subpart C

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature:  Date: 11.05.10

Typed/Printed Name: A. Moses

6.2 *Test Equipment Used.*

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8594E	3313U00346	March 10, 2010	1 year

7. 20 dB Bandwidth

7.1 Test procedure

Specification: FCC Part 15, Subpart C (15.247-a2)

7.2 Test procedure

The E.U.T. was set to the applicable test frequency. The spectrum analyzer was set to 30 kHz resolution BW. The spectrum bandwidth of the E.U.T. at the point of 20 dB below maximum peak power was measured and recorded.

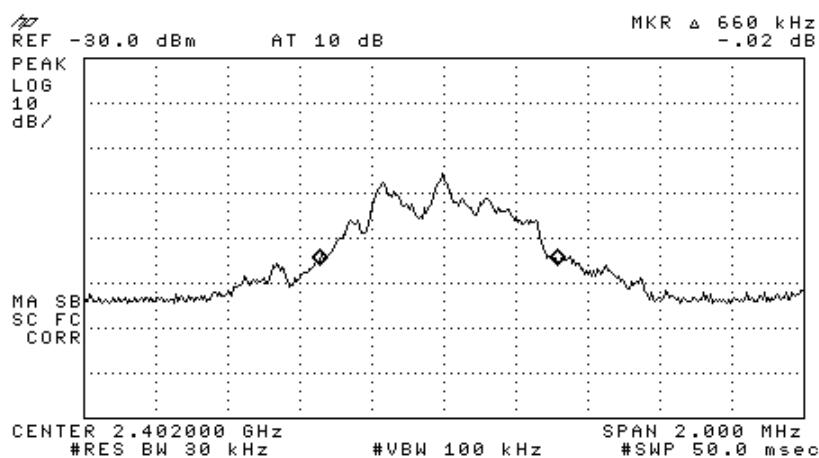


Figure 14 — 2402.0 MHz

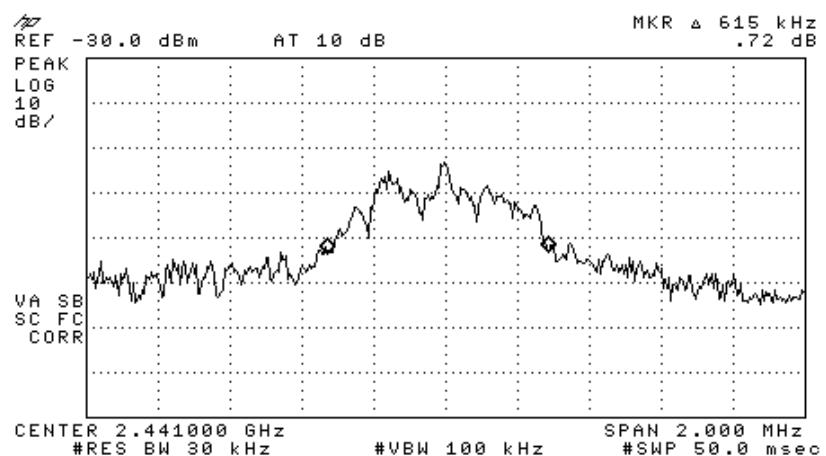


Figure 15 — 2441.0 MHz

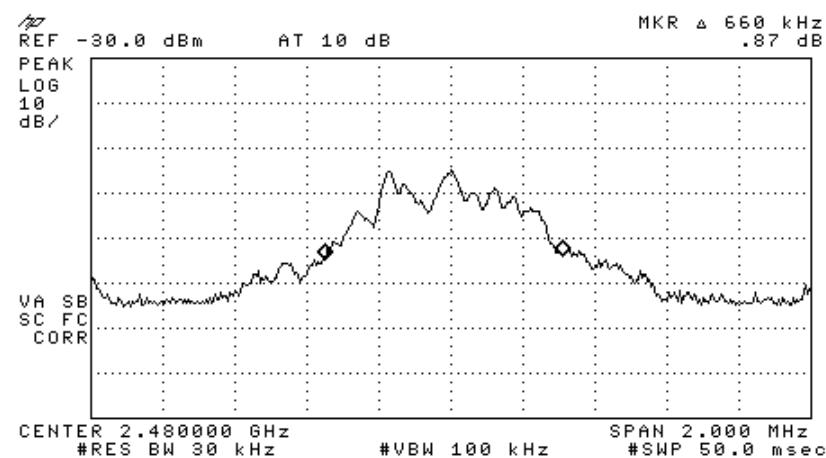


Figure 16 — 2448.0 MHz

7.3 **Results table**

E.U.T. Description: CG-6108 ACT – 3 Lead
 Model No.: FG-00084
 Serial Number: 0908630876
 Specification: FCC Part 15, Subpart C (15.247-a2)

Operation Frequency (MHz)	Reading (kHz)
2402	660
2441	615
2480	660

Figure 17 20 dB Bandwidth

TEST PERSONNEL:

Tester Signature: A. Moses

Date: 11.05.10

Typed/Printed Name: A. Moses

7.4 **Test Equipment Used.**

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibr.	Period
Spectrum Analyzer	HP	8594E	3313U00346	March 10, 2010	1 year

8. Band Edge

[In Accordance with section 15.247(d)]

8.1 Test procedure

The E.U.T was placed on a non-metallic table, 0.8 meters above the ground plane, on a remote-controlled turntable in the OATS. The test distance was 3 meters.

The transmitter unit operated with normal modulation. The EMI receiver was set to 1 MHz resolution BW. The EUT was set up as shown in *Figure 1*, and its proper operation was checked.

The EMI receiver was adjusted to the transmission channel at the maximum radiated level. The display line was set to 20 dBc and the EMI receiver was set to the band edge frequencies.

Maximum power level below 2400 MHz and above 2483.5 MHz was measured relative to power level at 2402 MHz, and 2480 MHz correspondingly.

The E.U.T. was tested in 2 operating channels and frequencies (1 (2.402 GHz); 14 (2.480 GHz)).

The E.U.T. was tested at 2402 and 2480 MHz with GFSK (Gaussian Frequency Shift Keying) modulation.

8.2 Results table

E.U.T. Description: CG-6108 ACT – 3 Lead
 Model No.: FG-00084
 Serial Number: 0908630876
 Specification: F.C.C. Part 15, Subpart C (15.247 (d))

Operation Frequency (MHz)	Band Edge Frequency (MHz)	Spectrum Level (dBuV/m)	Specification (dBuV/m)	Margin (dB)
2480	2484	56.1	74.0	-17.9
2402	2390	53.5	74.0	-20.5

Figure 18 Band Edge Peak Detector

Operation Frequency (MHz)	Band Edge Frequency (MHz)	Spectrum Level (dBuV/m)	Specification (dBuV/m)	Margin (dB)
2480	2484	45.2	54.0	-8.8
2402	2390	40.8	54.0	-13.2

Figure 19 Band Edge Average Detector

JUDGEMENT: Passed by 8.8 dB

TEST PERSONNEL:

Tester Signature:  Date: 11.05.10

Typed/Printed Name: A. Moses

8.3 **Test Equipment Used.**

Band edge Spectrum

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Receiver	HP	85422E	3906A00276	November 10, 2009	1 year
RF Section	HP	85420E	3705A00248	November 10, 2009	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A
Antenna-Log Periodic	A.H.System	SAS-200/511	253	January 29, 2009	2 years

Figure 20 Test Equipment Used

9. Radiated Emission, 9 kHz – 30 MHz

9.1 ***Test Specification***

9 kHz-30 MHz, FCC, Part 15, Subpart C, Section 209

9.2 ***Test Procedure***

The E.U.T. operation mode and test set-up are as described in Section 3.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.1.

The frequency range 9 kHz-30 MHz was scanned.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter at a distance of 3 meters.

The E.U.T. was operated at the frequency of 10 MHz. This frequency was measured using a peak detector.

The E.U.T. was tested in three operating channels and frequencies (1 (2.402 GHz); 8 (2.441 GHz); 14 (2.480 GHz)).

9.3 ***Measured Data***

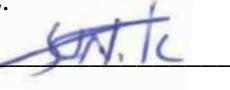
JUDGEMENT: Passed

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 209 specification.

The results for all three channels were the same.

No signals were detected in the frequency range of 9 kHz – 30 MHz.

TEST PERSONNEL:

Tester Signature: 

Date: 11.05.10

Typed/Printed Name: A. Moses

9.4 **Test Instrumentation Used, Radiated Measurements**

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 10, 2009	1 year
RF Section	HP	85420E	3705A00248	November 10, 2009	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 19, 2009	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

9.5 **Field Strength Calculation**

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$FS = RA + AF + CF$$

FS: Field Strength [dB μ V/m]
 RA: Receiver Amplitude [dB μ V]
 AF: Receiving Antenna Correction Factor [dB/m]
 CF: Cable Attenuation Factor [dB]

Example: $FS = 30.7 \text{ dB}\mu\text{V (RA)} + 14.0 \text{ dB (AF)} + 0.9 \text{ dB (CF)} = 45.6 \text{ dB}\mu\text{V}$

No external pre-amplifiers are used.

10. Spurious Radiated Emission 30 – 25000 MHz

10.1 ***Test Specification***

30 MHz- 25000 MHz, F.C.C., Part 15, Subpart C

10.2 ***Test Procedure***

The E.U.T. operation mode and test set-up are as described in Section 3.

See Section 3.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground.

The frequency range 30 MHz-25000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 30 MHz-2.9 GHz, a computerized EMI receiver complying to CISPR 16 requirements was used.

In the frequency range 2.9-25.0 GHz, a spectrum analyzer including a low noise amplifier was used. During average measurements, the IF bandwidth was 1 MHz and the video bandwidth was 100Hz. During peak measurements, the IF bandwidth was 1 MHz and the video bandwidth was 3 MHz.

The test distance was 3 meters.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

The E.U.T. was tested in three operating channels and frequencies (1 (2.402 GHz); 8 (2.441 GHz; 14 (2.480 GHz)).

10.3 **Test Data**

JUDGEMENT: Passed by 15.51 dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification. The results for all three operation channels were the same.

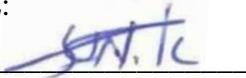
For the operation channel (2.402 GHz), the margin between the emission level and the specification limit is 15.51 dB in the worst case at the frequency of 4804.00 MHz, vertical polarization.

For the operation channel (2.441 GHz), the margin between the emission level and the specification limit is 19.4 dB in the worst case at the frequency of 4882.00 MHz, horizontal polarization.

For the operation channel (2.480 GHz), the margin between the emission level and the specification limit is 20.5 dB in the worst case at the frequency of 4950.00 MHz, horizontal and vertical polarizations.

Only 2nd harmonic frequencies were detected on all three operating frequencies.

TEST PERSONNEL:

Tester Signature:  Date: 11.05.10

Typed/Printed Name: A. Moses

Radiated Emission

E.U.T Description CG-6108 ACT – 3 Lead
 Type FG-00084
 Serial Number: 0908630876

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz to 25.0 GHz
 Test Distance: 3 meters Detector: Peak
 Operation Frequency: 2402 MHz

Freq.	Polarity	Peak Reading	Peak. Specification	Margin
(MHz)	(H/V)	(dB μ V/m)	(dB μ V/m)	(dB)
4804.00	H	49.29	74.0	-24.71
4804.00	V	51.34	74.0	-22.61

Figure 21. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL.
Detector: Peak

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Reading” includes correction factor.

* “Correction Factor” = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description CG-6108 ACT – 3 Lead
 Type FG-00084
 Serial Number: 0908630876

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz to 25.0 GHz
 Test Distance: 3 meters Detector: Average
 Operation Frequency: 2402 MHz

Freq.	Polarity	Average Amp	Average Specification	Margin
(MHz)	(H/V)	(dB μ V/m)	(dB μ V/m)	(dB)
4804.00	H	38.35	54.0	-15.65
4804.00	V	38.49	54.0	-15.51.

**Figure 22. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL
Detector: Average**

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Average Amp” includes correction factor.

* Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description: CG-6108 ACT – 3 Lead
 Type: FG-00084
 Serial Number: 0908630876

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz to 25.0 GHz
 Test Distance: 3 meters Detector: Peak
 Operation Frequency: 2441 MHz

Freq.	Polarity	Peak Amp	Peak. Specification	Margin
(MHz)	(H/V)	(dB μ V/m)	(dB μ V/m)	(dB)
4882.00	H	48.08	74.0	-25.92
4882.00	V	48.15	74.0	-25.85

Figure 23. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL.
Detector: Peak

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Amp” includes correction factor.

* “Correction Factor” = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description CG-6108 ACT – 3 Lead
 Type FG-00084
 Serial Number: 0908630876

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz to 25.0 GHz
 Test Distance: 3 meters Detector: Average
 Operation Frequency: 2441 MHz

Freq.	Polarity	Average Amp	Average Specification	Margin
(MHz)	(H/V)	(dB μ V/m)	(dB μ V/m)	(dB)
4882.00	H	38.12	54.0	-15.88
4882.00	V	38.1	54.0	-15.9

Figure 24. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL.
Detector: Average

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Average Amp” includes correction factor.

* Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description CG-6108 ACT – 3 Lead
 Type FG-00084
 Serial Number: 0908630876

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz to 25.0 GHz
 Test Distance: 3 meters Detector: Peak
 Operation Frequency: 2480 MHz

Freq.	Polarity	Peak Amp	Peak. Specification	Margin
(MHz)	(H/V)	(dB μ V/m)	(dB μ V/m)	(dB)
4960.00	H	48.26	74.0	-25.74
4960.00	V	48.62	74.0	-25.38

Figure 25. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL.
Detector: Peak

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Amp” includes correction factor.

* “Correction Factor” = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description CG-6108 ACT – 3 Lead
 Type FG-00084
 Serial Number: 0908630876

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz to 25.0 GHz
 Test Distance: 3 meters Detector: Average
 Operation Frequency: 2480 MHz

Freq. (MHz)	Polarity (H/V)	Average Amp (dB μ V/m)	Average Specification (dB μ V/m)	Margin (dB)
4960.00	H	38.32	54.0	-15.68
4960.00	V	38.42	54.0	-15.58

Figure 26. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL.
Detector: Average

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Average Amp” includes correction factor.

* Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

10.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	November 10, 2009	1 Year
RF Filter Section	HP	85420E	3705A00248	November 10, 2009	1 Year
Antenna Biconical	ARA	BCD 235/B	1041	March 25, 2009	1 Year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 6, 2009	1 Year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 29, 2009	2 Years
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 16, 2008	2 Years
Horn Antenna	ARA	SWH-28	1008	December 23, 2008	2 Years
Horn Antenna	Narda	V637	0410	December 23, 2008	2 Years
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	January 7, 2009	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 9, 2009	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	March 17, 2009	1 Year
Spectrum Analyzer	HP	8546E	3442A00275	January 11, 2010	1 Year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKG19982	N/A	N/A

10.5 **Field Strength Calculation 30 – 1000 MHz**

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$[\text{dB}\mu\text{v}/\text{m}] \text{ FS} = \text{RA} + \text{AF} + \text{CF}$$

FS: Field Strength [dB μ v/m]

RA: Receiver Amplitude [dB μ v]

AF: Receiving Antenna Correction Factor [dB/m]

CF: Cable Attenuation Factor [dB]

Example: FS = 30.7 dB μ V (RA) + 14.0 dB (AF) + 0.9 dB (CF) = 45.6 dB μ V

No external pre-amplifiers are used.

11. Antenna Gain/Information

The antenna gain is 4.1 dBi.

12. R.F Exposure/Safety Calculation

15.247 (i)

The ACT-3L CG-6108 system is comprised of the ACT-3L CG-6108 Continuous ECG Monitor and Arrhythmia Detector and transmitter with a software application, configured to process and transmit the ECG recordings. The ACT-3L CG-6108 is designed for self-testing by patients at home and for analyses by medical professionals at a remote Monitoring Center.

The ECG signals are transmitted via Bluetooth to the handheld device. The handheld device automatically transmits the recorded ECG, via its cellular link, to the Center. When cellular service is unavailable the ACT can transmit via landline telephone using a Bluetooth modem. Typical distance between the antenna and user is 2 cm.

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1307(b) (1) Requirements

(a) FCC limits at 2441 MHz is: $1 \frac{mW}{cm^2}$

Using table 1 of Section 1.1310 limit for general population/uncontrolled exposures, the above level is an average over 30 minutes.

(b) The power density produced by the E.U.T. is

$$S = \frac{P_t G_t}{4\pi R^2}$$

P_t- Transmitted Power 0.12 mW (Peak) = -9.2dBm

G_T- Antenna Gain, = 4.1 dBi, 2.51(numeric)

R- Distance from Transmitter using 2 cm worst case

(c) Transmitter peak power using source based time averaging of 20% maximum, 20 msec “ON” time, “OFF” + “ON” time 100 msec:

$$P_t = \frac{0.12 \times 20}{100} = 0.024mW$$

(d) The peak power density (time averaging) is :

$$S_p = \frac{0.024 \times 2.51}{4\pi(2)^2} = 0.0012 \frac{mW}{cm^2}$$

(e) This is significantly below the FCC limit.

13. APPENDIX B - CORRECTION FACTORS

13.1 Correction factors for CABLE

from EMI receiver
to test antenna
at 3 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)	FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3	1200.0	7.3
20.0	0.6	1400.0	7.8
30.0	0.8	1600.0	8.4
40.0	0.9	1800.0	9.1
50.0	1.1	2000.0	9.9
60.0	1.2	2300.0	11.2
70.0	1.3	2600.0	12.2
80.0	1.4	2900.0	13.0
90.0	1.6		
100.0	1.7		
150.0	2.0		
200.0	2.3		
250.0	2.7		
300.0	3.1		
350.0	3.4		
400.0	3.7		
450.0	4.0		
500.0	4.3		
600.0	4.7		
700.0	5.3		
800.0	5.9		
900.0	6.3		
1000.0	6.7		

NOTES:

1. The cable type is RG-214.
2. The overall length of the cable is 27 meters.
3. The above data is located in file 27MO3MO.CBL on the disk marked "Radiated Emission Tests EMI Receiver".

13.2 Correction factors for CABLE

from EMI receiver
to test antenna
at 3 meter range.

FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.2
2.0	1.6
3.0	2.0
4.0	2.4
5.0	3.0
6.0	3.4
7.0	3.8
8.0	4.2
9.0	4.6
10.0	5.0
12.0	5.8

NOTES:

1. The cable type is RG-8.
2. The overall length of the cable is 10 meters.

13.3 Correction factors for CABLE

from spectrum analyzer
to test antenna above 2.9 GHz

FREQUENCY (GHz)	CORRECTION FACTOR (dB)	FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.9	14.0	9.1
2.0	2.7	15.0	9.5
3.0	3.5	16.0	9.9
4.0	4.2	17.0	10.2
5.0	4.9	18.0	10.4
6.0	5.5	19.0	10.7
7.0	6.0	20.0	10.9
8.0	6.5	21.0	11.2
9.0	7.0	22.0	11.6
10.0	7.5	23.0	11.9
11.0	7.9	24.0	12.3
12.0	8.3	25.0	12.6
13.0	8.7	26.0	13.0

NOTES:

1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.
2. The cable is used for measurements above 2.9 GHz.
3. The overall length of the cable is 10 meters.

12.6 Correction factors for

LOG PERIODIC ANTENNA

Type LPD 2010/A

at 3 and 10 meter ranges.

Distance of 3 meters

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.1
250.0	10.2
300.0	12.5
400.0	15.4
500.0	16.1
600.0	19.2
700.0	19.4
800.0	19.9
900.0	21.2
1000.0	23.5

Distance of 10 meters

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.0
250.0	10.1
300.0	11.8
400.0	15.3
500.0	15.6
600.0	18.7
700.0	19.1
800.0	20.2
900.0	21.1
1000.0	23.2

NOTES:

1. Antenna serial number is 1038.
2. The above lists are located in file number 38M30.ANT for a 3 meter range, and file number 38M100.ANT for a 10 meter range.
3. The files mentioned above are located on the disk marked "Radiated Emission Test EMI Receiver".

13.4 Correction factors for LOG PERIODIC ANTENNA
Type SAS-200/511
at 3 meter range.

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
1.0	24.9
1.5	27.8
2.0	29.9
2.5	31.2
3.0	32.8
3.5	33.6
4.0	34.3
4.5	35.2
5.0	36.2
5.5	36.7
6.0	37.2
6.5	38.1

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
7.0	38.6
7.5	39.2
8.0	39.9
8.5	40.4
9.0	40.8
9.5	41.1
10.0	41.7
10.5	42.4
11.0	42.5
11.5	43.1
12.0	43.4
12.5	44.4
13.0	44.6

NOTES:

1. Antenna serial number is 253.
2. The above lists are located in file number SAS3M0.ANT for a 3 meter range.
3. The files mentioned above are located on the disk marked "Antenna Factors".

13.5 Correction factors for BICONICAL ANTENNA

Type BCD-235/B,
at 3 meter range

FREQUENCY (MHz)	AFE (dB/m)
20.0	19.4
30.0	14.8
40.0	11.9
50.0	10.2
60.0	9.1
70.0	8.5
80.0	8.9
90.0	9.6
100.0	10.3
110.0	11.0
120.0	11.5
130.0	11.7
140.0	12.1
150.0	12.6
160.0	12.8
170.0	13.0
180.0	13.5
190.0	14.0
200.0	14.8
210.0	15.3
220.0	15.8
230.0	16.2
240.0	16.6
250.0	17.6
260.0	18.2
270.0	18.4
280.0	18.7
290.0	19.2
300.0	19.9
310	20.7
320	21.9
330	23.4
340	25.1
350	27.0

NOTES:

1. Antenna serial number is 1041.
2. The above list is located in file 19BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".

13.6 Correction factors for Double-Ridged Waveguide Horn

**Model: 3115, S/N 29845
at 3 meter range.**

FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENN A Gain (dBi)	FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)
1.0	24.8	5.4	10.0	38.8	11.4
1.5	26.1	7.6	10.5	38.9	11.8
2.0	28.6	7.7	11.0	39.0	12.1
2.5	29.8	8.4	11.5	39.6	11.8
3.0	31.4	8.4	12.0	39.8	12.0
3.5	32.4	8.7	12.5	39.6	12.5
4.0	33.7	8.6	13.0	40.0	12.5
4.5	33.4	9.9	13.5	39.8	13.0
5.0	34.5	9.7	14.0	40.2	13.0
5.5	35.1	9.9	14.5	40.6	12.9
6.0	35.4	10.4	15.0	41.3	12.4
6.5	35.6	10.8	15.5	39.5	14.6
7.0	36.2	10.9	16.0	38.8	15.5
7.5	37.3	10.4	16.5	40.0	14.6
8.0	37.7	10.6	17.0	41.4	13.4
8.5	38.3	10.5	17.5	44.8	10.3
9.0	38.5	10.8	18.0	47.2	8.1
9.5	38.7	11.1			

13.7 Correction factors for

Horn Antenna

**Model: SWH-28
at 1 meter range.**

FREQUENCY (GHz)	AFE (dB /m)	Gain (dB1)
18.0	40.3	16.1
19.0	40.3	16.3
20.0	40.3	16.1
21.0	40.3	16.3
22.0	40.4	16.8
23.0	40.5	16.4
24.0	40.5	16.6
25.0	40.5	16.7
26.0	40.6	16.4

13.8 Correction factors for

**Horn Antenna
Model: V637**

FREQUENCY (GHz)	AFE (dB /m)	Gain (dB1)
26.0	43.6	14.9
27.0	43.7	15.1
28.0	43.8	15.3
29.0	43.9	15.5
30.0	43.9	15.8
31.0	44.0	16.0
32.0	44.1	16.2
33.0	44.1	16.4
34.0	44.1	16.7
35.0	44.2	16.9
36.0	44.2	17.1
37.0	44.2	17.4
38.0	44.2	17.6
39.0	44.2	17.8
40.0	44.2	18.0

13.9 Correction factors for ACTIVE LOOP ANTENNA

Model 6502
S/N 9506-2950

FREQUENCY (MHz)	Magnetic Antenna Factor (dB)	Electric Antenna Factor (dB)
.009	-35.1	16.4
.010	-35.7	15.8
.020	-38.5	13.0
.050	-39.6	11.9
.075	-39.8	11.8
.100	-40.0	11.6
.150	-40.0	11.5
.250	-40.0	11.6
.500	-40.0	11.5
.750	-40.1	11.5
1.000	-39.9	11.7
2.000	-39.5	12.0
3.000	-39.4	12.1
4.000	-39.7	11.9
5.000	-39.7	11.8
10.000	40.2	11.3
15.000	-40.7	10.8
20.000	-40.5	11.0
25.000	-41.3	10.2
30.000	42.3	9.2