



DATE: 11 February 2013

I.T.L. (PRODUCT TESTING) LTD.

FCC Radio Test Report

for

Visonic Ltd.

Equipment under test:

**PowerG Wireless PIR Motion Mirror
Detector with Anti-masking**

**Tower-32 AM PG2 (916 MHz)
TOWER-32AM K9 PG2 (916 MHz)***

* See customer's declaration on page 6.

Written by:

D. Shidlowsky, Documentation

Approved by:

A. Sharabi, Test Engineer

Approved by:

I. Raz, EMC Laboratory Manager

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This report relates only to items tested.



Measurement/Technical Report for Visonic Ltd.

PowerG Wireless PIR Motion Mirror Detector with Anti-masking

Tower-32 AM PG2 (916 MHz)

Tower-32 AM K9 PG2 (916 MHz)

FCC ID: WP3TOWER32PG2

This report concerns:	Original Grant:	X
	Class I Change:	
	Class II Change:	

Equipment type: Frequency Hopping Spread Spectrum

Limits used:
47CFR15 Section 15.247

Measurement procedures used are FCC Public Notice DA-00-705 and ANSI C63.4: 2003.

Application for Certification
prepared by:

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

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1. General Information

1.1 Administrative Information

Manufacturer:	Visonic Ltd.
Manufacturer's Address:	Habarzel 24 Tel Aviv Israel 69710 Tel: +972-3-645-6789 Fax: +972-3-645-6788
Manufacturer's Representative:	Arik Elshtein
Equipment Under Test (E.U.T):	PowerG Wireless PIR Motion Mirror Detector with Anti-masking
Equipment Model No.:	Tower-32 AM PG2 (916 MHz) TOWER-32AM K9 PG2 (916 MHz)*
Equipment Serial No.:	Not designated
Date of Receipt of E.U.T:	20.8.2012
Start of Test:	20.8.2012
End of Test:	03.10.2012**
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	47CFR15 Section 15.247

* See customer's declaration on following page.

** All radiated tests were performed before 03.09.12.



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P.O.Box 22020
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Fax: +972 3 645 6788
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Declaration of Similarity

To:
Israel Test
Laboratory
1 Bat-Sheva St. POB 87, LOD 71100
Israel

17/December/2012

Attention: Mr. David Shidlowski

Please be advised that the PIR Detector type Tower 32 AM K9 PG2 is the same
as Tower 32 PG2, except of the lens.

The lens of Tower 32 K9 n PG2 is providing the pet immune feature while the lens of Tower
32 PG2 is not.

Regards

Arick Elshtein
Standard Manager



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.

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 TOWER-32AM PG2 Dual Technology are 2-way, microprocessor-controlled, wireless digital mirror PIR detectors which include the following features:

- Adaptive Active Infra-Red Anti-Masking technology providing the most advanced reliable protection against intentional masking attempts (patent pending).
- Includes a fully supervised PowerG transceiver.
- 24 GHz K-band microwave module.
- Incorporates patent pending black mirrors for extremely high white light immunity.
- Advanced elliptical / parabolic mirror technology (patent pending)
- Provides multiple curtain coverage (patent pending)
- V-slot® optic technology (patent pending) for improved robustness, anti-vandalism and for very high reliability.
- Creep zone protection
- The advanced True Motion Recognition™ algorithm (patented) allows distinguishing between the true motion of an intruder and any other disturbances which may cause false alarms.
- Built-in auto diagnostic for both PIR and microwave detectors.
- Built-in link quality indicators; no need for the installer to physically approach the control panel thus making installation faster and easier.
- No vertical adjustment is needed.
- Motion event counter determines whether 1 or 2 consecutive motion events will trigger an alarm.
- Automatic termination of walk-test after 15 minutes.
- Microprocessor controlled, digital TMR signal processing with dual-slope digital temperature compensation.
- Sealed chamber protects the optical system.
- Front and back tamper protection.
- Microwave anti-masking
- Disguise mode that detects an intruder who cloaks his IR radiation

1.4 Test Methodology

Radiated testing was performed according to the procedures in FCC Public Notice DA 00-705 and 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 3, 2009). I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.



1.6 Measurement Uncertainty

Radiated Emission

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)
for open site 30-1000MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 4.96 dB

2. System Test Configuration

2.1 *Justification*

Unit was tested in a typical wall mounted orientation, same as installation position, transmitting from internal antenna at the max power at 3 different channels. Modulated GFSK 50Kbps Data Rate.

2.2 *EUT Exercise Software*

The EUT was tested when programmed with the formal, commercially released firmware, configured to transmit periodically at maximum transmission rate.

2.3 *Special Accessories*

No special accessories were needed in order to achieve compliance.

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

3. Radiated Measurement Test Set-up Photos



Figure 2. Radiated Emission Test



4. 20dB Minimum Bandwidth

4.1 Test Specification

F.C.C. Part 15, Subpart C: 15.247(a)(2)

4.2 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 spectrum analyzer was set to 10 kHz resolution BW. The spectrum bandwidth of the transmitter unit was measured and recorded. The test was performed to measure the transmitter occupied bandwidth. The EUT was set up as shown in *Figure 1*, and its proper operation was checked. The transmitter occupied bandwidth was measured with the EMI receiver as frequency delta between reference points on modulation envelope.

The E.U.T. was tested at Low (912.7505 MHz) , Mid (915.863 MHz) and High (919.106 MHz) channels

4.3 Test Results

Operation Frequency (MHz)	Bandwidth Reading (kHz)	Specification (kHz)
912.75	91.02	<250
915.86	103.40	<250
919.11	104.19	<250

Figure 3 — 20 dB Minimum Bandwidth Test Results Table

JUDGEMENT: Passed

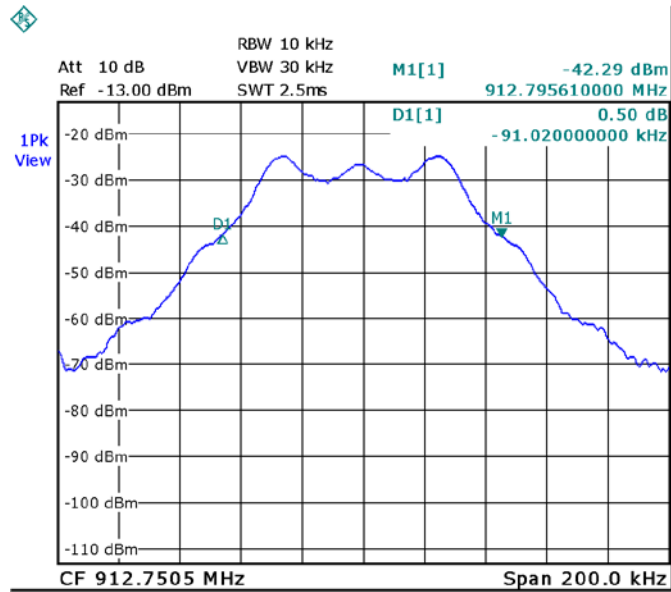
For additional information see *Figure 4 to Figure 6*.

TEST PERSONNEL:

Tester Signature: _____

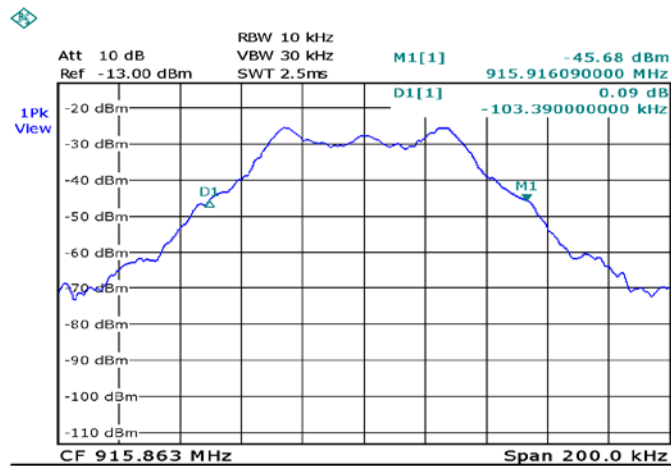
Date: 12.02.13

Typed/Printed Name: A. Sharabi



Date: 5.SEP.2012 14:37:55

Figure 4. — 912.75 MHz



Date: 5.SEP.2012 14:40:45

Figure 5. — 915.863 MHz

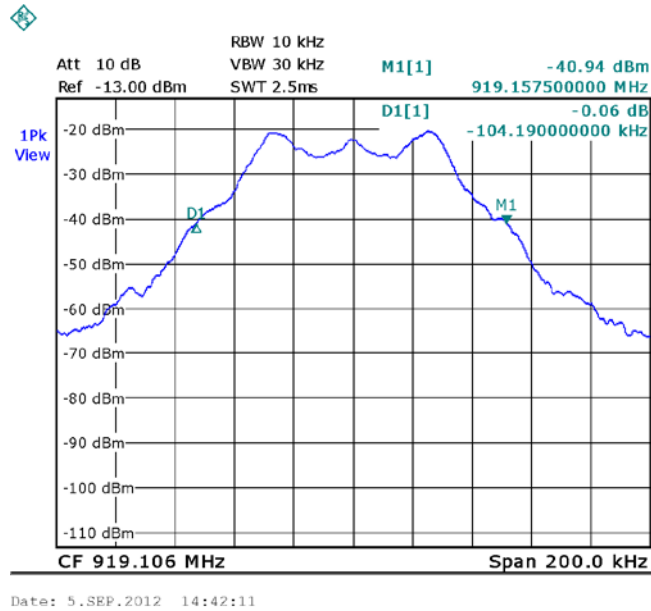


Figure 6. — 919.106 MHz

4.4 Test Equipment Used, 20 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	October 30, 2011	1 Year

Figure 7 Test Equipment Used



5. Number of Hopping Frequencies

5.1 Test Specification

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

5.2 Test Procedure

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

The spectrum analyzer was set to the following parameters:

Band of Operation: 902-928 MHz

RBW: 30 kHz

VBW: 100 kHz

Detector Function: Peak

Trace: Maximum Hold

5.3 Test Results


Number of Hopping Frequencies	Specification
50	≥ 50

Figure 8 Number of Hopping Frequencies Test Results Table

JUDGEMENT: Passed

For additional information see *Figure 9 to Figure 15*.

TEST PERSONNEL:

Tester Signature:  Date: 12.02.13

Typed/Printed Name: A. Sharabi



Number of Hopping Frequencies

E.U.T Description PowerG Wireless PIR Motion
Mirror Detector with Anti-masking
Type Tower-32 AM PG2 (916 MHz)
Serial Number: Not designated

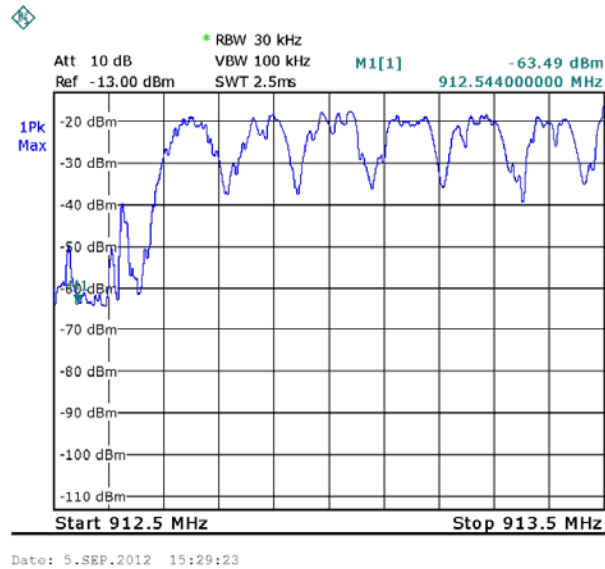


Figure 9. Number of Channels

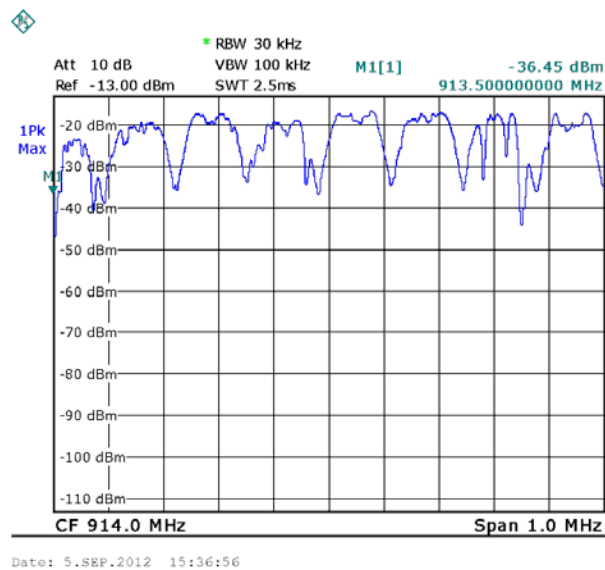


Figure 10. Number Of Channels



Number of Hopping Frequencies

E.U.T Description PowerG Wireless PIR Motion
Mirror Detector with Anti-masking
Type Tower-32 AM PG2 (916 MHz)
Serial Number: Not designated

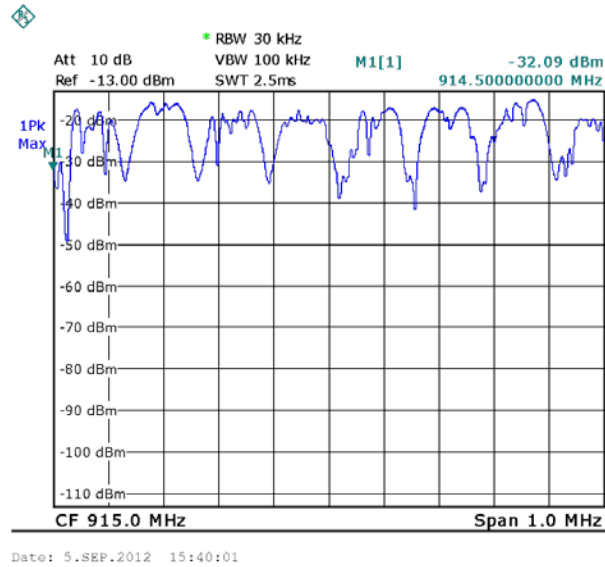


Figure 11. Number Of Channels

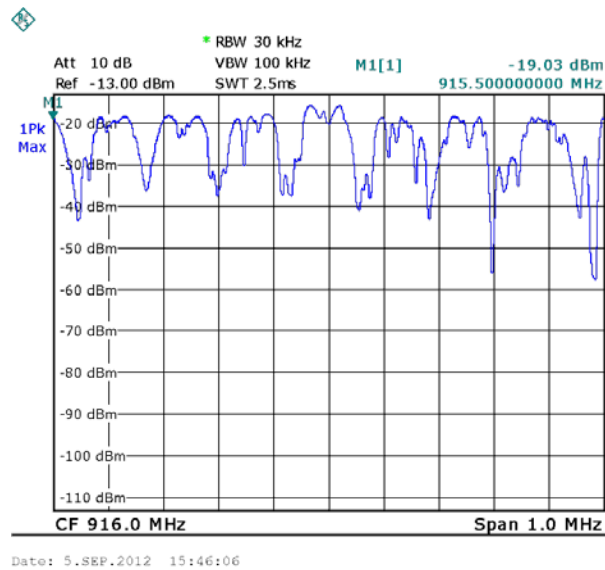


Figure 12. Number Of Channels



Number of Hopping Frequencies

E.U.T Description PowerG Wireless PIR Motion Mirror
Detector with Anti-masking
Type Tower-32 AM PG2 (916 MHz)
Serial Number: Not designated

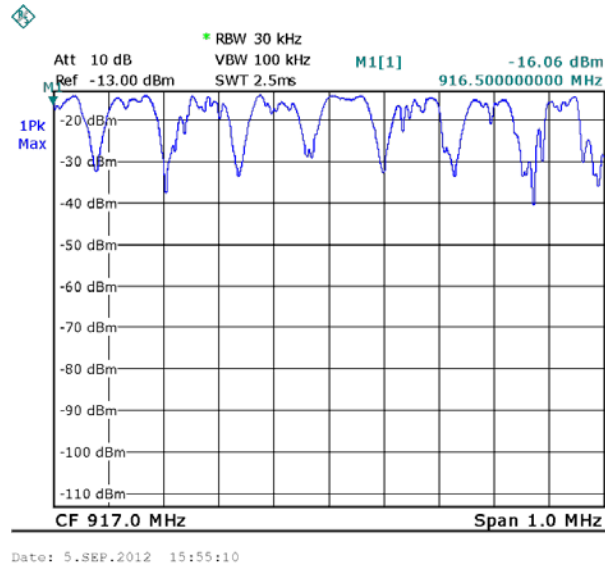


Figure 13. Number Of Channels

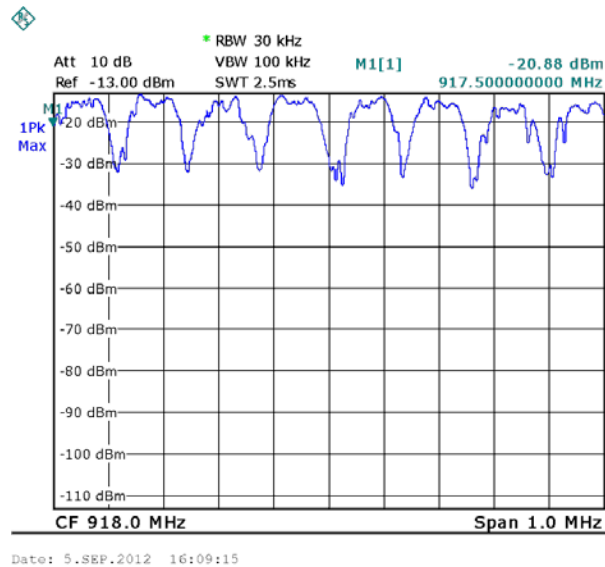


Figure 14. Number Of Channels

Number of Hopping Frequencies

E.U.T Description PowerG Wireless PIR Motion Mirror
Detector with Anti-masking
Type Tower-32 AM PG2 (916 MHz)
Serial Number: Not designated

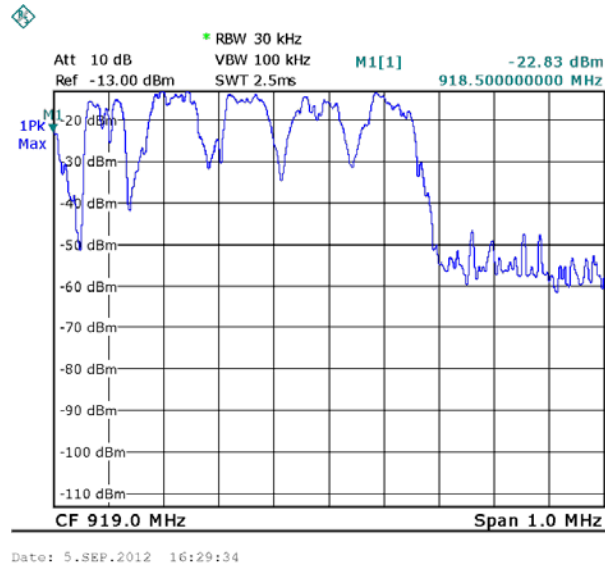


Figure 15. Number Of Channels

5.4 Test Equipment Used, Number of Hopping Frequencies

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	October 30, 2011	1 Year

Figure 16 Test Equipment Used



6. Channel Frequency Separation

6.1 Test Specification

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

6.2 Test procedure

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

The spectrum analyzer was set to the following parameters:

RBW: 30 kHz

VBW: 100 kHz

Detector Function: Peak

Trace: Maximum Hold

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

6.3 Test Results


Channel Frequency Separation (kHz)	Specification (kHz)	Margin (kHz)
119.8	>100	19.8

Figure 17 Channel Frequency Separation Test Results Table

JUDGEMENT: Passed by 19.8 kHz

For additional information see *Figure 18*.

TEST PERSONNEL:

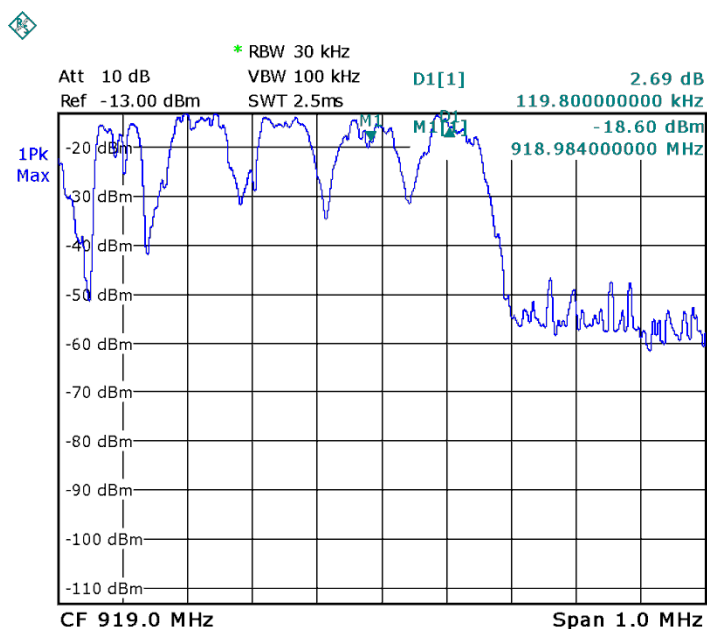
Tester Signature: 

Date: 12.02.13

Typed/Printed Name: A. Sharabi

Channel Frequency Separation

E.U.T Description PowerG Wireless PIR Motion
Mirror Detector with Anti-
masking
Type Tower-32 AM PG2 (916 MHz)
Serial Number: Not designated



Date: 5.SEP.2012 16:31:00

Figure 18. Channel Frequency Separation

6.4 Test Equipment Used, Channel Frequency Separation Test

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	October 30, 2011	1 Year

Figure 19 Test Equipment Used



7. Radiated Maximum Power Output

7.1 Test Specification

F.C.C. Part 15, Subpart C: 15.247(b)(2)

7.2 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 100 kHz resolution BW. The EUT was set up as shown in *Figure 1*, 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 worst case emission were measured vertically

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 the Low (912.750 MHz), Mid (915.863 MHz) and High (919.106 MHz) channels with modulation.



7.3 Test Results


Frequency	Pol	E	E	Antenna Gain	Antenna Distance	Calculated Results	Limit	Margin
(MHz)		(dB μ V/m)	(V/m)	(dBi)	(m)	(mW)	(mW)	(mW)
912.750	V	100.80	0.11	0	3	3.63	1000	-996.4
915.863	V	106.34	0.21	0	3	1.32	1000	-998.7
919.106	V	101.20	0.11	0	3	3.63	1000	-996.4

Figure 20 Radiated Power Output Test Results Table

JUDGEMENT: Passed by 996.4 mW

For additional information see *Figure 21* to *Figure 23*.

TEST PERSONNEL:

Tester Signature: 

Date: 12.02.13

Typed/Printed Name: A. Sharabi



ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 912.755 MHz
100.80 dB μ V/m

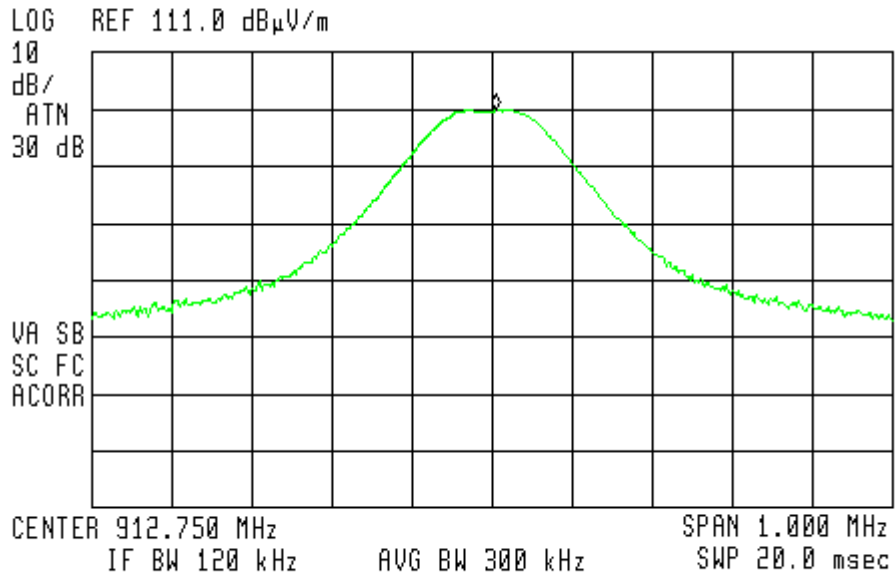


Figure 21 — 912.75 MHz



ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 915.878 MHz
106.34 dB μ V/m

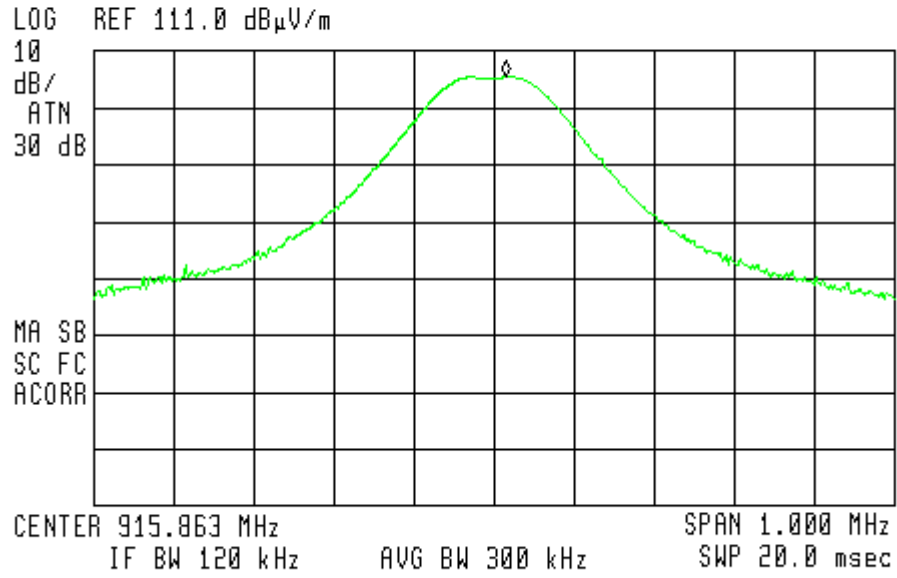


Figure 22 — 915.863 MHz



ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 919.074 MHz
101.20 dB μ V/m

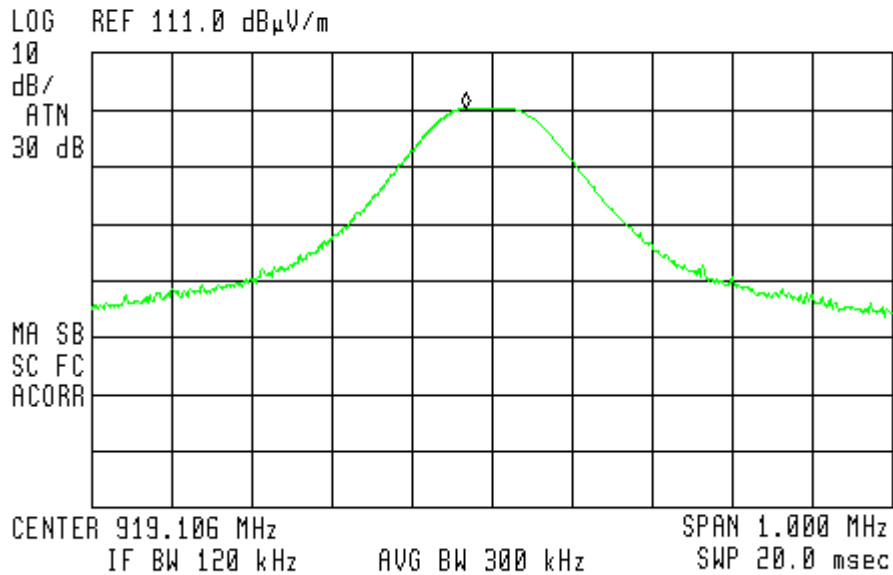


Figure 23 — 919.106 MHz

7.4 Test Equipment Used, Radiated Maximum Power Output

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
EMC Analyzer	HP	HP8593	3536A00120ADI	February 28, 2012	1 Year
Horn Antenna	EMCO	6502	9506-2950	October 19, 2011	1 Year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Turntable Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 24 Test Equipment Used



8. Dwell Time on Each Channel

8.1 Test Specification

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

8.2 Test Procedure

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

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 20 seconds


8.3 Test Results

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

Additional information of the results is given in *Figure 25 to Figure 26*.

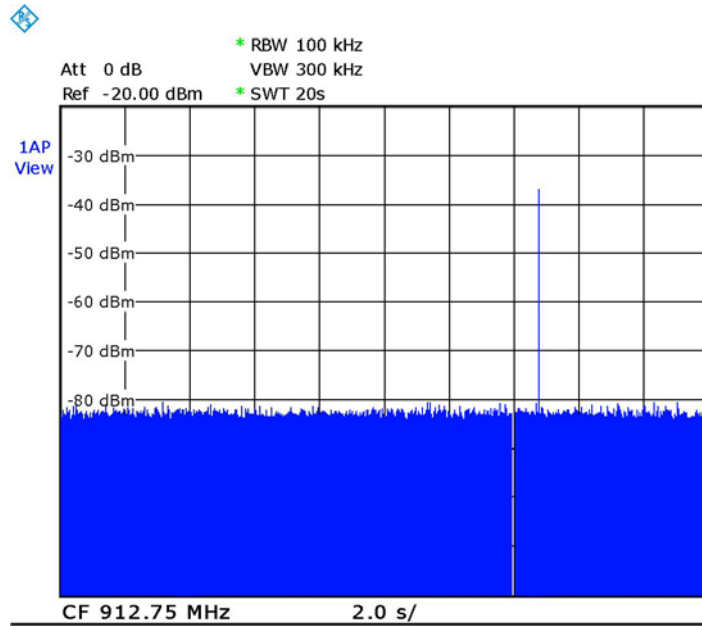
JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature:  _____

Date: 12.02.13

Typed/Printed Name: A. Sharabi



Date: 3.OCT.2012 12:25:33

Figure 25 — Transmission Within 20 sec

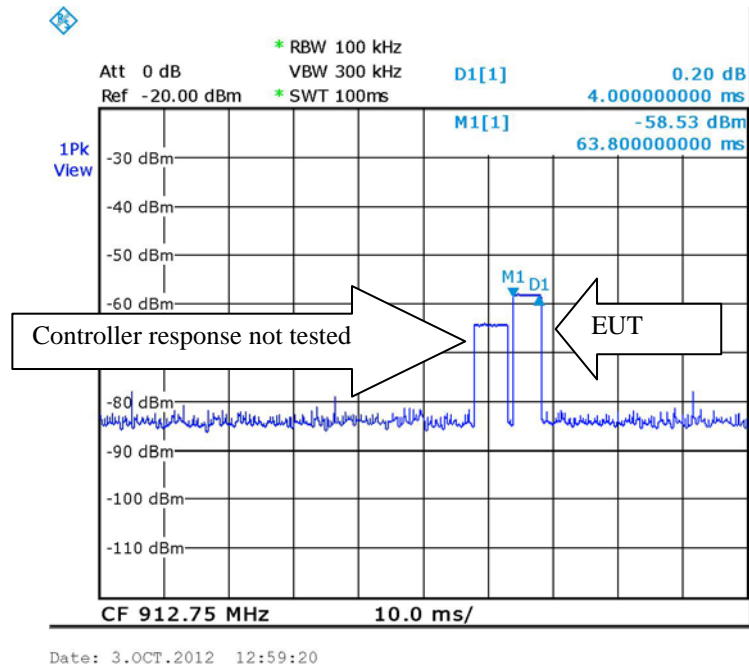


Figure 26 — Burst duration within 20sec

8.4 Test Equipment Used, Dwell Time on Each Channel

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	October 30, 2011	1 Year

Figure 27 Test Equipment Used



9. Band Edge

9.1 Test Specification

FCC Part 15, Section 15.247(d)

9.2 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 100 kHz 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 EMC analyzer was set to the band edge frequencies.

The E.U.T. was tested at the lower and the upper channels.

9.3 Test Results

Operation Frequency (MHz)	Band Edge Frequency (MHz)	Spectrum Level (dBuV/m)	Specification (dBuV/m)
Low	902.0	62.6	80.8
High	928.0	60.2	81.2

Figure 28 Band Edge Test results table

JUDGEMENT: Passed.

For additional information see *Figure 29* to *Figure 30*.

TEST PERSONNEL:

Tester Signature: _____

Date: 12.02.13

Typed/Printed Name: A. Sharabi



ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 902.00 MHz
62.59 dB μ V/m

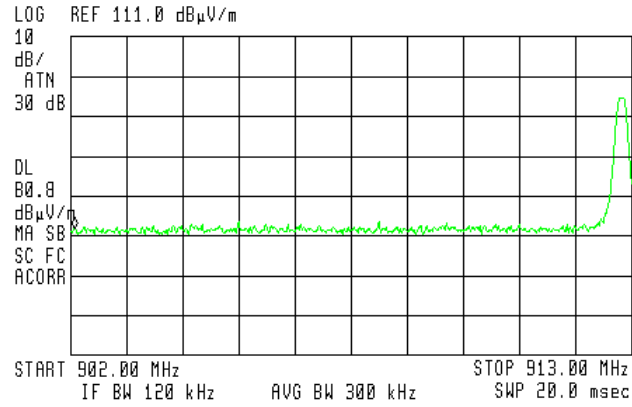


Figure 29 — 912.75 MHz



ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 920.000 MHz
60.21 dB μ V/m

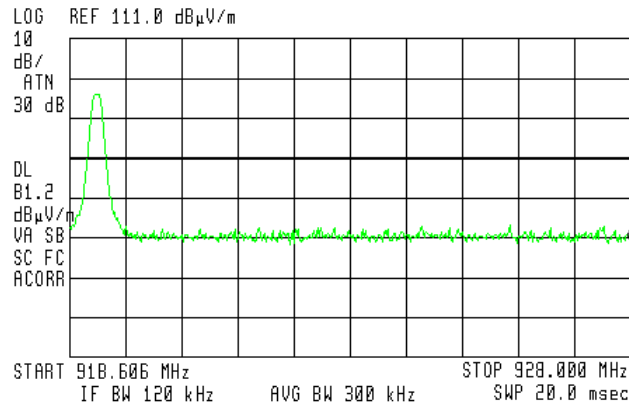


Figure 30 — 919.106 MHz



9.4 Test Equipment Used, Band Edge Spectrum.

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
EMC Analyzer	HP	HP8593	3536A00120ADI	February 28, 2012	1 Year
Horn Antenna	EMCO	6502	9506-2950	October 19, 2011	1 Year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Turntable Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 31 Test Equipment Used



10. Spurious Radiated Emission, 9 kHz – 30 MHz

10.1 Test Specification

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

10.2 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 frequencies of 912.79, 916.00, and 919.09 MHz. These frequencies were measured using a peak detector.

10.3 Test Results

JUDGEMENT: Passed

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

The results for all three operating frequencies were the same.

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

TEST PERSONNEL:

Tester Signature:  Date: 12.02.13

Typed/Printed Name: A. Sharabi



10.4 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 dB μ V (RA) + 14.0 dB (AF) + 0.9 dB (CF) = 45.6 dB μ V

No external pre-amplifiers are used.

10.5 Test Equipment Used, Spurious Radiated Emission 9 kHz – 30 MHz

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
EMC Analyzer	HP	HP8593	3536A00120ADI	February 28, 2012	1 Year
Active Loop Antenna	EMCO	6502	9506-2950	October 19, 2011	1 Year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Turntable Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 32 Test Equipment Used



11. Spurious Radiated Emission 30 MHz – 10 GHz

11.1 Test Specification

30 MHz- 10 GHz, F.C.C., Part 15, Subpart C

11.2 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-10 GHz 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.

In the frequency range of 30 MHz – 2.9 GHz, 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 2.9-10.0 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 100 Hz. 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 frequencies:
912.75 MHz; 916.0 MHz; 919.08 MHz.



11.3 Test Data

JUDGEMENT: Passed


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

For the operation frequency 912.79 MHz, the margin between the emission level and the specification limit is 13.9 in the worst case at the frequency of 2738.1 MHz, horizontal polarization.

For the operation frequency 915.89 MHz, the margin between the emission level and the specification limit is 6.0 in the worst case at the frequency of 2747.0 MHz, vertical polarization.

For the operation frequency 919.10 MHz, the margin between the emission level and the specification limit is 15.1 in the worst case at the frequency of 2757.5 MHz, vertical polarizations.

TEST PERSONNEL:

Tester Signature: 

Date: 12.02.13

Typed/Printed Name: A. Sharabi



Radiated Emission

E.U.T Description PowerG Wireless PIR Motion Mirror
Detector with Anti-masking
Type Tower-32 AM PG2 (916 MHz)
Serial Number: Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz to 10.0 GHz
Test Distance: 3 meters Detector: Peak

Operation Frequency (MHz)	Freq. (MHz)	Polarity (H/V)	Peak Reading (dB μ V/m)	Peak Specification (dB μ V/m)	Peak Margin (dB)
912.79	1825.5	H	53.9	74.0	-20.1
912.79	1825.5	V	53.0	74.0	-21.0
912.79	2738.1	H	57.9	74.0	-13.9
912.79	2738.1	V	59.2	74.0	-15.2
915.89	1831.0	H	55.2	74.0	-19.2
915.89	1831.0	V	60.6	74.0	-14.4
915.89	2747.0	H	58.7	74.0	-16.7
915.89	2747.0	V	68.0	74.0	-6.0
919.10	1838.2	H	53.3	74.0	-21.3
919.10	1838.2	V	49.4	74.0	-25.4
919.10	2757.5	H	59.1	74.0	-15.1
919.10	2757.5	V	54.2	74.0	-20.2

Figure 33. 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 PowerG Wireless PIR Motion Mirror
Detector with Anti-masking
Type Tower-32 AM PG2 (916 MHz)
Serial Number: Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Test Distance: 3 meters

Frequency range: 30 MHz to 10.0 GHz
Detector: Peak

Operation Frequency (MHz)	Freq. (MHz)	Polarity (H/V)	Peak Reading (dB μ V/m)	Duty Cycle Factor (dB)	Average Result (dB μ V/m)	Average Specification (dB μ V/m)	Average Margin (dB)
912.79	1825.5	H	53.9	-28.0	25.9	54.0	-28.1
912.79	1825.5	V	53.0	-28.0	25.0	54.0	-29.0
912.79	2738.1	H	57.9	-28.0	29.9	54.0	-25.9
912.79	2738.1	V	59.2	-28.0	30.2	54.0	-24.2
915.89	1831.0	H	55.2	-28.0	27.2	54.0	-27.2
915.89	1831.0	V	60.6	-28.0	32.6	54.0	-22.6
915.89	2747.0	H	58.7	-28.0	30.7	54.0	-24.7
915.89	2747.0	V	68.0	-28.0	40.0	54.0	-14.0
919.10	1838.2	H	53.3	-28.0	25.3	54.0	-29.3
919.10	1838.2	V	49.4	-28.0	21.4	54.0	-33.4
919.10	2757.5	H	59.1	-28.0	31.1	54.0	-23.1
919.10	2757.5	V	54.2	-28.0	26.2	54.0	-28.2

**Figure 34. 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.

“Peak Reading” includes correction factor.

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



11.4 **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:

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

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

No external pre-amplifiers are used.



11.5 Test Equipment Used, Spurious Radiated Emission 30 MHz – 10 GHz

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
EMC Analyzer	HP	HP8593	3536A00120ADI	February 28, 2012	1 Year
RF Amplifier	HP	8447F	3113A06386	February 28, 2012	1 Year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS- 0411N313	013	November 5, 2011	1 Year
Biconilog Antenna	EMCO	3142B	1250	September 05, 2011	1 Year
Horn Antenna	ETS	3115	6142	March 14, 2012	1 Year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Turntable Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 35 Test Equipment Used



12. Antenna Gain/Information

The antenna gain is 0dBi.

13. R.F Exposure/Safety

The typical placement of the E.U.T. is wall or ceiling mounted. The typical distance between the E.U.T. and the user is 1m.

Calculation of Maximum Permissible Exposure (MPE)

Based on 47CFR1 Section 1.1307(b)(1) Requirements

(a) FCC Limit at 912.75 MHz is: $\frac{f}{1500} = 0.609 \frac{mW}{cm^2}$

FCC Limit at 915.86MHz is: $\frac{f}{1500} = 0.611 \frac{mW}{cm^2}$

FCC Limit at 919.11 MHz is: $\frac{f}{1500} = 0.613 \frac{mW}{cm^2}$

Using Table 1 of 47CFR1 Section 1.1310 limit for general population/uncontrolled exposures, the above levels are 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 = Calculated Transmitted Power (includes G_t)

G_t = Antenna Gain

R = Distance From Transmitter

(c) The peak power density produced by the E.U.T. is:

Frequency (MHz)	Pt (mW)	Antenna type	G_T (dBi)	R (cm)	S_{AV} (mW/cm ²)	Spec (mW/cm ²)
912.75	3.63	Internal	0	100	2.88×10^{-5}	0.609
916.00	1.32	Internal	0	100	1.05×10^{-5}	0.611
919.09	3.63	Internal	0	100	2.88×10^{-5}	0.613

(d) The above are below the FCC limit.



14. APPENDIX A - CORRECTION FACTORS

14.1 Correction factors for CABLE

from EMI receiver
to test antenna
at 3 AND 10 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)	FREQUENCY (MHz)	CORRECTION FACTOR (dB)
30	1.96	700	11.25
35	2.08	800	12.53
40	2.26	900	13.86
45	2.43	1000	14.86
50	2.59	1200	15.7
55	2.65	1400	17.05
60	2.86	1600	18.2
65	2.96	1800	19.4
70	3.04	2000	21.3
75	3.27		
80	3.41		
85	3.54		
90	3.68		
95	3.77		
100	3.93		
110	4.19		
120	4.41		
130	4.6		
140	4.83		
150	5.06		
160	5.35		
170	5.57		
180	5.7		
190	5.84		
200	6.02		
250	6.86		
300	7.59		
350	8.09		
400	8.7		
450	9.15		
500	9.53		
550	9.82		
600	10.24		
650	10.74		

NOTES:

1. The cable type is RG-214/U



14.2 Correction factors for Bilog ANTENNA

Model: 3142

Antenna serial number: 1250

3 meter range

FREQUENCY	AFE	FREQUENCY	AFE
(MHz)	(dB/m)	(MHz)	(dB/m)
30	18.4	1100	25
40	13.7	1200	24.9
50	9.9	1300	26
60	8.1	1400	26.1
70	7.4	1500	27.1
80	7.2	1600	27.2
90	7.5	1700	28.3
100	8.5	1800	28.1
120	7.8	1900	28.5
140	8.5	2000	28.9
160	10.8		
180	10.4		
200	10.5		
250	12.7		
300	14.3		
400	17		
500	18.6		
600	19.6		
700	21.1		
800	21.4		
900	23.5		
1000	24.3		



14.3 Correction factors for Horn ANTENNA

Model: 3115

Antenna serial number: 6142

3 meter range

FREQUENCY	Antenna Factor	FREQUENCY	Antenna Factor
(MHz)	(dB/m)	(MHz)	(dB/m)
1000	23.9	10500	38.4
1500	25.4	11000	38.5
2000	27.3	11500	39.4
2500	28.5	12000	39.2
3000	30.4	12500	39.4
3500	31.6	13000	40.7
4000	33	14000	42.1
4500	32.7	15000	40.1
5000	34.1	16000	38.2
5500	34.5	17000	41.7
6000	34.9	17500	45.7
6500	35.1	18000	47.7
7000	35.9		
7500	37.5		
8000	37.6		
8500	38.3		
9000	38.5		
9500	38.1		
10000	38.6		



14.4 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