



DATE: 13 March 2013

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

FCC Radio Test Report


for


Visonic Ltd.

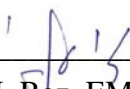
Equipment under test:

PowerG Wireless PIR Motion Mirror Detector with Anti-masking

Tower 20 AM PG2

Written by: 
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Approved by: 
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Approved by: 
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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 20 AM PG2

FCC ID: WP3TOWER20AMPG2

IC: 1467C-TOWER20AMPG2

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:
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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 20 AM PG2
Equipment Serial No.:	Not designated
Date of Receipt of E.U.T:	22.01.13
Start of Test:	22.01.13
End of Test:	23.01.13
Test Laboratory Location:	I.T.L (Product Testing) Ltd. 1 Batsheva St., Lod ISRAEL 7120101
Test Specifications:	47 CFR15 Section 15.247



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. 861911.
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-3006, R-2729, T-1877, G-245.
5. Industry Canada (Canada), IC File No.: 46405-4025; Site No. IC 4025A-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-20 PG2 is a 2-way, wireless outdoor digital mirror PIR detector which includes the following features:

- Patented 8 independent quad PIR detectors (Octa-QUAD_) operating in true Quad configuration (patented) with true motion recognition (TMR) processing for each of the 8 PIR detectors, as well as central motion processing that distinguishes between moving intruders and trees and bushes in motion.
- Advanced Obsidian Black Mirror™ optics (patent pending).
- Optimum performance even in poor weather conditions such as snow, rain, dust, wind and direct sunlight
- Tamper protection prevents opening and removal from wall
- PowerG two-way Frequency Hopping Spread Spectrum FHSS-TDMA technology - provides robustness and reliability that is closer than ever to wired systems
- Built-in link quality indicators enable installer to check signal quality without physically approaching the control panel, thus making installation faster and easier.
- Robust housing with recessed window.
- Smart anti masking distinguishes between masking spray and rain.
- Alarm LED is visible in sunlight.
- Automatic termination of walk-test after 15 minutes.
- Microprocessor-controlled temperature compensation.
- Immunity to pets weighing up to 18 Kg (40lb), not pet alley
- Built-in swivel bracket

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 Lod, Israel. This site is a FCC listed test laboratory (FCC Registration No. 861911, date of listing June 30, 2010). 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):

± 4.98 dB

2. System Test Configuration

2.1 *Justification*

The 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*

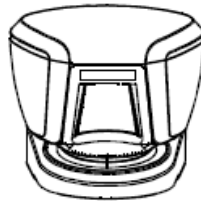


Figure 1. Configuration of Tested System

3. Radiated Measurement Test Set-up Photos



Figure 2. Radiated Emission Test



Figure 3. Radiated Emission Test



4. 20 dB 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 (912.75 MHz), Mid (915.86 MHz), and High (919.106 MHz) channels.

4.3 Test Results

Operation Frequency (MHz)	Bandwidth Reading (KHz)	Specification (KHz)
Low	104.19	<250
Mid	102.20	<250
High	104.59	<250

Figure 4 — 20 dB Minimum Bandwidth Test Results Table

JUDGEMENT: Passed

For additional information see Figure 5 to Figure 7.

TEST PERSONNEL:

Tester Signature: _____

Date: 18.03.13

Typed/Printed Name: A. Sharabi

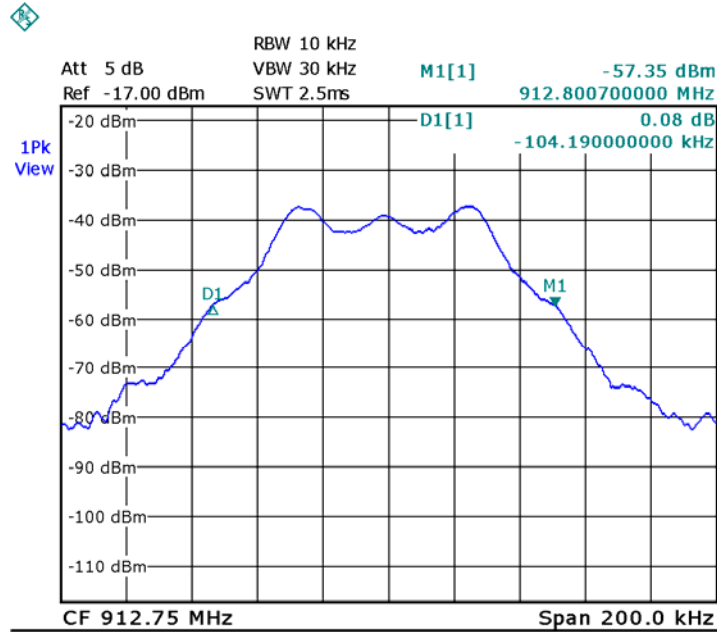


20dB Minimum Bandwidth

E.U.T Description PowerG Wireless PIR Motion
 Mirror Detector with Anti-masking

Type Tower 20 AM PG2

Serial Number: Not designated



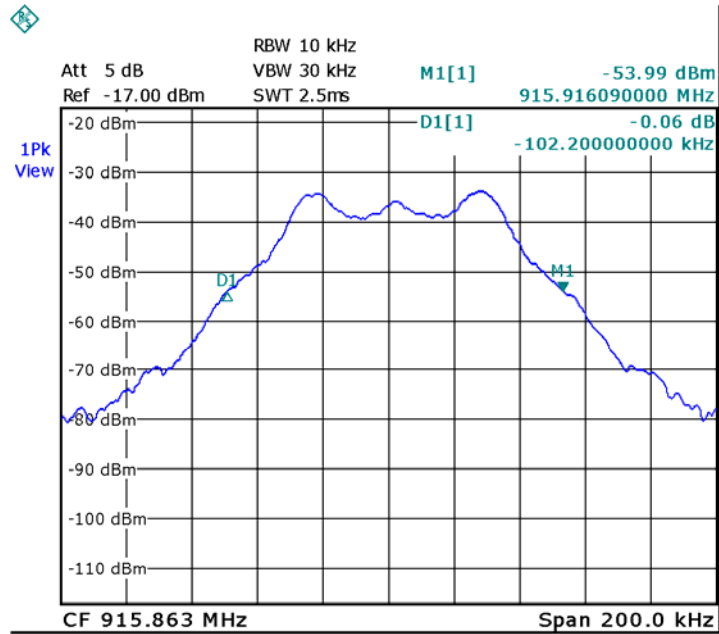
Date: 20.JAN.2013 10:28:06

Figure 5 912.75 MHz



20dB Minimum Bandwidth

E.U.T Description PowerG Wireless PIR Motion
Mirror Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated



Date: 20.JAN.2013 10:29:55

Figure 6. — 915.863 MHz



20dB Minimum Bandwidth

E.U.T Description PowerG Wireless PIR Motion
Mirror Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated

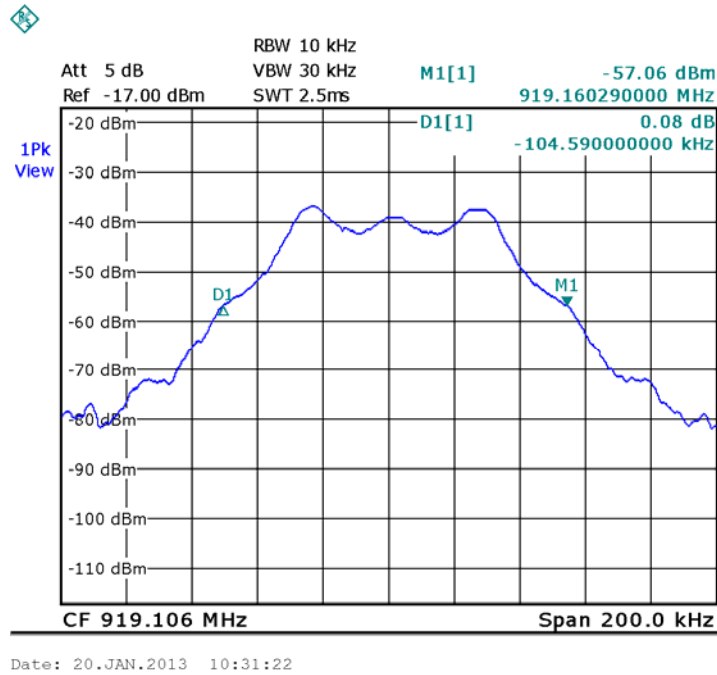


Figure 7. — 919.106 MHz

4.4 Test Equipment Used, 20 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	November 01, 2012	1 Year

Figure 8 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 9 Number of Hopping Frequencies Test Results Table

JUDGEMENT: Passed

For additional information see *Figure 10 to Figure 16*.

TEST PERSONNEL:

Tester Signature:  Date: 18.03.13

Typed/Printed Name: A. Sharabi



Number of Hopping Frequencies

E.U.T Description PowerG Wireless PIR Motion
Mirror Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated

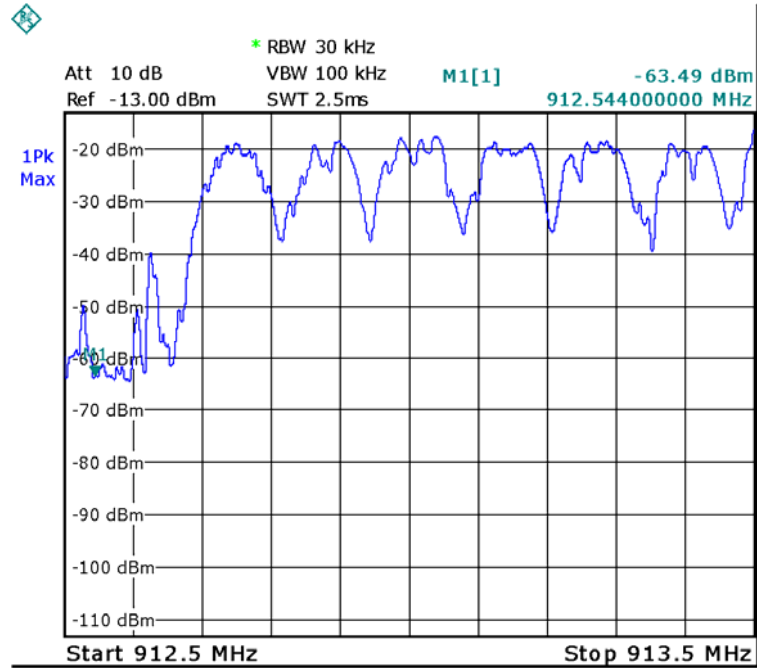


Figure 10. Number of Channels



Number of Hopping Frequencies

E.U.T Description PowerG Wireless PIR Motion Mirror
Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated

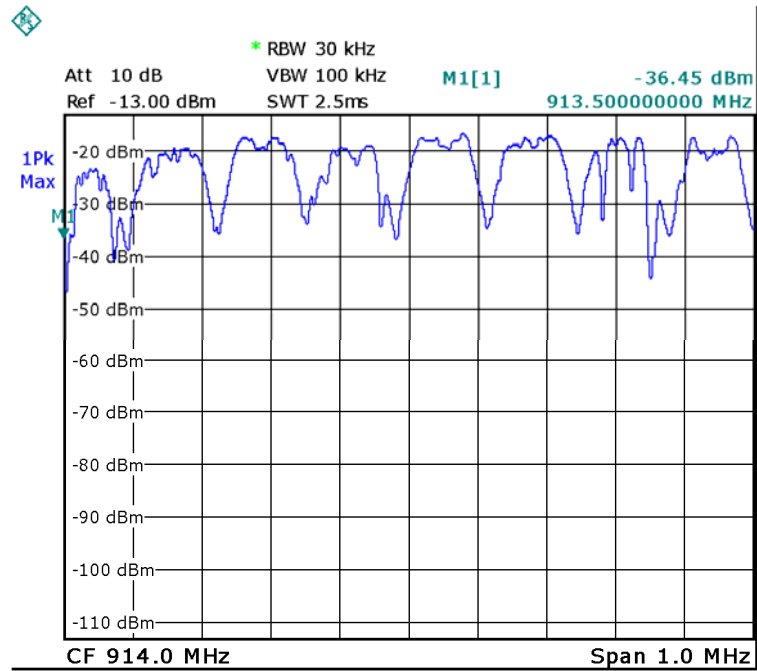


Figure 11. Number Of Channels



Number of Hopping Frequencies

E.U.T Description PowerG Wireless PIR Motion
Mirror Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated

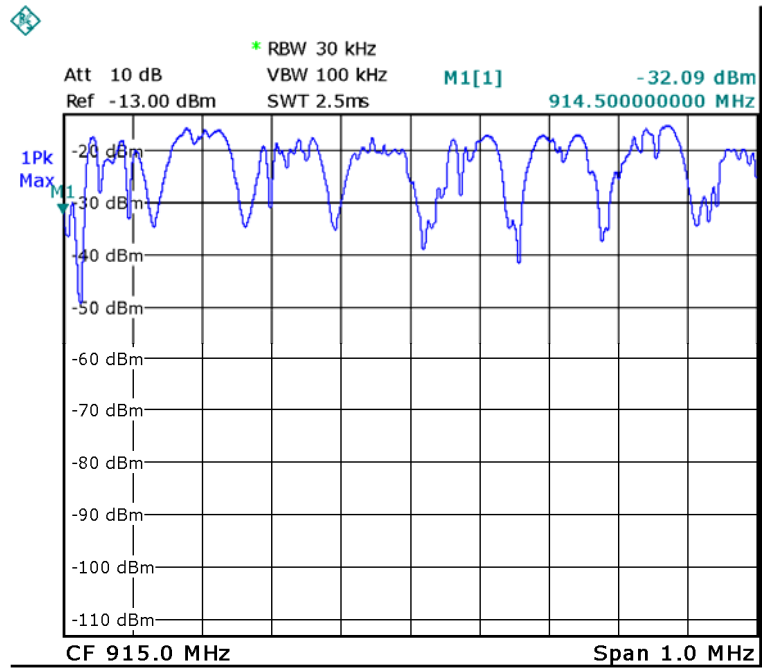


Figure 12. Number Of Channels



Number of Hopping Frequencies

E.U.T Description PowerG Wireless PIR Motion Mirror
Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated

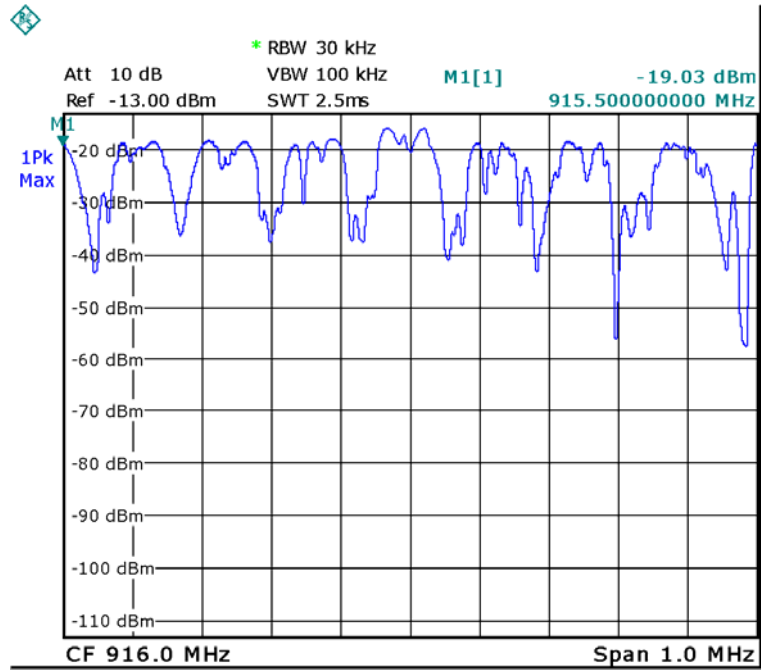


Figure 13. Number Of Channels



Number of Hopping Frequencies

E.U.T Description PowerG Wireless PIR Motion Mirror
Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated

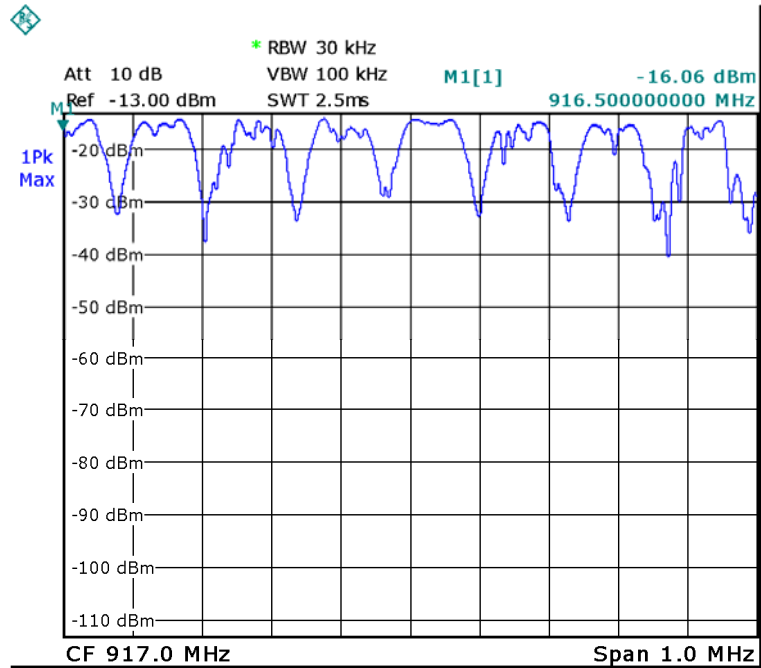


Figure 14. Number Of Channels



Number of Hopping Frequencies

E.U.T Description PowerG Wireless PIR Motion Mirror
Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated

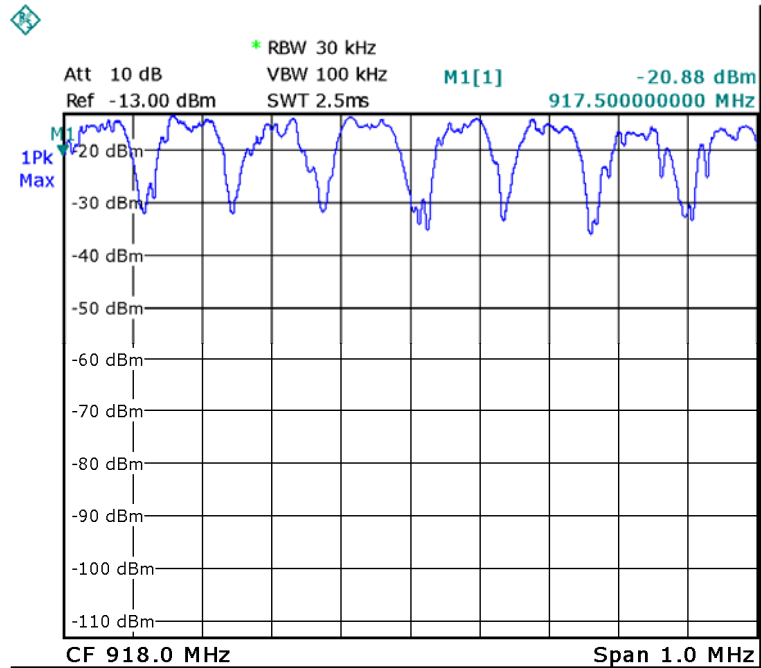


Figure 15. Number Of Channels

Number of Hopping Frequencies

E.U.T Description PowerG Wireless PIR Motion Mirror
Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated

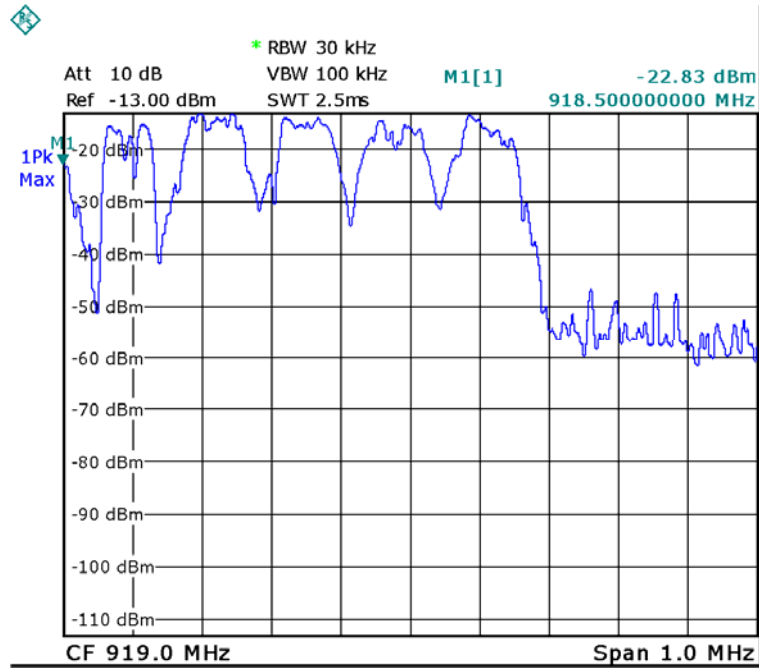


Figure 16. Number Of Channels

5.4 Test Equipment Used, Number of Hopping Frequencies

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	November 01, 2012	1 Year

Figure 17 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 18 Channel Frequency Separation Test Results Table

JUDGEMENT: Passed by 19.8 kHz

For additional information see *Figure 19*.

TEST PERSONNEL:

Tester Signature: 

Date: 18.03.13

Typed/Printed Name: A. Sharabi



Channel Frequency Separation

E.U.T Description PowerG Wireless PIR Motion
Mirror Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated

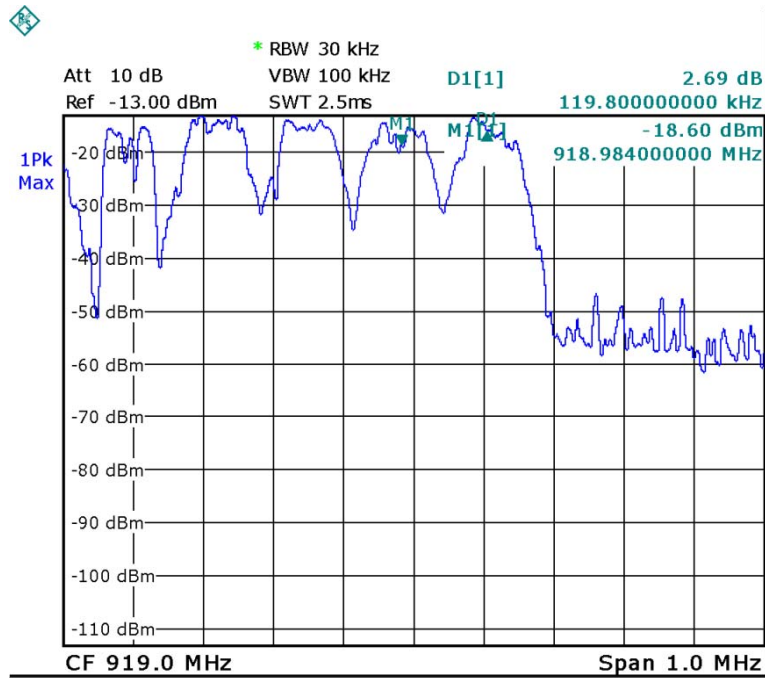


Figure 19. Channel Frequency Separation

6.4 Test Equipment Used, Channel Frequency Separation Test

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
Spectrum Analyzer	Rodhe & Schwarz	FSL6	100194	November 01, 2012	1 Year

Figure 20 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, Mid and High 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	H	102.82	0.138	0	3	5.71	1000	-994.29
915.863	H	106.93	0.222	0	3	14.79	1000	-985.21
919.106	H	101.54	0.119	0	3	4.25	1000	-995.75

Figure 21 Radiated Power Output Test Results Table

JUDGEMENT: Passed by 994.29 mW

For additional information see *Figure 22 to Figure 24*.

TEST PERSONNEL:

Tester Signature: 

Date: 18.03.13

Typed/Printed Name: A. Sharabi



Radiated Maximum Power Output

E.U.T Description PowerG Wireless PIR Motion
Mirror Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated

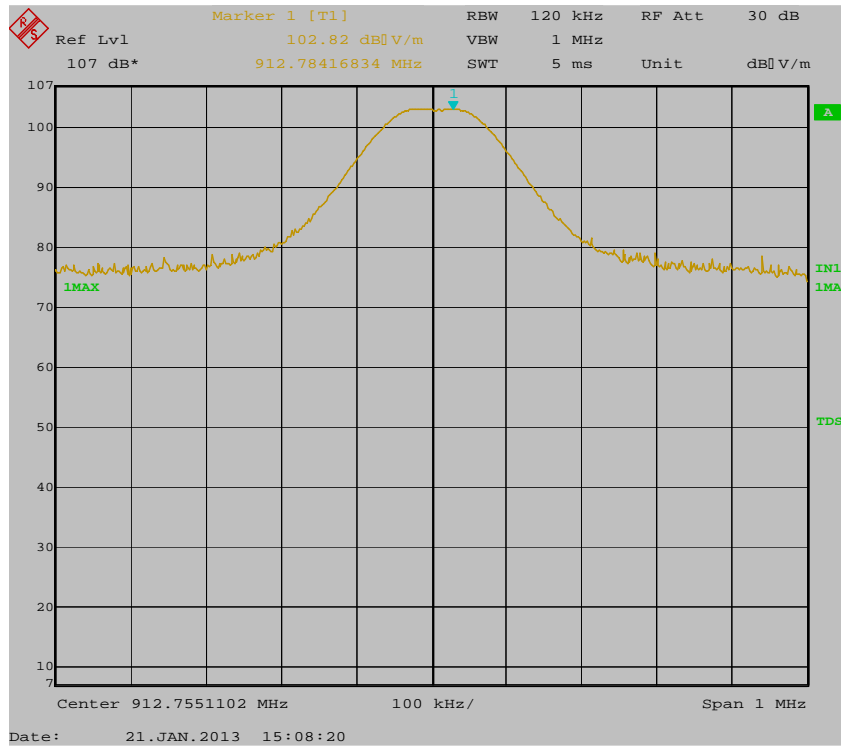


Figure 22 — 912.75 MHz



Radiated Maximum Power Output

E.U.T Description PowerG Wireless PIR Motion
Mirror Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated

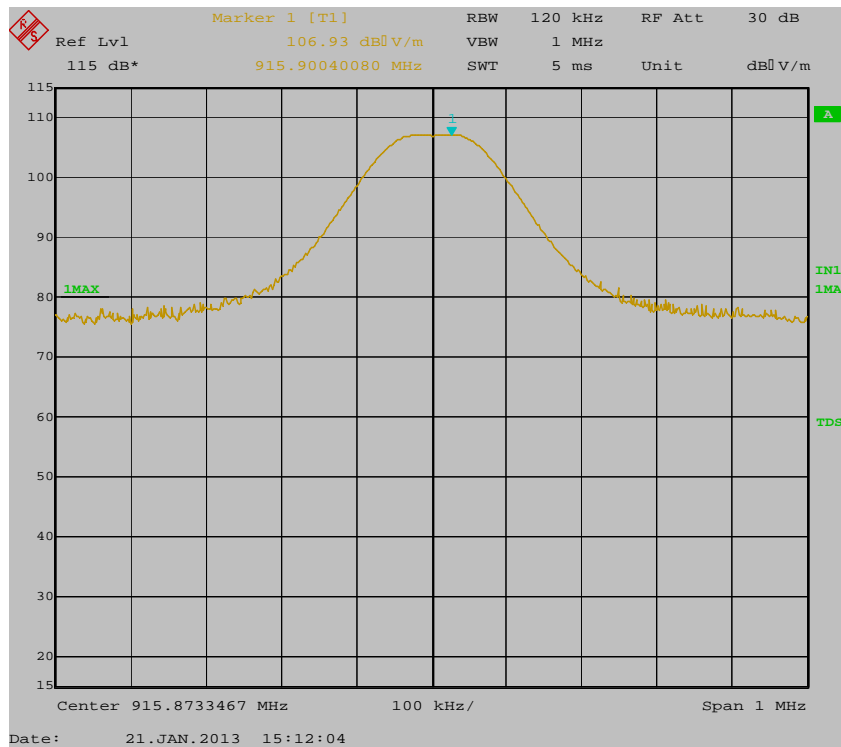


Figure 23 — 915.863 MHz



Radiated Maximum Power Output

E.U.T Description PowerG Wireless PIR Motion
Mirror Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated

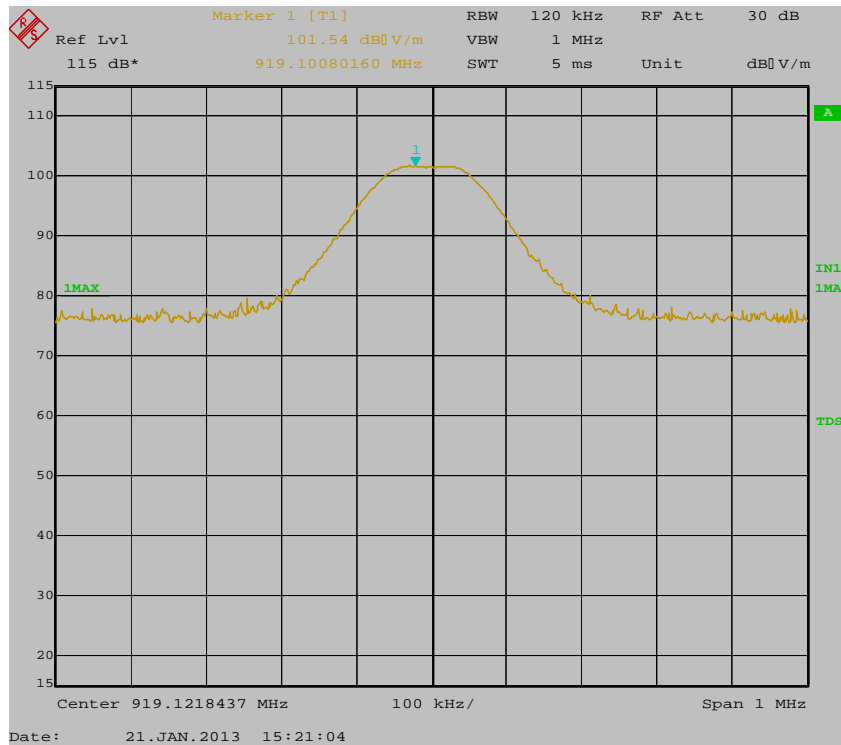


Figure 24 — 919.106 MHz



7.4 Test Equipment Used, Radiated Maximum Power Output

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
EMI Receiver	Rohde & Schwarz	ESIB7	100120	November 01, 2012	1 Year
Horn Antenna	EMCO	6502	9506-2950	October 21, 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 25 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 26 to Figure 27*.

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____

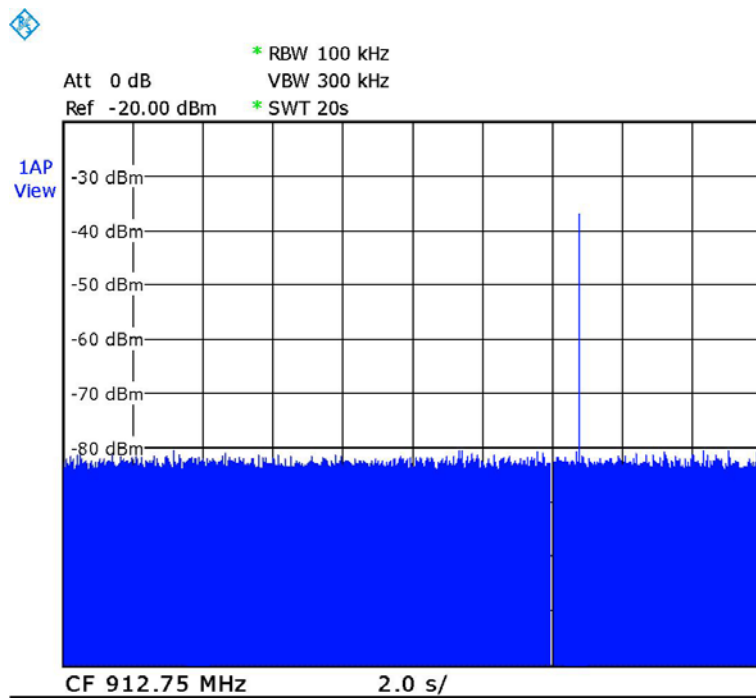
Date: 18.03.13

Typed/Printed Name: A. Sharabi



Dwell Time on Each Channel

E.U.T Description PowerG Wireless PIR Motion
Mirror Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated



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

Figure 26 — Transmission Within 20 sec



Dwell Time on Each Channel

E.U.T Description PowerG Wireless PIR Motion
Mirror Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated

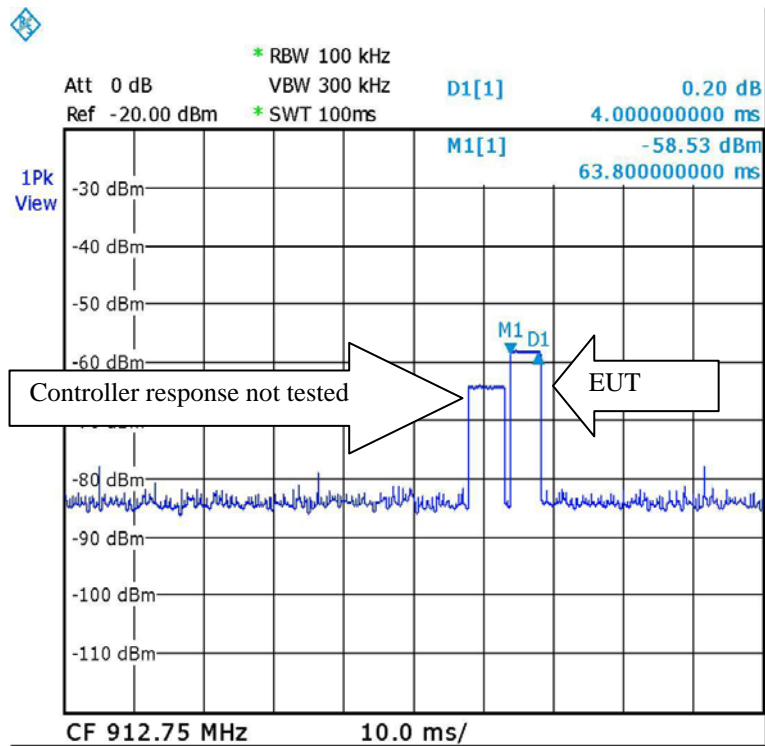


Figure 27 — Burst duration within 20sec

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	November 01, 2012	1 Year

Figure 28 Test Equipment Used

9. Band Edge

9.1 Test specification

FCC Part 15 Subpart C 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)
912.75	902.0	57.08	82.0
919.106	928.0	57.37	81.0

Figure 29 Band Edge Test results table

JUDGEMENT: Passed.

For additional information see Figure 30 to Figure 31.

TEST PERSONNEL:

Tester Signature: 

Date: 18.03.13

Typed/Printed Name: A. Sharabi



Band Edge

E.U.T Description PowerG Wireless PIR Motion
Mirror Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated

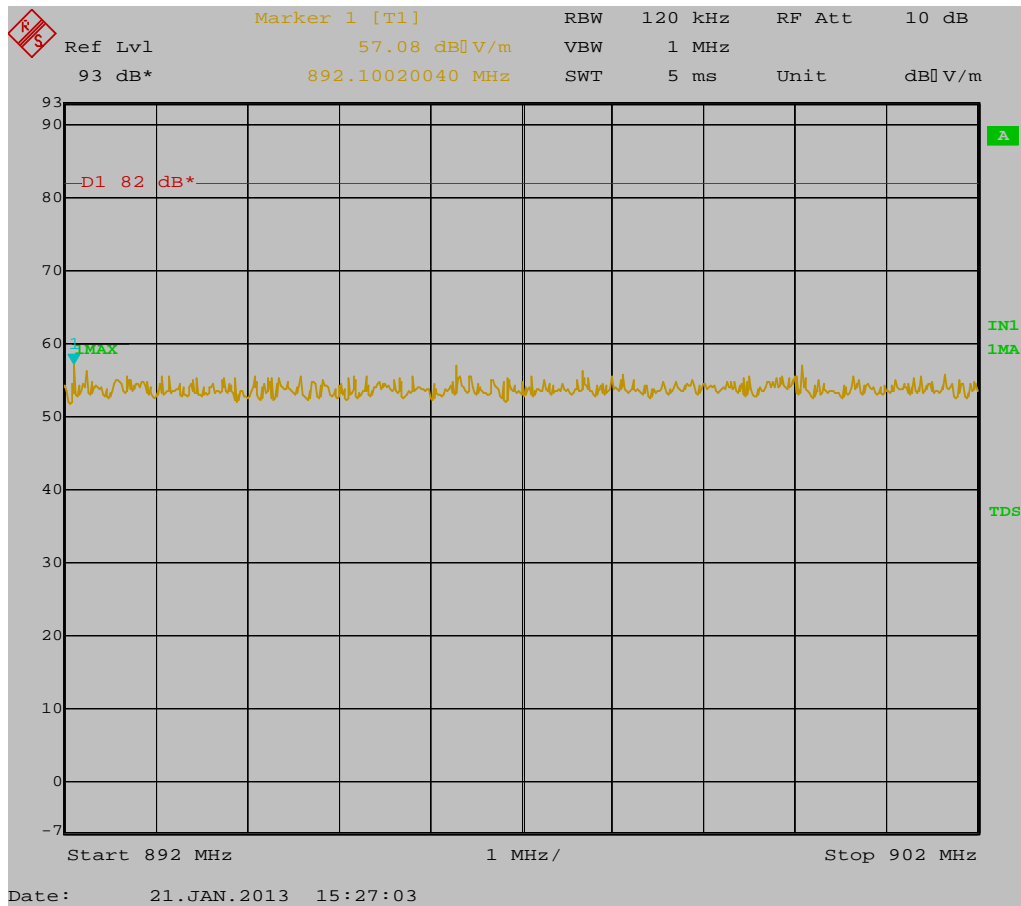


Figure 30 — 912.75 MHz



Band Edge

E.U.T Description PowerG Wireless PIR Motion
Mirror Detector with Anti-masking
Type Tower 20 AM PG2
Serial Number: Not designated

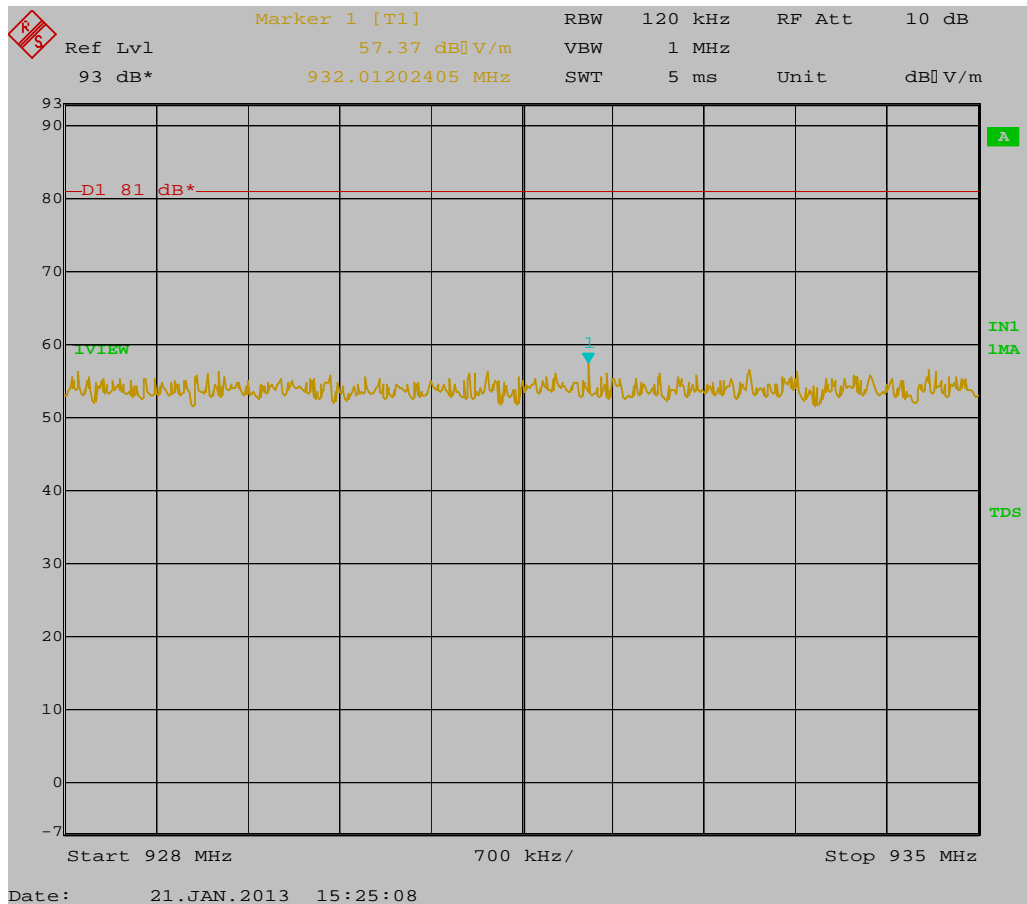


Figure 31 — 919.106 MHz



9.4 Test Equipment Used, Band Edge Spectrum.

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
EMI Receiver	Rohde & Schwarz	ESIB7	100120	November 01, 2012	1 Year
Horn Antenna	ETS	3115	6142	March 14, 2012	2 Years
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



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 channels were the same.

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

TEST PERSONNEL:

Tester Signature: 

Date: 18.03.13

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
EMI Receiver	Rohde & Schwarz	ESIB7	100120	November 01, 2012	1 Year
Active Loop Antenna	EMCO	6502	9506-2950	October 21, 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 33 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 2.

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 – 7.0 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 7.0-10.0 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:
912.79 MHz; 915.89 MHz; 919.10 MHz.



11.3 Test Results

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 11.9 in the worst case at the frequency of 2738.10 MHz, horizontal polarization.

For the operation frequency 915.89 MHz, the margin between the emission level and the specification limit is 11.0 in the worst case at the frequency of 2747.00 MHz, horizontal polarization.

For the operation frequency 919.10 MHz, the margin between the emission level and the specification limit is 11.5 in the worst case at the frequency of 2757.50 MHz, horizontal polarization.

TEST PERSONNEL:

Tester Signature: 

Date: 18.03.13

Typed/Printed Name: A. Sharabi



Radiated Emission

E.U.T Description PowerG Wireless PIR Motion Mirror
Detector with Anti-masking
Type Tower 20 AM PG2
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	1825.50	H	61.5	74.0	-12.5
912.79	1825.50	V	60.1	74.0	-13.9
912.79	2738.10	H	62.1	74.0	-11.9
912.79	2738.10	V	61.5	74.0	-12.5
915.89	1831.00	H	61.9	74.0	-12.1
915.89	1831.00	V	61.5	74.0	-12.5
915.89	2747.00	H	63.0	74.0	-11.0
915.89	2747.00	V	61.7	74.0	-12.3
919.10	1838.20	H	60.4	74.0	-13.6
919.10	1838.20	V	60.0	74.0	-14.0
919.10	2757.50	H	62.5	74.0	-11.5
919.10	2757.50	V	61.5	74.0	-12.5

Figure 34. 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 20 AM PG2
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: Average

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	1825.50	H	61.5	-28.0	33.5	54.0	-20.5
912.79	1825.50	V	60.1	-28.0	32.1	54.0	-21.9
912.79	2738.10	H	62.1	-28.0	34.1	54.0	-19.9
912.79	2738.10	V	61.5	-28.0	33.5	54.0	-20.5
915.89	1831.00	H	61.9	-28.0	33.9	54.0	-20.1
915.89	1831.00	V	61.5	-28.0	33.5	54.0	-20.5
915.89	2747.00	H	63.0	-28.0	35.0	54.0	-19.0
915.89	2747.00	V	61.7	-28.0	33.7	54.0	-20.3
919.10	1838.20	H	60.4	-28.0	32.4	54.0	-21.6
919.10	1838.20	V	60.0	-28.0	32.0	54.0	-22.0
919.10	2757.50	H	62.5	-28.0	34.5	54.0	-19.5
919.10	2757.50	V	61.5	-28.0	33.5	54.0	-20.5

**Figure 35. 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: 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.



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

Instrument	Manufacturer	Model	Serial Number	Last Calibration Date	Period
EMI Receiver	Rohde & Schwarz	ESIB7	100120	November 01, 2012	1 Year
EMC Analyzer	HP	HP8593EM	3536A00120ADI	February 28, 2012	1 Year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS- 0411N313	013	August 08, 2012	1 Year
Biconilog Antenna	EMCO	3142B	1250	July 07, 2012	1 Year
Horn Antenna	ETS	3115	6142	March 14, 2012	2 Years
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 36 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 915.86 MHz 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	5.71	Internal	0	100	4.54×10^{-5}	0.609
915.86	14.79	Internal	0	100	1.17×10^{-4}	0.611
919.11	4.25	Internal	0	100	3.38×10^{-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

FRQ	S.G.	REF	A AMP		FRQ	S.G.	REF	A	
								AMP	
10K	-30	-29.8	-30.2	0.4	50M	-30	-30.5	-31.7	1.2
15K	-30	-29.5	-29.7	0.2	100M	-30	-30.5	-32.2	0.7
20K	-30	-29.7	-29.9	0.2	150M	-30	-30.4	-32.5	2.1
30K	-30	-29.6	-29.9	0.3	200M	-30	-30.5	-32.8	2.3
50K	-30	-29.7	-30.0	0.3	300M	-30	-30.4	-33.3	2.9
75K	-30	-29.7	-30.0	0.3	500M	-30	-30.5	-34.3	3.8
100K	-30	-29.8	-30.0	0.2	750M	-30	-30.7	-35.3	4.8
150K	-30	-29.8	-30.0	0.2	1G	-30	-30.9	-36.3	5.4
200K	-30	-29.9	-30.2	0.3	1.5G	-15	-15.7	-22.4	6.7
500K	-30	-29.9	-30.3	0.4	2G	-15	-15.9	-24.9	9.0
1M	-30	-30.1	-30.5	0.4	2.5G	-15	-16.3	-25.7	9.4
1.5M	-30	-30.1	-30.6	0.5	3G	-15	-16.5	-26.4	9.9
2M	-30	-30.2	-30.7	0.5	3.5G	-15	-16.7	-26.9	10.2
5M	-30	-30.3	-30.9	0.6	4G	-15	-16.3	-27.5	11.2
10M	-30	-30.2	-31.0	0.8	4.5G	-15	-16.6	-28.7	12.1
15M	-30	-30.2	-31.1	0.9	5G	-15	-16.8	-29.9	13.1
20M	-30	-30.5	-31.3	0.8	5.5G	-15	-17.6	-31.1	13.5
					6G	-15	-17.2	-31.7	14.5

at 3 meter range.

NOTES:

1. The cable type is SPUMA400 RF-11N(X2) and 39m long
2. The cable is manufactured by Huber + Suhner



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



15. Comparison Industry Canada Requirements With FCC

IC: 1467C-TOWER20AMPG2 FCC ID: WP3TOWER20AMPG2

Test	FCC	IC
20 dB BW	15.247(a)2	RSS 210 Issue 8 A8.1(a)
Number of Hopping Frequencies	15.247(a)(1)(i)	RSS 210 Issue 8 A8.1(c)
Channel Frequency Separation	15.247(a)(1)	RSS 210 Issue 8 A8.1(b)
Max power / Peak power	15.247(b)(2)	RSS 210 Issue 8 A8.4(1)
Dwell Time on Each Channel	15.205(c)	RSS GEN Issue 3, 7.2.5 (Table 5)
Band Edge	15.247(d)	RSS 210 Issue 8 A8.5
Spurious radiated emission in the restricted band	15.205(c)	RSS GEN Issue 3, 7.2.5 (Table 5)
RF Exposure Limits	1.1307(b)(1)	RSS 102 4.4