



ISRAEL TESTING LABORATORIES
Global Certifications You Can Trust



DATE: 02 July 2015

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

FCC Radio Test Report

for

Essence Security Ltd.

Equipment under test:

WeR@Home Hub

ES8000WG*

2425 MHz Transmitter

*See customer's declaration on page 6.

Tested by:

N. Levi

Approved by:

D. Shidlowsky

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 Essence Security Ltd.

WeR@Home Hub

ES8000WG

02 July 2015

This report concerns:

Original Grant: X

Class I Change:

Class II Change:

Equipment type:

Digital Transmission System

Limits used:

47CFR15 Section 15.247

RSS 210, Issue 8, December 2010

Measurement procedure used is KDB 558074 D01 v03r02 and ANSI C63.4-2009.

Application for Certification

prepared by:

R. Pinchuck

ITL (Product Testing) Ltd.

1 Bat Sheva St.

Lod 7116002

Israel

e-mail Rpinchuck@itl.co.il

Applicant for this device:

(different from "prepared by")

Igal Zertser

Essence Security International Ltd.

12 Abba Eben Avenue, P.O.B. 2073

Ackerstein Tower Bldg D,

Herzeliya, 4612001, Israel

Tel: +972-9-958-5987

Fax: +972-9-956-4182

e-mail: igalze@essence-grp.com

TABLE OF CONTENTS

1.	GENERAL INFORMATION -----	5
1.1	Administrative Information	5
1.2	List of Accreditations	7
1.3	Product Description	8
1.4	Test Methodology	8
1.5	Test Facility	8
1.6	Measurement Uncertainty	8
2.	SYSTEM TEST CONFIGURATION -----	9
2.1	Justification	9
2.2	EUT Exercise Software	9
2.3	Special Accessories	9
2.4	Equipment Modifications	9
2.5	Configuration of Tested System	10
3.	CONDUCTED & RADIATED MEASUREMENT TEST SET-UP PHOTOS -----	11
4.	CONDUCTED EMISSION FROM AC PORTS -----	13
4.1	Test Specification	13
4.2	Test Procedure	13
4.3	Test Results.....	13
4.4	Test Equipment Used; Conducted Emission.....	18
5.	6 DB MINIMUM BANDWIDTH -----	19
5.1	Test Specification	19
5.2	Test Procedure	19
5.3	Test Results.....	19
5.4	Test Equipment Used; 6dB Bandwidth	20
6.	26 DB MINIMUM BANDWIDTH-----	21
6.1	Test Specification	21
6.2	Test Procedure	21
6.3	Test Results.....	21
6.4	Test Equipment Used; 26 dB Minimum Bandwidth.....	22
7.	MAXIMUM TRANSMITTED PEAK POWER OUTPUT -----	23
7.1	Test Specification	23
7.2	Test Procedure	23
7.3	Test Results.....	24
7.4	Test Equipment Used; Maximum Transmitted Peak Power Output.....	26
8.	BAND EDGE SPECTRUM -----	27
8.1	Test Specification	27
8.2	Test Procedure	27
8.3	Test Results.....	27
8.4	Test Equipment Used; Band Edge Spectrum	29
9.	TRANSMITTED POWER DENSITY -----	30
9.1	Test Specification	30
9.2	Test Procedure	30
9.3	Test Results.....	30
9.4	Test Equipment Used; Transmitted Power Density	32
10.	RADIATED EMISSION, 9 KHZ – 30 MHZ -----	33
10.1	Test Specification	33
10.2	Test Procedure	33
10.3	Test Results.....	33
10.4	Test Instrumentation Used, Radiated Measurements.....	34
10.5	Field Strength Calculation	34
11.	SPURIOUS RADIATED EMISSION, 30 – 25000 MHZ -----	35
11.1	Radiated Emission 30-25000 MHz.....	35
11.2	Test Results.....	36



11.3	Test Instrumentation Used, Radiated Measurements above 30 MHz	39
12.	INTERMODULATION -----	40
12.1	Test Procedure	40
12.2	Test Results	41
12.3	Test Instrumentation Used, Radiated Measurements Intermodulation	42
13.	ANTENNA GAIN/INFORMATION -----	43
14.	R.F EXPOSURE/SAFETY -----	44
15.	APPENDIX A - CORRECTION FACTORS -----	45
15.1	Correction factors for CABLE	45
15.2	Correction factors for CABLE	46
15.3	Correction factors for CABLE	47
15.4	Correction factors for Double-Ridged Waveguide Horn	48
15.5	Correction factors for Horn Antenna	49
15.6	Correction factors for ACTIVE LOOP ANTENNA	50
16.	COMPARISON INDUSTRY CANADA REQUIREMENTS WITH FCC -----	51



1. General Information

1.1 Administrative Information

Manufacturer:	Essence Security Ltd.
Manufacturer's Address:	12 Abba Eben Avenue, P.O.B. 2073 Ackerstein Tower Bldg D Herzeliya, 4612001, Israel Tel: +972-9-958-5987 Fax: +972-9-956-4182
Manufacturer's Representative:	Igal Zertser
Equipment Under Test (E.U.T):	WeR@Home Hub
Equipment Model No.:	ES8000WG*
Equipment Serial No.:	Not designated
Date of Receipt of E.U.T:	08.06.2015
Start of Test:	08.06.2015
End of Test:	09.06.2015
Test Laboratory Location:	I.T.L (Product Testing) Ltd. 1 Batsheva St., Lod ISRAEL 7120101
Test Specifications:	FCC Part 15, Subpart C RSS-210, Issue 8, December 2010 RSS Gen, Issue 4, November 2014

See customer's declaration on following page.



ISRAEL TESTING LABORATORIES
Global Certifications You Can Trust



Dated June 25, 2015

Declaration

I hereby declare that the device tested at I.T.L. on June 8, 2015 to June 9, 2015 is as follows:

Equipment Under Test (E.U.T.): WeR@Home Hub


Model No.: ES8000WG

Serial No: Not designated

Please use the above information for all reports and certificates.

Igal Zertser

Sincerely,


Igal Zertser
RF Engineering TL
Essence Security Ltd



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.), FCC Designation No. US1004.
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 4025A-1.

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

Product is an intelligent, home control panel for managing and communicating with the on-site WeR@Home™ System peripherals. It is powered by a rechargeable battery that can be charged by an AC/DC adaptor while operating. The unit contains a FCC-Certified Cellular module (Telit HE910-NAR) and a single-channel 2.4GHz DSSS Transceiver.

1.4 Test Methodology

Radiated testing was performed according to the procedures in KDB 558074 D01 v03r02, ANSI C63.4: 2009 and RSS-Gen Issue 4. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

Emissions tests were performed at I.T.L.'s testing facility in Lod, Israel. I.T.L.'s EMC Laboratory is accredited by A2LA, certificate No. 1152.01 and its FCC Designation Number is US1004.

1.6 Measurement Uncertainty

Conducted Emission

Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)

0.15 – 30 MHz:

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

± 3.44 dB

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

Note: See ITL Procedure No. PM 198.

2. System Test Configuration

2.1 Justification

The EUT was evaluated in installation position. The EUT was tested transmitting continuously at 2425MHz.

2.2 EUT Exercise Software

No special exercise software was used.

2.3 Special Accessories

No special accessories were needed to achieve compliance.

2.4 Equipment Modifications

No modifications were necessary in order to achieve compliance.

2.5 Configuration of Tested System

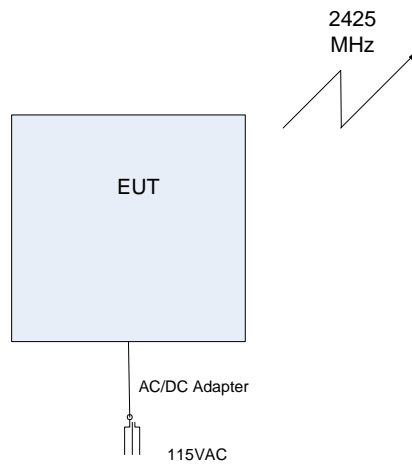


Figure 1. Configuration of Tested System

3. Conducted & Radiated Measurement Test Set-up Photos



Figure 2. Conducted Emission Test



Figure 3. Radiated Emission Test



Figure 4. Radiated Emission Test



Figure 5. Radiated Emission Test

4. Conducted Emission From AC Ports

4.1 Test Specification

F.C.C., Part 15, Subpart C, 15.207

4.2 Test Procedure

The E.U.T operation mode and test setup are as described in Section 2. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room (see Section 3), with the E.U.T placed on a 0.8 meter high wooden table. In the case of a floor-standing E.U.T., it was placed on the horizontal ground plane.

The E.U.T was powered from 115 V AC / 60 Hz via 50 Ohm / 50 μ Hn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T

The center of the E.U.T.'s AC cable was folded back and forth, in order to form a bundle less than 0.80 meters and a total cable length of 1 meter.

The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission. The configuration tested is shown in the photograph, *Figure 2. Conducted Emission Test*.

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are pre-loaded to the receiver and are displayed on the receiver's spectrum display.

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector.

4.3 Test Results

The E.U.T met the requirements of the FCC Part 15, Subpart C, 15.207 specifications.

The margin between the emission levels and the specification limit is, in the worst case, 18.16 dB for the phase line at 0.386 MHz and 19.4 dB at 0.386 MHz for the neutral line.

The details of the highest emissions are given in *Figure 6 to Figure 9*.



Conducted Emission

E.U.T Description WeR@Home Hub
Type ES8000WG
Serial Number: Not designated

Specification: FCC Part 15, Subpart C, Class B
Lead: Phase
Detectors: Quasi-peak, Average

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CE22BQP			
Trace2:	CE22BAP			
Trace3:	---			
	TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1	Quasi Peak	174 kHz	42.28	-22.48
2	Average	174 kHz	27.12	-27.64
2	Average	382 kHz	25.57	-22.66
1	Quasi Peak	386 kHz	39.98	-18.16
2	Average	454 kHz	17.07	-29.72
1	Quasi Peak	462 kHz	29.91	-26.74
1	Quasi Peak	958 kHz	25.93	-30.06
2	Average	982 kHz	15.00	-30.99
2	Average	1.254 MHz	14.74	-31.25
1	Quasi Peak	1.558 MHz	25.21	-30.78
2	Average	2.362 MHz	11.60	-34.39
1	Quasi Peak	3.174 MHz	22.41	-33.58
1	Quasi Peak	3.754 MHz	21.48	-34.51
2	Average	4.83 MHz	11.92	-34.07
1	Quasi Peak	6.302 MHz	14.85	-45.14
2	Average	8.438 MHz	8.15	-41.84
2	Average	16.126 MHz	9.23	-40.76
1	Quasi Peak	16.366 MHz	15.27	-44.72
2	Average	18.514 MHz	8.52	-41.47
1	Quasi Peak	19.27 MHz	14.76	-45.23

Date: 8.JUN.2015 17:32:40

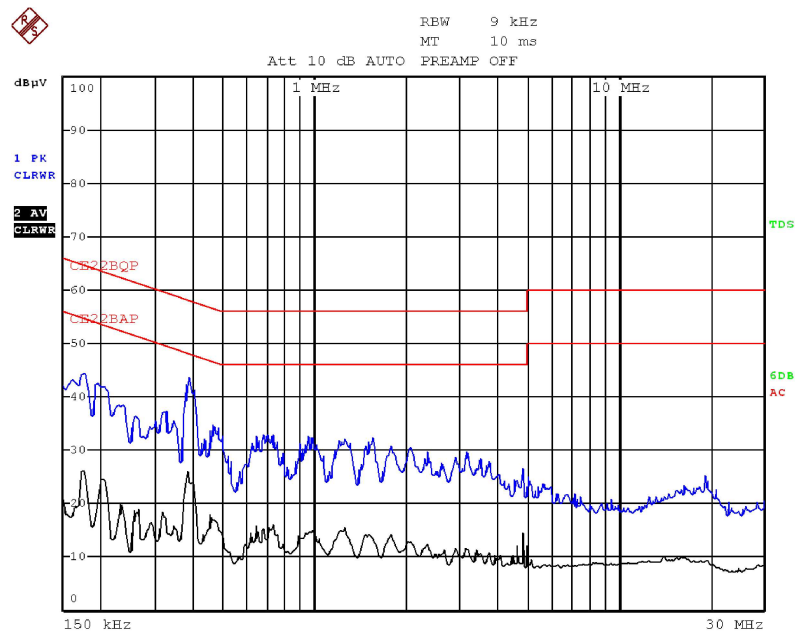
Figure 6. Detectors: Quasi-peak, Average

Note: DELTA LIMIT 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.

Conducted Emission

E.U.T Description WeR@Home Hub
Type ES8000WG
Serial Number: Not designated

Specification: FCC Part 15, Subpart C, Class B
Lead: Phase
Detectors: Quasi-peak, Average



Date: 8.JUN.2015 17:28:17

Figure 7 Detectors: Quasi-peak, Average

Conducted Emission

E.U.T Description WeR@Home Hub
Type ES8000WG
Serial Number: Not designated

Specification: FCC Part 15, Subpart C, Class B
Lead: Neutral
Detectors: Quasi-peak, Average

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CE22BQP			
Trace2:	CE22BAP			
Trace3:	---			
	TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
2	Average	174 kHz	27.99	-26.77
1	Quasi Peak	226 kHz	35.76	-26.82
1	Quasi Peak	386 kHz	38.74	-19.40
2	Average	386 kHz	26.27	-21.87
1	Quasi Peak	466 kHz	31.19	-25.39
2	Average	466 kHz	17.85	-28.73
1	Quasi Peak	946 kHz	27.40	-28.60
2	Average	978 kHz	15.80	-30.19
2	Average	1.254 MHz	15.30	-30.69
1	Quasi Peak	1.278 MHz	27.23	-28.76
1	Quasi Peak	2.33 MHz	24.19	-31.80
2	Average	2.33 MHz	12.52	-33.47
1	Quasi Peak	3.77 MHz	21.90	-34.09
2	Average	4.834 MHz	11.72	-34.28
1	Quasi Peak	6.354 MHz	16.03	-43.96
2	Average	8.294 MHz	7.28	-42.71
2	Average	16.538 MHz	8.69	-41.30
1	Quasi Peak	17.01 MHz	14.82	-45.17
1	Quasi Peak	18.762 MHz	14.86	-45.13
2	Average	20.082 MHz	8.61	-41.38

Date: 8.JUN.2015 17:19:32

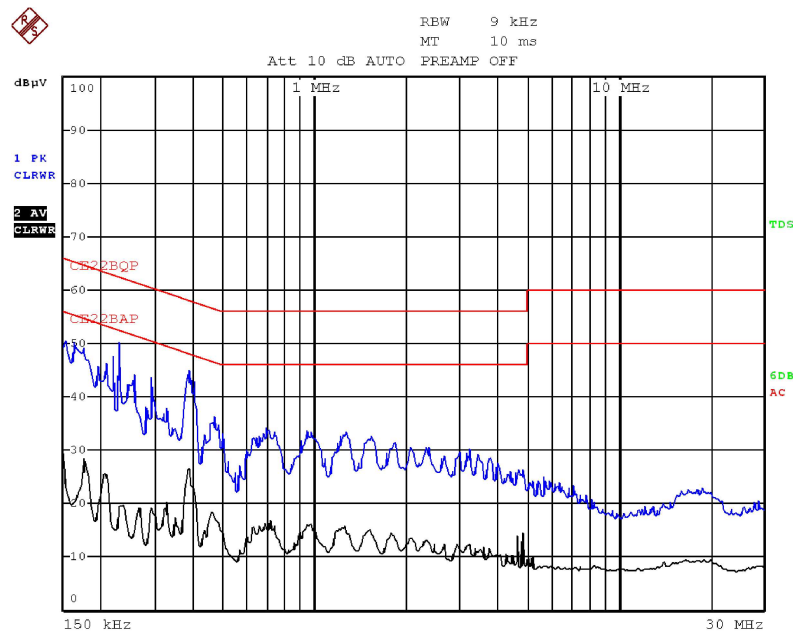
Figure 8. Detectors: Quasi-peak, Average

Note: DELTA LIMIT 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.

Conducted Emission

E.U.T Description WeR@Home Hub
Type ES8000WG
Serial Number: Not designated

Specification: FCC Part 15, Subpart C, Class B
Lead: Neutral
Detectors: Quasi-peak, Average



Date: 8.JUN.2015 17:13:18

Figure 9 Detectors: Quasi-peak, Average



4.4 Test Equipment Used; Conducted Emission

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
LISN	Fischer	FCC-LISN-25A	127	March 16, 2015	1 year
Transient Limiter	HP	11947A	3107A03041	May 13, 2015	1 year
EMI Receiver	Rohde & Schwarz	ESCI7	100724	January 4, 2015	1 year

5. 6 dB Minimum Bandwidth

5.1 Test Specification

F.C.C. Part 15, Subpart C: (15.247-a2)

5.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 2.

See Section 2.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

The E.U.T was tested at 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 1.

The spectrum bandwidth of the E.U.T. at the point of 6 dB below maximum peak power was measured and recorded.

The E.U.T. was tested at 2425MHz.

5.3 Test Results

Operation Frequency (MHz)	Modulation	Reading (MHz)	Specification (MHz)
2425.00	DSSS	1.65	>0.5

Figure 10 6 dB Minimum Bandwidth

JUDGEMENT: Passed

For additional information see *Figure 11.*

11:32:32 08 JUN 2015

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR Δ 1.65 MHz
.59 dB

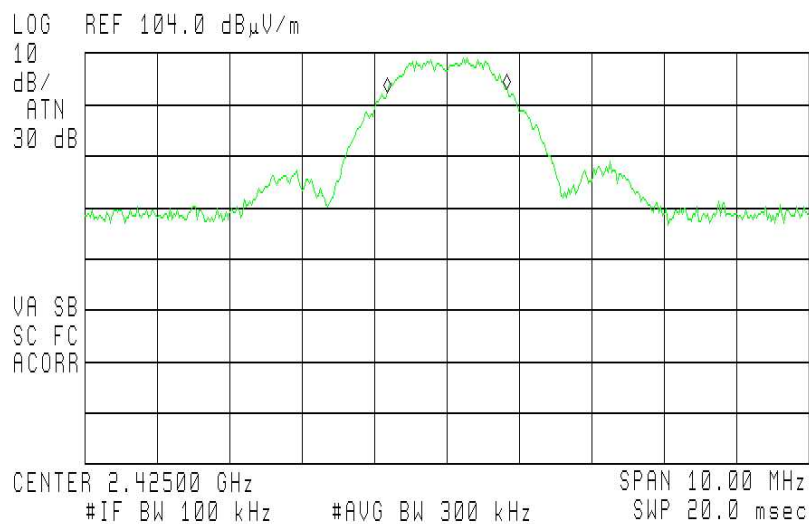


Figure 11 — 2425MHz Channel

5.4 Test Equipment Used; 6dB Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	8542E	3906A00276	March 19, 2015	1 year
Horn Antenna	ETS	3115	6142	May 19, 2015	3 years
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 12 Test Equipment Used

6. 26 dB Minimum Bandwidth

6.1 Test Specification

F.C.C., Part 2 Section 2.1049
RSS GEN, 2014, Section 6.6

6.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 2.

See Section 2.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

The E.U.T was tested at 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 1.

The spectrum bandwidth of the E.U.T. at the point of 26 dB below maximum peak power was measured and recorded.

The E.U.T. was tested at 2425MHz.

6.3 Test Results

Operation Frequency (MHz)	Modulation	Reading (MHz)
2425.00	DSSS	3.1

Figure 13 26 dB Minimum Bandwidth

JUDGEMENT: Passed

For additional information see *Figure 14.*

11:35:49 08 JUN 2015

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 3.10 MHz
1.14 dB

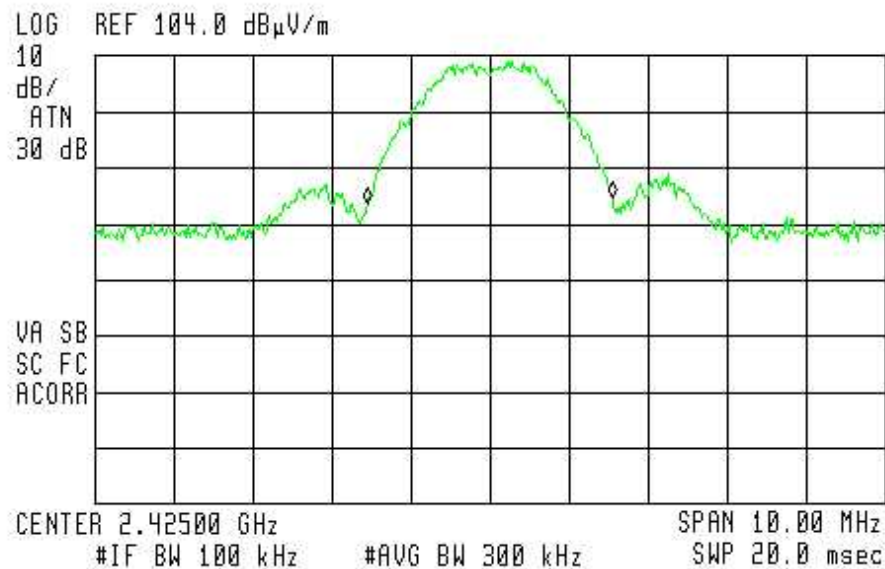


Figure 14 — 2425MHz Channel

6.4 Test Equipment Used; 26 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	8542E	3906A00276	March 19, 2015	1 year
Horn Antenna	ETS	3115	6142	May 19, 2015	3 years
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 15 Test Equipment Used

7. Maximum Transmitted Peak Power Output

7.1 Test Specification

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

7.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 2.

See Section 2.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

The E.U.T was tested at 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 1.

The E.U.T was evaluated in channel 2425MHz.

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:

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

E - Field Strength (V/m)

d – Distance from transmitter (m)

G – Antenna gain

P – Peak power (W)

7.3 Test Results

Operation Frequency (MHz)	Polarization	Modulation	Power (dBuV/m)	Power (dBm)	Power (W)	Specification (W)	Margin (W)
2425.00	V	DSSS	106.30	11.1	0.0129	1.0	-0.9871
2425.00	H	DSSS	101.32	6.1	0.0041	1.0	-0.9959

Figure 16 Maximum Peak Power Output

JUDGEMENT: Passed by 0.9871 W

For additional information see *Figure 17* and *Figure 18*.

11:44:55 08 JUN 2015

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.42550 GHz
106.30 dB μ V/m

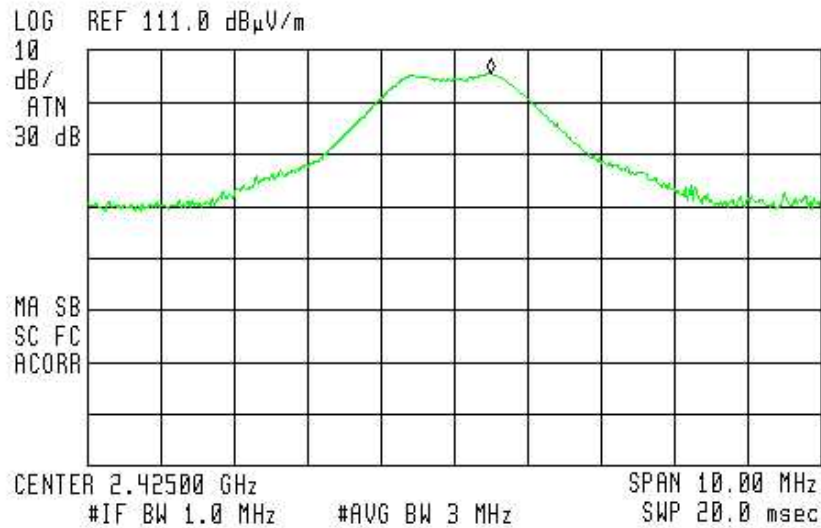


Figure 17 2425MHz Channel - Vertical Polarization

14:08:40 08 JUN 2015

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.42548 GHz
101.32 dB μ V/m

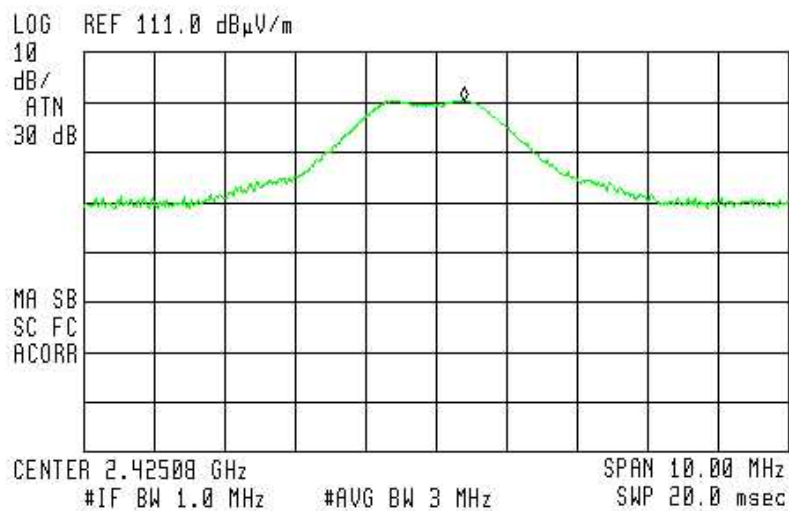


Figure 18 2425MHz Channel - Horizontal Polarization

7.4 Test Equipment Used; Maximum Transmitted Peak Power Output

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	8542E	3906A00276	March 19, 2015	1 year
Horn Antenna	ETS	3115	6142	May 19, 2015	3 years
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 19 Test Equipment Used

8. Band Edge Spectrum

8.1 Test Specification

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

8.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 2.

See Section 2.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

The E.U.T was tested at 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 1.

Maximum power level at 2400 MHz and above 2483.5 MHz was measured relative to power level at 2425MHz.

8.3 Test Results

Operation Frequency (MHz)	Modulation	Band Edge Frequency (MHz)	Spectrum Level (dBuV/m)	Specification (dBuV/m)	Margin (dB)
2425.0	DSSS	2400.0	72.1	82.7	-10.6
2425.0	DSSS	2483.5	72.7	82.7	-10.0

Figure 20 Band Edge Spectrum

JUDGEMENT: Passed by 10 dB

For additional information see *Figure 21* and *Figure 22*.

11:56:22 08 JUN 2015

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.40001 GHz
72.14 dB μ V/m

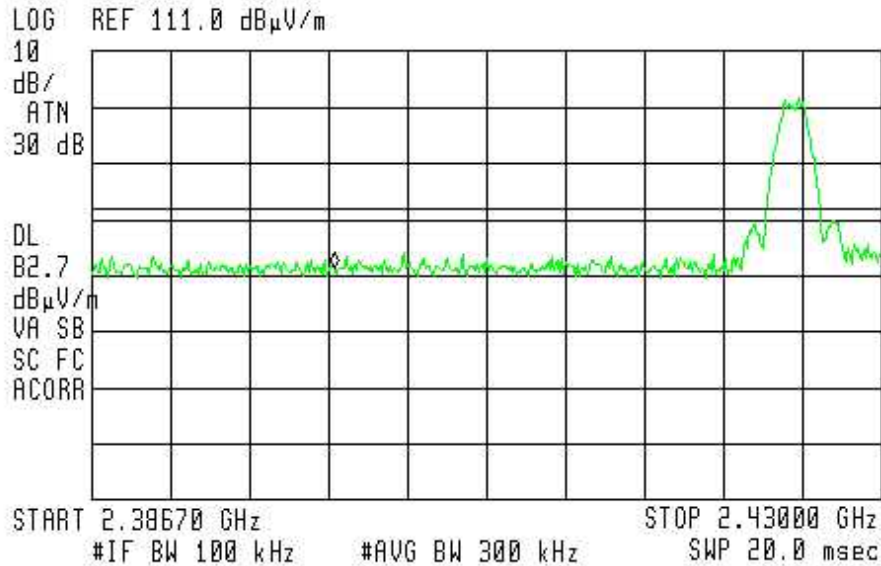


Figure 21 —Lower Band Edge, DSSS

11:59:05 08 JUN 2015

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.48353 GHz
72.73 dB μ V/m

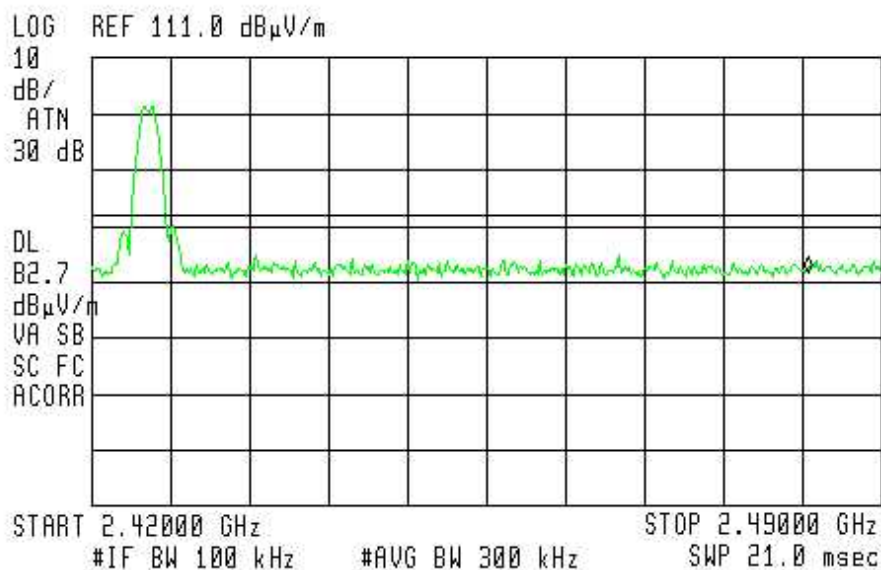


Figure 22 —Upper Band Edge, DSSS

8.4 Test Equipment Used; Band Edge Spectrum

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	8542E	3906A00276	March 19, 2015	1 year
Horn Antenna	ETS	3115	6142	May 19, 2015	3 years
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 23 Test Equipment Used

9. Transmitted Power Density

9.1 Test Specification

F.C.C. Part 15, Subpart C (15.247(d))

9.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 2.

See Section 2.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

The E.U.T was tested at 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 1.

The E.U.T was tested vertical antenna test polarity for worst case.

The spectrum analyzer was set to 3 kHz resolution BW and sweep time of 1 second for each 3 kHz “window”. The spectrum peaks were located at each of the 3 operating frequencies.

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

9.3 Test Results

Operation Frequency (MHz)	Polarization	Modulation	Reading Spectrum Analyzer (dBuV/m)	Results (dBm)	Specification (dBm)	Margin (dB)
2425	V	DSSS	91.6	-0.9	8	-8.9
2425	H	DSSS	86.97	-5.5	8	-13.5

Figure 24 Test Results

JUDGEMENT: Passed by 8.9 dB

For additional information see *Figure 25* and *Figure 26*.

12:06:59 08 JUN 2015

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.42508 GHz
91.58 dB μ V/m

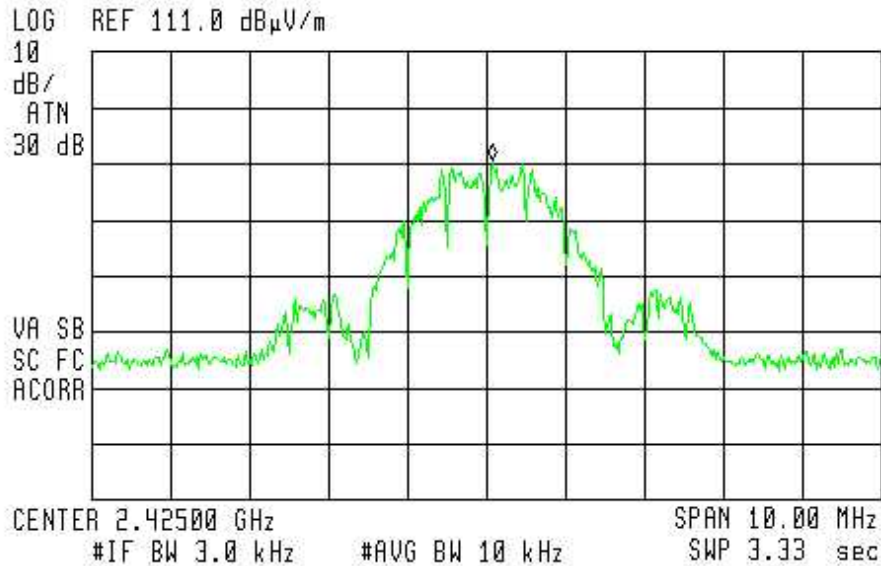


Figure 25 — 2425 MHz Channel, DSSS, Vertical

14:06:41 08 JUN 2015

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.42508 GHz
86.97 dB μ V/m

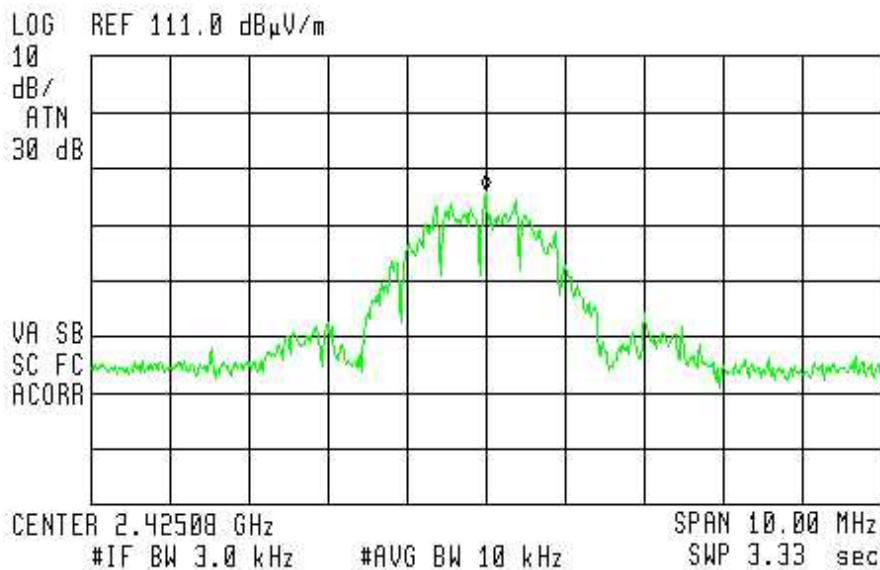


Figure 26 — 2425 MHz Channel, DSSS, Horizontal



9.4 Test Equipment Used; Transmitted Power Density

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	8542E	3906A00276	March 19, 2015	1 year
Horn Antenna	ETS	3115	6142	May 19, 2015	3 years
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 27 Test Equipment Used

10. Radiated Emission, 9 kHz – 30 MHz

10.1 Test Specification

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

RSS 210 Issue 8, Clause 2.5

10.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 2.

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 1.

The frequency range 9 kHz-30 MHz was scanned.

The emissions were measured using a computerized EMI receiver complying with 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 2.425GHz 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.

All emissions were more than the EMI receiver noise level which is <6dB below the specification limit.

10.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESBI7	100120	January 1, 2015	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 28 Test Equipment Used

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

No external pre-amplifiers are used.

11. Spurious Radiated Emission, 30 – 25000 MHz

11.1 Radiated Emission 30-25000 MHz

The E.U.T operation mode and test set-up are as described in Section 2.

See Section 2.1 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, 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 1.

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 frequency range 30-1000 MHz, the readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

In the frequency range 1-6.0 GHz, a computerized EMI receiver complying with CISPR 16 requirements was used.

In the frequency range 6.0-25.0 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 3MHz.

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 operated at 2.425GHz using a peak detector.



11.2 Test Results

JUDGEMENT: Passed by 2.9 dB

For radiated emissions between 30MHz and 1 GHz, all observed emissions were at least 20dB below the limits and no data was reported.

For the operation frequency of 2425.0 MHz, the margin between the emission level and the specification limit is in the worst case 6.0 dB at the frequency of 2483.5 MHz, Vertical polarization.

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

The details of the highest emissions are given in *Figure 29* to *Figure 30*.

Radiated Emission Above 1 GHz

E.U.T Description WeR@Home Hub
Type ES8000WG
Serial Number: Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters Detector: Peak
Operation Frequency: 2425 MHz

Freq.	Polarity	Peak Amp	Peak. Specification	Peak. Margin
(MHz)	(H/V)	(dBμV/m)	(dB μV/m)	(dB)
2390.0	H	51.0	74.0	-23.0
2390.0	V	60.0	74.0	-14.0
2483.5	H	52.0	74.0	-22.0
2483.5	V	60.0	74.0	-14.0
4850.0	H	59.0	74.0	-15.0
4850.0	V	59.0	74.0	-15.0

**Figure 29. 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 Above 1 GHz

E.U.T Description WeR@Home Hub
Type ES8000WG
Serial Number: Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters Detector: Average
Operation Frequency: 2425 MHz

Freq.	Polarity	Average Amp	Average Specification	Average Margin
(MHz)	(H/V)	(dBμV/m)	(dB μV/m)	(dB)
2390.0	H	39.0	54.0	-15.0
2390.0	V	47.8	54.0	-6.2
2483.5	H	41.0	54.0	-13.0
2483.5	V	48.0	54.0	-6.0
4850.0	H	47.0	54.0	-7.0
4850.0	V	46.0	54.0	-8.0

**Figure 30. 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

11.3 Test Instrumentation Used, Radiated Measurements above 30 MHz

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESBI7	100120	January 1, 2015	1 year
Spectrum Analyzer	R&S	FSL6	100194	January 1, 2015	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	May 19, 2015	3 years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	2 years
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Spectrum Analyzer	HP	8592L	3826A01204	March 4, 2015	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 11, 2015	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 31 Test Equipment Used

12. Intermodulation

12.1 Test Procedure

The test method was based on ANSI/TIA-603-C: 2004, Section 2.2.12

Unwanted Emissions: Radiated Spurious.

The power of any emission outside of the authorized operating frequency ranges (728-758; 862-894; 1930-1990; 2110-2155 MHz) must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB, yielding – 13dBm.

(a) The E.U.T. operation mode and test set-up are as described in Section 2.

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

(b) *Figure 1.*

The E.U.T. was operated in Downlink mode at 4 different channels at center frequency of each band at the same time, transmitting at CW signal.

(c) The frequency range 9 kHz-25 GHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. The emissions were measured at a distance of 3 meters.

(b) The E.U.T. was replaced by a substitution antenna (dipole 30MHz-1GHz, Horn Antenna above 1GHz) driven by a signal generator. The height was readjusted for maximum reading. The signal generator level was adjusted to obtain the same reading on the EMI receiver as in step (a).

The signals observed in step (a) were converted to radiated power using:

$$P_d(\text{dBm}) = P_g(\text{dBm}) - \text{Cable Loss (dB)} + \text{Substitution Antenna Gain (dB)}$$

P_d = Dipole equivalent power (result).

P_g = Signal generator output level.

12.2 Test Results

Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dBμV/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
836.7+2425.0	3261.7	V	64.5	-31.18	11.2	9.5	-32.88	-13.0	-19.88
2*836.7+2425.0	4098.4	V	69.6	-26.69	11.2	9.5	-28.39	-13.0	-15.39
2425.0-836.7	1588.3	V	63.9	-32.39	11.2	9.5	-34.09	-13.0	-21.09
2*2425.0+836.7	5685.7	V	69.9	-24.63	13.5	9.9	-28.23	-13.0	-15.23
2*2425.0-836.7	4013.3	V	68.1	-27.58	11.2	9.5	-29.28	-13.0	-16.28
2425.0-2*836.7	751.6	V	42.2	-52.28	4.8	1.57	-55.51	-13.0	-42.51
836.7+2425.0	3261.7	H	66.4	-31.04	9.9	9.6	-31.34	-13.0	-18.34
2*836.7+2425.0	4098.4	H	69.7	-26.86	11.2	8.6	-29.46	-13.0	-16.46
2425.0-836.7	1588.3	H	55.0	-43.71	6.7	8	-42.41	-13.0	-29.41
2*2425.0+836.7	5685.7	H	64.9	-29.22	13.5	10.8	-31.92	-13.0	-18.92
2*2425.0-836.7	4013.3	H	59.0	-37.23	11.2	8.6	-39.83	-13.0	-26.83
2425.0-2*836.7	751.6	H	41.5	-55.93	4.8	1.57	-59.16	-13.0	-46.16

Figure 32 Test Results Intermodulation

JUDGEMENT: Passed

12.3 Test Instrumentation Used, Radiated Measurements Intermodulation

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	8542E	3906A00276	March 19, 2015	1 Year
RF Filter Section	HP	85420E	3705A00248	March 19, 2015	1 Year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 Year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	May 19, 2015	3 years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 Years
Low Noise Amplifier	Narda	LNA-DBS-0411N313	013	August 22, 2014	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	March 4, 2015	1 Year
Spectrum Analyzer	HP	8564E	3442A00275	March 11, 2015	1 Year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 33 Test Equipment Used



13. Antenna Gain/Information

The antenna gain is -2.0 dBi, integral.

14. R.F Exposure/Safety

Typical use of the E.U.T. is as a home control panel for managing and communicating with home system.

The typical placement of the E.U.T. is on a flat surface ie. desk, tabletop.

The typical distance between the E.U.T. and the user is 20 cm.

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1310 Requirements and RSS 102 Issue 5, Section 2.52.

(a) FCC limits at 2425 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

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

P_t- Transmitted Power 106.30 dBuV/m (Peak) = 12.9mW (includes antenna gain)

G_T- Antenna Gain, -2.0 dBi

R- Distance from Transmitter using 20m worst case

(c) The peak power density is:

$$S = \frac{(12.9)}{4f(20)^2} = 0.0026 \frac{mW}{cm^2}$$

(d) This is below the FCC/IC limit.

15. APPENDIX A - CORRECTION FACTORS

15.1 Correction factors for CABLE from EMI receiver to test antenna at 3 meter range.

Frequency (MHz)	Cable Loss (dB)	Frequency (MHz)	Cable Loss (dB)
0.010	0.4	50.00	1.2
0.015	0.2	100.00	0.7
0.020	0.2	150.00	2.1
0.030	0.3	200.00	2.3
0.050	0.3	300.00	2.9
0.075	0.3	500.00	3.8
0.100	0.2	750.00	4.8
0.150	0.2	1000.00	5.4
0.200	0.3	1500.00	6.7
0.500	0.4	2000.00	9.0
1.00	0.4	2500.00	9.4
1.50	0.5	3000.00	9.9
2.00	0.5	3500.00	10.2
5.00	0.6	4000.00	11.2
10.00	0.8	4500.00	12.1
15.00	0.9	5000.00	13.1
20.00	0.8	5500.00	13.5
		6000.00	14.5

NOTES:

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

15.2 Correction factors for CABLE
from EMI receiver
to test antenna
at 3 meter range.

FREQUENCY	CORRECTION
(GHz)	FACTOR
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.*

15.3 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.*

15.4 Correction factors for Horn

Double-Ridged Waveguide

**Model: 3115, S/N 6142
at 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		



15.5 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



15.6 Correction factors for ACTIVE LOOP ANTENNA
Model 6502
S/N 9506-2950

FREQUENCY	Magnetic Antenna Factor	Electric Antenna Factor
(MHz)	(dB)	(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

16. Comparison Industry Canada Requirements With FCC

Essence Security WeR@Home Hub, ES8000WG
IC: 11061A-ES8000WG FCC ID: YXG-ES8000WG

Test	FCC	IC
❑ Radiated Emission	15.209	RSS 210 Issue 8 Clause 2.5
❑ Max power / Peak power	15.247(b)(3)	RSS 210 Issue 8 A8.4(4)
❑ 6dB BW	15.247(a)2	RSS 210 Issue 8 A8.2a
❑ Power density	15.247(e)	RSS 210 Issue 8 A8.2b
❑ Spurious radiated emission in the restricted band	15.205(c)	RSS 210 Issue 8 2.5 RSS Gen 7.2.2 (Table 1)
❑ Band edge spectrum	15.247(d)	RSS 210 Issue 8 A8.5
❑ RF Exposure Limits	1.1310	RSS 102 4.4