



DATE: 01 December 2015

I.T.L. (PRODUCT TESTING) LTD.
FCC Radio Test Report
for
WeFind-Tech LTD

Equipment under test:

Kwik WiFi Connected Button*

118K*

*See customer's Declaration on page

Approved by: _____
N. Levi

Approved by: _____
D. Shidowsky

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This report relates only to items tested.



Measurement/Technical Report for WeFind-Tech LTD

Kwik WiFi Connected Button

118K

FCC ID: 2ACPH118K

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

Equipment type: Digital Transmission System

Limits used: 47CFR15 Section 15.247

Measurement procedure used is KDB 558074 D01 v03r03 and
ANSI C63.10: 2013.

Application for Certification prepared by:	Applicant for this device: (different from "prepared by")
R. Pinchuck	Ofer Klein
ITL (Product Testing) Ltd.	14 Kehilat Saloniki St.
1 Bat Sheva St.	Tel Aviv 69513, Israel
Lod 7116002	Tel: +972 54 320 9191
Israel	Fax:
e-mail Rpinchuck@itl.co.il	e-mail ofer@wefind-tech.com



TABLE OF CONTENTS

1. GENERAL INFORMATION -----	4
1.1 Administrative Information.....	4
1.2 List of Accreditations	6
1.3 Product Description	7
1.4 Test Methodology	7
1.5 Test Facility	7
1.6 Measurement Uncertainty	7
2. SYSTEM TEST CONFIGURATION-----	8
2.1 Justification.....	8
2.2 EUT Exercise Software	8
2.3 Special Accessories	8
2.4 Equipment Modifications	8
2.5 Configuration of Tested System	9
3. RADIATED MEASUREMENT TEST SET-UP PHOTOS -----	10
4. 6 DB MINIMUM BANDWIDTH -----	12
4.1 Test Specification	12
4.2 Test Procedure	12
4.3 Test Results.....	12
4.4 Test Equipment Used; 6dB Bandwidth	18
6. MAXIMUM TRANSMITTED PEAK POWER OUTPUT -----	19
6.1 Test Specification	19
6.2 Test Procedure	19
6.3 Test Results.....	19
6.4 Test Equipment Used; Maximum Peak Power Output.....	25
7. BAND EDGE SPECTRUM -----	26
7.1 Test Specification	26
7.2 Test Procedure	26
7.3 Test Results.....	26
7.4 Test Equipment Used; Band Edge Spectrum	30
8. RADIATED EMISSION, 9 KHZ – 30 MHZ -----	31
8.1 Test Specification	31
8.2 Test Procedure	31
8.3 Test Results.....	31
8.4 Test Instrumentation Used, Radiated Measurements.....	32
8.5 Field Strength Calculation	32
9. SPURIOUS RADIATED EMISSION, 30 – 25000 MHZ -----	33
9.1 Test Specification	33
9.2 Test Procedure	33
9.3 Test Results.....	33
9.4 Test Instrumentation Used, Radiated Measurements Above 1 GHz	36
10. TRANSMITTED POWER DENSITY -----	37
10.1 Test Specification	37
10.2 Test Procedure	37
10.3 Test Results.....	37
10.4 Test Equipment Used; Transmitted Power Density	43
11. ANTENNA GAIN/INFORMATION -----	44
12. R.F EXPOSURE/SAFETY-----	45
13. APPENDIX A - CORRECTION FACTORS -----	46
13.1 Correction factors for CABLE	46
13.2 Correction factors for Log ANTENNA	47
13.3 Correction factors for Biconical ANTENNA.....	48
13.4 Correction factors for Horn ANTENNA.....	49
13.5 Correction factors for ACTIVE LOOP ANTENNA	50



1. General Information

1.1 Administrative Information

Manufacturer: WeFind-Tech LTD

Manufacturer's Address: 14 Kehilat Saloniki St.
Tel Aviv 69513, Israel
Tel: +972 54 320 9191
Fax:+972

Manufacturer's Representative: Ofer Klein

Equipment Under Test (E.U.T): Kwik WiFi Connected Button*

Equipment Model No.: 118K*

Equipment Serial No.: Not designated

Date of Receipt of E.U.T: 08.09.2015

Start of Test: 10.09.2015

End of Test: 15.09.2015

Test Laboratory Location: I.T.L (Product Testing) Ltd.
1 Batsheva St.,
Lod
ISRAEL 7120101

Test Specifications: FCC Part 15, Subpart C

*See customer's Declaration on following page.



Date: October 29, 2015

DECLARATION

I hereby declare that the E.U.T. name, model name, and serial number of the E.U.T. tested at the I.T.L. Radio laboratory between 08-15 September 2015 is as follows:

E.U.T. Name: Kwik WiFi Connected Button
Model Name: 118K
Serial Number: Not designated

Please use the above names and serial number in the test report and certificate.

Thank you,

Signature: 
Evgeni Mashkevich
Hardware & Embedded Developer
WeFind-Tech 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:.
5. Industry Canada (Canada), IC File No.: 46405-4025; Sites No. IC 4025A-1, 4025A-2.

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

Kwik is an end-to-end IoT platform connecting retailers, brands and service providers to their customers. The platform includes WiFi connected button, mobile app, cloud services and 3rd party interfaces.

When clicking the button, the message is sent through WiFi and triggers actions. For example, a click on a button that is connected to a specific brand, will place an order for a product or a service by that brand.

The device operates with the following modulations:

DSS (Bit Rate 1Mbps)
CCK (Bit Rate 11 Mbps)
OFDM (54Mbps)

1.4 Test Methodology

Radiated testing was performed according to the procedures in KDB 558074 D01 v03r03, ANSI C63.10: 2013. 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

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

Exploratory emission testing was performed in 3 orthogonal polarities to determine the worst case.

In all axes the spurious levels were under the noise level. According to above results the worst case was the X axis.

The fundamental results are shown in *Figure 1* below:

Frequency (MHz)	Y (dBuV/m)	X (dBuV/m)	Z (dBuV/m)
2412.0	73.2	74.0	70.1
2437.0	71.2	72.4	67.8
2462.0	70.3	71.2	67.2

Figure 1. Radiate Emission Screening Results

The unit evaluated when transmitting at the low channel (2412MHz), the mid channel (2437MHz) and the high channel (2462MHz)

The E.U.T. contains an integral antenna. An antenna port was placed on the E.U.T. for conducted test purposes only.

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

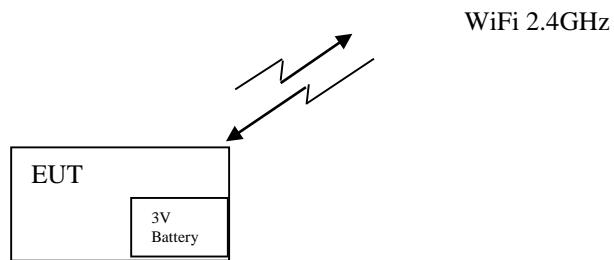


Figure 2. Configuration of Tested System

3. Radiated Measurement Test Set-up Photos



Figure 3. Radiated Emission Test



Figure 4. Radiated Emission Test

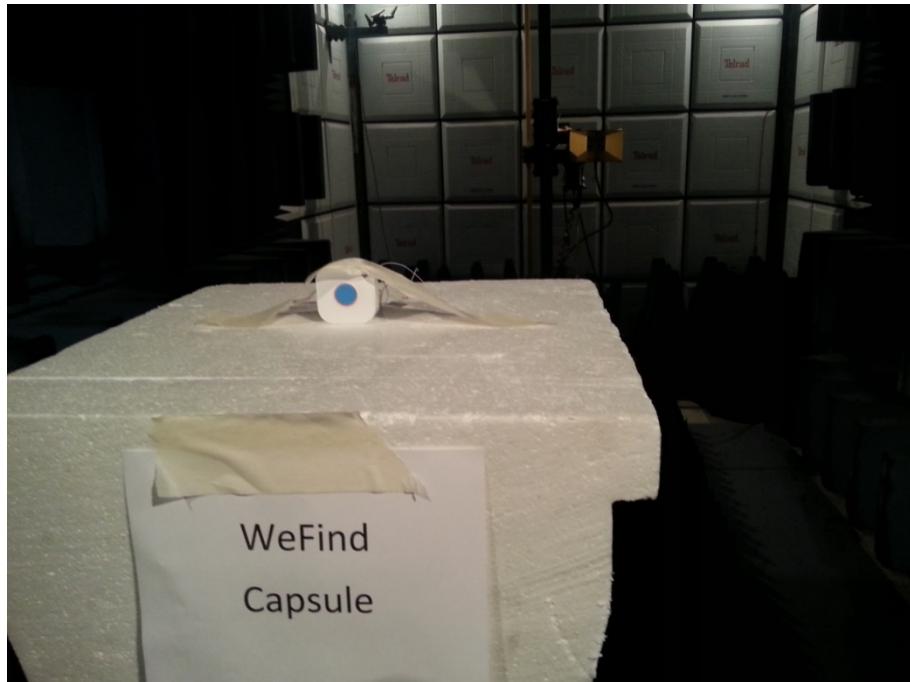


Figure 5. Radiated Emission Test



4. 6 dB Minimum Bandwidth

4.1 Test Specification

FCC, Part 15, Subpart C, Section 247(a)(2)

4.2 Test Procedure

The EUT was connected to a spectrum analyzer via a RF cable 1.5dB and 20dB RF attenuator.

The spectrum bandwidth of the E.U.T. at the point of 6 dB below maximum peak power was measured and recorded. The RBW set to 100 kHz.

The 6dB bandwidth test was measured at Lowest, Middle and Highest frequency and for modulations DSS (Bit Rate 1Mbps), CCK (Bit Rate 11 Mbps) and OFDM (54Mbps).

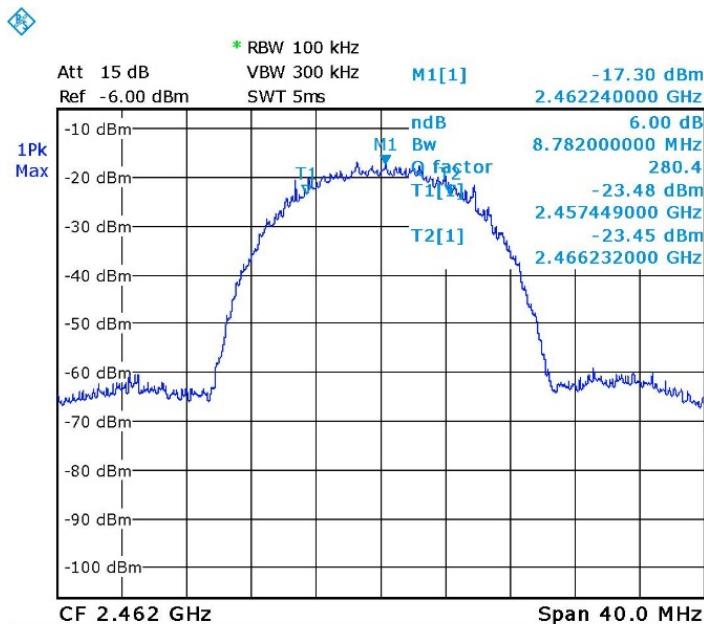
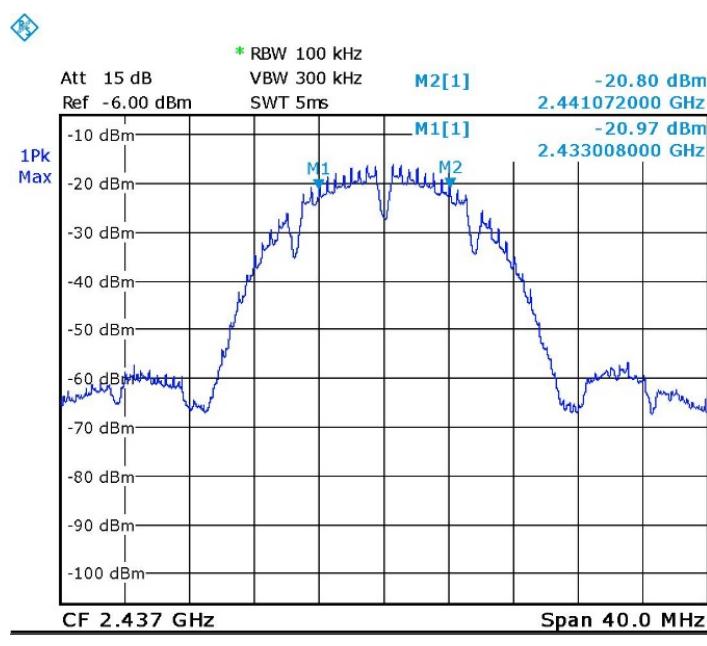
4.3 Test Results

Operation Frequency (MHz)	Bit Rate (Mbps)	Result (MHz)	Specification (MHz)
2412	1	10.0	>0.5
	11	7.5	>0.5
	54	16.3	>0.5
2437	1	9.0	>0.5
	11	8.0	>0.5
	54	16.3	>0.5
2462	1	8.9	>0.5
	11	8.8	>0.5
	54	16.4	>0.5

Figure 6 6 dB Minimum Bandwidth

JUDGEMENT: Passed

For additional information see *Figure 7* to *Figure 15*.

**Figure 7. 2462 MHz, 11Mbps****Figure 8. 2437 MHz, 11Mbps**

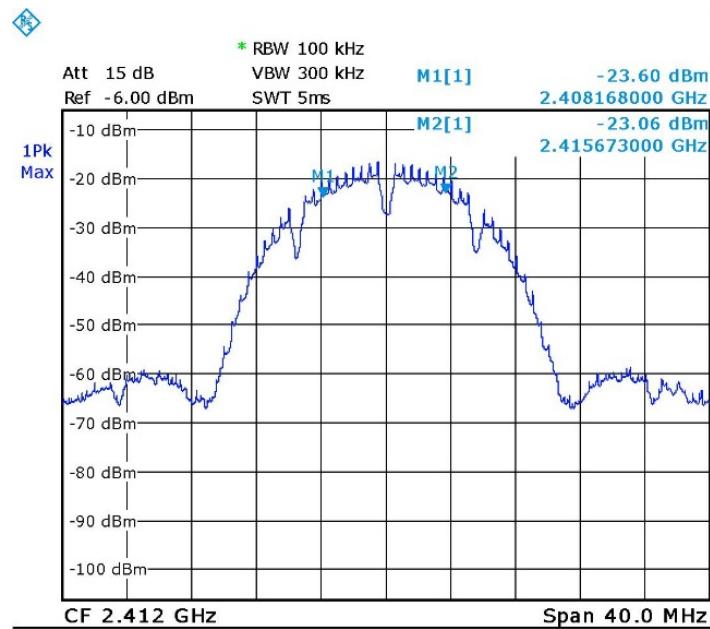


Figure 9. 2412 MHz, 11Mbps

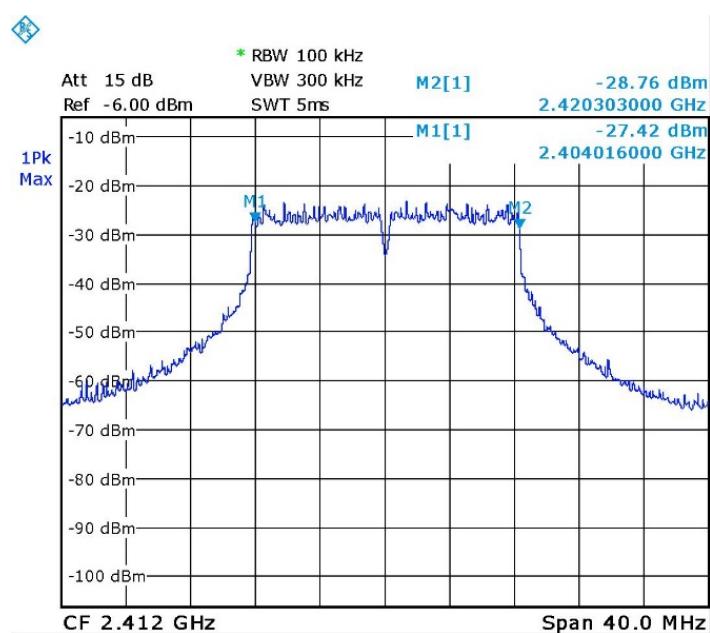
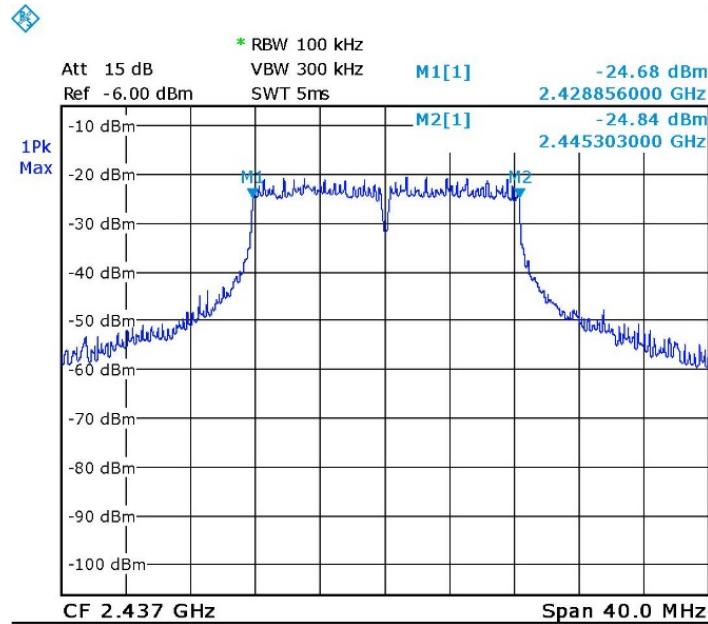
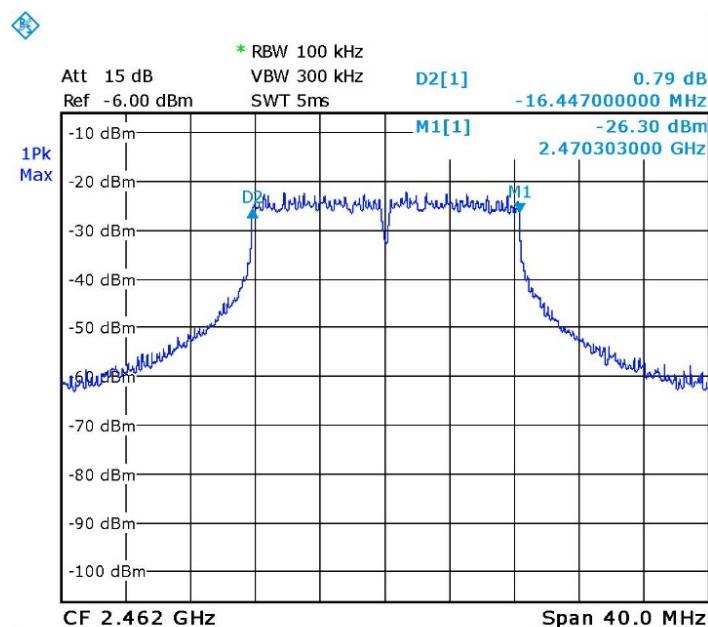


Figure 10 2412 MHz, 54Mbps



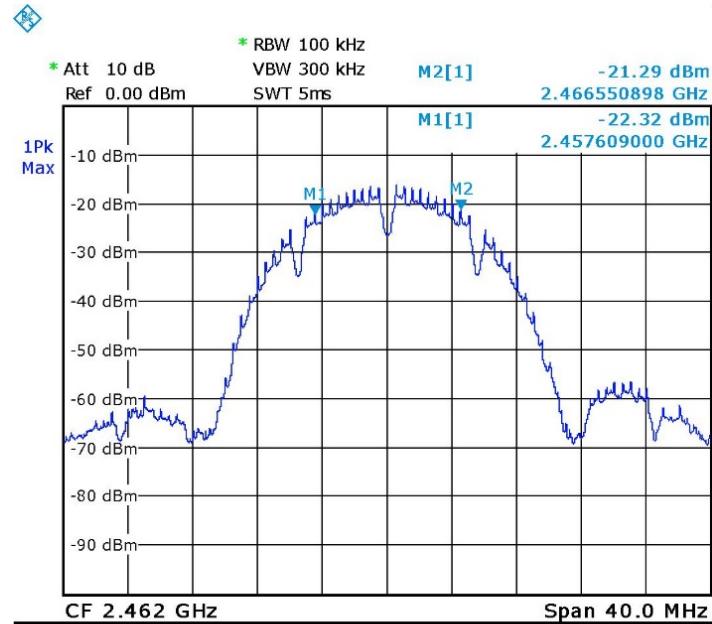
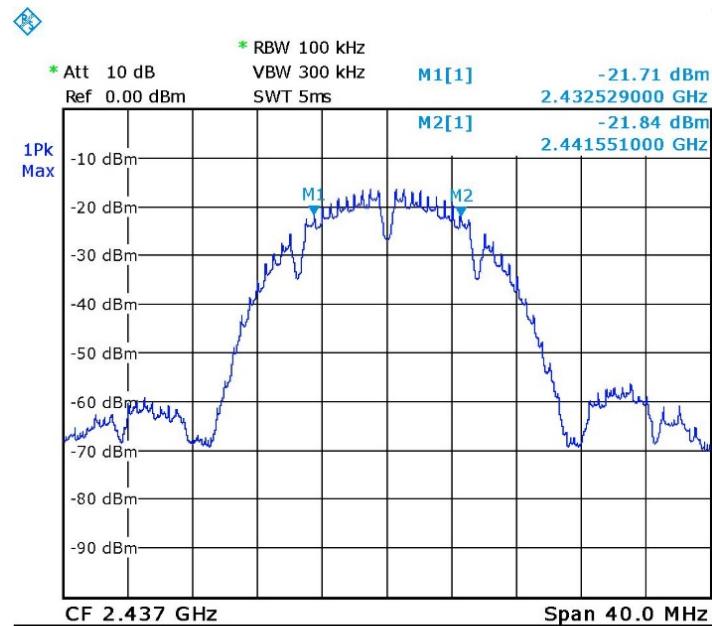
Date: 10.SEP.2015 15:08:19

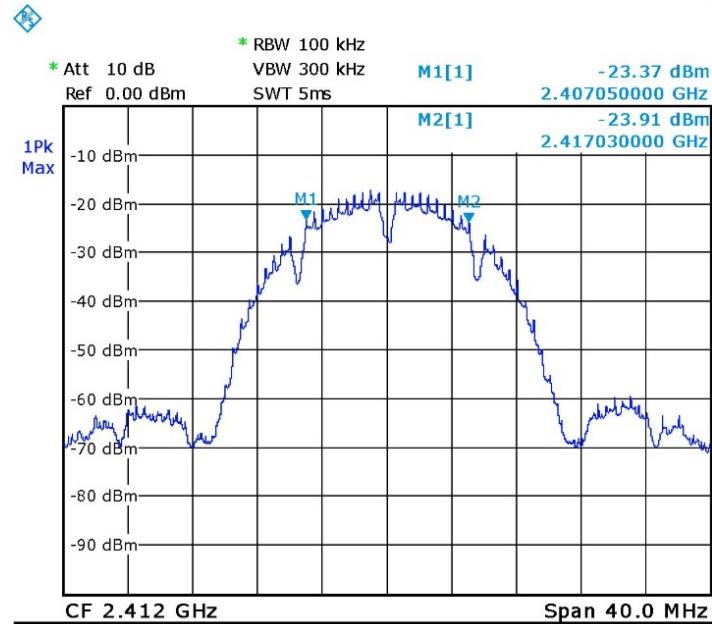
Figure 11 2437 MHz, 54Mbps



Date: 10.SEP.2015 15:05:22

Figure 12 2462 MHz, 54Mbps

**Figure 13 2462 MHz, 1Mbps****Figure 14 2437 MHz, 1Mbps**



Date: 12.OCT.2015 16:46:52

Figure 15 2412 MHz, 1Mbps



4.4 **Test Equipment Used; 6dB Bandwidth**

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
1m Low Loss Coaxial Cable	Huber Zoner	705A009301EIM	---	September 24, 2015	1 year
Spectrum Analyzer	R&S	FSL6	100194	January 1, 2015	1 year
20 dB Attenuator	MCL	VAT-20W2+	848	June 15 2015	1 year

Figure 16 Test Equipment Used



5. Maximum Transmitted Peak Power Output

5.1 Test Specification

FCC, Part 15, Subpart C, Section 247(b)(3)

5.2 Test Procedure

The E.U.T was tested via conducted method. The EUT was connected to a spectrum analyzer via a RF cable 1.5dB and 20dB RF attenuator.

The Channel Power measure below with maximum peak power was measured and recorded. The RBW set to 1MHz.

The E.U.T was evaluated in 3 channels: Low (2412 MHz), Mid (2437 MHz) and High (2462 MHz).

The E.U.T. transmits with the following modulations:
DSS (Bit Rate 1Mbps), CCK (Bit Rate 11 Mbps) and OFDM (54Mbps).

5.3 Test Results

Power results were calculated per the equation below

$$W = \frac{10^{\left(\frac{\text{Power Results (dBm)}}{10}\right)}}{1000}$$

Operation Frequency (MHz)	Bit Rate (Mbps)	Measured Power (dBm)	Antenna Gain (dBi)	Power Results (dBm)	Calculated Power (W)	Specification (W)	Margin (W)
Low	1	16.2	2.0	18.2	0.07	1.0	-0.93
	11	20.6	2.0	22.6	0.18	1.0	-0.82
	54	18.5	2.0	20.5	0.11	1.0	-0.89
Mid	1	17.6	2.0	19.6	0.09	1.0	-0.91
	11	21.0	2.0	23.0	0.20	1.0	-0.80
	54	19.5	2.0	21.5	0.14	1.0	-0.86
High	1	16.7	2.0	18.7	0.07	1.0	-0.93
	11	20.8	2.0	22.8	0.19	1.0	-0.81
	54	18.2	2.0	20.2	0.10	1.0	-0.90

Figure 17 Maximum Peak Power Output

JUDGEMENT: Passed by 0.80W

For additional information see *Figure 18* or *Figure 26*.

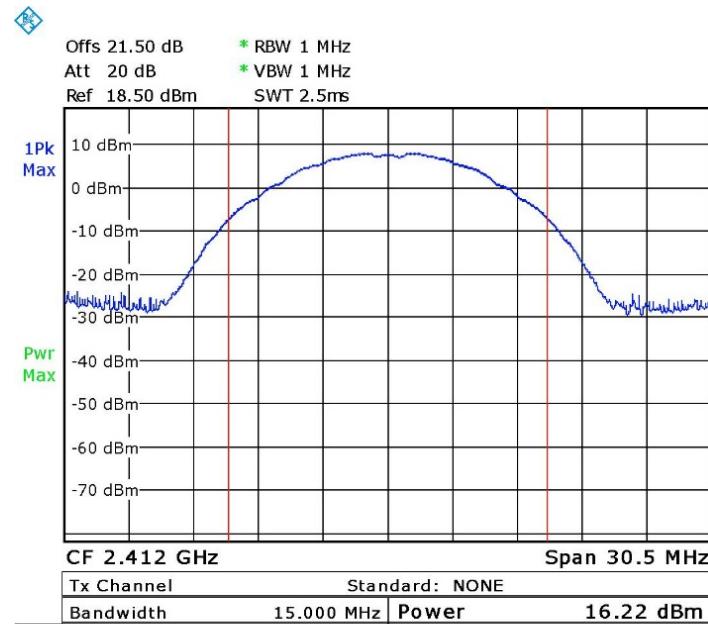


Figure 18 2412.0 MHz – 1Mbps

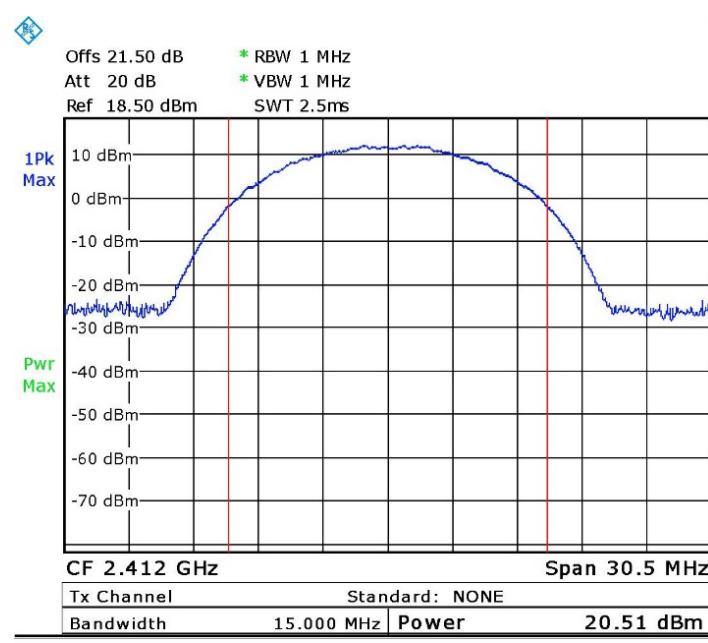


Figure 19 2412.0 MHz – 11Mbps

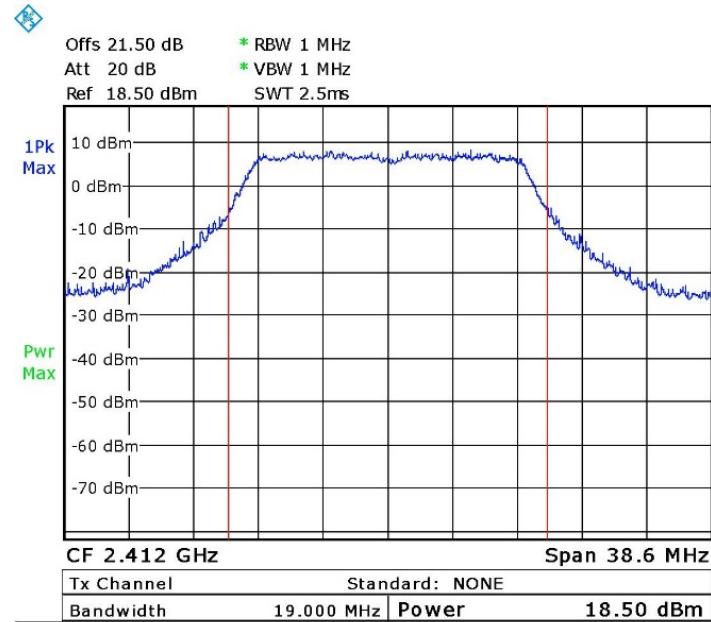


Figure 20 2412.0 MHz – 54Mbps

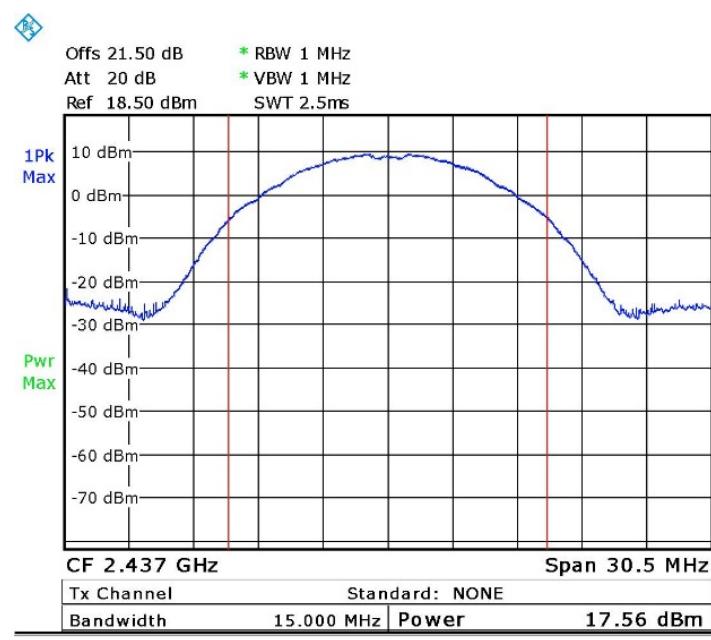


Figure 21 2437.0 MHz – 1Mbps

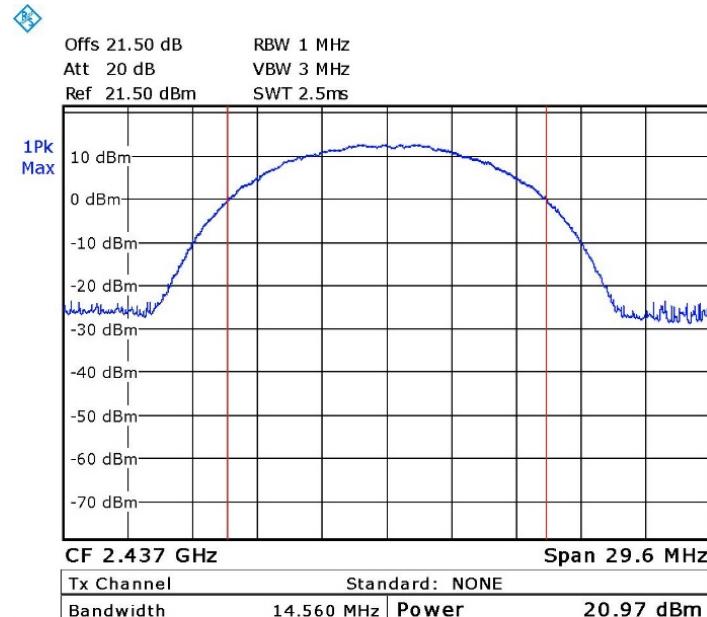


Figure 22 2437.0 MHz – 11Mbps

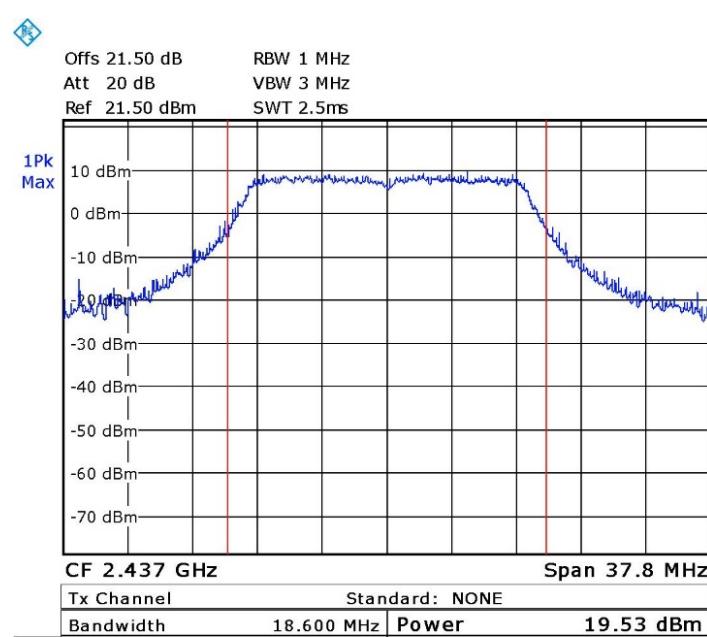


Figure 23 2437.0 MHz – 54Mbps

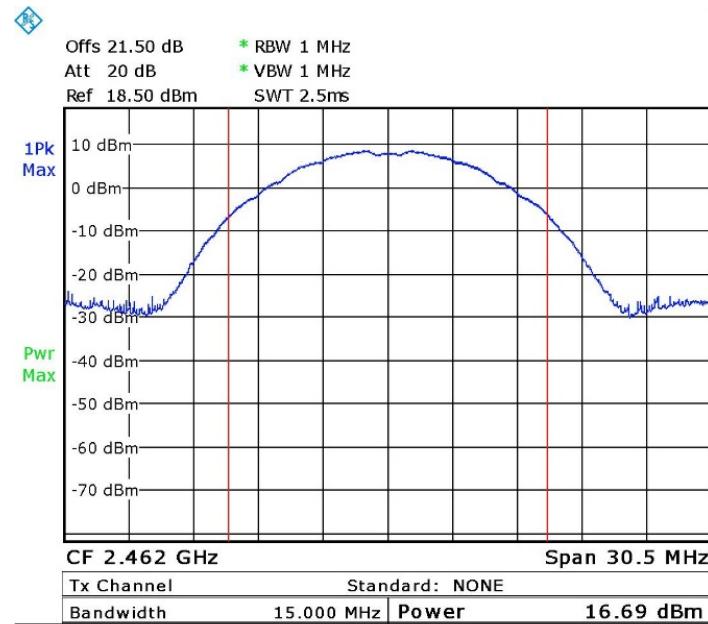


Figure 24 2462.0 MHz – 1Mbps

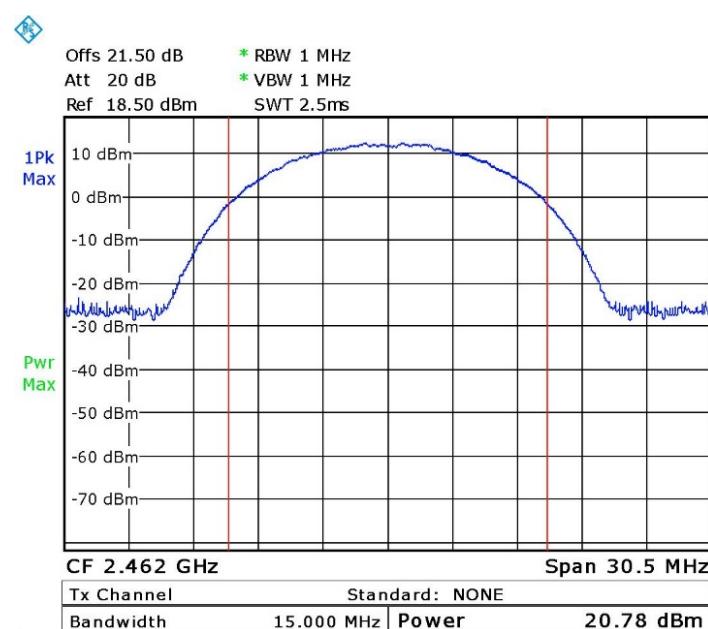


Figure 25 2462.0 MHz – 11Mbps

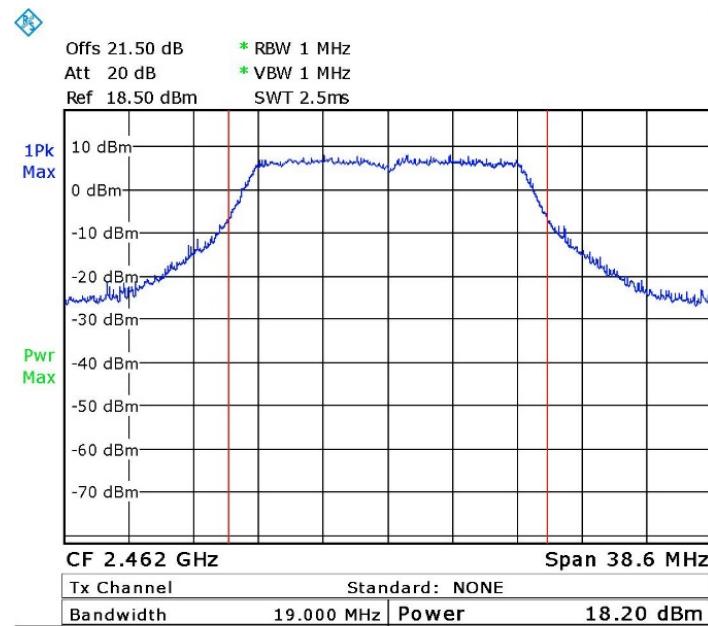


Figure 26 2462.0 MHz – 54Mbps



5.4 **Test Equipment Used; Maximum Peak Power Output**

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
1m Low Loss Coaxial Cable	Huber Zoner	705A009301EIM	---	September 24, 2015	1 year
Spectrum Analyzer	R&S	FSL6	100194	January 1, 2015	1 year
20 dB Attenuator	MCL	VAT-20W2+	848	June 15 2015	1 year

Figure 27 Test Equipment Used



6. Band Edge Spectrum

6.1 Test Specification

FCC, Part 15, Subpart C, Section 247(d)

6.2 Test Procedure

The E.U.T was tested via conducted method. The EUT was connected to a spectrum analyzer via a RF cable 1.5dB and 20dB RF attenuator.

The Channel Power recorded below was measured with maximum peak power. The RBW set to 1MHz.

The E.U.T was evaluated in 2 transmitted channels: Low and High and for all possible Bit rates 1, 11 and 54Mbps.

The RBW=VBW was set to 100 kHz.

The E.U.T. transmits with the following modulations:

DSS (Bit Rate 1Mbps), CCK (Bit Rate 11 Mbps) and OFDM (54Mbps).

6.3 Test Results

Operation Frequency (MHz)	Bit Rate [Mbps]	Band Edge Frequency (MHz)	Spectrum Level (dBm)	Specification (dBm)	Margin (dB)
2412.0	1	2400.0	-46.0	-16.9	-29.1
	11		-41.5	-16.6	-24.9
	54		-34.7	-23.8	-10.9
2462.0	1	2483.5	-44.0	-16.0	-28.0
	11		-43.8	-16.7	-27.1
	54		-44.6	-17.3	-27.3

Figure 28 Band Edge Spectrum

JUDGEMENT: Passed by 10.9dB

For additional information see *Figure 29* to *Figure 34*.

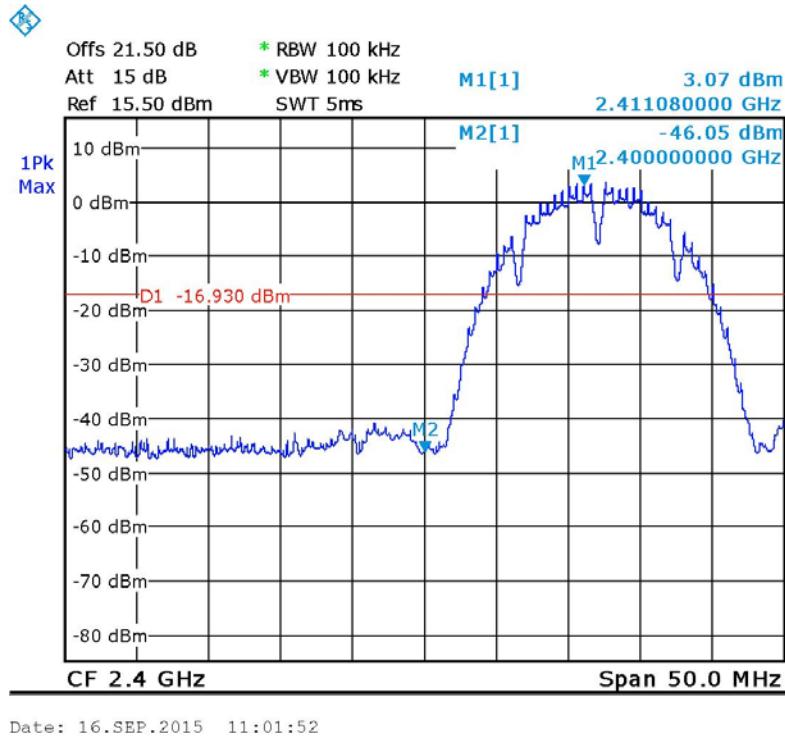


Figure 29 —Lower Band Edge – 1Mbps

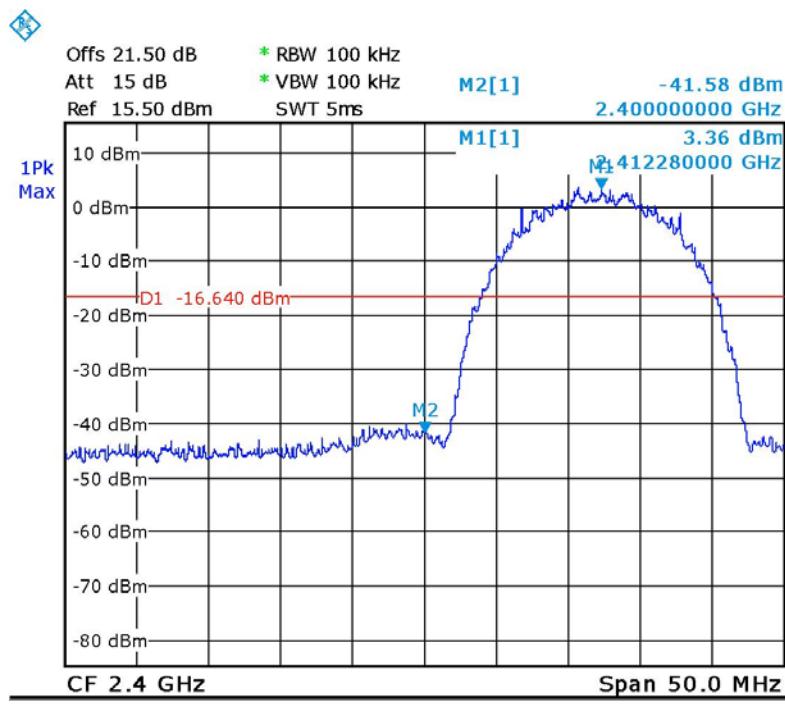


Figure 30 Lower Band Edge – 11Mbps

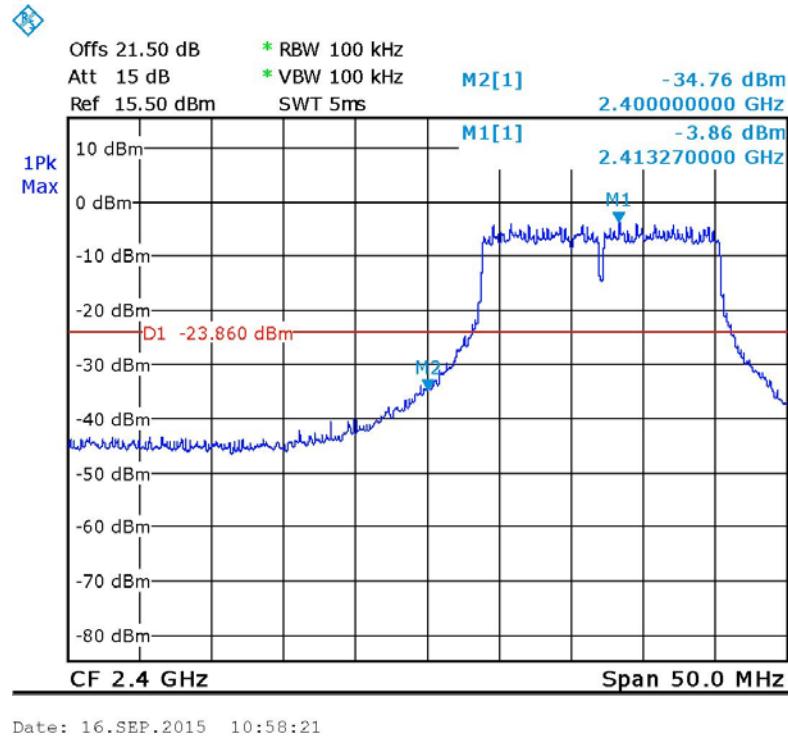


Figure 31 Lower Band Edge – 54Mbps

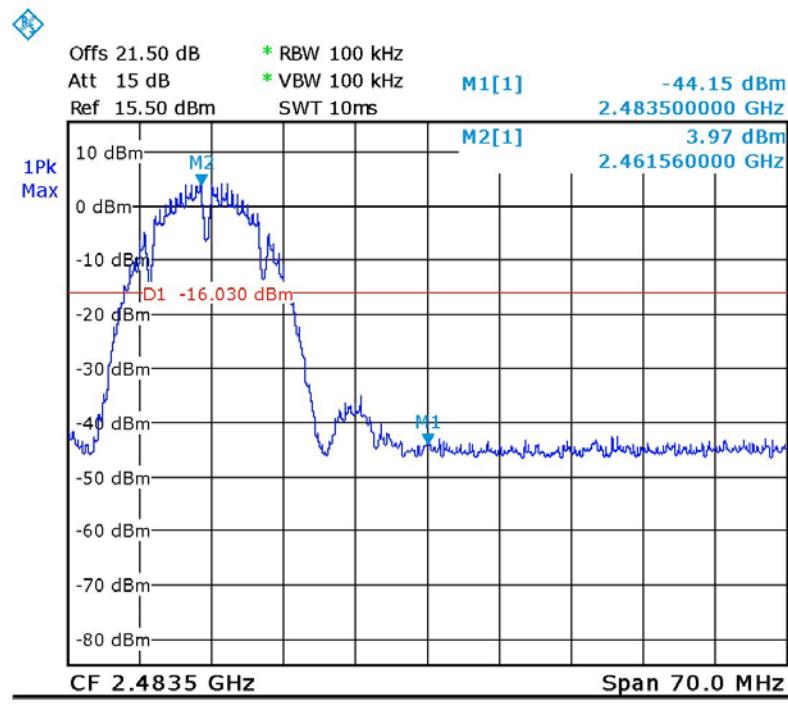
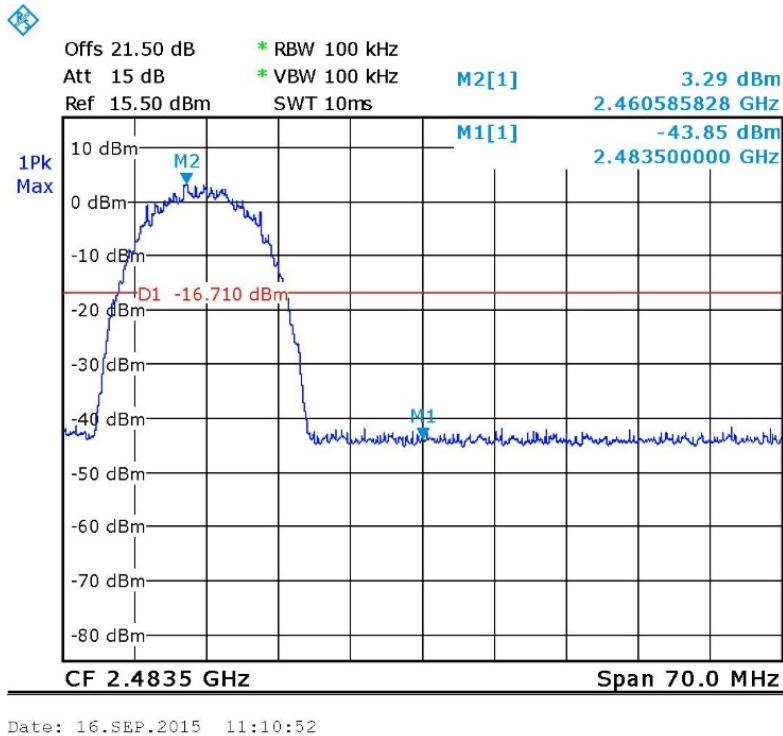
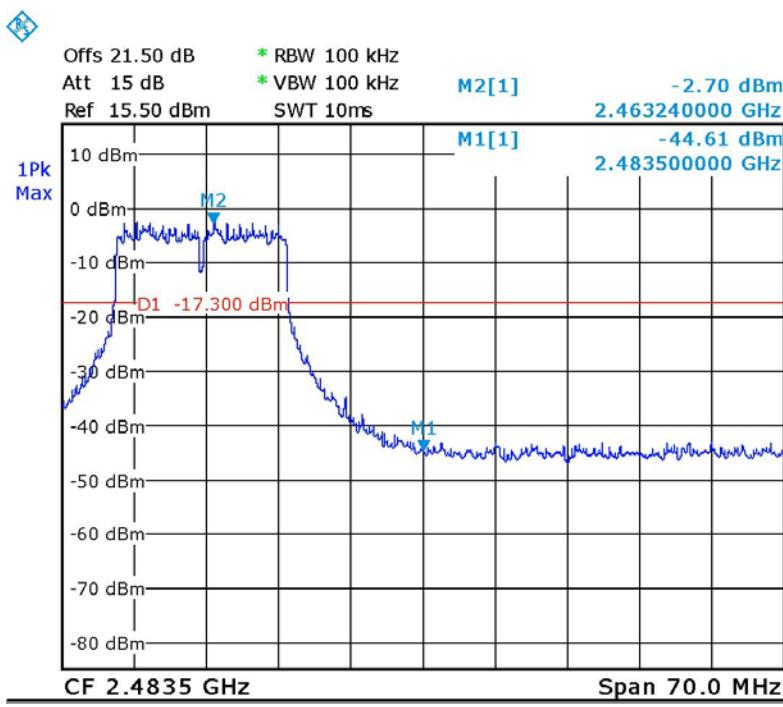


Figure 32 —Upper Band Edge – 1Mbps



Date: 16.SEP.2015 11:10:52

Figure 33 Upper Band Edge – 11Mbps

Date: 16.SEP.2015 11:12:31

Figure 34 Upper Band Edge – 54Mbps



6.4 **Test Equipment Used; Band Edge Spectrum**

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
1m Low Loss Coaxial Cable	Huber Zoner	705A009301EIM	---	September 24, 2015	1 year
Spectrum Analyzer	R&S	FSL6	100194	January 1, 2015	1 year
20 dB Attenuator	MCL	VAT-20W2+	848	June 15 2015	1 year

Figure 35 Test Equipment Used



7. Radiated Emission, 9 kHz – 30 MHz

7.1 Test Specification

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

7.2 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 2.

The frequency range 9 kHz-30 MHz was scanned.

The emissions were measured using a computerized EMI receiver complying with CISPR 16 requirements.

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 low, mid and high channels.

The E.U.T. transmits with the following modulations:

DSS (Bit Rate 1Mbps), CCK (Bit Rate 11 Mbps) and OFDM (54Mbps).

7.3 Test Results

JUDGEMENT: Passed

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

All signals were below the EMI receiver noise level which is at least 6dB below the specification limit.



7.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	8542E	3906A00276	March 11, 2015	1 year
EMI Receiver Filter	HP	85420E	3705A00248	March 19, 2015	1 year
Loop Antenna	EMCO	6502	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/EMC	2090	9608-1456	N/A	N/A

Figure 36 Test Equipment Used

7.5 Field Strength Calculation

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors", 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.



8. Spurious Radiated Emission, 30 – 25000 MHz

8.1 Test Specification

FCC, Part 15, Subpart C, Sections 15.209, 15.247

8.2 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, 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 for measurements below 1GHz, 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 2*.

The E.U.T was then transferred to the Chamber for measurements above 1GHz.

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 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 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 measured also for 100 kHz outside the frequency band and the emissions were below 20dB of the carrier level for 100 kHz.

The E.U.T. was operated at the low, mid and high channels.

8.3 Test Results

JUDGEMENT: Passed by 0.3dB

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 37* to *Figure 38*.



Radiated Emission

E.U.T Description Kwik WiFi Connected Button
Type 118K
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 (MHz)	Freq. (MHz)	Polarity (H/V)	Peak Reading (dB μ V/m)	Peak Specification (dB μ V/m)	Peak Margin (dB)
2412.0	2390.0	H	58.2	74.0	-15.8
2412.0	2390.0	V	57.1	74.0	-16.9
2412.0	4824.0	H	64.3	74.0	-9.7
2412.0	4824.0	V	60.5	74.0	-13.5
2437.0	4874.0	H	62.5	74.0	-11.5
2437.0	4874.0	V	58.7	74.0	-15.3
2462.0	4924.0	H	63.1	74.0	-10.9
2462.0	4924.0	V	61.8	74.0	-12.2
2462.0	2483.5	H	57.5	74.0	-16.5
2462.0	2483.5	V	57.7	74.0	-16.3

**Figure 37. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL.
Detector: Peak**

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

“Peak Amp” includes correction factor.

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



Radiated Emission

E.U.T Description Kwik WiFi Connected Button
Type 118K
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 (MHz)	Freq. (MHz)	Polarity (H/V)	Average Reading (dB μ V/m)	Average Specification (dB μ V/m)	Average Margin (dB)
2412.0	2390.0	H	51.3	54.0	-2.7
2412.0	2390.0	V	50.7	54.0	-3.3
2412.0	4824.0	H	53.5	54.0	-0.5
2412.0	4824.0	V	50.5	54.0	-3.5
2437.0	4874.0	H	53.7	54.0	-0.3
2437.0	4874.0	V	52.0	54.0	-2.0
2462.0	4924.0	H	51.8	54.0	-2.2
2462.0	4924.0	V	51.2	54.0	-2.8
2462.0	2483.5	H	50.8	54.0	-3.2
2462.0	2483.5	V	50.5	54.0	-3.5

**Figure 38. 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



8.4 **Test Instrumentation Used, Radiated Measurements Above 1 GHz**

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Test Receiver	Rohde & Schwarz	ESCI7	100724	January 4, 2015	1 year
Horn Antenna	ETS	3115	29845	May 19, 2015	3 years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 years
EMI Receiver	HP	8542E	3906A00276	March 11, 2015	1 year
RF Filter Section	HP	85420E	3705A00248	March 19, 2015	1 year
Spectrum Analyzer	HP	8593EM	3536A00120ADI	February 24, 2015	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 11, 2015	1 year
Biconical Antenna	EMCO	3104	2606	December 28. 2014	1 year
Log Periodic Antenna	EMCO	3146	9505-4081	December 28. 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA28-B	232	March 1, 2015	1 year
Low Noise Amplifier	Narda	DBS-0411N313	13	March 1, 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 39 Test Equipment Used



9. Transmitted Power Density

9.1 Test Specification

FCC, Part 15, Subpart C, Section 247(e)

9.2 Test Procedure

The E.U.T was tested using vertical antenna test polarity as the worst case.

The E.U.T was tested via conducted method. The EUT was connected to a spectrum analyzer via a RF cable 1.5dB and 20dB RF attenuator.

The spectrum analyzer was set to 3 kHz RBW.

The E.U.T was evaluated in 3 channels: Low (2412 MHz), Mid (2437 MHz) and High (2462 MHz).

The E.U.T. transmits with the following modulations:

DSS (Bit Rate 1Mbps), CCK (Bit Rate 11 Mbps) and OFDM (54Mbps).

9.3 Test Results

Operation Frequency (MHz)	Bit Rate (Mbps)	Reading Spectrum Analyzer (dBm)	Antenna Gain (dB)	Result (dBm)	Specification (dBm)	Margin (dB)
2412	1	-10.7	2.0	-8.7	8.0	-16.7
	11	-9.8	2.0	-7.8	8.0	-15.8
	54	-15.2	2.0	-13.2	8.0	-21.2
2437	1	-8.4	2.0	-6.4	8.0	-14.4
	11	-9.3	2.0	-7.3	8.0	-15.3
	54	-15.2	2.0	-13.2	8.0	-21.2
2462	1	-8.2	2.0	-6.2	8.0	-14.2
	11	-11.0	2.0	-9.0	8.0	-17.0
	54	-15.3	2.0	-13.3	8.0	-21.3

Figure 40 Test Results

JUDGEMENT: Passed by 14.2dB

For additional information see *Figure 41* to *Figure 49*.

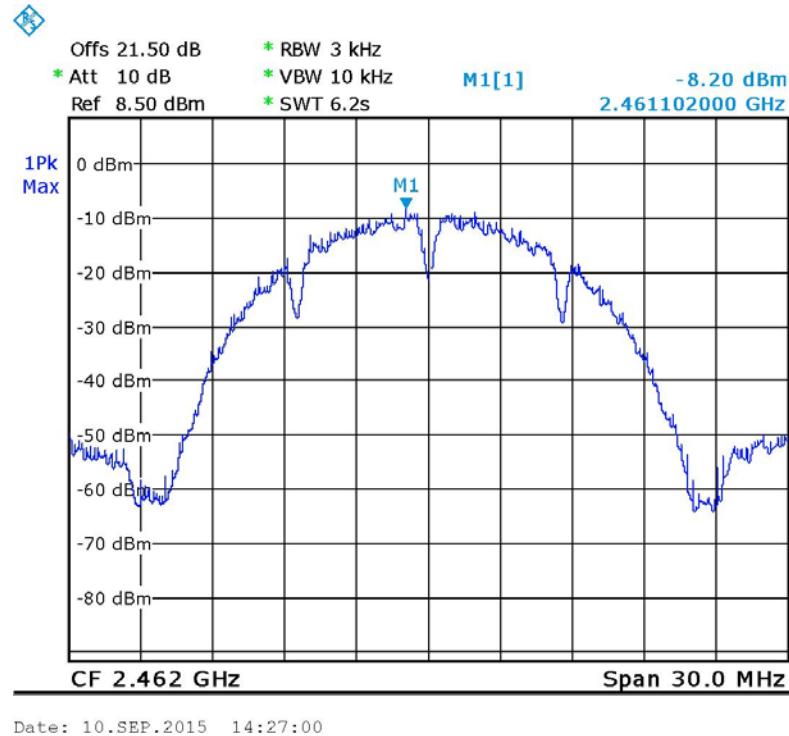


Figure 41 — 2462 MHz, 1Mbps

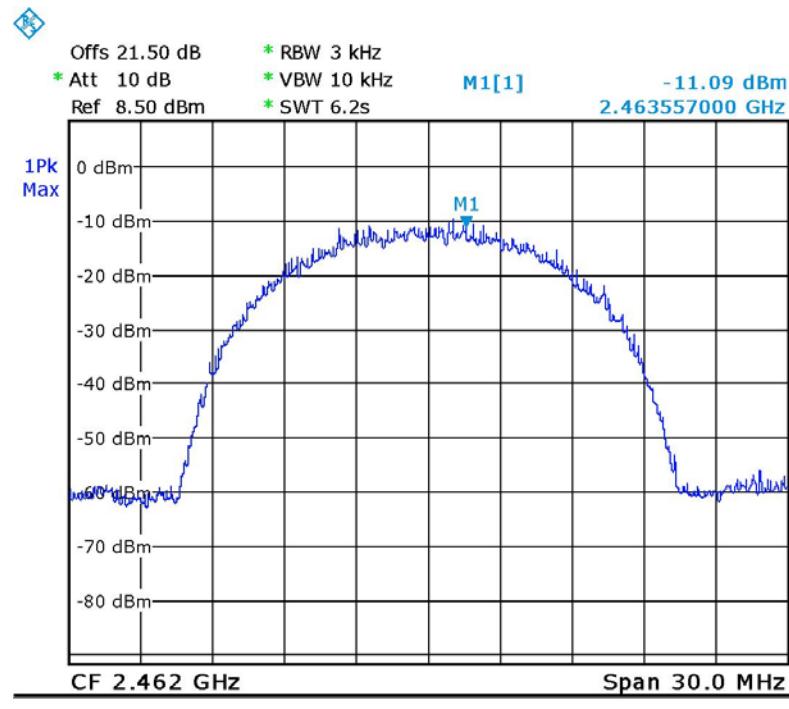


Figure 42 2462MHz, 11Mbps

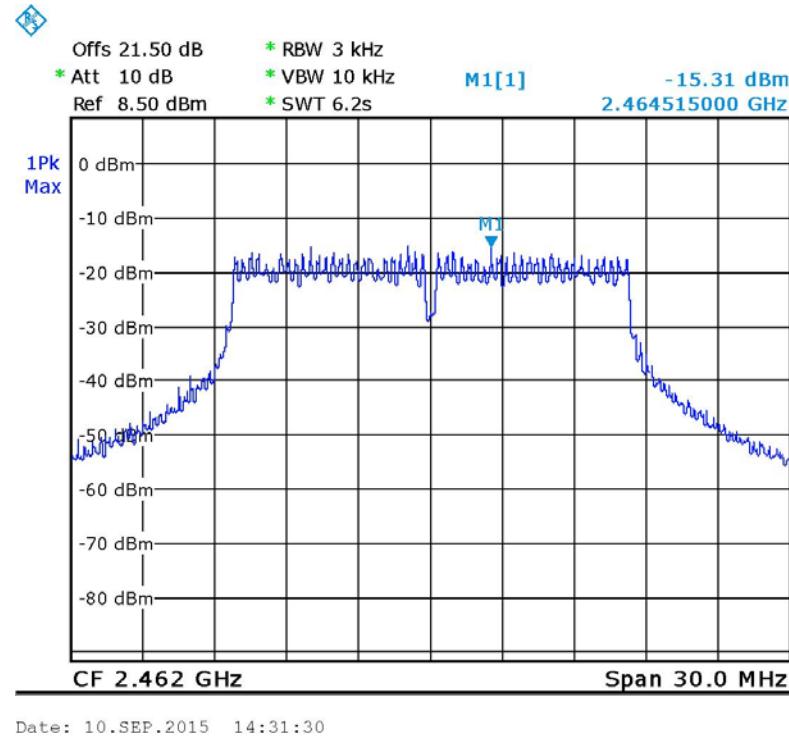


Figure 43 2462MHz, 54Mbps

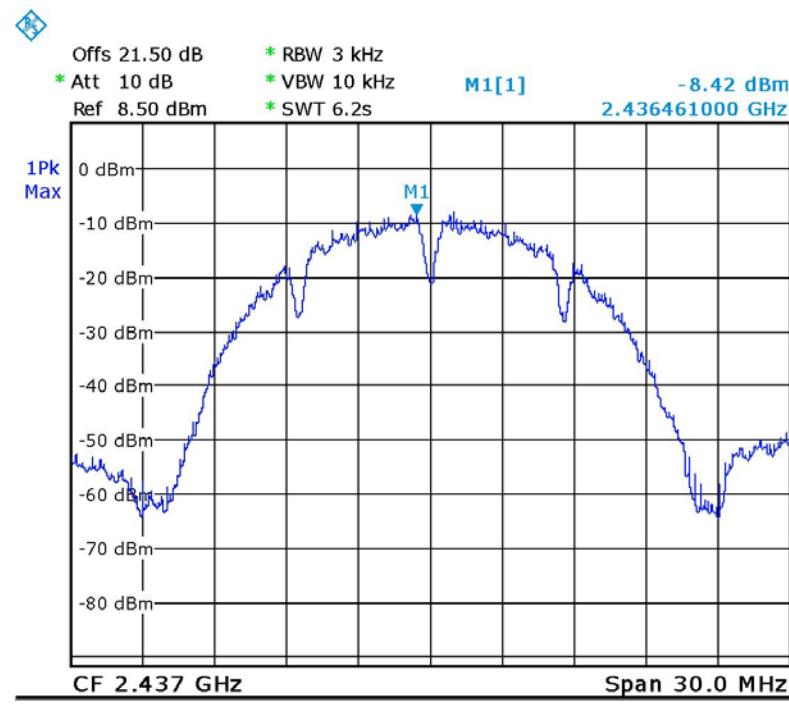


Figure 44 2437MHz, 1Mbps

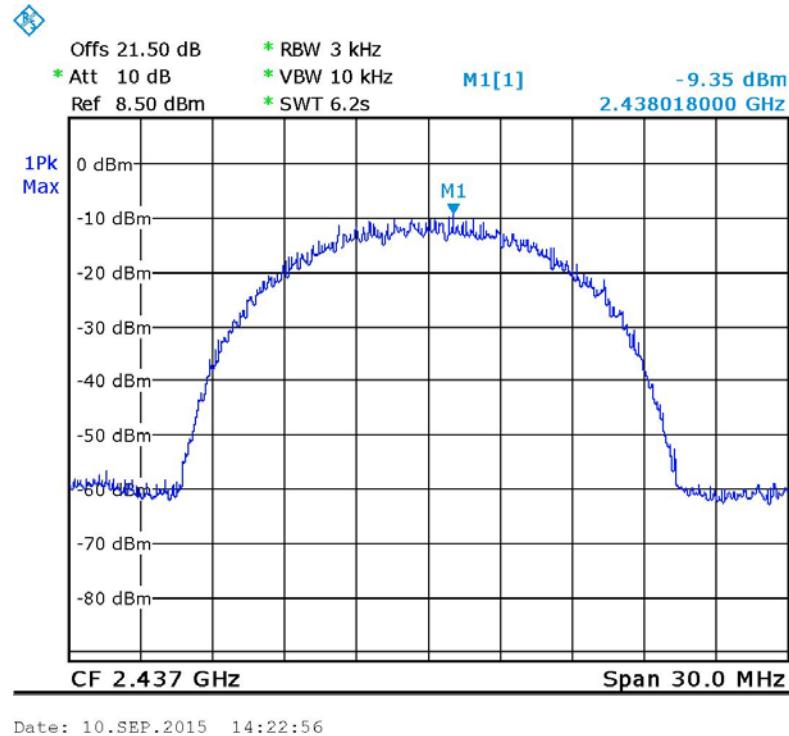


Figure 45 2437MHz, 11Mbps

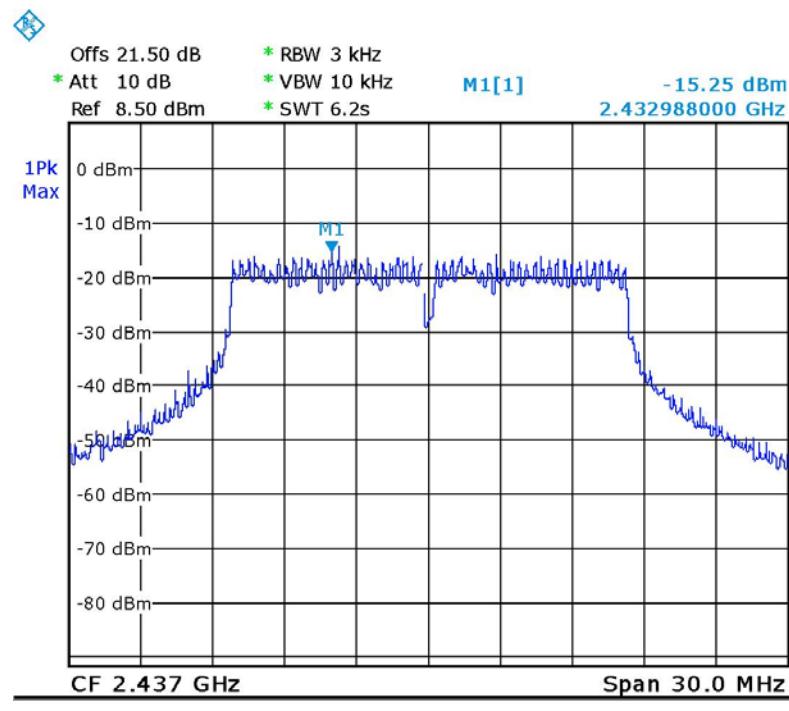
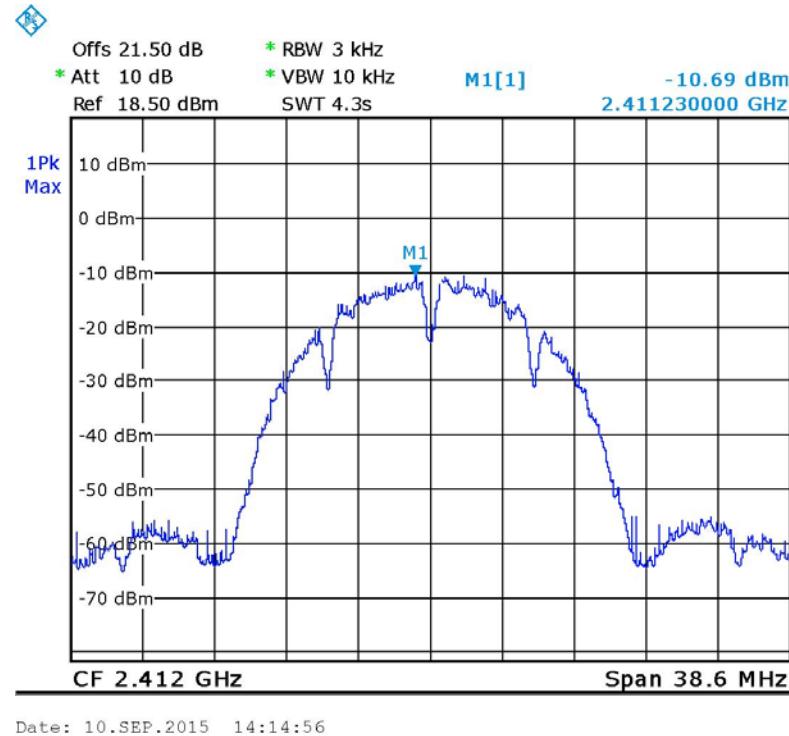
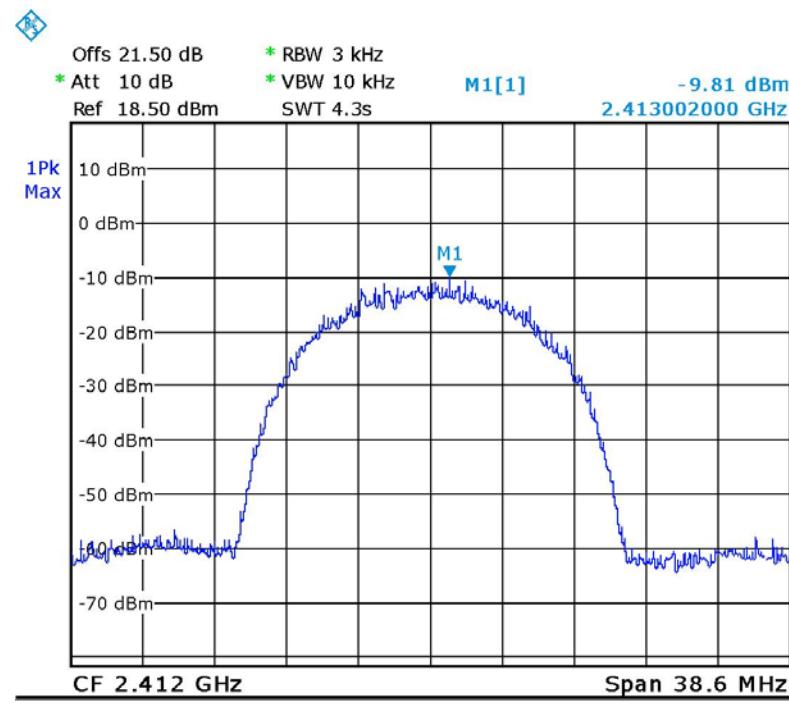


Figure 46 2437MHz, 54Mbps



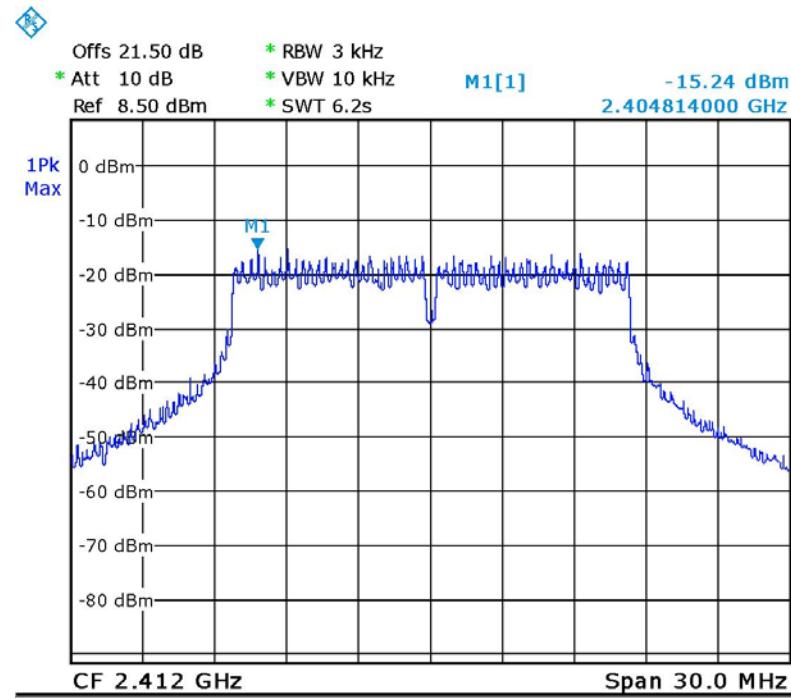
Date: 10.SEP.2015 14:14:56

Figure 47 2412MHz, 1Mbps



Date: 10.SEP.2015 14:13:14

Figure 48 2412MHz, 11Mbps



Date: 10.SEP.2015 14:19:18

Figure 49 2412MHz, 54Mbps



9.4 **Test Equipment Used; Transmitted Power Density**

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
1m Low Loss Coaxial Cable	Huber Zoner	705A009301EIM	---	September 24, 2015	1 year
Spectrum Analyzer	R&S	FSL6	100194	January 1, 2015	1 year
20 dB Attenuator	MCL	VAT-20W2+	848	June 15 2015	1 year

Figure 50 Test Equipment Used



10. Antenna Gain/Information

The antenna gain is 2dBi, integral.



11. R.F Exposure/Safety

Calculation of SAR Test Exclusion Thresholds for 100 MHz- 6GHz and ≤ 50 mm per Appendix A of KDB 447498 D01 V06

Typical use of the E.U.T. is as WiFi connected button. Placement is on a surface.

(a) EIRP maximum is 23.0 dBm (Peak) = 200.0 mW (includes antenna gain)

(b) Calculation of average EIRP based on source-based time-averaging.

Max Tx-Sequence Time	1.345msec
Min Tx-gap Time	101.043msec
Duty Cycle	1.3%

c) Duty Cycle Factor (DCF) = $\frac{\text{MaxTxSequenceTime}}{0.1} \text{ (sec)} = \frac{0.001345}{0.1} = 0.01345$

Average EIRP = EIRP Max x DCF (mW) = 200 x 0.01345 = **2.69 mW**

d) As per Appendix A of KDB 447498 D01 V06, SAR Test Exclusion Thresholds for 100 MHz-6 GHz and ≤ 50 mm, the power threshold for the E.U.T. is 10 mW (2450 MHz and 5mm).

e) The Average EIRP as calculated above is 2.69 mW.

f) This is below the SAR power threshold; accordingly SAR testing is not required.



12. APPENDIX A - CORRECTION FACTORS

12.1 Correction factors for

CABLE
from EMI receiver
to test antenna
at 3 meter range.

Frequency (MHz)	Cable Loss (dB)
0.010	0.4
0.015	0.2
0.020	0.2
0.030	0.3
0.050	0.3
0.075	0.3
0.100	0.2
0.150	0.2
0.200	0.3
0.500	0.4
1.00	0.4
1.50	0.5
2.00	0.5
5.00	0.6
10.00	0.8
15.00	0.9
20.00	0.8

Frequency (MHz)	Cable Loss (dB)
50.00	1.2
100.00	0.7
150.00	20.1
200.00	2.3
300.00	2.9
500.00	3.8
750.00	4.8
1000.00	5.4
1500.00	6.7
2000.00	9.0
2500.00	9.4
3000.00	9.9
3500.00	10.2
4000.00	11.2
4500.00	12.1
5000.00	13.1
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



12.2 Correction factors for

Log ANTENNA

Model: 3146

Antenna serial number: 9505-4081

3 meter range

CALIBRATION DATA

Frequency, MHz	Antenna factor, dB/m ¹⁾
200	11.55
250	11.60
300	14.43
400	15.38
500	17.98
600	18.78
700	21.17
800	21.16
900	22.67
1000	24.09

¹⁾ The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.



12.3 Correction factors for

Biconical ANTENNA

Model: 3104

Antenna serial number: 2606

3 meter range

CALIBRATION DATA

Frequency, MHz	Near free space antenna factor, dB/m	Geometry specific correction factor, dB	Free space antenna factor, dB/m ¹⁾
30	12.97	0.13	12.84
35	12.34	0.09	12.25
40	12.03	0.06	11.97
45	11.42	0.02	11.40
50	11.91	0.03	11.88
60	11.92	0.37	11.55
70	9.60	0.25	9.35
80	6.99	-0.45	7.44
90	10.87	-0.34	11.21
100	11.51	-0.06	11.57
120	13.30	0.20	13.10
140	12.56	-0.01	12.57
160	14.49	-0.12	14.61
180	16.53	0.05	16.48
200	15.30	0.15	15.15

¹⁾ The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.



13.4 Correction factors for Horn ANTENNA

Model: 3115

Antenna serial number: 29845

10 meter range

FREQUENCY (MHz)	AFE (dB/m)	FREQUENCY (MHz)	AFE (dB/m)
1000	22.4	10000	36.1
2000	25.2	11000	37.0
3000	31.1	12000	41.3
4000	30.2	13000	38.1
5000	34.2	14000	41.7
6000	31.6	15000	39.0
7000	34.7	16000	38.8
8000	34.8	17000	43.2
9000	36.2	18000	43.7



12.5 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