Prüfbericht-Nr.: *Test report no.:*	**60431071-003**	**Auftrags-Nr.:** *Order no.*:	23870469 030	Seite 1 von 56 *Page 1 of 56*
Kunden-Referenz-Nr.: *Client reference no.:*	1288983	**Auftragsdatum:** *Order date:*	2020.11.29	
Auftraggeber: *Client:*	IKEA of Sweden AB			
Prüfgegenstand: *Test item:*	Hub for smart products			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	DIRIGERA / E2003 / FCC ID: FHO-E2003			
Auftrags-Inhalt: *Order content*:	Accredited testing according to FCC Part 15C			
Prüfgrundlage: *Test specification:*	FCC 47 CFR Part 15.247 with parts 15.207 & 15.209 ANSI C63.10: 2013			
Wareneingangsdatum: *Date of sample receipt:*	2020.11.30			
Prüfmuster-Nr.: *Test sample no:*	See section 2.3			
Prüfzeitraum: *Testing period:*	2020.12.02 – 2021.01.20			
Ort der Prüfung: *Place of testing:*	Lund, Sweden			
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland Sweden			
Prüfergebnis*: *Test result*:*	Pass			

überprüft von: reviewed by:	X Signed by: Niall Forrester	**genehmigt von:** authorized by:	X Signed by: Hakan Ahlberg
Datum: 2021.12.06 *Date:*		**Datum: 2021.12.06** *Date:*	
Stellung / *Position:*	Senior Technical Expert	**Stellung** / *Position:*	Lab Manager

Sonstiges / *Other:* This report contains measurements for the WLAN 2.4GHz radio interface only

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Revision History60431071-00360431071-003

REVISION	DATE	REMARKS	AUTHOR
001	2021.04.23	First Release	Niall Forrester
002	2021.08.29	Corrected gain figures, updated module name.	Niall Forrester
003	2021.12.06	Replaced gain with module figure	Niall Forrester
Note: Latest revision report will replace all previous reports			
This report based on FCC Part 15.247 Template version 1.2			

Summary of Test Results

FCC 47 CFR Rule Part	Test Description	Applicability	Report Section	RESULT	REMARKS
15.207	AC Power Line Conducted Emissions (Intentional Radiators)	YES	4.1	PASS	
15.209	Radiated Emissions (Intentional Radiators)	YES	4.2	PASS	
15.247 (d)	Antenna Conducted Emissions	NO	4.3	N/A.	Radiated testing performed
15.247 (d)	Band Edge Compliance (Authorized Band)	YES	4.4	N.P.	See Note 1
15.247 (d)	Band Edge Compliance (Restricted Band)	YES	4.5	PASS	
15.247 (a)(1)	20dB Bandwidth	NO	4.6	N/A	WLAN is non-hopping
15.247 (a)(1)	Carrier (Hopping Channel) Separation	NO	4.7	N/A	WLAN is non-hopping
15.247 (a)(1)	Number of Hopping Channels	NO	4.8	N/A	WLAN is non-hopping
15.247 (a)(1)	Time of Occupancy (Dwell Time)	NO	4.9	N/A	WLAN is non-hopping
15.247 (a)(2)	6dB Bandwidth	YES	4.10	N.P.	See Note 1
15.247 (b)	Peak Conducted Output Power	YES	4.11	N.P.	See Note 1
15.247 (e)	Power Spectral Density	YES	4.12	N.P.	See Note 1
-	Conducted Power Comparison	YES	4.13	Comparison Only	Comparing with certified module

Possible test case verdicts:

- Test case does not apply to the test object: N/A
- Test object complies with the requirement: PASS or COMPLIANT
- Test object does not meet the requirement: FAIL or NOT COMPLIANT
- Test case not performed on the test object: N.P.

Note 1: the device includes pre-certified modules as described in section 2.1 below

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1. GENERAL INFORMATION

1.1 Test Site

Test Facility:	**TÜV Rheinland Sweden AB**
Address:	**Mobilvägen 10**
	223 62 Lund
	Sweden
Swedac Registration Number: **FCC Test Firm Registration Number:** **ISED Test Site Registration Number:**	**10325** **517458** **24753**

1.2 Client Information

Company Name:	**IKEA**
Address:	**Tulpanvägen 8**
	343 34 Älmhult
	Sweden
Contact Person:	**Jeton Salihu**
Contact e-Mail / Telephone	**Jeton.salihu@inter.ikea.com** **+46 701443175**

2. PRODUCT INFORMATION

2.1 General Description

Model name:	DIRIGERA
Manufacturer:	IKEA of Sweden AB, SE-343 81 Älmhult
Model number / Marketing name:	E2003
FCC ID:	FHO-E2003
Description:	Electronic product acting as central hub for IKEAs Home Smart products.
Ancillary Equipment:	See section 2.8

The device incorporates three separate pre-certified modules:

- Murata LBEE5ZZ2AW (FCC ID: VPYLBEE5HY1MW) for WLAN 2.4 GHz 802.11 b/g/n, WLAN 5GHz 802.11 a/n/ac and Bluetooth Low Energy
- Silicon Labs MGM210L “No. 1” (FCC ID: QOQMGM210L) for ZigBee 802.15.4
- Silicon Labs MGM210L “No. 2” (FCC ID: QOQMGM210L) for Thread 802.15.4

Each module uses its own built-in antenna

2.2 Device Characteristics

Type of Power Supply	USB Power Supply (via AC/DC Adapter)
Nominal Supply Voltage	120V or 230V AC (Adapter) / 5V DC (USB)
Supply Voltage Range	100-240V AC
Operating Temperature Range	0ºC - 40 ºC
Operating Air Humidity Range	-
Highest Internal Frequency Source	5825 MHz

2.3 Test Samples

EUT #	EUT ID	Description	Used For:
1	A002959287-010	Standard Sample	Conducted Emissions Radiated Emissions
2	A002959287-013	Standard Sample	Radiated Emissions
3	A002959287-001	Modified with semi-rigid cable in place of each antenna	Conducted Power Measurements

2.4 Wireless Technologies and Bands Supported by the EUT

Technology	Band	Frequency Range (Tx)	Evaluation Performed*
WiFi 802.11 b/g/n (LBEE5ZZ2AW)	2.4 GHz	2412 MHz - 2462 MHz	YES
WiFi 802.11 a/n/ac (LBEE5ZZ2AW)	5 GHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5720 MHz 5745 MHz - 5825 MHz	NO
BlueTooth Low Energy (LBEE5ZZ2AW)	2.4 GHz	2402 MHz – 2480 MHz	NO
ZigBee 802.15.4 (MGM210L No.1)	2.4 GHz	2400 MHz – 2483.5 MHz	NO
Thread 802.15.4 (MGM210L No.2)	2.4 GHz	2400 MHz – 2483.5 MHz	NO

*This statement refers only to this report. Other wireless technologies may be covered by other reports.

2.5 Antenna Information

Technology	Band	Number of Antennas	Antenna Type(s)	Gain
WiFi 802.11 a/b/g/n/ac BlueTooth Low Energy (LBEE5ZZ2AW)	2.4 GHz 5 GHz	1	Monopole	0.10 -0.40
ZigBee 802.15.4 (MGM210L No.1)	2.4 GHz	1	Inverted F PCB Trace	0.50
Thread 802.15.4 (MGM210L No.2)	2.4 GHz	1	Inverted F PCB Trace	0.50

2.6 Simultaneous Transmission Capabilities

Active Technologies	Bands	Active Modules
WiFi 802.11 a/n/ac + ZigBee 802.15.4	5 GHz 2.4 GHz	(LBEE5ZZ2AW) + (MGM210L No.1)
WiFi 802.11 a/n/ac + Thread 802.15.4	5 GHz 2.4 GHz	(LBEE5ZZ2AW) + (MGM210L No.2)

Except for the two cases listed above, no other simultaneous transmission capabilities are supported by the device. It is not possible for the device to send on any two 2.4GHz technologies simultaneously, and there is no situation where all three modules are active simultaneously. The LBEE5ZZ2AW module cannot transmit for Bluetooth simultaneously with any WLAN configuration.

2.7 Wireless Technology Details

Technology	Band	Modulation Type(s)	No. of Channels	Channel Spacing	Adaptivity
WiFi 802.11 b/g/n (LBEE5ZZ2AW)	2.4 GHz	CCK / BPSK / QPSK / 16-QAM / 64-QAM	11	5 MHz	N/A
WiFi 802.11 a/n/ac (LBEE5ZZ2AW)	5 GHz	BPSK / QPSK / 16-QAM / 64-QAM	As per 802.11	5 MHz	N/A
BlueTooth Low Energy (LBEE5ZZ2AW)	2.4 GHz	GFSK	40	2 MHz	N/A
ZigBee 802.15.4 (MGM210L No.1)	2.4 GHz	O-QPSK	16	5 MHz	N/A
Thread 802.15.4 (MGM210L No.2)	2.4 GHz	O-QPSK	16	5 MHz	N/A

2.8 Ancillary Equipment

ID	Description	Manufacturer / Model	Hardware & Software Versions
A002959287-011	AC/DC Power Supply	IKEA ICPWS5	-
A002959287-012	USB Cable	-	-
A002959287-017	AC/DC Power Supply	IKEA ICPWS5	-
A002959287-018	USB Cable	-	-
A002959287-020	LAN Cable (UTP)	-	-
A002959287-025	LAN Cable (UTP)	-	-

2.9 EUT Diagrams

-

3. TEST METHODS

3.1 Test Standards

Testing was performed according to the following standards / references

Standard	Version	Description
FCC 47 CFR 15.247	-	Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
FCC 47 CFR 15.207	-	Conducted limits
FCC 47 CFR 15.209	-	Radiated emission limits; general requirements

3.2 Additional references

The following standards / references were also considered for the testing

Standard	Version	Description
ANSI C63.10	2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

3.3 Limits

FCC 47 CFR Rule Part	Test Description	Limit Reference (FCC 47 CFR Reference)
15.207	AC Power Line Conducted Emissions (Intentional Radiators)	15.207 (a)
15.209	Radiated Emissions (Intentional Radiators)	15.209 (a) *See Note 1
15.247 (d)	Antenna Conducted Emissions	15.247 (d)
15.247 (d)	Band Edge Compliance (Authorized Band)	15.247 (d)
15.247 (d)	Band Edge Compliance (Restricted Band)	15.247 (d)
15.247 (a)(1)	20dB Bandwidth	15.247 (a)(1)
15.247 (a)(1)	Carrier (Hopping Channel) Separation	15.247 (a)(1)
15.247 (a)(1)	Number of Hopping Channels	15.247 (a)(1)
15.247 (a)(1)	Time of Occupancy (Dwell Time)	15.247 (a)(1)
15.247 (a)(2)	6dB Bandwidth	15.247 (a)(2)
15.247 (b)	Peak Conducted Output Power	15.247 (b)(1) [Hopping] 15.247 (b)(3) [Non-Hopping]
15.247 (e)	Power Spectral Density	15.247 (e)

Interpretation of the measurement results has been performed in accordance with ANSI C63.10 section 1.3

Compliance with the requirements has been based on the results of the measurements compared to the specified limits, not taking into account measurement instrumentation uncertainty.

Measurement Uncertainty figures are stated in section 6

Note 1

Radiated Emissions limits in the tables from 47 CFR sections 15.109 & 15.209 are presented in µV/m. Measurements on the test system are made in dBµV/m. To convert between these, the following adjustment is used:

$$New\ Limit = 20\log\left(\frac{Original\ Limit}{10^6}\right)+120$$

Example: from 15.209(a) the limit for 30MHz – 88MHz is 100µV/m at 3m. This gives:

$$New\ Limit = 20\log\left(\frac{100}{10^6}\right)+120 = 40\text{dBµV/m at 3m}$$

Additionally, in some cases testing has been performed at distances other than those specified in the tables. When this has occurred, the limits have been adjusted in accordance with the requirements in 47 CFR 15.31, using an extrapolation factor of 40dB/decade at frequencies below 30MHz and 20dB/decade at or above 30MHz

Example: from 15.209(a) the limit for 1.705MHz – 30MHz is 30µV/m (=29.54 dBµV/m) at 30m

$Limit@3m = Limit@30m + 40\log\left(\frac{30}{3}\right)$ = 29.54 +40.00 = 69.54 dBµV/m at 3m

Example: from 15.209(a) the limit for 1GHz – 18GHz is 500µV/m (=53.98 dBµV/m) at 3m

$Limit@1m = Limit@3m + 20\log\left(\frac{3}{1}\right)$ = 53.98 +9.54 = 63.52 dBµV/m at 1m

3.4 Description of Test Methods and Equipment Setup

3.4.1 General Description

Testing was performed in accordance with the various requirements of ANSI C63.4 and ANSI C63.10. Any deviations from the test methods are described in section 3.7

Where different arrangements of equipment were used for different types of measurements, these are tabulated in section 3.4.2 and details of each arrangement are included in subsequent sections

3.4.2 Test Equipment Setup Used by Test Type

FCC 47 CFR Rule Part	Test Description	Test Equipment Used
15.207	AC Power Line Conducted Emissions (Intentional Radiators)	Conducted Emissions
15.209	Radiated Emissions (Intentional Radiators)	SAC5
15.247 (d)	Antenna Conducted Emissions	N/A
15.247 (d)	Band Edge Compliance (Authorized band)	N.P.
15.247 (d)	Band Edge Compliance (Restricted band)	SAC 5
15.247 (a)(1)	20dB Bandwidth	N.P.
15.247 (a)(1)	Carrier (Hopping Channel) Separation	N.P.
15.247 (a)(1)	Number of Hopping Channels	N.P.
15.247 (a)(1)	Time of Occupancy (Dwell Time)	N.P.
15.247 (a)(2)	6dB Bandwidth	N.P.
15.247 (b)	Peak Conducted Output Power	N.P.
15.247 (e)	Power Spectral Density	N.P.

3.4.3 Test Equipment Setup – Conducted Power measurements for comparison

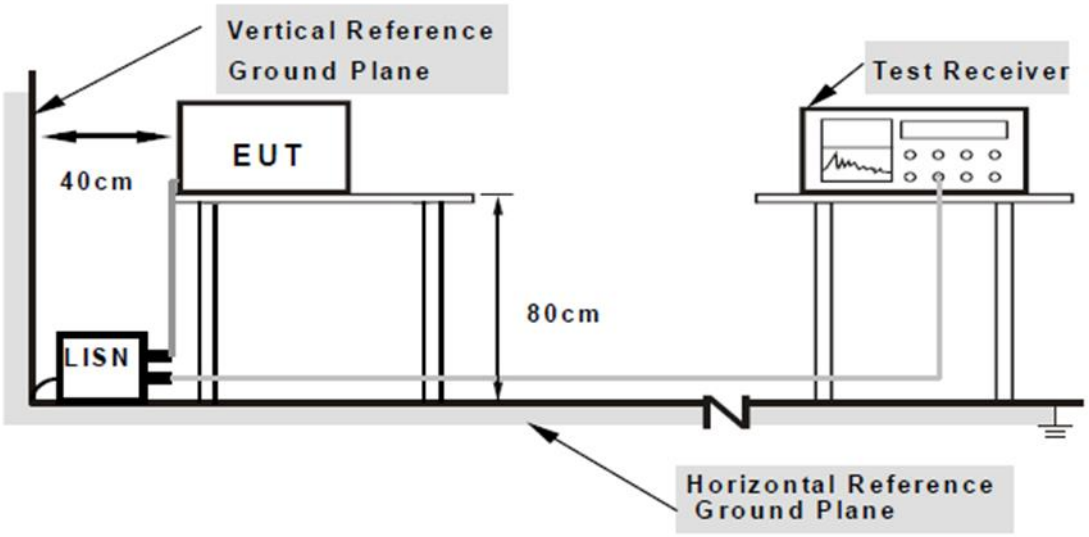
Measurements were performed with the DUT connected via an RF cable to the input of a spectrum analyser. The loss in the cable was compensated for in the measurement results.

3.4.4 Test Equipment Setup – Conducted Emissions

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The LISNs provide 50Ω/ 50µH of coupling impedance for the measuring instrument.

- The lines of the power mains connected to the EUT were checked for maximum conducted interference.

- The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10 dB under the prescribed limits could not be reported.



3.4.5 Test Equipment Setup – SAC 5 (Radiated Emissions and Restricted Band Edge)

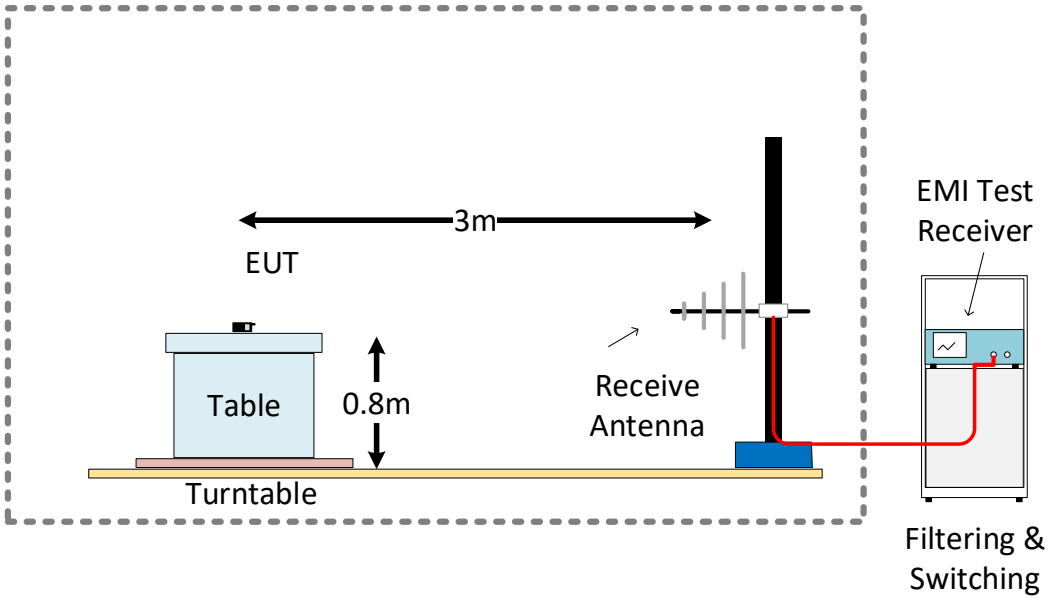
- For frequency range 30MHz-1GHz Log-Periodic Antenna was used. Antenna elevated from 100 cm from floor to 400 cm from floor, and was placed at 3 m from center of turntable in tilted position. The equipment under test (EUT) was placed at the middle of the turntable at 150 cm height from floor. The antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

- For frequency range 1GHz-18GHz horn Antenna was used. Antenna elevated from 100 cm from floor to 200 cm from floor, and was placed at 3 m from center of turntable. The equipment under test (EUT) was placed at the middle of the turntable at 150 cm height from floor. The antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

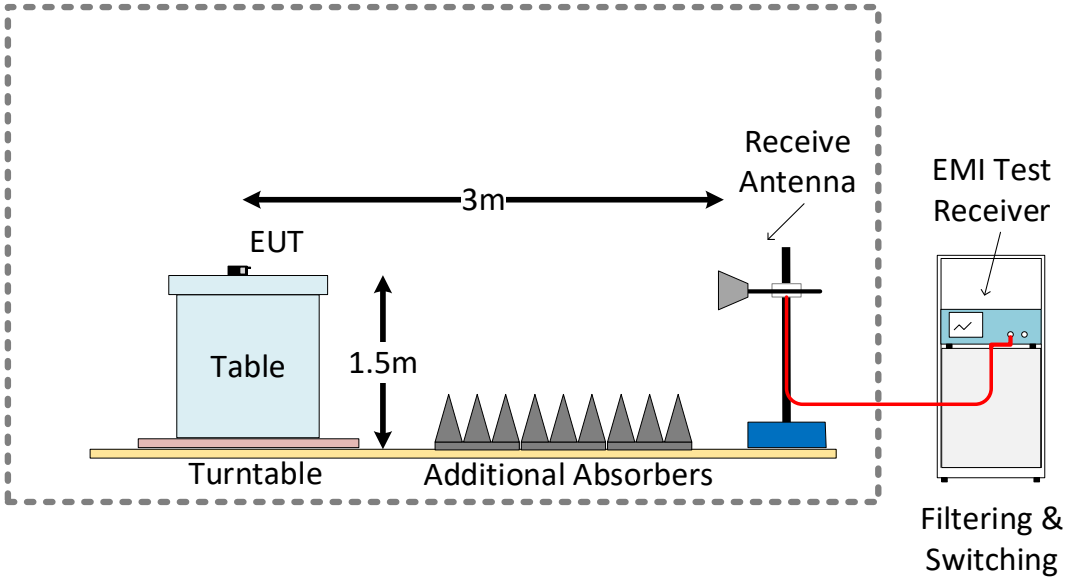
- For frequency range 18GHz-40GHz double horn Antenna was used. Antenna's height was adjusted to150 cm from floor, and 1 m distance to center of turntable. The equipment under test (EUT) was placed at the middle of the turntable on at 150 cm height from floor.

- For all frequency ranges the turntable was rotated 360˚ for obtaining the maximum emission.

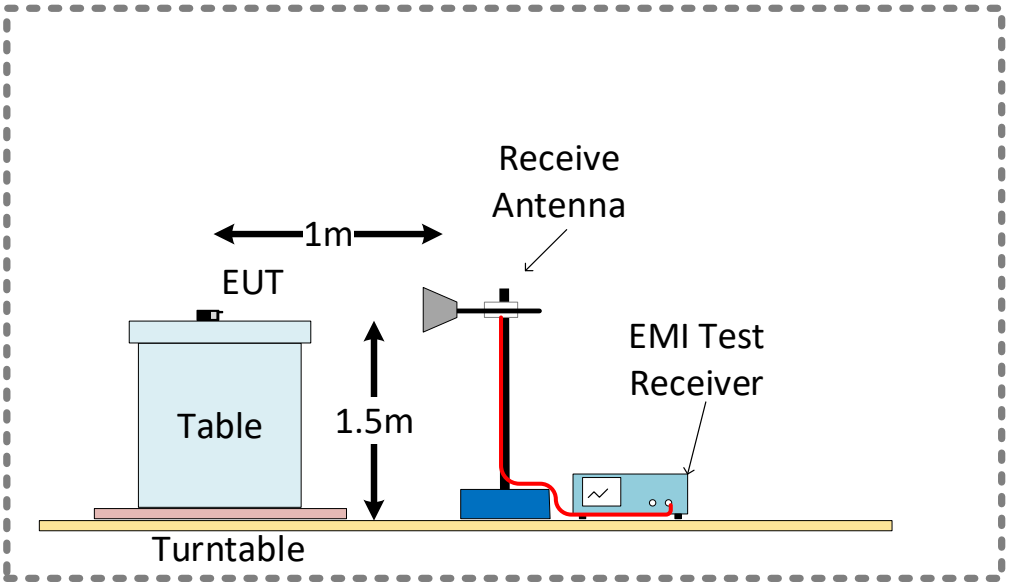
SAC 5 Test Setup Configuration 30MHz – 1GHz



SAC 5 Test Setup Configuration 1GHz – 18GHz



SAC 5 Test Setup Configuration 18GHz – 40GHz



3.5 EUT Configuration During Test

AC Power Line Conducted Emissions

For AC power line conducted emissions testing, the device was connected to the USB Charger and set to continuous transmit mode on the mid channel with appropriate modulation. A LAN cable was connected between the device and a laptop PC placed outside of the test area. Conducted emissions tests were run on the Mains AC connection to the charger. See test setup photographs for more detail.

Radiated Emissions

For radiated emissions testing, the device was connected to the USB Charger and set to continuous transmit mode on an appropriate channel, with appropriate modulation. A LAN cable was connected between the device and a laptop PC placed outside of the test area.

Conducted Power Measurements

For conducted power measurements, the RF output of the device was connected to the test equipment via an RF cable. The device was connected to the USB Charger and set to continuous transmit mode on an appropriate channel, with appropriate modulation. A LAN cable was connected between the device and a laptop PC placed outside of the test area.

3.6 EUT Operation Modes

Operation mode	Description
Continuous Tx	The device was set to transmit continuously with an appropriate frequency and modulation.

3.7 Deviations from the Test Standard

This product is based on pre-certified modules as described in section 2.1, hence a limited test scope has been verified.

Measurement data from certification reports for the modules was used in determining which tests to include or exclude from the scope. A comparison of conducted output power between the module and the device covered by this report is included in section 4.13

3.8 Environmental Conditions

3.8.1 Environmental Conditions – Conducted power Measurements

Date	Time	Temperature (°C)	Relative Humidity (%)
2020.12.10	07:36	19.7	31

3.8.2 Environmental Conditions – Conducted Emissions System

Date	Time	Temperature (°C)	Relative Humidity (%)
2020.12.21	09:00	24.2	33

3.8.3 Environmental Conditions – SAC5 (Radiated Emissions)

Date	Time	Temperature (°C)	Relative Humidity (%)
2020.12.02	08:41	19.4	36
2020.12.03	07:53	18.5	37
2020.12.04	08:22	18.5	36
2020.12.09	13:34	19.9	39
2020.12.10	07:38	18.3	39
2021.01.05	08:36	18.4	32
2021.01.07	07:30	18.3	32
2021.01.08	07:45	18.6	32
2021.01.20	08:00	18.3	34

4. TEST RESULTS

4.1 Test Results – AC Power Line Conducted Emissions (Intentional Transmitter)

4.1.1 AC Power Line Conducted Emissions (Intentional) – Test Summary

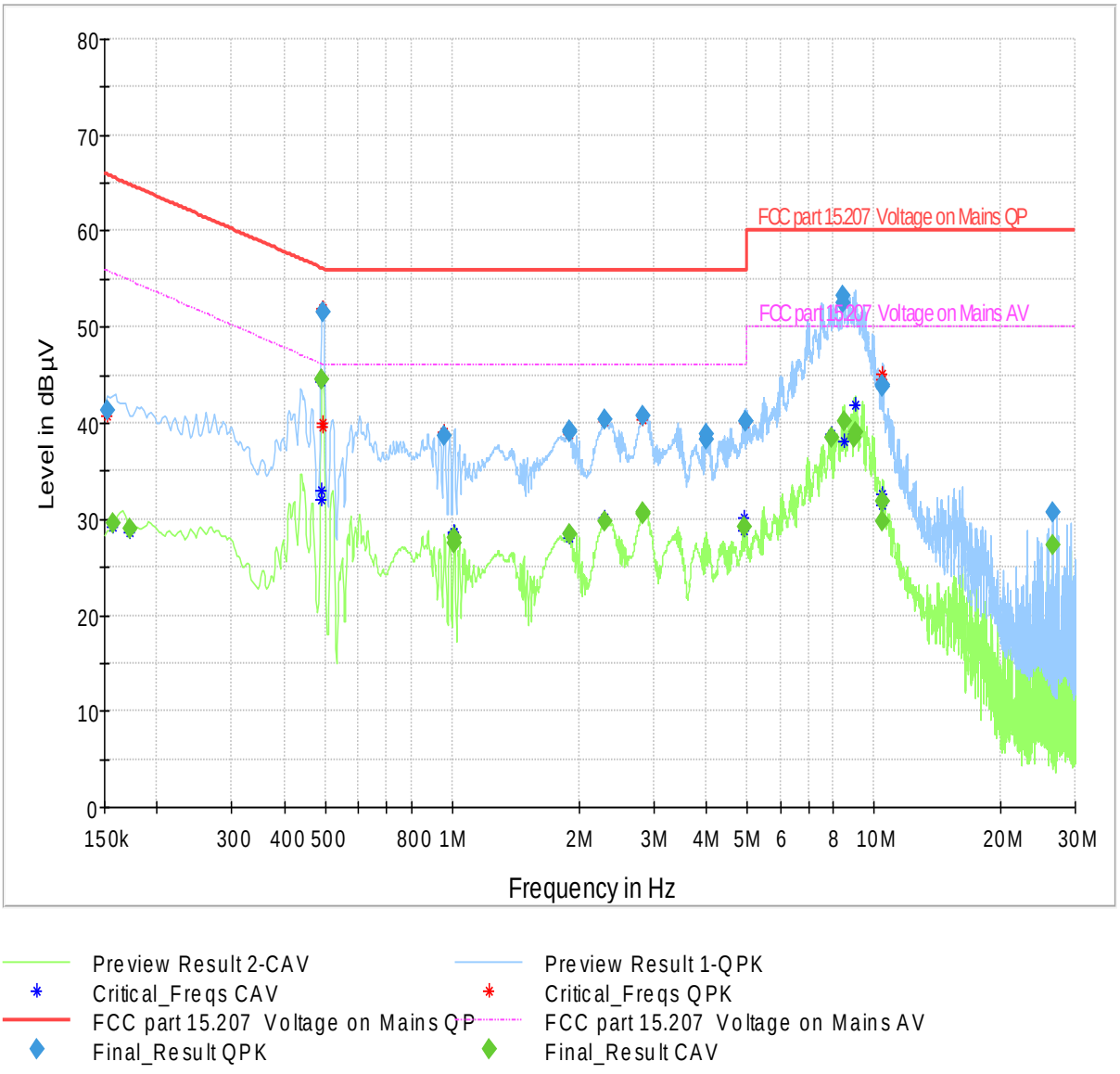
Test Specification	FCC 47 CFR 15.207 (Part 15 Subpart C)	
Test Engineer & Date	Fariborz Abasi	2020.12.21
EUT and Ancillary Equipment IDs	A002959287-010	A002959287-017 A002959287-018 A002959287-020
EUT Operation Mode(s)	Continuous Tx	
EUT Wireless Configuration(s)	WLAN 802.11 b/g/n (see below for details)	
EUT Hardware Configuration(s)	Power from USB Power Supply	
Overall Result	PASS	

Test Parameter	Wireless Configuration	Frequency Range	Result*
AC Conducted Power Line Emissions – "N" Line	WLAN 802.11b 5.5Mbps Mid Chan. (BPSK 2437 MHz)	150 kHz – 30 MHz	PASS
AC Conducted Power Line Emissions – "L1" Line	WLAN 802.11b 5.5Mbps Mid Chan. (BPSK 2437 MHz)	150 kHz – 30 MHz	PASS
AC Conducted Power Line Emissions – "N" Line	WLAN 802.11g 6Mbps Mid Chan. (BPSK 2437 MHz)	150 kHz – 30 MHz	PASS
AC Conducted Power Line Emissions – "L1" Line	WLAN 802.11g 6Mbps Mid Chan. (BPSK 2437 MHz)	150 kHz – 30 MHz	PASS
AC Conducted Power Line Emissions – "N" Line	WLAN 802. 802.11n MCS 0 Mid Chan. (BPSK 2437 MHz)	150 kHz – 30 MHz	PASS
AC Conducted Power Line Emissions – "L1" Line	WLAN 802. 802.11n MCS 0 Mid Chan. (BPSK 2437 MHz)	150 kHz – 30 MHz	PASS

* For detailed measurements, see tables and graphs in sections below

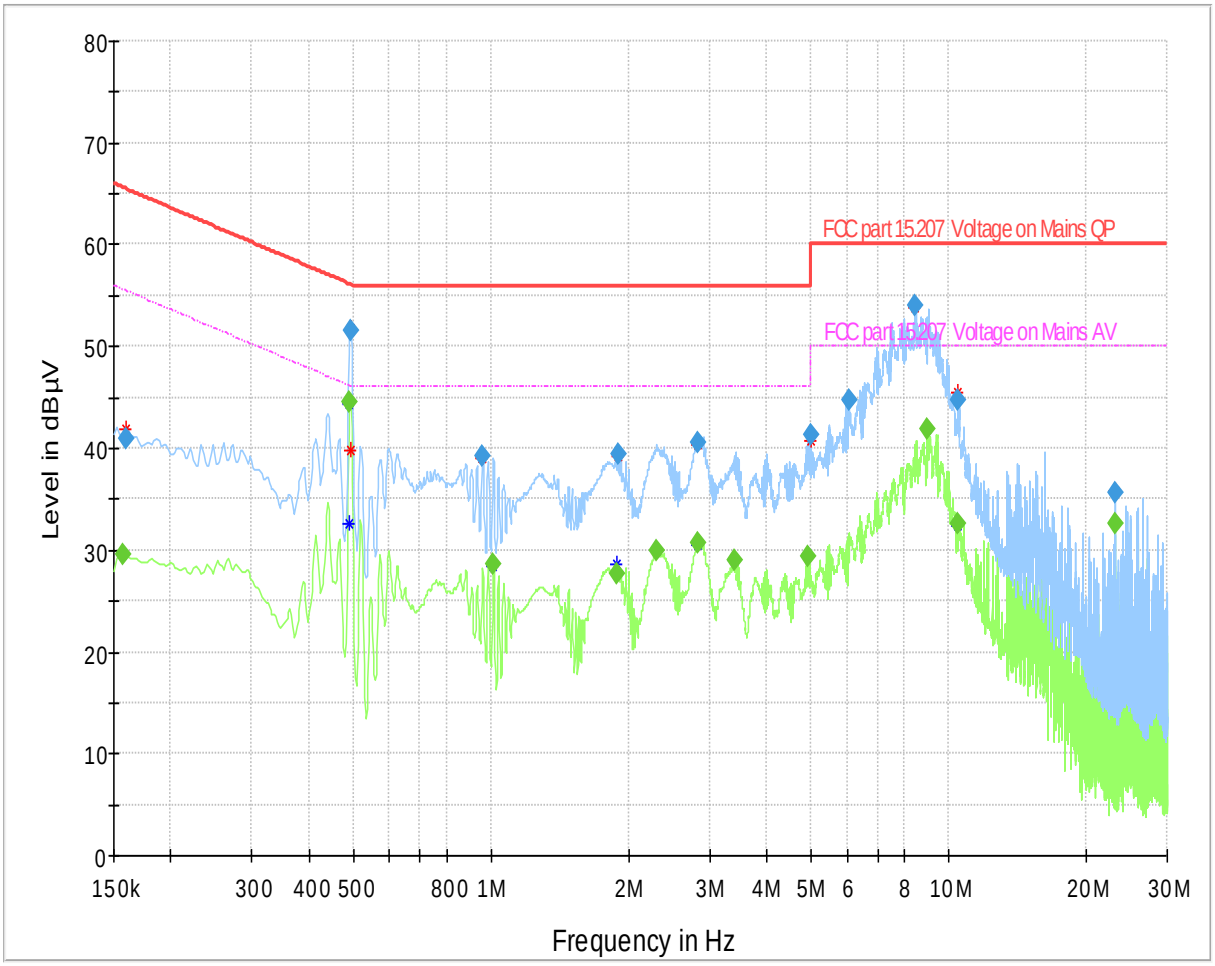
4.1.2 AC Power Line Conducted Emissions (Intentional) – Test Details

Test	Conducted Emission	
Test mode condition	WLAN 2.4 GHz 802.11b (mid channel – 2437 MHz)	
Standard	47 CFR Part 15.247 Class A	
EUT	A002959287-010	
Ancillary Equipment	A002959287-020 Ethernet cable A002959287-018 USB cable A002959287-017 AC / DC power supply	
Test Engineer	Fariborz Abasi	Date: 2020-12-21



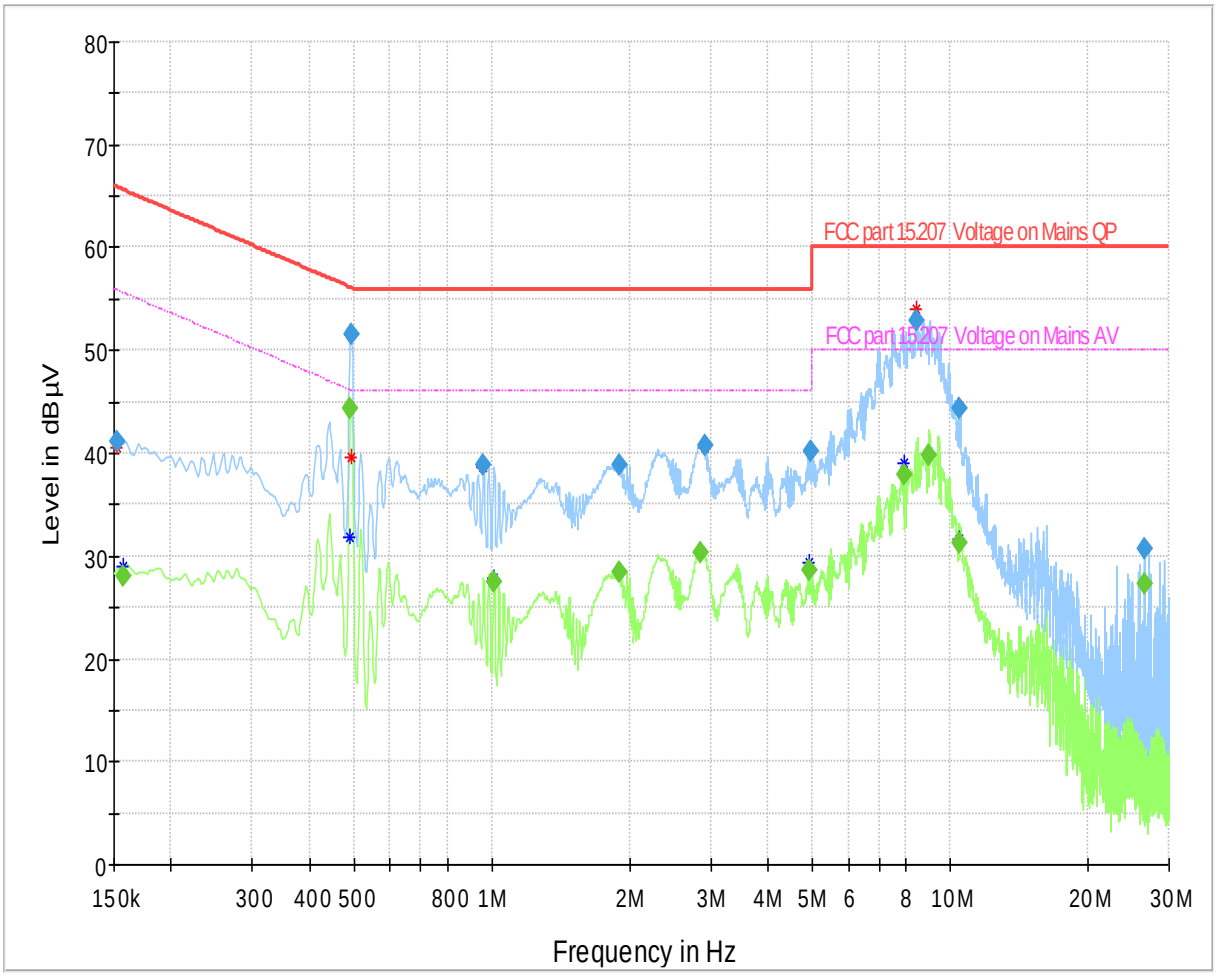
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.152250	41.25	---	65.88	24.62	1000.0	9.000	L1	ON	9.7
0.156750	---	29.66	55.63	25.97	1000.0	9.000	L1	ON	9.7
0.172500	---	28.92	54.84	25.92	1000.0	9.000	L1	ON	9.7
0.492000	---	44.47	46.13	1.67	1000.0	9.000	L1	ON	9.6
0.494250	51.50	---	56.10	4.59	1000.0	9.000	L1	ON	9.6
0.960000	38.62	---	56.00	17.38	1000.0	9.000	L1	ON	9.7
1.009500	---	28.00	46.00	18.00	1000.0	9.000	L1	ON	9.7
1.011750	---	27.53	46.00	18.47	1000.0	9.000	L1	ON	9.7
1.893750	39.18	---	56.00	16.82	1000.0	9.000	L1	ON	9.7
1.893750	---	28.41	46.00	17.59	1000.0	9.000	L1	ON	9.7
1.896000	39.05	---	56.00	16.95	1000.0	9.000	L1	ON	9.7
2.298750	40.43	---	56.00	15.57	1000.0	9.000	L1	ON	9.7
2.301000	---	29.82	46.00	16.18	1000.0	9.000	L1	ON	9.7
2.838750	40.77	---	56.00	15.23	1000.0	9.000	L1	ON	9.8
2.838750	---	30.53	46.00	15.47	1000.0	9.000	L1	ON	9.8
2.841000	---	30.72	46.00	15.28	1000.0	9.000	L1	ON	9.8
3.986250	38.88	---	56.00	17.12	1000.0	9.000	L1	ON	9.8
3.988500	38.32	---	56.00	17.68	1000.0	9.000	L1	ON	9.8
4.920000	---	29.29	46.00	16.71	1000.0	9.000	L1	ON	9.8
4.960500	40.10	---	56.00	15.90	1000.0	9.000	L1	ON	9.8
4.980750	40.12	---	56.00	15.88	1000.0	9.000	L1	ON	9.8
7.917000	---	38.48	50.00	11.52	1000.0	9.000	L1	ON	9.8
8.430000	53.21	---	60.00	6.79	1000.0	9.000	N	ON	9.8
8.441250	52.45	---	60.00	7.55	1000.0	9.000	N	ON	9.8
8.481750	---	40.22	50.00	9.78	1000.0	9.000	N	ON	9.8
8.999250	---	38.53	50.00	11.47	1000.0	9.000	N	ON	9.9
9.024000	---	38.96	50.00	11.04	1000.0	9.000	L1	ON	9.9
10.477500	---	29.85	50.00	20.15	1000.0	9.000	N	ON	9.9
10.479750	---	31.89	50.00	18.11	1000.0	9.000	N	ON	9.9
10.486500	43.72	---	60.00	16.28	1000.0	9.000	L1	ON	9.9
10.488750	43.95	---	60.00	16.05	1000.0	9.000	L1	ON	9.9
26.610000	---	27.25	50.00	22.75	1000.0	9.000	N	ON	10.1
26.610000	30.67	---	60.00	29.33	1000.0	9.000	N	ON	10.1

Test	Conducted Emission	
Test mode condition	WLAN 2.4 GHz 802.11g (mid channel – 2437 MHz)	
Standard	47 CFR Part 15.247 Class A	
EUT	A002959287-010	
Ancillary Equipment	A002959287-020 Ethernet cable A002959287-018 USB cable A002959287-017 AC / DC power supply	
Test Engineer	Fariborz Abasi	Date: 2020-12-21



Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.156750	---	29.65	55.63	25.99	1000.0	9.000	L1	ON	9.7
0.159000	40.86	---	65.52	24.65	1000.0	9.000	N	ON	9.7
0.492000	---	44.46	46.13	1.67	1000.0	9.000	L1	ON	9.6
0.494250	51.56	---	56.10	4.53	1000.0	9.000	L1	ON	9.6
0.957750	39.29	---	56.00	16.71	1000.0	9.000	L1	ON	9.7
1.011750	---	28.70	46.00	17.30	1000.0	9.000	L1	ON	9.7
1.887000	---	27.75	46.00	18.25	1000.0	9.000	L1	ON	9.7
1.891500	39.38	---	56.00	16.62	1000.0	9.000	L1	ON	9.7
2.298750	---	29.92	46.00	16.08	1000.0	9.000	L1	ON	9.7
2.827500	40.49	---	56.00	15.51	1000.0	9.000	L1	ON	9.8
2.841000	---	30.64	46.00	15.36	1000.0	9.000	L1	ON	9.8
3.417000	---	28.96	46.00	17.04	1000.0	9.000	L1	ON	9.8
4.920000	---	29.34	46.00	16.66	1000.0	9.000	L1	ON	9.8
4.987500	41.29	---	56.00	14.71	1000.0	9.000	L1	ON	9.8
6.060750	44.71	---	60.00	15.29	1000.0	9.000	N	ON	9.8
8.441250	54.00	---	60.00	6.00	1000.0	9.000	N	ON	9.8
8.985750	---	41.98	50.00	8.02	1000.0	9.000	L1	ON	9.9
10.466250	---	32.67	50.00	17.33	1000.0	9.000	L1	ON	9.9
10.488750	44.78	---	60.00	15.22	1000.0	9.000	L1	ON	9.9
23.129250	---	32.64	50.00	17.36	1000.0	9.000	N	ON	10.1
23.129250	35.73	---	60.00	24.27	1000.0	9.000	L1	ON	10.0

Test	Conducted Emission	
Test mode condition	WLAN 2.4 GHz 802.11n (mid channel – 2437 MHz)	
Standard	47 CFR Part 15.247 Class A	
EUT	A002959287-010	
Ancillary Equipment	A002959287-020 Ethernet cable A002959287-018 USB cable A002959287-017 AC / DC power supply	
Test Engineer	Fariborz Abasi	Date: 2020-12-21



Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.152250	41.15	---	65.88	24.73	1000.0	9.000	L1	ON	9.7
0.156750	---	27.97	55.63	27.66	1000.0	9.000	L1	ON	9.7
0.492000	---	44.42	46.13	1.71	1000.0	9.000	L1	ON	9.6
0.494250	51.47	---	56.10	4.62	1000.0	9.000	L1	ON	9.6
0.960000	38.84	---	56.00	17.16	1000.0	9.000	L1	ON	9.7
1.011750	---	27.46	46.00	18.54	1000.0	9.000	L1	ON	9.7
1.893750	38.86	---	56.00	17.14	1000.0	9.000	L1	ON	9.7
1.896000	---	28.41	46.00	17.59	1000.0	9.000	L1	ON	9.7
2.847750	---	30.33	46.00	15.67	1000.0	9.000	L1	ON	9.8
2.910750	40.72	---	56.00	15.28	1000.0	9.000	L1	ON	9.8
4.920000	---	28.63	46.00	17.37	1000.0	9.000	L1	ON	9.8
4.960500	40.17	---	56.00	15.83	1000.0	9.000	L1	ON	9.8
7.921500	---	37.89	50.00	12.11	1000.0	9.000	L1	ON	9.8
8.441250	52.94	---	60.00	7.06	1000.0	9.000	N	ON	9.8
8.999250	---	39.77	50.00	10.23	1000.0	9.000	L1	ON	9.9
10.464000	---	31.19	50.00	18.81	1000.0	9.000	N	ON	9.9
10.486500	44.45	---	60.00	15.55	1000.0	9.000	L1	ON	9.9
26.610000	---	27.36	50.00	22.64	1000.0	9.000	N	ON	10.1
26.610000	30.78	---	60.00	29.22	1000.0	9.000	N	ON	10.1

4.2 Test Results – Radiated Emissions (Intentional Transmitter)

4.2.1 Radiated Emissions (Intentional) – Test Summary

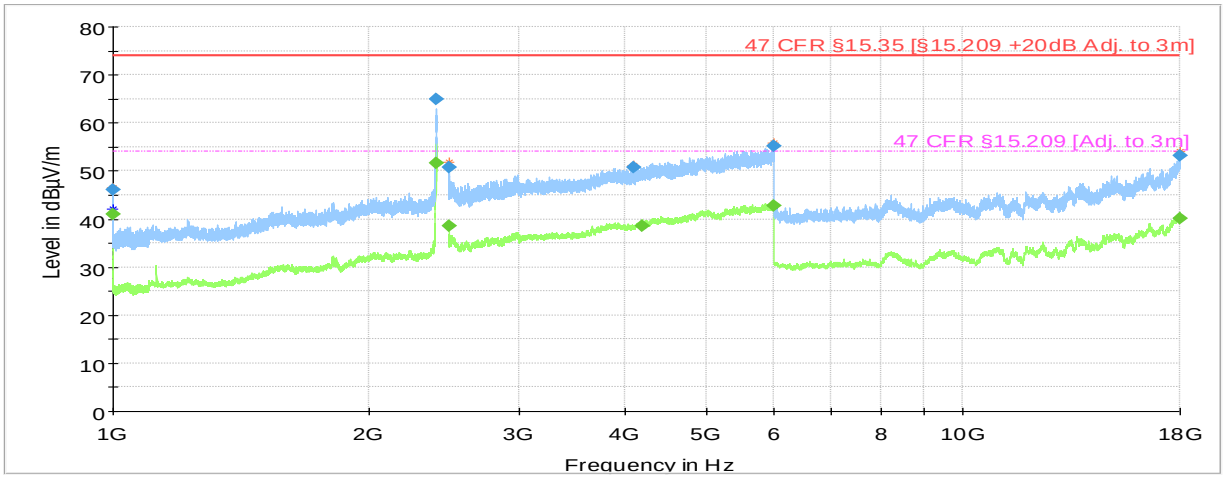
Test Specification	FCC 47 CFR 15.209 (Part 15 Subpart C)	
Test Engineer & Date	Fariborz Abasi/ Niall Forrester/Sam Ebadeh Simon Palmhager / Joel Efraimsson	2020.12.02 – 2021.01.20
EUT and Ancillary Equipment IDs	A002959287-010 / A002959287-013	A002959287-011/012/25
EUT Operation Mode(s)	Continuous Tx	
EUT Wireless Configuration(s)	WLAN 802.11 b/g/n (see below for details)	
EUT Hardware Configuration(s)	Power from USB Power Supply	
Overall Result	PASS	

Test Parameter	Wireless Configuration	Frequency Range	Result
Radiated Emissions	WLAN 802.11b 5.5Mbps Low Chan. (CCK 2412 MHz)	1 GHz – 18 GHz	PASS
Radiated Emissions	WLAN 802.11g 6Mbps Low Chan. (CCK 2412 MHz)	1 GHz – 18 GHz	PASS
Radiated Emissions	WLAN 802. 802.11n MCS 0 Low Chan. (BPSK 2412 MHz)	1 GHz – 18 GHz	PASS
Radiated Emissions	WLAN 802.11b 5.5Mbps Low Chan. (BPSK 2412 MHz)	18 GHz – 40 GHz	PASS
Radiated Emissions	WLAN 802.11g 6Mbps Low Chan. (BPSK 2412 MHz)	18 GHz – 40 GHz	PASS
Radiated Emissions	WLAN 802. 802.11n MCS 0 Low Chan. (BPSK 2412 MHz)	18 GHz – 40 GHz	PASS
Radiated Emissions	WLAN 802.11n MCS 0 Mid Chan. (BPSK 2437 MHz)	9 kHz – 30 MHz	PASS
Radiated Emissions	WLAN 802.11n MCS 0 Mid Chan. (BPSK 2437 MHz)	30 MHz – 1 GHz	PASS
Radiated Emissions	WLAN 802.11b 5.5Mbps Mid Chan. (CCK 2437 MHz)	1 GHz – 18 GHz	PASS
Radiated Emissions	WLAN 802.11g 6Mbps Mid Chan. (CCK 2437 MHz)	1 GHz – 18 GHz	PASS
Radiated Emissions	WLAN 802. 802.11n MCS 0 Mid Chan. (BPSK 2437 MHz)	1 GHz – 18 GHz	PASS
Radiated Emissions	WLAN 802.11b 5.5Mbps Mid Chan. (BPSK 2437 MHz)	18 GHz – 40 GHz	PASS
Radiated Emissions	WLAN 802.11g 6Mbps Mid Chan. (BPSK 2437 MHz)	18 GHz – 40 GHz	PASS
Radiated Emissions	WLAN 802. 802.11n MCS 0 Mid Chan. (BPSK 2437 MHz)	18 GHz – 40 GHz	PASS
Radiated Emissions	WLAN 802.11b 5.5Mbps High Chan. (CCK 2462 MHz)	1 GHz – 18 GHz	PASS
Radiated Emissions	WLAN 802.11g 6Mbps High Chan. (CCK 2462 MHz)	1 GHz – 18 GHz	PASS
Radiated Emissions	WLAN 802. 802.11n MCS 0 High Chan. (BPSK 2462 MHz)	1 GHz – 18 GHz	PASS
Radiated Emissions	WLAN 802.11b 5.5Mbps High Chan. (BPSK 2462 MHz)	18 GHz – 40 GHz	PASS
Radiated Emissions	WLAN 802.11g 6Mbps High Chan. (BPSK 2462 MHz)	18 GHz – 40 GHz	PASS
Radiated Emissions	WLAN 802. 802.11n MCS 0 High Chan. (BPSK 2462 MHz)	18 GHz – 40 GHz	PASS

4.2.2 Radiated Emissions (Intentional) – Test Details

Low Channel

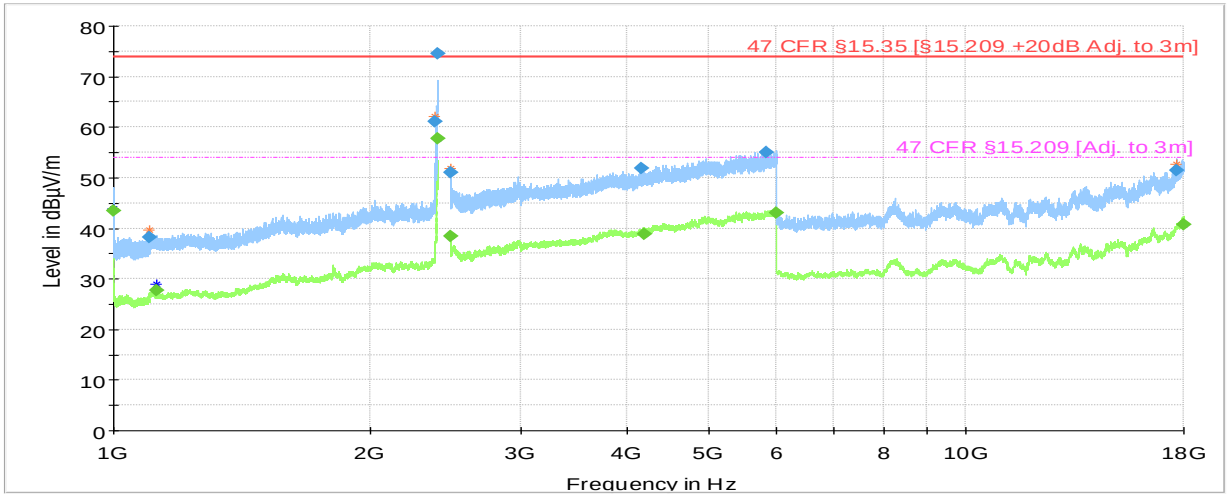
Test mode condition	WLAN 2.4 GHz 802.11b (low channel – 2412 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-013	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Fariborz Abasi	Date: 2021-01-07
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1000.020080	---	40.89	53.98	13.09	1000.0	1000.000	100.0	V	72.0
1000.046683	46.05	---	73.98	27.93	1000.0	1000.000	100.0	V	72.0
2398.215206	---	51.62	53.98	2.36	1000.0	1000.000	177.0	H	326.0
2398.224208	64.85	---	73.98	9.13	1000.0	1000.000	148.0	H	-18.0
2483.514000	---	38.60	53.98	15.38	1000.0	1000.000	102.0	H	190.0
2483.717500	50.78	---	73.98	23.20	1000.0	1000.000	125.0	V	54.0
4092.836000	50.78	---	73.98	23.20	1000.0	1000.000	175.0	H	202.0
4191.543000	---	38.46	53.98	15.52	1000.0	1000.000	100.0	V	206.0
5979.365000	---	42.73	53.98	11.24	1000.0	1000.000	125.0	V	20.0
5986.808000	55.23	---	73.98	18.75	1000.0	1000.000	125.0	H	116.0
17980.219000	---	40.22	53.98	13.76	1000.0	1000.000	175.0	H	52.0
17980.835000	53.19	---	73.98	20.79	1000.0	1000.000	101.0	H	112.0

***NOTE – Peak at 2397-2400MHz is an artefact of the path compensation in the test system and not related to the device under test. See band-edge test for correct data for this region.**

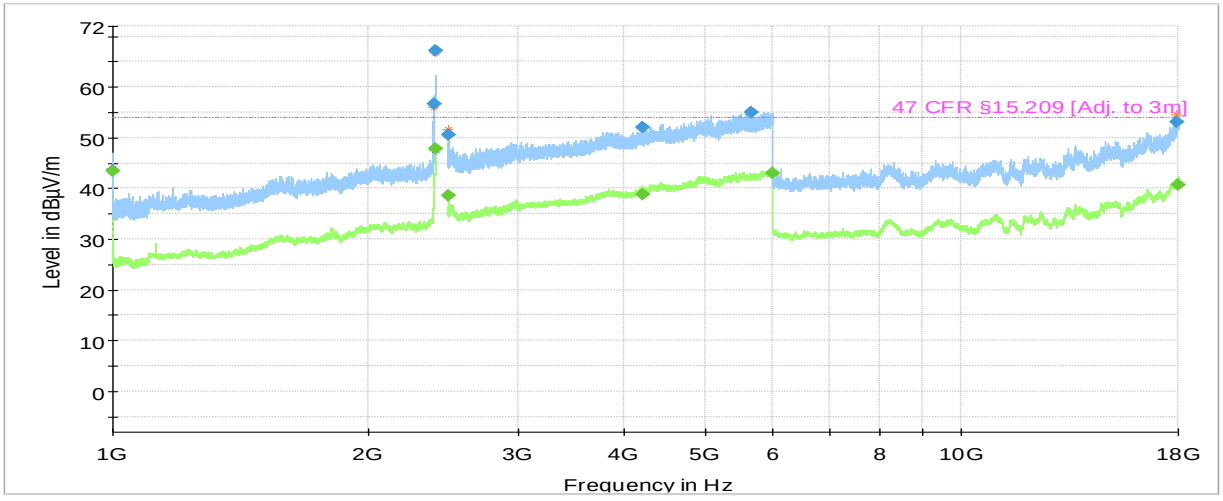
Test mode condition	WLAN 2.4 GHz 802.11g (low channel – 2412 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-010	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Niall Forrester	Date: 2020-12-04
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1000.024794	---	43.54	53.98	10.44	1000.0	1000.000	137.0	H	267.0
1101.661301	38.27	---	73.98	35.71	1000.0	1000.000	198.0	H	311.0
1124.965000	---	27.64	53.98	26.34	1000.0	1000.000	100.0	H	72.0
2385.481000	61.05	---	73.98	12.93	1000.0	1000.000	187.0	H	338.0
2397.611564	74.47	---	73.98	-0.49	1000.0	1000.000	147.0	H	338.0
2399.987500	---	57.76	53.98	-3.78	1000.0	1000.000	148.0	H	338.0
2483.604107	---	38.42	53.98	15.56	1000.0	1000.000	210.0	V	248.0
2483.639000	50.96	---	73.98	23.02	1000.0	1000.000	187.0	V	155.0
4165.444000	51.94	---	73.98	22.04	1000.0	1000.000	100.0	V	112.0
4195.893000	---	38.84	53.98	15.14	1000.0	1000.000	158.0	V	206.0
5824.700000	54.94	---	73.98	19.04	1000.0	1000.000	175.0	H	162.0
5982.556000	---	43.02	53.98	10.96	1000.0	1000.000	102.0	H	100.0
17678.893000	51.42	---	73.98	22.56	1000.0	1000.000	175.0	V	244.0
17983.412000	---	40.78	53.98	13.20	1000.0	1000.000	206.0	V	116.0

***NOTE – Peak at 2397-2400MHz is an artefact of the path compensation in the test system and not related to the device under test. See band-edge test for correct data for this region.**

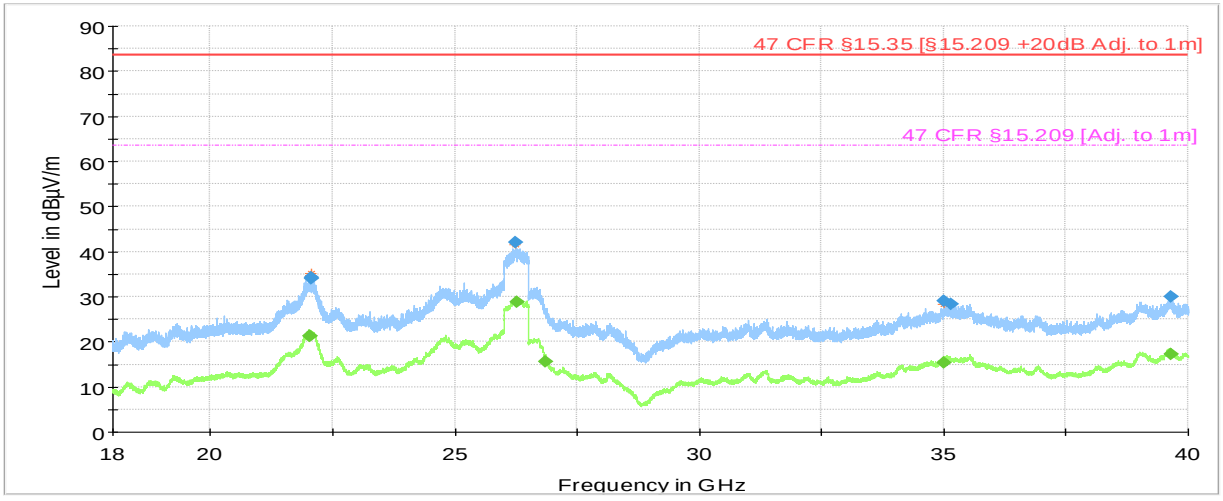
Test mode condition	WLAN 2.4 GHz 802.11n (low channel – 2412 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-010	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Simon Palmhager	Date: 2020-12-03
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1000.007042	---	43.49	53.98	10.49	1000.0	1000.000	137.0	H	267.0
2390.395000	56.58	---	73.98	17.40	1000.0	1000.000	210.0	V	324.0
2399.845000	---	47.75	53.98	6.23	1000.0	1000.000	102.0	H	-18.0
2399.945195	67.13	---	73.98	6.85	1000.0	1000.000	127.0	H	87.0
2483.505500	---	38.60	53.98	15.38	1000.0	1000.000	206.0	H	252.0
2483.873700	50.64	---	73.98	23.34	1000.0	1000.000	206.0	H	20.0
4204.572000	---	38.79	53.98	15.19	1000.0	1000.000	125.0	V	280.0
4206.747000	52.15	---	73.98	21.83	1000.0	1000.000	175.0	H	-22.0
5641.678000	54.92	---	73.98	19.06	1000.0	1000.000	100.0	H	112.0
5984.813000	---	42.96	53.98	11.02	1000.0	1000.000	125.0	H	335.0
17953.537000	53.05	---	73.98	20.93	1000.0	1000.000	158.0	V	98.0
17995.424000	---	40.78	53.98	13.20	1000.0	1000.000	210.0	H	252.0

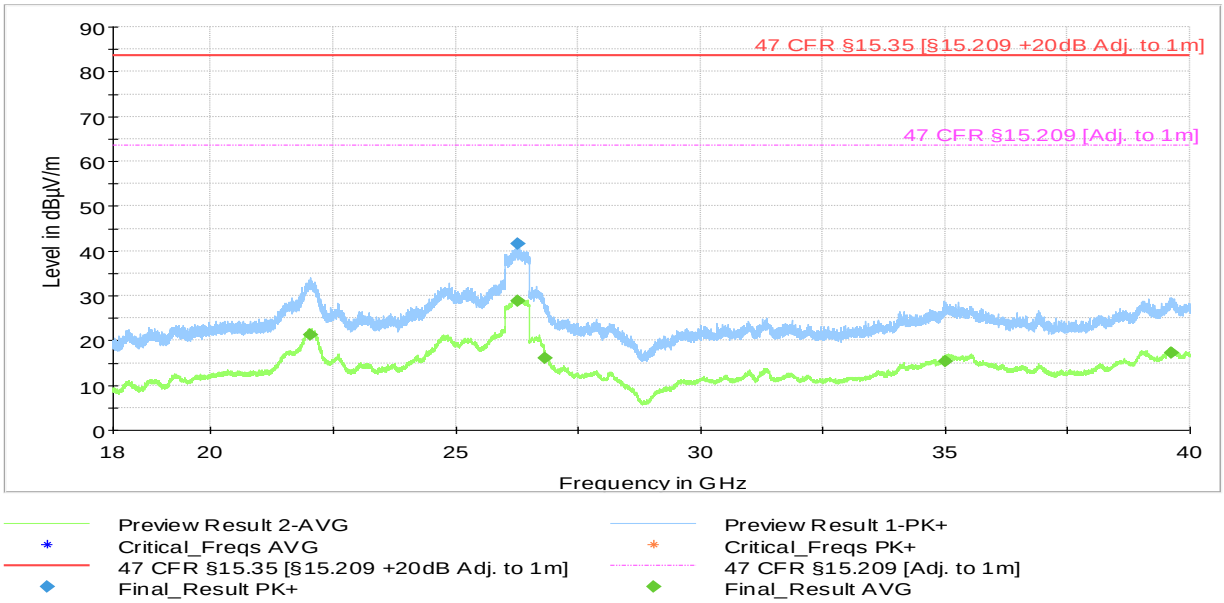
***NOTE – Peak at 2397-2400MHz is an artefact of the path compensation in the test system and not related to the device under test. See band-edge test for correct data for this region.**

Test mode condition	WLAN 2.4 GHz 802.11b (low channel – 2412 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-013	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Simon Palmhager	Date: 2020-12-30
Chamber details	Chamber: SAC 5	



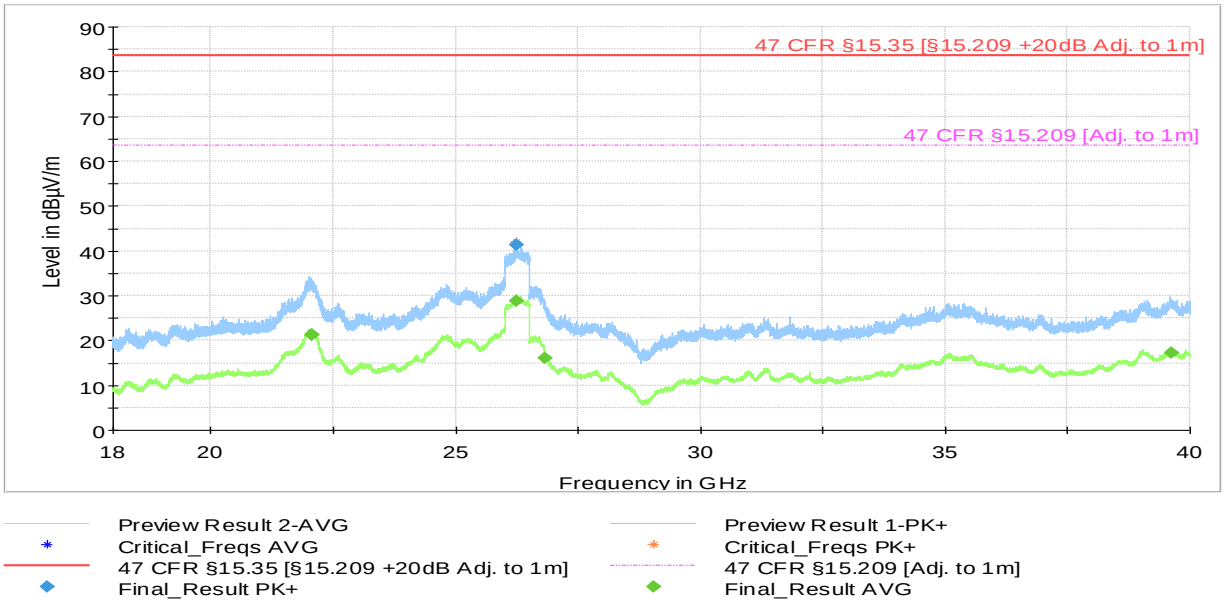
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
22042.264000	---	21.31	63.52	42.21	1000.0	1000.000	155.0	H	306.0
22042.429000	---	21.27	63.52	42.25	1000.0	1000.000	155.0	H	308.0
22047.180000	34.26	---	83.52	49.26	1000.0	1000.000	155.0	V	112.0
22049.578000	34.02	---	83.52	49.50	1000.0	1000.000	155.0	V	112.0
26244.064000	42.15	---	83.52	41.37	1000.0	1000.000	155.0	H	172.0
26255.951000	---	28.74	63.52	34.79	1000.0	1000.000	155.0	H	8.0
26844.980000	---	15.66	63.52	47.86	1000.0	1000.000	155.0	H	36.0
35000.500000	---	15.45	63.52	48.08	1000.0	1000.000	155.0	V	82.0
35005.834000	29.12	---	83.52	54.41	1000.0	1000.000	155.0	H	188.0
35162.998000	28.44	---	83.52	55.08	1000.0	1000.000	155.0	V	98.0
39635.284000	---	17.15	63.52	46.37	1000.0	1000.000	155.0	H	146.0
39636.008000	30.10	---	83.52	53.43	1000.0	1000.000	155.0	H	156.0

Test mode condition	WLAN 2.4 GHz 802.11g (low channel – 2412 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-013	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Sam Ebadeh	Date: 2021-01-05
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
22017.480000	---	21.30	63.52	42.23	1000.0	1000.000	155.0	V	52.0
26255.946000	---	28.76	63.52	34.77	1000.0	1000.000	155.0	H	112.0
26264.590000	41.64	---	83.52	41.88	1000.0	1000.000	155.0	H	222.0
26833.110000	---	15.98	63.52	47.54	1000.0	1000.000	155.0	V	336.0
34997.109000	---	15.35	63.52	48.17	1000.0	1000.000	155.0	H	342.0
39629.333000	---	17.19	63.52	46.33	1000.0	1000.000	155.0	H	38.0

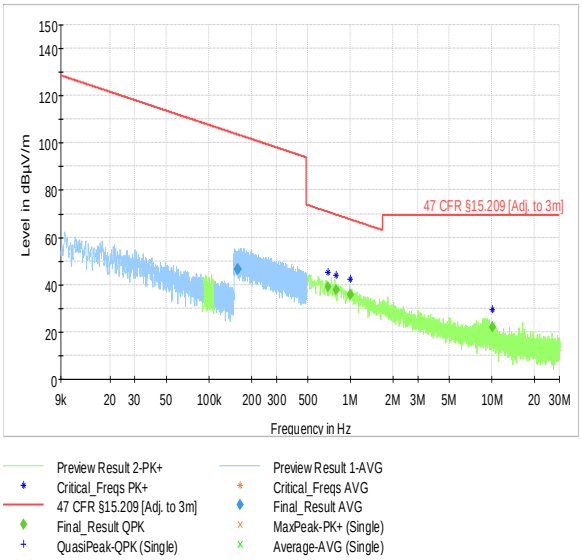
Test mode condition	WLAN 2.4 GHz 802.11n (low channel – 2412 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-013	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Sam Ebadeh	Date: 2021-01-05
Chamber details	Chamber: SAC 5	

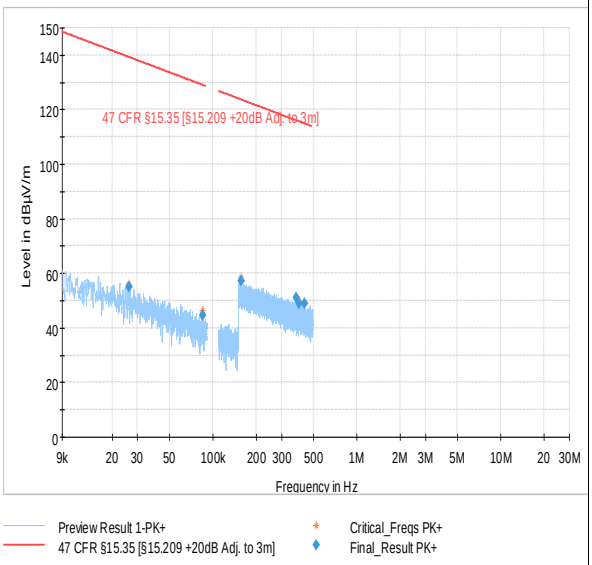


Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
22049.566000	---	21.20	63.52	42.32	1000.0	1000.000	155.0	H	322.0
22051.737000	---	21.21	63.52	42.31	1000.0	1000.000	155.0	H	312.0
26241.221000	41.44	---	83.52	42.08	1000.0	1000.000	155.0	V	52.0
26250.670000	---	28.80	63.52	34.72	1000.0	1000.000	155.0	H	52.0
26832.714000	---	15.98	63.52	47.54	1000.0	1000.000	155.0	V	172.0
39622.922000	---	17.22	63.52	46.30	1000.0	1000.000	155.0	H	102.0

Mid Channel

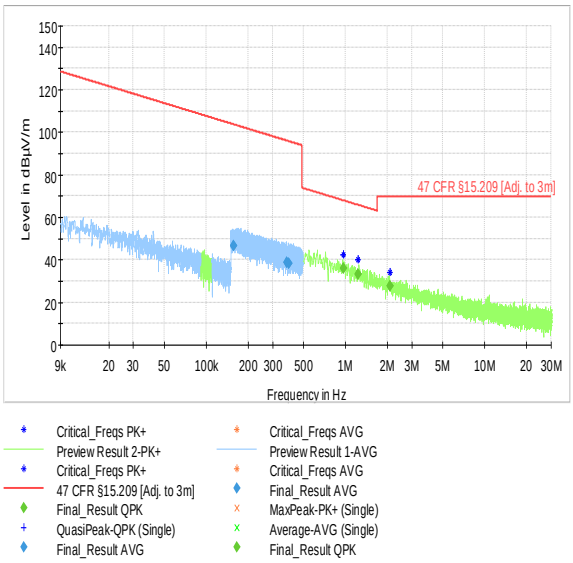
Test mode condition	WLAN 2.4 GHz 802.11n (mid channel – 2437 MHz)	
Antenna orientation	Loop Antenna Parallel to Axis	
Sweep frequency	9 KHz – 30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-010	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Joel Efraimsson	Date: 2021-01-20
Chamber details	Chamber: SAC 5	

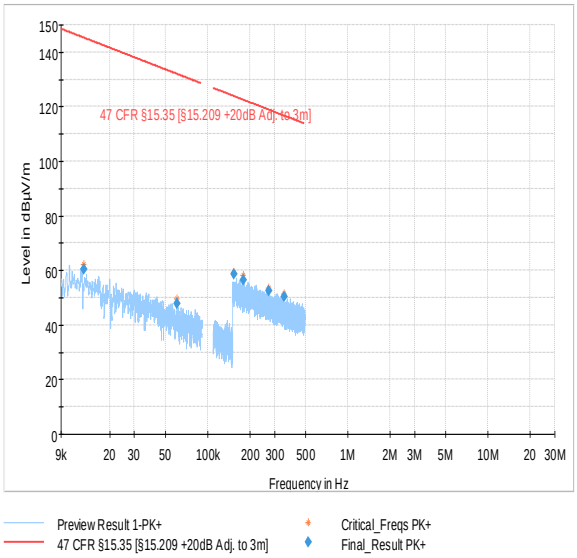




Frequency (MHz)	Average (dBµV/m)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.159865	46.48	---	---	103.53	57.05	1000.0	9.000	100.0	H	315.0
0.160551	46.41	---	---	103.49	57.09	1000.0	9.000	100.0	H	191.0
0.694704	---	39.08	---	70.77	31.69	1000.0	9.000	100.0	H	135.0
0.791980	---	37.77	---	69.63	31.86	1000.0	9.000	100.0	H	315.0
0.995263	---	35.73	---	67.65	31.91	1000.0	9.000	100.0	H	45.0
10.122215	---	21.90	---	69.54	47.64	1000.0	9.000	100.0	H	45.0
0.026151	---	---	54.92	139.25	84.33	1000.0	0.200	100.0	H	190.0
0.085022	---	---	44.67	129.01	84.34	1000.0	0.200	100.0	H	35.0
0.156919	---	---	57.21	123.69	66.48	1000.0	9.000	100.0	H	280.0
0.380337	---	---	51.21	116.00	64.79	1000.0	9.000	100.0	H	34.0
0.397118	---	---	48.98	115.63	66.65	1000.0	9.000	100.0	H	280.0
0.431806	---	---	48.94	114.90	65.96	1000.0	9.000	100.0	H	-41.0

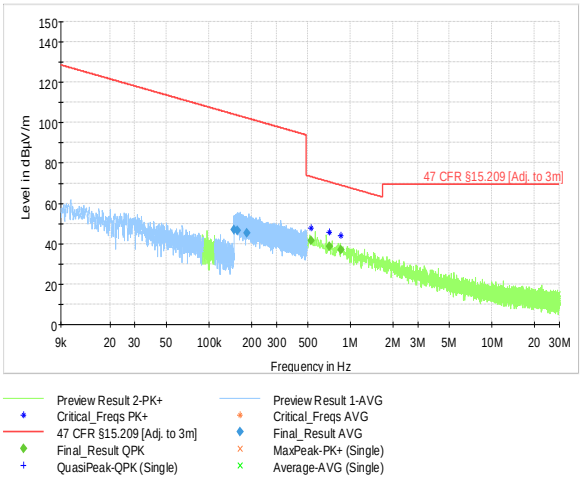
Test mode condition	WLAN 2.4 GHz 802.11n (mid channel – 2437 MHz)	
Antenna orientation	Loop Antenna Perpendicular to Axis	
Sweep frequency	9 KHz – 30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-010	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Joel Efraimsson	Date: 2021-01-20
Chamber details	Chamber: SAC 5	

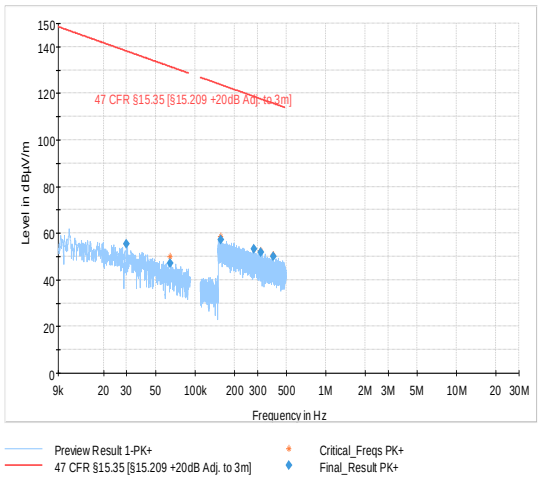




Frequency (MHz)	Average (dBµV/m)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.157292	46.60	---	---	103.67	57.07	1000.0	9.000	100.0	H	307.0
0.380523	38.65	---	---	96.00	57.35	1000.0	9.000	100.0	H	166.0
0.390497	38.29	---	---	95.77	57.48	1000.0	9.000	100.0	H	244.0
0.972938	---	35.96	---	67.84	31.88	1000.0	9.000	100.0	H	139.0
1.229353	---	33.35	---	65.81	32.46	1000.0	9.000	100.0	H	219.0
2.094828	---	27.78	---	69.54	41.76	1000.0	9.000	100.0	H	89.0
0.013062	---	---	60.30	145.28	84.98	1000.0	0.200	100.0	H	-27.0
0.060120	---	---	47.93	132.02	84.10	1000.0	0.200	100.0	H	243.0
0.153515	---	---	58.79	123.88	65.09	1000.0	9.000	100.0	H	225.0
0.179518	---	---	56.63	122.52	65.89	1000.0	9.000	100.0	H	135.0
0.274185	---	---	52.43	118.84	66.41	1000.0	9.000	100.0	H	225.0
0.351432	---	---	50.46	116.69	66.22	1000.0	9.000	100.0	H	-15.0

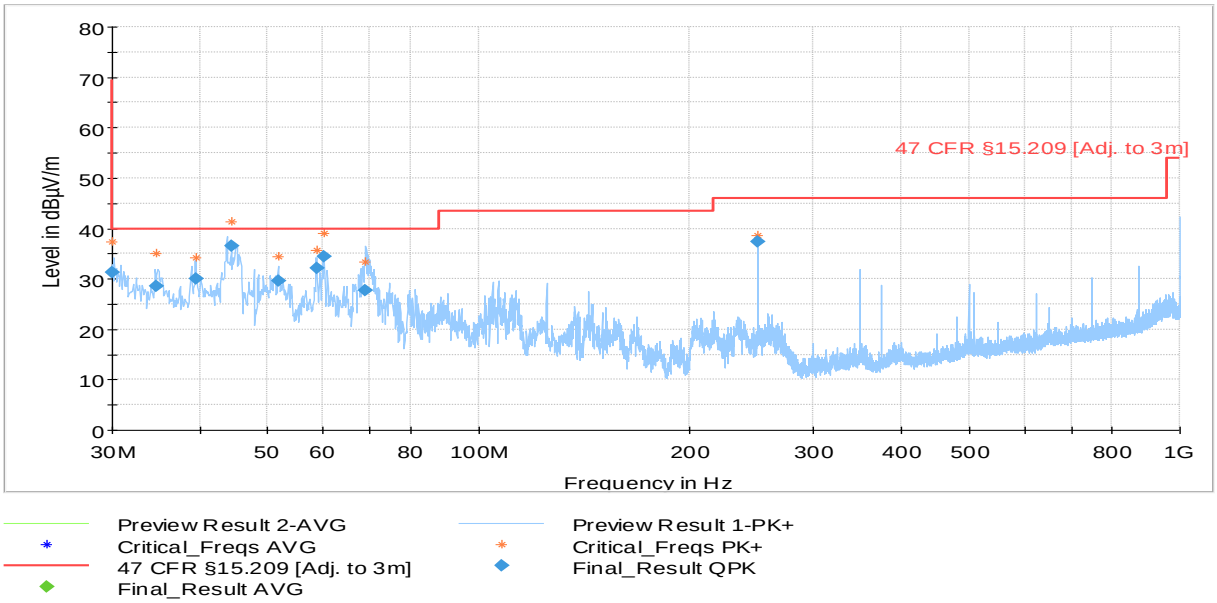
Test mode condition	WLAN 2.4 GHz 802.11n (mid channel – 2437 MHz)	
Antenna orientation	Loop Antenna Parallel to Floor	
Sweep frequency	9 KHz – 30 MHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-010	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Joel Efraimsson	Date: 2021-01-20
Chamber details	Chamber: SAC 5	





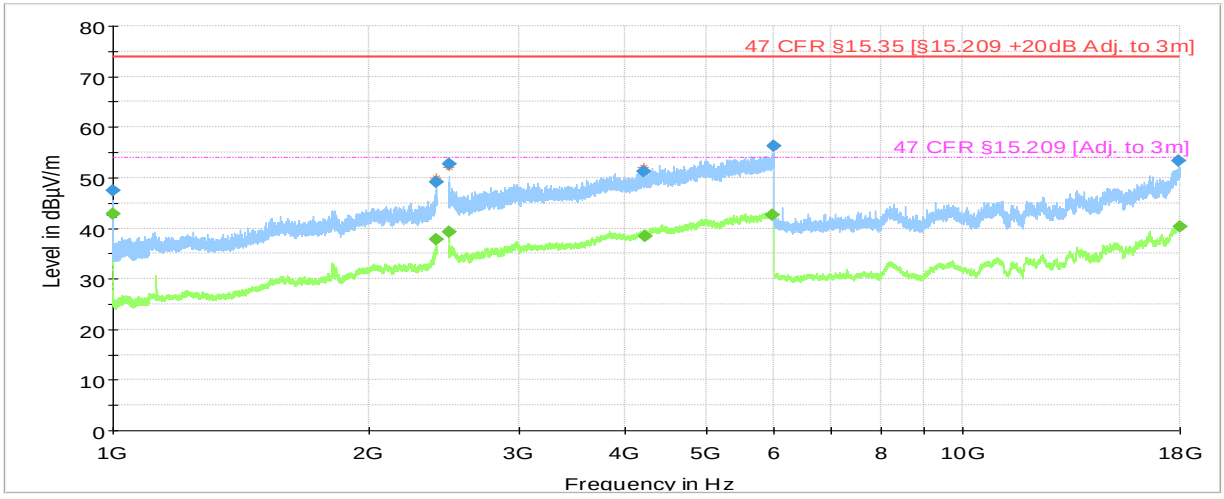
Frequency (MHz)	Average (dBµV/m)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.150741	46.89	---	---	104.04	57.15	1000.0	9.000	100.0	H	256.0
0.158345	46.46	---	---	103.61	57.15	1000.0	9.000	100.0	H	128.0
0.185662	45.15	---	---	102.23	57.08	1000.0	9.000	100.0	H	135.0
0.530988	---	41.62	---	73.10	31.48	1000.0	9.000	100.0	H	139.0
0.709276	---	38.77	---	70.59	31.82	1000.0	9.000	100.0	H	12.0
0.857106	---	37.02	---	68.94	31.93	1000.0	9.000	100.0	H	64.0
0.029779	---	---	55.53	138.13	82.59	1000.0	0.200	100.0	H	139.0
0.064714	---	---	47.28	131.38	84.11	1000.0	0.200	100.0	H	225.0
0.157869	---	---	57.36	123.64	66.28	1000.0	9.000	100.0	H	23.0
0.281212	---	---	53.10	118.62	65.52	1000.0	9.000	100.0	H	-45.0
0.319488	---	---	51.92	117.52	65.60	1000.0	9.000	100.0	H	190.0
0.397580	---	---	50.15	115.62	65.47	1000.0	9.000	100.0	H	225.0

Test mode condition	WLAN 2.4 GHz 802.11n (mid channel – 2437 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	30 MHz – 1 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-010	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Simon Palmhager	Date: 2020-12-10
Chamber details	Chamber: SAC 5	



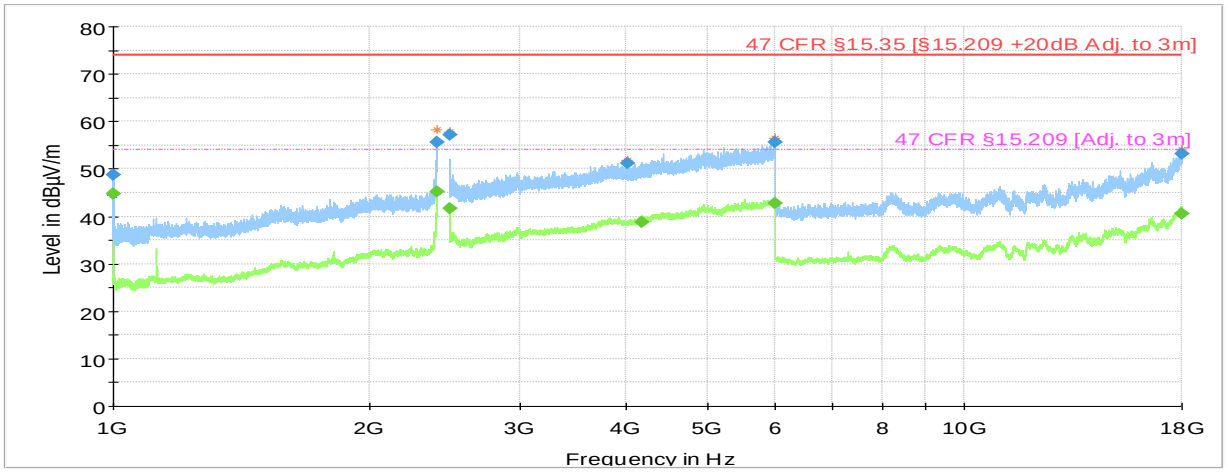
Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
30.024455	31.21	---	40.00	8.79	1000.0	120.000	133.0	H	19.0
34.697720	28.50	---	40.00	11.50	1000.0	120.000	100.0	V	68.0
39.448760	30.04	---	40.00	9.96	1000.0	120.000	100.0	V	68.0
44.365120	36.44	---	40.00	3.56	1000.0	120.000	125.0	V	8.0
51.829520	29.64	---	40.00	10.36	1000.0	120.000	125.0	V	22.0
58.722560	32.23	---	40.00	7.77	1000.0	120.000	125.0	V	233.0
60.221960	34.49	---	40.00	5.51	1000.0	120.000	125.0	V	248.0
68.997000	27.69	---	40.00	12.31	1000.0	120.000	125.0	V	162.0
250.005480	37.28	---	46.02	8.74	1000.0	120.000	133.0	H	112.0

Test mode condition	WLAN 2.4 GHz 802.11b (mid channel – 2437 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-013	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Fariborz Abasi	Date: 2021-01-07
Chamber details	Chamber: SAC 5	



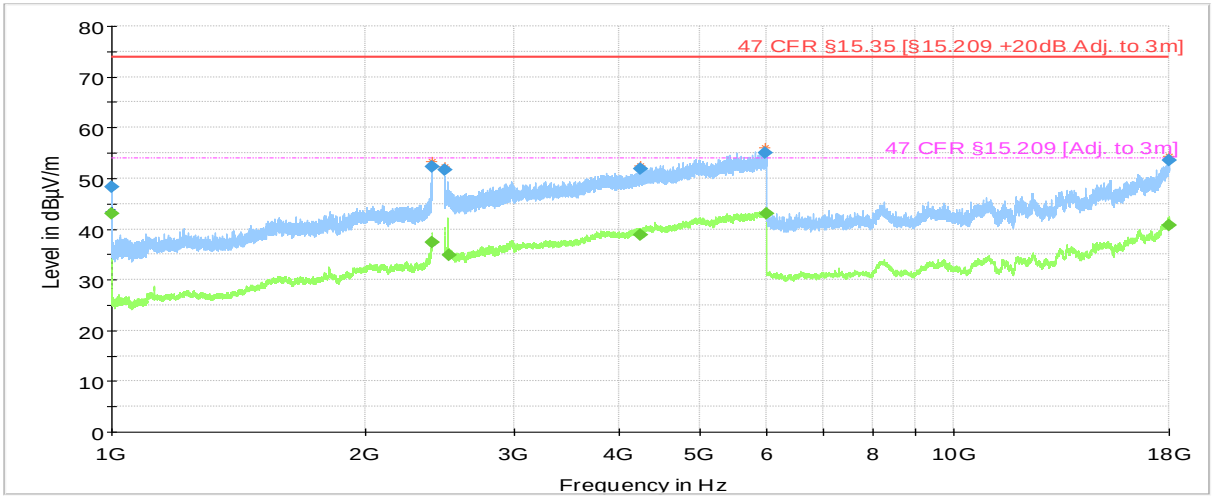
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1000.016416	47.37	---	73.98	26.61	1000.0	1000.000	105.0	V	22.0
1000.038654	---	42.79	53.98	11.19	1000.0	1000.000	102.0	V	11.0
2399.898482	49.20	---	73.98	24.78	1000.0	1000.000	170.0	H	190.0
2399.967000	---	37.76	53.98	16.22	1000.0	1000.000	136.0	H	-22.0
2483.553074	---	39.33	53.98	14.64	1000.0	1000.000	175.0	H	335.0
2483.653000	52.62	---	73.98	21.36	1000.0	1000.000	175.0	H	-22.0
4214.318000	51.32	---	73.98	22.65	1000.0	1000.000	177.0	V	-18.0
4230.981000	---	38.49	53.98	15.49	1000.0	1000.000	125.0	H	178.0
5976.454000	---	42.72	53.98	11.26	1000.0	1000.000	125.0	V	132.0
5979.361000	56.21	---	73.98	17.77	1000.0	1000.000	175.0	V	296.0
17945.931000	53.25	---	73.98	20.73	1000.0	1000.000	100.0	V	22.0
17991.292000	---	40.26	53.98	13.72	1000.0	1000.000	206.0	V	130.0

Test mode condition	WLAN 2.4 GHz 802.11g (mid channel – 2437 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-013	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Joel Efraimsson	Date: 2020-12-02
Chamber details	Chamber: SAC 5	



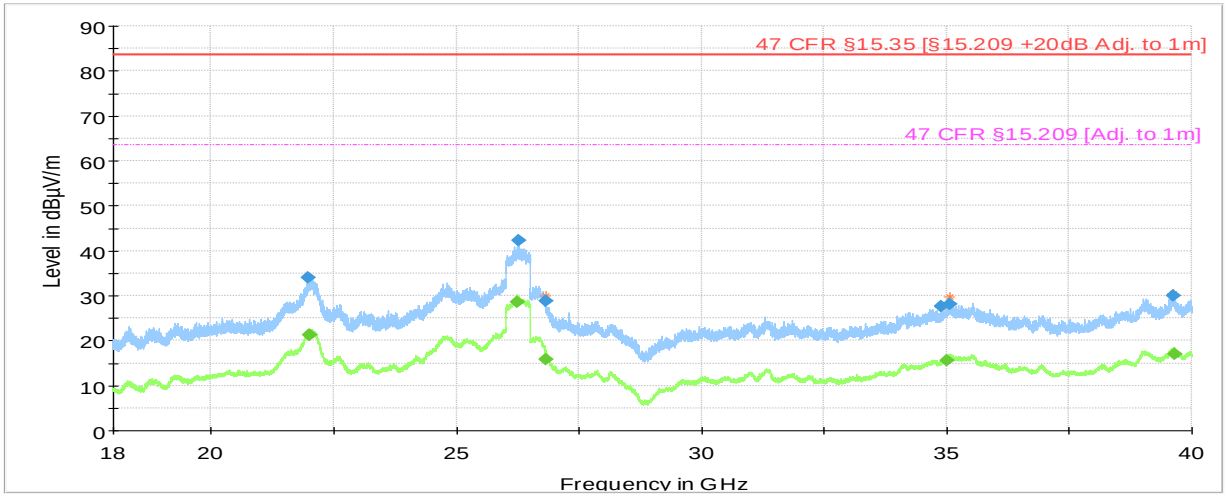
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1000.025653	---	44.74	53.98	9.24	1000.0	1000.000	137.0	H	267.0
1000.088218	48.68	---	73.98	25.30	1000.0	1000.000	127.0	H	267.0
2397.837840	55.65	---	73.98	18.33	1000.0	1000.000	169.0	H	252.0
2399.716000	---	45.15	53.98	8.83	1000.0	1000.000	127.0	H	338.0
2483.542174	---	41.72	53.98	12.26	1000.0	1000.000	198.0	H	338.0
2483.638153	57.15	---	73.98	16.83	1000.0	1000.000	125.0	H	338.0
4023.453000	51.22	---	73.98	22.76	1000.0	1000.000	125.0	V	158.0
4184.842000	---	38.75	53.98	15.23	1000.0	1000.000	210.0	V	162.0
5979.944000	55.52	---	73.98	18.46	1000.0	1000.000	100.0	V	72.0
5984.480000	---	42.88	53.98	11.10	1000.0	1000.000	210.0	V	41.0
17975.489000	---	40.57	53.98	13.41	1000.0	1000.000	125.0	V	158.0
17981.033000	53.27	---	73.98	20.71	1000.0	1000.000	135.0	H	292.0

Test mode condition	WLAN 2.4 GHz 802.11n (mid channel – 2437 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-013	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Simon Palmhager	Date: 2020-12-03
Chamber details	Chamber: SAC 5	



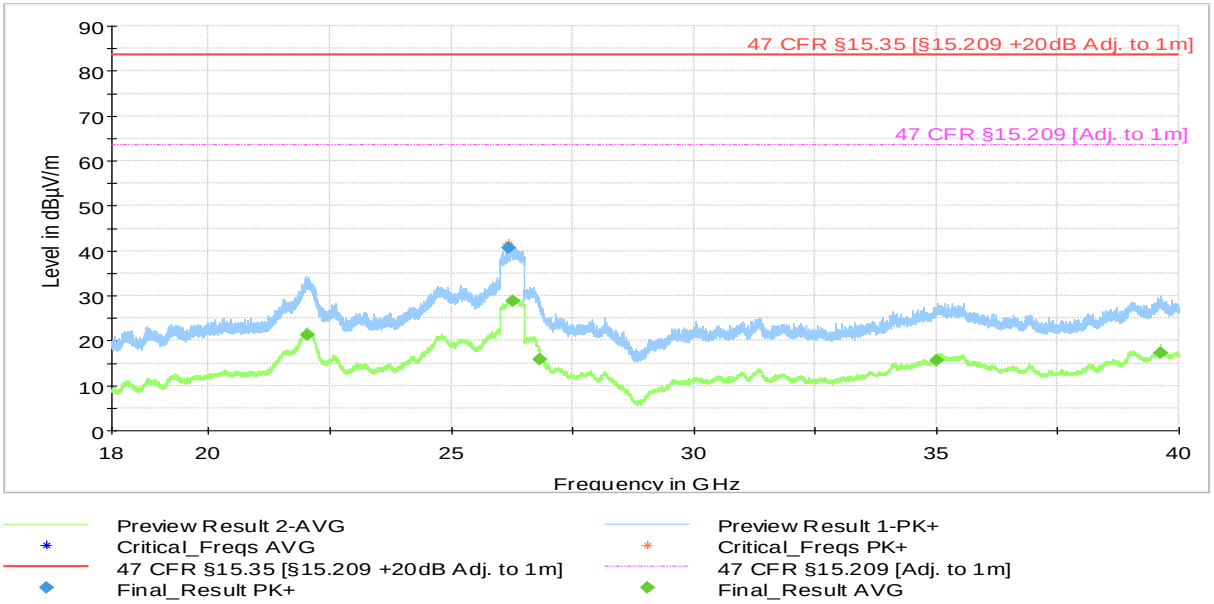
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1000.003507	---	43.13	53.98	10.85	1000.0	1000.000	137.0	H	267.0
1000.059787	48.27	---	73.98	25.71	1000.0	1000.000	148.0	H	267.0
2399.882010	---	37.39	53.98	16.59	1000.0	1000.000	198.0	V	313.0
2399.889014	52.24	---	73.98	21.74	1000.0	1000.000	210.0	V	311.0
2483.590727	51.55	---	73.98	22.43	1000.0	1000.000	175.0	H	54.0
2510.528700	---	34.96	53.98	19.02	1000.0	1000.000	125.0	H	282.0
4238.973000	51.92	---	73.98	22.06	1000.0	1000.000	175.0	V	144.0
4239.662000	---	38.83	53.98	15.15	1000.0	1000.000	125.0	H	26.0
5956.727000	54.95	---	73.98	19.03	1000.0	1000.000	169.0	V	290.0
5981.496000	---	43.04	53.98	10.94	1000.0	1000.000	210.0	H	178.0
17987.894000	---	40.66	53.98	13.32	1000.0	1000.000	120.0	V	244.0
17991.132000	53.57	---	73.98	20.41	1000.0	1000.000	125.0	H	8.0

Test mode condition	WLAN 2.4 GHz 802.11b (mid channel – 2437 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-013	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Simon Palmhager	Date: 2021-01-05
Chamber details	Chamber: SAC 5	



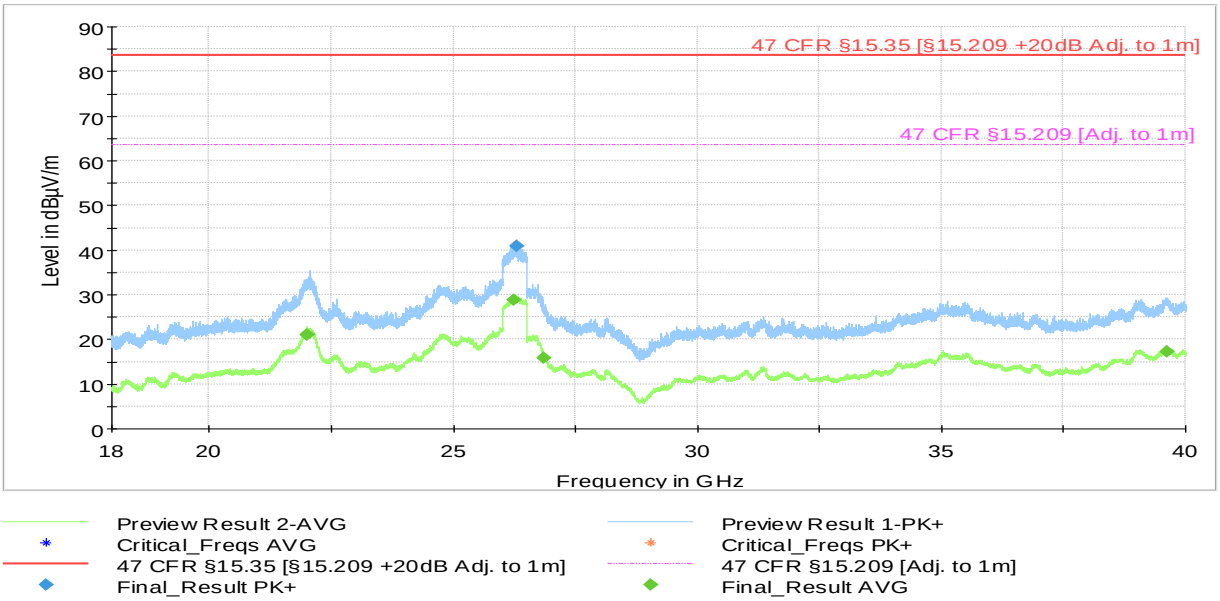
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
21972.043000	33.97	---	83.52	49.55	1000.0	1000.000	155.0	H	22.0
22001.451000	---	21.24	63.52	42.28	1000.0	1000.000	155.0	H	322.0
22002.919000	---	21.19	63.52	42.34	1000.0	1000.000	155.0	H	312.0
26241.797000	---	28.62	63.52	34.90	1000.0	1000.000	155.0	V	216.0
26259.416000	42.24	---	83.52	41.28	1000.0	1000.000	155.0	H	172.0
26835.495000	---	15.93	63.52	47.60	1000.0	1000.000	155.0	V	172.0
26836.577000	28.84	---	83.52	54.68	1000.0	1000.000	155.0	V	262.0
34883.361000	27.56	---	83.52	55.96	1000.0	1000.000	155.0	V	116.0
35007.064000	---	15.50	63.52	48.02	1000.0	1000.000	155.0	H	68.0
35064.634000	28.12	---	83.52	55.40	1000.0	1000.000	155.0	H	292.0
39631.935000	29.93	---	83.52	53.59	1000.0	1000.000	155.0	H	222.0
39640.771000	---	17.09	63.52	46.43	1000.0	1000.000	155.0	V	158.0

Test mode condition	WLAN 2.4 GHz 802.11g (mid channel – 2437 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-013	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Sam Ebadeh	Date: 2021-01-05
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
22028.364000	---	21.32	63.52	42.20	1000.0	1000.000	155.0	H	98.0
26166.671000	40.71	---	83.52	42.82	1000.0	1000.000	155.0	H	172.0
26254.275000	---	28.81	63.52	34.71	1000.0	1000.000	155.0	V	262.0
26836.174000	---	15.92	63.52	47.60	1000.0	1000.000	155.0	H	248.0
35005.428000	---	15.52	63.52	48.00	1000.0	1000.000	155.0	H	276.0
39616.743000	---	17.25	63.52	46.27	1000.0	1000.000	155.0	V	22.0

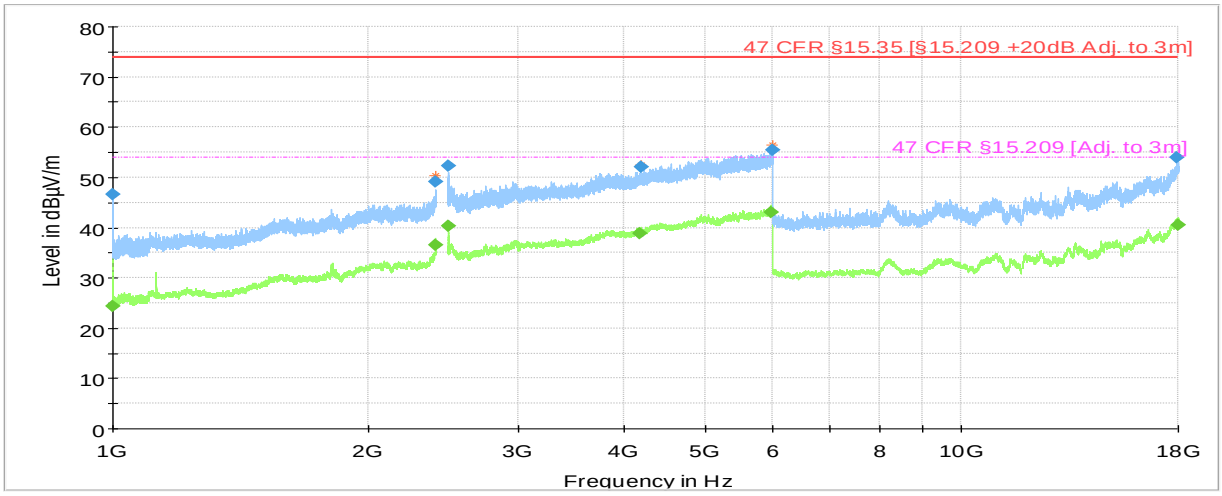
Test mode condition	WLAN 2.4 GHz 802.11n (mid channel – 2437 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-013	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Sam Ebadeh	Date: 2021-01-05
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
21990.629000	---	21.14	63.52	42.39	1000.0	1000.000	155.0	H	342.0
21992.776000	---	21.12	63.52	42.40	1000.0	1000.000	155.0	H	342.0
26253.459000	---	28.86	63.52	34.66	1000.0	1000.000	155.0	V	26.0
26297.880000	40.84	---	83.52	42.69	1000.0	1000.000	155.0	H	192.0
26840.815000	---	15.76	63.52	47.76	1000.0	1000.000	155.0	V	292.0
39610.237000	---	17.22	63.52	46.31	1000.0	1000.000	155.0	V	-4.0

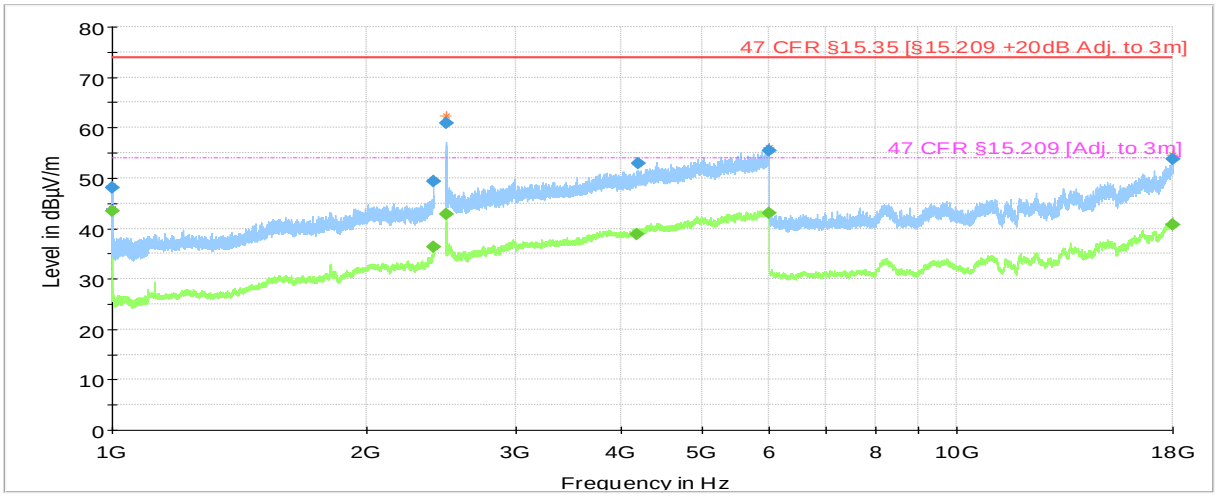
High Channel

Test mode condition	WLAN 2.4 GHz 802.11b (high channel – 2462 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-013	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Sam Ebadeh	Date: 2021-01-08
Chamber details	Chamber: SAC 5	



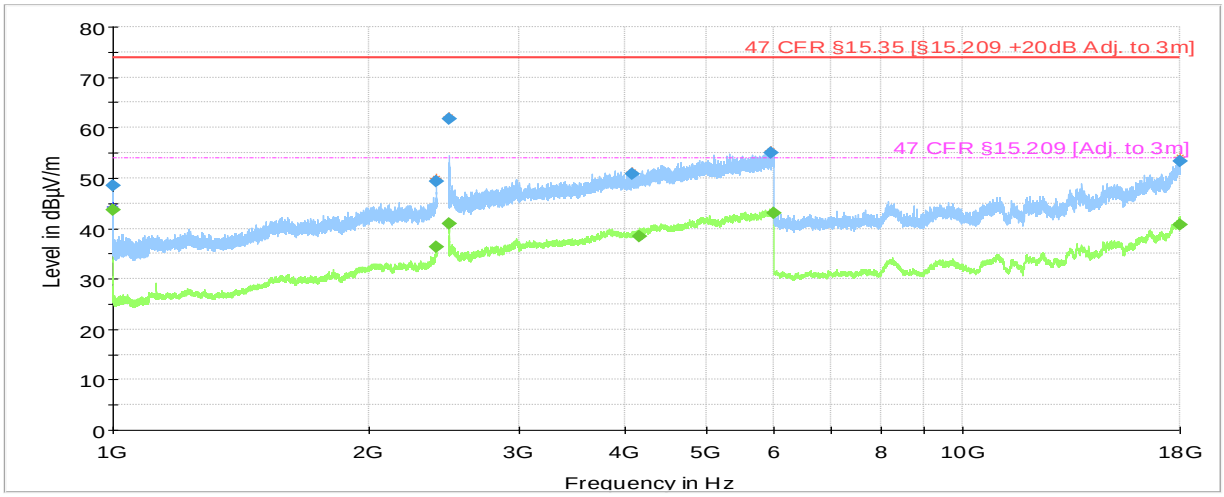
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1000.035784	46.52	---	73.98	27.46	1000.0	1000.000	121.0	V	22.0
1000.241440	---	24.32	53.98	29.66	1000.0	1000.000	102.0	V	10.0
2399.919500	49.13	---	73.98	24.85	1000.0	1000.000	138.0	V	177.0
2399.967000	---	36.57	53.98	17.41	1000.0	1000.000	127.0	H	190.0
2483.576245	---	40.30	53.98	13.67	1000.0	1000.000	125.0	H	-18.0
2483.715359	52.22	---	73.98	21.76	1000.0	1000.000	100.0	H	248.0
4185.246000	---	38.80	53.98	15.18	1000.0	1000.000	100.0	H	100.0
4194.512000	52.06	---	73.98	21.92	1000.0	1000.000	187.0	V	234.0
5975.866000	---	43.05	53.98	10.93	1000.0	1000.000	175.0	H	200.0
5980.611000	55.50	---	73.98	18.48	1000.0	1000.000	120.0	V	202.0
17903.901000	54.03	---	73.98	19.95	1000.0	1000.000	159.0	H	42.0
17989.378000	---	40.43	53.98	13.55	1000.0	1000.000	210.0	V	22.0

Test mode condition	WLAN 2.4 GHz 802.11g (high channel – 2462 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-010	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Niall Forrester	Date: 2020-12-04
Chamber details	Chamber: SAC 5	



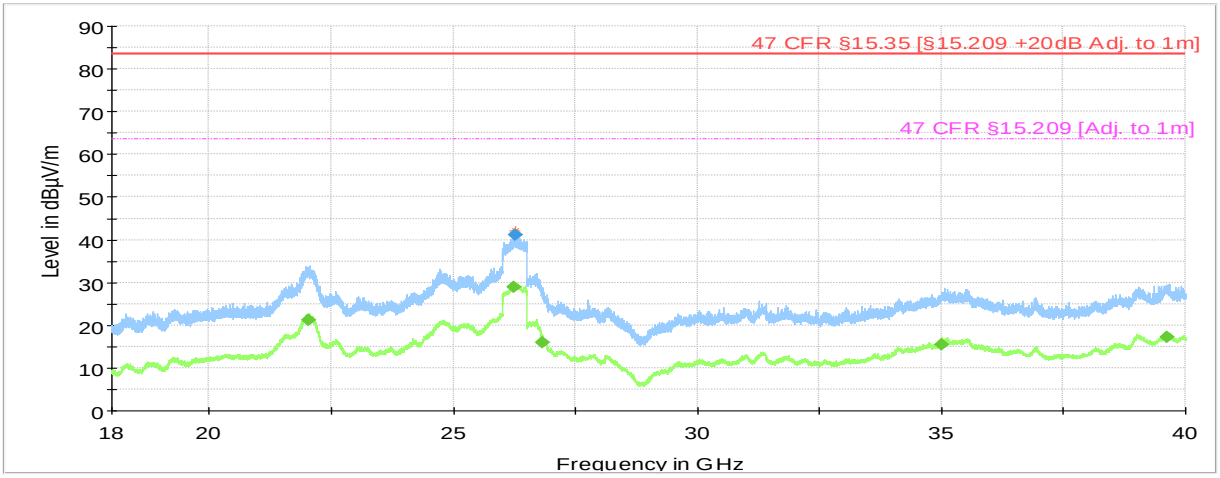
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1000.007042	---	43.46	53.98	10.52	1000.0	1000.000	138.0	H	267.0
1000.040014	48.09	---	73.98	25.89	1000.0	1000.000	137.0	H	267.0
2399.816000	49.31	---	73.98	24.67	1000.0	1000.000	127.0	H	22.0
2399.911000	---	36.25	53.98	17.73	1000.0	1000.000	125.0	H	202.0
2483.886481	60.89	---	73.98	13.09	1000.0	1000.000	125.0	H	335.0
2484.332859	---	42.86	53.98	11.12	1000.0	1000.000	137.0	H	338.0
4181.137000	---	38.77	53.98	15.21	1000.0	1000.000	137.0	H	-18.0
4200.693000	52.86	---	73.98	21.12	1000.0	1000.000	148.0	V	-18.0
5978.744000	---	43.01	53.98	10.97	1000.0	1000.000	100.0	H	290.0
5985.529000	55.51	---	73.98	18.47	1000.0	1000.000	120.0	V	112.0
17971.513000	---	40.67	53.98	13.31	1000.0	1000.000	210.0	V	-22.0
17998.046500	53.66	---	73.98	20.32	1000.0	1000.000	175.0	H	52.0

Test mode condition	WLAN 2.4 GHz 802.11n (high channel – 2462 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-010	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Simon Palmhager	Date: 2020-12-03
Chamber details	Chamber: SAC 5	



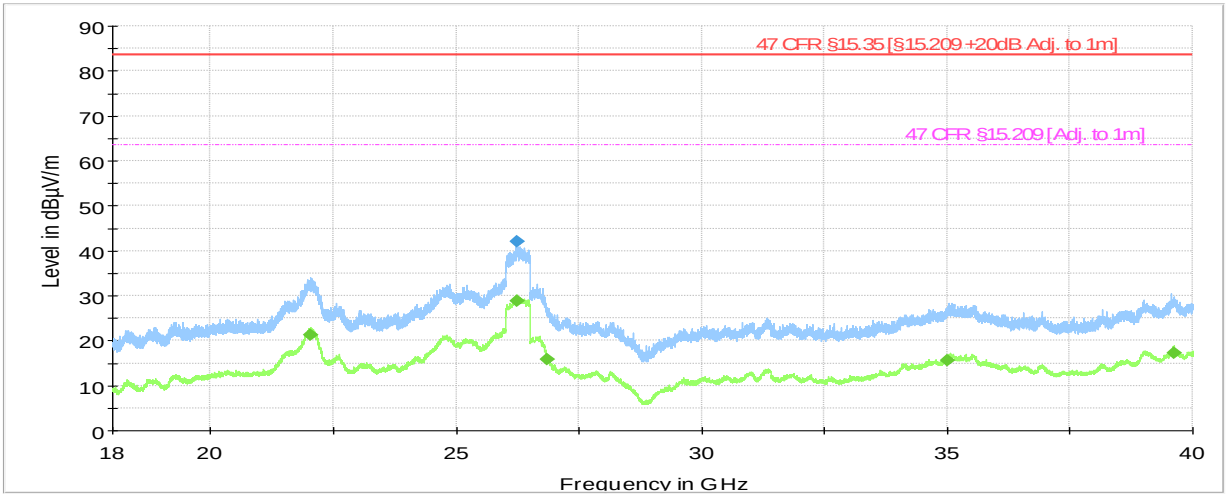
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1000.013554	---	43.67	53.98	10.31	1000.0	1000.000	137.0	H	267.0
1000.034036	48.61	---	73.98	25.37	1000.0	1000.000	148.0	H	267.0
2399.853500	49.43	---	73.98	24.55	1000.0	1000.000	121.0	H	144.0
2399.994000	---	36.39	53.98	17.59	1000.0	1000.000	125.0	V	202.0
2483.579612	---	40.92	53.98	13.05	1000.0	1000.000	102.0	H	338.0
2483.996500	61.77	---	73.98	12.21	1000.0	1000.000	198.0	H	338.0
4077.781000	50.77	---	73.98	23.21	1000.0	1000.000	210.0	H	116.0
4156.232000	---	38.42	53.98	15.56	1000.0	1000.000	120.0	H	245.0
5936.122000	54.99	---	73.98	18.99	1000.0	1000.000	175.0	H	248.0
5981.524000	---	43.00	53.98	10.98	1000.0	1000.000	100.0	V	222.0
17990.706000	---	40.69	53.98	13.29	1000.0	1000.000	197.0	V	98.0
17995.998520	53.36	---	73.98	20.62	1000.0	1000.000	196.0	H	289.0

Test mode condition	WLAN 2.4 GHz 802.11b (high channel – 2462 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-013	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Sam Ebadeh	Date: 2021-01-05
Chamber details	Chamber: SAC 5	



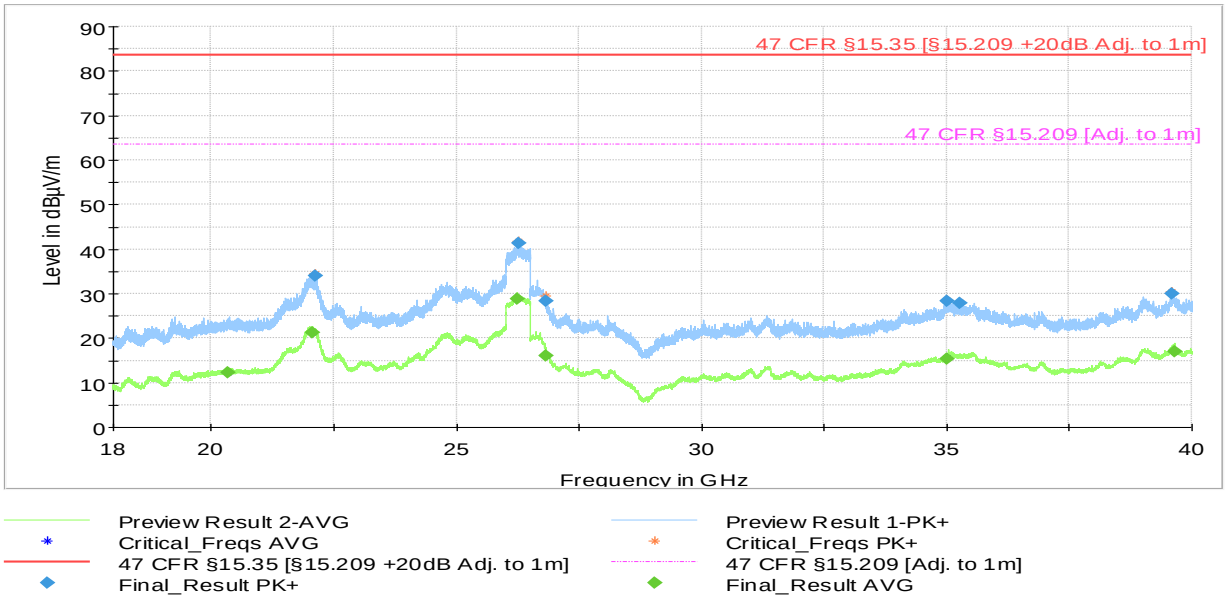
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
22036.252000	---	21.29	63.52	42.24	1000.0	1000.000	155.0	V	112.0
26250.400000	---	28.81	63.52	34.72	1000.0	1000.000	155.0	V	232.0
26266.717000	41.26	---	83.52	42.26	1000.0	1000.000	155.0	V	38.0
26833.611000	---	15.93	63.52	47.60	1000.0	1000.000	155.0	H	112.0
35011.208000	---	15.54	63.52	47.98	1000.0	1000.000	155.0	V	-4.0
39626.039000	---	17.25	63.52	46.27	1000.0	1000.000	155.0	V	22.0

Test mode condition	WLAN 2.4 GHz 802.11g (high channel – 2462 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-013	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Sam Ebadeh	Date: 2021-01-05
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
22044.366000	---	21.27	63.52	42.25	1000.0	1000.000	155.0	V	132.0
26251.096000	---	28.84	63.52	34.68	1000.0	1000.000	155.0	V	352.0
26252.699000	42.04	---	83.52	41.48	1000.0	1000.000	155.0	H	206.0
26838.239000	---	15.83	63.52	47.69	1000.0	1000.000	155.0	H	338.0
35009.838000	---	15.54	63.52	47.98	1000.0	1000.000	155.0	H	96.0
39610.836000	---	17.20	63.52	46.33	1000.0	1000.000	155.0	V	296.0

Test mode condition	WLAN 2.4 GHz 802.11n (high channel – 2462 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	18 GHz – 40 GHz	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-013	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Sam Ebadeh	Date: 2021-01-05
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
20345.882000	---	12.37	63.52	51.15	1000.0	1000.000	155.0	H	236.0
22052.037000	---	21.23	63.52	42.29	1000.0	1000.000	155.0	V	72.0
22105.615000	34.11	---	83.52	49.41	1000.0	1000.000	155.0	V	68.0
26250.450000	---	28.84	63.52	34.68	1000.0	1000.000	155.0	V	-8.0
26255.673000	41.23	---	83.52	42.29	1000.0	1000.000	155.0	H	232.0
26829.676000	---	16.06	63.52	47.46	1000.0	1000.000	155.0	H	146.0
26836.442000	28.38	---	83.52	55.14	1000.0	1000.000	155.0	V	52.0
35000.884000	---	15.47	63.52	48.06	1000.0	1000.000	155.0	V	252.0
35005.395000	28.23	---	83.52	55.29	1000.0	1000.000	155.0	H	22.0
35256.462000	27.86	---	83.52	55.66	1000.0	1000.000	155.0	H	126.0
39589.324000	29.89	---	83.52	53.63	1000.0	1000.000	155.0	H	278.0
39647.817000	---	17.01	63.52	46.51	1000.0	1000.000	155.0	H	38.0

4.3 Test Results – Antenna Conducted Emissions

4.3.1 Antenna Conducted Emissions – Test Summary

Emissions measurements have been performed as radiated test (see section 4.2)

4.4 Test Results – Band Edge Compliance (Authorized Band)

4.4.1 Band Edge Compliance (Authorized Band) – Test Summary

This test has not been performed. The device is based on certified modules as described in section 2.1

4.5 Test Results – Band Edge Compliance (Restricted Band)

4.5.1 Band Edge Compliance (Restricted Band) – Test Summary

Test Specification	47 CFR 15.209 & 15.247 (d)	
Test Engineer & Date	Simon Palmhager Niall Forrester	2020.12.04 – 2020.12.09
EUT and Ancillary Equipment IDs	A002959287-010	A002959287-011 A002959287-012 A002959287-025
EUT Operation Mode(s)	Continuous Tx	
EUT Wireless Configuration(s)	WLAN 802.11 b/g/n (see below for details)	
EUT Hardware Configuration(s)	Power from USB Power Supply	
Overall Result	PASS	

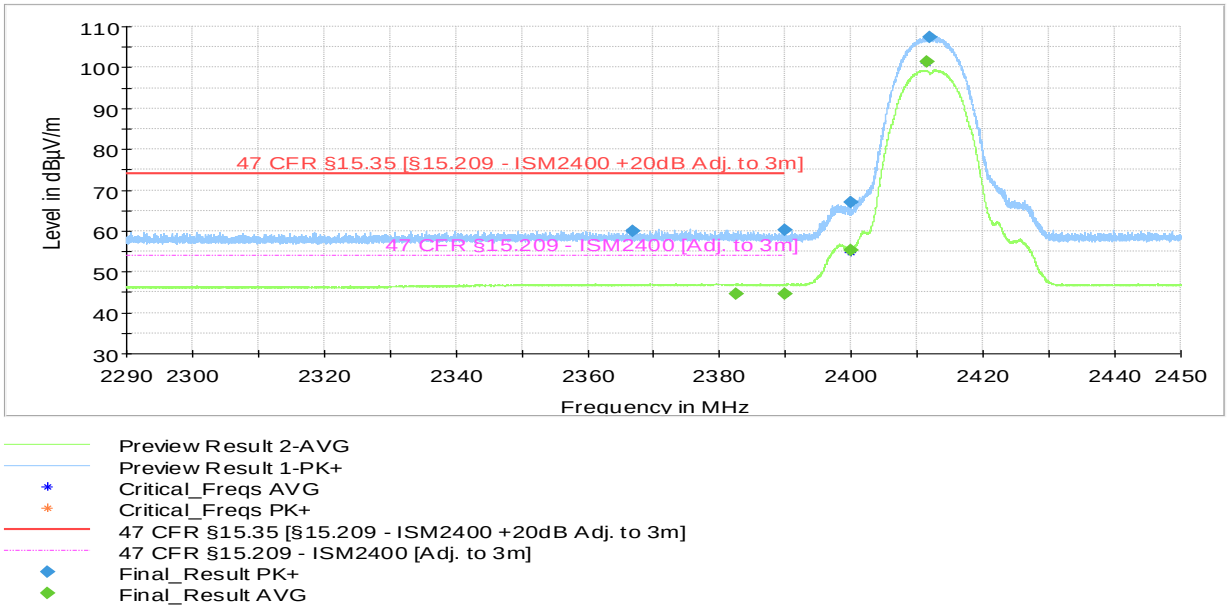
Test Parameter	Wireless Configuration	Result*
Emissions at Band Edge (Rest. Band – Low Edge)	WLAN 802.11b 5.5Mbps Low Chan. (CCK 2412 MHz)	PASS
Emissions at Band Edge (Rest. Band – Low Edge)	WLAN 802.11g 6Mbps Low Chan. (BPSK 2412 MHz)	PASS
Emissions at Band Edge (Rest. Band – Low Edge)	WLAN 802. 802.11n MCS 0 Low Chan. (BPSK 2412 MHz)	PASS
Emissions at Band Edge (Rest. Band – High Edge)	WLAN 802.11b 5.5Mbps High Chan. (CCK 2462 MHz)	PASS
Emissions at Band Edge (Rest. Band – High Edge)	WLAN 802.11g 6Mbps High Chan. (BPSK 2462 MHz)	PASS
Emissions at Band Edge (Rest. Band – High Edge)	WLAN 802. 802.11n MCS 0 High Chan. (BPSK 2462 MHz)	PASS

* For detailed measurements, see tables and graphs in sections below

4.5.2 Band Edge Compliance (Restricted Band) – Test Details

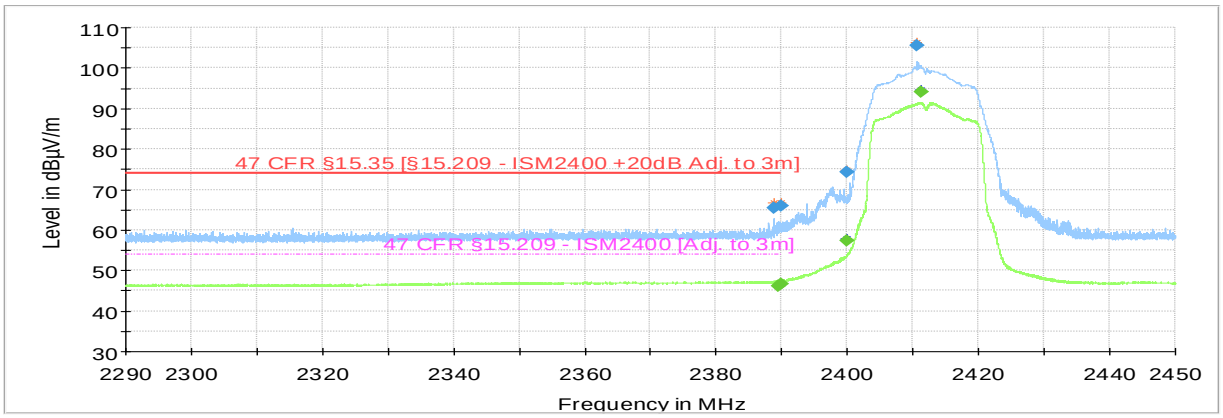
Restricted Band – Low Edge

Test mode condition	WLAN 2.4 GHz 802.11b (low channel – 2412 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz Lower Band Edge	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-010	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Simon Palmhager	Date: 2020-12-09
Chamber details	Chamber: SAC 5	



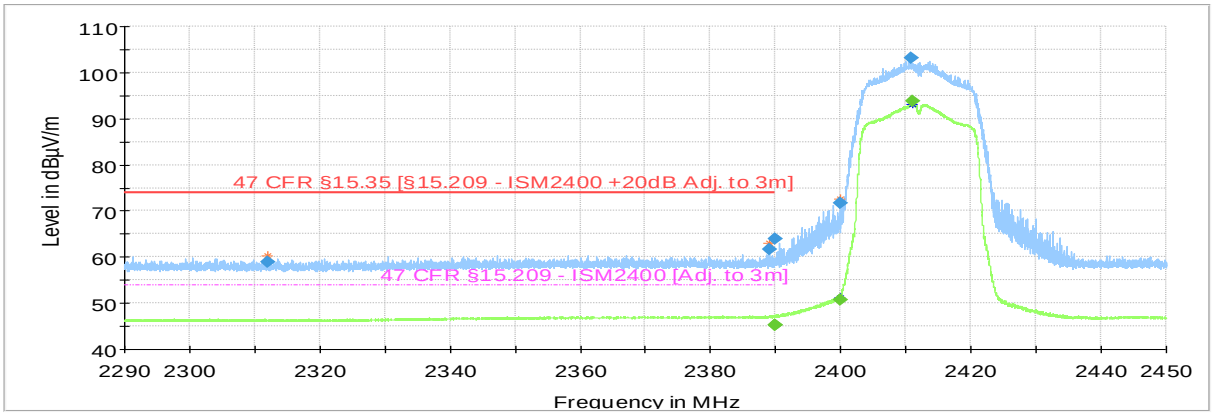
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2366.880000	59.87	---	73.98	14.11	1000.0	1000.000	210.0	V	340.0
2382.512000	---	44.59	53.98	9.39	1000.0	1000.000	145.0	H	327.0
2390.000000	---	44.64	53.98	9.33	1000.0	1000.000	157.0	H	327.0
2390.000000	60.14	---	73.98	13.84	1000.0	1000.000	111.0	H	4.0
2400.000000	66.98	---	---	---	1000.0	1000.000	121.0	H	350.0
2400.000000	---	55.37	---	---	1000.0	1000.000	145.0	H	331.0
2411.456000	---	101.32	---	---	1000.0	1000.000	157.0	H	339.0
2411.808000	107.41	---	---	---	1000.0	1000.000	135.0	H	325.0

Test mode condition	WLAN 2.4 GHz 802.11g (low channel – 2412 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz Lower Band Edge	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-010	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Niall Forrester	Date: 2020-12-04
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2388.864000	65.42	---	73.98	8.56	1000.0	1000.000	180.0	H	339.0
2389.520000	---	46.27	53.98	7.71	1000.0	1000.000	169.0	H	332.0
2390.000000	---	46.55	53.98	7.42	1000.0	1000.000	169.0	H	332.0
2390.000000	66.08	---	73.98	7.90	1000.0	1000.000	145.0	H	340.0
2400.000000	74.34	---	---	---	1000.0	1000.000	145.0	H	339.0
2400.000000	---	57.25	---	---	1000.0	1000.000	145.0	H	339.0
2410.704000	105.45	---	---	---	1000.0	1000.000	144.0	H	340.0
2411.232000	---	94.09	---	---	1000.0	1000.000	145.0	H	332.0

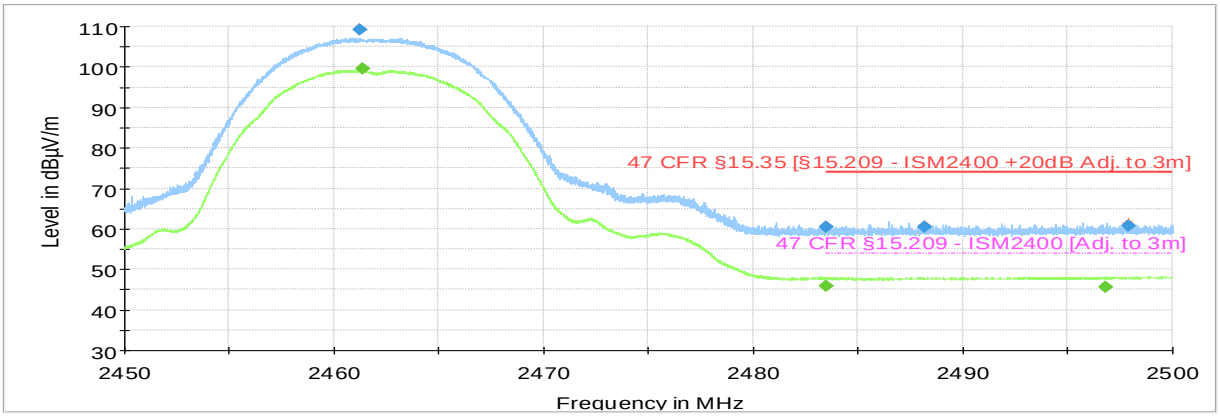
Test mode condition	WLAN 2.4 GHz 802.11n (low channel – 2412 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz Lower Band Edge	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-010	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Simon Palmhager	Date: 2020-12-09
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2312.000000	58.94	---	73.98	15.04	1000.0	1000.000	210.0	H	226.0
2389.136000	61.71	---	73.98	12.27	1000.0	1000.000	111.0	H	325.0
2389.824000	---	45.30	53.98	8.68	1000.0	1000.000	111.0	H	353.0
2390.000000	---	45.29	53.98	8.69	1000.0	1000.000	111.0	H	348.0
2390.000000	64.00	---	73.98	9.98	1000.0	1000.000	144.0	H	338.0
2400.000000	71.61	---	---	---	1000.0	1000.000	133.0	H	327.0
2400.000000	---	50.69	---	---	1000.0	1000.000	132.0	H	344.0
2410.784000	103.14	---	---	---	1000.0	1000.000	122.0	H	353.0
2410.944000	---	93.73	---	---	1000.0	1000.000	122.0	H	352.0

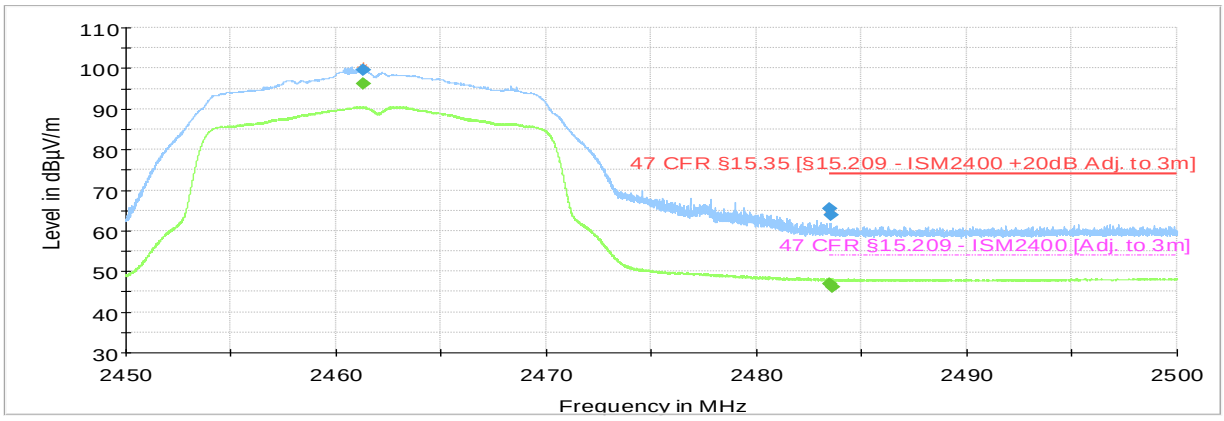
Restricted Band – High Edge

Test mode condition	WLAN 2.4 GHz 802.11b (high channel – 2462 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz Lower Band Edge	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-010	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Simon Palmhager	Date: 2020-12-09
Chamber details	Chamber: SAC 5	



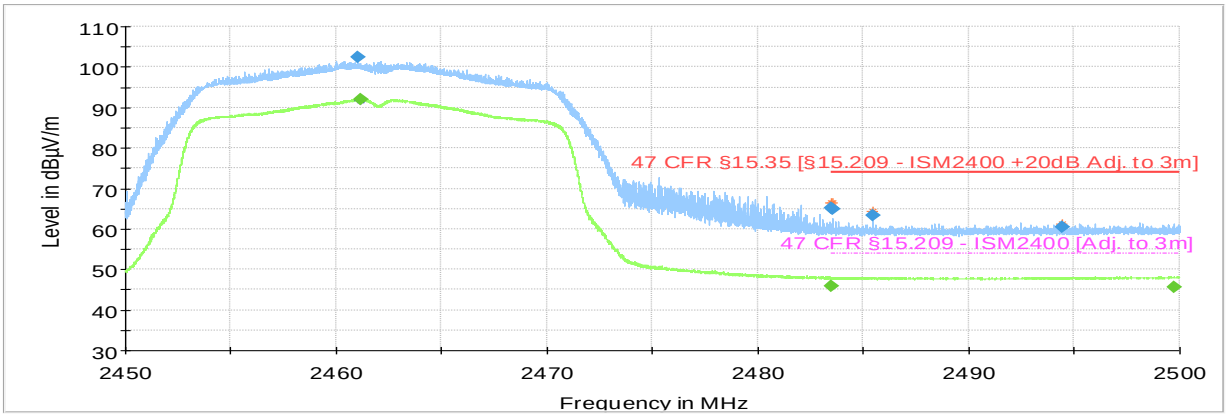
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2461.215000	109.16	---	---	---	1000.0	1000.000	132.0	H	336.0
2461.340000	---	99.65	---	---	1000.0	1000.000	133.0	H	326.0
2483.500000	---	45.81	53.98	8.17	1000.0	1000.000	134.0	H	0.0
2483.500000	60.37	---	73.98	13.61	1000.0	1000.000	210.0	V	0.0
2488.165000	60.44	---	73.98	13.54	1000.0	1000.000	168.0	V	179.0
2496.780000	---	45.64	53.98	8.34	1000.0	1000.000	110.0	V	202.0
2497.875000	60.64	---	73.98	13.34	1000.0	1000.000	210.0	V	4.0

Test mode condition	WLAN 2.4 GHz 802.11g (high channel – 2462 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz Lower Band Edge	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-010	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Niall Forrester	Date: 2020-12-04
Chamber details	Chamber: SAC 5	



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2461.305000	---	96.25	---	---	1000.0	1000.000	159.0	H	340.0
2461.310000	99.68	---	---	---	1000.0	1000.000	121.0	H	88.0
2483.500000	---	46.82	53.98	7.16	1000.0	1000.000	133.0	H	340.0
2483.500000	65.45	---	73.98	8.53	1000.0	1000.000	145.0	H	335.0
2483.545000	63.89	---	73.98	10.09	1000.0	1000.000	204.0	H	328.0
2483.620000	---	46.24	53.98	7.74	1000.0	1000.000	180.0	H	325.0

Test mode condition	WLAN 2.4 GHz 802.11n (high channel – 2462 MHz)	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz Lower Band Edge	
Standard	47 CFR FCC Part 15 subpart C	
EUT	A002959287-010	
Ancillary Equipment	A002959287-011, A002959287-012, A002959287-025	
Test Engineer	Simon Palmhager	Date: 2020-12-09
Chamber details	Chamber: SAC 5	



Preview Result 2-AVG
Preview Result 1-PK+
Critical_Freqs AVG
Critical_Freqs PK+
47 CFR §15.35 [§15.209 - ISM2400 +20dB Adj. to 3m]
47 CFR §15.209 - ISM2400 [Adj. to 3m]
Final_Result PK+
Final_Result AVG

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2461.010000	102.47	---	---	---	1000.0	1000.000	100.0	H	318.0
2461.140000	---	91.93	---	---	1000.0	1000.000	100.0	H	316.0
2483.500000	---	45.99	53.98	7.99	1000.0	1000.000	180.0	H	319.0
2483.500000	65.13	---	73.98	8.85	1000.0	1000.000	180.0	H	330.0
2483.530000	65.03	---	73.98	8.95	1000.0	1000.000	133.0	H	338.0
2485.470000	63.24	---	73.98	10.74	1000.0	1000.000	181.0	H	337.0
2494.410000	60.56	---	73.98	13.42	1000.0	1000.000	122.0	V	56.0
2499.745000	---	45.65	53.98	8.33	1000.0	1000.000	210.0	V	350.0

4.6 Test Results – 20dB Bandwidth

4.6.1 20dB Bandwidth – Test Summary

This requirement is not applicable as the radio technology is non-hopping

4.7 Test Results – Carrier (Hopping Channel) Separation

4.7.1 Carrier (Hopping Channel) Separation – Test Summary

This requirement is not applicable as the radio technology is non-hopping

4.8 Test Results – Number of Hopping Channels

4.8.1 Number of Hopping Channels – Test Summary

This requirement is not applicable as the radio technology is non-hopping

4.9 Test Results – Time of Occupancy (Dwell Time)

4.9.1 Time of Occupancy (Dwell Time) – Test Summary

This requirement is not applicable as the radio technology is non-hopping

4.10 Test Results – 6dB Bandwidth

4.10.1 6dB Bandwidth – Test Summary

This test has not been performed. The device is based on certified modules as described in section 2.1

4.11 Test Results – Peak Conducted Output Power

4.11.1 Peak Conducted Output Power – Test Summary

This test has not been performed. The device is based on certified modules as described in section 2.1

4.12 Test Results – Power Spectral Density

4.12.1 Power Spectral Density – Test Summary

This test has not been performed. The device is based on certified modules as described in section 2.1

4.13 Test Results – Conducted Power Comparison

4.13.1 Conducted Power Comparison – Test Summary

Test Specification	ANSI C63.10 clause 11.9.2.2.2	
Test Engineer & Date	Niall Forrester	2020.12.10
EUT and Ancillary Equipment IDs	A002959287-001	A002959287-011 A002959287-012 A002959287-025
EUT Operation Mode(s)	Continuous Tx	
EUT Wireless Configuration(s)	WLAN 802.11 b/g/n (see below for details)	
EUT Hardware Configuration(s)	Power from USB Power Supply	
Overall Result	Measured power does not exceed the maximum measured power from the module by more than the measurement uncertainty listed in section 6.1	

Test Parameter	Wireless Configuration	Measured Level (dBm)	Reference Level (dBm) See Note 1
Average Power	WLAN 802.11b 1Mbps Mid Chan. (CCK 2437 MHz)	16.18	17.45
Average Power	WLAN 802.11b 5.5Mbps Mid Chan. (CCK 2437 MHz)	16.22	
Average Power	WLAN 802.11b 11Mbps Mid Chan. (CCK 2437 MHz)	15.59	
Average Power	WLAN 802.11g 6Mbps Mid Chan. (BPSK 2437 MHz)	15.42	15.78
Average Power	WLAN 802.11g 24Mbps Mid Chan. (16-QAM 2437 MHz)	11.49	
Average Power	WLAN 802.11g 54Mbps Mid Chan. (64-QAM 2437 MHz)	5.11	
Average Power	WLAN 802. 802.11n MCS 0 Mid Chan. (BPSK 2437 MHz)	13.13	13.59
Average Power	WLAN 802. 802.11n MCS 3 Mid Chan. (16-QAM 2437 MHz)	9.36	
Average Power	WLAN 802. 802.11n MCS 7 Mid Chan. (64-QAM 2437 MHz)	4.30	

Note 1: The reference level is the maximum measured power of a given configuration for the pre-certified module. This data is taken from MRT Laboratory report number 1802WSU008-U1

5. TEST EQUIPMENT STATUS

5.1 List of Hardware with Calibration Dates

5.1.1 Hardware List – Conducted Power Measurements

Type	Manufacturer	Model	Serial Number / ID	Calibration Date	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSU26	100308 2704108	14.07.2020	14.07.2021

5.1.2 Hardware List – Conducted Emissions System

Type	Manufacturer	Model	Serial Number / ID	Calibration Date	Calibration Due
Two-Line V-network	Rohde & Schwarz	ENV216	101090 2704076	2020.07.16	2021.07.16
Test Receiver 9KHz to 3.5 GHz	Rohde & Schwarz	ESR3	101674 2704016	2020.07.17	2021.07.17

5.1.3 Hardware List – SAC5 System

Type	Manufacturer	Model	Serial Number / ID	Calibration Date	Calibration Due
EMI Test Receiver	Rohde & Schwarz	ESW44	101760 2881044	2020.07.17	2021.07.17
Ultra Broadband Antenna	Rohde & Schwarz	HL562E	100988 2823181	2019.07.23	2021.07.23
Double Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF907	102678 2823164	2019.07.15	2021.07.15
Control Device	Maturo	NCD	NCD/393/2372.01	N/A	N/A
Open Switch & Control Unit	Rohde & Schwarz	OSP150	100081 2884198	2020.08.04	2021.08.04
Open Switch & Control Unit	Rohde & Schwarz	OSP120	100084 2761253	2020.08.04	2021.08.04
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension 1	101333 2761265	2020.08.04	2021.08.04
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension 2	101335 2761266	2020.08.04	2021.08.04
Shielded Filter Unit	Rohde & Schwarz	OSP-F Base Unit	101330 2761262	2020.08.04	2021.08.04
Humidity Temperature Probe	Lufft	OPUS 20	1236.0118.0802.033 2771042	2020.07.31	2022.07.31

5.2 Software / Firmware Versions

Equipment	Software / Firmware Name	Version
Conducted Emissions System	EMC 32	V10.60.10
SAC 5	EMC 32	V10.60.10

6. MEASUREMENT UNCERTAINTY

6.1 Measurement Uncertainty for Conducted Power Measurements

Parameter	Uncertainty (Coverage Factor k=2)
Conducted power	0.51 dB

6.2 Measurement Uncertainty for Conducted Emissions

Parameter	Uncertainty (Coverage Factor k=2)
Conducted emissions with LISN 150KHz to 30 MHz	2.98 dB

6.3 Measurement Uncertainty for SAC 5 (Radiated Emissions & Band Edge)

Parameter	Uncertainty (Coverage Factor k=2)
Field Strength 10 Hz -9 kHz	3.38 dB
Field Strength 9 kHz -30 MHz	3.38 dB
Field Strength 30 MHz -1000 MHz	3.38 dB
Field Strength 1 GHz -18 GHz	4.88 dB
Field Strength 18 GHz - 40 GHz	5.14 dB

7. PHOTOGRAPHS

For photographs, see Appendix 1