

Prüfbericht-Nr.: Test report no.:	SE23LMMU-002	Auftrags-Nr.: Order no.:	0290100320	Seite 1 von 19 Page 1 of 19
Kunden-Referenz-Nr.: Client reference no.:	1288994	Auftragsdatum: Order date:	2022.12.02	
Auftraggeber: Client:	ASSA ABLOY Entrance Systems AB			
Prüfgegenstand: Test item:	Wireless IoT Gateway			
Bezeichnung / Typ-Nr.: Identification / Type no.:	IoT Gateway 2.0, FCC ID: 2A8JO-IOT20A			
Auftrags-Inhalt: Order content:	Accredited Testing			
Prüfgrundlage: Test specification:	FCC 47 CFR Part 15B with parts 15.107 & 15.109 ANSI C63.4: 2014			
Wareneingangsdatum: Date of sample receipt:	2023.03.16			
Prüfmuster-Nr.: Test sample no.:	See section 2.3			
Prüfzeitraum: Testing period:	2023.03.22 – 2023.07.14			
Ort der Prüfung: Place of testing:	Lund, Sweden			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland Sweden			
Prüfergebnis*: Test result*:	Pass			
überprüft von: reviewed by:	X 	genehmigt von: authorized by:	X 	
Datum: 2024.04.15 Date:	Signed by: Maria Nyltun	Datum: 2024.04.15 Date:	Signed by: Hakan Ahlberg	
Stellung / Position:	Test Engineer	Stellung / Position:	Lab Manager	
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt 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			
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts.</i>				

Revision History

REVISION	DATE	REMARKS	AUTHOR
001	2024-03-26	First Release	Niall Forrester /Maria Nyltun
002	2024-04-15	Updated version	Maria Nyltun
Note: Latest revision report will replace all previous reports			
This report based on FCC Part 15B no JBP Template version 1.3			

Summary of Test Results

FCC 47 CFR Rule Part	Test Description	Applicability	Report Section	RESULT	REMARKS
15.107	AC Power Line Conducted Emissions (Unintentional Radiators)	YES	4.1	PASS	
15.109	Radiated Emissions (Unintentional Radiators)	YES	4.2	PASS	

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. |

Table of Contents

1. GENERAL INFORMATION	4
1.1 Test Site.....	4
1.2 Client Information	4
2. PRODUCT INFORMATION.....	5
2.1 General Description.....	5
2.2 Device Characteristics.....	5
2.3 Test Samples	5
2.4 Wireless Technologies and Bands Supported by the EUT.....	6
2.5 Antenna Information.....	6
2.6 Wireless Technology Details	7
2.7 Ancillary Equipment.....	7
2.8 EUT Diagrams.....	7
3. TEST METHODS	7
3.1 Test Standards.....	7
3.2 Additional references.....	7
3.3 Limits	8
3.4 Description of Test Methods and Equipment Setup	9
3.5 EUT Configuration During Test.....	11
3.6 EUT Operation Modes.....	12
3.7 Deviations from the Test Standard	12
3.8 Environmental Conditions.....	12
4. TEST RESULTS	13
4.1 Test Results – AC Power Line Conducted Emissions (Unintentional Trans.)	13
4.2 Test Results – Radiated Emissions (Unintentional Transmitter).....	15
5. TEST EQUIPMENT STATUS.....	18
5.1 List of Hardware with Calibration Dates	18
5.2 Software / Firmware Versions.....	19
6. MEASUREMENT UNCERTAINTY	19
6.1 Measurement Uncertainty for Conducted Emissions	19
6.2 Measurement Uncertainty for SAC 5 (Radiated Emissions & Band Edge)	19
7. PHOTOGRAPHS.....	19

1. GENERAL INFORMATION

1.1 Test Site

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

1.2 Client Information

Company Name:	ASSA ABLOY Entrance Systems AB
Address:	PO Box 822
	SE-261 27 Landskrona
	Sweden
Contact Person:	Fredrik Brödje
Contact e-Mail / Telephone	fredrik.brodje@assaabloy.com +46 10 47 48 907

2. PRODUCT INFORMATION

2.1 General Description

Model name:	IoT Gateway 2
Manufacturer:	ASSA ABLOY Entrance Systems AB
Model number / Marketing name:	IoT Gateway 2
FCC ID:	2A8JO-IOT20A
Description:	Wireless IoT Gateway
Ancillary Equipment:	See section 2.7

2.2 Device Characteristics

Device Class for 47 CFR Part 15 B	Class B
Type of Power Supply	DC via Jack or RJ45 connector
Nominal Supply Voltage	24V DC
Supply Voltage Range	5 to 28V DC
Operating Temperature Range	-
Operating Air Humidity Range	-
Highest Internal Frequency Source	2690 MHz

2.3 Test Samples

EUT #	EUT ID	Description	Used For:
1	A003435986-004	Standard Sample	Radiated Emissions
2	A003435986-005	Standard Sample	Conducted Emissions

2.4 Wireless Technologies and Bands Supported by the EUT

Technology	Band	Frequency Range (Tx)	Evaluation Performed*
Bluetooth Low Energy	2.4 GHz	2402.0 MHz – 2480.0 MHz	N/A
LTE FDD	1	1920.0 MHz – 1980.0 MHz	N/A
LTE FDD	2	1840.0 MHz – 1910.0 MHz	N/A
LTE FDD	3	1710.0 MHz – 1785.0 MHz	N/A
LTE FDD	4	1710.0 MHz – 1755.0 MHz	N/A
LTE FDD	5	824.0 MHz – 849.0 MHz	N/A
LTE FDD	7	2500.0 MHz – 2570.0 MHz	N/A
LTE FDD	8	880.0 MHz – 915.0 MHz	N/A
LTE FDD	12	699.0 MHz – 716.0 MHz	N/A
LTE FDD	13	777.0 MHz – 787.0 MHz	N/A
LTE FDD	18	815.0MHz – 830.0 MHz	N/A
LTE FDD	19	830.0 MHz – 845.0 MHz	N/A
LTE FDD	20	832.0 MHz – 862.0 MHz	N/A
LTE FDD	26	814.0MHz – 849.0 MHz	N/A
LTE FDD	28	703.0MHz – 748.0 MHz	N/A
LTE TDD	38	2570.0 MHz – 2620.0 MHz	N/A
LTE TDD	39	1880.0 MHz – 1920.0 MHz	N/A
LTE TDD	40	2300.0 MHz – 2400.0 MHz	N/A
LTE TDD	41	2496.0 MHz – 2690.0 MHz	N/A

*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
Bluetooth Low Energy	2.4 GHz	1	PCB antenna	2.9 dBi
LTE FDD LTE FDD	5, 8, 12, 13, 18, 19, 20, 26, 28	1	FPC Embedded Antenna	2.9 dBi
LTE FDD LTE TDD	1, 2, 3, 4, 7 38, 39, 40, 41			4.3 dBi

§CHECK THESE! TAKEN FROM KYOCERA DATASHEET

2.6 Wireless Technology Details

Technology*	Band	Modulation Type(s)	No. of Channels	Channel Spacing	Adaptivity
Bluetooth Low Energy	2.4 GHz	GFSK	40	2 MHz	N/A
LTE FDD	1, 2, 3, 4, 5, 7, 8, 12, 13, 18 19, 20 26, 28	QPSK 16-QAM 64-QAM 256-QAM	According to LTE specs	According to LTE specs	N/A
LTE TDD	38, 39, 40, 41				

*Note: No simultaneous transmissions for BLE and LTE.

2.7 Ancillary Equipment

A003435986-001	Assa Abloy 1007773 Control Unit
A003435986-002	Phihong PSM050-320A Switching Power Supply

2.8 EUT Diagrams

-

3. TEST METHODS

3.1 Test Standards

Testing was performed according to the following standards / references

Standard	Version	Description
FCC 47 CFR 15.107	-	Conducted limits
FCC 47 CFR 15.109	-	Radiated emission limits

3.2 Additional references

The following standards / references were also considered for the testing

Standard	Version	Description
ANSI C63.4	2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

3.3 Limits

FCC 47 CFR Rule Part	Test Description	Limit Reference (FCC 47 CFR Reference)
15.107	AC Power Line Conducted Emissions (Unintentional Radiators)	15.107 (a) for Class B Devices
15.109	Radiated Emissions (Unintentional Radiators)	15.109 (a) for Class B Devices *See Note 1

Interpretation of the measurement results has been performed in accordance with ANSI C63.4 section 10.2.8.2

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 are presented in $\mu\text{V/m}$. Measurements on the test system are made in $\text{dB}\mu\text{V/m}$. To convert between these, the following adjustment is used:

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

Example: from 15.209(a) the limit for 30MHz – 88MHz is $100\mu\text{V/m}$ at 3m. This gives:

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

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 $30\mu\text{V/m}$ (=29.54 $\text{dB}\mu\text{V/m}$) at 30m

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

Example: from 15.209(a) the limit for 1GHz – 18GHz is $500\mu\text{V/m}$ (=53.98 $\text{dB}\mu\text{V/m}$) at 3m

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

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

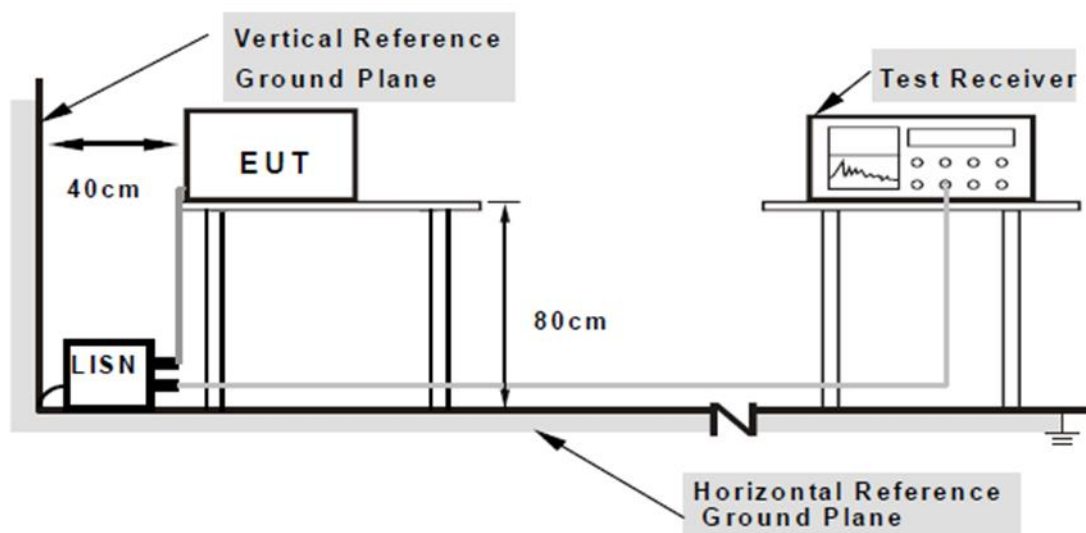
Where different arrangements of equipment were used for different types of measurements, these are tabulated in section 3.4.2 and details of each arrangement are included in subsequent sections

3.4.2 Test Equipment Setup Used by Test Type

FCC 47 CFR Rule Part	Test Description	Test Equipment Used
15.107	AC Power Line Conducted Emissions (Unintentional Radiators)	Conducted Emissions
15.109	Radiated Emissions (Unintentional Radiators)	SAC5

3.4.3 Test Equipment Setup – Conducted Emissions

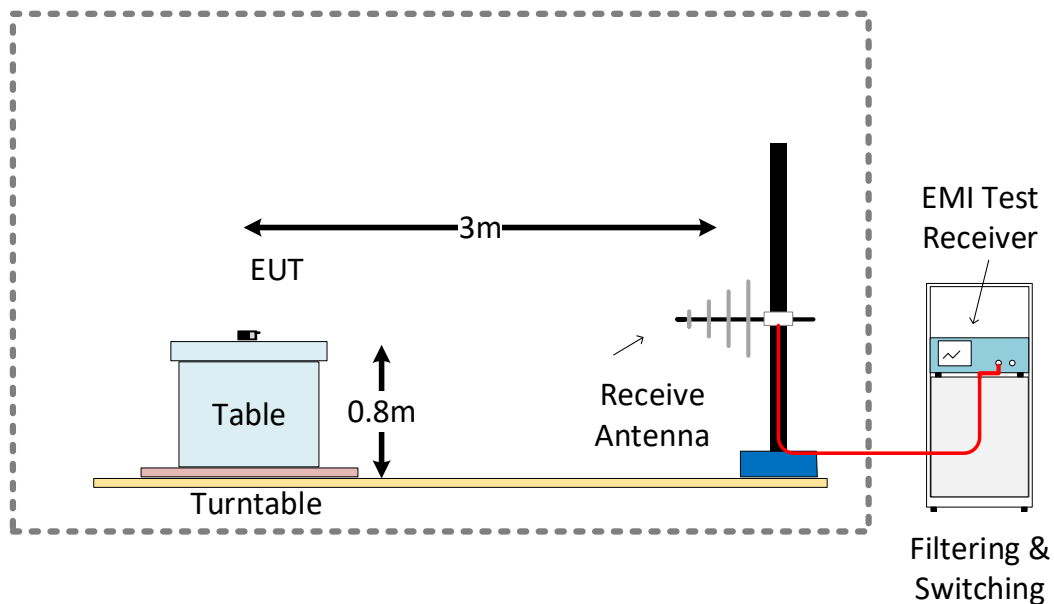
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The LISNs provide 50Ω/ 50μH of coupling impedance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



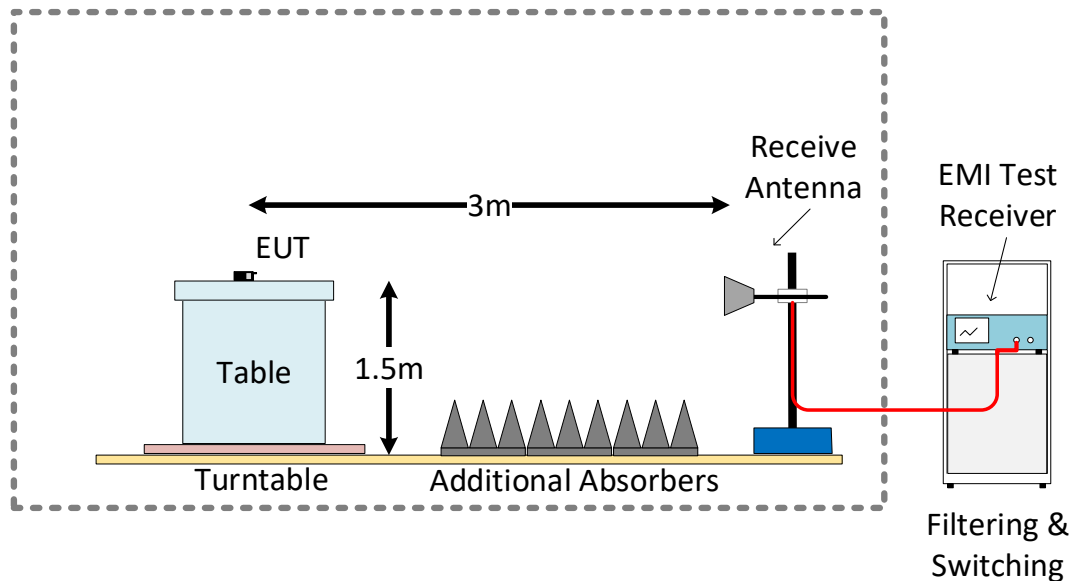
3.4.4 Test Equipment Setup – SAC 5 (Radiated Emissions)

- 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 80 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 to 150 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

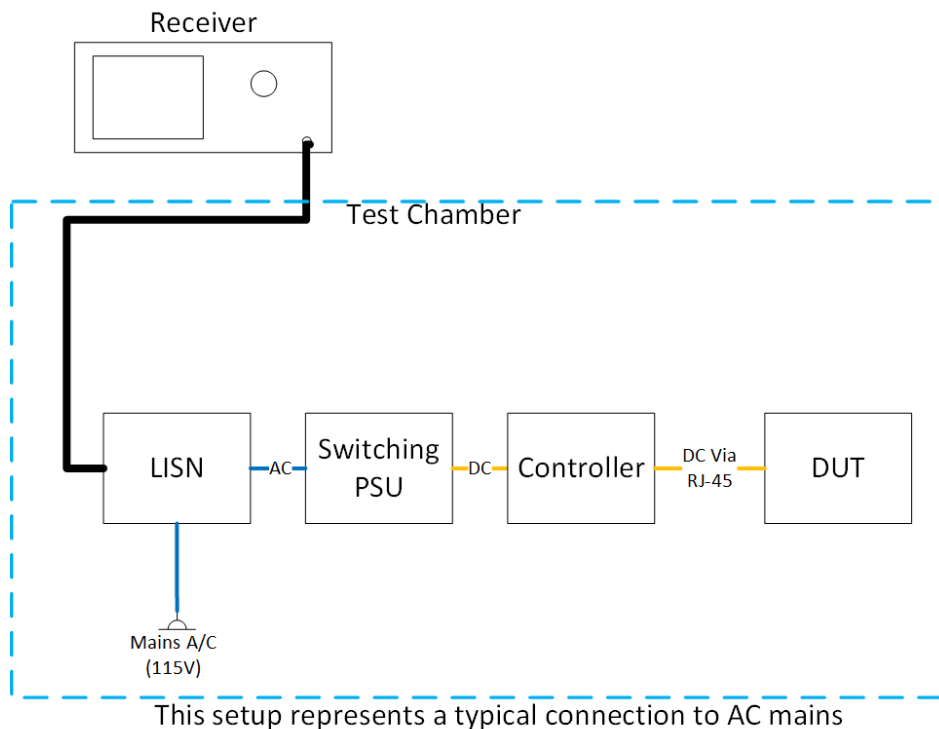


SAC 5 Test Setup Configuration 1GHz – 18GHz

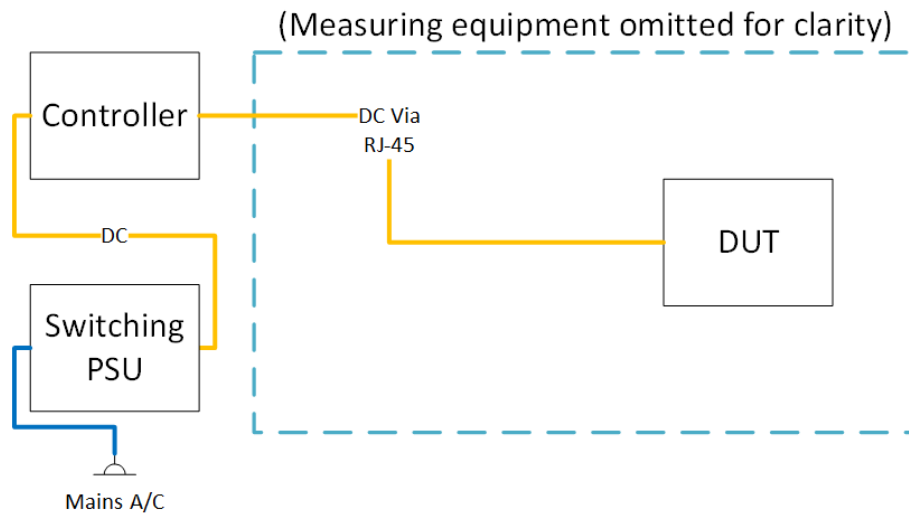


3.5 EUT Configuration During Test

3.5.1 Block Diagram for Conducted Emissions EUT Setup



3.5.2 Block Diagram for Radiated Emissions EUT Setup



3.6 EUT Operation Modes

Operation mode	Description
Idle	Device is powered up with radio transmitters in receive mode (not transmitting). Power supplied via RJ-45

3.7 Deviations from the Test Standard

None

3.8 Environmental Conditions

3.8.1 Environmental Conditions – Conducted Emissions System

Date	Time	Temperature (°C)	Relative Humidity (%)
2023.07.14	10:19	22.8	52

3.8.2 Environmental Conditions – SAC5 (Radiated Emissions)

Date	Time	Temperature (°C)	Relative Humidity (%)
2023.03.22	09:20	19.6	36
2023.03.31	08:35	18.2	37

4. TEST RESULTS

4.1 Test Results – AC Power Line Conducted Emissions (Unintentional Trans.)

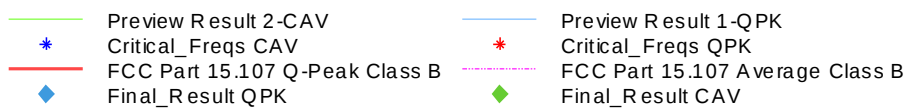
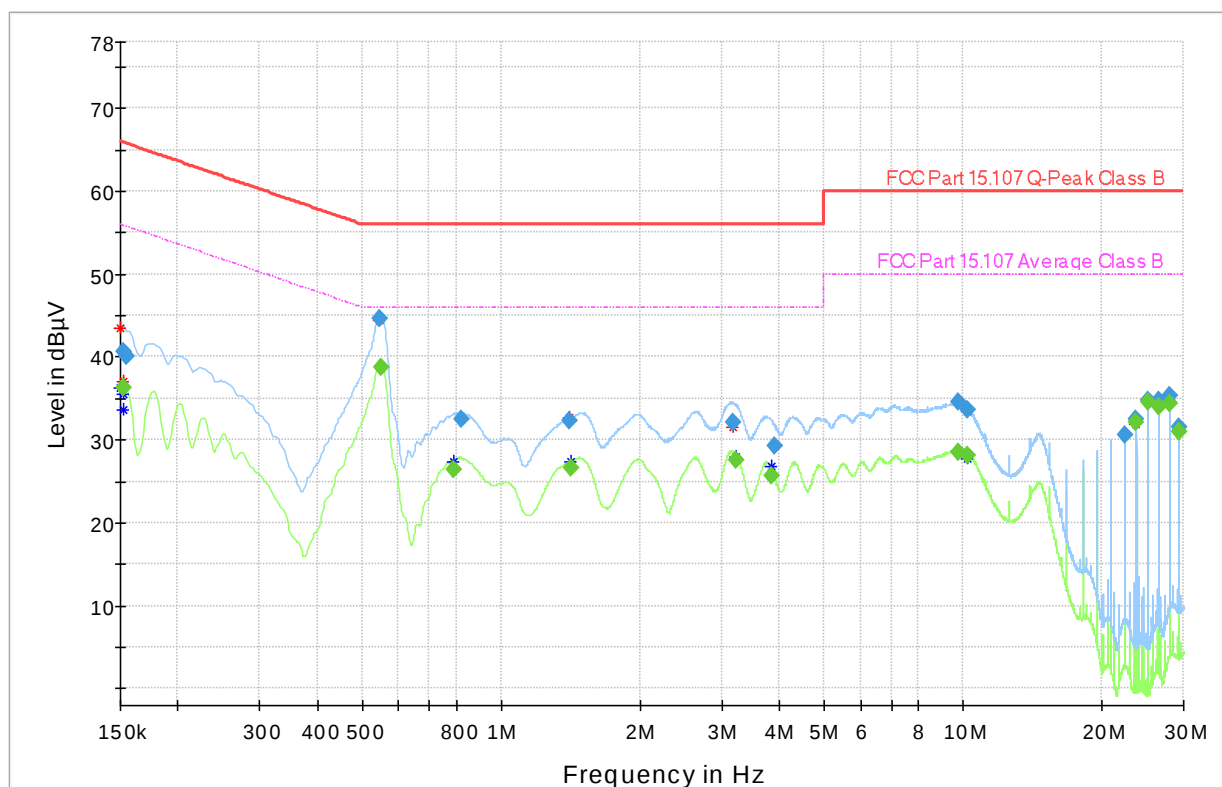
4.1.1 AC Power Line Conducted Emissions (Unintentional) – Test Summary

Test Specification	FCC 47 CFR 15.107 (Part 15 Subpart B)	
Test Engineer & Date	Niall Forrester	2023.07.14
EUT and Ancillary Equipment IDs	A003435986-005	A003435986-001 A003435986-002
EUT Operation Mode(s)	Idle	
EUT Wireless Configuration(s)	N/A	
EUT Hardware Configuration(s)	N/A	
Overall Result	PASS	
Test Parameter	Frequency Range	Result*
AC Conducted Power Line Emissions – “N” Line 115V / 60Hz	150 kHz – 30 MHz	PASS
AC Conducted Power Line Emissions – “L1” Line 115V / 60Hz	150 kHz – 30 MHz	PASS

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

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

Test mode condition	Conducted Emissions	
Sweep frequency	150 kHz – 30 MHz	
Standard	FCC 47 Part 15.107	
EUT	A003435986-005	
Ancillary Equipment	A003435986-001, A003435986-002	
Test Engineer	Niall Forrester	Date: 2023.07.14



Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.152250	---	36.38	55.88	19.50	1000.0	9.000	L1	ON
0.152250	40.73	---	65.88	25.15	1000.0	9.000	N	ON
0.154500	40.07	---	65.75	25.68	1000.0	9.000	N	ON
0.546000	44.69	---	56.00	11.31	1000.0	9.000	N	ON
0.548250	---	38.78	46.00	7.22	1000.0	9.000	L1	ON
0.791250	---	26.35	46.00	19.65	1000.0	9.000	N	ON
0.820500	32.53	---	56.00	23.47	1000.0	9.000	N	ON
1.407750	32.28	---	56.00	23.72	1000.0	9.000	N	ON
1.419000	---	26.60	46.00	19.40	1000.0	9.000	N	ON
3.176250	32.18	---	56.00	23.82	1000.0	9.000	N	ON
3.237000	---	27.50	46.00	18.50	1000.0	9.000	L1	ON
3.842250	---	25.67	46.00	20.33	1000.0	9.000	L1	ON
3.907500	29.28	---	56.00	26.72	1000.0	9.000	N	ON
9.768750	34.60	---	60.00	25.40	1000.0	9.000	N	ON
9.768750	---	28.58	50.00	21.42	1000.0	9.000	N	ON
10.225500	33.66	---	60.00	26.34	1000.0	9.000	N	ON
10.232250	---	28.22	50.00	21.78	1000.0	9.000	N	ON
22.328250	30.67	---	60.00	29.33	1000.0	9.000	N	ON
23.723250	32.45	---	60.00	27.55	1000.0	9.000	N	ON
23.723250	---	32.07	50.00	17.93	1000.0	9.000	N	ON
25.118250	34.84	---	60.00	25.16	1000.0	9.000	N	ON
25.118250	---	34.67	50.00	15.33	1000.0	9.000	N	ON
26.515500	34.75	---	60.00	25.25	1000.0	9.000	N	ON
26.515500	---	33.94	50.00	16.06	1000.0	9.000	N	ON
27.908250	---	34.46	50.00	15.54	1000.0	9.000	N	ON
27.910500	35.26	---	60.00	24.74	1000.0	9.000	N	ON
29.305500	---	31.03	50.00	18.97	1000.0	9.000	N	ON
29.305500	31.52	---	60.00	28.48	1000.0	9.000	N	ON

4.2 Test Results – Radiated Emissions (Unintentional Transmitter)

4.2.1 Radiated Emissions (Unintentional) – Test Summary

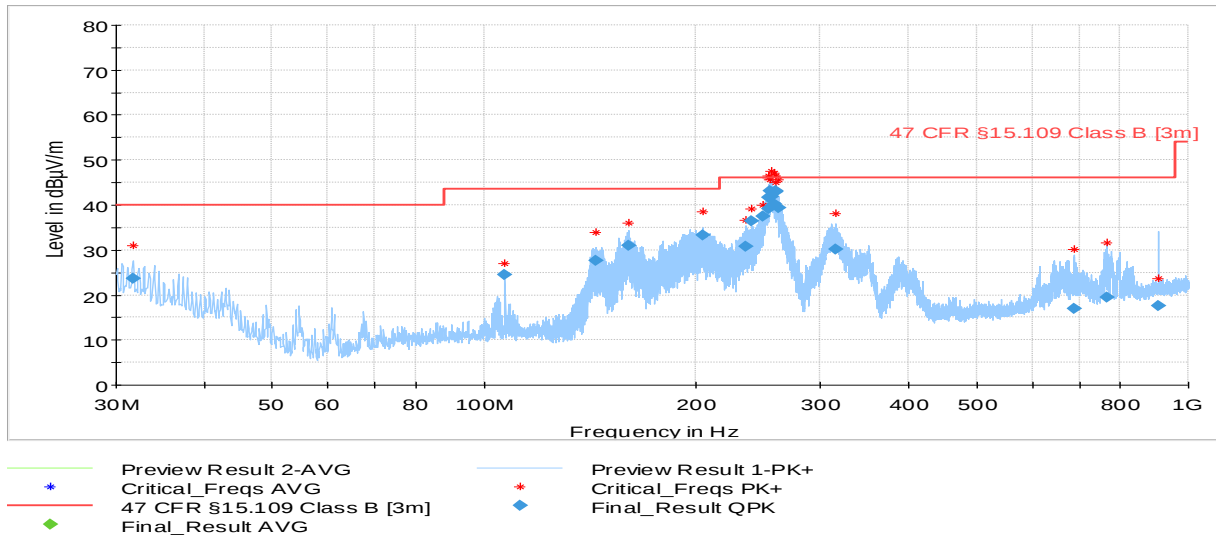
Test Specification	FCC 47 CFR 15.109 (Part 15 Subpart B)	
Test Engineer & Date	Niall Forrester	2023.03.22 – 2023.03.31
EUT and Ancillary Equipment IDs	A003435986-004	A003435986-001 A003435986-002
EUT Operation Mode(s)	Idle	
EUT Wireless Configuration(s)	N/A	
EUT Hardware Configuration(s)	N/A	
Overall Result	PASS	
Test Parameter	Frequency Range	Result*
Radiated Emissions - Idle Mode	30 MHz – 1 GHz	PASS
Radiated Emissions - Idle Mode	1 GHz – 18 GHz	PASS

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

4.2.2 Radiated Emissions (Unintentional) – Test Details

30MHz – 1GHz

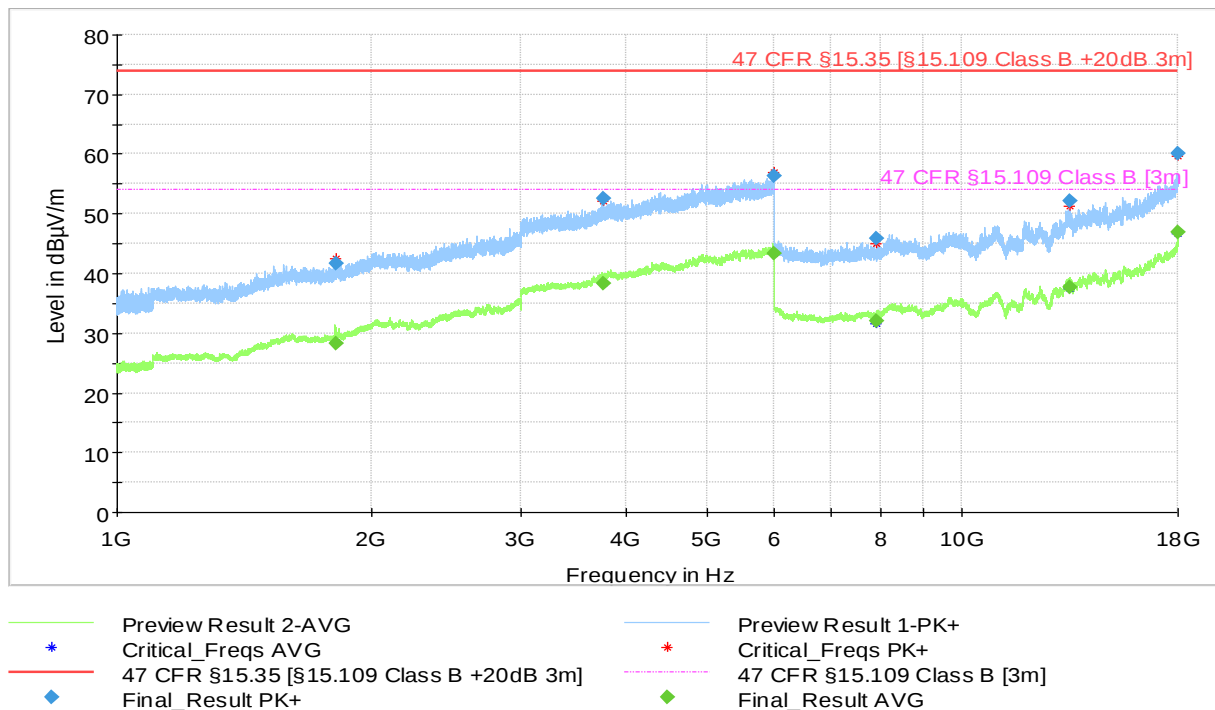
Test mode condition	Idle mode	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	30 MHz – 1 GHz	
Standard	47 CFR FCC Part 15 subpart B	
EUT	A003435986-004	
Ancillary Equipment	A003435986-001, A003435986-002	
Test Engineer	Niall Forrester	Date: 2023.03.31
Chamber details	Chamber: SAC 5	



Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
31.782480	23.68	40.00	16.32	1000.0	120.000	100.0	V	41.0
107.024080	24.48	43.52	19.05	1000.0	120.000	129.0	V	290.0
143.903320	27.55	43.52	15.97	1000.0	120.000	275.0	V	154.0
160.631360	31.04	43.52	12.48	1000.0	120.000	375.0	V	292.0
204.083920	33.34	43.52	10.18	1000.0	120.000	100.0	V	41.0
234.900920	30.76	46.02	15.26	1000.0	120.000	125.0	V	87.0
239.913000	36.42	46.02	9.61	1000.0	120.000	104.0	V	112.0
249.293480	37.51	46.02	8.51	1000.0	120.000	279.0	V	221.0
253.192680	39.09	46.02	6.93	1000.0	120.000	125.0	H	72.0
253.785000	41.66	46.02	4.36	1000.0	120.000	100.0	H	87.0
254.378440	43.04	46.02	2.98	1000.0	120.000	104.0	H	110.0
255.488720	41.85	46.02	4.17	1000.0	120.000	100.0	H	99.0
258.146400	40.26	46.02	5.76	1000.0	120.000	125.0	H	296.0
259.354560	43.22	46.02	2.80	1000.0	120.000	171.0	H	296.0
259.955360	42.91	46.02	3.11	1000.0	120.000	179.0	H	338.0
261.608960	39.38	46.02	6.64	1000.0	120.000	125.0	H	296.0
315.202840	30.22	46.02	15.80	1000.0	120.000	125.0	H	252.0
687.616520	16.96	46.02	29.06	1000.0	120.000	125.0	V	221.0
765.216600	19.38	46.02	26.64	1000.0	120.000	175.0	H	296.0
906.963560	17.59	46.02	28.43	1000.0	120.000	325.0	H	206.0

1GHz – 18GHz

Test mode condition	Idle mode	
Antenna orientation	Horizontal and Vertical	
Sweep frequency	1 GHz – 18 GHz	
Standard	47 CFR FCC Part 15 subpart B	
EUT	A003435986-004	
Ancillary Equipment	A003435986-001, A003435986-002	
Test Engineer	Niall Forrester	Date: 2023.03.22
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)
1813.530000	---	28.31	53.98	25.67	1000.0	1000.000	315.0	V	86.0
1815.878000	41.78	---	73.98	32.20	1000.0	1000.000	139.0	V	86.0
3759.623000	---	38.37	53.98	15.61	1000.0	1000.000	265.0	V	232.0
3767.835000	52.67	---	73.98	21.31	1000.0	1000.000	265.0	H	322.0
5989.771000	56.37	---	73.98	17.61	1000.0	1000.000	410.0	H	262.0
5992.452000	---	43.41	53.98	10.57	1000.0	1000.000	315.0	H	98.0
7922.831000	---	32.02	53.98	21.96	1000.0	1000.000	410.0	V	142.0
7924.090000	45.93	---	73.98	28.05	1000.0	1000.000	389.0	V	98.0
13415.385000	52.14	---	73.98	21.84	1000.0	1000.000	385.0	V	142.0
13432.150000	---	37.68	53.98	16.30	1000.0	1000.000	365.0	V	222.0
17984.594000	60.09	---	73.98	13.89	1000.0	1000.000	315.0	H	52.0
17986.941000	---	46.96	53.98	7.02	1000.0	1000.000	385.0	V	188.0

5. TEST EQUIPMENT STATUS

5.1 List of Hardware with Calibration Dates

5.1.1 Hardware List – Conducted Emissions System

Type	Manufacturer	Model	Serial Number / ID	Calibration Date	Calibration Due
Two-Line V-network	Rohde & Schwarz	ENV216	101090 2704076	2023.07.03	2024.07.03
Test Receiver 9KHz to 3.5 GHz	Rohde & Schwarz	ESR3	101674 2704016	2023.06.29	2024.06.29
Humidity Temperature Probe	Lufft	OPUS 20	146.0216.0802.030 2703980	2022.07.27	2024.07.27

5.1.2 Hardware List – SAC5 System

Type	Manufacturer	Model	Serial Number / ID	Calibration Date	Calibration Due
EMI Test Receiver	Rohde & Schwarz	ESW44	101760 2881044	2022.07.21	2023.07.21
Ultra Broadband Antenna	Rohde & Schwarz	HL562E	100988 2823181	2021.07.26	2023.07.26
Double Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF907	102678 2823164	2021.07.26	2023.07.26
Horn Antenna	ETS Lindgren	UG-596A/U	20898 2814839	2022.07.26	2024.07.26
Horn Antenna – 40 GHz	ETS Lindgren	UG-600A/U	20623 2814834	2022.07.26	2024.07.26
Control Device	Maturo	NCD	NCD/393/2372.01 2884216	N/A	N/A
Open Switch & Control Unit	Rohde & Schwarz	OSP150	100081 2884198	2022.08.01	2023.08.01
Open Switch & Control Unit	Rohde & Schwarz	OSP120	100084 2761253	2022.08.01	2023.08.01
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension 1	101333 2761265	2022.08.01	2023.08.01
Shielded Filter Unit	Rohde & Schwarz	OSP-F Extension 2	101335 2761266	2022.08.01	2023.08.01
Shielded Filter Unit	Rohde & Schwarz	OSP-F Base Unit	101330 2761262	2022.08.01	2023.08.01
Humidity Temperature Probe	Lufft	OPUS 20	146.0216.0802.030 2703980	2022.07.27	2024.07.27

5.2 Software / Firmware Versions

Equipment	Software / Firmware Name	Version
Conducted Emissions System	EMC 32	V10.60.20
SAC 5	EMC 32	V10.60.20

6. MEASUREMENT UNCERTAINTY

6.1 Measurement Uncertainty for Conducted Emissions

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

6.2 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

See Appendix 1 for photographs