

|                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                     |                                                            |                                                                             |                                                                                       |                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| <b>Prüfbericht-Nr.:</b><br>Test report no.:                                                                                                                                                                                                                                                                                                                                                               | <b>60424544-002</b>                                                                 | <b>Auftrags-Nr.:</b><br>Order no.:                         | 23870459 030                                                                | Seite 1 von 21<br>Page 1 of 21                                                        |                                        |
| <b>Kunden-Referenz-Nr.:</b><br>Client reference no.:                                                                                                                                                                                                                                                                                                                                                      | 1288973                                                                             | <b>Auftragsdatum:</b><br>Order date:                       | 2020.05.08                                                                  |                                                                                       |                                        |
| <b>Auftraggeber:</b><br>Client:                                                                                                                                                                                                                                                                                                                                                                           | Axis Communications AB                                                              |                                                            |                                                                             |                                                                                       |                                        |
| <b>Prüfgegenstand:</b><br>Test item:                                                                                                                                                                                                                                                                                                                                                                      | OSDP card reader                                                                    |                                                            |                                                                             |                                                                                       |                                        |
| <b>Bezeichnung / Typ-Nr.:</b><br>Identification / Type no.:                                                                                                                                                                                                                                                                                                                                               | AXIS A4020-E / FCC ID PNB-AXISA4020-E                                               |                                                            |                                                                             |                                                                                       |                                        |
| <b>Auftrags-Inhalt:</b><br>Order content:                                                                                                                                                                                                                                                                                                                                                                 | Accredited testing according to FCC 47 CFR Part 15B                                 |                                                            |                                                                             |                                                                                       |                                        |
| <b>Prüfgrundlage:</b><br>Test specification:                                                                                                                                                                                                                                                                                                                                                              | FCC 47 CFR Part 15B with parts 15.107 & 15.109<br>ANSI C63.4: 2014                  |                                                            |                                                                             |                                                                                       |                                        |
| <b>Wareneingangsdatum:</b><br>Date of sample receipt:                                                                                                                                                                                                                                                                                                                                                     | 2020.10.30                                                                          |                                                            |                                                                             |                                                                                       |                                        |
| <b>Prüfmuster-Nr.:</b><br>Test sample no.:                                                                                                                                                                                                                                                                                                                                                                | See section 2.3                                                                     |                                                            |                                                                             |                                                                                       |                                        |
| <b>Prüfzeitraum:</b><br>Testing period:                                                                                                                                                                                                                                                                                                                                                                   | 2020.11.02 – 2020.11.13                                                             |                                                            |                                                                             |                                                                                       |                                        |
| <b>Ort der Prüfung:</b><br>Place of testing:                                                                                                                                                                                                                                                                                                                                                              | Lund, Sweden                                                                        |                                                            |                                                                             |                                                                                       |                                        |
| <b>Prüflaboratorium:</b><br>Testing laboratory:                                                                                                                                                                                                                                                                                                                                                           | TÜV Rheinland Sweden                                                                |                                                            |                                                                             |                                                                                       |                                        |
| <b>Prüfergebnis*:</b><br>Test result*:                                                                                                                                                                                                                                                                                                                                                                    | Pass                                                                                |                                                            |                                                                             |                                                                                       |                                        |
| <b>überprüft von:</b><br>reviewed by:                                                                                                                                                                                                                                                                                                                                                                     |  |                                                            | <b>genehmigt von:</b><br>authorized by:                                     |  |                                        |
| <b>Datum:</b> 2021.08.10<br>Date:                                                                                                                                                                                                                                                                                                                                                                         | Signed by: Niall Forrester                                                          |                                                            | <b>Datum:</b> 2021.08.10<br>Date:                                           | Signed by: Per Isacson                                                                |                                        |
| <b>Stellung / Position:</b>                                                                                                                                                                                                                                                                                                                                                                               | Senior Technical Expert                                                             |                                                            | <b>Stellung / Position:</b>                                                 | Lab Manager                                                                           |                                        |
| <b>Sonstiges / Other:</b>                                                                                                                                                                                                                                                                                                                                                                                 | The device contains a certified NFC radio module with FCC ID: 2AQPZ-NFC2F           |                                                            |                                                                             |                                                                                       |                                        |
| <b>Zustand des Prüfgegenstandes bei Anlieferung:</b><br>Condition of the test item at delivery:                                                                                                                                                                                                                                                                                                           |                                                                                     |                                                            | Prüfmuster vollständig und unbeschädigt<br>Test item complete and undamaged |                                                                                       |                                        |
| * Legende:                                                                                                                                                                                                                                                                                                                                                                                                | 1 = sehr gut<br>P(ass) = entspricht o.g. Prüfgrundlage(n)                           | 2 = gut<br>F(ail) = entspricht nicht o.g. Prüfgrundlage(n) | 3 = befriedigend<br>F(ail) = entspricht nicht o.g. Prüfgrundlage(n)         | 4 = ausreichend<br>N/A = nicht anwendbar                                              | 5 = mangelhaft<br>N/T = nicht getestet |
| * Legend:                                                                                                                                                                                                                                                                                                                                                                                                 | 1 = very good<br>P(ass) = passed a.m. test specification(s)                         | 2 = good<br>F(ail) = failed a.m. test specification(s)     | 3 = satisfactory<br>F(ail) = failed a.m. test specification(s)              | 4 = sufficient<br>N/A = not applicable                                                | 5 = poor<br>N/T = not tested           |
| <p><b>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.</b><br/> <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></p> |                                                                                     |                                                            |                                                                             |                                                                                       |                                        |

## Revision History60424544-00260424544-002

| REVISION                                                       | DATE       | REMARKS             | AUTHOR          |
|----------------------------------------------------------------|------------|---------------------|-----------------|
| 001                                                            | 2021-02-17 | First Release       | Niall Forrester |
| 002                                                            | 2021-08-10 | Added module FCC ID | Niall Forrester |
|                                                                |            |                     |                 |
| Note: Latest revision report will replace all previous reports |            |                     |                 |
| This report based on FCC Part 15B no JBP Template version 1.1  |            |                     |                 |

## 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.                  |

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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:         | 10325                   |
| FCC Test Firm Registration Number:  | 517458                  |
| ISED Test Site Registration Number: | 24753                   |

### 1.2 Client Information

|                            |                                                                                                  |
|----------------------------|--------------------------------------------------------------------------------------------------|
| Company Name:              | Axis Communications                                                                              |
| Address:                   | Emdalavägen 14                                                                                   |
|                            | 223 69 Lund                                                                                      |
|                            | Sweden                                                                                           |
|                            |                                                                                                  |
| Contact Person:            | Alexander Holmström                                                                              |
| Contact e-Mail / Telephone | <a href="mailto:Alexander.holmstrom@axis.com">Alexander.holmstrom@axis.com</a> /<br>+46709615637 |

## 2. PRODUCT INFORMATION

### 2.1 General Description

|                                |                  |
|--------------------------------|------------------|
| Model name:                    | AXIS A4020-E     |
| Manufacturer:                  | AXIS             |
| Model number / Marketing name: | AXIS A4020-E     |
| FCC ID:                        | PNB-AXISA4020-E  |
| Description:                   | OSDP card reader |
| Ancillary Equipment:           | See section 2.7  |

The device contains a certified NFC radio module with FCC ID: 2AQPZ-NFC2F

### 2.2 Device Characteristics

|                                   |                                               |
|-----------------------------------|-----------------------------------------------|
| Device Class for 47 CFR Part 15 B | Class B                                       |
| Type of Power Supply              | DC                                            |
| Nominal Supply Voltage            | 12V                                           |
| Supply Voltage Range              | 12-24V                                        |
| Operating Temperature Range       | -30°C - 65°C                                  |
| Operating Air Humidity Range      | 10% – 100% relative humidity (non-condensing) |
| Highest Internal Frequency Source | 80 MHz                                        |

### 2.3 Test Samples

| EUT # | EUT ID         | Description                                   | Used For:                                 |
|-------|----------------|-----------------------------------------------|-------------------------------------------|
| 1     | A002938353-001 | Standard sample<br>HW: 2090916 R3.9 FW: Alpha | Conducted Emissions<br>Radiated Emissions |

### 2.4 Wireless Technologies and Bands Supported by the EUT

| Technology    | Band | Frequency Range (Tx)    | Evaluation Performed* |
|---------------|------|-------------------------|-----------------------|
| 13.56MHz RFID | HF   | 13.553 MHz – 13.567 MHz | YES                   |

\*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 |
|---------------|------|--------------------|-----------------|------|
| 13.56MHz RFID | HF   | 1                  | Loop antenna    | N/A  |

## 2.6 Wireless Technology Details

| Technology           | Band | Modulation Type(s) | No. of Channels | Channel Spacing | Adaptivity |
|----------------------|------|--------------------|-----------------|-----------------|------------|
| 13.56MHz RFID Type A | HF   | ASK 100%           | 1               | N/A             | N/A        |
| 13.56MHz RFID Type B | HF   | ASK 10%            | 1               | N/A             | N/A        |

## 2.7 Ancillary Equipment

| ID             | Description                   | Manufacturer / Model | Hardware & Software Versions |
|----------------|-------------------------------|----------------------|------------------------------|
| A002938353-004 | Power Over Ethernet Injector  | Axis T8133           | -                            |
| A002938353-005 | STP Ethernet Cable            | -                    | -                            |
| A002938353-006 | RJ45 Power & Signalling Cable | -                    | -                            |
| A002938353-007 | Door Controller               | Axis A1601           | -                            |
| A002938353-016 | STP Ethernet Cable            | -                    | -                            |

## 2.8 EUT Diagrams

N/A

### 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<br>*See Note 1 |

#### 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

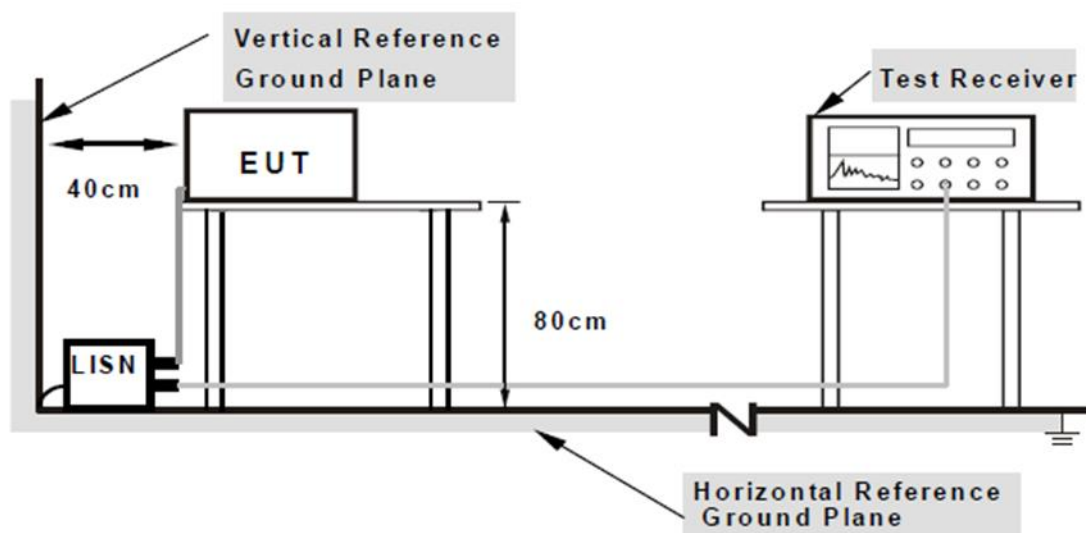
Where different arrangements of equipment were used for different types of measurements, these are tabulated in section 3.4.2 and details of each arrangement are included in subsequent sections

#### 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

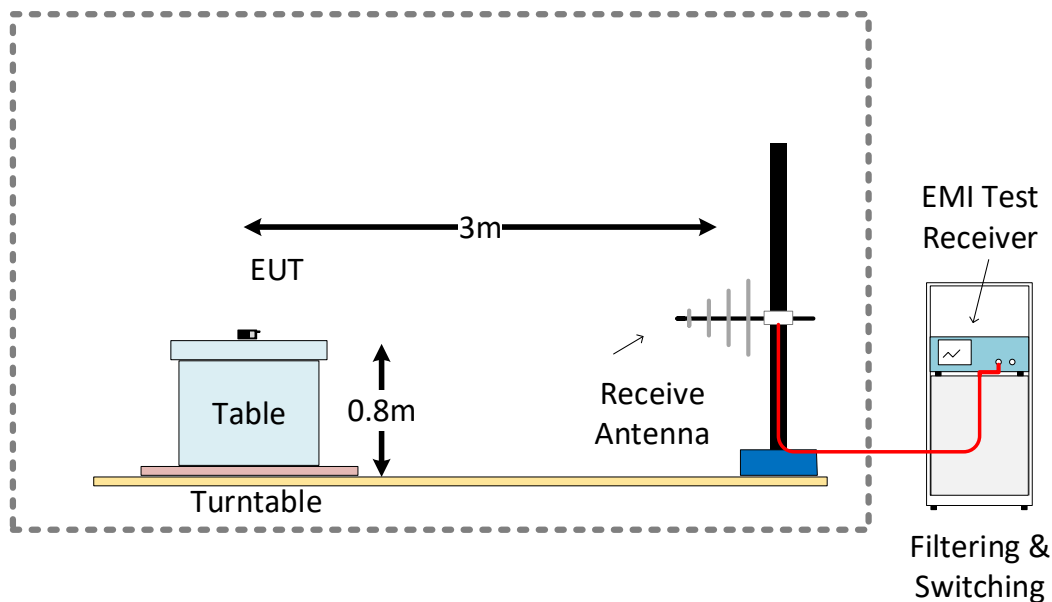
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The LISNs provide 50Ω/ 50μH of coupling impedance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



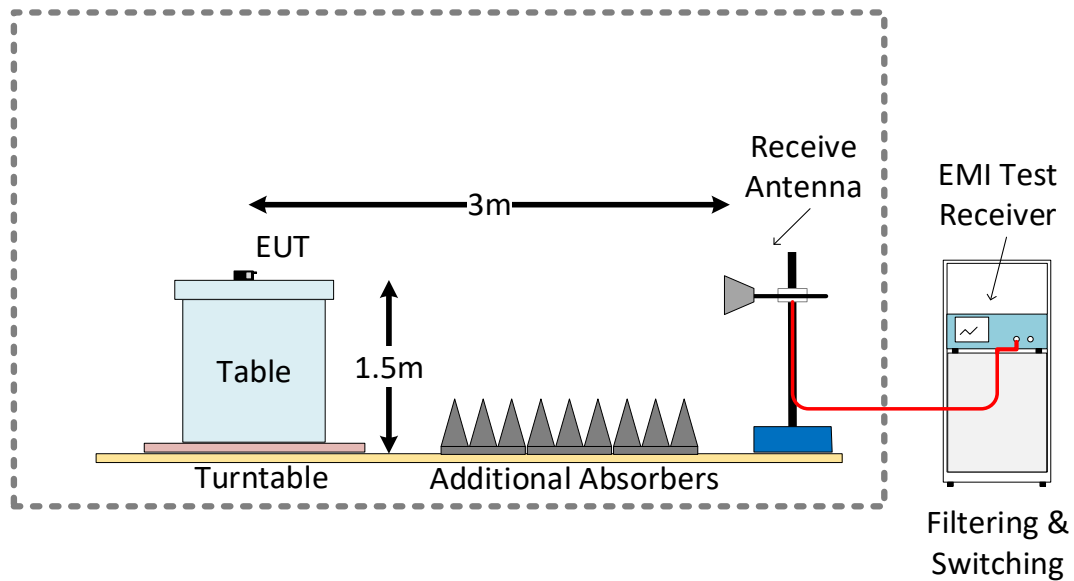
#### 3.4.4 Test Equipment Setup – SAC 5 (Radiated Emissions)

- 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 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 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.

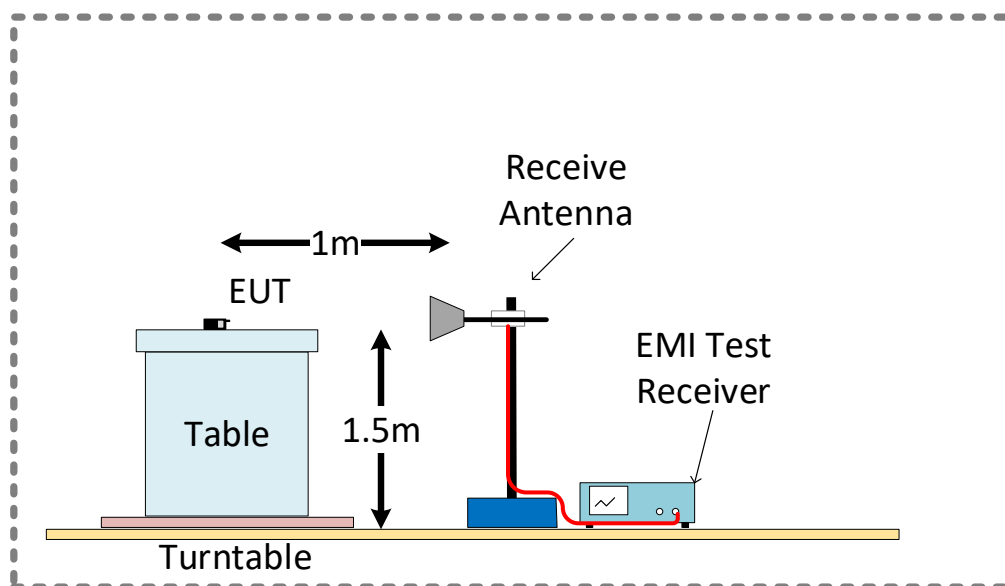
**SAC 5 Test Setup Configuration 30MHz – 1GHz**



### SAC 5 Test Setup Configuration 1GHz – 18GHz

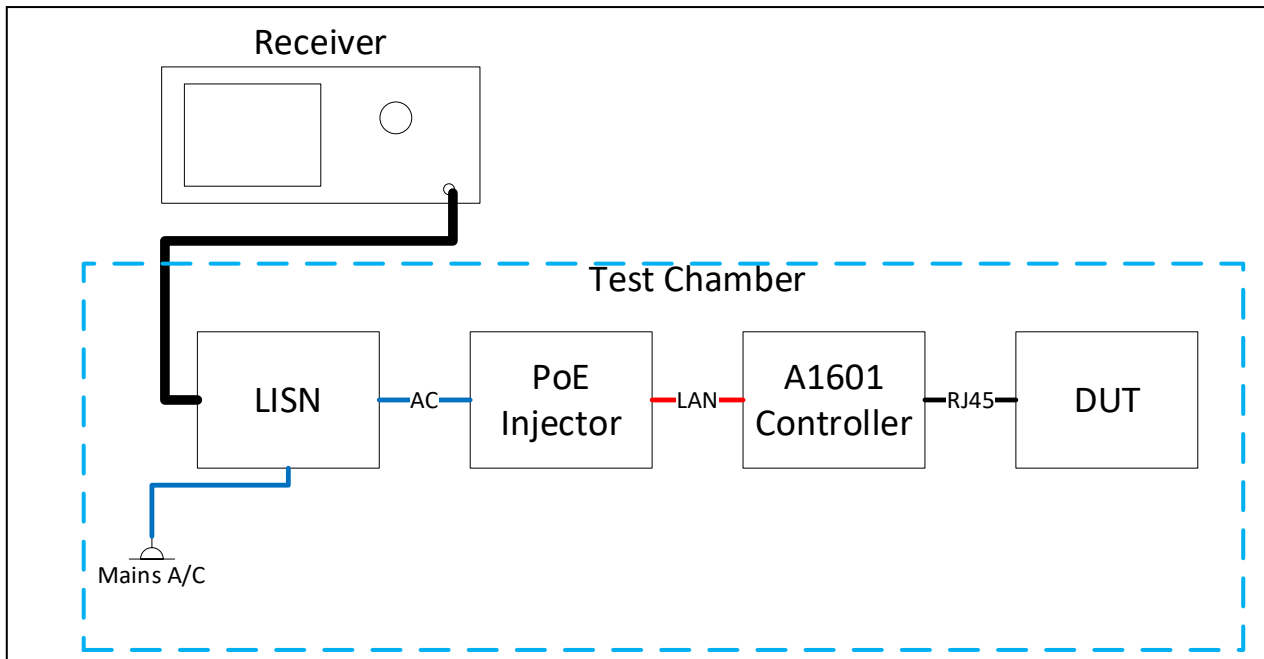


### SAC 5 Test Setup Configuration 18GHz – 40GHz

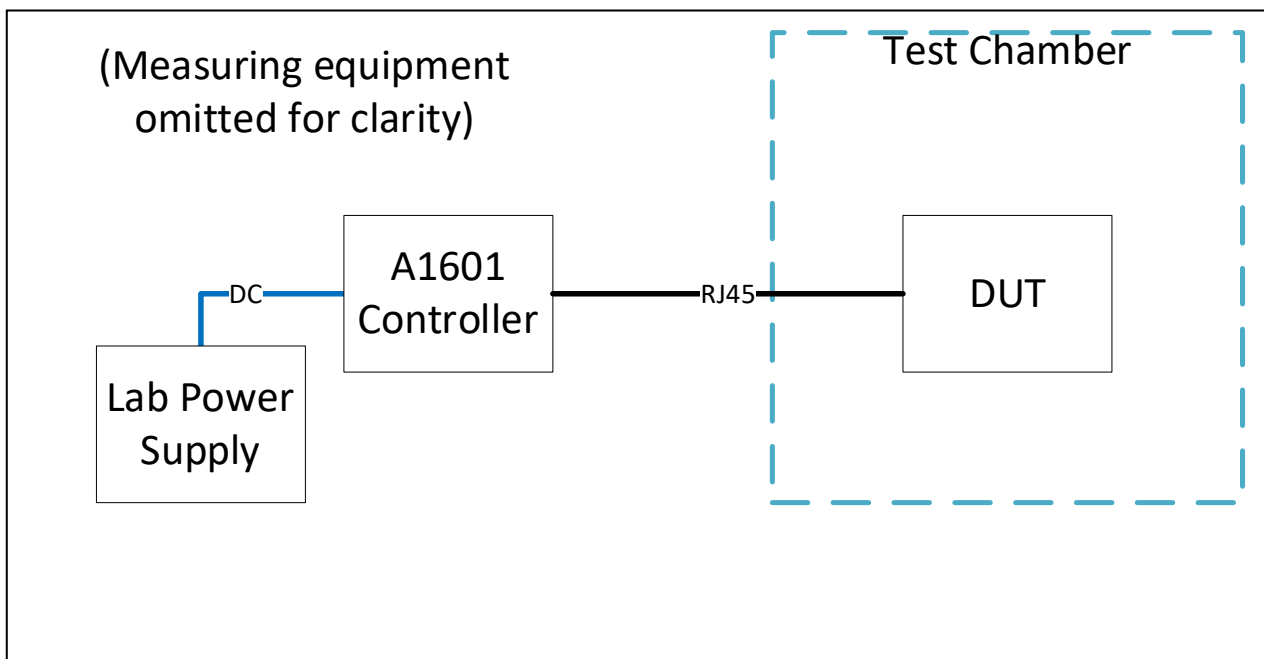


### 3.5 EUT Configuration During Test

#### Conducted Emissions Testing: Block Diagram



#### Radiated Emissions Testing: Block Diagram



### 3.6 EUT Operation Modes

| Operation mode | Description                         |
|----------------|-------------------------------------|
| Idle Mode      | Device is not actively transmitting |

### 3.7 Deviations from the Test Standard

None

### 3.8 Environmental Conditions

#### 3.8.1 Environmental Conditions – Conducted Emissions System

##### Environmental Conditions Log – Conducted Emissions

| Date       | Time  | Temperature (°C) | Relative Humidity (%) |
|------------|-------|------------------|-----------------------|
| 2020.11.13 | 08:20 | 21.9             | 38                    |

#### 3.8.2 Environmental Conditions – SAC5 (Radiated Emissions)

##### Environmental Conditions Log – SAC5

| Date       | Time  | Temperature (°C) | Relative Humidity (%) |
|------------|-------|------------------|-----------------------|
| 2020.11.02 | 07:46 | 18.4             | 59                    |

## 4. TEST RESULTS

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

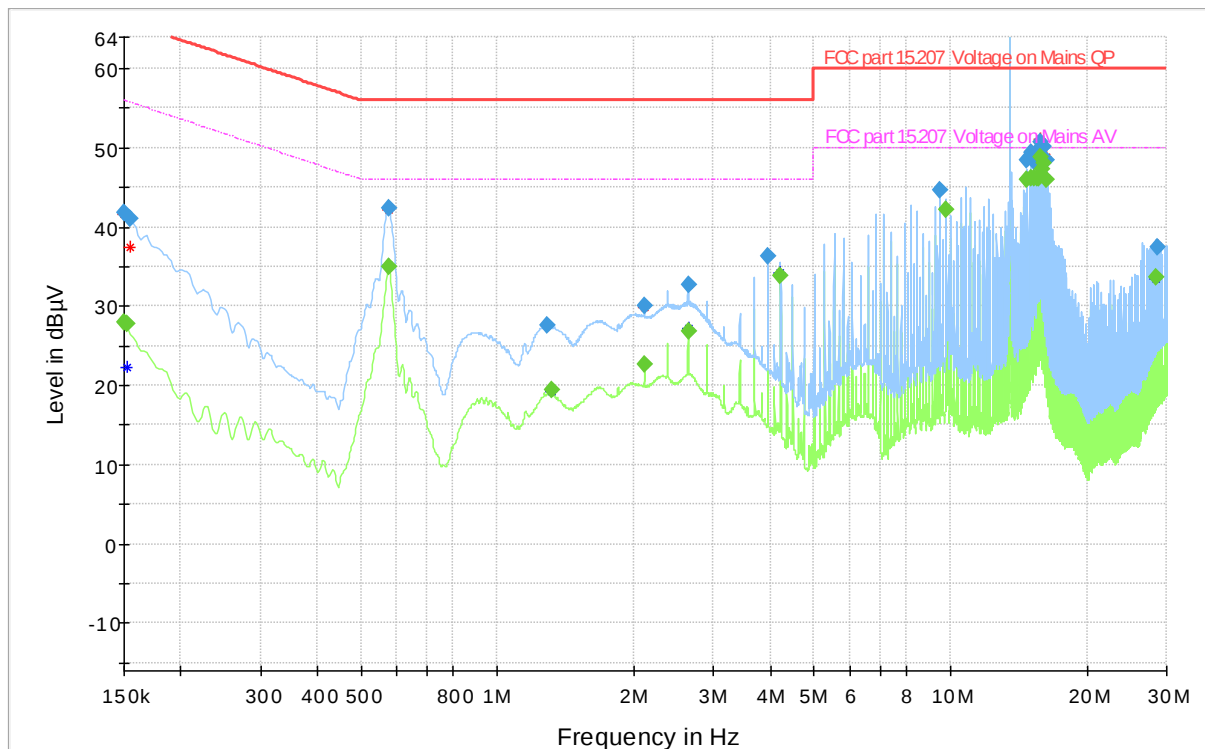
#### 4.1.1 AC Power Line Conducted Emissions (Unintentional) – Test Summary

| Test Specification                                        | FCC 47 CFR 15.107 (Part 15 Subpart B) |                                                                      |
|-----------------------------------------------------------|---------------------------------------|----------------------------------------------------------------------|
| Test Engineer & Date                                      | Fariborz Abasi                        | 2020.11.13                                                           |
| EUT and Ancillary Equipment IDs                           | A002938353-001                        | A002938353-004<br>A002938353-006<br>A002938353-007<br>A002938353-016 |
| EUT Operation Mode(s)                                     | Idle Mode                             |                                                                      |
| EUT Wireless Configuration(s)                             | Idle Mode                             |                                                                      |
| EUT Hardware Configuration(s)                             | Power via PoE                         |                                                                      |
| Overall Result                                            | PASS                                  |                                                                      |
| Test Parameter                                            | Frequency Range                       | Result*                                                              |
| AC Conducted Power Line Emissions – “N” Line (Idle Mode)  | 150 kHz – 30 MHz                      | PASS                                                                 |
| AC Conducted Power Line Emissions – “L1” Line (Idle Mode) | 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

|                            |                                                                                                                             |                  |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------|
| <b>Test</b>                | Conducted Emission                                                                                                          |                  |
| <b>Test mode condition</b> | Idle Mode                                                                                                                   |                  |
| <b>Standard</b>            | 47 CFR Part 15.107 Class B                                                                                                  |                  |
| <b>EUT</b>                 | A002938353-001                                                                                                              |                  |
| <b>Ancillary Equipment</b> | A002938353-004: POE<br>A002938353-006: RJ45 Cable<br>A002938353-007: A1601 Controller<br>A002938353-016: STP Ethernet cable |                  |
| <b>Test Engineer</b>       | Fariborz Abasi                                                                                                              | Date: 2020-11-13 |



| Frequency (MHz) | QuasiPeak (dBµV) | CAverage (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.150000        | ---              | 27.99           | 56.00        | 28.01       | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 0.150000        | 41.73            | ---             | 66.00        | 24.27       | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 0.152250        | ---              | 27.77           | 55.88        | 28.10       | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 0.154500        | 41.03            | ---             | 65.75        | 24.72       | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 0.575250        | ---              | 35.08           | 46.00        | 10.92       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 0.575250        | 42.32            | ---             | 56.00        | 13.68       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 1.290750        | 27.51            | ---             | 56.00        | 28.49       | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 1.317750        | ---              | 19.39           | 46.00        | 26.61       | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 2.109750        | ---              | 22.61           | 46.00        | 23.39       | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 2.109750        | 29.98            | ---             | 56.00        | 26.02       | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 2.638500        | 32.76            | ---             | 56.00        | 23.24       | 1000.0          | 9.000           | N    | ON     | 9.8        |
| 2.638500        | ---              | 26.86           | 46.00        | 19.14       | 1000.0          | 9.000           | N    | ON     | 9.8        |
| 3.957000        | 36.25            | ---             | 56.00        | 19.75       | 1000.0          | 9.000           | L1   | ON     | 9.8        |
| 4.220250        | ---              | 33.88           | 46.00        | 12.12       | 1000.0          | 9.000           | L1   | ON     | 9.8        |
| 9.496500        | 44.66            | ---             | 60.00        | 15.34       | 1000.0          | 9.000           | N    | ON     | 9.9        |
| 9.759750        | ---              | 42.27           | 50.00        | 7.73        | 1000.0          | 9.000           | N    | ON     | 9.9        |
| 13.560000       | 70.31            | ---             | 60.00        | -10.31      | 1000.0          | 9.000           | L1   | ON     | 9.9        |
| 13.560000       | ---              | 66.62           | 50.00        | -16.62      | 1000.0          | 9.000           | N    | ON     | 9.9        |
| 14.770500       | 48.44            | ---             | 60.00        | 11.56       | 1000.0          | 9.000           | L1   | ON     | 9.9        |
| 14.770500       | ---              | 45.93           | 50.00        | 4.07        | 1000.0          | 9.000           | N    | ON     | 10.0       |
| 15.033750       | ---              | 46.24           | 50.00        | 3.76        | 1000.0          | 9.000           | L1   | ON     | 9.9        |
| 15.033750       | 49.36            | ---             | 60.00        | 10.64       | 1000.0          | 9.000           | L1   | ON     | 9.9        |
| 15.297000       | ---              | 46.20           | 50.00        | 3.80        | 1000.0          | 9.000           | N    | ON     | 10.0       |
| 15.299250       | 48.19            | ---             | 60.00        | 11.81       | 1000.0          | 9.000           | L1   | ON     | 9.9        |
| 15.560250       | ---              | 46.12           | 50.00        | 3.88        | 1000.0          | 9.000           | L1   | ON     | 9.9        |
| 15.560250       | 49.34            | ---             | 60.00        | 10.66       | 1000.0          | 9.000           | L1   | ON     | 9.9        |
| 15.693000       | ---              | 46.13           | 50.00        | 3.87        | 1000.0          | 9.000           | N    | ON     | 10.0       |
| 15.695250       | 49.81            | ---             | 60.00        | 10.19       | 1000.0          | 9.000           | L1   | ON     | 9.9        |
| 15.825750       | ---              | 48.77           | 50.00        | 1.23        | 1000.0          | 9.000           | N    | ON     | 10.0       |
| 15.825750       | 50.76            | ---             | 60.00        | 9.24        | 1000.0          | 9.000           | L1   | ON     | 9.9        |
| 15.956250       | ---              | 47.27           | 50.00        | 2.73        | 1000.0          | 9.000           | N    | ON     | 10.0       |
| 15.958500       | 50.06            | ---             | 60.00        | 9.94        | 1000.0          | 9.000           | L1   | ON     | 9.9        |
| 16.089000       | ---              | 48.15           | 50.00        | 1.85        | 1000.0          | 9.000           | N    | ON     | 10.0       |
| 16.089000       | 50.09            | ---             | 60.00        | 9.91        | 1000.0          | 9.000           | L1   | ON     | 9.9        |
| 16.221750       | ---              | 45.92           | 50.00        | 4.08        | 1000.0          | 9.000           | N    | ON     | 10.0       |
| 16.221750       | 48.44            | ---             | 60.00        | 11.56       | 1000.0          | 9.000           | L1   | ON     | 9.9        |
| 28.353750       | ---              | 33.66           | 50.00        | 16.34       | 1000.0          | 9.000           | N    | ON     | 10.1       |
| 28.619250       | 37.44            | ---             | 60.00        | 22.56       | 1000.0          | 9.000           | N    | ON     | 10.1       |

## 4.2 Test Results – Radiated Emissions (Unintentional Transmitter)

### 4.2.1 Radiated Emissions (Unintentional) – Test Summary

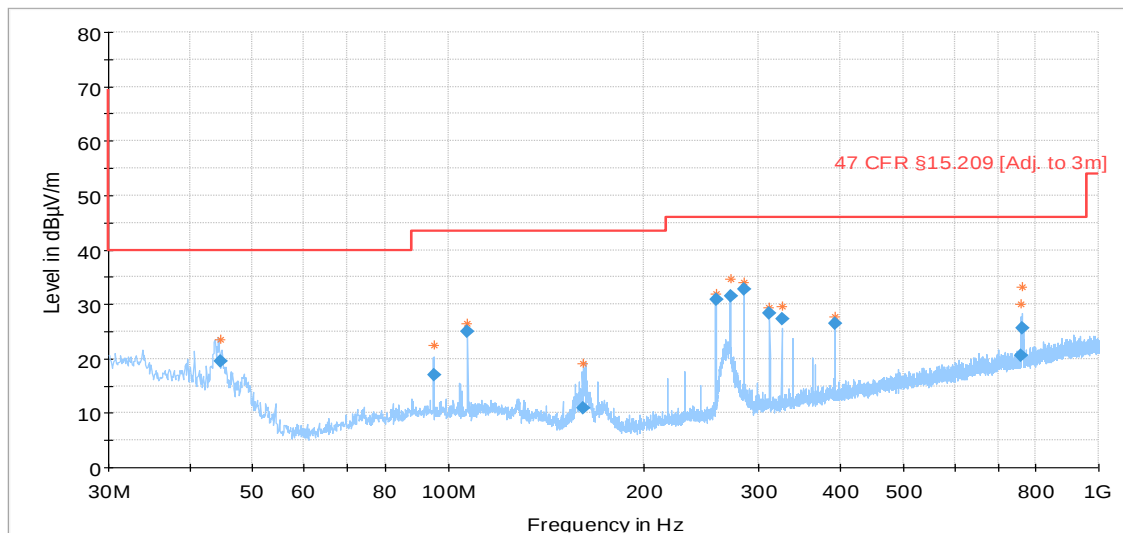
| Test Specification              | FCC 47 CFR 15.109 (Part 15 Subpart B)   |                                                                      |
|---------------------------------|-----------------------------------------|----------------------------------------------------------------------|
| Test Engineer & Date            | Niall Forrester                         | 2020.11.02                                                           |
| EUT and Ancillary Equipment IDs | A002938353-001                          | A002938353-004<br>A002938353-005<br>A002938353-006<br>A002938353-007 |
| EUT Operation Mode(s)           | Idle Mode                               |                                                                      |
| EUT Wireless Configuration(s)   | Idle Mode                               |                                                                      |
| EUT Hardware Configuration(s)   | Power via controller / Lab power supply |                                                                      |
| 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                                                              |                  |
| Antenna orientation | Horizontal and Vertical                                           |                  |
| Sweep frequency     | 30 MHz-1 GHz                                                      |                  |
| Standard            | 47 CFR Part 15 subpart B                                          |                  |
| EUT                 | A002938353-001                                                    |                  |
| Ancillary Equipment | A002938353-004, A002938353-005,<br>A002938353-006, A002938353-007 |                  |
| Test Engineer       | Niall Forrester                                                   | Date: 2020.11.02 |
| Chamber details     | Chamber: SAC 5                                                    |                  |

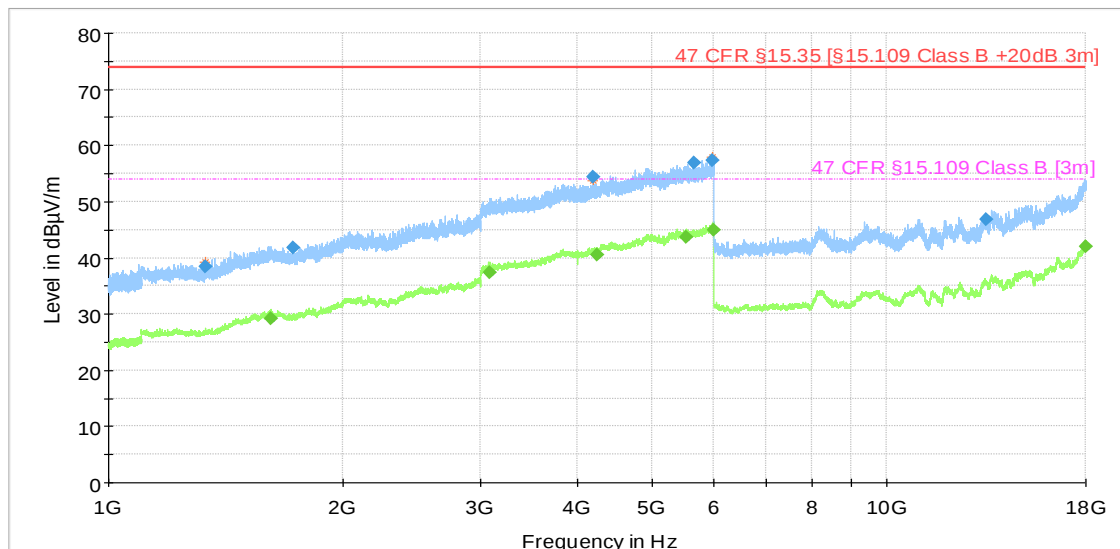


Preview Result 2-AVG  
 Critical\_Freqs AVG  
 47 CFR §15.209 [Adj. to 3m]  
 Final\_Result AVG  
 Preview Result 1-PK+  
 Critical\_Freqs PK+  
 Final\_Result QPK

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|
| 44.540160       | 19.63              | 40.00          | 20.37       | 1000.0          | 120.000         | 100.0       | V   | 68.0          |
| 94.863720       | 16.93              | 43.52          | 26.59       | 1000.0          | 120.000         | 100.0       | V   | 112.0         |
| 106.999120      | 24.95              | 43.52          | 18.57       | 1000.0          | 120.000         | 100.0       | V   | 334.0         |
| 161.302040      | 10.84              | 43.52          | 32.68       | 1000.0          | 120.000         | 175.0       | H   | -22.0         |
| 257.639160      | 30.81              | 46.02          | 15.21       | 1000.0          | 120.000         | 171.0       | V   | 68.0          |
| 271.193400      | 31.60              | 46.02          | 14.42       | 1000.0          | 120.000         | 100.0       | H   | -22.0         |
| 284.760160      | 32.79              | 46.02          | 13.23       | 1000.0          | 120.000         | 100.0       | H   | 116.0         |
| 311.887880      | 28.28              | 46.02          | 17.74       | 1000.0          | 120.000         | 100.0       | H   | 310.0         |
| 325.457920      | 27.22              | 46.02          | 18.80       | 1000.0          | 120.000         | 100.0       | H   | -22.0         |
| 393.250840      | 26.36              | 46.02          | 19.66       | 1000.0          | 120.000         | 100.0       | H   | -4.0          |
| 760.396920      | 20.65              | 46.02          | 25.37       | 1000.0          | 120.000         | 100.0       | H   | 130.0         |
| 762.683240      | 25.58              | 46.02          | 20.44       | 1000.0          | 120.000         | 175.0       | V   | 26.0          |

1GHz – 18GHz

|                     |                                                                   |                  |
|---------------------|-------------------------------------------------------------------|------------------|
| Test mode condition | Idle                                                              |                  |
| Antenna orientation | Horizontal and Vertical                                           |                  |
| Sweep frequency     | 1 GHz – 18 GHz                                                    |                  |
| Standard            | 47 CFR Part 15 subpart B                                          |                  |
| EUT                 | A002938353-001                                                    |                  |
| Ancillary Equipment | A002938353-004, A002938353-005,<br>A002938353-006, A002938353-007 |                  |
| Test Engineer       | Niall Forrester                                                   | Date: 2020.11.02 |
| Chamber details     | Chamber: SAC 5                                                    |                  |



— Preview Result 2-AVG  
— Preview Result 1-PK+  
\* Critical\_Freqs AVG  
\* Critical\_Freqs PK+  
— 47 CFR §15.35 [§15.109 Class B +20dB 3m]  
— 47 CFR §15.109 Class B [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) |
|-----------------|------------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|
| 1333.973000     | 38.51            | ---              | 73.98          | 35.47       | 1000.0          | 1000.000        | 410.0       | H   | 142.0         |
| 1615.690000     | ---              | 29.16            | 53.98          | 24.82       | 1000.0          | 1000.000        | 215.0       | V   | -4.0          |
| 1730.200000     | 41.84            | ---              | 73.98          | 32.14       | 1000.0          | 1000.000        | 135.0       | V   | -8.0          |
| 3082.084000     | ---              | 37.42            | 53.98          | 16.56       | 1000.0          | 1000.000        | 193.0       | V   | 322.0         |
| 4189.221000     | 54.31            | ---              | 73.98          | 19.67       | 1000.0          | 1000.000        | 193.0       | V   | 176.0         |
| 4238.684000     | ---              | 40.51            | 53.98          | 13.47       | 1000.0          | 1000.000        | 365.0       | V   | 42.0          |
| 5518.274000     | ---              | 43.57            | 53.98          | 10.41       | 1000.0          | 1000.000        | 365.0       | H   | 222.0         |
| 5647.712000     | 56.82            | ---              | 73.98          | 17.16       | 1000.0          | 1000.000        | 243.0       | H   | 98.0          |
| 5968.353000     | 57.26            | ---              | 73.98          | 16.72       | 1000.0          | 1000.000        | 165.0       | H   | 262.0         |
| 5979.869000     | ---              | 45.00            | 53.98          | 8.98        | 1000.0          | 1000.000        | 215.0       | H   | 132.0         |
| 13385.104000    | 46.85            | ---              | 73.98          | 27.13       | 1000.0          | 1000.000        | 100.0       | H   | 322.0         |
| 17990.204000    | ---              | 41.90            | 53.98          | 12.08       | 1000.0          | 1000.000        | 343.0       | V   | -8.0          |

## 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<br>2704076  | 2020.07.16       | 2021.07.16      |
| Test Receiver 9KHz to 3.5 GHz | Rohde & Schwarz | ESR3   | 101674<br>2704016  | 2020.07.17       | 2021.07.17      |

#### 5.1.2 Hardware List – SAC5 System

| Type                                 | Manufacturer    | Model             | Serial Number / ID            | Calibration Date | Calibration Due |
|--------------------------------------|-----------------|-------------------|-------------------------------|------------------|-----------------|
| EMI Test Receiver                    | Rohde & Schwarz | ESW44             | 101760<br>2881044             | 2020.07.17       | 2021.07.17      |
| Ultra Broadband Antenna              | Rohde & Schwarz | HL562E            | 100988<br>2823181             | 2019.07.23       | 2021.07.23      |
| Double Ridged Waveguide Horn Antenna | Rohde & Schwarz | HF907             | 102678<br>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<br>2884198             | 2020.08.04       | 2021.08.04      |
| Open Switch & Control Unit           | Rohde & Schwarz | OSP120            | 100084<br>2761253             | 2020.08.04       | 2021.08.04      |
| Shielded Filter Unit                 | Rohde & Schwarz | OSP-F Extension 1 | 101333<br>2761265             | 2020.08.04       | 2021.08.04      |
| Shielded Filter Unit                 | Rohde & Schwarz | OSP-F Extension 2 | 101335<br>2761266             | 2020.08.04       | 2021.08.04      |
| Shielded Filter Unit                 | Rohde & Schwarz | OSP-F Base Unit   | 101330<br>2761262             | 2020.08.04       | 2021.08.04      |
| Humidity Temperature Probe           | Lufft           | OPUS 20           | 1236.0118.0802.033<br>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 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

For photographs see Appendix 1