



Test report No:  
NIE: 62129RRF.017

## Partial Test report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

Radio Frequency Devices.

Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.

Radiated emission limits; general requirements.

Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and Licence-Exempt Local Area Network (LE-LAN) Devices.

General Requirements and Information for the Certification of Radio Apparatus.

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (*) Identification of item tested         | Wireless hearing instrument                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| (*) Trademark                             | ReSound, Beltone, Interton, GN Hearing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| (*) Model and /or type reference          | CAR13A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Other identification of the product       | HW version: PCBA, CAMBR RIE13 PB, V1.A, rev. B<br>SW version: Dooku 2<br>FCC ID: X26CAR13A<br>IC: 6941C-CAR13A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| (*) Features                              | Audio amplification, proprietary 2.4 GHz wireless functionality (Proximity), Bluetooth 5.0 and 10.667 MHz wireless magnetic induction functionality                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Applicant                                 | GN HEARING A/S<br>Lautrupbjerg 7, 2750 Ballerup, Denmark                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Test method requested, standard           | USA FCC Part 15.247 (10-1-19) Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.<br>USA FCC Part 15.209 (10-1-19) Edition: Radiated emission limits; general requirements.<br>CANADA RSS-247 Issue 2 (February 2017).<br>CANADA RSS-Gen Issue 5 (March 2019).<br>-Transmitter out of band radiated emissions with simultaneous transmissions.<br>Guidance for Performing Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid Systems Devices Operating Under Section 15.247 of the FCC Rules. 558074 D01 Meas Guidance v05r02 dated April 2, 2019.<br>ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices. |
| Approved by (name / position & signature) | Rafael López Martín<br>EMC Consumer & RF Lab. Manager<br><br>RAFAEL LÓPEZ MARTÍN<br>2020.07.10<br>11:53:35 +02'00'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Date of issue                             | 2020-07-06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Report template No                        | FDT08_22<br>(*) "Data provided by the client"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

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## Competences and guarantees

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DEKRA Testing and Certification is a testing laboratory accredited by the National Accreditation Body (ENAC - Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification is a FCC-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification at the time of performance of the test.

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The results presented in this Test Report apply only to the particular item under test established in this document.

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## General conditions

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1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification and the Accreditation Bodies.

## Uncertainty

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Uncertainty (factor  $k=2$ ) was calculated according to the DEKRA Testing and Certification internal document PODT000.

## Data provided by the client

---

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample of the model CAR13A is a wireless hearing aid.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of result.

## Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

| Control N° | Description                 | Model  | Serial N°  | Date of reception |
|------------|-----------------------------|--------|------------|-------------------|
| 62129C/268 | Wireless hearing instrument | CAR13A | 2000801584 | 2020/04/16        |

Sample S/01 has undergone the test(s): The Radiated tests indicated in Appendixes A, B.

## Test sample description

|                          |                                               |                                        |                          |                          |                                   |                          |                          |
|--------------------------|-----------------------------------------------|----------------------------------------|--------------------------|--------------------------|-----------------------------------|--------------------------|--------------------------|
| Ports..... :             | Port name and description                     | Cable                                  |                          |                          |                                   |                          |                          |
|                          |                                               | Specified max length [m]               | Attached during test     | Shielded                 | Coupled to patient <sup>(3)</sup> |                          |                          |
|                          |                                               |                                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>          |                          |                          |
|                          |                                               |                                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>          |                          |                          |
|                          |                                               |                                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>          |                          |                          |
|                          |                                               |                                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>          |                          |                          |
|                          |                                               |                                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>          |                          |                          |
|                          | Supplementary information to the ports..... : |                                        |                          |                          |                                   |                          |                          |
| Rated power supply ..... | Voltage and Frequency                         |                                        | Reference poles          |                          |                                   |                          |                          |
|                          |                                               |                                        | L1                       | L2                       | L3                                | N                        | PE                       |
|                          | <input type="checkbox"/>                      | AC:                                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>          | <input type="checkbox"/> | <input type="checkbox"/> |
|                          | <input type="checkbox"/>                      | AC:                                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>          | <input type="checkbox"/> | <input type="checkbox"/> |
|                          | <input checked="" type="checkbox"/>           | DC: Internal non-rechargeable battery. |                          |                          |                                   |                          |                          |
| <input type="checkbox"/> | DC:                                           |                                        |                          |                          |                                   |                          |                          |
| Rated Power .....        | 1.45 V                                        |                                        |                          |                          |                                   |                          |                          |
| Clock frequencies.....   | 2.48 GHz and 10.667 MHz                       |                                        |                          |                          |                                   |                          |                          |
| Other parameters .....   |                                               |                                        |                          |                          |                                   |                          |                          |

|                                               |                                     |                                                                        |              |
|-----------------------------------------------|-------------------------------------|------------------------------------------------------------------------|--------------|
| Software version .....                        | Dooku 2                             |                                                                        |              |
| Hardware version .....                        | PCBA, CAMBR RIE13 PB, V1.A, rev. B  |                                                                        |              |
| Dimensions in cm (W x H x D) .....            |                                     |                                                                        |              |
| Mounting position .....                       | <input type="checkbox"/>            | Table top equipment                                                    |              |
|                                               | <input type="checkbox"/>            | Wall/Ceiling mounted equipment                                         |              |
|                                               | <input type="checkbox"/>            | Floor standing equipment                                               |              |
|                                               | <input type="checkbox"/>            | Hand-held equipment                                                    |              |
|                                               | <input checked="" type="checkbox"/> | Other: Placed behind ear                                               |              |
| Modules/parts.....                            | Module/parts of test item           | Type                                                                   | Manufacturer |
|                                               |                                     |                                                                        |              |
|                                               |                                     |                                                                        |              |
|                                               |                                     |                                                                        |              |
|                                               |                                     |                                                                        |              |
| Accessories (not part of the test item) ..... | Description                         | Type                                                                   | Manufacturer |
|                                               | Computer                            | Certified according to IEC 60950-1, IEC 62368-1 or equivalent standard |              |
|                                               |                                     |                                                                        |              |
|                                               |                                     |                                                                        |              |
|                                               |                                     |                                                                        |              |
|                                               |                                     |                                                                        |              |
|                                               |                                     |                                                                        |              |
|                                               |                                     |                                                                        |              |
| Documents as provided by the applicant.....   | Description                         | File name                                                              | Issue date   |
|                                               |                                     |                                                                        |              |
|                                               |                                     |                                                                        |              |
|                                               |                                     |                                                                        |              |

<sup>(3)</sup> Only for Medical Equipment

## Identification of the client

GN HEARING A/S

Lautrupbjerg 7, 2750 Ballerup, Denmark

## Testing period and place

|               |                                        |
|---------------|----------------------------------------|
| Test Location | DEKRA Testing and Certification S.A.U. |
| Date (start)  | 2020-05-18                             |
| Date (finish) | 2020-05-19                             |

## Document history

| Report number | Date       | Description   |
|---------------|------------|---------------|
| 62129RRF.017  | 2020-07-06 | First release |

## Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

|                   |                                     |
|-------------------|-------------------------------------|
| Temperature       | Min. = 15 °C<br>Max. = 35 °C        |
| Relative humidity | Min. = 20 %<br>Max. = 75 %          |
| Air pressure      | Min. = 860 mbar<br>Max. = 1060 mbar |

In the semianechoic chamber, the following limits were not exceeded during the test.

|                   |                                     |
|-------------------|-------------------------------------|
| Temperature       | Min. = 15 °C<br>Max. = 35 °C        |
| Relative humidity | Min. = 20 %<br>Max. = 75 %          |
| Air pressure      | Min. = 860 mbar<br>Max. = 1060 mbar |

## Remarks and comments

The tests have been performed by the technical personnel: José Manuel Jiménez and José Gabriel Pérez.

Used instrumentation:

### Radiated Measurements:

|     |                                                                          | Last Calibration | Due Calibration |
|-----|--------------------------------------------------------------------------|------------------|-----------------|
| 1.  | Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP          | N.A.             | N.A.            |
| 2.  | Shielded Room ETS LINDGREN S101                                          | N.A.             | N.A.            |
| 3.  | Active Loop Antenna HEWLETT PACKARD 11966A                               | 2018/06          | 2020/06         |
| 4.  | EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7                           | 2018/10          | 2020/10         |
| 5.  | DC Power Supply 30V/5A KEYSIGHT TECHNOLOGIES U8002A                      | N.A.             | N.A.            |
| 6.  | Digital Multimeter, FLUKE 175                                            | 2019/10          | 2020/10         |
| 7.  | Biconical/Log Antenna 30MHz - 6GHz ETS LINDGREN 3142E                    | 2017/09          | 2020/09         |
| 8.  | RF Pre-amplifier 40 dB, 10 MHz - 6 GHz BONN ELEKTRONIK BLNA 0160-01N     | 2020/02          | 2021/02         |
| 9.  | Horn antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D            | 2018/01          | 2021/01         |
| 10. | Broadband Horn antenna 18 - 40 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9170 | 2018/07          | 2021/07         |
| 11. | RF Pre-amplifier G>30dB, 1-18GHz BONN ELEKTRONIK BLMA 0118-3A            | 2019/11          | 2020/11         |
| 12. | Low Noise Amplifier G>30dB, 18 - 40 GHz BONN ELEKTRONIK BLMA 1840-1M     | 2019/02          | 2021/02         |
| 13. | Signal and Spectrum Analyzer ROHDE AND SCHWARZ FSV40                     | 2019/10          | 2021/10         |

## Testing verdicts

|                 |     |
|-----------------|-----|
| Not applicable: | N/A |
| Pass:           | P   |
| Fail:           | F   |
| Not measured:   | N/M |

## Summary

| FCC PART 15 PARAGRAPH / RSS-247                                                                                      |         |        |
|----------------------------------------------------------------------------------------------------------------------|---------|--------|
| Requirement – Test case                                                                                              | Verdict | Remark |
| FCC 15.31 (h), 15.209 (a), 15.247 (d) / RSS-Gen 8.9, RSS-247 5.5:<br>- Emission limitations radiated (Transmitter)   | P       | (1)    |
| <u>Supplementary information and remarks:</u><br>(1) Only co-location radiated spurious emission test was requested. |         |        |

## Appendix A: Test results. Bluetooth Low Energy 5.0 (2M, 1M) + SRD 10.667 MHz

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FCC 15.31 (h), 15.209 (a), 15.247 (d) / RSS-Gen 8.9, RSS-247 5.5 Emission limitations radiated  
(Transmitter) .....14

## TEST CONDITIONS

### POWER SUPPLY (V):

Vnominal: 1.45 Vdc

Type of Power Supply: Battery.

### ANTENNA:

Type of Antenna: Integral.

Maximum Declared Antenna Gain for Bluetooth LE: -11.1 dBi

Maximum Declared Antenna Gain for Inductive coil: Not Applicable

### RADIOS AND CHANNELS TESTED:

|                   | Bluetooth Low Energy 5.0 (2M, 1M) / DTS |                         |
|-------------------|-----------------------------------------|-------------------------|
| Mode:             | 1M (GFSK - 1DH5)                        |                         |
| Channel Spacing:  | 2 MHz                                   |                         |
| Frequency Range:  | 2402 MHz to 2480 MHz                    |                         |
| Transmit Channel: | Channel                                 | Channel Frequency (MHz) |
|                   | 39                                      | 2480                    |

|                   | SRD 10.667 MHz / D-BPSK |                         |
|-------------------|-------------------------|-------------------------|
| Mode:             | Single Channel          |                         |
| Channel Spacing:  | Not Applicable          |                         |
| Frequency Range:  | 5 – 30 MHz              |                         |
| Transmit Channel: | Channel                 | Channel Frequency (MHz) |
|                   | 1                       | 10.667                  |

The EUT was tested in the following operating mode:

- Continuous transmission with a modulated carrier at maximum power in all required channels selecting the supported data rates/modulations types.

During transmitter test the EUT was being controlled by the SW tool to operate in a continuous transmit mode on the test channel as required and in each of the different modulation modes.

### Transmission modes selected with each Radio:

The following configurations were selected based on preliminary testing that identified those corresponding to the worst cases:

\* Bluetooth Low Energy: Transmitter radiated spurious emissions tests were performed with the EUT transmitting in 1Mbps.

\* SRD 10.667 MHz: Transmitter radiated spurious emissions tests were performed with the EUT transmitting in the single channel configuration supported by this radio.

### Simultaneous transmission modes selected:

\* Co-location Bluetooth, SRD 10.667 MHz, with the EUT configured to simultaneously transmit two signals at maximum output power: Bluetooth Low Energy in 1Mbps mode, SRD 10.667 MHz.

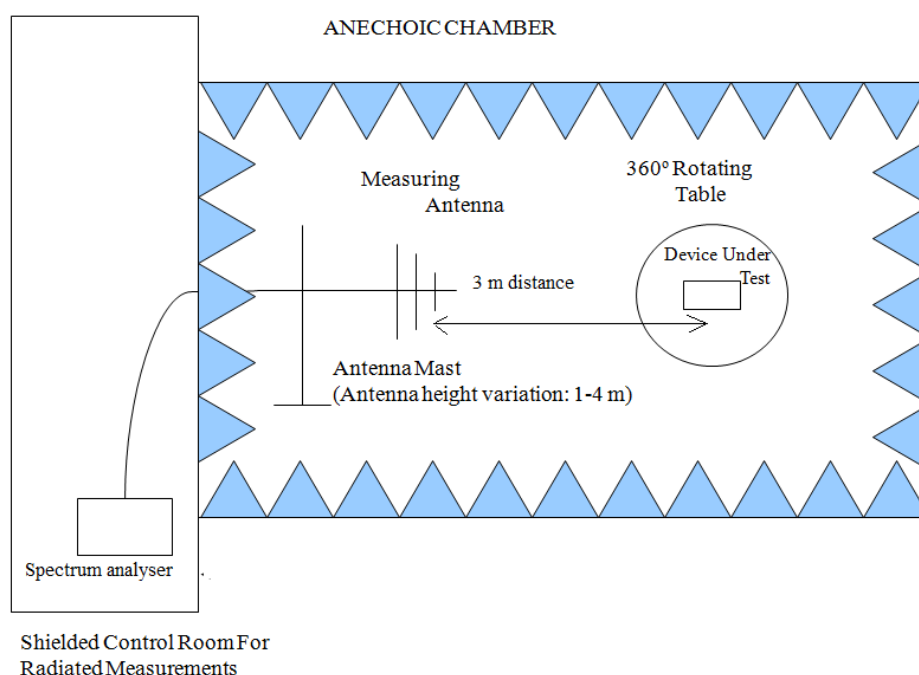
### RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m (Loop antenna for the range between 9 kHz to 30 MHz and Bilog antenna for 30 MHz to 1000 MHz) and at distance of 1 m for the frequency range 1 GHz-26 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-26 GHz horn antenna).

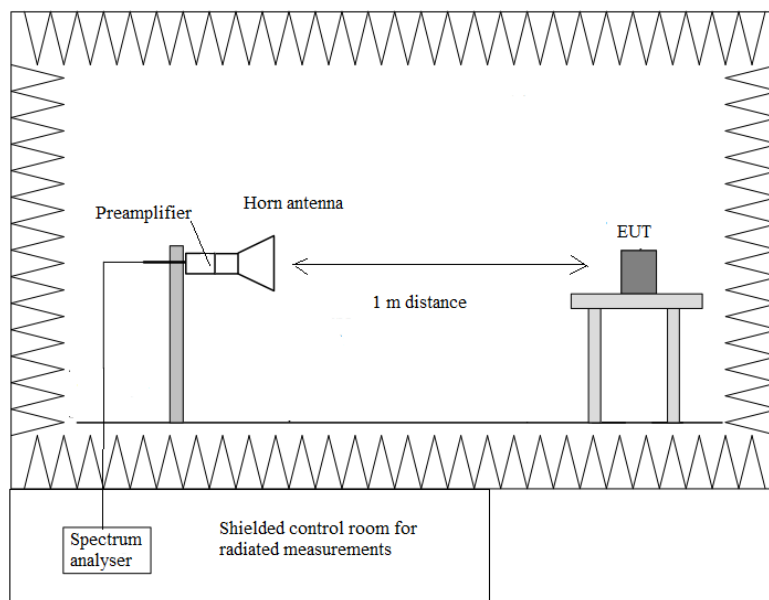
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

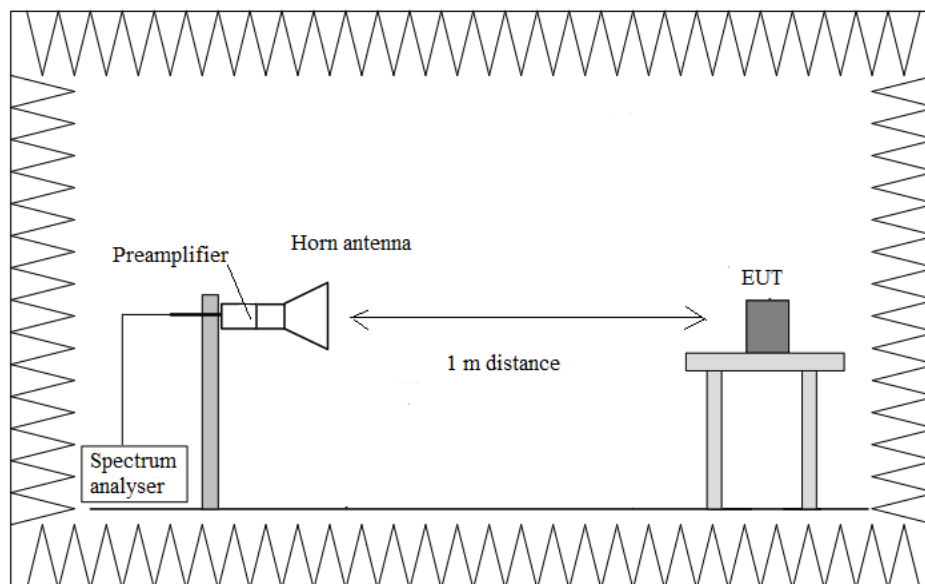
Radiated measurements setup 30 MHz < f < 1 GHz:



Radiated measurements setup  $f > 1$  GHz up to 17 GHz:



Radiated measurements setup  $f > 17$  GHz up to 40 GHz:



## FCC 15.31 (h), 15.209 (a), 15.247 (d) / RSS-Gen 8.9, RSS-247 5.5 Emission limitations radiated (Transmitter)

### SPECIFICATION:

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), appearing outside of the band 13.110 MHz - 14.010 MHz band must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c) / RSS-Gen):

| Frequency Range (MHz) | Field strength (µV/m) | Field strength (dBµV/m) | Measurement distance (m) |
|-----------------------|-----------------------|-------------------------|--------------------------|
| 0.009-0.490           | 2400/F(kHz)           | -                       | 300                      |
| 0.490-1.705           | 24000/F(kHz)          | -                       | 30                       |
| 1.705 - 30.0          | 30                    | 29.54                   | 30                       |
| 30 - 88               | 100                   | 40                      | 3                        |
| 88 - 216              | 150                   | 43.5                    | 3                        |
| 216 - 960             | 200                   | 46                      | 3                        |
| 960 - 40000           | 500                   | 54                      | 3                        |

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247. Attenuation below the general field strength limits specified in RSS-Gen is not required.

### RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-1000 MHz and at distance of 1m for the frequency range 1 GHz-26 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

Test performed on the following worst cases in all relevant tests channels.

### Frequency range 9 kHz - 30 MHz

The spurious emissions do not depend on either the operating channel or the modulation mode.

No spurious frequencies detected at less than 20 dB below the limit.

Measurement uncertainty (dB):  $< \pm 2.99$

### Frequency range 30 MHz - 1 GHz

The spurious emissions below 1 GHz do not depend on either the operating channel or the modulation mode.

No spurious frequencies detected at less than 20 dB below the limit.

Measurement uncertainty (dB):  $< \pm 5.08$

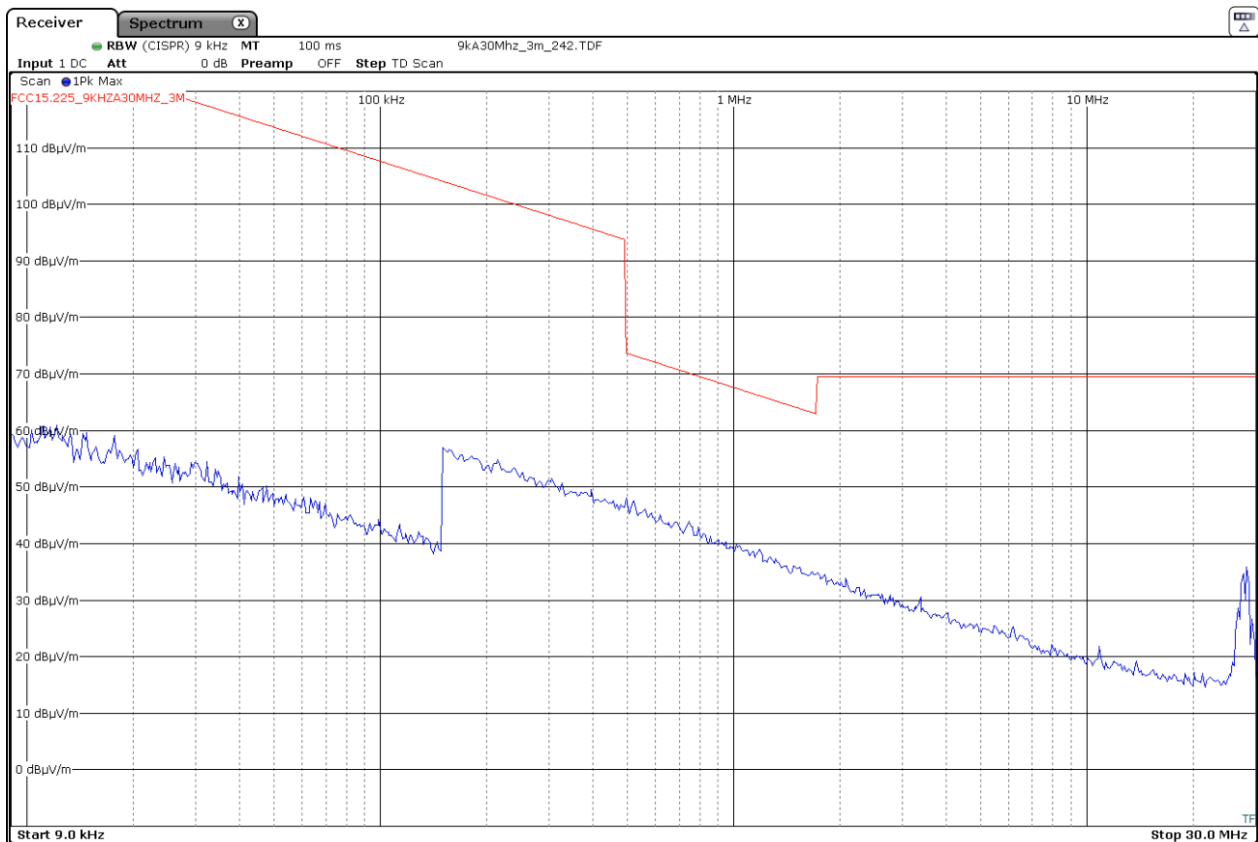
### Frequency range 1 - 26 GHz

Spurious frequencies detected closest to the limit:

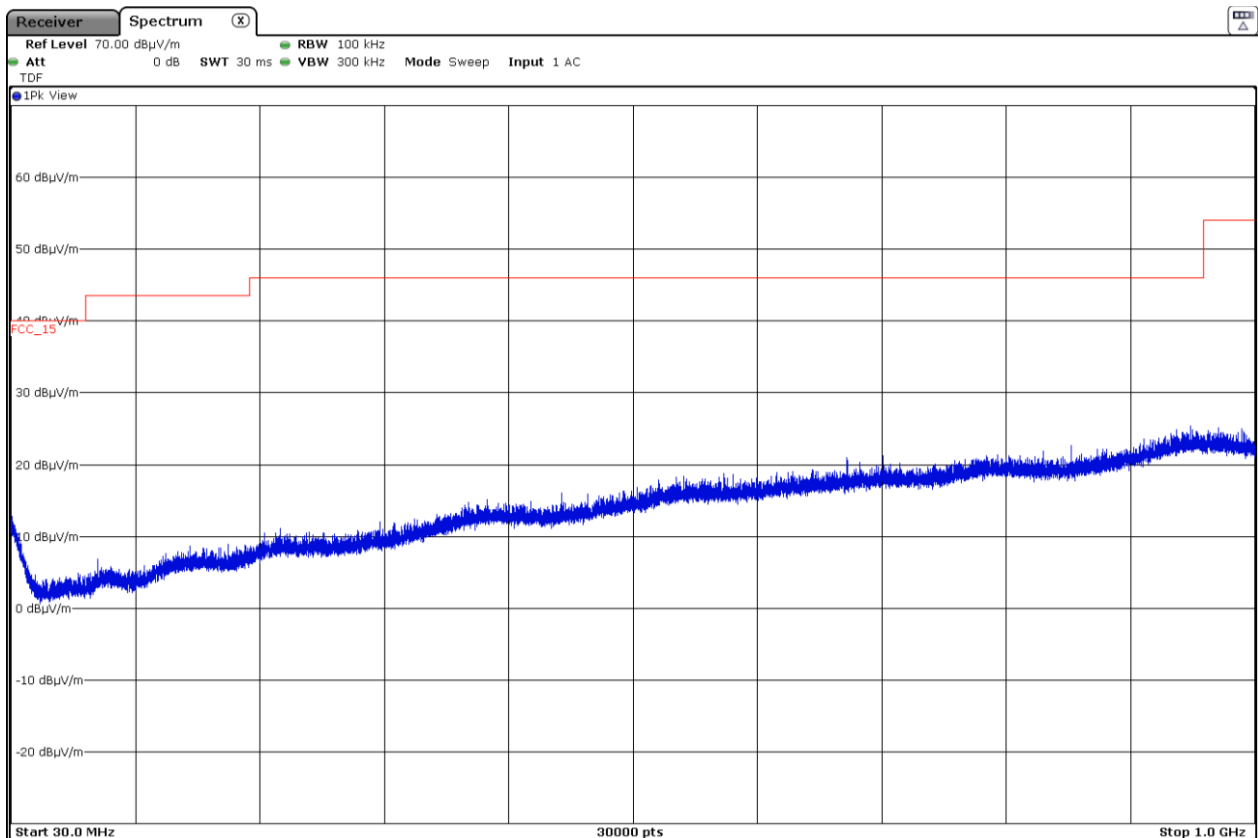
| Spurious frequency (GHz) | Emission Level (dB $\mu$ V/m) | Polarization | Detector | Measurement Uncertainty (dB) |
|--------------------------|-------------------------------|--------------|----------|------------------------------|
| 4.96023                  | 49.71                         | V            | Peak     | $< \pm 5.13$                 |
| 9.92043                  | 51.11                         | V            | Peak     | $< \pm 5.13$                 |

Verdict: PASS

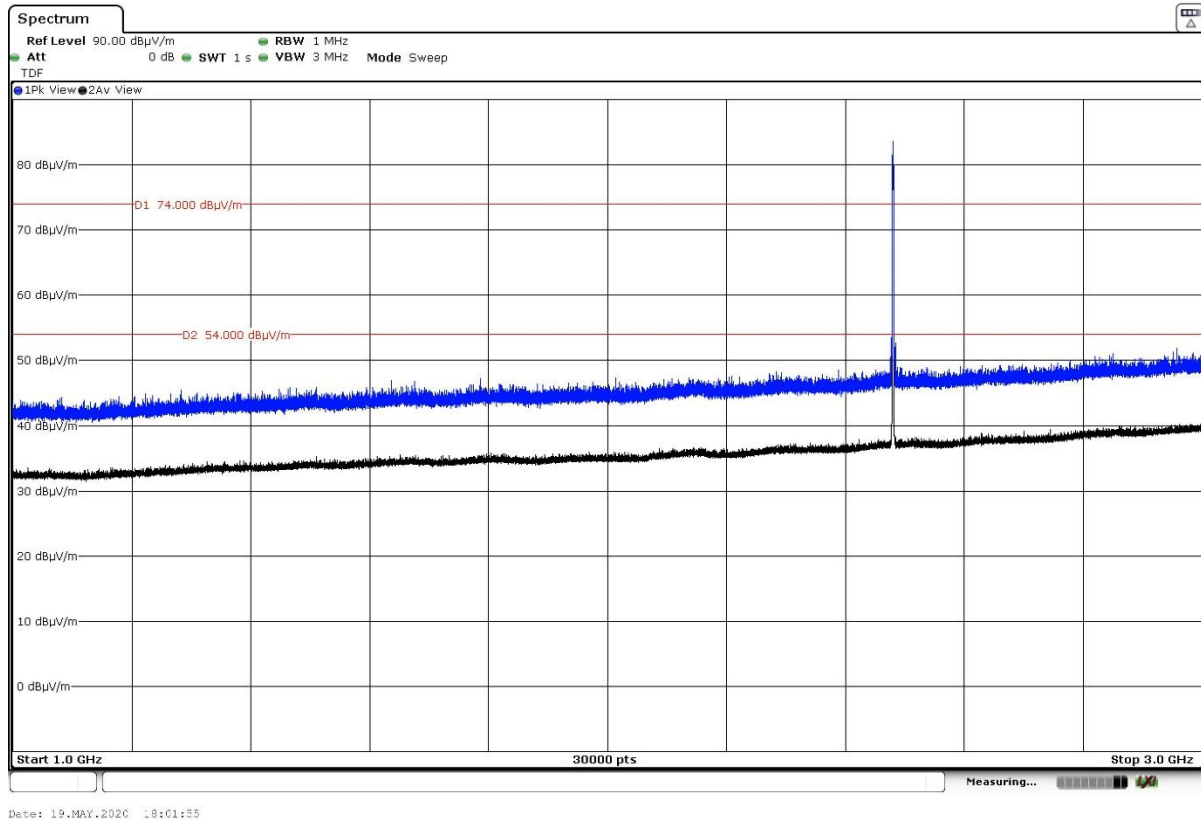
### FREQUENCY RANGE 9 kHz - 30 MHz (worst case):



### FREQUENCY RANGE 30 MHz - 1 GHz (worst case):

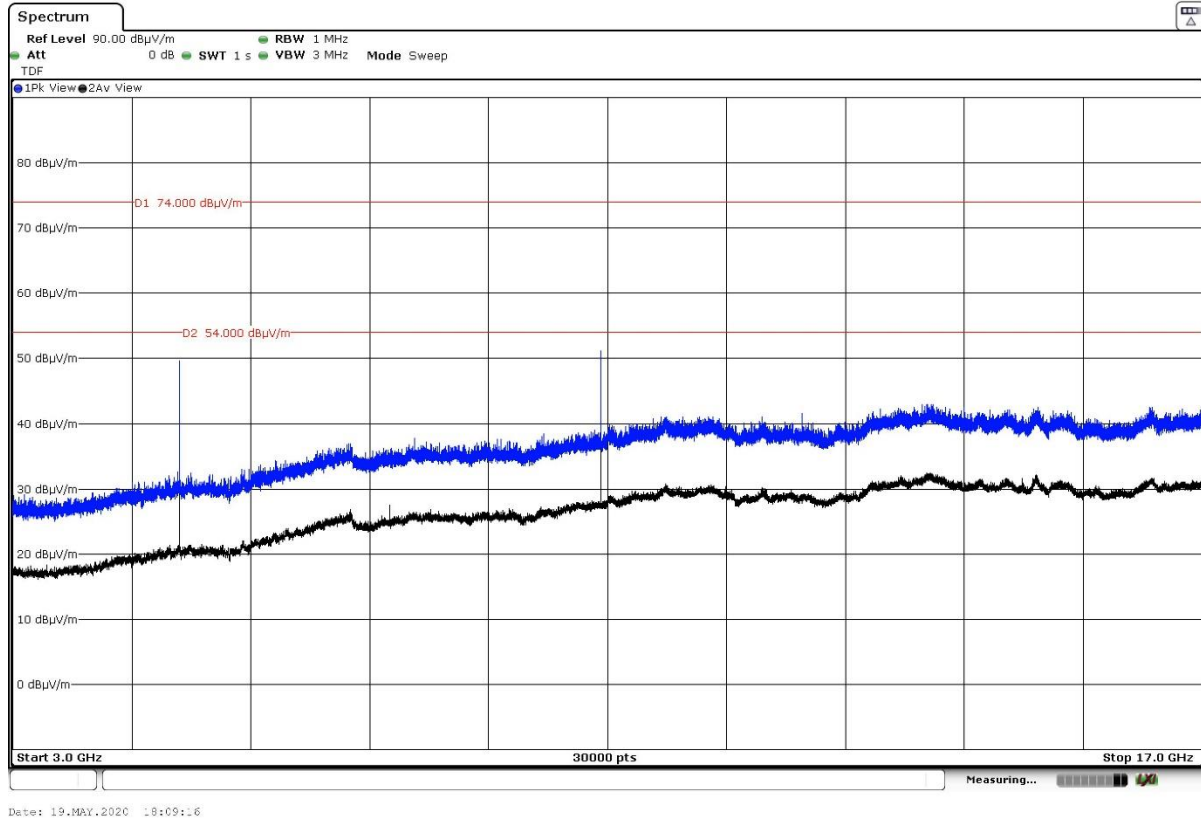


### FREQUENCY RANGE 1 – 3 GHz (worst case):

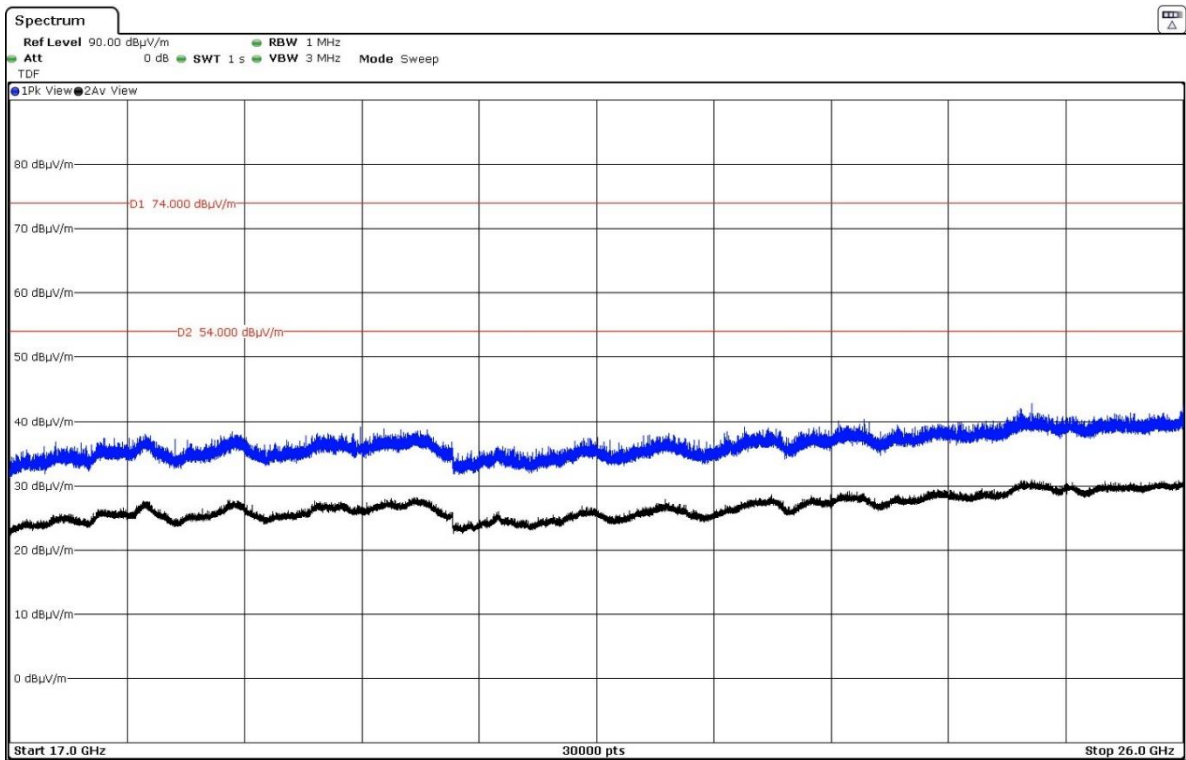


The peak above the highest limit is the Bluetooth LE carrier frequency.

### FREQUENCY RANGE 3 – 17 GHz (worst case):



FREQUENCY RANGE 17 – 26 GHz (worst case):



## Appendix B: Test results. Proprietary protocol 2.4 GHz + SRD 10.667 MHz

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TEST CONDITIONS.....21

FCC 15.31 (h), 15.209 (a), 15.247 (d) / RSS-Gen 8.9, RSS-247 5.5 Emission limitations radiated  
(Transmitter) .....24

## TEST CONDITIONS

### POWER SUPPLY (V):

Vnominal: 1.45 Vdc

Type of Power Supply: Battery.

### ANTENNA:

Type of Antenna: Integral.

Maximum Declared Antenna Gain for Proprietary protocol 2.4 GHz: -11.1 dBi

Maximum Declared Antenna Gain for Inductive coil: Not Applicable

### RADIOS AND CHANNELS TESTED:

|                   | Proprietary protocol 2.4 GHz / DTS |                         |
|-------------------|------------------------------------|-------------------------|
| Mode:             | 2 Mbps                             |                         |
| Channel Spacing:  | 2 MHz                              |                         |
| Frequency Range:  | 2402 MHz to 2480 MHz               |                         |
| Transmit Channel: | Channel                            | Channel Frequency (MHz) |
|                   | 39                                 | 2480                    |

|                   | SRD 10.667 MHz / D-BPSK |                         |
|-------------------|-------------------------|-------------------------|
| Mode:             | Single Channel          |                         |
| Channel Spacing:  | Not Applicable          |                         |
| Frequency Range:  | 5 – 30 MHz              |                         |
| Transmit Channel: | Channel                 | Channel Frequency (MHz) |
|                   | 1                       | 10.667                  |

The EUT was tested in the following operating mode:

- Continuous transmission with a modulated carrier at maximum power in all required channels selecting the supported data rates/modulations types.

During transmitter test the EUT was being controlled by the SW tool to operate in a continuous transmit mode on the test channel as required and in each of the different modulation modes.

### Transmission modes selected with each Radio:

The following configurations were selected based on preliminary testing that identified those corresponding to the worst cases:

\* Proprietary protocol 2.4 GHz: Transmitter radiated spurious emissions tests were performed with the EUT transmitting with a bit rate of 2 Mbps.

\* SRD 10.667 MHz: Transmitter radiated spurious emissions tests were performed with the EUT transmitting in the single channel configuration supported by this radio.

### Simultaneous transmission modes selected:

\* Co-location Bluetooth, SRD 10.667 MHz, with the EUT configured to simultaneously transmit two signals at maximum output power: Proprietary protocol 2.4 GHz in 2 Mbps mode, SRD 10.667 MHz.

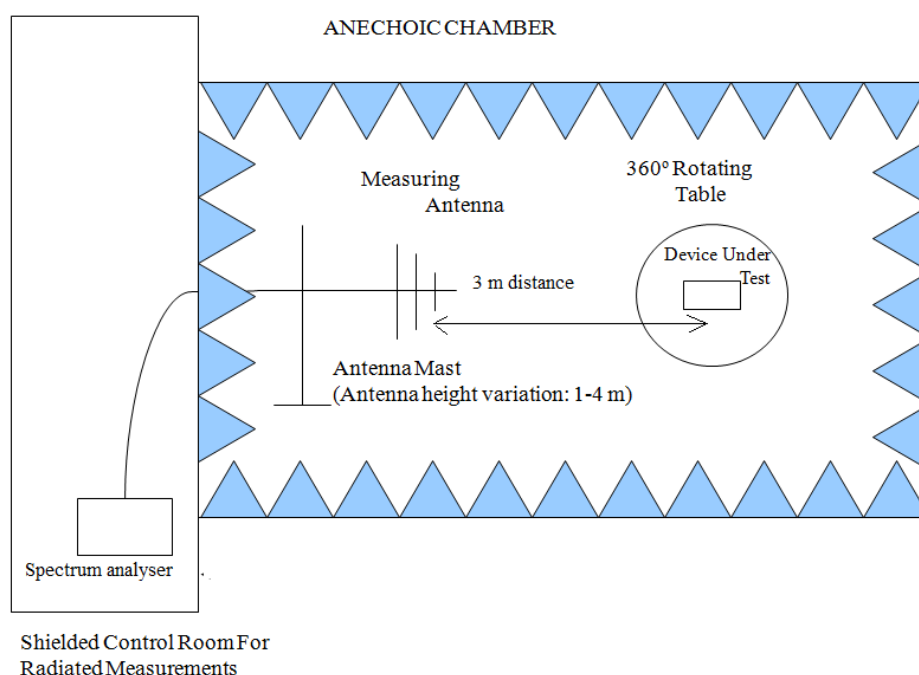
### RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m (Loop antenna for the range between 9 kHz to 30 MHz and Bilog antenna for 30 MHz to 1000 MHz) and at distance of 1 m for the frequency range 1 GHz-26 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-26 GHz horn antenna).

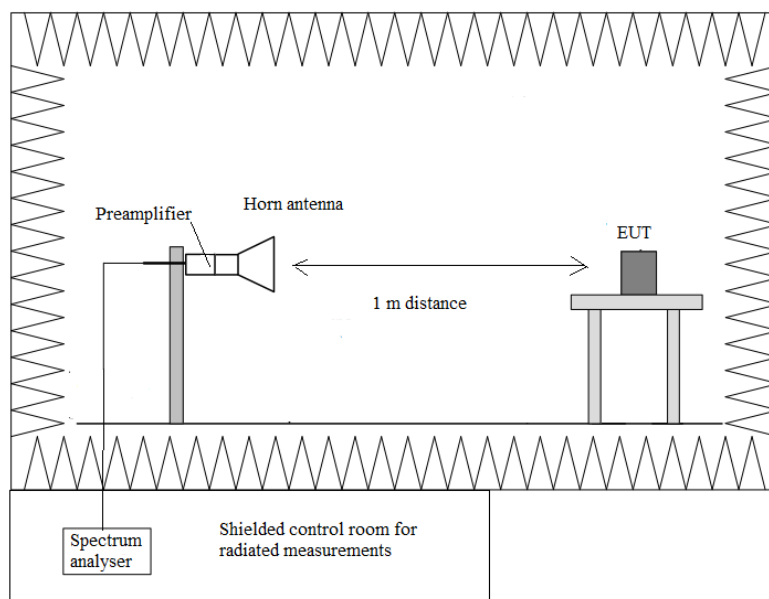
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

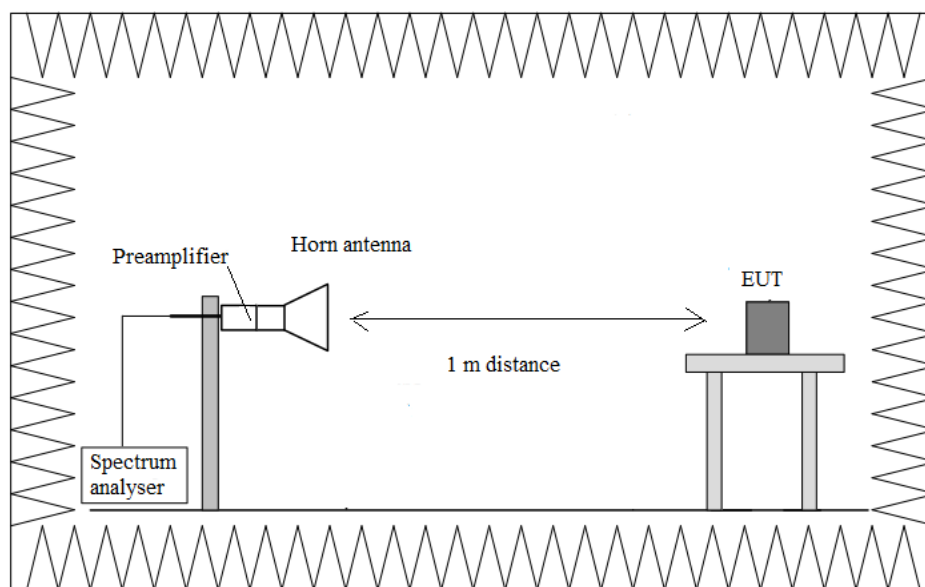
Radiated measurements setup 30 MHz < f < 1 GHz:



### Radiated measurements setup $f > 1$ GHz up to 17 GHz:



### Radiated measurements setup $f > 17$ GHz up to 40 GHz:



## FCC 15.31 (h), 15.209 (a), 15.247 (d) / RSS-Gen 8.9, RSS-247 5.5 Emission limitations radiated (Transmitter)

### SPECIFICATION:

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), appearing outside of the band 13.110 MHz - 14.010 MHz band must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c) / RSS-Gen):

| Frequency Range (MHz) | Field strength ( $\mu\text{V/m}$ ) | Field strength ( $\text{dB}\mu\text{V/m}$ ) | Measurement distance (m) |
|-----------------------|------------------------------------|---------------------------------------------|--------------------------|
| 0.009-0.490           | 2400/F(kHz)                        | -                                           | 300                      |
| 0.490-1.705           | 24000/F(kHz)                       | -                                           | 30                       |
| 1.705 - 30.0          | 30                                 | 29.54                                       | 30                       |
| 30 - 88               | 100                                | 40                                          | 3                        |
| 88 - 216              | 150                                | 43.5                                        | 3                        |
| 216 - 960             | 200                                | 46                                          | 3                        |
| 960 - 40000           | 500                                | 54                                          | 3                        |

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247. Attenuation below the general field strength limits specified in RSS-Gen is not required.

### RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-1000 MHz and at distance of 1m for the frequency range 1 GHz-26 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

Test performed on the following worst cases in all relevant tests channels.

### Frequency range 9 kHz - 30 MHz

The spurious emissions do not depend on either the operating channel or the modulation mode.

No spurious frequencies detected at less than 20 dB below the limit.

Measurement uncertainty (dB):  $< \pm 2.99$

### Frequency range 30 MHz - 1 GHz

The spurious emissions below 1 GHz do not depend on either the operating channel or the modulation mode.

No spurious frequencies detected at less than 20 dB below the limit.

Measurement uncertainty (dB):  $< \pm 5.08$

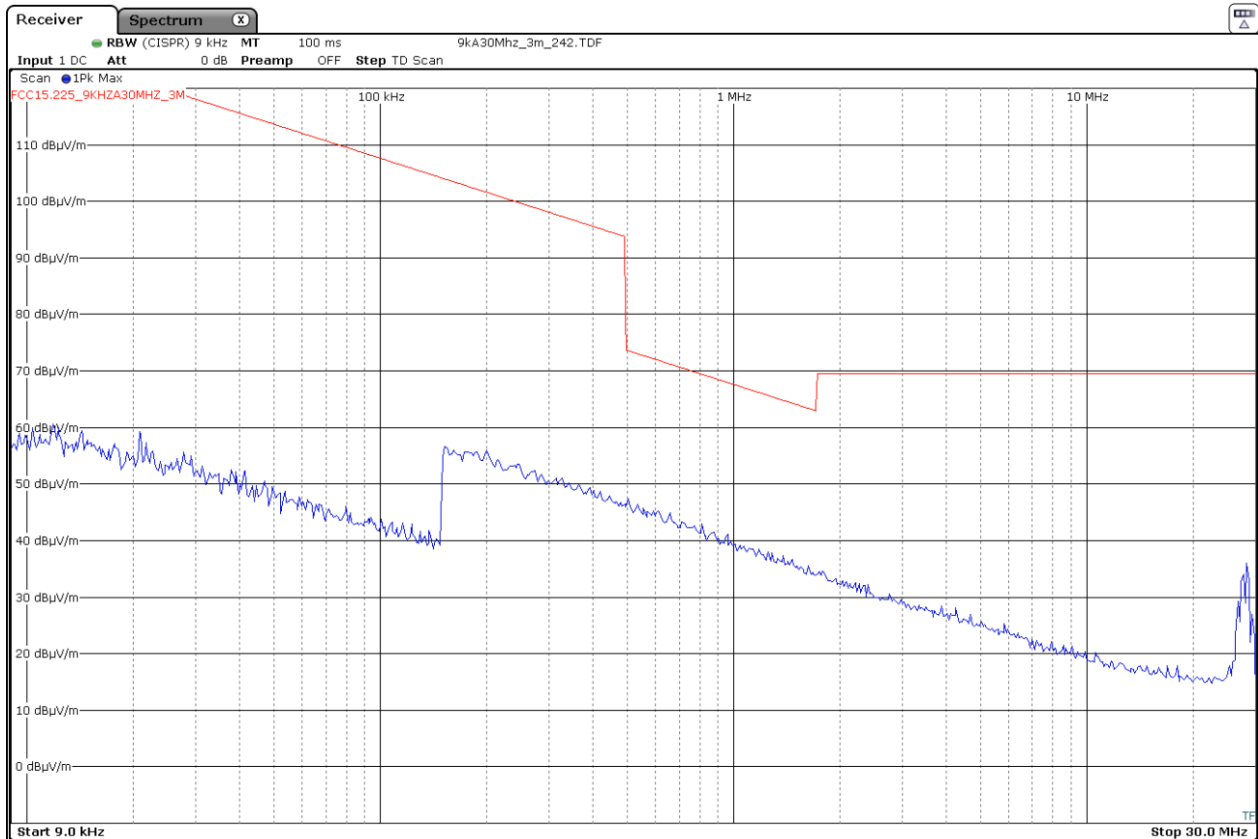
### Frequency range 1 - 26 GHz

Spurious frequencies detected closest to the limit:

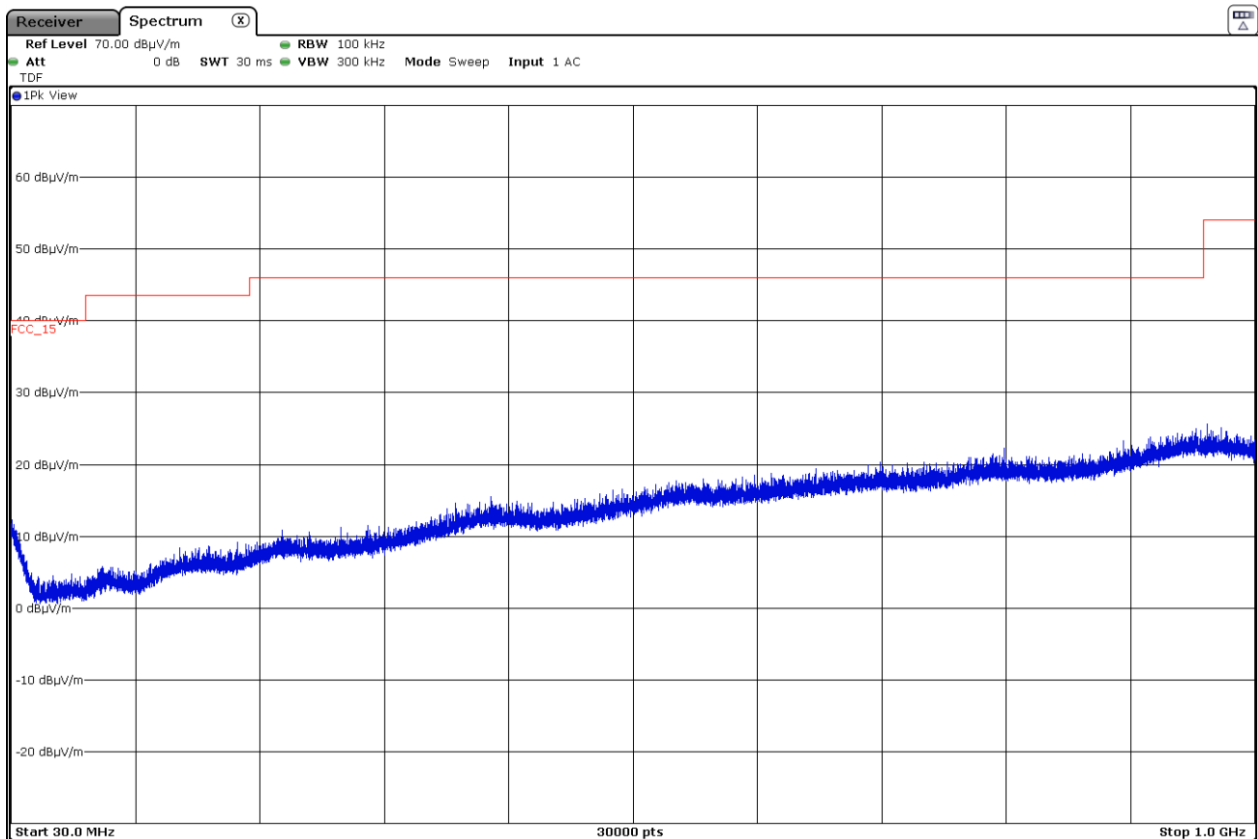
| Spurious frequency (GHz) | Emission Level (dB $\mu$ V/m) | Polarization | Detector | Measurement Uncertainty (dB) |
|--------------------------|-------------------------------|--------------|----------|------------------------------|
| 4.95930                  | 49.40                         | V            | Peak     | $< \pm 5.13$                 |
| 9.92137                  | 49.38                         | V            | Peak     | $< \pm 5.13$                 |

Verdict: PASS

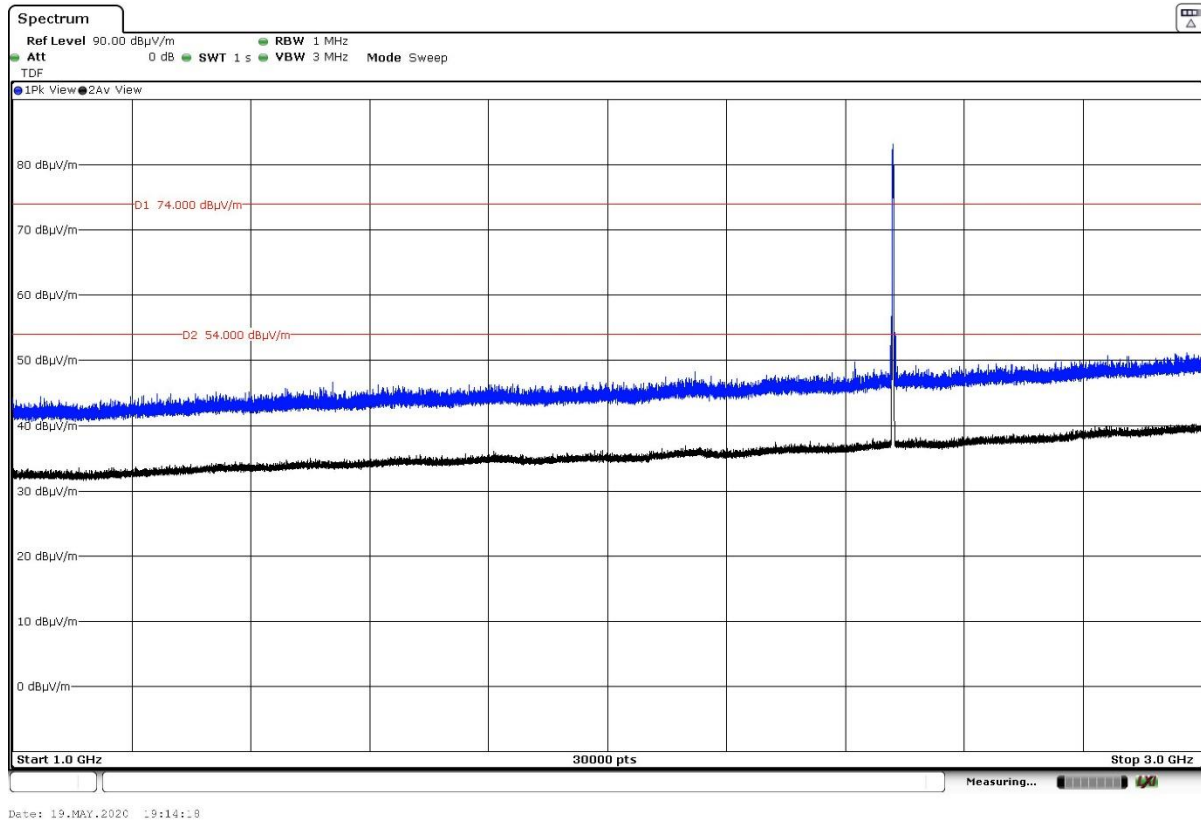
### FREQUENCY RANGE 9 kHz - 30 MHz (worst case):



### FREQUENCY RANGE 30 MHz - 1 GHz (worst case):

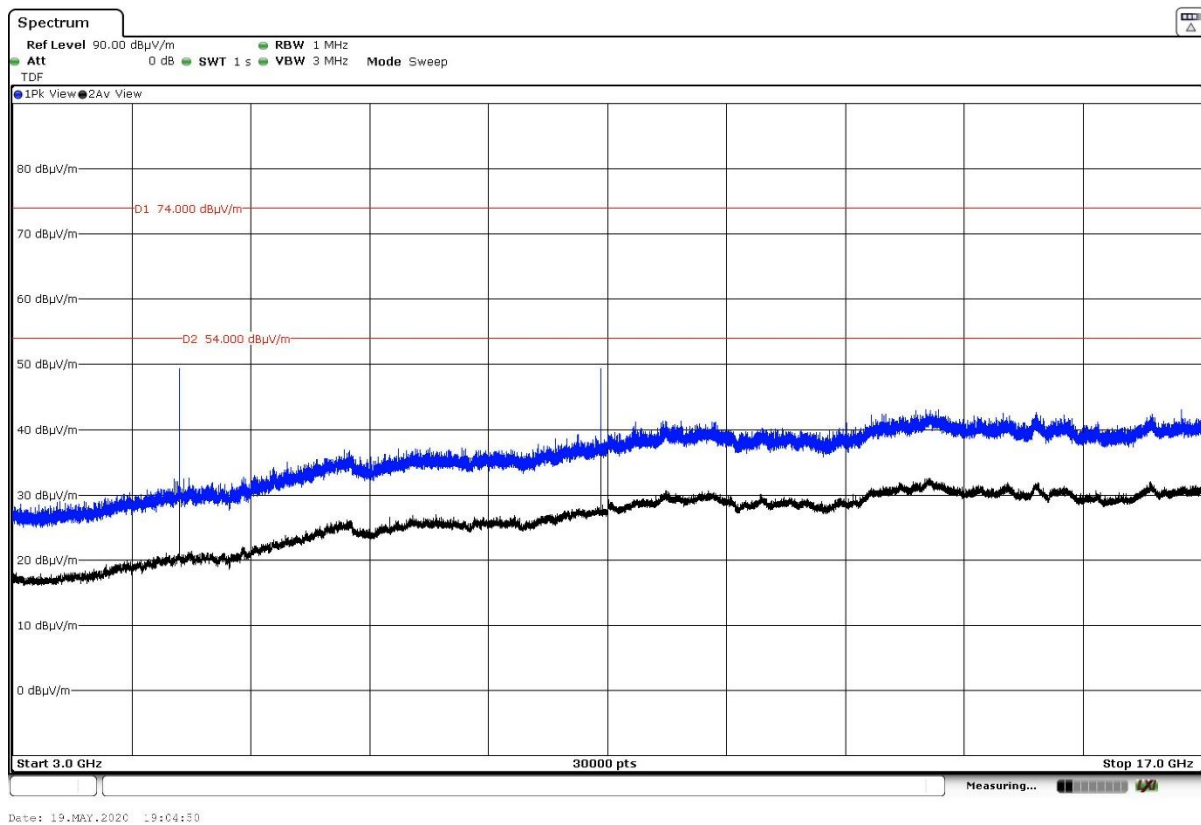


### FREQUENCY RANGE 1 – 3 GHz (worst case):



The peak above the highest limit is the Proprietary protocol 2.4 GHz carrier frequency.

### FREQUENCY RANGE 3 – 17 GHz (worst case):



FREQUENCY RANGE 17 – 26 GHz (worst case):

