



Test report No:  
NIE: 61299RRF003

## Partial Test report

USA FCC Part 15.247,15.407, 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.

Unlicensed National Information Infrastructure (U-NII) Devices:

General technical requirements.

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   | Automotive Infotainment System                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| (*) Trademark                       | BMW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| (*) Model and /or type reference    | MGU_F APN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Other identification of the product | HW version: HW 3.1<br>SW version: 19w20.5-1-16<br>FCC ID: A269ZUA160<br>IC: 700B-UA160                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| (*) Features                        | BT, WiFi, USB2/3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Applicant                           | ALPSALPINE INC.<br>20-1 YOSHIMA INDUSTRIAL PARK, IWAKI, FUKUSHIMA 970-1192, JAPAN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Test method requested, standard     | USA FCC Part 15.407 (10-1-18) Edition: Unlicensed National Information Infrastructure (U-NII) Devices. General technical requirements. Band U-NII-3 (5725 MHz – 5850 MHz).<br>USA FCC Part 15.247 (10-1-18) Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.<br>USA FCC Part 15.209 (10-1-18) Edition: Radiated emission limits; general requirements.<br>CANADA RSS-247 Issue 2 (February 2017).<br>CANADA RSS-Gen Issue 5 (April 2018).<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>Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices 789033 D02 General U-NII Test Procedures New Rules v02r01 dated Dec 14, 2017.<br>ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices. |
| Summary                             | IN COMPLIANCE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

|                                           |                                               |
|-------------------------------------------|-----------------------------------------------|
| Approved by (name / position & signature) | Jose Carlos Luque<br>RF Lab. Supervisor       |
| Date of issue                             | 2020-01-07                                    |
| 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 FCC-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

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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.
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## 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

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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 MGU\_F APN is a device for entertainment and communication inside the car, this includes playing music from several external sources or internal flash-memory, connecting mobile devices (e.g. Apple Car Play) and a navigation system.

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 |
|------------|--------------------------------|-----------|-----------------|-------------------|
| 61299/058  | Automotive Infotainment System | MGU_F APN | ALB314K0672984  | 2019/07/24        |
| 61299/043  | CAN Box                        | --        | J0035319        | 2019/07/16        |
| 61299/046  | Display                        | --        | --              | 2019/07/16        |
| 61299/061  | Ethernet Board                 | --        | --              | 2019/07/24        |
| 61299/064  | Ethernet-USB Adapter           | EU-4306   | EU430693MA00744 | 2019/07/24        |
| 61299/065  | Harness                        | --        | --              | 2019/07/24        |
| 61299/111  | Antenna                        | --        | --              | 2019/08/30        |
| 61299/112  | Antenna                        |           |                 | 2019/08/30        |

Sample S/01 has undergone the following test(s): The RADIATED tests indicated in Appendix A for the mode bluetooth basic rate, 802.11 b and 802.11 a20 U-NII-1.

- Sample S/02 is composed of the following elements:

| Control N° | Description                    | Model     | Serial N°       | Date of reception |
|------------|--------------------------------|-----------|-----------------|-------------------|
| 61299/057  | Automotive Infotainment System | MGU_F APN | ALB314K0673026  | 2019/07/24        |
| 61299/046  | Display                        | --        | --              | 2019/07/16        |
| 61299/059  | CAN Box                        | --        | 80008147        | 2019/07/24        |
| 61299/061  | Ethernet Board                 | --        | --              | 2019/07/24        |
| 61299/064  | Ethernet-USB Adapter           | EU-4306   | EU430693MA00744 | 2019/07/24        |
| 61299/065  | Harness                        | --        | --              | 2019/07/24        |
| 61299/111  | Antenna                        |           |                 | 2019/08/30        |
| 61299/112  | Antenna                        |           |                 | 2019/08/30        |

Sample S/02 has undergone the following test(s): The RADIATED tests indicated in Appendix A for the mode bluetooth basic rate, 802.11 b and 802.11 a20 U-NII-3.

## Test sample description

|                                               |                                      |                                        |                      |                                     |                          |              |    |
|-----------------------------------------------|--------------------------------------|----------------------------------------|----------------------|-------------------------------------|--------------------------|--------------|----|
| Ports..... :                                  | Port name and description            |                                        | Cable                |                                     |                          |              |    |
|                                               |                                      |                                        | Specified length [m] | Attached during test                | Shielded                 |              |    |
|                                               | BT                                   |                                        |                      | <input checked="" type="checkbox"/> | <input type="checkbox"/> |              |    |
|                                               | WLAN                                 |                                        |                      | <input checked="" type="checkbox"/> | <input type="checkbox"/> |              |    |
|                                               | USB2                                 |                                        |                      | <input checked="" type="checkbox"/> | <input type="checkbox"/> |              |    |
|                                               | USB3                                 |                                        |                      | <input checked="" type="checkbox"/> | <input type="checkbox"/> |              |    |
|                                               | APIX                                 |                                        |                      | <input checked="" type="checkbox"/> | <input type="checkbox"/> |              |    |
|                                               | OABR                                 |                                        |                      | <input checked="" type="checkbox"/> | <input type="checkbox"/> |              |    |
| Supplementary information to the ports..... : | N/A                                  |                                        |                      |                                     |                          |              |    |
| Rated power supply .....                      | Voltage and Frequency                |                                        | Reference poles      |                                     |                          |              |    |
|                                               |                                      |                                        | L1                   | L2                                  | L3                       | N            | PE |
|                                               | <input checked="" type="checkbox"/>  | DC: 12Vdc.                             |                      |                                     |                          |              |    |
| Rated Power .....                             | 12V                                  |                                        |                      |                                     |                          |              |    |
| Clock frequencies.....                        | Not provided data                    |                                        |                      |                                     |                          |              |    |
| Other parameters .....                        | FCC ID: A269ZUA160<br>IC: 700B-UA160 |                                        |                      |                                     |                          |              |    |
| Software version .....                        | 19w20.5-1-16                         |                                        |                      |                                     |                          |              |    |
| Hardware version .....                        | HW 3.1                               |                                        |                      |                                     |                          |              |    |
| Dimensions in cm (L x W x D).....             | Not provided data                    |                                        |                      |                                     |                          |              |    |
| Mounting position .....                       | <input checked="" type="checkbox"/>  | Table top equipment                    |                      |                                     |                          |              |    |
|                                               | <input checked="" type="checkbox"/>  | Other: Vehicular environment equipment |                      |                                     |                          |              |    |
| Modules/parts..... :                          | Module/parts of test item            |                                        |                      | Type                                |                          | Manufacturer |    |
|                                               | BT                                   |                                        |                      |                                     |                          | WNC          |    |
|                                               | WiFi                                 |                                        |                      |                                     |                          | WNC          |    |
| Accessories (not part of the test item) ..... | Description                          |                                        |                      | Type                                |                          | Manufacturer |    |
|                                               | Can Box                              |                                        |                      |                                     |                          | Harman       |    |
|                                               | Display                              |                                        |                      |                                     |                          | Visteon      |    |
|                                               | OABR-converter                       |                                        |                      |                                     |                          | Harman       |    |
|                                               | Description                          |                                        |                      | File name                           |                          | Issue date   |    |

|                                              |                                |                                                       |           |
|----------------------------------------------|--------------------------------|-------------------------------------------------------|-----------|
| Documents as provided by the applicant ..... | Testing manual for BT and WLAN | I&k-MGU_Testing Manual (Radio_WLAN-BT)_v11_2018-01-18 | 18.1.2018 |
|                                              | -                              |                                                       |           |
|                                              | -                              |                                                       |           |

## Identification of the client

ALPINE ELECTRONICS GMBH  
Ohmstrasse 4, 85716 Unterschleißheim, Germany

## Testing period and place

|               |                                        |
|---------------|----------------------------------------|
| Test Location | DEKRA Testing and Certification S.A.U. |
| Date (start)  | 2019-09-10                             |
| Date (finish) | 2019-12-12                             |

## Document history

| Report number | Date       | Description   |
|---------------|------------|---------------|
| 61299RRF003   | 2020-01-07 | 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 %   |

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: Ignacio Cabra, Cristina Calle.

Used instrumentation:

### Radiated Measurements:

|                                                                              | Last Calibration | Due Calibration |
|------------------------------------------------------------------------------|------------------|-----------------|
| 1. Semianechoic Absorber Lined Chamber ETS FACT3 200STP                      | N.A.             | N.A.            |
| 2. EMI Test Receiver ROHDE AND SCHWARZ ESR7                                  | 2018/10          | 2020/10         |
| 3. BiconicalLog antenna ETS LINDGREN 3142E                                   | 2017/09          | 2020/09         |
| 4. RF Pre-amplifier 40 dB, 10 MHz-6 GHz BONN ELEKTRONIK BLNA 0160-01N        | 2019/02          | 2020/08         |
| 5. Signal and Spectrum Analyzer ROHDE AND SCHWARZ FSV40                      | 2018/02          | 2020/02         |
| 6. RF Pre-amplifier, 30 dB ,1-18 GHz BONN ELEKTRONIK BLMA 0118-3A            | 2019/04          | 2020/04         |
| 7. Broadband Horn antenna 1-18 GHz SCHWARZBECK BBHA 9120 D                   | 2018/01          | 2021/01         |
| 8. RF Pre-amplifier 30 dB, 18 GHz-40 GHz BONN ELEKTRONIK BLMA 1840-1M        | 2019/02          | 2021/02         |
| 9. Broadband Horn antenna 18-40 GHz SCHWARZBECK BBHA 9170                    | 2018/07          | 2021/07         |
| 10. DC Power Supply Keysight Technologies U8002A                             | ---              | ---             |
| 12. Biconical/Log Antenna 30 MHz - 6 GHz ETS LINDGREN 3142E                  | 2017/04          | 2020/04         |
| 13. DC Power Supply, 30V, 5A KEYSIGHT TECHNOLOGIES U8002A                    | N.A.             | N.A.            |
| 14. Multimeter FLUKE 179                                                     | 2019/06          | 2020/06         |
| 15. Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP          | N.A.             | N.A.            |
| 16. Shielded Room ETS LINDGREN S101                                          | N.A.             | N.A.            |
| 17. Multi-device Controller EMCO 2090                                        | N.A.             | N.A.            |
| 18. Multi-device Controller FRANKONIA FC-06                                  | N.A.             | N.A.            |
| 19. Low Pass Filter DC - 1 GHz WAINWRIGHT INSTRUMENTS WLK1000-6SS            | 2018/06          | 2020/06         |
| 20. EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7                           | 2018/10          | 2020/10         |
| 21. Pre-Amplifier G>40dB 10MHz-6GHz, BONN ELEKTRONIK, BLNA 0160-01N          | 2019/02          | 2020/02         |
| 22. Spectrum Analyzer ROHDE AND SCHWARZ FSW50                                | 2018/02          | 2020/02         |
| 23. RF Pre-amplifier, 40 dB ,1-18 GHz BONN ELEKTRONIK BLMA 0118-1M           | 2019/04          | 2020/04         |
| 24. Low Noise Amplifier G>30dB, 18 - 40 GHz BONN ELEKTRONIK BLMA 1840-1M     | 2018/02          | 2020/02         |
| 25. Broadband Horn Antenna 18 - 40 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9170 | 2018/07          | 2021/07         |

## 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 15.209 (a), 15.247 (d), 15.407 (b) / RSS-Gen 8.9, RSS-247 5.5, 6.2.1.2, 6.2.2.2, 6.2.3.2 & 6.2.4.2:<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.

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FCC 15.209 (a), 15.247 (d), 15.407 (b) / RSS-Gen 8.9, RSS-247 5.5, 6.2.1.2, 6.2.2.2, 6.2.3.2 & 6.2.4.2 Emission  
limitations radiated (Transmitter) .....18

## TEST CONDITIONS

### POWER SUPPLY (V):

V nominal: 12 Vdc.  
Type of Power Supply: External power supply (Car Battery).

### ANTENNA:

Bluetooth EDR and 802.11 bgn20 1x1:

Type of Antenna: External antenna.  
Maximum Declared Antenna Gain: -6.2 dBi (Antenna gain plus antenna cable loss).

802.11 a20 / n2040 / ac2040 / ac80 1x1:

Type of Antenna: External antenna.  
Maximum Declared Antenna Gain: -5.4 dBi (antenna gain plus antenna cable loss).

### RADIOS AND CHANNELS TESTED:

|                   | Bluetooth EDR (FHSS)    |                         |
|-------------------|-------------------------|-------------------------|
| Mode:             | Basic Rate (GFSK - DH5) |                         |
| Channel Spacing:  | 1 MHz                   |                         |
| Frequency Range:  | 2402 MHz to 2480 MHz    |                         |
| Transmit Channels | Channel                 | Channel Frequency (MHz) |
|                   | 39                      | 2441                    |

|                   | WLAN (IEEE 802.11 bgn20 1x1) / Digital Transmission System (DTS) |                         |
|-------------------|------------------------------------------------------------------|-------------------------|
| Mode:             | 802.11 b: 1, 2, 5.5 & 11 Mbps (SISO)                             |                         |
| Channel Spacing:  | 20 MHz                                                           |                         |
| Frequency Range:  | 2412 MHz to 2472 MHz                                             |                         |
| Transmit Channels | Channel                                                          | Channel Frequency (MHz) |
|                   | 6                                                                | 2437                    |

|                   | WLAN (IEEE 802.11 anac) / U-NII-1                     |                         |
|-------------------|-------------------------------------------------------|-------------------------|
| Mode:             | 802.11 a20: 6, 9, 12, 18, 24, 36, 48 & 54 Mbps (SISO) |                         |
| Frequency Range:  | 5150 MHz to 5250 MHz                                  |                         |
| Channel Spacing:  | 20 MHz                                                |                         |
| Transmit Channels | Channel                                               | Channel Frequency (MHz) |
|                   | Middle: 40                                            | 5200                    |

|                   |                                                       |                         |
|-------------------|-------------------------------------------------------|-------------------------|
|                   | WLAN (IEEE 802.11 anac) / U-NII-3                     |                         |
| Mode:             | 802.11 a20: 6, 9, 12, 18, 24, 36, 48 & 54 Mbps (SISO) |                         |
| Frequency Range:  | 5725 MHz to 5850 MHz                                  |                         |
| Channel Spacing:  | 20 MHz                                                |                         |
| Transmit Channels | Channel                                               | Channel Frequency (MHz) |
|                   | Middle: 157                                           | 5785                    |

The test set-up was made in accordance to the general provisions of FCC DTS Measurement 558074 D01 DTS Meas Guidance v05r2 dated April 2, 2019 and FCC Unlicensed National Information Infrastructure (U-NII) Devices 789033 D02 General U-NII Test Procedures New Rules v02r01 dated Dec 14, 2017.

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.

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

#### Transmission modes selected with each radio:

\* Bluetooth Basic Rate: Transmitter radiated spurious emissions tests were performed with the EUT transmitting in Basic Rate mode because its power is higher than EDR mode.

\* 2.4 GHz WLAN: Transmitter radiated spurious emissions tests were performed with the EUT transmitting in 802.11 b / 1Mbps / SISO mode configuration as this mode was found to transmit higher EIRP than all the other 2.4 GHz WLAN modes.

\* 5 GHz U-NII-1 WLAN: Transmitter radiated spurious emissions tests were performed with the EUT transmitting in U-NII-1 802.11a 20 / 6Mbps / SISO mode configuration as this mode was found to transmit higher EIRP than all the other 5 GHz WLAN modes.

\* 5 GHz U-NII-3 WLAN: Transmitter radiated spurious emissions tests were performed with the EUT transmitting in U-NII-3 802.11a 20 / 6Mbps / SISO mode configuration as this mode was found to transmit higher EIRP than all the other 5 GHz WLAN modes.

#### Simultaneous transmission modes selected:

\* **Bluetooth Basic Rate, 2.4 GHz WLAN and 5 GHz U-NII-1 WLAN co-location**, with the EUT configured to simultaneously transmit three signals at maximum output power, Bluetooth Basic Rate in DH5 mode, 2.4GHz WLAN (Wi-Fi) in 802.11b / 1 Mbps / SISO and 5GHz WLAN (Wi-Fi) in 802.11a20 / 6 Mbps / SISO.

\* **Bluetooth Basic Rate, 2.4 GHz WLAN and 5 GHz U-NII-3 WLAN co-location**, with the EUT configured to simultaneously transmit three signals at maximum output power, Bluetooth Basic Rate in DH5 mode, 2.4GHz WLAN (Wi-Fi) in 802.11b / 1 Mbps / SISO and 5GHz WLAN (Wi-Fi) in 802.11a20 / 6 Mbps / SISO.

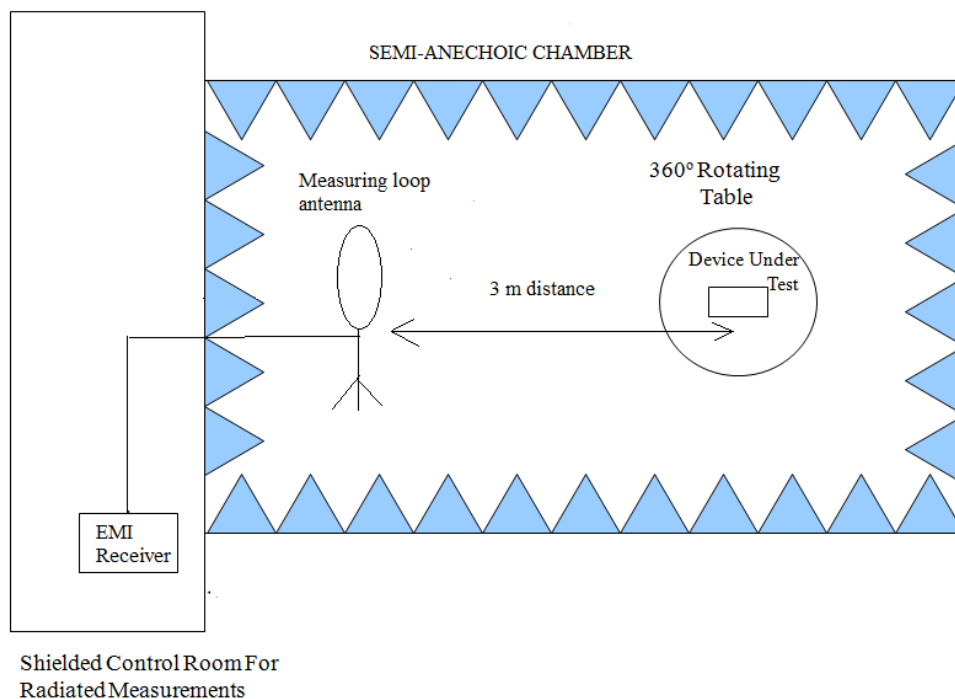
## RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m. The EUT was placed at a height of 80 cm above the reference ground plane in the center of the chamber turntable to perform the measurements below 1GHz and The EUT was placed at a height of 1.5 meters above the test chamber floor in the center of the chamber turntable to perform the measurements above 1GHz. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

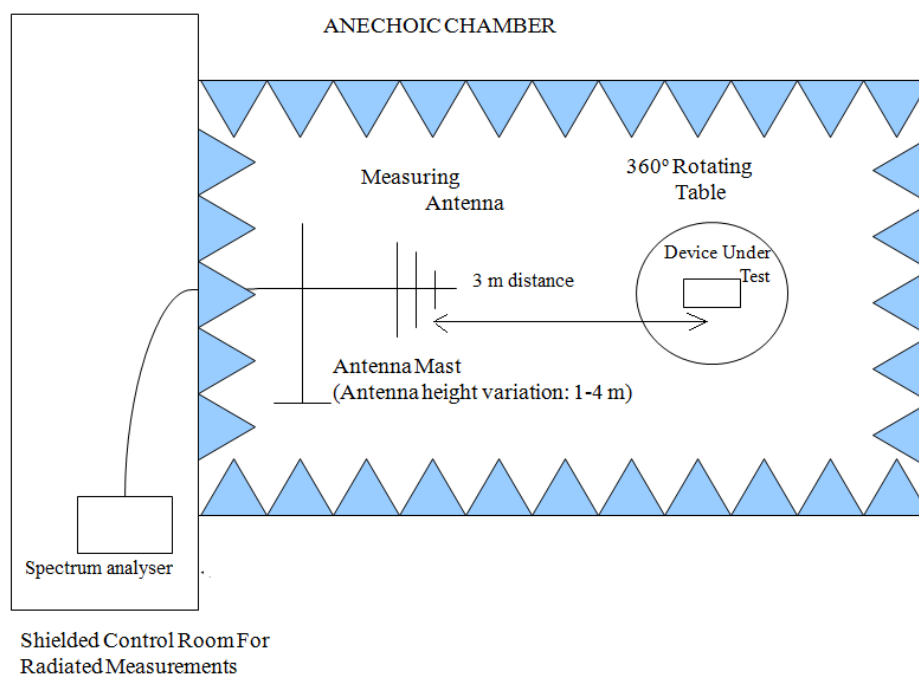
Measurements were made in both horizontal and vertical planes of polarization.

The final measured value, for the given emission, in the tables below incorporates the calibrated antenna factor, preamplifier gain (if used) and cable losses.

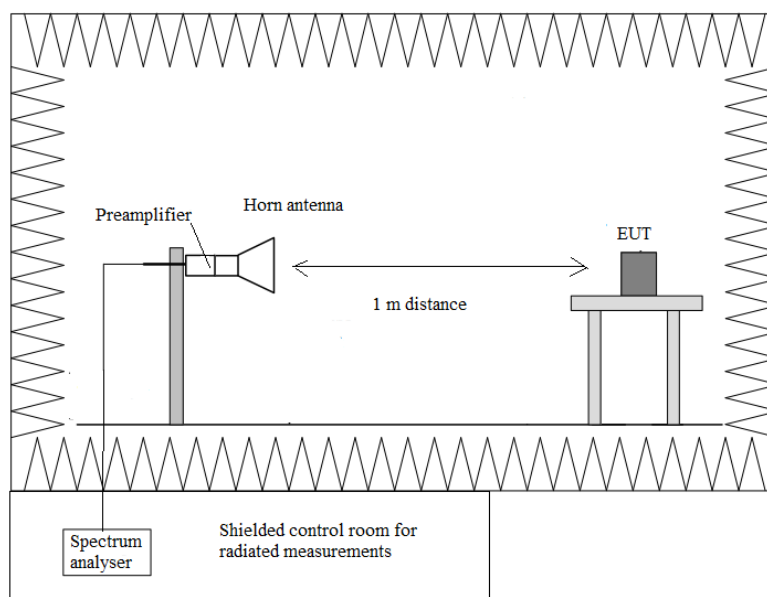
Radiated measurements setup  $9 \text{ kHz} < f < 30 \text{ MHz}$ :



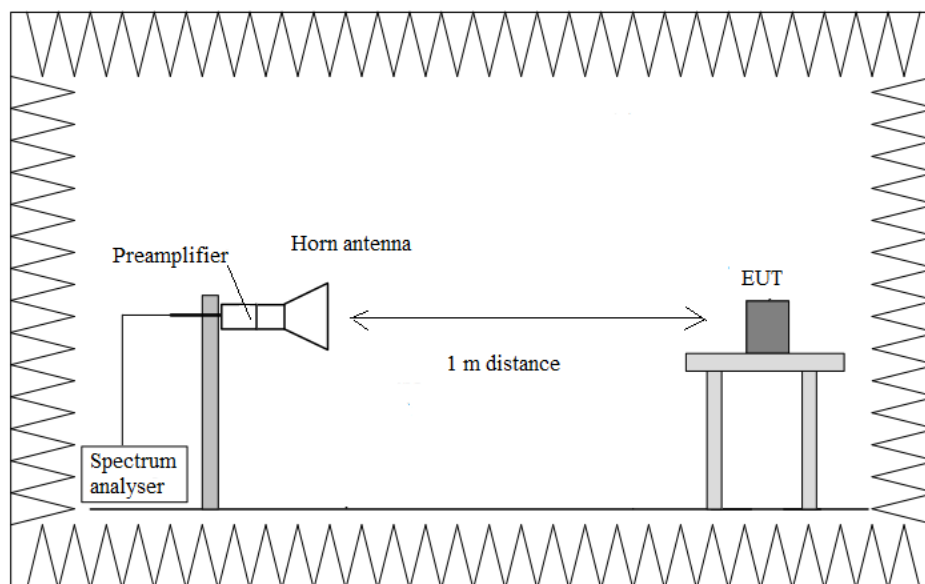
### Radiated measurements setup $30 \text{ MHz} < f < 1 \text{ GHz}$ :



### Radiated measurements setup $f > 1 \text{ GHz}$ up to 18 GHz:



Radiated measurements setup  $f > 18$  GHz up to 40 GHz:



## FCC 15.209 (a), 15.247 (d), 15.407 (b) / RSS-Gen 8.9, RSS-247 5.5, 6.2.1.2, 6.2.4.2 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-40 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:

- **Mode Bluetooth BR, 802.11 b, 802.11 a20 U-NII-1.**

|                |                                        |
|----------------|----------------------------------------|
| Bluetooth EDR: | GFSK (2441 MHz).                       |
| 802.11 b:      | 20MHz, 1Mbps, SISO, Port 2 (2437 MHz). |
| 802.11 a20:    | 20MHz, 6Mbps, SISO, Port 1 (5200 MHz). |

### Frequency range 30 MHz - 1 GHz

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

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

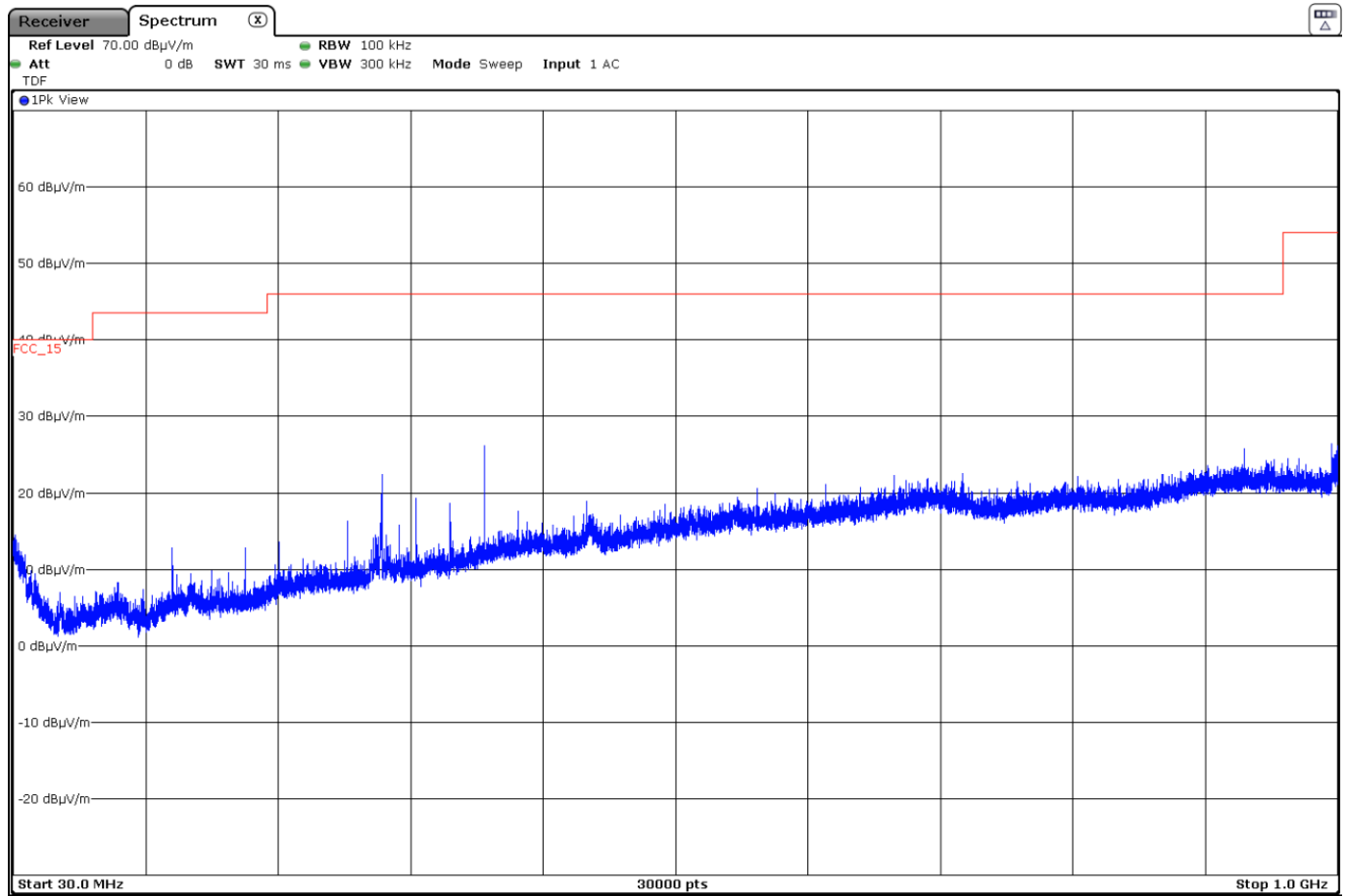
### Frequency range 1 - 40 GHz

Spurious frequencies detected at less than 20 dB below the limit:

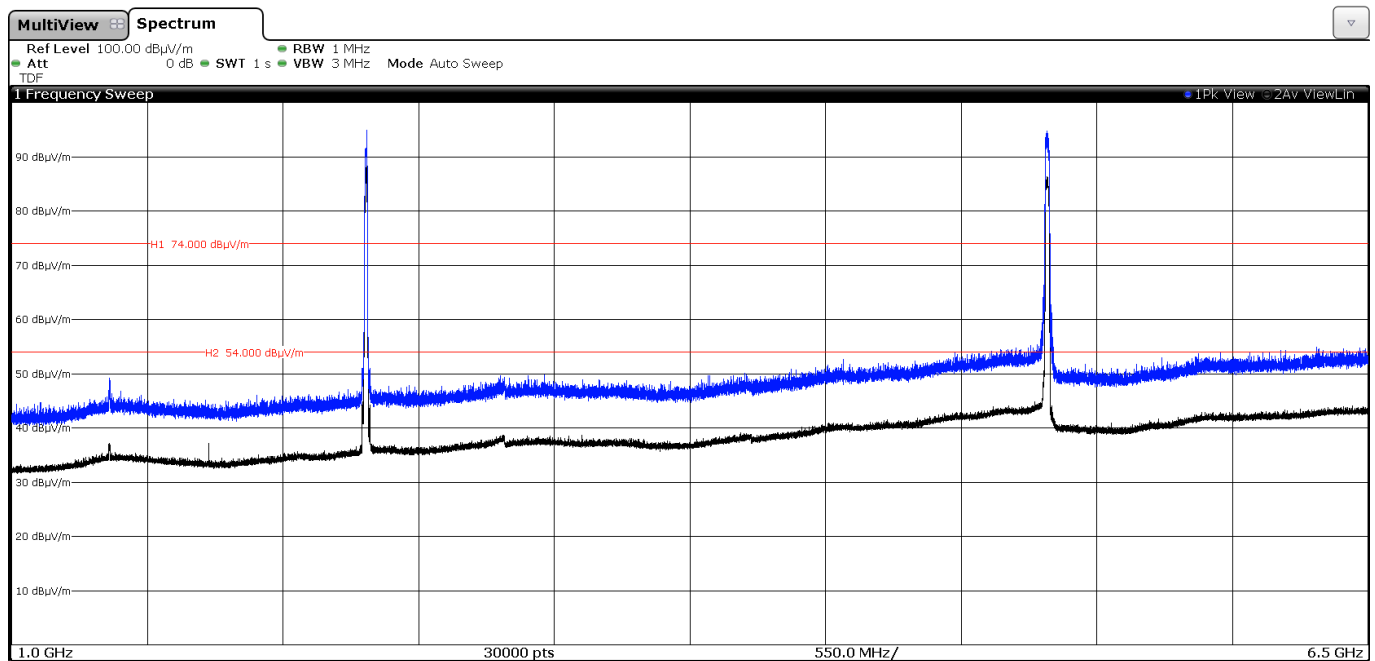
| Spurious frequency (GHz) | Emission Level (dBμV/m) | Polarization | Detector | Measurement Uncertainty (dB) |
|--------------------------|-------------------------|--------------|----------|------------------------------|
| 1.39701                  | 49.21                   | H            | Peak     | <±3.04                       |
| 1.7999                   | 44.16                   | H            | Peak     | <±3.04                       |
| 10.0010                  | 45.87                   | V            | Peak     | <±4.88                       |
| 10.39288                 | 54.26                   | V            | Peak     | <±4.88                       |

Verdict: PASS

## FREQUENCY RANGE 30 MHz - 1 GHz

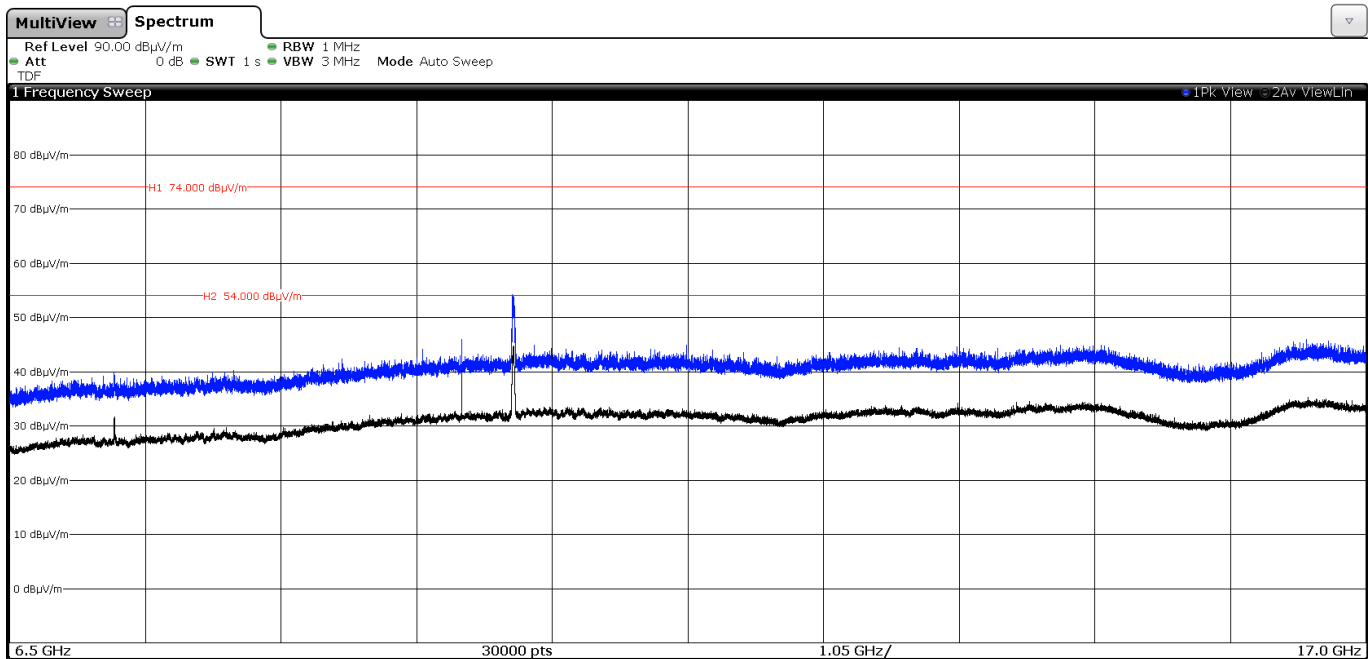


## FREQUENCY RANGE 1 – 6.5 GHz

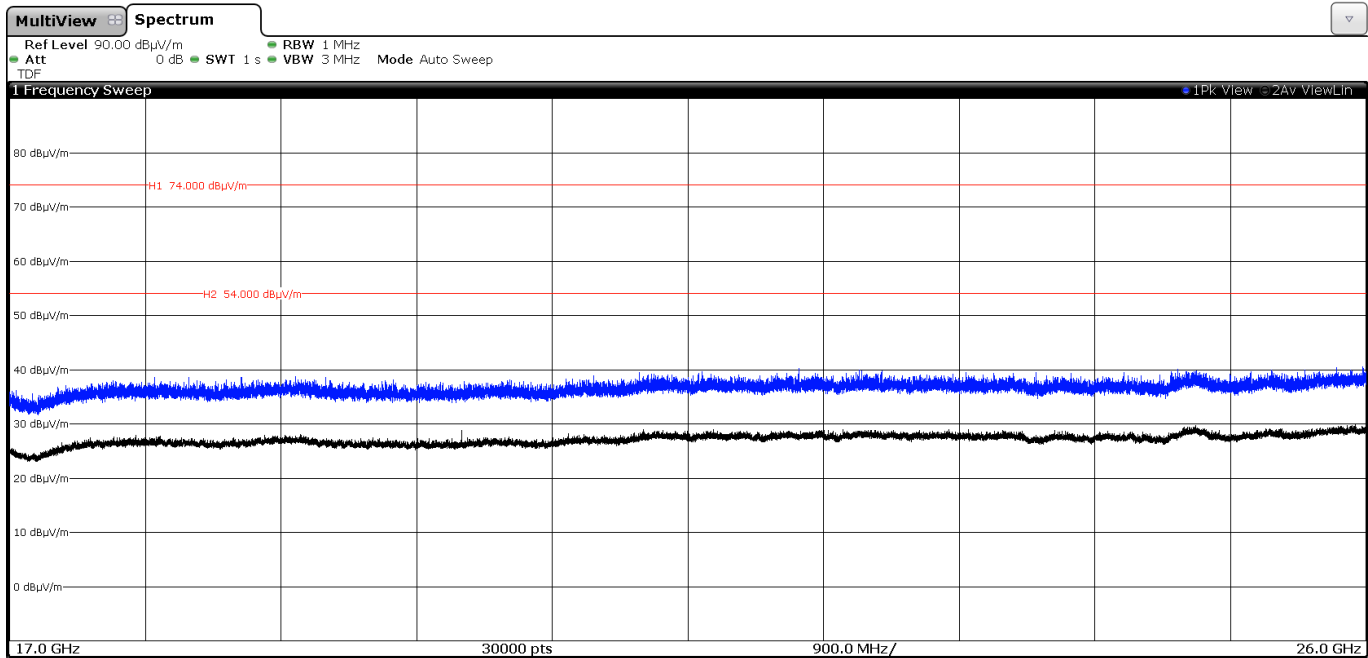


The peaks above the limit are the Bluetooth EDR, Wi-Fi 2.4 GHz and Wi-Fi 5 GHz carrier frequencies.

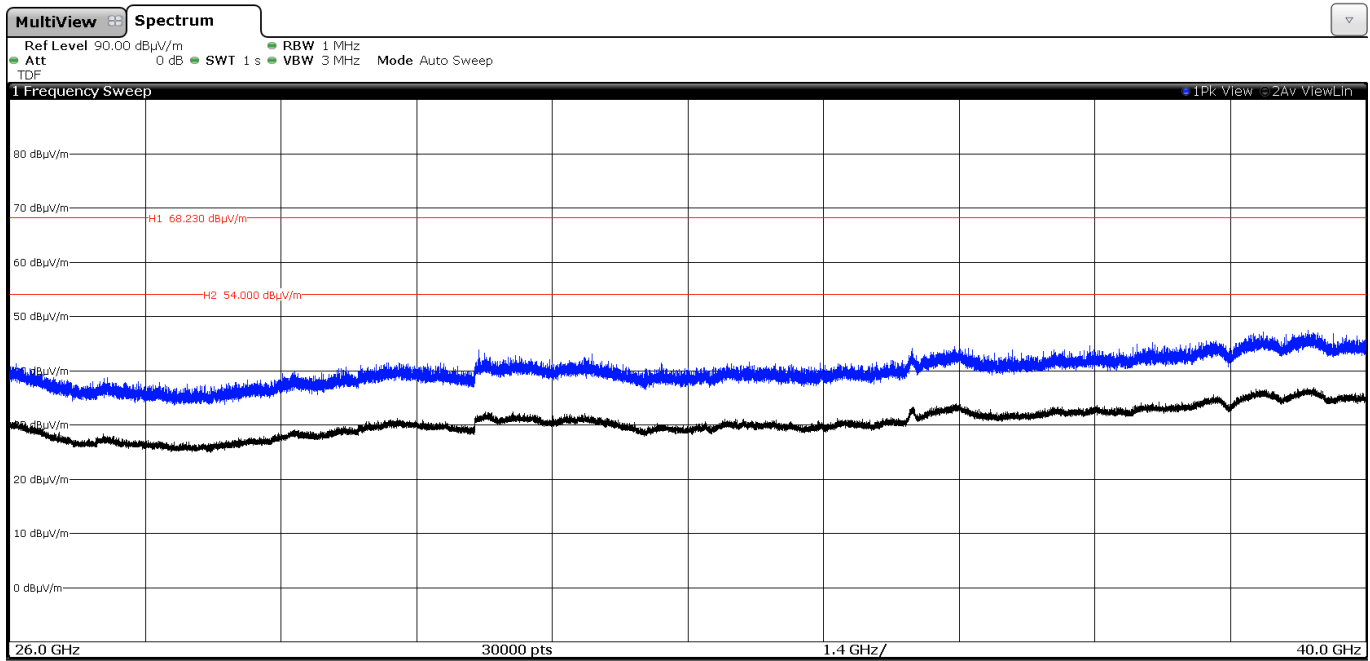
FREQUENCY RANGE 6.5 - 17 GHz



FREQUENCY RANGE 17 - 26 GHz



FREQUENCY RANGE 26 - 40 GHz



- **Mode Bluetooth BR, 802.11 b, 802.11 a20 U-NII-3.**

|                |                                        |
|----------------|----------------------------------------|
| Bluetooth EDR: | GFSK (2441 MHz).                       |
| 802.11 b:      | 20MHz, 1Mbps, SISO, Port 2 (2437 MHz). |
| 802.11 a20:    | 20MHz, 6Mbps, SISO, Port 1 (5785 MHz). |

### Frequency range 30 MHz - 1 GHz

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

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | Emission Level (dBμV/m) | Polarization | Detector   | Measurement Uncertainty (dB) |
|--------------------------|-------------------------|--------------|------------|------------------------------|
| 86.697                   | 21.9                    | V            | Quasi peak | <± 2.07                      |
| 375.013                  | 26.7                    | V            | Quasi peak | <± 2.07                      |
| 542.209                  | 28.8                    | V            | Quasi peak | <± 2.07                      |
| 750.015                  | 29.7                    | H            | Quasi peak | <± 2.07                      |

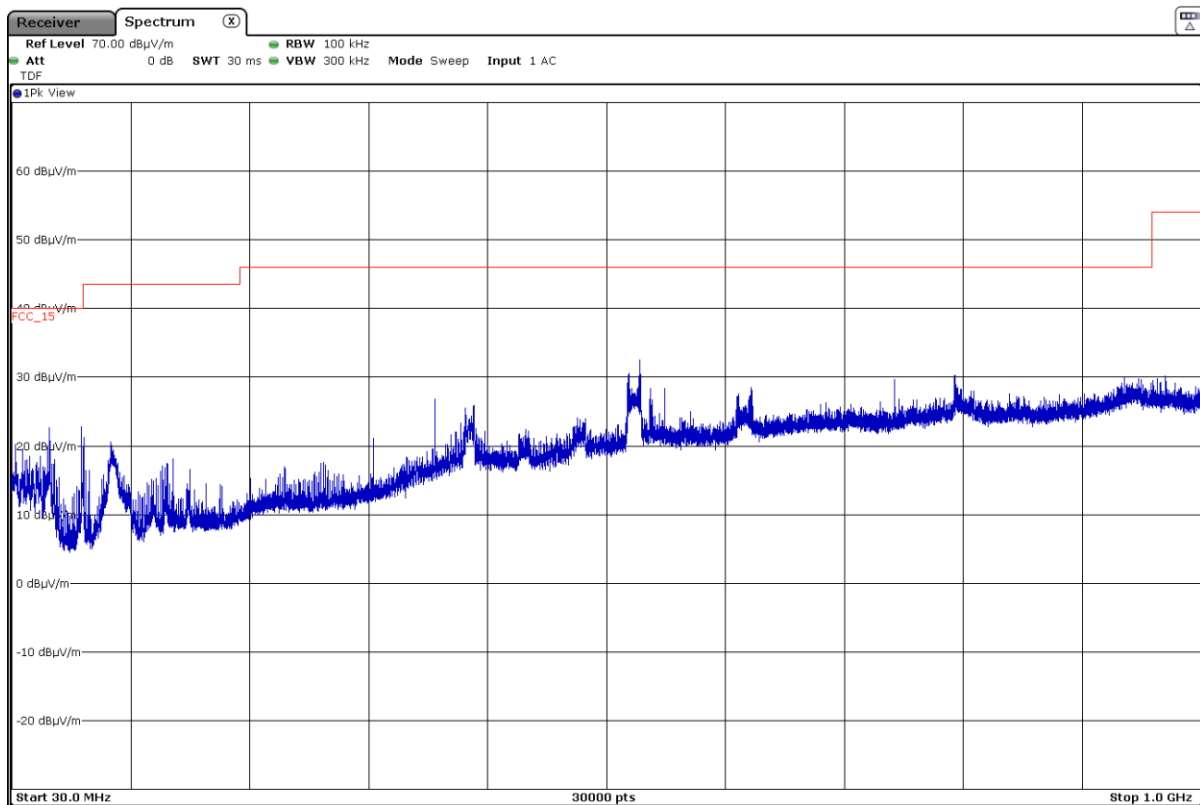
### Frequency range 1 - 40 GHz

Spurious frequencies detected at less than 20 dB below the limit:

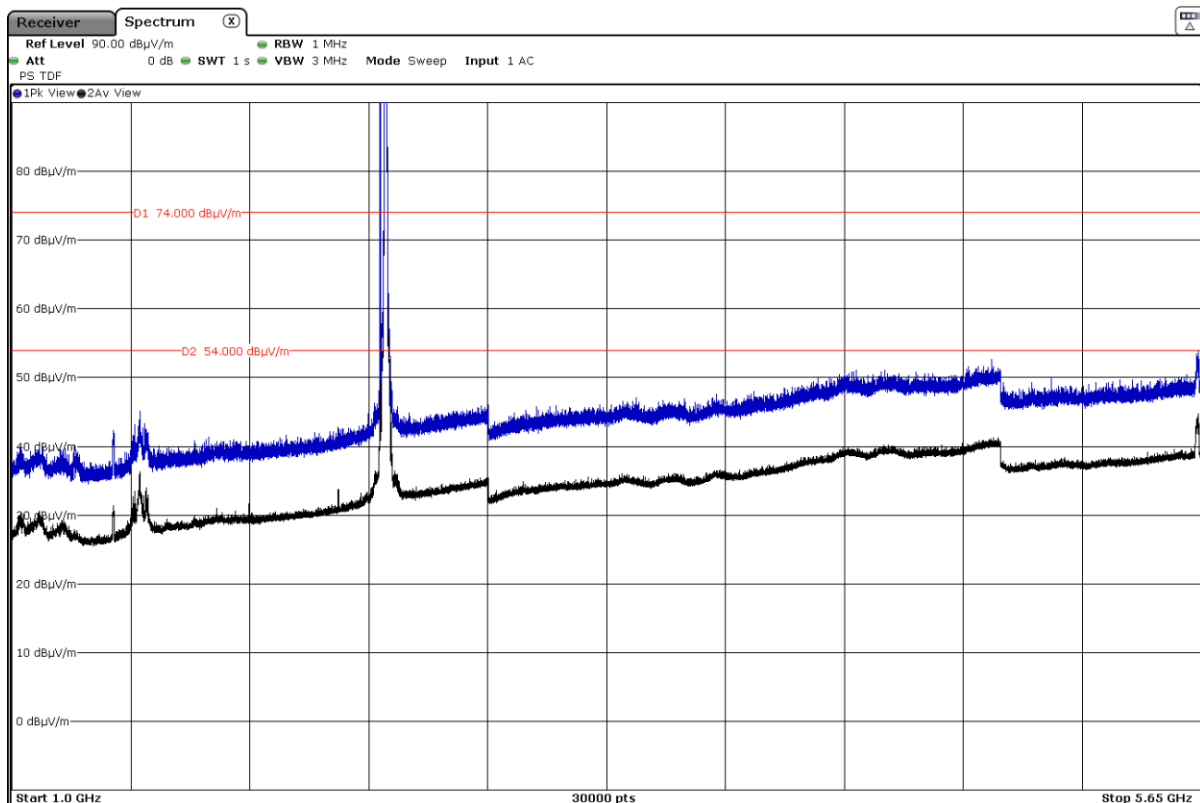
| Spurious frequency (GHz) | Emission Level (dBμV/m) | Polarization | Detector | Measurement Uncertainty (dB) |
|--------------------------|-------------------------|--------------|----------|------------------------------|
| 1.39858                  | 43.73                   | H            | Peak     | <±3.04                       |
| 1.50042                  | 45.18                   | V            | Peak     | <±3.04                       |
| 5.63799                  | 53.87                   | V            | Peak     | <±4.88                       |
| 11.57083                 | 60.87                   | V            | Peak     | <±4.88                       |
|                          | 50.81                   |              | Average  | <±4.88                       |

Verdict: PASS

## FREQUENCY RANGE 30 MHz - 1 GHz

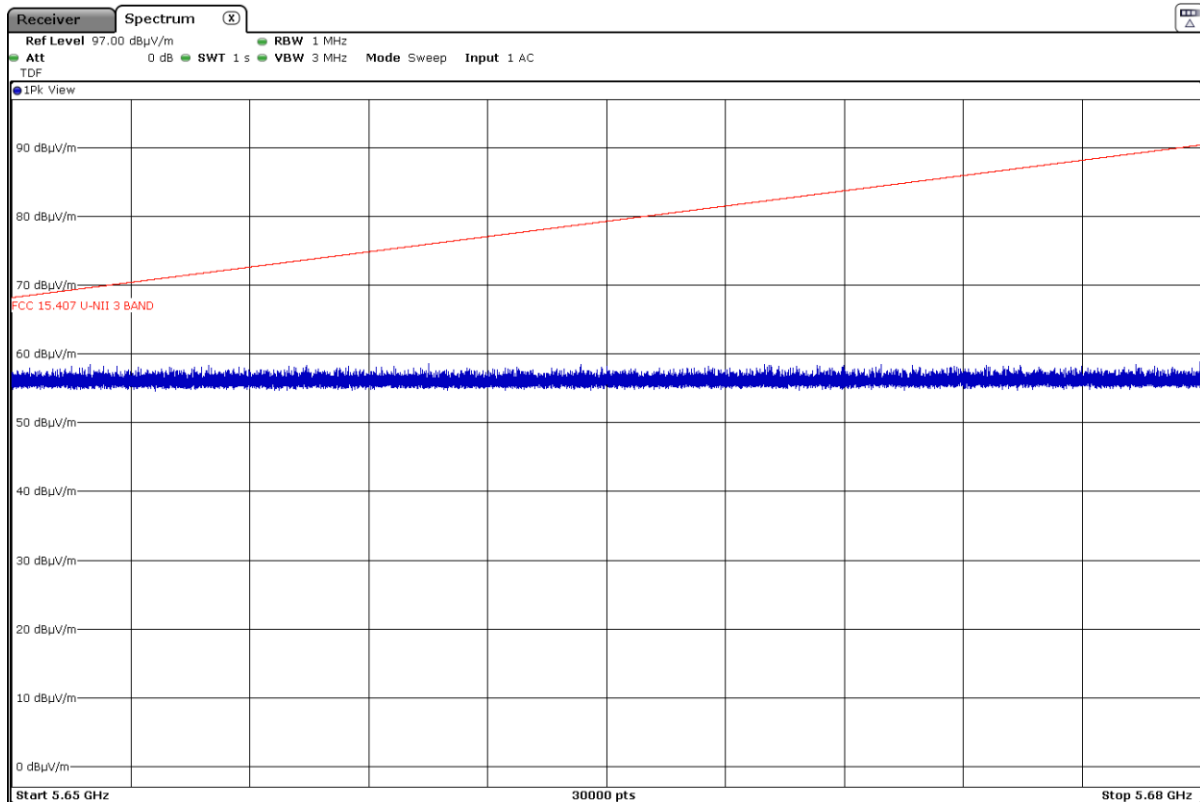


## FREQUENCY RANGE 1 – 5.65 GHz

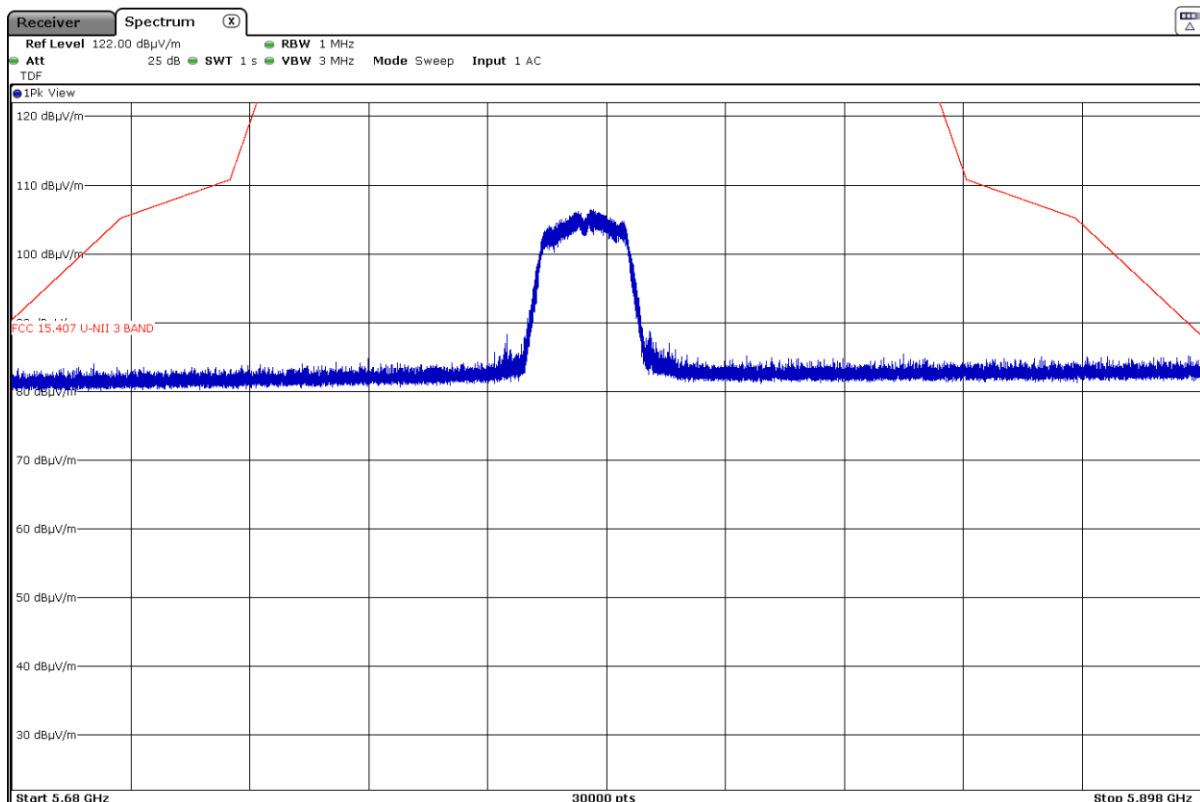


The peaks above the limit are the Bluetooth EDR and Wi-Fi 2.4 GHz carrier frequencies.

## FREQUENCY RANGE 5.65 – 5.68 GHz

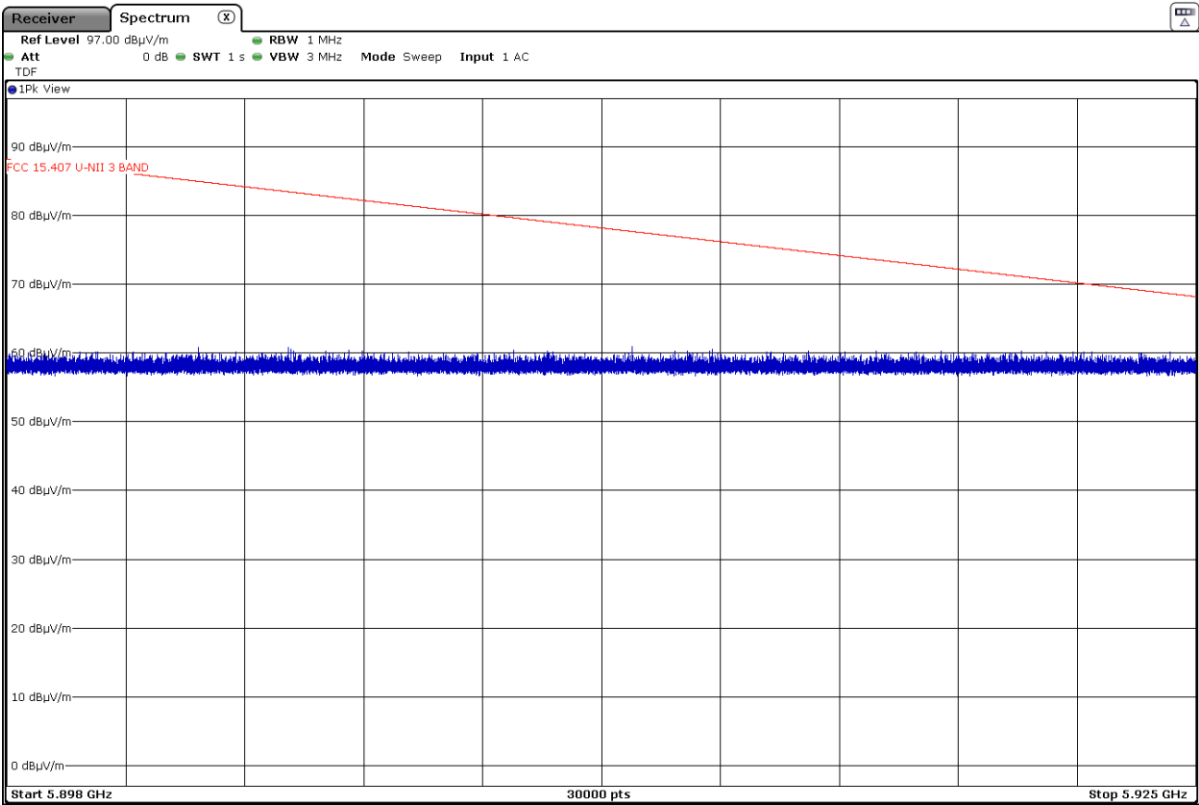


## FREQUENCY RANGE 5.68 – 5.898 GHz

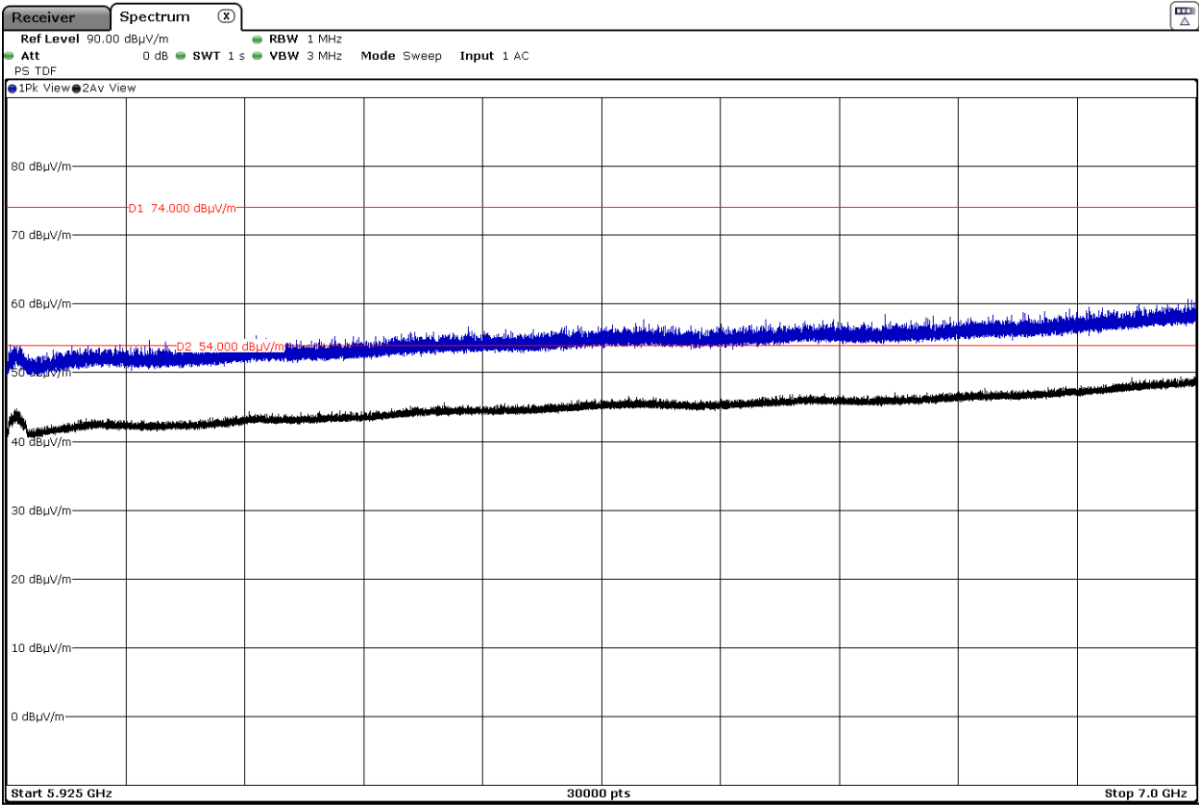


The peak above the limit is the Wi-Fi 5 GHz carrier frequency.

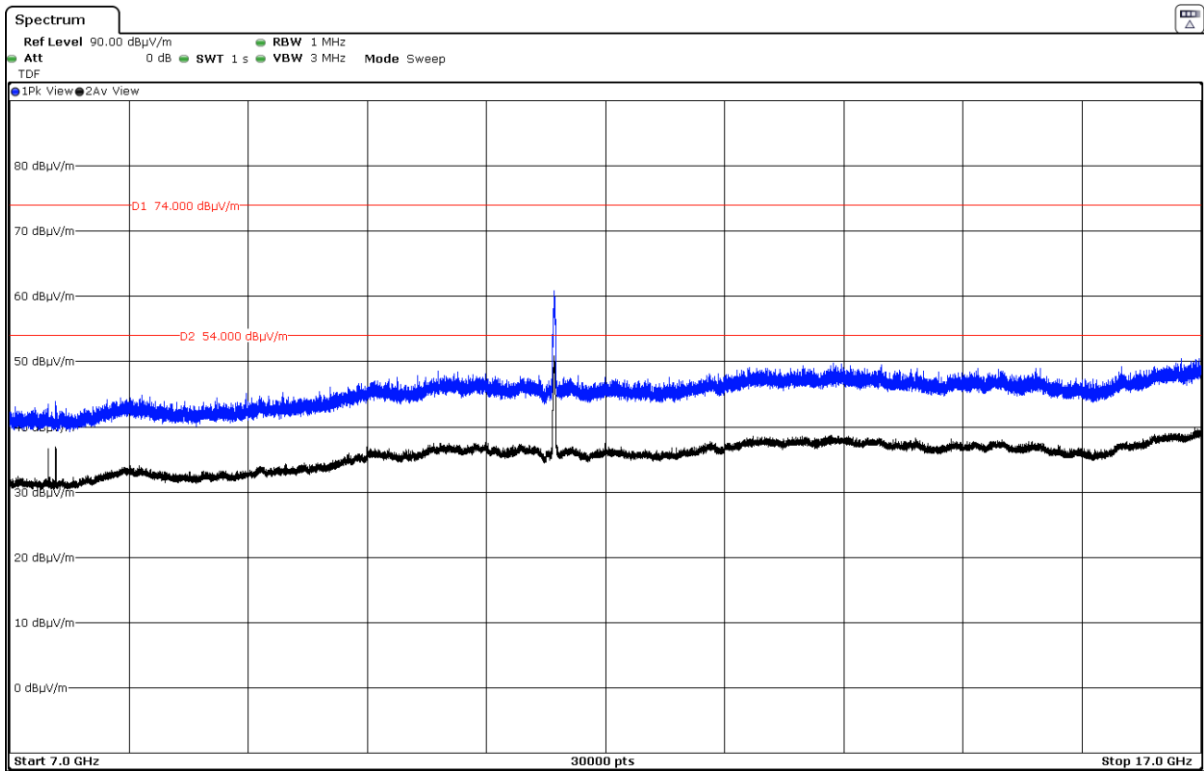
FREQUENCY RANGE 5.898 – 5.925 GHz



FREQUENCY RANGE 5.925 - 7 GHz



FREQUENCY RANGE 7 - 17 GHz



FREQUENCY RANGE 17 - 40 GHz

