

Test report No:  
NIE: 62486RRF.011

## Partial Test Report

Reference Standard:  
USA FCC Part 22  
CANADA RSS-132

|                                           |                                                                                                                                                                                                                                                         |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (*) Identification of item tested         | Telematic control unit with wireless technologies, used in automotive industry                                                                                                                                                                          |
| (*) Trademark                             | BMW                                                                                                                                                                                                                                                     |
| (*) Model and /or type reference          | WAVE-11-HIGH-R1                                                                                                                                                                                                                                         |
| Other identification of the product       | HW version: D3<br>SW version: 20512H.001_047_009<br>FCC ID: T8GWAVE11HIGH-R1<br>IC: 6434A-WAVE11HIGH-R1                                                                                                                                                 |
| (*) Features                              | GSM, UMTS, LTE, 5G, GNSS                                                                                                                                                                                                                                |
| Applicant                                 | HARMAN BECKER AUTOMOTIVE SYSTEMS GMBH<br>BECKER-GOERING-STR. 16, 76307 KARLSBAD,<br>GERMANY                                                                                                                                                             |
| Test method requested, standard           | USA FCC Part 22 (10-1-19 Edition).<br>CANADA RSS-132 Issue 3, January 2013.<br>- Radiated emissions.<br>ANSI C63.26-2015.<br>KDB 971168 D01 Power Meas License Digital Systems<br>v03r01, April. 2018.                                                  |
| Approved by (name / position & signature) | José Carlos Luque<br>RF Lab. Supervisor<br><br>Firmado digitalmente por<br>74841983Y JOSE<br>CARLOS LUQUE<br>(C:A29507456)<br>Fecha: 2021.03.22<br>11:19:49 +01'00' |
| Date of issue                             | 2021-03-22                                                                                                                                                                                                                                              |
| Report template No                        | FDT08_23<br>(*) "Data provided by the client"                                                                                                                                                                                                           |

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## Competences and guarantees

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## General conditions

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1. This report is only referred to the item that has undergone the test.
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## Uncertainty

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Uncertainty (factor  $k=2$ ) was calculated according to the DEKRA Testing and Certification S.A.U. 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 the model WAVE-11-HIGH-R1 is a Telematics control unit with wireless technologies, used in automotive, equipped with 2 modems, OEM and customer. The project name WAVE has the meaning "Wireless Access in Vehicular Environment" and thus describes the key features of this device as Communication and Data Interface. This unit was designed for automotive usage and contains the following features: GSM, UMTS, LTE, 5G, and GNSS.

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 results.

## 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 |
|------------|------------------------------|-----------------|-----------------|-------------------|
| 62486E/719 | Telematic Control Unit       | WAVE-11-HIGH-R1 | B395A.0M4907000 | 2021/02/04        |
| 62486E/012 | Antenna (DA WAVE HIGH 5G US) | DA05DI20        | --              | 2020/09/22        |
| 62486E/036 | Antenna Box                  | AB01-I20-01     | --              | 2020/09/22        |
| 62486E/037 | Antenna Box                  | AB01-I20-01     | --              | 2020/09/22        |
| 62486E/038 | Antenna Box                  | AB01-I20-01     | --              | 2020/09/22        |
| 62486E/039 | Antenna Box                  | AB01-I20-01     | --              | 2020/09/22        |
| 62486E/117 | Harness                      | --              | --              | 2020/09/28        |

Auxiliary elements used with the Sample S/01:

| Control N° | Description                   | Model      | Serial N° | Date of reception |
|------------|-------------------------------|------------|-----------|-------------------|
| 62486E/109 | Battery Li-ion                | 11FR1580-2 | --        | 2020/09/28        |
| 62486E/042 | Antenna ground plane for roof | --         | --        | 2020/09/22        |
| 62486E/131 | RF Cable for 4-Fakra          | --         | --        | 2020/09/28        |
| 62486E/055 | OABR Cable                    | --         | --        | 2020/09/22        |
| 62486E/162 | OABR 1000 BaseT Converter     | --         | --        | 2020/09/28        |
| 62486E/070 | I-Box OABR Adapter            | --         | --        | 2020/09/28        |
| 62486E/072 | Ethernet Cable                | --         | --        | 2020/09/22        |
| 62486E/090 | Speaker                       | FR7        | --        | 2020/09/28        |
| 62486E/101 | SOS Pulser (E-Call)           | 9385       | 11221     | 2020/09/28        |

Sample S/01 has undergone the following test(s): The Radiated tests indicated in the Appendix A.

## Test sample description

|                                               |                                                |                                                                                                    |                                     |                                     |                                   |                          |                          |
|-----------------------------------------------|------------------------------------------------|----------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------|-----------------------------------|--------------------------|--------------------------|
| Ports..... :                                  | Port name and description                      | Cable                                                                                              |                                     |                                     |                                   |                          |                          |
|                                               |                                                | Specified max length [m]                                                                           | Attached during test                | Shielded                            | Coupled to patient <sup>(3)</sup> |                          |                          |
|                                               | RF connector –code D <b>violet</b> trunk/roof) | Port not used for SOP2021 (it has V2X interfaces and gateway for SDARS signal towards another ECU) | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>          |                          |                          |
|                                               | RF connector – code C <b>blue</b> (trunk/roof) | >5m                                                                                                | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>          |                          |                          |
|                                               | NanoMQS 20pol                                  | >5m                                                                                                | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>          |                          |                          |
|                                               | NanoMQS 10pol                                  | >8m                                                                                                | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>          |                          |                          |
|                                               | HDBT MATenet 2-Pol (Roof/Trunk)                | >5m                                                                                                | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>          |                          |                          |
|                                               | Antenna Connector grey (Roof)                  | <0.5m                                                                                              | <input checked="" type="checkbox"/> | <input checked="" 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: 12V car battery / attenuator (4,5 V ≤ UB ≤ 18 V; UB typical: 12 V)                             |                                     |                                     |                                   |                          |                          |
| <input type="checkbox"/>                      | DC:                                            |                                                                                                    |                                     |                                     |                                   |                          |                          |
| Rated Power .....                             | 12V DC                                         |                                                                                                    |                                     |                                     |                                   |                          |                          |
| Clock frequencies.....                        | 25MHz;26MHz;32,768kHz;49,58MHz;                |                                                                                                    |                                     |                                     |                                   |                          |                          |
| Other parameters .....                        | See Technical description                      |                                                                                                    |                                     |                                     |                                   |                          |                          |
| Software version .....                        | D3                                             |                                                                                                    |                                     |                                     |                                   |                          |                          |
| Hardware version .....                        | 20512H.001_047_009                             |                                                                                                    |                                     |                                     |                                   |                          |                          |

|                                               |                                     |                                           |                      |
|-----------------------------------------------|-------------------------------------|-------------------------------------------|----------------------|
| Dimensions in cm (W x H x D) .....            | 160x18x112 mm                       |                                           |                      |
| 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: automotive telematics control unit |                      |
| Modules/parts .....                           | Module/parts of test item           | Type                                      | Manufacturer         |
|                                               |                                     |                                           |                      |
|                                               |                                     |                                           |                      |
|                                               |                                     |                                           |                      |
|                                               |                                     |                                           |                      |
| Accessories (not part of the test item) ..... | Description                         | Type                                      | Manufacturer         |
|                                               | Cable Harness                       | -                                         |                      |
|                                               | 2G/3G4G/5G Antenna                  | -                                         | Hirschmann/<br>Molex |
|                                               | E-CALL button/LED                   | -                                         |                      |
|                                               | SOS Loudspeaker                     | -                                         |                      |
|                                               | Wake-up unit Box                    | -                                         |                      |
|                                               |                                     |                                           |                      |
| Documents as provided by the applicant .....  | Description                         | File name                                 | Issue date           |
|                                               | Technical Description               |                                           |                      |
|                                               |                                     |                                           |                      |
|                                               |                                     |                                           |                      |
|                                               |                                     |                                           |                      |

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

## Identification of the client

HARMAN BECKER AUTOMOTIVE SYSTEMS GMBH  
BECKER-GOERING-STR. 16, 76307 KARLSBAD, GERMANY

## Testing period and place

|               |                                        |
|---------------|----------------------------------------|
| Test Location | DEKRA Testing and Certification S.A.U. |
| Date (start)  | 2021-02-23                             |
| Date (finish) | 2021-02-24                             |

## Document history

| Report number | Date       | Description    |
|---------------|------------|----------------|
| 62486RRF.011  | 2021-03-22 | 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 %   |

## Remarks and comments

The tests have been performed by the technical personnel: Javier Miguel Nadales and Miguel Manuel López.

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.  | EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7                      | 2019/10          | 2021/10         |
| 4.  | Biconical/Log Antenna 30MHz - 6GHz ETS LINDGREN 3142E               | 2020/10          | 2023/10         |
| 5.  | Multi-Device Controller INNCO CO3000                                | N.A.             | N.A.            |
| 6.  | Signal and Spectrum Analyzer 10 Hz - 40 GHz ROHDE AND SCHWARZ FSV40 | 2019/10          | 2021/10         |
| 7.  | RF Preamplifier G>30dB, 1-18GHz BONN ELEKTRONIK BLMA 0118-3A        | 2020/10          | 2021/10         |
| 8.  | Horn Antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D       | 2020/08          | 2023/08         |
| 9.  | Wideband Radio Communication Tester ROHDE AND SCHWARZ CMW500        | N.A.             | N.A.            |
| 10. | Wideband Radio Communication Tester ROHDE AND SCHWARZ CMX500        | N.A.             | N.A.            |

## Testing verdicts

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

## Summary

| FCC PART 22 / RSS-132 PARAGRAPH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |         |        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------|
| Requirement – Test case                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Verdict | Remark |
| FCC 22.913 / RSS-132 5.4: RF output power                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | N/M     | (1)    |
| FCC 2.1047 / RSS-132 5.2: Modulation characteristics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | N/M     | (1)    |
| FCC 22.355 / RSS-132 5.3: Frequency stability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | N/M     | (1)    |
| FCC 2.1049: Occupied Bandwidth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | N/M     | (1)    |
| FCC 22.917 / RSS-132 5.5: Spurious emissions at antenna terminals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | N/M     | (1)    |
| FCC 22.917 / RSS-132 5.5: Radiated emissions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | P       | (2)    |
| <u>Supplementary information and remarks:</u><br>(1) Test not requested. Radiated emissions test only requested.<br>(2) The report 62486RRF.001 contains the results of the pre-testing to determine the worst case of the setting of the antennas.<br>· Conf #1: MIMO1 Port -> Int BuA Antenna / MIMO2 Port -> MIMO2 Antenna / Antennenbox for NAD#2.<br>· Conf #2: MIMO1 Port -> Int BuA Antenna / MIMO2 Port -> MIMO2 Antenna / FSA antenna for NAD#2.<br>· Conf #3: MIMO1 Port -> MIMO1 Antenna / MIMO2 Port -> MIMO2 Antenna / Antennenbox for NAD#2.<br>· Conf #4: MIMO1 Port -> MIMO2 Antenna / MIMO2 Port -> MIMO2 Antenna / FSA antenna for NAD#2. |         |        |

## Appendix A: Test results for FCC Part 22 / RSS-132

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## TEST CONDITIONS

### POWER SUPPLY (V):

Vnominal: 12 Vdc  
Type of Power Supply: External DC (vehicle battery).

The module with the highest antenna gain has been tested using the worst case obtained for conducted output power for New Radio 5G. And the other module has been tested using an adjacent channel to the 5G with LTE band with a setting that would allow communication in the same band to both modules simultaneously.

### TEST FREQUENCIES:

- 5G SA & LTE (MIMO 2x2):

n5A + LTE Band 5. (antenna configuration 3):

Table 4.3.1.1.1.5-1: Test frequencies for NR operating band n5 and SCS 15 kHz

| CBW [MHz] | carrier Bandwidth [PRBs] | Range    |      | Carrier centre [MHz] | Carrier centre [ARFCN] | point A [MHz] | absolute Frequency Point A [ARFCN] | offsetTo Carrier [Carrier PRBs] | SS block SCS [kHz] | GSCN | absolute Frequency SSB [ARFCN] | $k_{SSB}$ | Offset Carrier CORE SET#0 [RBs] Note 2 | CORE SET#0 Index (Offset [RBs]) Note 1 | offsetTo PointA (SIB1) [PRBs] Note 1 |
|-----------|--------------------------|----------|------|----------------------|------------------------|---------------|------------------------------------|---------------------------------|--------------------|------|--------------------------------|-----------|----------------------------------------|----------------------------------------|--------------------------------------|
| 5         | 25                       | Downlink | Low  | 871.5                | 174300                 | 869.25        | 173850                             | 0                               | 15                 | 2178 | 174270                         | 8         | 1                                      | 0 (0)                                  | 1                                    |
|           |                          |          | Mid  | 881.5                | 176300                 | 860.89        | 172178                             | 102                             |                    | 2203 | 176210                         | 0         | 0                                      | 0 (0)                                  | 102                                  |
|           |                          |          | High | 891.5                | 178300                 | 798.53        | 159706                             | 504                             |                    | 2228 | 178330                         | 4         | 1                                      | 1 (2)                                  | 507                                  |
|           |                          | Uplink   | Low  | 826.5                | 165300                 | 824.25        | 164850                             | 0                               | -                  | -    | -                              | -         | -                                      | -                                      |                                      |
|           |                          |          | Mid  | 836.5                | 167300                 | 743.53        | 148706                             | 504                             |                    | -    | -                              | -         | -                                      | -                                      |                                      |
|           |                          |          | High | 846.5                | 169300                 | 843.17        | 168634                             | 6                               |                    | -    | -                              | -         | -                                      | -                                      |                                      |
| 10        | 52                       | Downlink | Low  | 874                  | 174800                 | 869.32        | 173864                             | 0                               | 15                 | 2179 | 174290                         | 10        | 1                                      | 0 (0)                                  | 1                                    |
|           |                          |          | Mid  | 881.5                | 176300                 | 858.46        | 171692                             | 102                             |                    | 2197 | 175730                         | 2         | 0                                      | 0 (0)                                  | 102                                  |
|           |                          |          | High | 889                  | 177800                 | 793.6         | 158720                             | 504                             |                    | 2218 | 177410                         | 2         | 1                                      | 2 (4)                                  | 509                                  |
|           |                          | Uplink   | Low  | 829                  | 165800                 | 824.32        | 164864                             | 0                               | -                  | -    | -                              | -         | -                                      | -                                      |                                      |
|           |                          |          | Mid  | 836.5                | 167300                 | 741.1         | 148220                             | 504                             |                    | -    | -                              | -         | -                                      | -                                      |                                      |
|           |                          |          | High | 844                  | 168800                 | 838.24        | 167648                             | 6                               |                    | -    | -                              | -         | -                                      | -                                      |                                      |
| 15        | 79                       | Downlink | Low  | 876.5                | 175300                 | 869.39        | 173878                             | 0                               | 15                 | 2177 | 174250                         | 4         | 0                                      | 0 (0)                                  | 0                                    |
|           |                          |          | Mid  | 881.5                | 176300                 | 856.03        | 171206                             | 102                             |                    | 2191 | 175250                         | 4         | 0                                      | 0 (0)                                  | 102                                  |
|           |                          |          | High | 886.5                | 177300                 | 788.67        | 157734                             | 504                             |                    | 2205 | 176430                         | 4         | 1                                      | 2 (4)                                  | 509                                  |
|           |                          | Uplink   | Low  | 831.5                | 166300                 | 824.39        | 164878                             | 0                               | -                  | -    | -                              | -         | -                                      | -                                      |                                      |
|           |                          |          | Mid  | 836.5                | 167300                 | 738.67        | 147734                             | 504                             |                    | -    | -                              | -         | -                                      | -                                      |                                      |
|           |                          |          | High | 841.5                | 168300                 | 833.31        | 166662                             | 6                               |                    | -    | -                              | -         | -                                      | -                                      |                                      |
| 20        | 106                      | Downlink | Low  | 879                  | 175800                 | 869.46        | 173892                             | 0                               | 15                 | 2178 | 174270                         | 6         | 0                                      | 0 (0)                                  | 0                                    |
|           |                          |          | Mid  | 881.5                | 176300                 | 853.6         | 170720                             | 102                             |                    | 2185 | 174770                         | 6         | 0                                      | 0 (0)                                  | 102                                  |
|           |                          |          | High | 884                  | 176800                 | 783.74        | 156748                             | 504                             |                    | 2192 | 175450                         | 6         | 1                                      | 2 (4)                                  | 509                                  |
|           |                          | Uplink   | Low  | 834                  | 166800                 | 824.46        | 164892                             | 0                               | -                  | -    | -                              | -         | -                                      | -                                      |                                      |
|           |                          |          | Mid  | 836.5                | 167300                 | 736.24        | 147248                             | 504                             |                    | -    | -                              | -         | -                                      | -                                      |                                      |
|           |                          |          | High | 839                  | 167800                 | 828.38        | 165676                             | 6                               |                    | -    | -                              | -         | -                                      | -                                      |                                      |

Note 1: The CORESET#0 Index and the associated CORESET#0 Offset refers to Table 13-1 in TS 38.213 [22]. The value of CORESET#0 Index is signalled in controlResourceSetZero (pdcch-ConfigSIB1) in the MIB. The offsetToPointA IE is expressed in units of resource blocks assuming 15 kHz subcarrier spacing for FR1 and 60 kHz subcarrier spacing for FR2.

Note 2: The parameter Offset Carrier CORESET#0 specifies the offset from the lowest subcarrier of the carrier and the lowest subcarrier of CORESET#0. It corresponds to the parameter  $\Delta F_{\text{OffsetCORESET-0-Carrier}}$  in Annex C expressed in number of common RBs.

| Module NAD2              |           |          |             |          | Module NAD1                     |          |             |        |
|--------------------------|-----------|----------|-------------|----------|---------------------------------|----------|-------------|--------|
| Test frequencies for n5A |           |          |             |          | Test frequencies for LTE Band 5 |          |             |        |
| 5G Carrier in Band n5    |           |          |             |          | LTE Band 5                      |          |             |        |
| Channel                  | n5A       |          |             |          |                                 |          |             |        |
|                          | SCS (kHz) | BW (MHz) | Freq. (MHz) | NR-ARFCN | Channel                         | BW (MHz) | Freq. (MHz) | EARFCN |
| Low                      | 15        | 20       | 834         | 166800   | Adjacent channel to Low         | 5        | 846.5       | 20625  |
| Middle                   | 15        | 20       | 836.5       | 167300   | Adjacent channel to Middle      | 1.4      | 847.3       | 20633  |
| High                     | 15        | 20       | 839         | 167800   | Adjacent channel to High        | 5        | 826.5       | 26815  |

## Radiated emissions

### SPECIFICATION:

FCC §22.917 and RSS-132 Issue 3 Clause 5.5:

The power of emissions shall be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB. P in watts.

### METHOD:

The measurement was performed with the EUT inside an anechoic chamber. The spectrum was scanned from 30 MHz to at least the 10th harmonic of the High frequency generated within the equipment.

The EUT was placed on a 1 meter high non-conductive stand at a 3 meter distance from the measuring antenna.

Detected emissions were maximized at each frequency by rotating the EUT and adjusting the measuring antenna height and polarization. The maximum field strength (dBμV/m) is measured and recorded.

The maximum field strength (dBμV/m) of each detected emission at less than 20 dB respect to the limit is converted to an equivalent EIRP level (dBm) according to ANSI C63.26 with the formula:

$EIRP (dBm) = E (dB\mu V/m) + 20 \log(D) - 104.8$ ; where D is the measurement distance (in the far field region) in m. D = 3 m

### Measurement Limit:

According to specification. the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB. P in Watts.

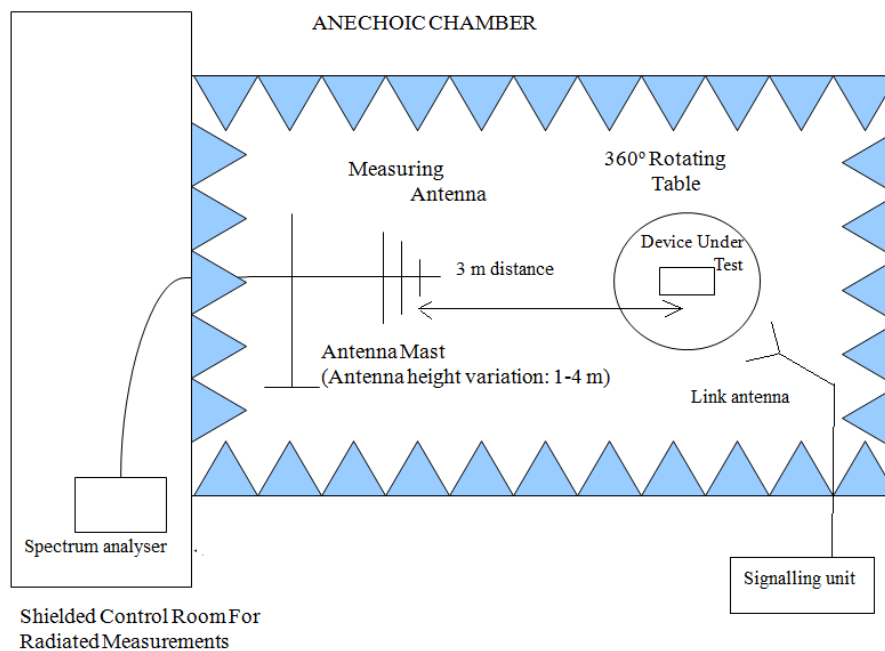
At  $P_o$  transmitting power. the specified minimum attenuation becomes  $43+10\log (P_o)$ . and the level in dBm relative  $P_o$  becomes:

$$P_o (dBm) - [43 + 10 \log (P_o \text{ in mWatts}) - 30] = -13 \text{ dBm}$$

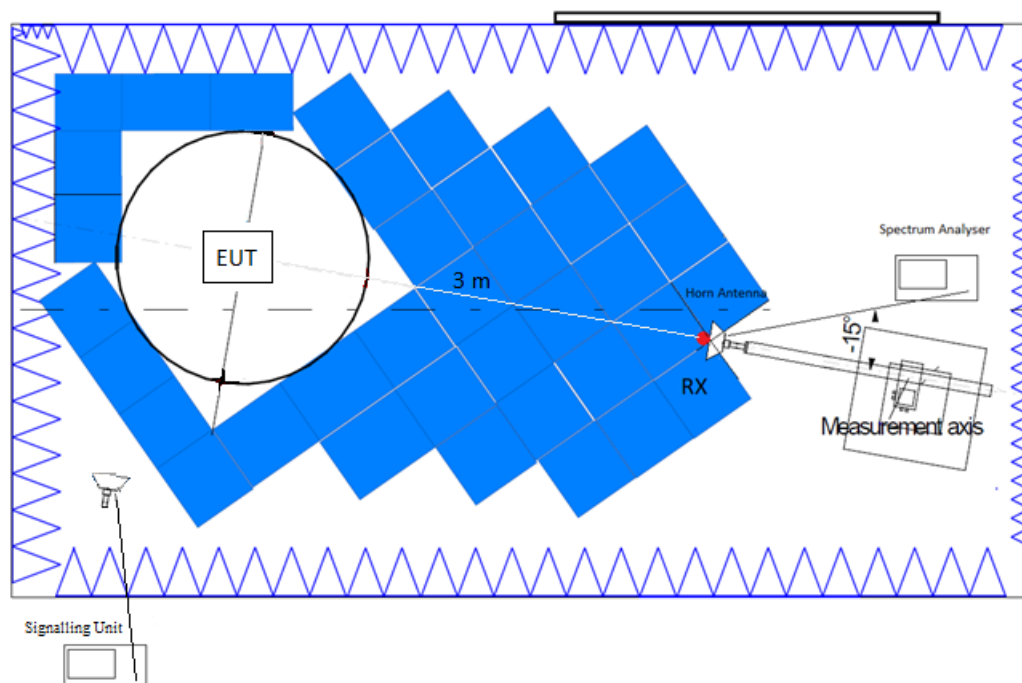
A resolution bandwidth / video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

## TEST SETUP:

Radiated measurements below 1 GHz:



Radiated measurements above 1 GHz up to 8.5 GHz:



## RESULTS:

### • n5A + LTE Band 5:

A preliminary scan determined the worst case:

1) n5A (Module NAD2):

n5A: Pi/2 BPSK, BW=20 MHz, SCS=15 kHz, RB=1, Offset=0.

2) LTE Band 5 (Module NAD1):

5: QPSK, BW=5 MHz (for Low and High Channels), BW=1.4 MHz (for Middle Channel), RB=1, Offset=0.

The following results are the ones of the worst case.

### - LOW CHANNEL:

#### Frequency range 30 MHz - 1 GHz:

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

#### Frequency range 1 - 8.5 GHz:

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

### - MIDDLE CHANNEL:

#### Frequency range 30 MHz - 1 GHz:

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

#### Frequency range 1 - 8.5 GHz:

Spurious frequencies at less than 20 dB below the limit:

| Spurious frequency (GHz) | E.I.R.P (dBm) | Polarization | Detector | Measurement Uncertainty (dB) |
|--------------------------|---------------|--------------|----------|------------------------------|
| 2.54359375               | -31.73        | V            | Peak     | <± 5.13                      |

**- HIGH CHANNEL:**

**Frequency range 30 MHz - 1 GHz:**

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

**Frequency range 1 - 8.5 GHz:**

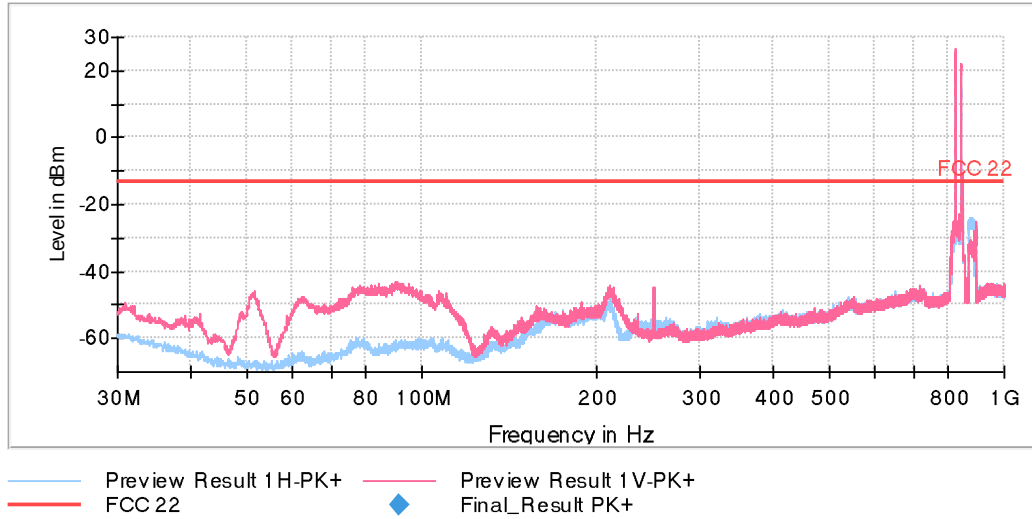
No spurious frequencies at less than 20 dB below the limit.

Measurement Uncertainty (dB):  $<\pm 5.08$  for  $f \geq 30$  MHz up to 1 GHz  
 $<\pm 5.13$  for  $f \geq 1$  GHz up to 8.5 GHz

Verdict: PASS

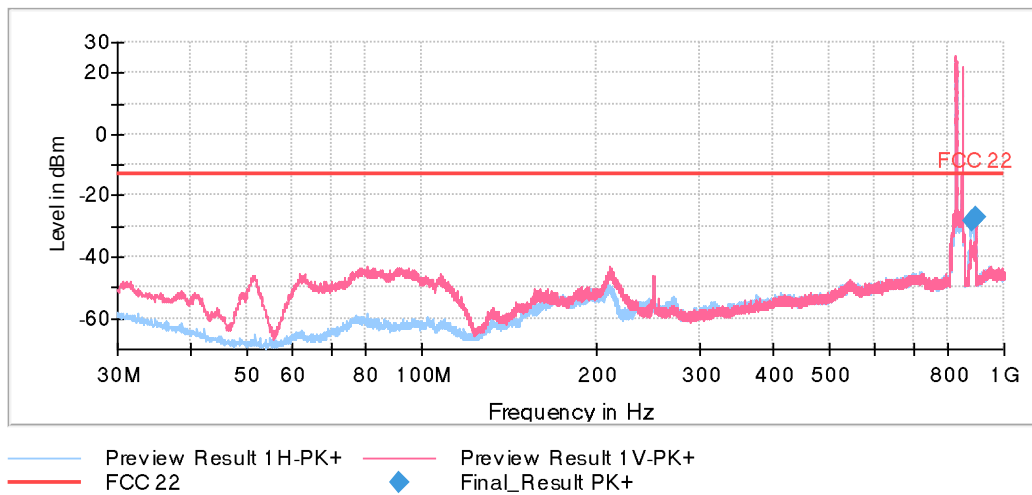
## FREQUENCY RANGE 30 MHz - 1 GHz (worst case):

- Low Channel:



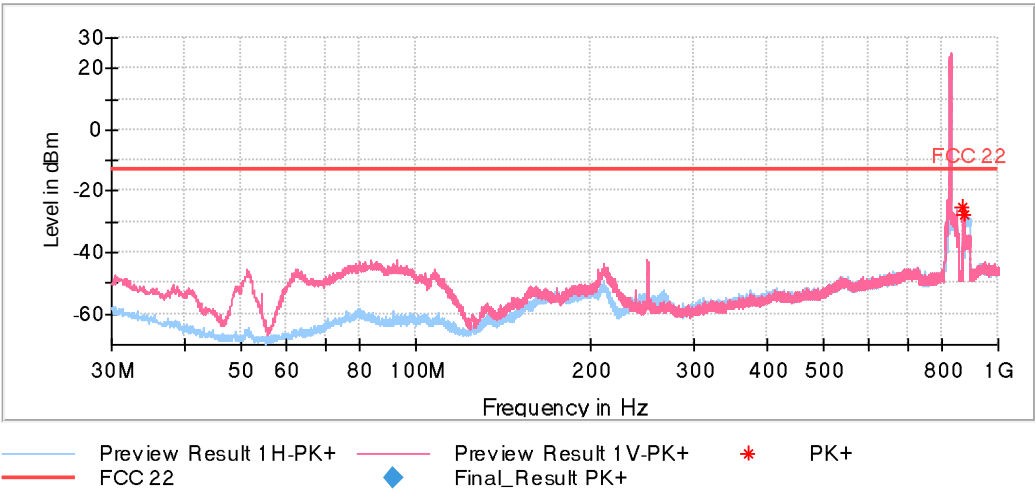
The peaks above the limit are the carrier frequencies. The peaks at 879MHz and 891.5MHz correspond to the downlink signals.

- Middle Channel:



The peaks above the limit are the carrier frequencies. The peaks at 881.5MHz and 892.3MHz correspond to the downlink signals.

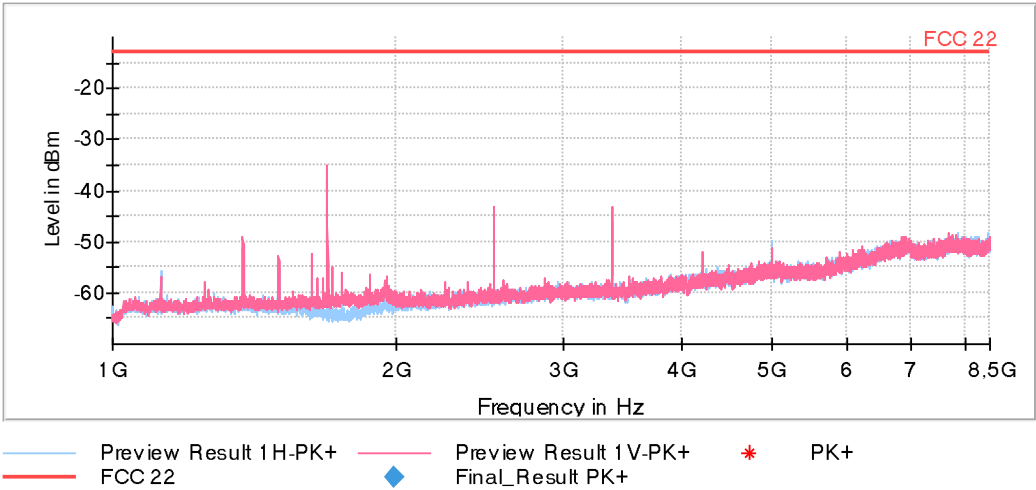
- High Channel:



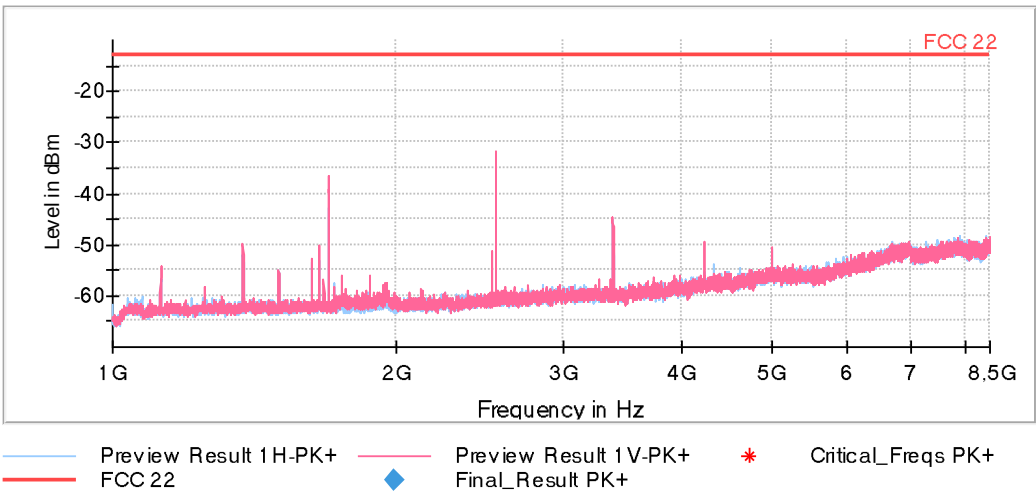
The peaks above the limit are the carrier frequencies. The peaks at 871.5MHz corresponds to the downlink signal.

FREQUENCY RANGE 1 - 8.5 GHz (worst case):

- Low Channel:



- Middle Channel:



- High Channel:

