



## HAC RF EMISSIONS TEST REPORT

**FCC 47 CFR § 20.19  
ANSI C63.19-2019**

*For*  
**SMARTPHONE**

**FCC ID: BCG-E8687A  
Model Name: A3297**

**Report Number: 14982482-S4V2  
Issue Date: 8/20/2024**

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## Revision History

| Rev. | Date      | Revisions                                         | Revised By      |
|------|-----------|---------------------------------------------------|-----------------|
| V1   | 7/31/2024 | Initial Issue                                     | --              |
| V2   | 8/20/2024 | Updated Sections 4.1/7.1/8/10. Appendices D and H | Coltyce Sanders |
|      |           |                                                   |                 |
|      |           |                                                   |                 |

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## 1. Attestation of Test Results

|                      |                                        |
|----------------------|----------------------------------------|
| Applicant Name       | APPLE, INC.                            |
| FCC ID               | BCG-E8687A                             |
| Model Name           | A3297                                  |
| Applicable Standards | FCC 47 CFR § 20.19<br>ANSI C63.19-2019 |
| Date Tested          | 7/9/2024 and 8/16/2024                 |
| Test Results         | Pass                                   |

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested can demonstrate compliance with the requirements as documented in this report.

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not considered unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the U.S. Government, or any agency of the U.S. government.

Approved & Released By:



Prepared By:



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## 2. Test Methodology

The tests documented in this report were performed in accordance with ANSI C63.19-2019 Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids and FCC Published procedure:

- KDB 285076 D01 HAC Guidance v06r04
- KDB 285076 D03 HAC FAQ v01r06
- TCB workshop updates

## 3. Facilities and Accreditation

|                      |
|----------------------|
| 47173 Benicia Street |
| SAR Lab H            |

UL Verification Services Inc. is accredited by A2LA, Certificate Number 0751.05

The Test Lab Conformity Assessment Body Identifier (CABID) (for IC only)

| Location                                               | CABID  | Company Number |
|--------------------------------------------------------|--------|----------------|
| 47173 Benicia Street, Fremont, CA, 94538 UNITED STATES | US0104 | 2324A          |
| 47266 Benicia Street, Fremont, CA, 94538 UNITED STATES |        |                |

## 4. Calibration and Uncertainty

### 4.1. Measuring Instrument Calibration

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

#### Test Equipment

| Name of Equipment                    | Manufacturer  | Type/Model  | Serial No. | Cal. Due Date |
|--------------------------------------|---------------|-------------|------------|---------------|
| Synthesized Signal Generator         | R&S           | SMB 100A    | 180970-zC  | 2/28/2025     |
| Power Meter                          | Keysight      | N1912A      | MY55196008 | 1/31/2025     |
| Power Sensor                         | Agilent       | N1912A      | MY53260001 | 1/31/2025     |
| Power Sensor                         | Agilent       | N1912A      | MY52200012 | 1/31/2025     |
| Bi-directional coupler               | Mini-Circuits | ZUDC10-183+ | 1722       | N/A           |
| Data Acquisition Electronics         | SPEAG         | DAE4        | 1546       | 3/11/2025     |
| E-Field Probe <sup>1</sup>           | SPEAG         | EF3DV3      | 4028       | 9/4/2024      |
| Calibration Dipole                   | SPEAG         | CD1880V3    | 1122       | 2/3/2025      |
| Radio Communication Tester           | R&S           | CMW 500     | 164541-Ci  | 2/28/2025     |
| Modulation and Interference Analyzer | SPEAG         | MAIA        | 1284       | N/A           |
| Spectrum Analyzer                    | Agilent       | E4446A      | MY45300064 | 2/28/2025     |

#### Note(s):

1. According to SPEAG's Technical Report, "MIF Verification", Doc # TR-FB-12.09.04-1, issued date: 9/4/2012. E-field probes are calibrated with specified uncertainty according to ISO 17025 as described in their calibration certificate. The MIF according to the definition in ANSI C63.19 is specific for a modulation and can therefore be used as a constant value if the probe has been PMR calibrated.
2. In accordance with UL Quality Policy ULID-008202, reference dipoles need only be returned to the system manufacturer for calibration every three years. The dipole target, impedance and return loss must be checked at least yearly by the test laboratory and compared to the calibration certificate. If any of these parameters deviate by more than that permitted by UL Quality Policy ULID-008202 then the dipole shall be withdrawn from use and return to the manufacturer for immediate re-calibration. Refer to Appendix F of this report for both the calibration certificates and the in-house checks (where appropriate).

## 4.2. Measurement Uncertainty

| Error Description                                                          | Uncertainty value ( $\pm\%$ ) | Probe Dist. | Div.  | (C)<br>E | Std. Unc.( $\pm\%$ )<br>E |
|----------------------------------------------------------------------------|-------------------------------|-------------|-------|----------|---------------------------|
| <b>Measurement System</b>                                                  |                               |             |       |          |                           |
| Probe Calibration                                                          | 5.1                           | N           | 1     | 1        | 5.1                       |
| Axial Isotropy                                                             | 4.7                           | R           | 1.732 | 1        | 2.7                       |
| Sensor Displacement                                                        | 7.2                           | R           | 1.732 | 1        | 4.2                       |
| Boundary Effects                                                           | 2.4                           | R           | 1.732 | 1        | 1.4                       |
| Linearity                                                                  | 4.7                           | R           | 1.732 | 1        | 2.7                       |
| Scaling to Peak Power with MIF                                             | 0.0                           | R           | 1.732 | 1        | 0.0                       |
| System Detection Limit                                                     | 1.0                           | R           | 1.732 | 1        | 0.6                       |
| Readout Electronics                                                        | 0.3                           | N           | 1     | 1        | 0.3                       |
| Response Time                                                              | 0.0                           | R           | 1.732 | 1        | 0.0                       |
| Integration Time                                                           | 0.0                           | R           | 1.732 | 1        | 0.0                       |
| RF Ambient Conditions                                                      | 3.0                           | R           | 1.732 | 1        | 1.7                       |
| RF Reflections                                                             | 12.0                          | R           | 1.732 | 1        | 6.9                       |
| Probe Positioner                                                           | 1.2                           | R           | 1.732 | 1        | 0.7                       |
| Probe Positioning                                                          | 3.0                           | R           | 1.732 | 1        | 1.7                       |
| Extrapolation and Interpolation                                            | 1.0                           | R           | 1.732 | 1        | 0.6                       |
| <b>Dipole Related</b>                                                      |                               |             |       |          |                           |
| Dist. Dipole - Scan Plane                                                  | 5.2                           | R           | 1.732 | 1        | 3.0                       |
| Input Power                                                                | 4.7                           | N           | 1     | 1        | 4.7                       |
| Combined Std. Uncertainty                                                  |                               |             |       |          | 12.1                      |
| <b>Expanded Std. Uncertainty on Power (Coverage Factor for 95%, k = 2)</b> |                               |             |       |          | <b>24.2</b>               |
| <b>Expanded Std. Uncertainty on Field</b>                                  |                               |             |       |          | <b>12.1</b>               |
| Notes for table                                                            |                               |             |       |          |                           |
| 1. N - Nomal                                                               |                               |             |       |          |                           |
| 2. R - Rectangular                                                         |                               |             |       |          |                           |
| 3. Div. - Divisor used to obtain standard uncertainty                      |                               |             |       |          |                           |
| 4. C <sub>i</sub> - is the Sensitivity coefficient                         |                               |             |       |          |                           |

| Error Description                                                          | Uncertainty value ( $\pm\%$ ) | Probe Dist. | Div.  | (C) <sub>i</sub><br>E | Std. Unc.( $\pm\%$ )<br>E |
|----------------------------------------------------------------------------|-------------------------------|-------------|-------|-----------------------|---------------------------|
| <b>Measurement System</b>                                                  |                               |             |       |                       |                           |
| Probe Calibration                                                          | 5.1                           | N           | 1     | 1                     | 5.1                       |
| Axial Isotropy                                                             | 4.7                           | R           | 1.732 | 1                     | 2.7                       |
| Sensor Displacement                                                        | 7.2                           | R           | 1.732 | 0.5                   | 2.1                       |
| Boundary Effects                                                           | 2.4                           | R           | 1.732 | 1                     | 1.4                       |
| Phantom Boundary Effect                                                    | 7.2                           | R           | 1.732 | 1                     | 4.2                       |
| Probe Linearity                                                            | 4.7                           | R           | 1.732 | 1                     | 2.7                       |
| Scaling to Peak Power with MIF                                             | 10.0                          | R           | 1.732 | 1                     | 5.8                       |
| System Detection Limit                                                     | 1.0                           | R           | 1.732 | 1                     | 0.6                       |
| Readout Electronics                                                        | 0.3                           | N           | 1     | 1                     | 0.3                       |
| Response Time                                                              | 0.8                           | R           | 1.732 | 0                     | 0                         |
| Integration Time                                                           | 2.6                           | R           | 1.732 | 0                     | 0                         |
| RF Ambient Conditions                                                      | 3.0                           | R           | 1.732 | 1                     | 1.7                       |
| RF Reflections                                                             | 12.0                          | R           | 1.732 | 1                     | 6.9                       |
| Probe Positioner                                                           | 1.2                           | R           | 1.732 | 1                     | 0.7                       |
| Probe Positioning                                                          | 3.0                           | R           | 1.732 | 1                     | 1.7                       |
| Extrapolation and Interpolation                                            | 1.0                           | R           | 1.732 | 1                     | 0.6                       |
| <b>Test sample Related</b>                                                 |                               |             |       |                       |                           |
| Device Positioning Vertical                                                | 4.7                           | R           | 1.732 | 1                     | 2.7                       |
| Device Positioning Lateral                                                 | 1.0                           | R           | 1.732 | 1                     | 0.6                       |
| Device Holder and Phantom                                                  | 2.4                           | R           | 1.732 | 1                     | 1.4                       |
| Power Drift                                                                | 5.0                           | R           | 1.732 | 1                     | 2.9                       |
| <b>Phantom and Setup Related</b>                                           |                               |             |       |                       |                           |
| Phantom Thickness                                                          | 2.4                           | R           | 1.732 | 1                     | 1.4                       |
| Combined Std. Uncertainty                                                  |                               |             |       |                       | 13.1                      |
| <b>Expanded Std. Uncertainty on Power (Coverage Factor for 95%, k = 2)</b> |                               |             |       |                       | <b>26.3</b>               |
| <b>Expanded Std. Uncertainty on Field</b>                                  |                               |             |       |                       | <b>13.1</b>               |
| Notes for table                                                            |                               |             |       |                       |                           |
| 1. N - Nomal                                                               |                               |             |       |                       |                           |
| 2. R - Rectangular                                                         |                               |             |       |                       |                           |
| 3. Div. - Divisor used to obtain standard uncertainty                      |                               |             |       |                       |                           |
| 4. C <sub>i</sub> - is the Sensitivity coefficient                         |                               |             |       |                       |                           |



## 5. System Specifications

E-field measurements are performed using the DASY6<sup>1</sup> automated dosimetric assessment system. The DASY6 is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland.

The DASY6 HAC Extension consists of the following parts:

### Test Arch Phantom

The specially designed Test Arch allows high precision positioning of both the device and any of the validation dipoles.

#### EF3DV3 Isotropic E-Field Probe

- |                |                                                                                                                                                                                                                                                                       |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Construction:  | <ul style="list-style-type: none"><li>• One dipole parallel, two dipoles normal to probe axis</li><li>• Built-in shielding against static charges</li><li>• PEEK enclosure material</li></ul>                                                                         |
| Calibration:   | <ul style="list-style-type: none"><li>• In air from 100 MHz to 3.0 GHz (absolute accuracy <math>\pm 6.0\%</math>, <math>k=2</math>)</li><li>• ISO/IEC 17025 <a href="#">calibration service</a> available.</li></ul>                                                  |
| Frequency:     | <ul style="list-style-type: none"><li>• 40 MHz – &gt;6 GHz (can be extended to &lt; 20 MHz)</li><li>• Linearity: <math>\pm 0.2</math> dB (100 MHz – 3 GHz)</li></ul>                                                                                                  |
| Directivity:   | <ul style="list-style-type: none"><li>• <math>\pm 0.2</math> dB in air (rotation around probe axis)</li><li>• <math>\pm 0.4</math> dB in air (rotation normal to probe axis)</li></ul>                                                                                |
| Dynamic Range: | <ul style="list-style-type: none"><li>• 2 V/m to &gt; 1000 V/m; Linearity: <math>\pm 0.2</math> dB</li></ul>                                                                                                                                                          |
| Dimensions:    | <ul style="list-style-type: none"><li>• Overall length: 337 mm (Tip: 20 mm)</li><li>• Tip diameter: 3.9 mm (Body: 12 mm)</li><li>• Distance from probe tip to dipole centers: 1.5 mm</li><li>• Sensor displacement to probe's calibration point: &lt;0.7 mm</li></ul> |
| Application:   | <ul style="list-style-type: none"><li>• General near-field measurements up to 6 GHz</li><li>• HAC measurements up to 6 GHz</li><li>• Field component measurements</li><li>• Fast automatic scanning in phantoms</li></ul>                                             |

<sup>1</sup> DASY6: v1.2.0.1713 and older generations.

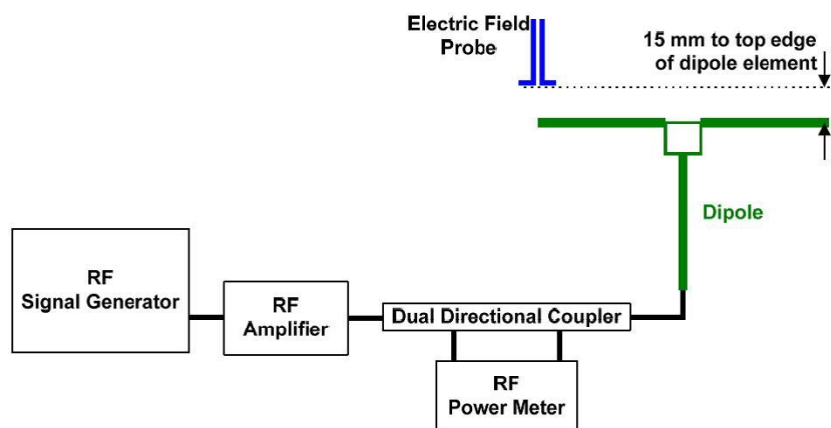
## 6. System Validation

The test setup was validated when first configured and verified periodically thereafter to ensure proper function. The procedure provided in this section is a validation procedure using dipole antennas for which the field levels were computed by numeric modeling.

Procedure:

- Place a dipole antenna meeting the requirements given in ANSI C63.19 in the normally occupied by the WD.
- The dipole antenna serves as a known source for an electrical and magnetic output. Position the E-field probe so that the following occurs:
  - The probes and their cables are parallel to the coaxial feed of the dipole antenna
  - The probe cables and the coaxial feed of the dipole antenna approach the measurement area from opposite directions
  - The center point of the probe element(s) is 15 mm from the closest surface of the dipole elements.
- Scan the length of the dipole with the E-field probe and record the two maximum values found near the dipole ends. Average the two readings and compare the reading to the expected value in the calibration certificate or the expected value in this standard.

### Setup diagram



### 6.1. System Validation Results

| SAR Lab | Date     | Dipole Type_Serial #_Center Freq. | Dipole Cal. Due Data | E-Field Measured (V/m) | E-Field Target (V/m) (From SPEAG) | E-Field <sup>1</sup> Delta ± % | Plot No. |
|---------|----------|-----------------------------------|----------------------|------------------------|-----------------------------------|--------------------------------|----------|
| H       | 7/9/2024 | CD1880V3_SN:1122_(1880 MHz)       | 2/3/2025             | 82.4                   | 86.6                              | -4.85                          | 1        |

#### Note(s):

- Delta (Deviation) % = 100 \* (Measured value minus Target value) divided by the Target value. Deltas within ±18% are acceptable, of which 12% is deviation and 13% is measurement uncertainty.

## 7. Device Under Test

|                         |                                 |             |                     |
|-------------------------|---------------------------------|-------------|---------------------|
| Normal operation        | Held to head                    |             |                     |
| Back Cover              | The Back Cover is not removable |             |                     |
| Test sample information | S/N<br>FLKG7LRQV2               | IMEI<br>N/A | Notes<br>HAC Sample |

### 7.1. Air Interfaces and Operating Modes

| Air Interface                                                                                                                                                              | Bands (MHz)        | Type  | C63.19 Tested    | Simultaneous Transmitter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Name of Voice Service | Power Mode <sup>3,4</sup> | Power Reduction |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------|-----------------|
| GSM                                                                                                                                                                        | 850                | VO    | No <sup>1</sup>  | Wi-Fi, BT, NB U-NII, 802.15.4 & 802.15.4ab NB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | CMRS                  | Max Power & Mode A        | N/A             |
|                                                                                                                                                                            | 1900               |       | Yes <sup>2</sup> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           | N/A             |
|                                                                                                                                                                            | 850 GPRS/EDGE      | DT/VD | No <sup>1</sup>  | Wi-Fi, BT, NB U-NII, 802.15.4 & 802.15.4ab NB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | FaceTime              | Max Power & Mode A        | N/A             |
|                                                                                                                                                                            | 1900 GPRS/EDGE     | DT/VD | Yes <sup>2</sup> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           | N/A             |
| W-CDMA (UMTS)                                                                                                                                                              | 850                | VO    | No <sup>1</sup>  | Wi-Fi, BT, NB U-NII, 802.15.4 & 802.15.4ab NB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | CMRS                  | Max Power & Mode A        | N/A             |
|                                                                                                                                                                            | 1700               |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
|                                                                                                                                                                            | 1900               |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
|                                                                                                                                                                            | HSPA               | VD    | No <sup>1</sup>  | Wi-Fi, BT, NB U-NII, 802.15.4 & 802.15.4ab NB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | FaceTime              | Max Power & Mode A        | N/A             |
| LTE - FDD                                                                                                                                                                  | 700 (B12/13/17)    | VD    | No <sup>1</sup>  | 5G NR, Wi-Fi, BT, NB U-NII, 802.15.4 & 802.15.4ab NB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | CMRS<br>FaceTime      | Max Power & Mode A        | N/A             |
|                                                                                                                                                                            | 850 (B5/26)        |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
|                                                                                                                                                                            | 1700 (B4/66)       |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
|                                                                                                                                                                            | 1900 (B2/25)       |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
|                                                                                                                                                                            | 2300 (B30)         |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
|                                                                                                                                                                            | 2500 (B7)          |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
| LTE - TDD                                                                                                                                                                  | 2600 (B41)         | VD    | No <sup>1</sup>  | 5G NR, Wi-Fi, BT, NB U-NII, 802.15.4 & 802.15.4ab NB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | CMRS<br>FaceTime      | Max Power & Mode A        | N/A             |
|                                                                                                                                                                            | 3600 (B48)         |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
| 5G NR(FR1) FDD                                                                                                                                                             | 700 (n12)          | VD    | No <sup>1</sup>  | LTE, Wi-Fi, BT, NB U-NII, 802.15.4 & 802.15.4ab NB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | CMRS<br>FaceTime      | Max Power & Mode A        | N/A             |
|                                                                                                                                                                            | 850 (n5/n26)       |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
|                                                                                                                                                                            | 1700 (n66/n70)     |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
|                                                                                                                                                                            | 1900 (n2/n25)      |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
|                                                                                                                                                                            | 2300 (n30)         |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
|                                                                                                                                                                            | 2500 (n7)          |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
| 5G NR(FR1) TDD                                                                                                                                                             | 2600 (n41)         | VD    | No <sup>1</sup>  | LTE, Wi-Fi, BT, NB U-NII, 802.15.4 & 802.15.4ab NB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | CMRS<br>FaceTime      | Max Power & Mode A        | N/A             |
|                                                                                                                                                                            | 3500 (n77 Block A) |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
|                                                                                                                                                                            | 3700 (n48)         |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
|                                                                                                                                                                            | 3900 (n77 Block C) |       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                           |                 |
| Type<br>VO: Legacy Cellular Voice Service<br>DT: Digital Transport only (no voice)<br>VD: IP Voice Service over Digital Transport<br>CMRS: Commercial Mobile Radio Service |                    |       |                  | Note:<br>1. Evaluated for RF <sub>AIPL</sub> . Refer to §10.<br>2. Evaluated for RF <sub>AIL</sub> . Refer to §11.<br>3. For all air interfaces, the declared maximum output across all power tables, including held-to-head, off-body and body-worn, was used for the RF <sub>AIPL</sub> evaluation. The declared maximum output power is Max Power for WWAN operating modes and Max Power for WLAN operating modes. Refer to §10 for RF <sub>AIPL</sub> evaluations.<br>4. For all air interfaces, the maximum held-to-head output power was used for the RF <sub>AIL</sub> evaluation. The maximum held-to-head output power is Mode A for WWAN operating modes and Power State 1 Mode A for WLAN operating modes. Refer to §11 for RF <sub>AIL</sub> evaluations. |                       |                           |                 |

**Air Interfaces and Operating Modes**

| Air Interface                                                                                                                                                              | Bands (MHz)            | Type | C63.19 Tested   | Simultaneous Transmitter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Name of Voice Service | Power Mode <sup>3,4,5</sup>      | Power Reduction |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------|-----------------|
| Wi-Fi                                                                                                                                                                      | 2450                   | VD   | No <sup>1</sup> | WWAN, NB U-NII & 802.15.4ab                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | CMRS FaceTime         | Max Power & Power State 1 Mode A | N/A             |
|                                                                                                                                                                            | U-NII-1                |      |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |                                  |                 |
|                                                                                                                                                                            | U-NII-2A               |      |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |                                  |                 |
|                                                                                                                                                                            | U-NII-2C               |      |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |                                  |                 |
|                                                                                                                                                                            | U-NII-3                |      |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |                                  |                 |
|                                                                                                                                                                            | U-NII-5 (VLP, SP, LPI) | VD   | No <sup>1</sup> | WWAN, BT, 802.15.4, & 802.15.4ab NB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | CMRS FaceTime         | Max Power & Power State 1 Mode A | N/A             |
|                                                                                                                                                                            | U-NII-6 (LPI)          | VD   | No <sup>2</sup> | WWAN, BT, 802.15.4, & 802.15.4ab NB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | CMRS FaceTime         | N/A                              | N/A             |
|                                                                                                                                                                            | U-NII-7 (VLP, SP, LPI) |      |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |                                  |                 |
|                                                                                                                                                                            | U-NII-8 (LPI)          |      |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |                                  |                 |
| NB U-NII                                                                                                                                                                   | 5200 (U-NII-1)         | DT   | N/A             | WWAN, Wi-Fi 2.4 GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | N/A                   | N/A                              | N/A             |
|                                                                                                                                                                            | 5800 (U-NII-3)         |      |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |                                  |                 |
| 802.15ab NB                                                                                                                                                                | 5800 (U-NII-3)         | DT   | N/A             | WWAN, BT, 802.15.4 & Wi-Fi <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | N/A                   | N/A                              | N/A             |
| 802.15.4                                                                                                                                                                   | 2450                   | DT   | N/A             | WWAN, 802.15.4ab NB & Wi-Fi 5/6G                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | N/A                   | N/A                              | N/A             |
| BT                                                                                                                                                                         | 2.4GHz                 | DT   | N/A             | WWAN, 802.15.4ab NB & Wi-Fi 5/6G                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | N/A                   | N/A                              | N/A             |
| NFC                                                                                                                                                                        | 13                     | DT   | N/A             | WWAN, BT, Wi-Fi 2.4G, Wi-Fi 5/6G, 802.15.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | N/A                   | N/A                              | N/A             |
| UWB (Ultra-Wideband)                                                                                                                                                       | 6500                   | DT   | N/A             | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | N/A                   | N/A                              | N/A             |
|                                                                                                                                                                            | 8000                   |      |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |                                  |                 |
| Type<br>VO: Legacy Cellular Voice Service<br>DT: Digital Transport only (no voice)<br>VD: IP Voice Service over Digital Transport<br>CMRS: Commercial Mobile Radio Service |                        |      |                 | Note:<br>1. Evaluated for RF <sub>AIPL</sub> . Refer to §10.<br>2. Supported Frequency > 6GHz. ANSI C63,19 2019 only requires HAC evaluations for Technologies/Frequencies < 6GHz.<br>3. For all air interfaces, the declared maximum output across all power tables, including held-to-head, off-body and body-worn, was used for the RF <sub>AIPL</sub> evaluation. The declared maximum output power is Max Power for WWAN operating modes and Max Power for WLAN operating modes. Refer to §10 for RF <sub>AIPL</sub> evaluations.<br>4. For all air interfaces, the maximum held-to-head output power was used for the RF <sub>AIL</sub> evaluation. The maximum held-to-head output power is Mode A for WWAN operating modes and Power State 1 Mode A for WLAN operating modes. Refer to §11 for RF <sub>AIL</sub> evaluations.<br>5. Refer to UL SAR FCC Report 14982479-S1 for WLAN Max Output power values. |                       |                                  |                 |

## 8. Modulation Interference Factor (MIF)

A WD's interference potential is a function of both the WD's average in-use near-field field strength and of the signal's audio-frequency amplitude modulation characteristics. The portion of the interference potential attributable to the modulation characteristic can be evaluated independently of any particular WD. This evaluation of this interference potential relative to a signal's average field strength is described in D.7 and is termed its Modulation Interference Factor (MIF). The MIF may be determined through analysis and simulation, allowing evaluation of an RF technology's RF interference potential in advance of actual product development.

The evaluation method or the MIF is defined in ANSI C63.19 section D.7. Most MIF values were not tested by a probe or as specified in the standards but are based on analysis provided by SPEAG for all the air interfaces (GSM, WCDMA, LTE, 5G NR, and Wi-Fi). For operating modes in which SPEAG did not provide MIF values, test lab manually performed MIF measurements using procedure outlined in *SPEAG DASY6 Module HAC System Handbook §7.1 MIF Measurements with MAIA*. The data included in this report are for the worst case operating modes. The UIDs used are listed below:

| UID       | Communication System Name                               | MIF (dB) |
|-----------|---------------------------------------------------------|----------|
| 10021-DAC | GSM-FDD (TDMA, GMSK)                                    | 3.63     |
| 10023-DAC | GPRS-FDD (TDMA, GMSK, TN 0)                             | 3.80     |
| 10024-DAC | GPRS-FDD (TDMA, GMSK, TN 0-1)                           | 1.15     |
| 10011-CAC | UMTS-FDD (WCDMA)                                        | -27.23   |
| 10225-CAC | UMTS-FDD (HSPA+)                                        | -20.39   |
| 10170-CAF | LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16QAM)                  | -9.76    |
| 10182-CAF | LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16QAM)                  | -9.76    |
| 10176-CAH | LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16QAM)                  | -9.76    |
| 10173-CAH | LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16QAM)                  | -1.44    |
| 10235-CAH | LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16QAM)                  | -1.44    |
| 10061-CAB | IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)               | -2.02    |
| 10077-CAB | IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)          | 0.12     |
| 10069-CAD | IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)               | -3.15    |
| 10317-AAE | IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle) | -9.82    |
| 10591-AAD | IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc duty cycle)   | -5.59    |
| 10636-AAE | IEEE 802.11ac WiFi (160MHz, MCS0, 90pc duty cycle)      | -5.56    |
| 10671-AAC | IEEE 802.11ax/be (20MHz, MCS0, 90pc duty cycle)         | -5.58    |
| 10797-AAF | 5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)             | -14.32   |
| 10803-AAF | 5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)            | -14.38   |
| N/A*      | 5G NR PC2 (CP-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)        | -1.77    |
| 10866-AAD | 5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)         | -16.69   |
| N/A*      | 5G NR PC2 (DFT-s-OFDM, 50 RB, 100 MHz, BPSK, 30 kHz)    | -1.16    |
| N/A*      | 5G NR PC2 (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)     | -1.31    |
| 10898-AAB | 5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)          | -16.68   |
| 10903-AAB | 5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)          | -16.68   |
| 10929-AAC | 5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)          | -15.06   |
| 10930-AAC | 5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)          | -15.06   |
| 10931-AAC | 5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)          | -15.06   |
| 10932-AAC | 5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)          | -15.06   |
| 10933-AAC | 5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)          | -15.06   |
| 10934-AAC | 5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)          | -15.07   |
| 10935-AAD | 5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)          | -15.07   |

### Note(s):

- Refer to Appendix G for RF-E UID Specifications summary provided by SPEAG.
- \*Refer to Appendix H for MIF measurements conducted by test lab for 5G NR TDD Power Class 2.

## 9. RF Emissions Measurement Criteria

The WD's conducted power must be at or below either the stated  $RF_{AIPL}$  (Table 4.1) or the stated peak power level (Table 4.2), or the average near-field emissions over the measurement area must be at or below the stated  $RF_{AIL}$  (Table 4.3), or the stated peak field strength (Table 4.4). The WD may demonstrate compliance by meeting any of these four requirements, but it must do so in each of its operating bands at its established worst-case normal speech-mode operating condition.

**Table 4.1 - Wireless device RF audio interference power level**

| Frequency Range (MHz) | $RF_{AIPL}$ (dBm) |
|-----------------------|-------------------|
| < 960                 | 29                |
| 960 – 2000            | 26                |
| > 2000                | 25                |

**Table 4.2 - Wireless device RF peak power level**

| Frequency Range (MHz) | $RF_{Peak Power}$ (dBm) |
|-----------------------|-------------------------|
| < 960                 | 35                      |
| 960 – 2000            | 32                      |
| > 2000                | 31                      |

**Table 4.3 - Wireless device RF audio interference level**

| Frequency Range (MHz) | $RF_{AIL}$ [dB(V/m)] |
|-----------------------|----------------------|
| $\leq 960$            | 39                   |
| 960 – 2000            | 36                   |
| > 2000                | 35                   |

**Table 4.4 - Wireless device RF peak near-field level**

| Frequency Range (MHz) | $RF_{peak}$ [dB(V/m)] |
|-----------------------|-----------------------|
| $\leq 960$            | 45                    |
| 960 – 2000            | 42                    |
| > 2000                | 41                    |

## 10. Evaluation for RF Audio Interference Power Level (RF<sub>AIPL</sub>)

An RF air interface technology of a device is exempt from testing when its average antenna input power plus its MIF is at or below the RF<sub>AIPL</sub> listed in the table below (from ANSI C63.19 2019 §4.7) for any of its operating modes. If a device supports multiple RF air interfaces, each RF air interface shall be evaluated individually.

**Table 4.1—Wireless device RF audio interference power level**

| Frequency Range (MHz) | RF <sub>AIPL</sub> (dBm) |
|-----------------------|--------------------------|
| < 960                 | 29                       |
| 960 – 2000            | 26                       |
| > 2000                | 25                       |

For all air interfaces, the declared maximum output across all power tables, including held-to-head, off-body and body-worn, was used for the RF<sub>AIPL</sub> evaluation. The declared maximum output power is Max Power for WWAN operating modes and Max Power for WLAN operating modes.

### ANT 1

| Air-Interface      | Frequency Range | Multiplex Scheme | Modulation | BW (MHz) | SCS (kHz) | Power Mode | Max Output Power (dBm) | Duty Cycle | Average Frame Power (dBm) | Worst Case MIF (dB) | RF <sub>AIPL</sub> (dBm) | RF <sub>AIPL</sub> Limit (dBm) | HAC RF <sub>AIL</sub> Required |
|--------------------|-----------------|------------------|------------|----------|-----------|------------|------------------------|------------|---------------------------|---------------------|--------------------------|--------------------------------|--------------------------------|
| GSM850             | 824.2 - 848.8   | TDMA             | GMSK       | NA       | NA        | Max Power  | 33.5                   | 12.5%      | 24.5                      | 3.80                | 28.3                     | 29                             | No                             |
| GSM850             | 824.2 - 848.8   | TDMA             | GMSK       | NA       | NA        | Max Power  | 32.5                   | 25%        | 26.5                      | 1.15                | 27.6                     | 29                             | No                             |
| GSM1900            | 1850.2 - 1909.8 | TDMA             | GMSK       | NA       | NA        | Max Power  | 32.0                   | 12.5%      | 23.0                      | 3.80                | 26.8                     | 26                             | Yes                            |
| GSM1900            | 1850.2 - 1909.8 | TDMA             | GMSK       | NA       | NA        | Max Power  | 31.0                   | 25%        | 25.0                      | 1.15                | 26.1                     | 26                             | Yes                            |
| W-CDMA Band II     | 1850 - 1910     | FDD              | HSPA+      | NA       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -20.39              | 5.3                      | 26                             | No                             |
| W-CDMA Band IV     | 1710 - 1755     | FDD              | HSPA+      | NA       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -20.39              | 5.3                      | 26                             | No                             |
| W-CDMA Band V      | 824 - 849       | FDD              | HSPA+      | NA       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -20.39              | 5.3                      | 29                             | No                             |
| LTE Band 2         | 1850 - 1910     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 26                             | No                             |
| LTE Band 4         | 1710 - 1755     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 26                             | No                             |
| LTE Band 5         | 824 - 849       | FDD SC-FDMA      | 16-QAM     | 10       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 29                             | No                             |
| LTE Band 7         | 2500 - 2570     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 25                             | No                             |
| LTE Band 12        | 699 - 716       | FDD SC-FDMA      | 16-QAM     | 10       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 29                             | No                             |
| LTE Band 13        | 777 - 787       | FDD SC-FDMA      | 16-QAM     | 10       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 29                             | No                             |
| LTE Band 17        | 704 - 716       | FDD SC-FDMA      | 16-QAM     | 10       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 29                             | No                             |
| LTE Band 25        | 1850 - 1915     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 26                             | No                             |
| LTE Band 26        | 814 - 849       | FDD SC-FDMA      | 16-QAM     | 15       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 29                             | No                             |
| LTE Band 30        | 2305 - 2315     | FDD SC-FDMA      | 16-QAM     | 10       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 25                             | No                             |
| LTE Band 41 PC3    | 2496 - 2690     | TDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.7                   | 63.3%      | 23.7                      | -1.44               | 22.3                     | 25                             | No                             |
| LTE Band 41 PC2    | 2496 - 2690     | TDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 28.7                   | 43.3%      | 25.1                      | -1.44               | 23.6                     | 25                             | No                             |
| LTE Band 66        | 2110 - 2200     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 25                             | No                             |
| 5G NR Band n2      | 1850 - 1910     | FDD DFT-s-OFDM   | QPSK       | 40       | 15        | Max Power  | 25.7                   | 100%       | 25.7                      | -15.07              | 10.6                     | 26                             | No                             |
| 5G NR Band n5      | 824 - 849       | FDD DFT-s-OFDM   | QPSK       | 25       | 15        | Max Power  | 25.7                   | 100%       | 25.7                      | -15.06              | 10.6                     | 29                             | No                             |
| 5G NR Band n7      | 2500 - 2570     | FDD DFT-s-OFDM   | QPSK       | 50       | 15        | Max Power  | 25.7                   | 100%       | 25.7                      | -15.07              | 10.6                     | 25                             | No                             |
| 5G NR Band n12     | 699 - 716       | FDD DFT-s-OFDM   | QPSK       | 15       | 15        | Max Power  | 25.7                   | 100%       | 25.7                      | -15.06              | 10.6                     | 29                             | No                             |
| 5G NR Band n25     | 1850 - 1915     | FDD DFT-s-OFDM   | QPSK       | 40       | 15        | Max Power  | 25.7                   | 100%       | 25.7                      | -15.07              | 10.6                     | 26                             | No                             |
| 5G NR Band n26     | 814 - 849       | FDD DFT-s-OFDM   | QPSK       | 30       | 15        | Max Power  | 25.7                   | 100%       | 25.7                      | -15.06              | 10.6                     | 29                             | No                             |
| 5G NR Band n30     | 2305 - 2315     | FDD DFT-s-OFDM   | QPSK       | 10       | 15        | Max Power  | 25.2                   | 100%       | 25.2                      | -15.06              | 10.1                     | 25                             | No                             |
| 5G NR Band n41 PC3 | 2496 - 2690     | TDD DFT-s-OFDM   | QPSK       | 100      | 30        | Max Power  | 25.7                   | 100%       | 25.7                      | -16.69              | 9.0                      | 25                             | No                             |
| 5G NR Band n41 PC3 | 2496 - 2690     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 24.2                   | 100%       | 24.2                      | -14.38              | 9.8                      | 25                             | No                             |
| 5G NR Band n41 PC2 | 2496 - 2690     | TDD DFT-s-OFDM   | π/2 BPSK   | 100      | 30        | Max Power  | 28.7                   | 50%        | 25.7                      | -1.16               | 24.5                     | 25                             | No                             |
| 5G NR Band n41 PC2 | 2496 - 2690     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 27.2                   | 50%        | 24.2                      | -1.77               | 22.4                     | 25                             | No                             |
| 5G NR Band n66     | 2110 - 2200     | FDD DFT-s-OFDM   | QPSK       | 40       | 15        | Max Power  | 25.7                   | 100%       | 25.7                      | -15.07              | 10.6                     | 25                             | No                             |
| 5G NR Band n70     | 1695 - 1710     | FDD DFT-s-OFDM   | QPSK       | 25       | 15        | Max Power  | 25.7                   | 100%       | 25.7                      | -15.06              | 10.6                     | 26                             | No                             |

#### Note(s):

- Average Antenna Input power = Average Frame power in order to account for the Operating Duty cycles for each respective Air Interface.
- Worst Case MIF = the Highest MIF value for each respective RF Air Interface.
- For operating modes where Average Antenna Input power plus MIF is below RF<sub>AIPL</sub>, they are compliant to RF<sub>AIPL</sub> requirements.
  - For operating modes where Average Antenna Input power plus MIF is above RF<sub>AIPL</sub>, they were evaluated to RF<sub>AIL</sub> requirements. Refer to §11 for RF<sub>AIL</sub> Evaluations.

**ANT 2**

| Air-Interface      | Frequency Range | Multiplex Scheme | Modulation | BW (MHz) | SCS (kHz) | Power Mode | Max Output Power (dBm) | Duty Cycle | Average Frame Power (dBm) | Worst Case MIF (dB) | RF <sub>AIRL</sub> (dBm) | RF <sub>AIRL</sub> Limit (dBm) | HAC RF <sub>AIL</sub> Required |
|--------------------|-----------------|------------------|------------|----------|-----------|------------|------------------------|------------|---------------------------|---------------------|--------------------------|--------------------------------|--------------------------------|
| GSM850             | 824.2 - 848.8   | TDMA             | GMSK       | NA       | NA        | Max Power  | 32.5                   | 12.5%      | 23.5                      | 3.80                | 27.3                     | 29                             | No                             |
| GSM850             | 824.2 - 848.8   | TDMA             | GMSK       | NA       | NA        | Max Power  | 31.5                   | 25%        | 25.5                      | 1.15                | 26.6                     | 29                             | No                             |
| GSM1900            | 1850.2 - 1909.8 | TDMA             | GMSK       | NA       | NA        | Max Power  | 29.5                   | 12.5%      | 20.5                      | 3.80                | 24.3                     | 26                             | No                             |
| GSM1900            | 1850.2 - 1909.8 | TDMA             | GMSK       | NA       | NA        | Max Power  | 28.5                   | 25%        | 22.5                      | 1.15                | 23.6                     | 26                             | No                             |
| W-CDMA Band II     | 1850 - 1910     | FDD              | HSPA+      | NA       | NA        | Max Power  | 23.4                   | 100%       | 23.4                      | -20.39              | 3.0                      | 26                             | No                             |
| W-CDMA Band IV     | 1710 - 1755     | FDD              | HSPA+      | NA       | NA        | Max Power  | 23.4                   | 100%       | 23.4                      | -20.39              | 3.0                      | 26                             | No                             |
| W-CDMA Band V      | 824 - 849       | FDD              | HSPA+      | NA       | NA        | Max Power  | 25.2                   | 100%       | 25.2                      | -20.39              | 4.8                      | 29                             | No                             |
| LTE Band 2         | 1850 - 1910     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 23.4                   | 100%       | 23.4                      | -9.76               | 13.6                     | 26                             | No                             |
| LTE Band 4         | 1710 - 1755     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 26                             | No                             |
| LTE Band 5         | 824 - 849       | FDD SC-FDMA      | 16-QAM     | 10       | NA        | Max Power  | 25.2                   | 100%       | 25.2                      | -9.76               | 15.4                     | 29                             | No                             |
| LTE Band 7         | 2500 - 2570     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 23.7                   | 100%       | 23.7                      | -9.76               | 13.9                     | 25                             | No                             |
| LTE Band 12        | 699 - 716       | FDD SC-FDMA      | 16-QAM     | 10       | NA        | Max Power  | 25.2                   | 100%       | 25.2                      | -9.76               | 15.4                     | 29                             | No                             |
| LTE Band 13        | 777 - 787       | FDD SC-FDMA      | 16-QAM     | 10       | NA        | Max Power  | 25.2                   | 100%       | 25.2                      | -9.76               | 15.4                     | 29                             | No                             |
| LTE Band 17        | 704 - 716       | FDD SC-FDMA      | 16-QAM     | 10       | NA        | Max Power  | 25.2                   | 100%       | 25.2                      | -9.76               | 15.4                     | 29                             | No                             |
| LTE Band 25        | 1850 - 1915     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 23.4                   | 100%       | 23.4                      | -9.76               | 13.6                     | 26                             | No                             |
| LTE Band 26        | 814 - 849       | FDD SC-FDMA      | 16-QAM     | 15       | NA        | Max Power  | 25.2                   | 100%       | 25.2                      | -9.76               | 15.4                     | 29                             | No                             |
| LTE Band 30        | 2305 - 2315     | FDD SC-FDMA      | 16-QAM     | 10       | NA        | Max Power  | 22.4                   | 100%       | 22.4                      | -9.76               | 12.6                     | 25                             | No                             |
| LTE Band 41 PC3    | 2496 - 2690     | TDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.7                   | 63.3%      | 23.7                      | -1.44               | 22.3                     | 25                             | No                             |
| LTE Band 41 PC2    | 2496 - 2690     | TDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 28.7                   | 43.3%      | 25.1                      | -1.44               | 23.6                     | 25                             | No                             |
| LTE Band 66        | 2110 - 2200     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 25                             | No                             |
| 5G NR Band n2      | 1850 - 1910     | FDD DFT-s-OFDM   | QPSK       | 40       | 15        | Max Power  | 23.4                   | 100%       | 23.4                      | -15.07              | 8.3                      | 26                             | No                             |
| 5G NR Band n5      | 824 - 849       | FDD DFT-s-OFDM   | QPSK       | 25       | 15        | Max Power  | 25.2                   | 100%       | 25.2                      | -15.06              | 10.1                     | 29                             | No                             |
| 5G NR Band n7      | 2500 - 2570     | FDD DFT-s-OFDM   | QPSK       | 50       | 15        | Max Power  | 23.7                   | 100%       | 23.7                      | -15.07              | 8.6                      | 25                             | No                             |
| 5G NR Band n12     | 699 - 716       | FDD DFT-s-OFDM   | QPSK       | 15       | 15        | Max Power  | 25.2                   | 100%       | 25.2                      | -15.06              | 10.1                     | 29                             | No                             |
| 5G NR Band n25     | 1850 - 1915     | FDD DFT-s-OFDM   | QPSK       | 40       | 15        | Max Power  | 23.4                   | 100%       | 23.4                      | -15.07              | 8.3                      | 26                             | No                             |
| 5G NR Band n26     | 814 - 849       | FDD DFT-s-OFDM   | QPSK       | 30       | 15        | Max Power  | 25.2                   | 100%       | 25.2                      | -15.06              | 10.1                     | 29                             | No                             |
| 5G NR Band n30     | 2305 - 2315     | FDD DFT-s-OFDM   | QPSK       | 10       | 15        | Max Power  | 22.4                   | 100%       | 22.4                      | -15.06              | 7.3                      | 25                             | No                             |
| 5G NR Band n41 PC3 | 2496 - 2690     | TDD DFT-s-OFDM   | QPSK       | 100      | 30        | Max Power  | 25.7                   | 100%       | 25.7                      | -16.69              | 9.0                      | 25                             | No                             |
| 5G NR Band n41 PC3 | 2496 - 2690     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 24.2                   | 100%       | 24.2                      | -14.38              | 9.8                      | 25                             | No                             |
| 5G NR Band n41 PC2 | 2496 - 2690     | TDD DFT-s-OFDM   | π/2 BPSK   | 100      | 30        | Max Power  | 28.7                   | 50%        | 25.7                      | -1.16               | 24.5                     | 25                             | No                             |
| 5G NR Band n41 PC2 | 2496 - 2690     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 27.2                   | 50%        | 24.2                      | -1.77               | 22.4                     | 25                             | No                             |
| 5G NR Band n66     | 2110 - 2200     | FDD DFT-s-OFDM   | QPSK       | 40       | 15        | Max Power  | 25.7                   | 100%       | 25.7                      | -15.07              | 10.6                     | 25                             | No                             |
| 5G NR Band n70     | 1695 - 1710     | FDD DFT-s-OFDM   | QPSK       | 25       | 15        | Max Power  | 25.7                   | 100%       | 25.7                      | -15.06              | 10.6                     | 26                             | No                             |

**Note(s):**

- Average Antenna Input power = Average Frame power in order to account for the Operating Duty cycles for each respective Air Interface.
- Worst Case MIF = the Highest MIF value for each respective RF Air Interface.
- For all operating modes, Average Antenna Input power plus MIF is below RF<sub>AIRL</sub> therefore is compliant to RF<sub>AIRL</sub> requirements.

**ANT 3**

| Air-Interface      | Frequency Range | Multiplex Scheme | Modulation | BW (MHz) | SCS (kHz) | Power Mode | Max Output Power (dBm) | Duty Cycle | Average Frame Power (dBm) | Worst Case MIF (dB) | RF <sub>AIRL</sub> (dBm) | RF <sub>AIRL</sub> Limit (dBm) | HAC RF <sub>AIL</sub> Required |
|--------------------|-----------------|------------------|------------|----------|-----------|------------|------------------------|------------|---------------------------|---------------------|--------------------------|--------------------------------|--------------------------------|
| GSM1900            | 1850.2 - 1909.8 | TDMA             | GMSK       | NA       | NA        | Max Power  | 31.5                   | 12.5%      | 22.5                      | 3.80                | 26.3                     | 26                             | Yes                            |
| GSM1900            | 1850.2 - 1909.8 | TDMA             | GMSK       | NA       | NA        | Max Power  | 30.5                   | 25%        | 24.5                      | 1.15                | 25.6                     | 26                             | No                             |
| W-CDMA Band II     | 1850 - 1910     | FDD              | HSPA+      | NA       | NA        | Max Power  | 25.5                   | 100%       | 25.5                      | -20.39              | 5.1                      | 26                             | No                             |
| W-CDMA Band IV     | 1710 - 1755     | FDD              | HSPA+      | NA       | NA        | Max Power  | 25.5                   | 100%       | 25.5                      | -20.39              | 5.1                      | 26                             | No                             |
| LTE Band 2         | 1850 - 1910     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 26                             | No                             |
| LTE Band 4         | 1710 - 1755     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 26                             | No                             |
| LTE Band 7         | 2500 - 2570     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.3                   | 100%       | 25.3                      | -9.76               | 15.5                     | 25                             | No                             |
| LTE Band 25        | 1850 - 1915     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.5                   | 100%       | 25.5                      | -9.76               | 15.7                     | 26                             | No                             |
| LTE Band 30        | 2305 - 2315     | FDD SC-FDMA      | 16-QAM     | 10       | NA        | Max Power  | 25.3                   | 100%       | 25.3                      | -9.76               | 15.5                     | 25                             | No                             |
| LTE Band 41 PC3    | 2496 - 2690     | TDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.7                   | 63.3%      | 23.7                      | -1.44               | 22.3                     | 25                             | No                             |
| LTE Band 41 PC2    | 2496 - 2690     | TDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 28.0                   | 43.3%      | 24.4                      | -1.44               | 22.9                     | 25                             | No                             |
| LTE Band 66        | 2110 - 2200     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.7                   | 100%       | 25.7                      | -9.76               | 15.9                     | 25                             | No                             |
| 5G NR Band n2      | 1850 - 1910     | FDD DFT-s-OFDM   | QPSK       | 40       | 15        | Max Power  | 25.7                   | 100%       | 25.7                      | -15.07              | 10.6                     | 26                             | No                             |
| 5G NR Band n7      | 2500 - 2570     | FDD DFT-s-OFDM   | QPSK       | 50       | 15        | Max Power  | 25.3                   | 100%       | 25.3                      | -15.07              | 10.2                     | 25                             | No                             |
| 5G NR Band n25     | 1850 - 1915     | FDD DFT-s-OFDM   | QPSK       | 40       | 15        | Max Power  | 25.5                   | 100%       | 25.5                      | -15.07              | 10.4                     | 26                             | No                             |
| 5G NR Band n30     | 2305 - 2315     | FDD DFT-s-OFDM   | QPSK       | 10       | 15        | Max Power  | 24.8                   | 100%       | 24.8                      | -15.06              | 9.7                      | 25                             | No                             |
| 5G NR Band n41 PC3 | 2496 - 2690     | TDD DFT-s-OFDM   | QPSK       | 100      | 30        | Max Power  | 25.7                   | 100%       | 25.7                      | -16.69              | 9.0                      | 25                             | No                             |
| 5G NR Band n41 PC3 | 2496 - 2690     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 24.2                   | 100%       | 24.2                      | -14.38              | 9.8                      | 25                             | No                             |
| 5G NR Band n41 PC2 | 2496 - 2690     | TDD DFT-s-OFDM   | π/2 BPSK   | 100      | 30        | Max Power  | 28.0                   | 50%        | 25.0                      | -1.16               | 23.8                     | 25                             | No                             |
| 5G NR Band n41 PC2 | 2496 - 2690     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 26.5                   | 50%        | 23.5                      | -1.77               | 21.7                     | 25                             | No                             |
| 5G NR Band n66     | 2110 - 2200     | FDD DFT-s-OFDM   | QPSK       | 40       | 15        | Max Power  | 25.7                   | 100%       | 25.7                      | -15.07              | 10.6                     | 25                             | No                             |
| 5G NR Band n70     | 1695 - 1710     | FDD DFT-s-OFDM   | QPSK       | 25       | 15        | Max Power  | 25.5                   | 100%       | 25.5                      | -15.06              | 10.4                     | 26                             | No                             |
| 802.11b            | 2402 - 2482     | 802.11b          | DSSS       | NA       | NA        | Max Power  | 22.0                   | 100%       | 22.0                      | -2.02               | 20.0                     | 25                             | No                             |
| 802.11g            | 2402 - 2482     | 802.11g          | DSSS/OFDM  | NA       | NA        | Max Power  | 22.0                   | 100%       | 22.0                      | 0.12                | 22.1                     | 25                             | No                             |
| 802.11n            | 2402 - 2482     | 802.11n          | MCS0       | NA       | NA        | Max Power  | 22.0                   | 100%       | 22.0                      | -5.59               | 16.4                     | 25                             | No                             |
| 802.11ax           | 2402 - 2482     | 802.11ax         | MCS0       | NA       | NA        | Max Power  | 22.0                   | 100%       | 22.0                      | -5.58               | 16.4                     | 25                             | No                             |
| 802.11be           | 2402 - 2482     | 802.11be         | MCS0       | NA       | NA        | Max Power  | 22.0                   | 100%       | 22.0                      | -5.58               | 16.4                     | 25                             | No                             |

**Note(s):**

- Average Antenna Input power = Average Frame power in order to account for the Operating Duty cycles for each respective Air Interface.
- Worst Case MIF = the Highest MIF value for each respective RF Air Interface.
- For operating modes where Average Antenna Input power plus MIF is below RF<sub>AIRL</sub>, they are compliant to RF<sub>AIRL</sub> requirements.
  - For operating modes where Average Antenna Input power plus MIF is above RF<sub>AIRL</sub>, they were evaluated to RF<sub>AIL</sub> requirements. Refer to §11 for RF<sub>AIL</sub> Evaluations.



**ANT 4**

| Air-Interface              | Frequency Range | Multiplex Scheme | Modulation | BW (MHz) | SCS (kHz) | Power Mode | Max Output Power (dBm) | Duty Cycle | Average Frame Power (dBm) | Worst Case MIF (dB) | RF <sub>AIPL</sub> (dBm) | RF <sub>AIPL</sub> Limit (dBm) | HAC RF <sub>FAIL</sub> Required |
|----------------------------|-----------------|------------------|------------|----------|-----------|------------|------------------------|------------|---------------------------|---------------------|--------------------------|--------------------------------|---------------------------------|
| GSM1900                    | 1850.2 - 1909.8 | TDMA             | GMSK       | NA       | NA        | Max Power  | 29.0                   | 12.5%      | 20.0                      | 3.80                | 23.8                     | 26                             | No                              |
| GSM1900                    | 1850.2 - 1909.8 | TDMA             | GMSK       | NA       | NA        | Max Power  | 28.0                   | 25%        | 22.0                      | 1.15                | 23.1                     | 26                             | No                              |
| W-CDMA Band II             | 1850 - 1910     | FDD              | HSPA+      | NA       | NA        | Max Power  | 22.9                   | 100%       | 22.9                      | -20.39              | 2.5                      | 26                             | No                              |
| W-CDMA Band IV             | 1710 - 1755     | FDD              | HSPA+      | NA       | NA        | Max Power  | 22.9                   | 100%       | 22.9                      | -20.39              | 2.5                      | 26                             | No                              |
| LTE Band 2                 | 1850 - 1910     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 22.9                   | 100%       | 22.9                      | -9.76               | 13.1                     | 26                             | No                              |
| LTE Band 4                 | 1710 - 1755     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.2                   | 100%       | 25.2                      | -9.76               | 15.4                     | 26                             | No                              |
| LTE Band 7                 | 2500 - 2570     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 22.7                   | 100%       | 22.7                      | -9.76               | 12.9                     | 25                             | No                              |
| LTE Band 25                | 1850 - 1915     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 22.9                   | 100%       | 22.9                      | -9.76               | 13.1                     | 26                             | No                              |
| LTE Band 30                | 2305 - 2315     | FDD SC-FDMA      | 16-QAM     | 10       | NA        | Max Power  | 22.7                   | 100%       | 22.7                      | -9.76               | 12.9                     | 25                             | No                              |
| LTE Band 41 PC3            | 2496 - 2690     | TDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.7                   | 63.3%      | 23.7                      | -1.44               | 22.3                     | 25                             | No                              |
| LTE Band 41 PC2            | 2496 - 2690     | TDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 27.7                   | 43.3%      | 24.1                      | -1.44               | 22.6                     | 25                             | No                              |
| LTE Band 48 PC3            | 3550 - 3700     | TDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.2                   | 63.3%      | 23.2                      | -1.44               | 21.8                     | 25                             | No                              |
| LTE Band 66                | 2110 - 2200     | FDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.2                   | 100%       | 25.2                      | -9.76               | 15.4                     | 25                             | No                              |
| 5G NR Band n2              | 1850 - 1910     | FDD DFT-s-OFDM   | QPSK       | 40       | 15        | Max Power  | 22.9                   | 100%       | 22.9                      | -15.07              | 7.8                      | 26                             | No                              |
| 5G NR Band n7              | 2500 - 2570     | FDD DFT-s-OFDM   | QPSK       | 50       | 15        | Max Power  | 22.7                   | 100%       | 22.7                      | -15.07              | 7.6                      | 25                             | No                              |
| 5G NR Band n25             | 1850 - 1915     | FDD DFT-s-OFDM   | QPSK       | 40       | 15        | Max Power  | 22.9                   | 100%       | 22.9                      | -15.07              | 7.8                      | 26                             | No                              |
| 5G NR Band n30             | 2305 - 2315     | FDD DFT-s-OFDM   | QPSK       | 10       | 15        | Max Power  | 22.2                   | 100%       | 22.2                      | -15.06              | 7.1                      | 25                             | No                              |
| 5G NR Band n41 PC3         | 2496 - 2690     | TDD DFT-s-OFDM   | QPSK       | 100      | 30        | Max Power  | 25.7                   | 100%       | 25.7                      | -16.69              | 9.0                      | 25                             | No                              |
| 5G NR Band n41 PC2         | 2496 - 2690     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 24.2                   | 100%       | 24.2                      | -14.38              | 9.8                      | 25                             | No                              |
| 5G NR Band n41 PC3         | 2496 - 2690     | TDD DFT-s-OFDM   | π/2 BPSK   | 100      | 30        | Max Power  | 27.7                   | 50%        | 24.7                      | -1.16               | 23.5                     | 25                             | No                              |
| 5G NR Band n41 PC2         | 2496 - 2690     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 26.2                   | 50%        | 23.2                      | -1.77               | 21.4                     | 25                             | No                              |
| 5G NR Band n48 PC3         | 3550 - 3700     | TDD DFT-s-OFDM   | QPSK       | 100      | 30        | Max Power  | 25.2                   | 100%       | 25.2                      | -16.69              | 8.5                      | 25                             | No                              |
| 5G NR Band n48 PC3         | 3550 - 3700     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 23.7                   | 100%       | 23.7                      | -14.38              | 9.3                      | 25                             | No                              |
| 5G NR Band n66             | 2110 - 2200     | FDD DFT-s-OFDM   | QPSK       | 40       | 15        | Max Power  | 25.2                   | 100%       | 25.2                      | -15.07              | 10.1                     | 25                             | No                              |
| 5G NR Band n70             | 1695 - 1710     | FDD DFT-s-OFDM   | QPSK       | 25       | 15        | Max Power  | 25.2                   | 100%       | 25.2                      | -15.06              | 10.1                     | 26                             | No                              |
| 5G NR Band n77 Block A PC3 | 3450 - 3550     | TDD DFT-s-OFDM   | QPSK       | 100      | 30        | Max Power  | 26.0                   | 100%       | 26.0                      | -16.69              | 9.3                      | 25                             | No                              |
| 5G NR Band n77 Block A PC3 | 3450 - 3550     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 24.5                   | 100%       | 24.5                      | -14.38              | 10.1                     | 25                             | No                              |
| 5G NR Band n77 Block A PC2 | 3450 - 3550     | TDD DFT-s-OFDM   | π/2 BPSK   | 100      | 30        | Max Power  | 27.6                   | 50%        | 24.6                      | -1.16               | 23.4                     | 25                             | No                              |
| 5G NR Band n77 Block A PC2 | 3450 - 3550     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 26.1                   | 50%        | 23.1                      | -1.77               | 21.3                     | 25                             | No                              |
| 5G NR Band n77 Block C PC3 | 3700 - 3980     | TDD DFT-s-OFDM   | QPSK       | 100      | 30        | Max Power  | 26.0                   | 100%       | 26.0                      | -16.69              | 9.3                      | 25                             | No                              |
| 5G NR Band n77 Block C PC3 | 3700 - 3980     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 24.5                   | 100%       | 24.5                      | -14.38              | 10.1                     | 25                             | No                              |
| 5G NR Band n77 Block C PC2 | 3700 - 3980     | TDD DFT-s-OFDM   | π/2 BPSK   | 100      | 30        | Max Power  | 27.6                   | 50%        | 24.6                      | -1.16               | 23.4                     | 25                             | No                              |
| 5G NR Band n77 Block C PC2 | 3700 - 3980     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 26.1                   | 50%        | 23.1                      | -1.77               | 21.3                     | 25                             | No                              |
| 802.11b                    | 2402 - 2482     | 802.11b          | DSSS       | NA       | NA        | Max Power  | 22.0                   | 100%       | 22.0                      | -2.02               | 20.0                     | 25                             | No                              |
| 802.11g                    | 2402 - 2482     | 802.11g          | DSSS/OFDM  | NA       | NA        | Max Power  | 22.0                   | 100%       | 22.0                      | 0.12                | 22.1                     | 25                             | No                              |
| 802.11n                    | 2402 - 2482     | 802.11n          | MCS0       | NA       | NA        | Max Power  | 22.0                   | 100%       | 22.0                      | -5.59               | 16.4                     | 25                             | No                              |
| 802.11ax                   | 2402 - 2482     | 802.11ax         | MCS0       | NA       | NA        | Max Power  | 22.0                   | 100%       | 22.0                      | -5.58               | 16.4                     | 25                             | No                              |
| 802.11be                   | 2402 - 2482     | 802.11be         | MCS0       | NA       | NA        | Max Power  | 22.0                   | 100%       | 22.0                      | -5.58               | 16.4                     | 25                             | No                              |

**Note(s):**

- Average Antenna Input power = Average Frame power in order to account for the Operating Duty cycles for each respective Air Interface.
- Worst Case MIF = the Highest MIF value for each respective RF Air Interface.
- For all operating modes, Average Antenna Input power plus MIF is below RF<sub>AIPL</sub> therefore is compliant to RF<sub>AIPL</sub> requirements.

**ANT 5**

| Air-Interface | Frequency Range | Multiplex Scheme | Modulation | BW (MHz) | SCS (kHz) | Power Mode | Max Output Power (dBm) | Duty Cycle | Average Frame Power (dBm) | Worst Case MIF (dB) | RF <sub>AIPL</sub> (dBm) | RF <sub>AIPL</sub> Limit (dBm) | HAC RF <sub>FAIL</sub> Required |
|---------------|-----------------|------------------|------------|----------|-----------|------------|------------------------|------------|---------------------------|---------------------|--------------------------|--------------------------------|---------------------------------|
| 802.11a/h     | 5150 - 5250     | 802.11a/h        | OFDM       | NA       | NA        | Max Power  | 20.0                   | 100%       | 20.0                      | -3.15               | 16.9                     | 25                             | No                              |
| 802.11a       | 5150 - 5250     | 802.11a          | OFDM       | NA       | NA        | Max Power  | 20.0                   | 100%       | 20.0                      | -9.82               | 10.2                     | 25                             | No                              |
| 802.11n       | 5150 - 5250     | 802.11n          | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.59               | 15.4                     | 25                             | No                              |
| 802.11ac      | 5150 - 5250     | 802.11ac         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.56               | 15.4                     | 25                             | No                              |
| 802.11ax      | 5150 - 5250     | 802.11ax         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                              |
| 802.11be      | 5150 - 5250     | 802.11be         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                              |
| 802.11a/h     | 5250 - 5350     | 802.11a/h        | OFDM       | NA       | NA        | Max Power  | 20.0                   | 100%       | 20.0                      | -3.15               | 16.9                     | 25                             | No                              |
| 802.11a       | 5250 - 5350     | 802.11a          | OFDM       | NA       | NA        | Max Power  | 20.0                   | 100%       | 20.0                      | -9.82               | 10.2                     | 25                             | No                              |
| 802.11n       | 5250 - 5350     | 802.11n          | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.59               | 15.4                     | 25                             | No                              |
| 802.11ac      | 5250 - 5350     | 802.11ac         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.56               | 15.4                     | 25                             | No                              |
| 802.11ax      | 5250 - 5350     | 802.11ax         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                              |
| 802.11be      | 5250 - 5350     | 802.11be         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                              |
| 802.11a/h     | 5470 - 5725     | 802.11a/h        | OFDM       | NA       | NA        | Max Power  | 20.0                   | 100%       | 20.0                      | -3.15               | 16.9                     | 25                             | No                              |
| 802.11a       | 5470 - 5725     | 802.11a          | OFDM       | NA       | NA        | Max Power  | 20.0                   | 100%       | 20.0                      | -9.82               | 10.2                     | 25                             | No                              |
| 802.11n       | 5470 - 5725     | 802.11n          | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.59               | 15.4                     | 25                             | No                              |
| 802.11ac      | 5470 - 5725     | 802.11ac         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.56               | 15.4                     | 25                             | No                              |
| 802.11ax      | 5470 - 5725     | 802.11ax         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                              |
| 802.11be      | 5470 - 5725     | 802.11be         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                              |
| 802.11a/h     | 5725 - 5825     | 802.11a/h        | OFDM       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -3.15               | 17.9                     | 25                             | No                              |
| 802.11a       | 5725 - 5825     | 802.11a          | OFDM       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -9.82               | 11.2                     | 25                             | No                              |
| 802.11n       | 5725 - 5825     | 802.11n          | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.59               | 15.4                     | 25                             | No                              |
| 802.11ac      | 5725 - 5825     | 802.11ac         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.56               | 15.4                     | 25                             | No                              |
| 802.11ax      | 5725 - 5825     | 802.11ax         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                              |
| 802.11be      | 5725 - 5825     | 802.11be         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                              |
| 802.11a/h     | 5925 - 6000     | 802.11a/h        | OFDM       | NA       | NA        | Max Power  | 20.5                   | 100%       | 20.5                      | -3.15               | 17.4                     | 25                             | No                              |
| 802.11a       | 5925 - 6000     | 802.11a          | OFDM       | NA       | NA        | Max Power  | 20.5                   | 100%       | 20.5                      | -9.82               | 10.7                     | 25                             | No                              |
| 802.11ax      | 5925 - 6000     | 802.11ax         | MCS0       | NA       | NA        | Max Power  | 20.5                   | 100%       | 20.5                      | -5.58               | 14.9                     | 25                             | No                              |
| 802.11be      | 5925 - 6000     | 802.11be         | MCS0       | NA       | NA        | Max Power  | 20.5                   | 100%       | 20.5                      | -5.58               | 14.9                     | 25                             | No                              |

**Note(s):**

- Average Antenna Input power = Average Frame power in order to account for the Operating Duty cycles for each respective Air Interface.
- Worst Case MIF = the Highest MIF value for each respective RF Air Interface.
- For all operating modes, Average Antenna Input power plus MIF is below RF<sub>AIPL</sub> therefore is compliant to RF<sub>AIPL</sub> requirements.

**ANT 6**

| Air-Interface | Frequency Range | Multiplex Scheme | Modulation | BW (MHz) | SCS (kHz) | Power Mode | Max Output Power (dBm) | Duty Cycle | Average Frame Power (dBm) | Worst Case MIF (dB) | RF <sub>AIRL</sub> (dBm) | RF <sub>AIRL</sub> Limit (dBm) | HAC RF <sub>AIL</sub> Required |
|---------------|-----------------|------------------|------------|----------|-----------|------------|------------------------|------------|---------------------------|---------------------|--------------------------|--------------------------------|--------------------------------|
| 802.11a/h     | 5150 - 5250     | 802.11a/h        | OFDM       | NA       | NA        | Max Power  | 20.0                   | 100%       | 20.0                      | -3.15               | 16.9                     | 25                             | No                             |
| 802.11a       | 5150 - 5250     | 802.11a          | OFDM       | NA       | NA        | Max Power  | 20.0                   | 100%       | 20.0                      | -9.82               | 10.2                     | 25                             | No                             |
| 802.11n       | 5150 - 5250     | 802.11n          | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.59               | 15.4                     | 25                             | No                             |
| 802.11ac      | 5150 - 5250     | 802.11ac         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.56               | 15.4                     | 25                             | No                             |
| 802.11ax      | 5150 - 5250     | 802.11ax         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                             |
| 802.11be      | 5150 - 5250     | 802.11be         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                             |
| 802.11a/h     | 5250 - 5350     | 802.11a/h        | OFDM       | NA       | NA        | Max Power  | 20.0                   | 100%       | 20.0                      | -3.15               | 16.9                     | 25                             | No                             |
| 802.11a       | 5250 - 5350     | 802.11a          | OFDM       | NA       | NA        | Max Power  | 20.0                   | 100%       | 20.0                      | -9.82               | 10.2                     | 25                             | No                             |
| 802.11n       | 5250 - 5350     | 802.11n          | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.59               | 15.4                     | 25                             | No                             |
| 802.11ac      | 5250 - 5350     | 802.11ac         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.56               | 15.4                     | 25                             | No                             |
| 802.11ax      | 5250 - 5350     | 802.11ax         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                             |
| 802.11be      | 5250 - 5350     | 802.11be         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                             |
| 802.11a/h     | 5470 - 5725     | 802.11a/h        | OFDM       | NA       | NA        | Max Power  | 20.0                   | 100%       | 20.0                      | -3.15               | 16.9                     | 25                             | No                             |
| 802.11a       | 5470 - 5725     | 802.11a          | OFDM       | NA       | NA        | Max Power  | 20.0                   | 100%       | 20.0                      | -9.82               | 10.2                     | 25                             | No                             |
| 802.11n       | 5470 - 5725     | 802.11n          | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.59               | 15.4                     | 25                             | No                             |
| 802.11ac      | 5470 - 5725     | 802.11ac         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.56               | 15.4                     | 25                             | No                             |
| 802.11ax      | 5470 - 5725     | 802.11ax         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                             |
| 802.11be      | 5470 - 5725     | 802.11be         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                             |
| 802.11a/h     | 5725 - 5825     | 802.11a/h        | OFDM       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -3.15               | 17.9                     | 25                             | No                             |
| 802.11a       | 5725 - 5825     | 802.11a          | OFDM       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -9.82               | 11.2                     | 25                             | No                             |
| 802.11n       | 5725 - 5825     | 802.11n          | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.59               | 15.4                     | 25                             | No                             |
| 802.11ac      | 5725 - 5825     | 802.11ac         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.56               | 15.4                     | 25                             | No                             |
| 802.11ax      | 5725 - 5825     | 802.11ax         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                             |
| 802.11be      | 5725 - 5825     | 802.11be         | MCS0       | NA       | NA        | Max Power  | 21.0                   | 100%       | 21.0                      | -5.58               | 15.4                     | 25                             | No                             |
| 802.11a/h     | 5925 - 6000     | 802.11a/h        | OFDM       | NA       | NA        | Max Power  | 20.5                   | 100%       | 20.5                      | -3.15               | 17.4                     | 25                             | No                             |
| 802.11a       | 5925 - 6000     | 802.11a          | OFDM       | NA       | NA        | Max Power  | 20.5                   | 100%       | 20.5                      | -9.82               | 10.7                     | 25                             | No                             |
| 802.11ax      | 5925 - 6000     | 802.11ax         | MCS0       | NA       | NA        | Max Power  | 20.5                   | 100%       | 20.5                      | -5.58               | 14.9                     | 25                             | No                             |
| 802.11be      | 5925 - 6000     | 802.11be         | MCS0       | NA       | NA        | Max Power  | 20.5                   | 100%       | 20.5                      | -5.58               | 14.9                     | 25                             | No                             |

**Note(s):**

- Average Antenna Input power = Average Frame power in order to account for the Operating Duty cycles for each respective Air Interface.
- Worst Case MIF = the Highest MIF value for each respective RF Air Interface.
- For all operating modes, Average Antenna Input power plus MIF is below RF<sub>AIRL</sub> therefore is compliant to RF<sub>AIRL</sub> requirements.

**ANT 7**

| Air-Interface              | Frequency Range | Multiplex Scheme | Modulation | BW (MHz) | SCS (kHz) | Power Mode | Max Output Power (dBm) | Duty Cycle | Average Frame Power (dBm) | Worst Case MIF (dB) | RF <sub>AIRL</sub> (dBm) | RF <sub>AIRL</sub> Limit (dBm) | HAC RF <sub>AIL</sub> Required |
|----------------------------|-----------------|------------------|------------|----------|-----------|------------|------------------------|------------|---------------------------|---------------------|--------------------------|--------------------------------|--------------------------------|
| LTE Band 48 PC3            | 3550 - 3700     | TDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.8                   | 63.3%      | 23.8                      | -1.44               | 22.4                     | 25                             | No                             |
| 5G NR Band n48 PC3         | 3550 - 3700     | TDD DFT-s-OFDM   | QPSK       | 100      | 30        | Max Power  | 25.8                   | 100%       | 25.8                      | -16.69              | 9.1                      | 25                             | No                             |
| 5G NR Band n48 PC3         | 3550 - 3700     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 24.3                   | 100%       | 24.3                      | -14.38              | 9.9                      | 25                             | No                             |
| 5G NR Band n77 Block A PC3 | 3450 - 3550     | TDD DFT-s-OFDM   | QPSK       | 100      | 30        | Max Power  | 26.0                   | 100%       | 26.0                      | -16.69              | 9.3                      | 25                             | No                             |
| 5G NR Band n77 Block A PC3 | 3450 - 3550     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 24.5                   | 100%       | 24.5                      | -14.38              | 10.1                     | 25                             | No                             |
| 5G NR Band n77 Block A PC2 | 3450 - 3550     | TDD DFT-s-OFDM   | π/2 BPSK   | 100      | 30        | Max Power  | 28.7                   | 50%        | 25.7                      | -1.16               | 24.5                     | 25                             | No                             |
| 5G NR Band n77 Block A PC2 | 3450 - 3550     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 27.2                   | 50%        | 24.2                      | -1.77               | 22.4                     | 25                             | No                             |
| 5G NR Band n77 Block C PC3 | 3700 - 3980     | TDD DFT-s-OFDM   | QPSK       | 100      | 30        | Max Power  | 26.0                   | 100%       | 26.0                      | -16.69              | 9.3                      | 25                             | No                             |
| 5G NR Band n77 Block C PC3 | 3700 - 3980     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 24.5                   | 100%       | 24.5                      | -14.38              | 10.1                     | 25                             | No                             |
| 5G NR Band n77 Block C PC2 | 3700 - 3980     | TDD DFT-s-OFDM   | π/2 BPSK   | 100      | 30        | Max Power  | 28.7                   | 50%        | 25.7                      | -1.16               | 24.5                     | 25                             | No                             |
| 5G NR Band n77 Block C PC2 | 3700 - 3980     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 27.2                   | 50%        | 24.2                      | -1.77               | 22.4                     | 25                             | No                             |

**Note(s):**

- Average Antenna Input power = Average Frame power in order to account for the Operating Duty cycles for each respective Air Interface.
- Worst Case MIF = the Highest MIF value for each respective RF Air Interface.
- For all operating modes, Average Antenna Input power plus MIF is below RF<sub>AIRL</sub> therefore is compliant to RF<sub>AIRL</sub> requirements.

**ANT 8**

| Air-Interface              | Frequency Range | Multiplex Scheme | Modulation | BW (MHz) | SCS (kHz) | Power Mode | Max Output Power (dBm) | Duty Cycle | Average Frame Power (dBm) | Worst Case MIF (dB) | RF <sub>AIRL</sub> (dBm) | RF <sub>AIRL</sub> Limit (dBm) | HAC RF <sub>AIL</sub> Required |
|----------------------------|-----------------|------------------|------------|----------|-----------|------------|------------------------|------------|---------------------------|---------------------|--------------------------|--------------------------------|--------------------------------|
| LTE Band 48 PC3            | 3550 - 3700     | TDD SC-FDMA      | 16-QAM     | 20       | NA        | Max Power  | 25.6                   | 63.3%      | 23.6                      | -1.44               | 22.2                     | 25                             | No                             |
| 5G NR Band n48 PC3         | 3550 - 3700     | TDD DFT-s-OFDM   | QPSK       | 100      | 30        | Max Power  | 25.6                   | 100%       | 25.6                      | -16.69              | 8.9                      | 25                             | No                             |
| 5G NR Band n48 PC3         | 3550 - 3700     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 24.1                   | 100%       | 24.1                      | -14.38              | 9.7                      | 25                             | No                             |
| 5G NR Band n77 Block A PC3 | 3450 - 3550     | TDD DFT-s-OFDM   | QPSK       | 100      | 30        | Max Power  | 26.0                   | 100%       | 26.0                      | -16.69              | 9.3                      | 25                             | No                             |
| 5G NR Band n77 Block A PC3 | 3450 - 3550     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 24.5                   | 100%       | 24.5                      | -14.38              | 10.1                     | 25                             | No                             |
| 5G NR Band n77 Block A PC2 | 3450 - 3550     | TDD DFT-s-OFDM   | π/2 BPSK   | 100      | 30        | Max Power  | 28.2                   | 50%        | 25.2                      | -1.16               | 24.0                     | 25                             | No                             |
| 5G NR Band n77 Block A PC2 | 3450 - 3550     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 26.7                   | 50%        | 23.7                      | -1.77               | 21.9                     | 25                             | No                             |
| 5G NR Band n77 Block C PC3 | 3700 - 3980     | TDD DFT-s-OFDM   | QPSK       | 100      | 30        | Max Power  | 26.0                   | 100%       | 26.0                      | -16.69              | 9.3                      | 25                             | No                             |
| 5G NR Band n77 Block C PC3 | 3700 - 3980     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 24.5                   | 100%       | 24.5                      | -14.38              | 10.1                     | 25                             | No                             |
| 5G NR Band n77 Block C PC2 | 3700 - 3980     | TDD DFT-s-OFDM   | π/2 BPSK   | 100      | 30        | Max Power  | 28.2                   | 50%        | 25.2                      | -1.16               | 24.0                     | 25                             | No                             |
| 5G NR Band n77 Block C PC2 | 3700 - 3980     | TDD CP-OFDM      | QPSK       | 100      | 30        | Max Power  | 26.7                   | 50%        | 23.7                      | -1.77               | 21.9                     | 25                             | No                             |

**Note(s):**

- Average Antenna Input power = Average Frame power in order to account for the Operating Duty cycles for each respective Air Interface.
- Worst Case MIF = the Highest MIF value for each respective RF Air Interface.
- For all operating modes, Average Antenna Input power plus MIF is below RF<sub>AIRL</sub> therefore is compliant to RF<sub>AIRL</sub> requirements.

**ANT 9**

| Air-interface              | Frequency Range | Multiplex Scheme | Modulation   | BW (MHz) | SCS (kHz) | Power Mode | Max Output Power (dBm) | Duty Cycle | Average Frame Power (dBm) | Worst Case MIF (dB) | RF <sub>AIPL</sub> (dBm) | RF <sub>AIPL</sub> Limit (dBm) | HAC RF <sub>FAIL</sub> Required |
|----------------------------|-----------------|------------------|--------------|----------|-----------|------------|------------------------|------------|---------------------------|---------------------|--------------------------|--------------------------------|---------------------------------|
| LTE Band 48 PC3            | 3550 - 3700     | TDD SC-FDMA      | 16-QAM       | 20       | NA        | Max Power  | 26.0                   | 63.3%      | 24.0                      | -1.44               | 22.6                     | 25                             | No                              |
| 5G NR Band n48 PC3         | 3550 - 3700     | TDD DFT-s-OFDM   | QPSK         | 100      | 30        | Max Power  | 26.0                   | 100%       | 26.0                      | -16.69              | 9.3                      | 25                             | No                              |
| 5G NR Band n48 PC3         | 3550 - 3700     | TDD CP-OFDM      | QPSK         | 100      | 30        | Max Power  | 24.5                   | 100%       | 24.5                      | -14.38              | 10.1                     | 25                             | No                              |
| 5G NR Band n77 Block A PC3 | 3450 - 3550     | TDD DFT-s-OFDM   | QPSK         | 100      | 30        | Max Power  | 26.0                   | 100%       | 26.0                      | -16.69              | 9.3                      | 25                             | No                              |
| 5G NR Band n77 Block A PC3 | 3450 - 3550     | TDD CP-OFDM      | QPSK         | 100      | 30        | Max Power  | 24.5                   | 100%       | 24.5                      | -14.38              | 10.1                     | 25                             | No                              |
| 5G NR Band n77 Block A PC2 | 3450 - 3550     | TDD DFT-s-OFDM   | $\pi/2$ BPSK | 100      | 30        | Max Power  | 28.7                   | 50%        | 25.7                      | -1.16               | 24.5                     | 25                             | No                              |
| 5G NR Band n77 Block A PC2 | 3450 - 3550     | TDD CP-OFDM      | QPSK         | 100      | 30        | Max Power  | 27.2                   | 50%        | 24.2                      | -1.77               | 22.4                     | 25                             | No                              |
| 5G NR Band n77 Block C PC3 | 3700 - 3980     | TDD DFT-s-OFDM   | QPSK         | 100      | 30        | Max Power  | 26.0                   | 100%       | 26.0                      | -16.69              | 9.3                      | 25                             | No                              |
| 5G NR Band n77 Block C PC3 | 3700 - 3980     | TDD CP-OFDM      | QPSK         | 100      | 30        | Max Power  | 24.5                   | 100%       | 24.5                      | -14.38              | 10.1                     | 25                             | No                              |
| 5G NR Band n77 Block C PC2 | 3700 - 3980     | TDD DFT-s-OFDM   | $\pi/2$ BPSK | 100      | 30        | Max Power  | 28.7                   | 50%        | 25.7                      | -1.16               | 24.5                     | 25                             | No                              |
| 5G NR Band n77 Block C PC2 | 3700 - 3980     | TDD CP-OFDM      | QPSK         | 100      | 30        | Max Power  | 27.2                   | 50%        | 24.2                      | -1.77               | 22.4                     | 25                             | No                              |

**Note(s):**

- Average Antenna Input power = Average Frame power in order to account for the Operating Duty cycles for each respective Air Interface.
- Worst Case MIF = the Highest MIF value for each respective RF Air Interface.
- For all operating modes, Average Antenna Input power plus MIF is below RF<sub>AIPL</sub> therefore is compliant to RF<sub>AIPL</sub> requirements.

## 11. Evaluation for RF Audio Interference Level (RF<sub>AIL</sub>)

### 11.1. RF Audio Interference Level (RF<sub>AIL</sub>) Test Procedure

The following is a summary of the test procedure, taken from §4.5.3 of C63.19-2019:

- a. Confirm proper operation of the field probe, probe measurement system, spectral and temporal weighting filters, and the positioning system.
- b. Position the WD in its intended test position. A gauge block, depicted in A.1.2, can simplify this positioning.
- c. Set the WD to transmit a fixed and repeatable combination of signal power and modulation characteristic that is representative of the worst case (highest interference potential) encountered in normal use. Transiently occurring start-up, changeover, or termination conditions, or other operation likely to occur less than 1% of the time during normal operation, may be excluded from consideration.<sup>2</sup>
- d. The measurement area shall be centered on the acoustic output or the T-Coil mode measurement reference point, as appropriate. Locate the field probe at the initial test position in the 50 mm by 50 mm measurement area, which is contained in the measurement plane, described in 4.5.2 and illustrated in Figure A.1. If the field alignment method is used, align the probe for maximum field reception.
- e. Record the reading at the output of the measurement system.
- f. Scan the entire 50 mm by 50 mm measurement area in equally spaced step sizes and record the reading at each measurement point. The step size shall meet the specification for step size in 4.5.3.
- g. Calculate the average of the measurements taken in Step f).<sup>3</sup>
- h. Convert the average value found in Step g) to RF audio interference level, in volts per meter, by taking the square root of the reading and then dividing it by the measurement system transfer function, as established in 4.5.3.2.1 pre-test procedure. Convert the result to dB(V/m) by taking the base-10 logarithm and multiplying it by 20. Expressed as a formula:

$$RF \text{ audio interference level in dB(V/m)} = 20 \times \log \left( \frac{R_{ave}^{1/2}}{TF} \right)$$

where  $R_{ave}$  is the average reading

- i. Compare this RF audio interference level to the limits in Table 4.3 below and record the result.
  - a. Device is compliant if the average near-field emissions over the measurement area is at or below the stated RF<sub>AIL</sub> (Table 4.3)

**Table 4.3 - Wireless device RF audio interference level**

| Frequency Range (MHz) | RF <sub>AIL</sub> [dB(V/m)] |
|-----------------------|-----------------------------|
| ≤ 960                 | 39                          |
| 960 – 2000            | 36                          |
| > 2000                | 35                          |

#### Indirect Measurement Method

The measurement procedure using a probe and instrumentation chain with a response of <10 kHz (see 4.5.1) is identical to the direct measurement method of 4.5.3.2.2: however, because of the bandwidth limitations, it cannot include the direct use of the spectral and temporal weighting functions. The output of such measurement systems must be readings of steady state rms field strength in dB(V/m).

Replacing Step h) of 4.5.3.2.2: The RF audio interference level in dB(V/m) is obtained by adding the Modulation Interference Factor (in decibels) to the average steady state rms field strength reading over the measurement area, in dB(V/m), from Step g). Use this result to determine the WD's compliance per §4.7.

<sup>2</sup> Normally the amount of time a display remains on is a customer defined option. When this is true the display should not be illuminated during the test.

<sup>3</sup> Probe anisotropy may add significantly to the measurement uncertainty. This factor may be minimized by first moving the probe to the location of maximum measurement and then rotating the probe to align it for the maximum reading at that position. This rotation around the axis or shaft of the probe is recommended in order to minimize uncertainty due to anisotropy in the probe.

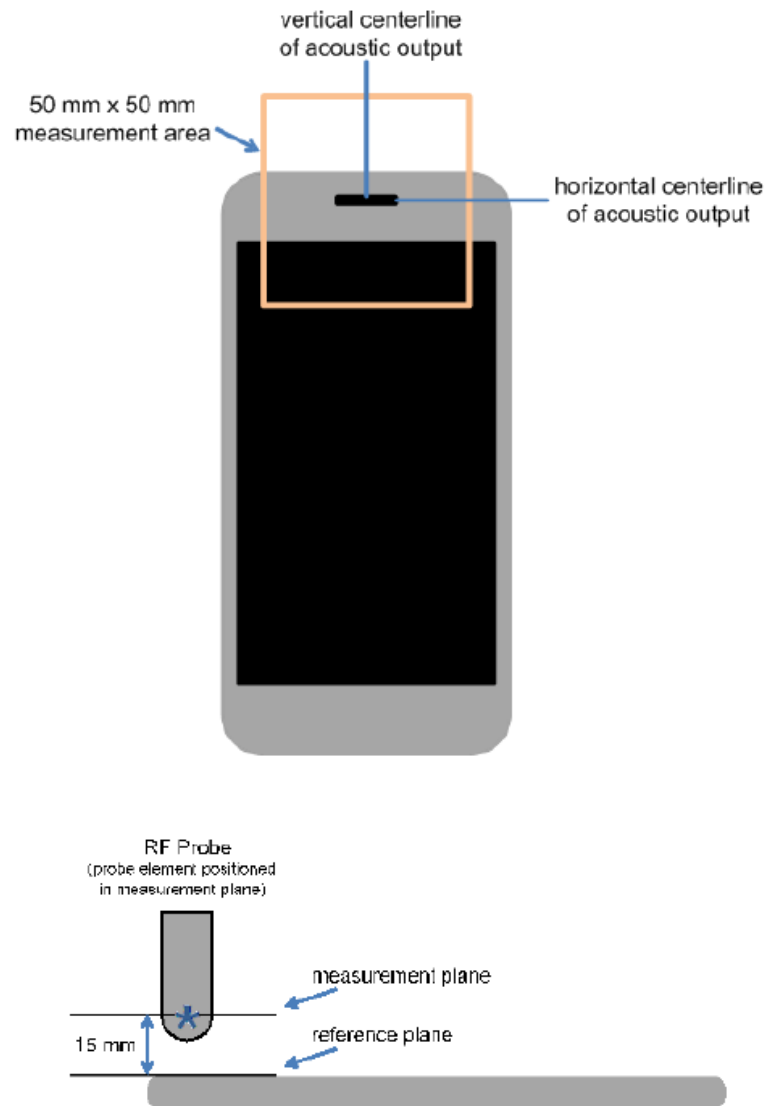
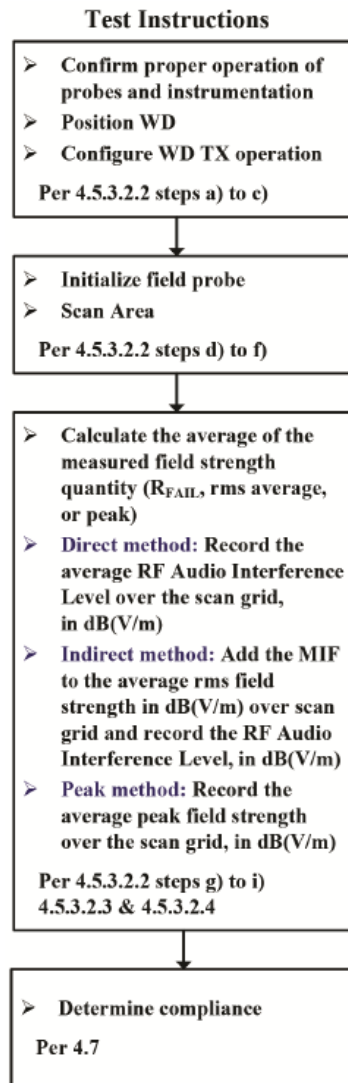


Figure 1 - WD reference and plane for RF emission measurements

## Test flowchart Per ANSI-63.19-2019



## 11.2. RF Audio Interference Level (RF<sub>AIL</sub>) Measured Results

MIF values were not tested by a probe or as specified in the standards but are based on analysis provided by SPEAG for the following User Identifiers and air interfaces. The data included in this report are for the worst case operating modes. Refer to §8, Appendix D, G and H for the MIF values that represent the worst case operating modes.

For all air interfaces, the maximum held-to-head output power was used for the RF<sub>AIL</sub> evaluation. The maximum held-to-head output power is Mode A for WWAN operating modes and Power State 1 Mode A for WLAN operating modes.

### Measure Results

| Antenna | Power Mode | Air-Interface        | Ch. No. | Freq. (MHz) | RF <sub>AIL</sub> (dB V/m) | RF <sub>AIL</sub> Limit (dBm) | Result | Margin | Plot No. |
|---------|------------|----------------------|---------|-------------|----------------------------|-------------------------------|--------|--------|----------|
| ANT 1   | Mode A     | GSM1900 GPRS 1 Slot  | 512     | 1850.2      | 23.47                      | 36                            | Pass   | 12.53  | 1        |
|         |            |                      | 661     | 1880.0      | 23.47                      | 36                            | Pass   | 12.53  | 2        |
|         |            |                      | 810     | 1909.8      | 22.98                      | 36                            | Pass   | 13.02  | 3        |
| ANT 1   | Mode A     | GSM1900 GPRS 2 Slots | 512     | 1850.2      | 23.50                      | 36                            | Pass   | 12.50  | 4        |
|         |            |                      | 661     | 1880.0      | 22.86                      | 36                            | Pass   | 13.14  | 5        |
|         |            |                      | 810     | 1909.8      | 22.01                      | 36                            | Pass   | 13.99  | 6        |
| ANT 3   | Mode A     | GSM1900 GPRS 1 Slot  | 512     | 1850.2      | 25.07                      | 36                            | Pass   | 10.93  | 7        |
|         |            |                      | 661     | 1880.0      | <b>26.71</b>               | 36                            | Pass   | 9.29   | 8        |
|         |            |                      | 810     | 1909.8      | 24.98                      | 36                            | Pass   | 11.02  | 9        |

#### Note(s):

Measured RF<sub>AIL</sub> results are below RF<sub>AIL</sub> limits, therefore is compliant to RF<sub>AIL</sub> requirements.

11.3. Worst Case RF<sub>AIL</sub> Test Plot

UL Verification Services Inc. SAR H

Date/Time: July 09, 2024 at 12:15

PCS 1900 RF Interference Potential Test Report

Hardware Setup

|                          |                                      |
|--------------------------|--------------------------------------|
| Probe   Calibration Date | EF3DV3 - SN4028   September 04, 2023 |
| DAE   Calibration Date   | DAE4 Sn1546   March 11, 2024         |
| Software Version         | 1.2.0.1713                           |

Communication Systems

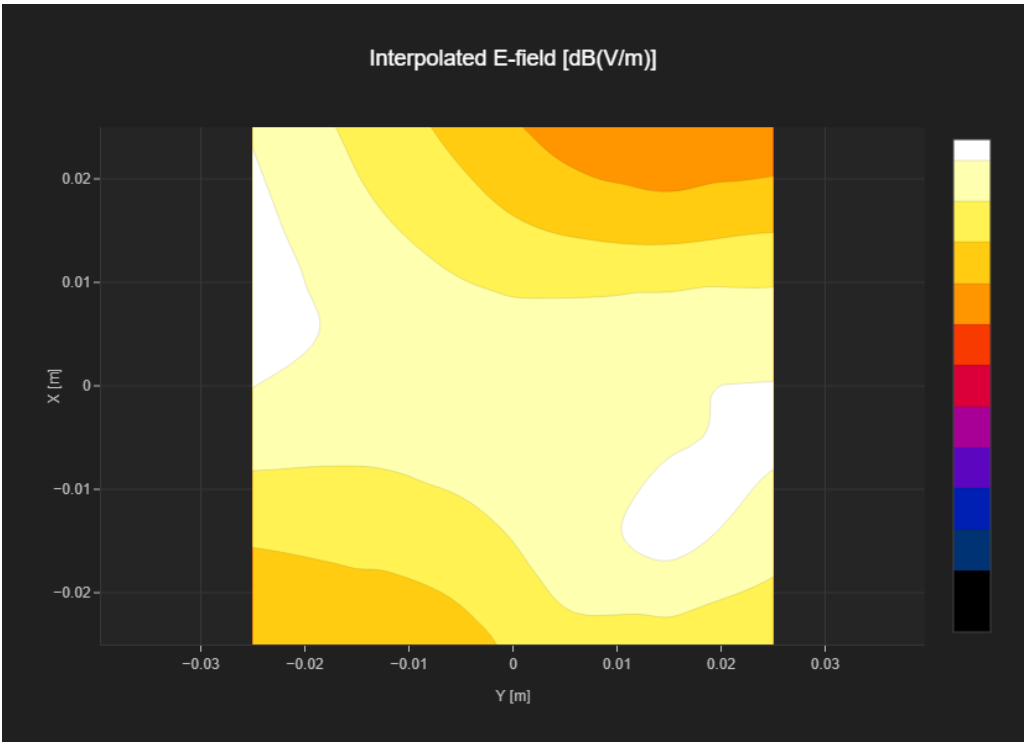
|                             |                             |
|-----------------------------|-----------------------------|
| MIF                         | 3.8                         |
| Channel   Frequency [MHz]   | 661   1880.0                |
| Communication Systems' Name | GPRS-FDD (TDMA, GMSK, TN 0) |

Grid Settings

|               |      |             |      |
|---------------|------|-------------|------|
| Extent X [mm] | 50.0 | Step X [mm] | 10.0 |
| Extent Y [mm] | 50.0 | Step Y [mm] | 10.0 |
| Distance [mm] | 15.0 |             |      |

Results

|              |       |                        |       |
|--------------|-------|------------------------|-------|
| Emax [dBV/m] | 26.63 | Eavg 50x50 Max [dBV/m] | 22.91 |
| Drift [dB]   | 0.03  | RFail [dBV/m]          | 26.71 |





## **Appendixes**

Refer to separated files for the following appendixes

**Appendix A: RF-E Setup Photo**

**Appendix B: RF-E System Validation Plots**

**Appendix C: RF-E Test Plots**

**Appendix D: RF-E MIF Attestation Letter**

**Appendix E: RF-E Probe Certificates**

**Appendix F: RF-E Dipole Certificates**

**Appendix G: RF-E UID Specifications**

**Appendix H: RF-E MIF Measurements**

**END OF REPORT**