

## TEST REPORT

Test report no.: 1-0834/20-01-02-A

BNetzA-CAB-02/21-102

### Testing laboratory

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**Accredited Testing Laboratory:**

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2018-03) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)

The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate starting with the registration number: D-PL-12076-01.

### Applicant

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### Manufacturer

**Omnipless Manufacturing (Pty) Limited trading as Cobham Aerospace Communications**

Westlake Drive

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### Test standard/s

47 CFR Part 25

Title 47 of the Code of Federal Regulations; Chapter I;  
Part 25 - Satellite Communications

47 CFR Part 87

Title 47 of the Code of Federal Regulations; Chapter I;  
Part 87 - Aviation Services

RSS - 170 Issue 3

Mobile Earth Stations (MESs) and Ancillary Terrestrial Component (ATC)  
Equipment Operating in the Mobile-Satellite Service (MSS) Bands

For further applied test standards please refer to section 3 of this test report.

### Test Item

**Kind of test item:** Aeronautical Inmarsat L-Band

**Model name:** AVIATOR UAV 200 SATCOM TERMINAL

**FCC ID** 2AS39-AVIATORUAV200

**IC** 24994-AVIAUAV200

**Frequency:** TX: 1626.5 MHz – 1660.5 MHz

**Antenna:** LGA External Antenna

**Power supply:** 28 V DC from Power Supply

**Temperature range:** -40°C to +55°C

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

### Test report authorized:



Thomas Vogler  
Lab Manager  
Radio Communications & EMC

### Test performed:



Meheza Walla  
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## 2 General information

### 2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CTC advanced GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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**This test report replaces the test report with the number 1-0834/20-01-02 and dated 2020-10-22**

### 2.2 Application details

|                                    |            |
|------------------------------------|------------|
| Date of receipt of order:          | 2020-08-03 |
| Date of receipt of test item:      | 2020-08-14 |
| Start of test:                     | 2020-08-18 |
| End of test:                       | 2020-10-02 |
| Person(s) present during the test: | -/-        |

### 2.3 Test laboratories sub-contracted

None

### 3 Test standard/s and references

| Test standard     | Date    | Description                                                                                                                            |
|-------------------|---------|----------------------------------------------------------------------------------------------------------------------------------------|
| 47 CFR Part 25    |         | Title 47 of the Code of Federal Regulations; Chapter I; Part 25 - Satellite Communications                                             |
| 47 CFR Part 87    |         | Title 47 of the Code of Federal Regulations; Chapter I; Part 87 - Aviation Services                                                    |
| RSS - 170 Issue 3 | 07-2015 | Mobile Earth Stations (MESS) and Ancillary Terrestrial Component (ATC) Equipment Operating in the Mobile-Satellite Service (MSS) Bands |

| Guidance         | Version | Description                                                                                                                                                         |
|------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |         |                                                                                                                                                                     |
| ANSI C63.4-2017  | -/-     | American national standard for methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz |
| ANSI C63.10-2013 | -/-     | American national standard of procedures for compliance testing of unlicensed wireless devices                                                                      |
| ANSI C63.26-2015 | -/-     | American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services                                                                   |

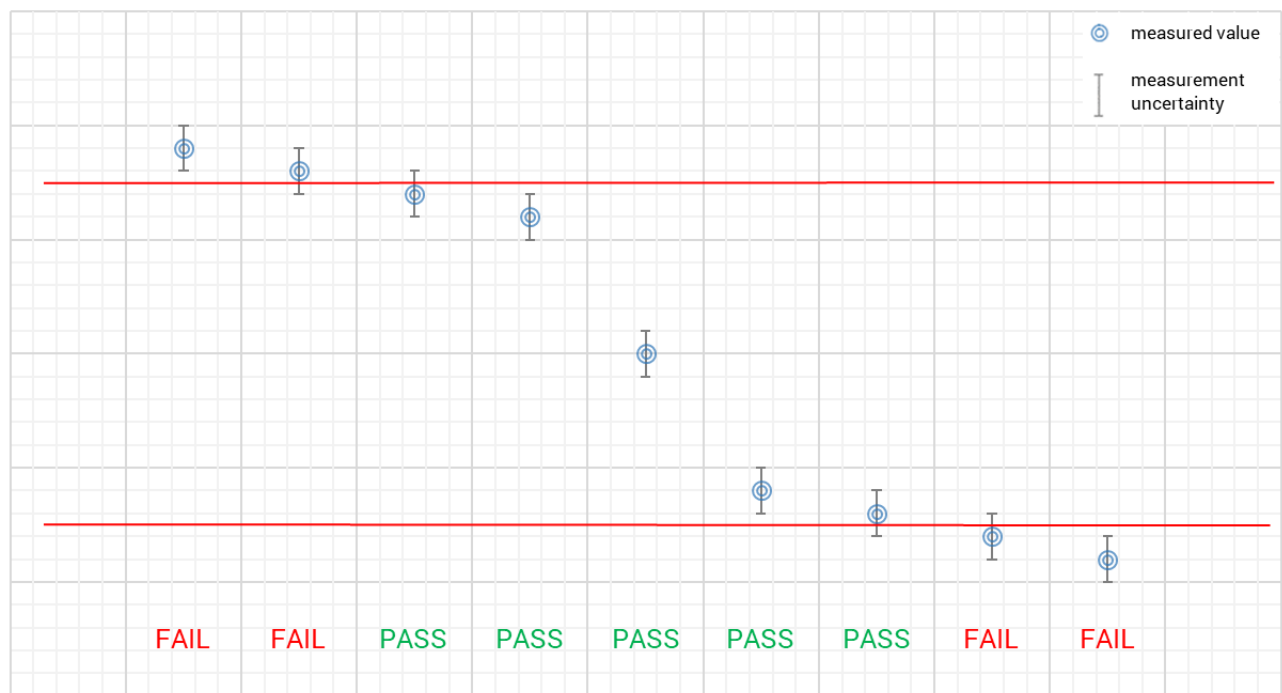
| Accreditation    | Description                                                                                                                                               |                                                                                                                                                                                                                                      |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                                                                                                                                                           |                                                                                                                                                                                                                                      |
| D-PL-12076-01-04 | Telecommunication and EMC Canada<br><a href="https://www.dakks.de/as/ast/d/D-PL-12076-01-04.pdf">https://www.dakks.de/as/ast/d/D-PL-12076-01-04.pdf</a>   |  <br>Deutsche<br>Akkreditierungsstelle<br>D-PL-12076-01-04 |
| D-PL-12076-01-05 | Telecommunication FCC requirements<br><a href="https://www.dakks.de/as/ast/d/D-PL-12076-01-05.pdf">https://www.dakks.de/as/ast/d/D-PL-12076-01-05.pdf</a> |  <br>Deutsche<br>Akkreditierungsstelle<br>D-PL-12076-01-05 |

#### 4 Reporting statements of conformity – decision rule

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3.

The measurement uncertainty is mentioned in this test report, see chapter 8, but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong.

measured value, measurement uncertainty, verdict



## 5 Test environment

|                             |                                                          |                                                                                                                     |
|-----------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Temperature :               | T <sub>nom</sub><br>T <sub>max</sub><br>T <sub>min</sub> | +22 °C during room temperature tests<br>+55 °C during high temperature tests<br>-40 °C during low temperature tests |
| Relative humidity content : |                                                          | 55 %                                                                                                                |
| Barometric pressure :       |                                                          | 1021 hpa                                                                                                            |
| Power supply :              | V <sub>nom</sub>                                         | 28 V DC from Power Supply                                                                                           |

## 6 Test item

### 6.1 General description

|                              |                                 |
|------------------------------|---------------------------------|
| Kind of test item:           | Aeronautical Inmarsat L-Band    |
| Type identification:         | AVIATOR UAV 200 SATCOM TERMINAL |
| HMN:                         | Not provided                    |
| PMN:                         | Not provided                    |
| HVIN:                        | Not provided                    |
| FVIN:                        | Not provided                    |
| S/N serial number:           | AU000066                        |
| hardware status:             | 1.00                            |
| software status:             | 1.07                            |
| Frequency band:              | TX: 1626.5 MHz – 1660.5 MHz     |
| TX output power cond.:       | 32.9 dBm (measured value)       |
| TX output power rad. (EIRP): | 40.9 dBm (calculated value)     |
| Type of modulation:          | QPSK, 16 QAM                    |
| Channel Bandwidth:           | 200 kHz                         |
| Type of radio transmission:  | G1W, D1W                        |
| Antenna:                     | LGA External Antenna            |
| Power supply:                | 28 V DC from Power Supply       |
| Temperature range:           | -40°C to +55°C                  |

### 6.2 List of components

| No. | Equipment                       | Manufacturer | (Part number / version / model) | Serial number           | Software version | tested (Y/N) |
|-----|---------------------------------|--------------|---------------------------------|-------------------------|------------------|--------------|
| 1   | AVIATOR UAV 200 SATCOM TERMINAL | COBHAM       | 677-A0219                       | AU000066                | 1.07             | Y            |
| 2   | Test PC                         | Shuttle      | DS77U3                          | DS77U00901<br>I42F00040 | -/-              | Y            |
| 3   | Interconnect Cable              | COBHAM       | 660-A901-200                    | 98170/04                | -/-              | Y            |

### 6.3 Antenna system(s)

| Description    | Polarization        | Gain  | Datasheet / pattern / test report |
|----------------|---------------------|-------|-----------------------------------|
| UAV200 Antenna | Right hand circular | 8 dBi | -/-                               |

Note:

Verification of Antenna pattern or antenna test reports is not part of this test report.  
 Above listed antennas should be compliant to test standard(s) listed under section 3!

### 6.4 Operating conditions

The Power and the Occupied Bandwidth were performed for all modulation at low, middle and high channels to find out the worst-case scenario. Spurious measurement were performed for those modulations: R20T0.5QD and FR80T5X32.

Operating condition 1: (fm=1643.5 MHz, fl= ..., fh=...) \*

Operating condition 2: Carrier Off

\* fl and fh varying due to different bearer types (see table below)

Note: fl = lowest operating frequency, fm = middle of the band, fh = highest operating frequency

| #  | Bearer Identifier | Systems designator | Min [MHz] | Max [MHz] |
|----|-------------------|--------------------|-----------|-----------|
| 1  | R5T1XD            | 50K0D1W            | 1626.625  | 1660.475  |
| 2  | R5T2XD            | 100KD1W            | 1626.65   | 1660.45   |
| 3  | R5T4.5XD          | 200KD1W            | 1626.8    | 1660.375  |
| 4  | R20T1XD           | 50K0D1W            | 1626.625  | 1660.475  |
| 5  | R20T2XD           | 100KD1W            | 1626.65   | 1660.45   |
| 6  | R20T4.5XD         | 200KD1W            | 1626.8    | 1660.375  |
| 7  | R5T2QD            | 100KG1W            | 1626.65   | 1660.45   |
| 8  | R5T4.5QD          | 200KG1W            | 1626.8    | 1660.375  |
| 9  | R20T0.5QD         | 25K0G1W            | 1626.6125 | 1660.4875 |
| 10 | R20T1QD           | 50K0G1W            | 1626.625  | 1660.475  |
| 11 | R20T2QD           | 100KG1W            | 1626.65   | 1660.45   |
| 12 | R20T4.5QD         | 200KG1W            | 1626.8    | 1660.375  |
| 13 | R80T0.5Q          | 25K0G1W            | 1626.6125 | 1660.4875 |
| 14 | R80T1Q            | 50K0G1W            | 1626.625  | 1660.475  |
| 15 | FR80T2.5X4        | 100KD1W            | 1626.65   | 1660.45   |
| 16 | FR80T2.5X16       | 100KD1W            | 1626.65   | 1660.45   |

## 6.5 Additional information

External photos: see customer documentation “870-A0867\_iss1.3 (AVIATOR UAV 200 External Pictures).pdf”

Internal photos: see customer documentation “870-A0866\_iss1.0 (AVIATOR UAV 200 Internal Pictures).pdf”

Test setup photos are included in test report: 1-0834/20-01-01\_AnnexC

Measurement results are included in test report 1-0834/20-01-01\_AnnexD

## 7 Sequence of testing

### 7.1 Sequence of testing radiated spurious 30 MHz to 1 GHz

#### Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 10 m or 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

#### Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 m to 3 m.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

#### Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable position  $\pm 45^\circ$  and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

## 7.2 Sequence of testing radiated spurious 1 GHz to 18 GHz

### Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a 2-axis positioner with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

### Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height is 1.5 m.
- At each turntable position and antenna polarization the analyzer sweeps with positive peak detector to find the maximum of all emissions.

### Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximizes the peaks by rotating the turntable from 0° to 360°. This measurement is repeated for different EUT-table positions (0° to 150° in 30°-steps) and for both antenna polarizations.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

## 8 Description of the test setup

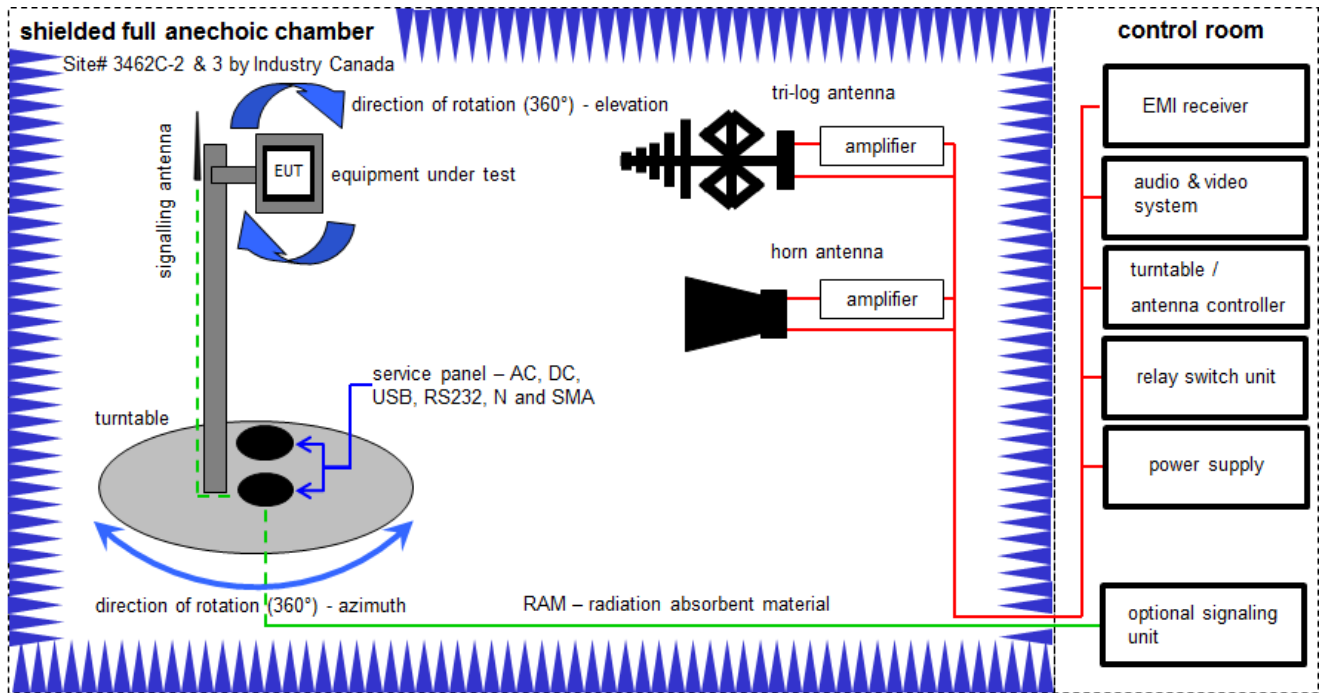
Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, RF generating and signaling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

### **Agenda:** Kind of Calibration

|      |                                            |     |                                                      |
|------|--------------------------------------------|-----|------------------------------------------------------|
| k    | calibration / calibrated                   | EK  | limited calibration                                  |
| ne   | not required (k, ev, izw, zw not required) | zw  | cyclical maintenance (external cyclical maintenance) |
| ev   | periodic self verification                 | izw | internal cyclical maintenance                        |
| Ve   | long-term stability recognized             | g   | blocked for accredited testing                       |
| vlk! | Attention: extended calibration interval   |     |                                                      |
| NK!  | Attention: not calibrated                  | *)  | next calibration ordered / currently in progress     |

## 8.1 Shielded fully anechoic chamber



Measurement distance: tri-log antenna and horn antenna 3 meter

$$OP = AV + D - G + CA$$

(OP-radiated output power; AV-analyzer value; D-free field attenuation of measurement distance; G-antenna gain+amplifier gain; CA-loss signal path)

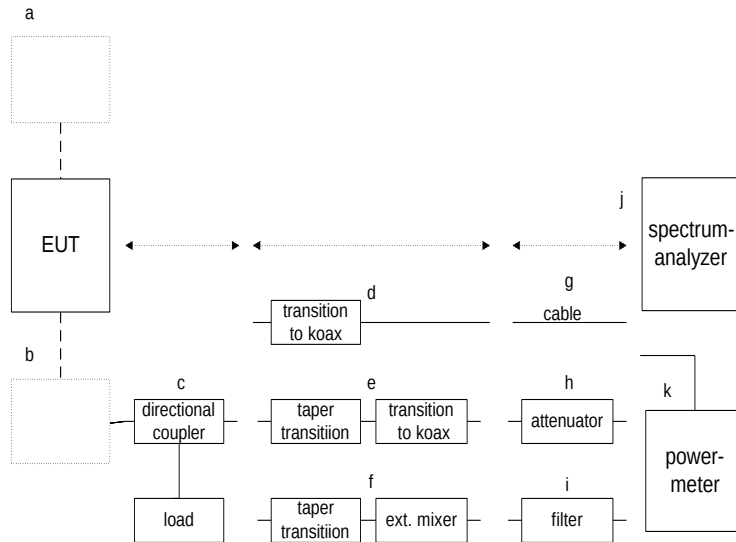
### Example calculation:

$$OP [dBm] = -65.0 [dBm] + 50 [dB] - 20 [dBi] + 5 [dB] = -30 [dBm] (1 \mu W)$$

### Equipment table:

| No. | Lab / Item | Equipment                                      | Type                    | Manufacturer                  | Serial No. | INV. No.  | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|------------------------------------------------|-------------------------|-------------------------------|------------|-----------|---------------------|------------------|------------------|
| 1   | n. a.      | Anechoic chamber                               | FAC 3/5m                | MWB / TDK                     | 87400/02   | 300000996 | ev                  | -/-              | -/-              |
| 2   | n. a.      | Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115                    | EMCO                          | 9107-3697  | 300001605 | vIKI!               | 27.02.2019       | 26.02.2021       |
| 3   | n. a.      | Switch / Control Unit                          | 3488A                   | HP                            | *          | 300000199 | ne                  | -/-              | -/-              |
| 4   | n. a.      | Highpass Filter                                | WHKX2.9/18G-12SS        | Wainwright                    | 1          | 300003492 | ev                  | -/-              | -/-              |
| 5   | n. a.      | EMI Test Receiver 20Hz- 26,5GHz                | ESU26                   | R&S                           | 100037     | 300003555 | k                   | 11.12.2019       | 10.12.2020       |
| 6   | n. a.      | TRILOG Broadband Test-Antenna 30 MHz - 3 GHz   | VULB9163                | Schwarzbeck Mess - Elektronik | 295        | 300003787 | vIKI!               | 19.02.2019       | 18.02.2021       |
| 7   | n. a.      | Broadband Amplifier 0.5-18 GHz                 | CBLU5184540             | CERNEX                        | 22049      | 300004481 | ev                  | -/-              | -/-              |
| 8   | n. a.      | 4U RF Switch Platform                          | L4491A                  | Agilent Technologies          | MY50000037 | 300004509 | ne                  | -/-              | -/-              |
| 9   | n. a.      | NEXIO EMV-Software                             | BAT EMC V3.19.1.21      | EMCO                          |            | 300004682 | ne                  | -/-              | -/-              |
| 10  | n. a.      | PC                                             | ExOne                   | F+W                           |            | 300004703 | ne                  | -/-              | -/-              |
| 11  | n. a.      | RF-Amplifier                                   | AMF-6F06001800-30-10P-R | NARDA-MITEQ Inc               | 2011572    | 300005241 | ev                  | -/-              | -/-              |

## 8.2 Conducted measurements (RF-Laboratory)



### Setup 1.1 x..x

For inband measurements: hgj + hgk  
 (20 dB + 10 dB attenuation, cable and analyzer or power meter)

For out-of-band and spurious measurements: higj  
 (10 dB attenuation + bandstop filter + cable + analyzer)

For spurious measurements > 3 GHz: higj:  
 (20 dB attenuation + high pass filter + cable + analyzer)

### RF-Laboratory Equipment:

| No. | Lab / Item | Equipment                                        | Type                             | Manufact.             | Serial No. | INV. No                     | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|--------------------------------------------------|----------------------------------|-----------------------|------------|-----------------------------|---------------------|------------------|------------------|
| 1   | C220       | HF-Cable                                         | SUCOFLEX 101                     | Huber&Suhner          | 3054/1     |                             | ev                  | -/-              | -/-              |
| 2   | U311       | High Power Attenuator 10 dB                      | WA-91-10-34                      | Weinschel             | A244       | 300004265                   | ev                  | -/-              | -/-              |
| 3   | U312       | High Power Attenuator 20 dB                      | WA-91-20-43                      | Weinschel             | A514       | 300004824                   | ev                  | -/-              | -/-              |
| 4   | n. a.      | Power Meter                                      | 438A                             | HP                    | 2804U01015 | 300000357                   | vKI!                | 12.12.2019       | 11.12.2021       |
| 5   | n. a.      | Power Sensor, 10 MHz to 26.5 GHz, -30 to +20 dBm | 8485A                            | HP                    | 2238A00798 | 300000511                   | vKI!                | 18.12.2018       | 17.12.2020       |
| 6   | R001       | Spectrum Analyzer 20 Hz - 50 GHz                 | FSU50                            | R&S                   | 200012     | 300003443                   | k                   | 19.02.2019       | 18.02.2021       |
| 8   | HPF        | High Pass Filter                                 | HPM50110                         | MICRO-TRONICS         | 083        | property of Thrane & Thrane | ev                  | -/-              | -/-              |
| 9   | WDPL       | Band Reject / Notch Filter                       | WRCGV14-1616-1626-1661-1671-70SS | WAINWRIGHT INSTRUMENT | 1          | CTC advanced GmbH           | ev                  | -/-              | -/-              |

## 9 Measurement results

### 9.1 Summary

|                                     |                                                                                                                          |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | <b>No deviations from the technical specifications were ascertained</b>                                                  |
| <input type="checkbox"/>            | There were deviations from the technical specifications ascertained                                                      |
| <input type="checkbox"/>            | This test report is only a partial test report.<br>The content and verdict of the performed test cases are listed below. |

| TC identifier | Description                      | verdict   | date       | Remark |
|---------------|----------------------------------|-----------|------------|--------|
| RF-Testing    | CFR 47 Part 25<br>CFR 47 Part 87 | see below | 2020-11-03 | -/-    |

| Test Specification Clause                                               | Test Case                                                                                                                                               | Pass | Fail | N/A | N/P | Results         |
|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-----|-----|-----------------|
| §2.1046<br>§25.204<br>§87.131<br>RSS-170, 5.3.2                         | RF power output<br>Power limits                                                                                                                         | X    |      |     |     | 12.3 dBW (EIRP) |
| §2.1049<br>§87.139 (i)(3)                                               | Emissions masks                                                                                                                                         | X    |      |     |     | complies        |
| §2.1049<br>§87.135<br>RSS-170, 5.1                                      | Occupied bandwidth                                                                                                                                      | X    |      |     |     | 170 kHz         |
| §2.1051<br>§25.202<br>§87.139 (a)<br>§87.139 (i)(1)<br>RSS-170, 5.4.3.1 | Spurious emissions at antenna terminals<br>Emission limitations (conducted emissions)                                                                   | X    |      |     |     | complies        |
| §2.1053<br>§25.202                                                      | Field strength of spurious radiation<br>Emission limitations (radiated emissions)                                                                       | X    |      |     |     | complies        |
| §2.1055<br>§25.202<br>§87.133 (a)<br>RSS-170, 5.2                       | Frequency stability<br>Frequency tolerances                                                                                                             | X    |      |     |     |                 |
| §15.107                                                                 | Unintentional Radiators:<br>AC conducted limits                                                                                                         |      |      | X   |     | DC powered      |
| §15.109                                                                 | Unintentional Radiators:<br>Radiated emission limits                                                                                                    |      |      | X   |     |                 |
| §25.216/<br>RSS-170, 5.4.3.2<br>& 5.4.4                                 | Limits on emissions from mobile earth stations<br>for protection of aeronautical radionavigation-<br>satellite service /<br>Carrier-Off State Emissions | X    |      |     |     | complies        |

**Note:**

N/A = Not applicable; N/P = Not performed

**9.2 Overview**

I. RF power output / Power limits .....16

II. Emission masks .....18

III. Occupied bandwidth.....19

IV. Emissions limitations (conducted emissions).....20

V. Emissions limits (radiated emissions) .....23

VI. Transmitter frequency tolerance .....24

VII. Emissions limitations (Protection of aeronautical).....26

## I. RF power output / Power limits

**Test setup(s):** section 7.2, setup 1.1hgk

The power is measured at the transmitter output terminals and the type of power is determined according to the emission designator as follows:

- (i) Mean power (pY) for amplitude modulated emissions and transmitting both sidebands using unmodulated full carrier.
- (ii) Peak envelope power (pX) for all emission designators other than those referred to in paragraph (i) of this note.

**Limits:**

**§87.131**

| Class of Station | Frequency | Authorized emissions | Maximum power |
|------------------|-----------|----------------------|---------------|
| Aircraft earth   | UHF       | G1D, G1E, G1W        | 60W           |

Power may not exceed 60 watts per carrier, as measured at the input of the antenna subsystem, including any installed diplexer. The maximum EIRP may not exceed 2000W per carrier.

**Limits:**

**RSS-170 5.3.2**

The application for MES certification shall state the MES e.i.r.p. that is necessary for satisfactory communication. The maximum permissible e.i.r.p. will be the stated e.i.r.p. plus a 2 dB margin. If a detachable antenna is used, the certification application shall state the recommended antenna type and manufacturer, the antenna gain and the maximum transmitter output power at the antenna terminal.

Note: The measurement was performed at the antenna amplifier output (An SMA connector is fitted on the DLNA – antenna port).

**Output Power Conducted with Powermeter (measured)**

| Modulation Scheme | max. Bandwidth | Transmitter conducted output power [dBm] |                  |                   | Transmitter radiated output power / EIRP [dBm] |                  |                   |
|-------------------|----------------|------------------------------------------|------------------|-------------------|------------------------------------------------|------------------|-------------------|
|                   |                | f <sub>low</sub>                         | f <sub>mid</sub> | f <sub>high</sub> | f <sub>low</sub>                               | f <sub>mid</sub> | f <sub>high</sub> |
| R5T1X             | 42 kHz         | 32.5                                     | 32.6             | 32.5              | 40.5                                           | 40.6             | 40.5              |
| R5T2X             | 84 kHz         | 31.6                                     | 31.7             | 31.6              | 39.6                                           | 39.7             | 39.6              |
| R5T45X            | 189 kHz        | 32.4                                     | 32.4             | 32.3              | 40.4                                           | 40.4             | 40.3              |
| R20T1X            | 42 kHz         | 32.6                                     | 32.5             | 32.5              | 40.6                                           | 40.5             | 40.5              |
| R20T2X            | 84 kHz         | 32.4                                     | 32.4             | 32.4              | 40.4                                           | 40.4             | 40.4              |
| R20T45X           | 189 kHz        | 32.4                                     | 32.5             | 32.4              | 40.4                                           | 40.5             | 40.4              |
| R5T2Q             | 84 kHz         | 32.3                                     | 32.4             | 32.3              | 40.3                                           | 40.4             | 40.3              |
| R5T45Q            | 189 kHz        | 32.4                                     | 32.5             | 32.4              | 40.4                                           | 40.5             | 40.4              |
| R20T05Q           | 21 kHz         | <b>32.9</b>                              | <b>32.9</b>      | <b>32.9</b>       | <b>40.9</b>                                    | <b>40.9</b>      | <b>40.9</b>       |
| R20T1Q            | 42 kHz         | 32.8                                     | 32.7             | 32.6              | 40.8                                           | 40.7             | 40.6              |
| R20T2Q            | 84 kHz         | 32.6                                     | 32.6             | 32.5              | 40.6                                           | 40.6             | 40.5              |
| R20T45Q           | 189 kHz        | 32.5                                     | 32.5             | 32.4              | 40.5                                           | 40.5             | 40.4              |
| R80T05Q           | 21 kHz         | 32.0                                     | 32.0             | 32.0              | 40.0                                           | 40.0             | 40.0              |
| R80T1Q            | 42 kHz         | 32.3                                     | 32.4             | 32.4              | 40.3                                           | 40.4             | 40.4              |
| FR80T2.5X4        | 95 kHz         | 32.1                                     | 32.2             | 32.2              | 40.1                                           | 40.2             | 40.2              |
| FR80T2.5X16       | 95 kHz         | 32.2                                     | 32.3             | 32.4              | 40.2                                           | 40.3             | 40.4              |

**Summary:**

Maximum conducted output power:

32.9 dBm = 2.9 dBW = **1.95 W** at amplifier output.

Maximum radiated output power (EIRP):

32.9 dBm + 8 dBi = 40.9 dBm = 10.9 dBW = **12.3 W**.

## II. Emission masks

**Test setup(s):** section 7.2, setup 1.1hgj

**Limits:**

**§87.131 (i)(3)**

While transmitting a single modulated signal at the rated output power of the transmitter, the emissions must be attenuated below the maximum emission level by at least:

| Frequency Offset (normalized to SR) | Attenuation (dB) |
|-------------------------------------|------------------|
| $\pm 0.75 \times \text{SR}$         | 0                |
| $\pm 1.40 \times \text{SR}$         | 20               |
| $\pm 2.95 \times \text{SR}$         | 40               |

Where:

SR = Symbol Rate,

SR = 1 × channel rate for BPSK,

SR = 0.5 × channel rate for QPSK.

The mask shall be defined by drawing straight lines through the above points.

**Plots:**

See Annex D / 2, plots 87-98-99-116.

### III. Occupied bandwidth

**Test setup(s):** section 7.2, setup 1.1hgj

(a) Occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to 0.5 percent of the total mean power of a given emission.

(b) The authorized bandwidth is the maximum occupied bandwidth authorized to be used by a station.

(c) The necessary bandwidth for a given class of emission is the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions.

| Modulation Scheme | Occupied Bandwidth (99%) |           |              | Limit [kHz] |
|-------------------|--------------------------|-----------|--------------|-------------|
|                   | $f_{low}$                | $f_{mid}$ | $f_{high}$   |             |
| R5T1X             | 39.3                     | 38.9      | 38.7         | 42 kHz      |
| R5T2X             | 75.2                     | 75.4      | 75.3         | 84 kHz      |
| R5T4.5X           | 166.6                    | 168.9     | <b>170.3</b> | 189 kHz     |
| R20T1X            | 39.1                     | 39.1      | 38.8         | 42 kHz      |
| R20T2X            | 75.3                     | 75.3      | 74.8         | 84 kHz      |
| R20T4.5X          | 165.7                    | 167.7     | 166.7        | 189 kHz     |
| R5T2Q             | 75.4                     | 75.8      | 74.6         | 84 kHz      |
| R5T4.5Q           | 164.8                    | 166.7     | 167.0        | 189 kHz     |
| R20T0.5Q          | 22.0                     | 19.2      | 19.2         | 22 kHz      |
| R20T1Q            | 39.0                     | 39.8      | 39.2         | 42 kHz      |
| R20T2Q            | 75.3                     | 75.3      | 75.2         | 84 kHz      |
| R20T4.5Q          | 164.7                    | 168.7     | 167.7        | 189 kHz     |
| R80T0.5Q          | 21.9                     | 19.4      | 19.1         | 22 kHz      |
| R80T1Q            | 38.9                     | 39.3      | 38.7         | 42 kHz      |
| FR80T2.5X4        | 87.4                     | 88.1      | 88.9         | 95 kHz      |
| FR80T2.5X16       | 87.6                     | 88.2      | 87.9         | 95 kHz      |

**Limits:**

**§87.135**

**Limits:**

**RSS-170 5.1**

|                 |                                         |                                          |
|-----------------|-----------------------------------------|------------------------------------------|
| Frequency range | $f(\text{lowest}) > 1625.5 \text{ MHz}$ | $f(\text{highest}) < 1660.5 \text{ MHz}$ |
|-----------------|-----------------------------------------|------------------------------------------|

**Plots:**

See Annex D / 2, plots 1 to 85

#### IV. Emissions limitations (conducted emissions)

**Test setup(s):** section 7.2, setup 1.1higj

In case of conflict with other provisions of §87.139, the provisions of this paragraph shall govern for aircraft earth stations. When using G1D, G1E, or G1W emissions in the 1646.5-1660.5 MHz frequency band, the emissions must be attenuated as shown below.

At rated output power, while transmitting a modulated single carrier, the composite spurious and noise output shall be attenuated by at least:

**Limits:**

**§87.139 (i)(1)**

| Frequency (MHz)  | Attenuation (dB) <sup>1</sup>     |
|------------------|-----------------------------------|
| 0.01 to 1525     | -135 dB/4 kHz                     |
| 1525 to 1559     | -203 dB/4 kHz                     |
| 1559 to 1585     | -155 dB/MHz                       |
| 1585 to 1605     | -143 dB/MHz                       |
| 1605 to 1610     | -117 dB/MHz                       |
| 1610 to 1610.6   | -95 dB/MHz                        |
| 1610.6 to 1613.8 | -80 dBW/MHz <sup>3</sup>          |
| 1613.8 to 1614   | -95 dB/MHz                        |
| 1614 to 1626.5   | -70 dB/4 kHz                      |
| 1626.5 to 1660   | -70 dB/4 kHz <sup>2 3 4</sup>     |
| 1660 to 1670     | -49.5 dBW/20 kHz <sup>2 3 4</sup> |
| 1670 to 1735     | -60 dB/4 kHz                      |
| 1735 to 12000    | -105 dB/4 kHz                     |
| 12000 to 18000   | -70 dB/4 kHz                      |

<sup>1</sup>These values are expressed in dB referenced to the carrier for the bandwidth indicated, and relative to the maximum emission envelope level, except where the attenuation is shown in dBW, the attenuation is expressed in terms of absolute power referenced to the bandwidth indicated.

<sup>2</sup>Attenuation measured within the transmit band excludes the band  $\pm 35$  kHz of the carrier frequency.

<sup>3</sup>This level is not applicable for intermodulation products.

<sup>4</sup>The upper limit for the excess power for any narrow-band spurious emission (excluding intermodulation products within a 30 kHz measurement bandwidth) shall be 10 dB above the power limit in this table.

**Note:**

Frequency response of filter as declared by the manufacturer:

The AVIATOR UAV 200 consist of a HPA, Duplex Filter and an Antenna Element in the transmission path. The duplex filter is by-passed in the modified UAV200, and the output is derived directly from the HPA. The duplex filter response is defined in Table 2.7 below:

| <b>Table 2.7: HELGA Duplex Filter Response</b> |                         |
|------------------------------------------------|-------------------------|
| <b>TX Path Frequency [MHz]</b>                 | <b>Attenuation [dB]</b> |
| 1518 – 1559                                    | 50                      |
| 1559 – 1585                                    | 40                      |
| 1585 – 1605                                    | 15                      |
| 1605 – 1610                                    | 8                       |
| 1626.5 – 1675                                  | 1                       |
| 2400 – 2500                                    | 40                      |
| 3253 – 3350                                    | 30                      |
| 4879 – 5025                                    | 12                      |

Filter response data delivered by the customer were also used as correction data during the measurements.

**Plots:**

See Annex D / 2, plots 88-95, 100-114, 119-125.

**Limits:**

**§87.139 (a) / RSS-170 5.3.4.1**

The average power of unwanted emissions shall be attenuated below the average output power, P (dBW), of the transmitter, as specified below:

- (1) 25 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 50%, up to and including 100% of the occupied bandwidth or necessary bandwidth, whichever is greater;
- (2) 35 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 100%, up to and including 250% of the occupied bandwidth or necessary bandwidth, whichever is greater; and
- (3)  $43 + 10 \log p$  (watts) in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 250% of the occupied bandwidth or necessary bandwidth, whichever is greater.

**Plots:**

See Annex D / 2, plots 86-96-97-115.

## V. Emissions limits (radiated emissions)

**Test setup(s):** section 7.1

**Limits:**

**§2.1053**

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.

(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:

- (1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
- (2) All equipment operating on frequencies higher than 25 MHz.
- (3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
- (4) Other types of equipment as required, when deemed necessary by the Commission.

**Measurement results:**

| Radiated Spurious Emissions [ dBm ] |          |               |                             |          |               |                             |          |               |
|-------------------------------------|----------|---------------|-----------------------------|----------|---------------|-----------------------------|----------|---------------|
| Low frequency                       |          |               | Middle frequency            |          |               | High channel                |          |               |
| F [ GHz ]                           | Detector | Level [ dBm ] | F [ GHz ]                   | Detector | Level [ dBm ] | F [ GHz ]                   | Detector | Level [ dBm ] |
| No critical peaks detected.         |          |               | No critical peaks detected. |          |               | No critical peaks detected. |          |               |
|                                     |          |               |                             |          |               |                             |          |               |
|                                     |          |               |                             |          |               |                             |          |               |
|                                     |          |               |                             |          |               |                             |          |               |
| Measurement uncertainty             |          |               | ± 3 dB                      |          |               |                             |          |               |

**Plots:**

see also Annex D / 3, plots 1 to 3.

## VI. Transmitter frequency tolerance

**Test setup(s):** section 7.2, setup 1.1hgj

**Limits:**

**§87.133 (a)**

| Frequency band-470 to 2450 MHz (lower limit exclusive, upper limit inclusive), and categories of stations: | Tolerance <sup>1</sup> | Tolerance <sup>2</sup> |
|------------------------------------------------------------------------------------------------------------|------------------------|------------------------|
| Aeronautical stations                                                                                      | 100                    | 20                     |
| Aircraft stations                                                                                          | 100                    | 20                     |
| Aircraft earth station                                                                                     |                        | 320 Hz <sup>3</sup>    |

<sup>1</sup>This tolerance is the maximum permitted until January 1, 1990, for transmitters installed before January 2, 1985, and used at the same installation. Tolerance is indicated in parts in 10<sup>6</sup> unless shown as Hertz (Hz).

<sup>2</sup>This tolerance is the maximum permitted after January 1, 1985 for new and replacement transmitters and to all transmitters after January 1, 1990. Tolerance is indicated in parts in 10<sup>6</sup> unless shown as Hertz (Hz).

<sup>3</sup>For purposes of certification, a tolerance of 160 Hz applies to the reference oscillator of the AES transmitter. This is a bench test.

**Limits:**

**RSS-170 5.2**

For mobile earth station equipment, the carrier frequency shall not depart from the reference frequency by more than  $\pm 10$  ppm.

**Measurement results:**

| Temperature<br>[ °C ] | Voltage<br>[ V DC ] | Reference Frequency<br>[ MHz ] | Measured Frequency<br>[ MHz ] | Deviation<br>[ Hz ] | Deviation<br>[ ppm ] |
|-----------------------|---------------------|--------------------------------|-------------------------------|---------------------|----------------------|
| -40                   | V <sub>nom</sub>    | fl: 1626. 600 000              | 1626.600 817                  | 0.82                | 0.50                 |
| -30                   | V <sub>nom</sub>    |                                | 1626.600 497                  | 0.50                | 0.31                 |
| -20                   | V <sub>nom</sub>    |                                | 1626.600 521                  | 0.52                | 0.32                 |
| -10                   | V <sub>nom</sub>    |                                | 1626.600 410                  | 0.41                | 0.25                 |
| 0                     | V <sub>nom</sub>    |                                | 1626.600 417                  | 0.42                | 0.26                 |
| +10                   | V <sub>nom</sub>    |                                | 1626.600 505                  | 0.51                | 0.31                 |
| +20                   | V <sub>nom</sub>    |                                | 1626.600 513                  | 0.51                | 0.32                 |
| +30                   | V <sub>nom</sub>    |                                | 1626.600 440                  | 0.44                | 0.27                 |
| +40                   | V <sub>nom</sub>    |                                | 1626.600 393                  | 0.39                | 0.24                 |
| +50                   | V <sub>nom</sub>    |                                | 1626.600 353                  | 0.35                | 0.22                 |
| +55                   | V <sub>nom</sub>    |                                | 1626.600 350                  | 0.35                | 0.22                 |

| Temperature<br>[ °C ] | Voltage<br>[ V DC ] | Reference Frequency<br>[ MHz ] | Measured Frequency<br>[ MHz ] | Deviation<br>[ Hz ] | Deviation<br>[ ppm ] |
|-----------------------|---------------------|--------------------------------|-------------------------------|---------------------|----------------------|
| -40                   | V <sub>nom</sub>    | fl: 1643. 500 000              | 1643.500 793                  | 0.79                | 0.48                 |
| -30                   | V <sub>nom</sub>    |                                | 1643.500 505                  | 0.51                | 0.31                 |
| -20                   | V <sub>nom</sub>    |                                | 1643.500 537                  | 0.54                | 0.33                 |
| -10                   | V <sub>nom</sub>    |                                | 1643.500 415                  | 0.42                | 0.25                 |
| 0                     | V <sub>nom</sub>    |                                | 1643.500 425                  | 0.43                | 0.26                 |
| +10                   | V <sub>nom</sub>    |                                | 1643.500 513                  | 0.51                | 0.31                 |
| +20                   | V <sub>nom</sub>    |                                | 1643.500 521                  | 0.52                | 0.32                 |
| +30                   | V <sub>nom</sub>    |                                | 1643.500 441                  | 0.44                | 0.27                 |
| +40                   | V <sub>nom</sub>    |                                | 1643.500 401                  | 0.40                | 0.24                 |
| +50                   | V <sub>nom</sub>    |                                | 1643.500 369                  | 0.37                | 0.22                 |
| +55                   | V <sub>nom</sub>    |                                | 1643.500 339                  | 0.34                | 0.21                 |

| Temperature<br>[ °C ] | Voltage<br>[ V DC ] | Reference Frequency<br>[ MHz ] | Measured Frequency<br>[ MHz ] | Deviation<br>[ Hz ] | Deviation<br>[ ppm ] |
|-----------------------|---------------------|--------------------------------|-------------------------------|---------------------|----------------------|
| -40                   | V <sub>nom</sub>    | fl: 1660. 400 000              | 1660.400 780                  | 0.78                | 0.47                 |
| -30                   | V <sub>nom</sub>    |                                | 1660.400 521                  | 0.52                | 0.31                 |
| -20                   | V <sub>nom</sub>    |                                | 1660.400 537                  | 0.54                | 0.32                 |
| -10                   | V <sub>nom</sub>    |                                | 1660.400 425                  | 0.42                | 0.26                 |
| 0                     | V <sub>nom</sub>    |                                | 1660.400 425                  | 0.42                | 0.26                 |
| +10                   | V <sub>nom</sub>    |                                | 1660.400 529                  | 0.53                | 0.32                 |
| +20                   | V <sub>nom</sub>    |                                | 1660.400 537                  | 0.54                | 0.32                 |
| +30                   | V <sub>nom</sub>    |                                | 1660.400 465                  | 0.46                | 0.28                 |
| +40                   | V <sub>nom</sub>    |                                | 1660.400 401                  | 0.40                | 0.24                 |
| +50                   | V <sub>nom</sub>    |                                | 1660.400 377                  | 0.38                | 0.23                 |
| +55                   | V <sub>nom</sub>    |                                | 1660.400 360                  | 0.36                | 0.22                 |

## VII. Emissions limitations (Protection of aeronautical)

### Description / Limit:

#### § 25.216 Limits on emissions from mobile earth stations for protection of aeronautical radionavigation-satellite service.

(h) Mobile earth stations manufactured more than six months after FEDERAL REGISTER publication of the rule changes adopted in FCC 03–283 with assigned uplink frequencies in the 1626.5–1660.5 MHz band shall suppress the power density of emissions in the 1605–1610 MHz band-segment to an extent determined by linear interpolation from -70 dBW/MHz at 1605 MHz to -46 dBW/MHz at 1610 MHz, averaged over any 2 millisecond active transmission interval. The e.i.r.p of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed a level determined by linear interpolation from -80 dBW at 1605 MHz to -56 dBW at 1610 MHz, averaged over any 2 millisecond active transmission interval.

(i) The e.i.r.p density of carrier-off state emissions from mobile earth stations manufactured more than six months after FEDERAL REGISTER publication of the rule changes adopted in FCC 03–283 with assigned uplink frequencies between 1 and 3 GHz shall not exceed -80 dBW/MHz in the 1559–1610 MHz band averaged over any two millisecond interval.

### Measurement results:

| Conducted Spurious Emissions [dBm] |          |             |                          |          |             |                          |          |             |
|------------------------------------|----------|-------------|--------------------------|----------|-------------|--------------------------|----------|-------------|
| $f_{\text{low}}$                   |          |             | $f_{\text{mid}}$         |          |             | $f_{\text{high}}$        |          |             |
| F [MHz]                            | Detector | Level [dBm] | F [MHz]                  | Detector | Level [dBm] | F [MHz]                  | Detector | Level [dBm] |
| No critical peaks found!           |          |             | No critical peaks found! |          |             | No critical peaks found! |          |             |
|                                    |          |             |                          |          |             |                          |          |             |
|                                    |          |             |                          |          |             |                          |          |             |
|                                    |          |             |                          |          |             |                          |          |             |
|                                    |          |             |                          |          |             |                          |          |             |
|                                    |          |             |                          |          |             |                          |          |             |
| Measurement uncertainty            |          |             | ± 1.5 dB                 |          |             |                          |          |             |

### Note:

Measurements are performed with modulation scheme R20T0.5QD.

### Plots:

See Annex D / 2, plots 126-130.

## 10 Glossary

|                        |                                                    |
|------------------------|----------------------------------------------------|
| <b>EUT</b>             | Equipment under test                               |
| <b>DUT</b>             | Device under test                                  |
| <b>GUE</b>             | GNSS User Equipment                                |
| <b>ETSI</b>            | European Telecommunications Standards Institute    |
| <b>EN</b>              | European Standard                                  |
| <b>FCC</b>             | Federal Communications Commission                  |
| <b>FCC ID</b>          | Company Identifier at FCC                          |
| <b>IC</b>              | Industry Canada                                    |
| <b>PMN</b>             | Product marketing name                             |
| <b>HMN</b>             | Host marketing name                                |
| <b>HVIN</b>            | Hardware version identification number             |
| <b>FVIN</b>            | Firmware version identification number             |
| <b>EMC</b>             | Electromagnetic Compatibility                      |
| <b>HW</b>              | Hardware                                           |
| <b>SW</b>              | Software                                           |
| <b>Inv. No.</b>        | Inventory number                                   |
| <b>S/N or SN</b>       | Serial number                                      |
| <b>C</b>               | Compliant                                          |
| <b>NC</b>              | Not compliant                                      |
| <b>NA</b>              | Not applicable                                     |
| <b>NP</b>              | Not performed                                      |
| <b>PP</b>              | Positive peak                                      |
| <b>QP</b>              | Quasi peak                                         |
| <b>AVG</b>             | Average                                            |
| <b>OC</b>              | Operating channel                                  |
| <b>OCW</b>             | Operating channel bandwidth                        |
| <b>OBW</b>             | Occupied bandwidth                                 |
| <b>OOB</b>             | Out of band                                        |
| <b>DFS</b>             | Dynamic frequency selection                        |
| <b>CAC</b>             | Channel availability check                         |
| <b>OP</b>              | Occupancy period                                   |
| <b>NOP</b>             | Non occupancy period                               |
| <b>DC</b>              | Duty cycle                                         |
| <b>PER</b>             | Packet error rate                                  |
| <b>CW</b>              | Clean wave                                         |
| <b>MC</b>              | Modulated carrier                                  |
| <b>WLAN</b>            | Wireless local area network                        |
| <b>RLAN</b>            | Radio local area network                           |
| <b>DSSS</b>            | Dynamic sequence spread spectrum                   |
| <b>OFDM</b>            | Orthogonal frequency division multiplexing         |
| <b>FHSS</b>            | Frequency hopping spread spectrum                  |
| <b>GNSS</b>            | Global Navigation Satellite System                 |
| <b>C/N<sub>0</sub></b> | Carrier to noise-density ratio, expressed in dB-Hz |

## 11 Document history

| Version | Applied changes                        | Date of release |
|---------|----------------------------------------|-----------------|
| -/-     | DRAFT Partial Test                     | 2020-08-26      |
| -/-     | DRAFT2 Full Test                       | 2020-10-05      |
| -/-     | IC Update, Class 6 HDR bearers removed | 2020-10-22      |
| -A      | Antenna Gain updated                   | 2020-10-28      |

## 12 Accreditation Certificate – D-PL-12076-01-04

| first page                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | last page                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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|  <p>Deutsche Akkreditierungsstelle GmbH</p> <p>Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV<br/>Signatory to the Multilateral Agreements of EA, ILAC and IAF for Mutual Recognition</p> <p><b>Accreditation</b> </p> <p>The Deutsche Akkreditierungsstelle GmbH attests that the testing laboratory<br/><b>CTC advanced GmbH</b><br/>Untertürkheimer Straße 6-10, 66117 Saarbrücken</p> <p>is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields:<br/><b>Telecommunication (TC) and Electromagnetic Compatibility (EMC) for Canadian Standards</b></p> <p>The accreditation certificate shall only apply in connection with the notice of accreditation of 11.01.2019 with the accreditation number D-PL-12076-01 and is valid until 21.04.2021. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 7 pages.</p> <p>Registration number of the certificate: <b>D-PL-12076-01-04</b></p> <p>Frankfurt am Main, 11.01.2019</p> <br>Dipl.-Biol. Uwe Zimmermann<br>Head of Division | <p>Deutsche Akkreditierungsstelle GmbH</p> <p>Office Berlin<br/>Spittelmarkt 10<br/>10117 Berlin</p> <p>Office Frankfurt am Main<br/>Europa-Allee 52<br/>60327 Frankfurt am Main</p> <p>Office Braunschweig<br/>Bundesallee 100<br/>38116 Braunschweig</p> <p>The publication of extracts of the accreditation certificate is subject to the prior written approval by Deutsche Akkreditierungsstelle GmbH (DAkKS). Exempted is the unchanged form of separate disseminations of the cover sheet by the conformity assessment body mentioned overleaf.</p> <p>No impression shall be made that the accreditation also extends to fields beyond the scope of accreditation attested by DAkKS.</p> <p>The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I p. 2625) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAkKS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations.</p> <p>The up-to-date state of membership can be retrieved from the following websites:<br/>EA: <a href="http://www.european-accreditation.org">www.european-accreditation.org</a><br/>ILAC: <a href="http://www.ilac.org">www.ilac.org</a><br/>IAF: <a href="http://www.iaf.nu">www.iaf.nu</a></p> |

**Note: The current certificate annex is published on the website (link see below) of the Accreditation Body DAkKS or may be received by CTC advanced GmbH on request**

<https://www.dakks.de/as/ast/d/D-PL-12076-01-04.pdf>

### 13 Accreditation Certificate – D-PL-12076-01-05

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|  <p>Deutsche Akkreditierungsstelle GmbH</p> <p>Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV<br/>Signatory to the Multilateral Agreements of EA, ILAC and IAF for Mutual Recognition</p> <p><b>Accreditation</b> </p> <p>The Deutsche Akkreditierungsstelle GmbH attests that the testing laboratory</p> <p><b>CTC advanced GmbH</b><br/>Untertürkheimer Straße 6-10, 66117 Saarbrücken</p> <p>is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields:</p> <p><b>Telecommunication (FCC Requirements)</b></p> <p>The accreditation certificate shall only apply in connection with the notice of accreditation of 11.01.2019 with the accreditation number D-PL-12076-01 and is valid until 21.04.2021. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 5 pages.</p> <p>Registration number of the certificate: <b>D-PL-12076-01-05</b></p> <p>Frankfurt am Main, 11.01.2019 <br/>Uwe Zimmermann<br/>Head of Division</p> <p><small>DAKKS 12076-01-05</small></p> | <p>Deutsche Akkreditierungsstelle GmbH</p> <p>Office Berlin<br/>Spittelmarkt 10<br/>10117 Berlin</p> <p>Office Frankfurt am Main<br/>Europa-Allee 52<br/>60327 Frankfurt am Main</p> <p>Office Braunschweig<br/>Bundesallee 100<br/>38116 Braunschweig</p> <p>The publication of extracts of the accreditation certificate is subject to the prior written approval by Deutsche Akkreditierungsstelle GmbH (DAkKS). Exempted is the unchanged form of separate disseminations of the cover sheet by the conformity assessment body mentioned overleaf.</p> <p>No impression shall be made that the accreditation also extends to fields beyond the scope of accreditation attested by DAkKS.</p> <p>The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I p. 2625) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAkKS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations.</p> <p>The up-to-date state of membership can be retrieved from the following websites:<br/>EA: <a href="http://www.european-accreditation.org">www.european-accreditation.org</a><br/>ILAC: <a href="http://www.ilac.org">www.ilac.org</a><br/>IAF: <a href="http://www.iaf.nu">www.iaf.nu</a></p> |

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