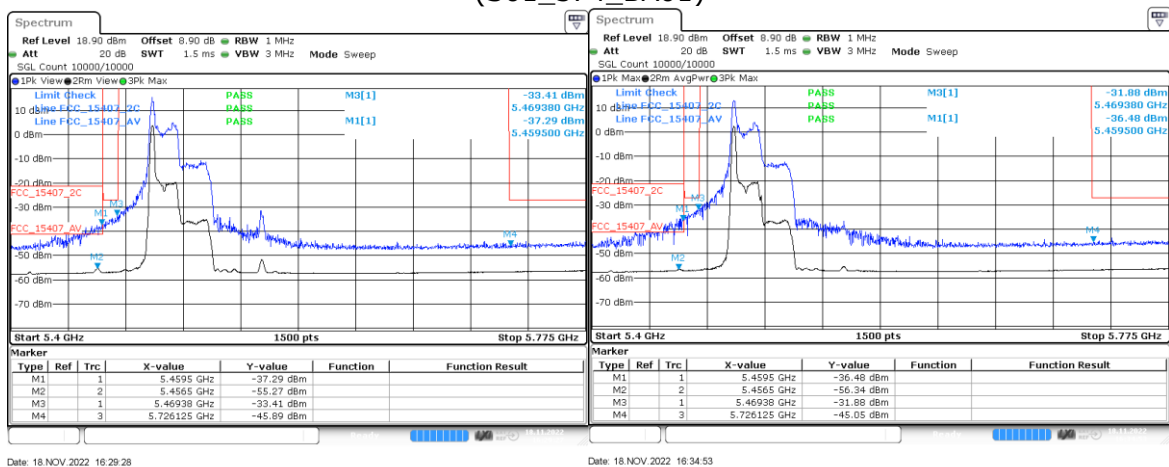
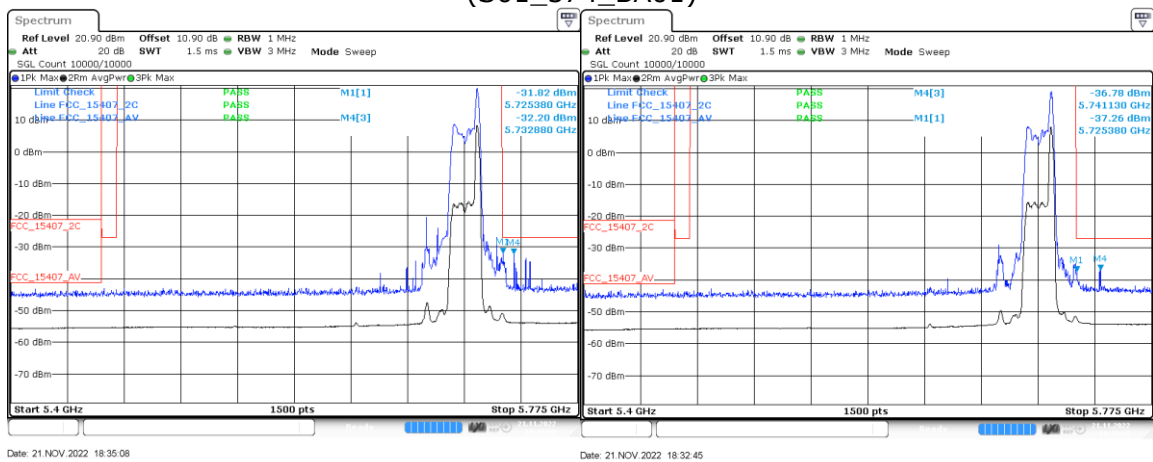
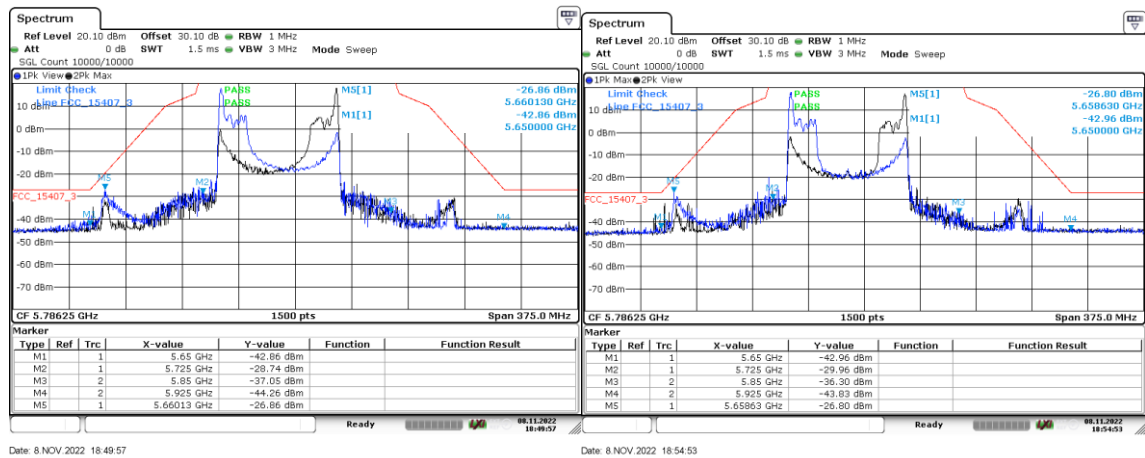
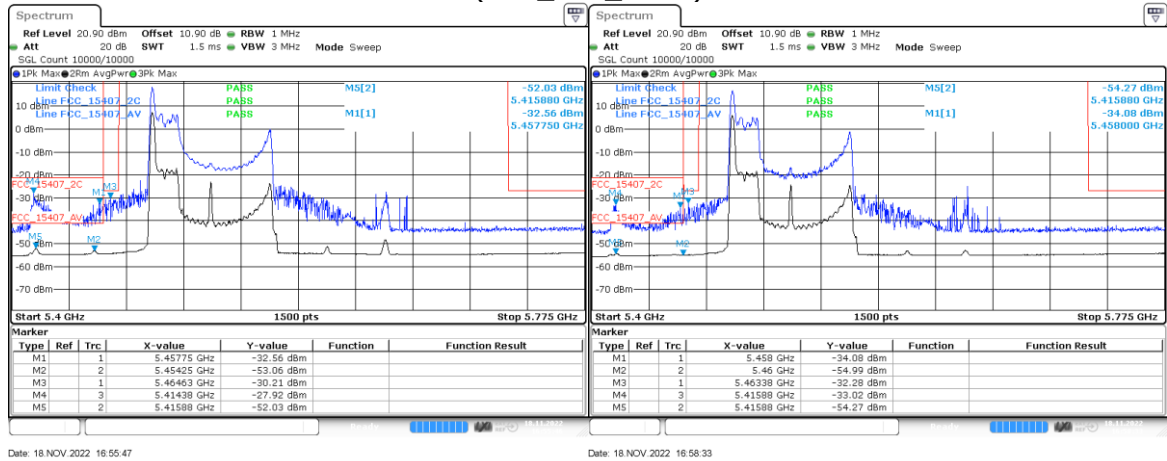




# Radio Technology = WLAN ax 80 MHz MIMO, lowest single RU (S01\_374\_BA01)



## 5.8.5 TEST EQUIPMENT USED

- Radiated Emissions FAR 5 GHz FCC
- R&S TS8997
- Radio Lab

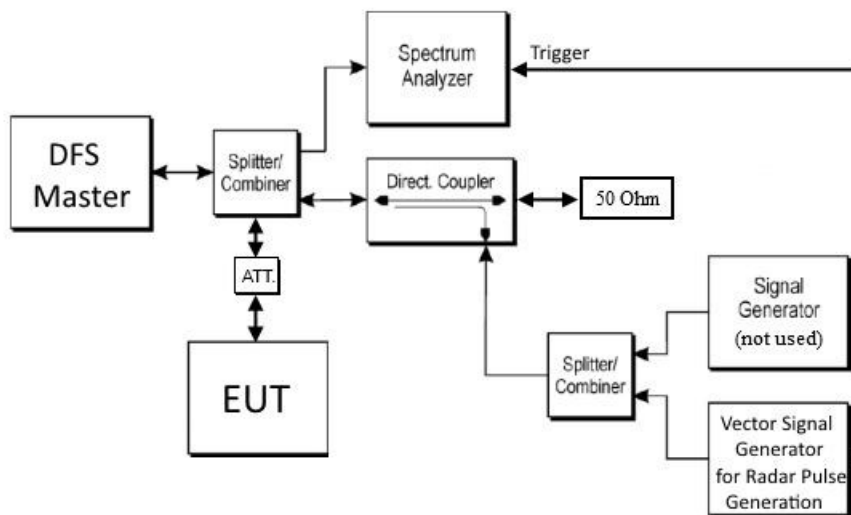
## 5.9 DYNAMIC FREQUENCY SELECTION

Standard **FCC Part 15 Subpart E**

**The test was performed according to:**  
KDB 905462 D02

### 5.9.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up in a shielded room for the DFS measurements. Since the EUT is a slave device without radar detection, it was connected to another device acting as master with radar detection.



After setting up a connection to the Master using the maximum supported bandwidth of the EUT, a radar pulse of type 0 was sent from the vector signal generator.

At the same time the spectrum analyser is triggered by the vector signal generator and a trace is recorded:

Analyzer settings:

- Resolution Bandwidth (RBW): 3 MHz
- Video Bandwidth (VBW): 3 MHz
- Trace: Clear/Write
- Sweeps: Single Sweep
- Sweptime: 20 s
- Detector: Peak
- Trigger: External

In addition to the plot also the trace data is recorded to calculate the Channel Closing Time.

Afterwards the test is repeated with a sweep time of 32 minutes to monitor the Non-occupancy period.

## 5.9.2 TEST REQUIREMENTS / LIMITS

Limits according KDB 905462 D02 UNII DFS Compliance Procedures New Rules

| Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Value                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| <i>Non-occupancy period</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Minimum 30 minutes                                                                                        |
| <i>Channel Availability Check Time</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 60 seconds                                                                                                |
| <i>Channel Move Time</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10 seconds<br>See Note 1.                                                                                 |
| <i>Channel Closing Transmission Time</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period.<br>See Notes 1 and 2. |
| <p><b>Note 1:</b> <i>Channel Move Time</i> and the <i>Channel Closing Transmission Time</i> should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.</p> <p><b>Note 2:</b> The <i>Channel Closing Transmission Time</i> is comprised of 200 milliseconds starting at the beginning of the <i>Channel Move Time</i> plus any additional intermittent control signals required to facilitate a <i>Channel</i> move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.</p> |                                                                                                           |

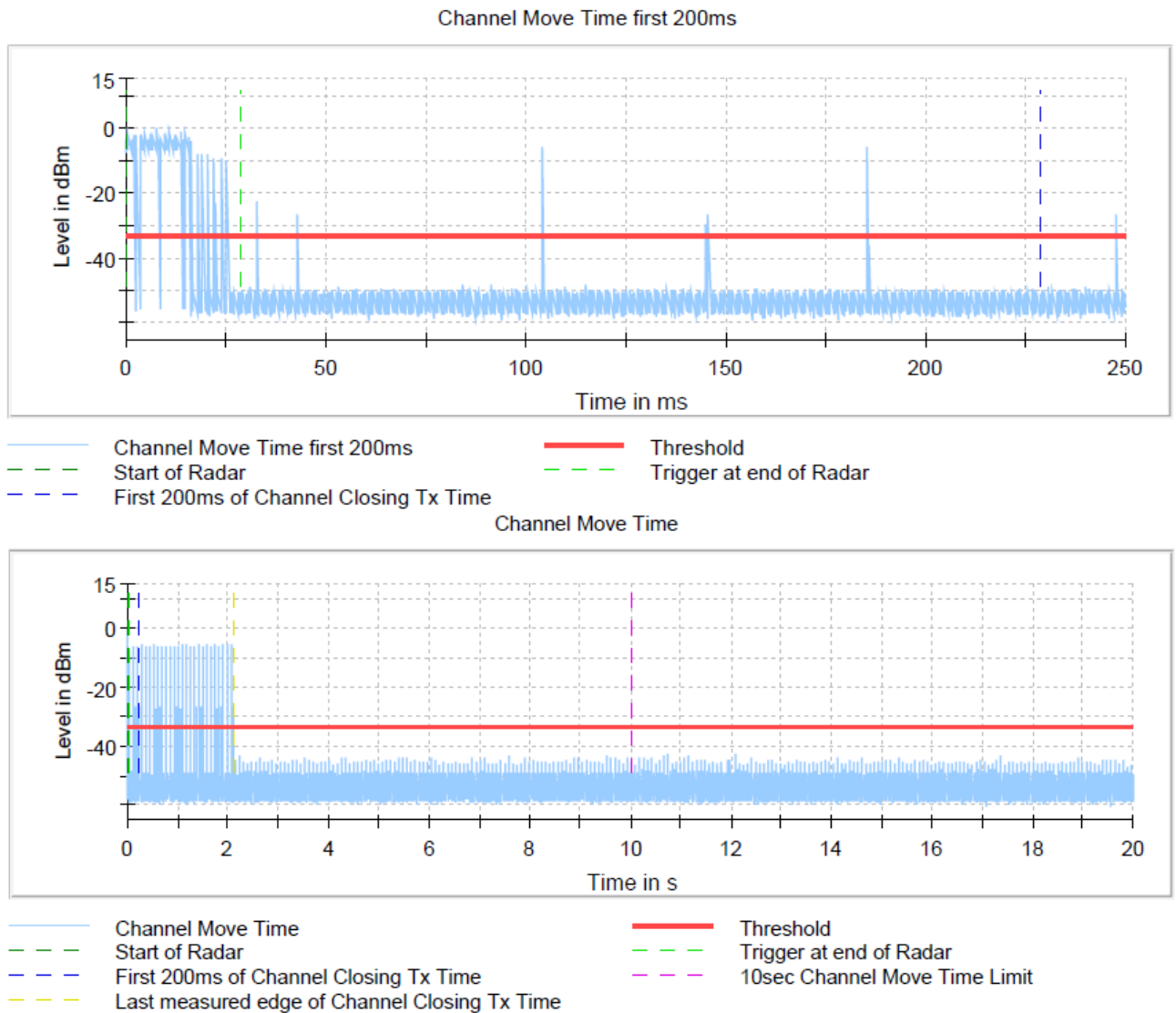
## 5.9.3 TEST PROTOCOL

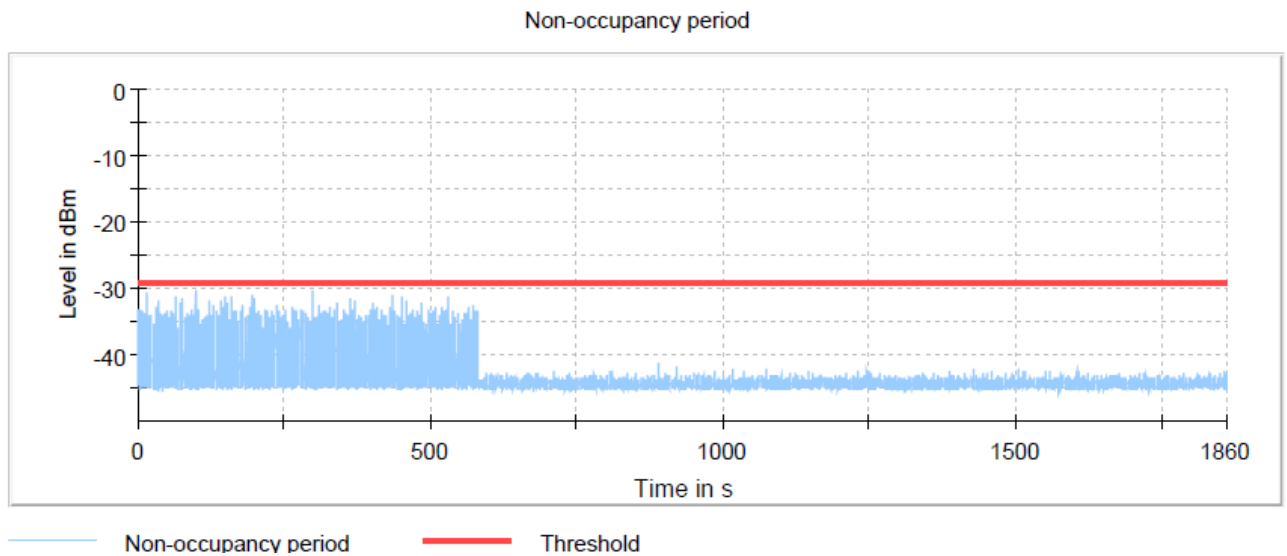
**Ambient temperature:** 24 °C  
**Air Pressure:** 1008 hPa  
**Humidity:** 40 %

| WLAN ac-Mode; 80 MHz |                        |                                                                               |            |             |                               |                                           |
|----------------------|------------------------|-------------------------------------------------------------------------------|------------|-------------|-------------------------------|-------------------------------------------|
| Ch. No.              | Ch. Center Freq. [MHz] | Aggregate Transmission Time from 200 ms to 10 s after end of radar pulse [ms] | Limit [ms] | Margin [ms] | Channel move time within 10 s | Transmissions within Non-occupancy period |
| 106                  | 5530                   | 10.664                                                                        | 60.0       | 49.3        | yes                           | none                                      |

Remark: Used Master device: Linksys WRT3200ACM, S/N: 1981160B900782, SW: 1.0.8.199531,  
FCC ID: Q87-WRT3200ACM  
Please see next sub-clause for the measurement plot.

#### 5.9.4 MEASUREMENT PLOTS





#### 5.9.5 TEST EQUIPMENT USED

- R&S TS8997

## 6 TEST EQUIPMENT

- 1 Conducted Emissions FCC  
Conducted Emissions AC Mains for FCC standards

| Ref.No. | Device Name          | Description                      | Manufacturer                        | Serial Number | Last Calibration | Calibration Due |
|---------|----------------------|----------------------------------|-------------------------------------|---------------|------------------|-----------------|
| 1.1     | MFS                  | Rubidium Frequency Normal MFS    | Datum GmbH                          | 002           | 2021-11          | 2022-11         |
| 1.2     | Opus10 TPR (8253.00) | T/P Logger 13                    | Lufft Mess- und Regeltechnik GmbH   | 13936         | 2021-10          | 2023-10         |
| 1.3     | Chroma 6404          | AC Source                        | Chroma ATE INC.                     | 64040001304   |                  |                 |
| 1.4     | Shielded Room 02     | Shielded Room 4m x 3m            | Frankonia Germany EMC Solution GmbH | -             |                  |                 |
| 1.5     | ESH3-Z5              | Two-Line V-Network (EUT)         | Rohde & Schwarz GmbH & Co. KG       | 829996/002    | 2021-08          | 2023-08         |
| 1.6     | ESR 7                | EMI Receiver / Spectrum Analyzer | Rohde & Schwarz                     | 101424        | 2021-01          | 2023-01         |
| 1.7     | Opus10 THI (8152.00) | T/H Logger 02                    | Lufft Mess- und Regeltechnik GmbH   | 7489          | 2021-10          | 2023-10         |

- 2 R&S TS8997  
2.4 and 5 GHz Bands Conducted Test Lab

| Ref.No. | Device Name          | Description                                        | Manufacturer                      | Serial Number | Last Calibration | Calibration Due |
|---------|----------------------|----------------------------------------------------|-----------------------------------|---------------|------------------|-----------------|
| 2.1     | MFS                  | Rubidium Frequency Normal MFS                      | Datum GmbH                        | 002           | 2021-11          | 2022-11         |
| 2.2     | Opus10 TPR (8253.00) | T/P Logger 13                                      | Lufft Mess- und Regeltechnik GmbH | 13936         | 2021-10          | 2023-10         |
| 2.3     | SMB100A              | Signal Generator 9 kHz - 6 GHz                     | Rohde & Schwarz                   | 107695        | 2021-06          | 2024-06         |
| 2.4     | NGSM 32/10           | Power Supply                                       | Rohde & Schwarz GmbH & Co. KG     | 3456          | 2022-01          | 2024-01         |
| 2.5     | FSW43                | Signal analyser                                    | Rohde & Schwarz GmbH & Co. KG     | 102013        | 2021-06          | 2023-06         |
| 2.6     | Opus10 THI (8152.00) | T/H Logger 14                                      | Lufft Mess- und Regeltechnik GmbH | 13993         | 2021-08          | 2023-08         |
| 2.7     | SMBV100A             | Vector Signal Generator 9 kHz - 6 GHz              | Rohde & Schwarz                   | 259291        | 2019-11          | 2022-11         |
| 2.8     | OSP120               | Contains Power Meter and Switching Unit OSP-B157W8 | Rohde & Schwarz                   | 101158        | 2021-08          | 2024-08         |

3 Radiated Emissions FAR 5 GHz FCC  
Radiated Emissions Tests for 5 GHz bands in a fully anechoic room

| Ref.No. | Device Name             | Description                                              | Manufacturer                        | Serial Number          | Last Calibration | Calibration Due |
|---------|-------------------------|----------------------------------------------------------|-------------------------------------|------------------------|------------------|-----------------|
| 3.1     | Opus10 TPR (8253.00)    | T/P Logger 13                                            | Lufft Mess- und Regeltechnik GmbH   | 13936                  | 2021-10          | 2023-10         |
| 3.2     | AMF-7D00101800-30-10P-R | Broadband Amplifier 100 MHz - 18 GHz                     | Miteq                               |                        |                  |                 |
| 3.3     | Anechoic Chamber 03     | FAR, 8.80m x 4.60m x 4.05m (l x w x h)                   | Albatross Projects                  | P26971-647-001-PRB     | 2021-04          | 2023-04         |
| 3.4     | Fluke 177               | Digital Multimeter 03 (Multimeter)                       | Fluke Europe B.V.                   | 86670383               | 2022-06          | 2024-06         |
| 3.5     | JS4-18002600-32-5P      | Broadband Amplifier 18 GHz - 26 GHz                      | Miteq                               | 849785                 |                  |                 |
| 3.6     | FSW 43                  | Spectrum Analyzer                                        | Rohde & Schwarz                     | 103779                 | 2021-06          | 2023-06         |
| 3.7     | EP 1200/B, NA/B1        | AC Source, Amplifier with integrated variable Oscillator | Spitzenberger & Spies GmbH & Co. KG | B6278                  |                  |                 |
| 3.8     | 3160-09                 | Standard Gain / Pyramidal Horn Antenna 26.5 GHz          | EMCO Elektronik GmbH                | 00083069               |                  |                 |
| 3.9     | WHKX 7.0/18G-8SS        | High Pass Filter                                         | Wainwright Instruments GmbH         | 09                     |                  |                 |
| 3.10    | TT 1.5 WI               | Turn Table                                               | Maturo GmbH                         | -                      |                  |                 |
| 3.11    | 3160-10                 | Standard Gain / Pyramidal Horn Antenna 40 GHz            | EMCO Elektronik GmbH                | 00086675               |                  |                 |
| 3.12    | Opus 20 THI (8120.00)   | ThermoHygro Datalogger                                   | Lufft Mess- und Regeltechnik GmbH   | 115.0318.0802.033      | 2020-10          | 2022-10         |
| 3.13    | TD1.5-10kg              | EUT Tilt Device (Rohacell)                               | Maturo GmbH                         | TD1.5-10kg/024/3790709 |                  |                 |
| 3.14    | PAS 2.5 - 10 kg         | Antenna Mast                                             | Maturo GmbH                         | -                      |                  |                 |
| 3.15    | AFS42-00101800-25-S-42  | Broadband Amplifier 25 MHz - 18 GHz                      | Miteq                               | 2035324                |                  |                 |
| 3.16    | HF 907                  | Double-ridged horn                                       | Rohde & Schwarz                     | 102444                 | 2021-09          | 2024-09         |

4 Radiated Emissions SAC H-Field  
Radiated emission tests in the H-Field in a semi anechoic room

| Ref.No. | Device Name          | Description                                              | Manufacturer                        | Serial Number | Last Calibration | Calibration Due |
|---------|----------------------|----------------------------------------------------------|-------------------------------------|---------------|------------------|-----------------|
| 4.1     | Opus10 TPR (8253.00) | T/P Logger 13                                            | Lufft Mess- und Regeltechnik GmbH   | 13936         | 2021-10          | 2023-10         |
| 4.2     | ESW44                | EMI Receiver / Spectrum Analyzer                         | Rohde & Schwarz GmbH & Co. KG       | 101603        | 2022-01          | 2024-01         |
| 4.3     | Anechoic Chamber 01  | SAC/FAR, 10.58 m x 6.38 m x 6.00 m                       | Frankonia                           | none          |                  |                 |
| 4.4     | Opus10 THI (8152.00) | T/H Logger 10                                            | Lufft Mess- und Regeltechnik GmbH   | 12488         | 2021-08          | 2023-08         |
| 4.5     | EP 1200/B, NA/B1     | AC Source, Amplifier with integrated variable Oscillator | Spitzenberger & Spies GmbH & Co. KG | B6278         |                  |                 |
| 4.6     | DS 420S              | Turn Table 2 m diameter                                  | HD GmbH                             | 420/573/99    |                  |                 |
| 4.7     | HFH2-Z2              | Loop Antenna + 3 Axis Tripod                             | Rohde & Schwarz GmbH & Co. KG       | 829324/006    | 2021-01          | 2024-01         |

5 Radiated Emissions SAC up to 1 GHz  
Radiated emission tests up to 1 GHz in a semi anechoic room

| Ref.No. | Device Name          | Description                                                        | Manufacturer                        | Serial Number       | Last Calibration | Calibration Due |
|---------|----------------------|--------------------------------------------------------------------|-------------------------------------|---------------------|------------------|-----------------|
| 5.1     | Opus10 TPR (8253.00) | T/P Logger 13                                                      | Lufft Mess- und Regeltechnik GmbH   | 13936               | 2021-10          | 2023-10         |
| 5.2     | ESW44                | EMI Receiver / Spectrum Analyzer                                   | Rohde & Schwarz GmbH & Co. KG       | 101603              | 2022-01          | 2024-01         |
| 5.3     | Anechoic Chamber 01  | SAC/FAR, 10.58 m x 6.38 m x 6.00 m                                 | Frankonia                           | none                |                  |                 |
| 5.4     | HL 562 ULTRALOG      | Biconical-log-per antenna (30 MHz - 3 GHz) with HL 562E biconicals | Rohde & Schwarz GmbH & Co. KG       | 830547/003          | 2021-09          | 2024-09         |
| 5.5     | Opus10 THI (8152.00) | T/H Logger 10                                                      | Lufft Mess- und Regeltechnik GmbH   | 12488               | 2021-08          | 2023-08         |
| 5.6     | EP 1200/B, NA/B1     | AC Source, Amplifier with integrated variable Oscillator           | Spitzenberger & Spies GmbH & Co. KG | B6278               |                  |                 |
| 5.7     | DS 420S              | Turn Table 2 m diameter                                            | HD GmbH                             | 420/573/99          |                  |                 |
| 5.8     | AM 4.0               | Antenna Mast 4 m                                                   | Maturo GmbH                         | AM4.0/180/1192 0513 |                  |                 |

6 Radio Lab  
Conducted Radio Test Lab

| Ref.No. | Device Name          | Description                    | Manufacturer                      | Serial Number | Last Calibration | Calibration Due |
|---------|----------------------|--------------------------------|-----------------------------------|---------------|------------------|-----------------|
| 6.1     | MFS                  | Rubidium Frequency Normal MFS  | Datum GmbH                        | 002           | 2021-11          | 2022-11         |
| 6.2     | FSV30                | Signal Analyzer 10 Hz - 30 GHz | Rohde & Schwarz                   | 103005        | 2022-06          | 2024-06         |
| 6.3     | Opus10 THI (8152.00) | T/H Logger 03                  | Lufft Mess- und Regeltechnik GmbH | 7482          | 2021-09          | 2023-09         |

The calibration interval is the time interval between "Last Calibration" and "Calibration Due"

## 7 ANTENNA FACTORS, CABLE LOSS AND SAMPLE CALCULATIONS

This chapter contains the antenna factors with their corresponding path loss of the used measurement path for all antennas as well as the insertion loss of the LISN.

### 7.1 LISN R&S ESH3-Z5 (150 KHZ – 30 MHZ)

| Frequency |  | Corr. | LISN<br>insertion<br>loss<br>ESH3-<br>Z5 | cable<br>loss<br>(incl. 10<br>dB<br>atten-<br>uator) |
|-----------|--|-------|------------------------------------------|------------------------------------------------------|
| MHz       |  | dB    | dB                                       | dB                                                   |
| 0.15      |  | 10.1  | 0.1                                      | 10.0                                                 |
| 5         |  | 10.3  | 0.1                                      | 10.2                                                 |
| 7         |  | 10.5  | 0.2                                      | 10.3                                                 |
| 10        |  | 10.5  | 0.2                                      | 10.3                                                 |
| 12        |  | 10.7  | 0.3                                      | 10.4                                                 |
| 14        |  | 10.7  | 0.3                                      | 10.4                                                 |
| 16        |  | 10.8  | 0.4                                      | 10.4                                                 |
| 18        |  | 10.9  | 0.4                                      | 10.5                                                 |
| 20        |  | 10.9  | 0.4                                      | 10.5                                                 |
| 22        |  | 11.1  | 0.5                                      | 10.6                                                 |
| 24        |  | 11.1  | 0.5                                      | 10.6                                                 |
| 26        |  | 11.2  | 0.5                                      | 10.7                                                 |
| 28        |  | 11.2  | 0.5                                      | 10.7                                                 |
| 30        |  | 11.3  | 0.5                                      | 10.8                                                 |

#### Sample calculation

$$U_{\text{LISN}} (\text{dB } \mu\text{V}) = U (\text{dB } \mu\text{V}) + \text{Corr. (dB)}$$

U = Receiver reading

LISN Insertion loss = Voltage Division Factor of LISN

Corr. = sum of single correction factors of used LISN, cables, switch units (if used)

Linear interpolation will be used for frequencies in between the values in the table.

## 7.2 ANTENNA R&S HFH2-Z2 (9 KHZ – 30 MHZ)

| Frequency | AF       | Corr. | cable loss 1     | cable loss 2      | cable loss 3  | cable loss 4  | distance corr.  | d <sub>Limit</sub>       | d <sub>used</sub>       |
|-----------|----------|-------|------------------|-------------------|---------------|---------------|-----------------|--------------------------|-------------------------|
| MHz       | dB (1/m) | dB    | (inside chamber) | (outside chamber) | (switch unit) | (to receiver) | (-40 dB/decade) | (meas. distance (limit)) | (meas. distance (used)) |
|           |          |       | dB               | dB                | dB            | dB            | dB              | m                        | m                       |
| 0.009     | 20.50    | -79.6 | 0.1              | 0.1               | 0.1           | 0.1           | -80             | 300                      | 3                       |
| 0.01      | 20.45    | -79.6 | 0.1              | 0.1               | 0.1           | 0.1           | -80             | 300                      | 3                       |
| 0.015     | 20.37    | -79.6 | 0.1              | 0.1               | 0.1           | 0.1           | -80             | 300                      | 3                       |
| 0.02      | 20.36    | -79.6 | 0.1              | 0.1               | 0.1           | 0.1           | -80             | 300                      | 3                       |
| 0.025     | 20.38    | -79.6 | 0.1              | 0.1               | 0.1           | 0.1           | -80             | 300                      | 3                       |
| 0.03      | 20.32    | -79.6 | 0.1              | 0.1               | 0.1           | 0.1           | -80             | 300                      | 3                       |
| 0.05      | 20.35    | -79.6 | 0.1              | 0.1               | 0.1           | 0.1           | -80             | 300                      | 3                       |
| 0.08      | 20.30    | -79.6 | 0.1              | 0.1               | 0.1           | 0.1           | -80             | 300                      | 3                       |
| 0.1       | 20.20    | -79.6 | 0.1              | 0.1               | 0.1           | 0.1           | -80             | 300                      | 3                       |
| 0.2       | 20.17    | -79.6 | 0.1              | 0.1               | 0.1           | 0.1           | -80             | 300                      | 3                       |
| 0.3       | 20.14    | -79.6 | 0.1              | 0.1               | 0.1           | 0.1           | -80             | 300                      | 3                       |
| 0.49      | 20.12    | -79.6 | 0.1              | 0.1               | 0.1           | 0.1           | -80             | 300                      | 3                       |
| 0.490001  | 20.12    | -39.6 | 0.1              | 0.1               | 0.1           | 0.1           | -40             | 30                       | 3                       |
| 0.5       | 20.11    | -39.6 | 0.1              | 0.1               | 0.1           | 0.1           | -40             | 30                       | 3                       |
| 0.8       | 20.10    | -39.6 | 0.1              | 0.1               | 0.1           | 0.1           | -40             | 30                       | 3                       |
| 1         | 20.09    | -39.6 | 0.1              | 0.1               | 0.1           | 0.1           | -40             | 30                       | 3                       |
| 2         | 20.08    | -39.6 | 0.1              | 0.1               | 0.1           | 0.1           | -40             | 30                       | 3                       |
| 3         | 20.06    | -39.6 | 0.1              | 0.1               | 0.1           | 0.1           | -40             | 30                       | 3                       |
| 4         | 20.05    | -39.5 | 0.2              | 0.1               | 0.1           | 0.1           | -40             | 30                       | 3                       |
| 5         | 20.05    | -39.5 | 0.2              | 0.1               | 0.1           | 0.1           | -40             | 30                       | 3                       |
| 6         | 20.02    | -39.5 | 0.2              | 0.1               | 0.1           | 0.1           | -40             | 30                       | 3                       |
| 8         | 19.95    | -39.5 | 0.2              | 0.1               | 0.1           | 0.1           | -40             | 30                       | 3                       |
| 10        | 19.83    | -39.4 | 0.2              | 0.1               | 0.2           | 0.1           | -40             | 30                       | 3                       |
| 12        | 19.71    | -39.4 | 0.2              | 0.1               | 0.2           | 0.1           | -40             | 30                       | 3                       |
| 14        | 19.54    | -39.4 | 0.2              | 0.1               | 0.2           | 0.1           | -40             | 30                       | 3                       |
| 16        | 19.53    | -39.3 | 0.3              | 0.1               | 0.2           | 0.1           | -40             | 30                       | 3                       |
| 18        | 19.50    | -39.3 | 0.3              | 0.1               | 0.2           | 0.1           | -40             | 30                       | 3                       |
| 20        | 19.57    | -39.3 | 0.3              | 0.1               | 0.2           | 0.1           | -40             | 30                       | 3                       |
| 22        | 19.61    | -39.3 | 0.3              | 0.1               | 0.2           | 0.1           | -40             | 30                       | 3                       |
| 24        | 19.61    | -39.3 | 0.3              | 0.1               | 0.2           | 0.1           | -40             | 30                       | 3                       |
| 26        | 19.54    | -39.3 | 0.3              | 0.1               | 0.2           | 0.1           | -40             | 30                       | 3                       |
| 28        | 19.46    | -39.2 | 0.3              | 0.1               | 0.3           | 0.1           | -40             | 30                       | 3                       |
| 30        | 19.73    | -39.1 | 0.4              | 0.1               | 0.3           | 0.1           | -40             | 30                       | 3                       |

### Sample calculation

$E \text{ (dB } \mu\text{V/m)} = U \text{ (dB } \mu\text{V)} + AF \text{ (dB 1/m)} + Corr. \text{ (dB)}$

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)

distance correction =  $-40 * \text{LOG}(d_{\text{Limit}}/d_{\text{used}})$

Linear interpolation will be used for frequencies in between the values in the table.

Table shows an extract of values

### 7.3 ANTENNA R&S HL562 (30 MHZ – 1 GHZ)

( $d_{\text{Limit}} = 3 \text{ m}$ )

| Frequency | AF<br>R&S<br>HL562 | Corr. |
|-----------|--------------------|-------|
| MHz       | dB (1/m)           | dB    |
| 30        | 18.6               | 0.6   |
| 50        | 6.0                | 0.9   |
| 100       | 9.7                | 1.2   |
| 150       | 7.9                | 1.6   |
| 200       | 7.6                | 1.9   |
| 250       | 9.5                | 2.1   |
| 300       | 11.0               | 2.3   |
| 350       | 12.4               | 2.6   |
| 400       | 13.6               | 2.9   |
| 450       | 14.7               | 3.1   |
| 500       | 15.6               | 3.2   |
| 550       | 16.3               | 3.5   |
| 600       | 17.2               | 3.5   |
| 650       | 18.1               | 3.6   |
| 700       | 18.5               | 3.6   |
| 750       | 19.1               | 4.1   |
| 800       | 19.6               | 4.1   |
| 850       | 20.1               | 4.4   |
| 900       | 20.8               | 4.7   |
| 950       | 21.1               | 4.8   |
| 1000      | 21.6               | 4.9   |

| cable<br>loss 1<br>(inside<br>chamber) | cable<br>loss 2<br>(outside<br>chamber) | cable<br>loss 3<br>(switch<br>unit) | cable<br>loss 4<br>(to<br>receiver) | distance<br>corr.<br>(-20 dB/<br>decade) | $d_{\text{Limit}}$<br>(meas.<br>distance<br>(limit)) | $d_{\text{used}}$<br>(meas.<br>distance<br>(used)) |
|----------------------------------------|-----------------------------------------|-------------------------------------|-------------------------------------|------------------------------------------|------------------------------------------------------|----------------------------------------------------|
| dB                                     | dB                                      | dB                                  | dB                                  | dB                                       | m                                                    | m                                                  |
| 0.29                                   | 0.04                                    | 0.23                                | 0.02                                | 0.0                                      | 3                                                    | 3                                                  |
| 0.39                                   | 0.09                                    | 0.32                                | 0.08                                | 0.0                                      | 3                                                    | 3                                                  |
| 0.56                                   | 0.14                                    | 0.47                                | 0.08                                | 0.0                                      | 3                                                    | 3                                                  |
| 0.73                                   | 0.20                                    | 0.59                                | 0.12                                | 0.0                                      | 3                                                    | 3                                                  |
| 0.84                                   | 0.21                                    | 0.70                                | 0.11                                | 0.0                                      | 3                                                    | 3                                                  |
| 0.98                                   | 0.24                                    | 0.80                                | 0.13                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.04                                   | 0.26                                    | 0.89                                | 0.15                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.18                                   | 0.31                                    | 0.96                                | 0.13                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.28                                   | 0.35                                    | 1.03                                | 0.19                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.39                                   | 0.38                                    | 1.11                                | 0.22                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.44                                   | 0.39                                    | 1.20                                | 0.19                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.55                                   | 0.46                                    | 1.24                                | 0.23                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.59                                   | 0.43                                    | 1.29                                | 0.23                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.67                                   | 0.34                                    | 1.35                                | 0.22                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.67                                   | 0.42                                    | 1.41                                | 0.15                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.87                                   | 0.54                                    | 1.46                                | 0.25                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.90                                   | 0.46                                    | 1.51                                | 0.25                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.99                                   | 0.60                                    | 1.56                                | 0.27                                | 0.0                                      | 3                                                    | 3                                                  |
| 2.14                                   | 0.60                                    | 1.63                                | 0.29                                | 0.0                                      | 3                                                    | 3                                                  |
| 2.22                                   | 0.60                                    | 1.66                                | 0.33                                | 0.0                                      | 3                                                    | 3                                                  |
| 2.23                                   | 0.61                                    | 1.71                                | 0.30                                | 0.0                                      | 3                                                    | 3                                                  |

( $d_{\text{Limit}} = 10 \text{ m}$ )

|      |      |      |
|------|------|------|
| 30   | 18.6 | -9.9 |
| 50   | 6.0  | -9.6 |
| 100  | 9.7  | -9.2 |
| 150  | 7.9  | -8.8 |
| 200  | 7.6  | -8.6 |
| 250  | 9.5  | -8.3 |
| 300  | 11.0 | -8.1 |
| 350  | 12.4 | -7.9 |
| 400  | 13.6 | -7.6 |
| 450  | 14.7 | -7.4 |
| 500  | 15.6 | -7.2 |
| 550  | 16.3 | -7.0 |
| 600  | 17.2 | -6.9 |
| 650  | 18.1 | -6.9 |
| 700  | 18.5 | -6.8 |
| 750  | 19.1 | -6.3 |
| 800  | 19.6 | -6.3 |
| 850  | 20.1 | -6.0 |
| 900  | 20.8 | -5.8 |
| 950  | 21.1 | -5.6 |
| 1000 | 21.6 | -5.6 |

|      |      |      |      |       |    |   |
|------|------|------|------|-------|----|---|
| 0.29 | 0.04 | 0.23 | 0.02 | -10.5 | 10 | 3 |
| 0.39 | 0.09 | 0.32 | 0.08 | -10.5 | 10 | 3 |
| 0.56 | 0.14 | 0.47 | 0.08 | -10.5 | 10 | 3 |
| 0.73 | 0.20 | 0.59 | 0.12 | -10.5 | 10 | 3 |
| 0.84 | 0.21 | 0.70 | 0.11 | -10.5 | 10 | 3 |
| 0.98 | 0.24 | 0.80 | 0.13 | -10.5 | 10 | 3 |
| 1.04 | 0.26 | 0.89 | 0.15 | -10.5 | 10 | 3 |
| 1.18 | 0.31 | 0.96 | 0.13 | -10.5 | 10 | 3 |
| 1.28 | 0.35 | 1.03 | 0.19 | -10.5 | 10 | 3 |
| 1.39 | 0.38 | 1.11 | 0.22 | -10.5 | 10 | 3 |
| 1.44 | 0.39 | 1.20 | 0.19 | -10.5 | 10 | 3 |
| 1.55 | 0.46 | 1.24 | 0.23 | -10.5 | 10 | 3 |
| 1.59 | 0.43 | 1.29 | 0.23 | -10.5 | 10 | 3 |
| 1.67 | 0.34 | 1.35 | 0.22 | -10.5 | 10 | 3 |
| 1.67 | 0.42 | 1.41 | 0.15 | -10.5 | 10 | 3 |
| 1.87 | 0.54 | 1.46 | 0.25 | -10.5 | 10 | 3 |
| 1.90 | 0.46 | 1.51 | 0.25 | -10.5 | 10 | 3 |
| 1.99 | 0.60 | 1.56 | 0.27 | -10.5 | 10 | 3 |
| 2.14 | 0.60 | 1.63 | 0.29 | -10.5 | 10 | 3 |
| 2.22 | 0.60 | 1.66 | 0.33 | -10.5 | 10 | 3 |
| 2.23 | 0.61 | 1.71 | 0.30 | -10.5 | 10 | 3 |

#### Sample calculation

$E \text{ (dB } \mu\text{V/m)} = U \text{ (dB } \mu\text{V)} + \text{AF (dB 1/m)} + \text{Corr. (dB)}$   
 $U$  = Receiver reading  
 $\text{AF}$  = Antenna factor  
 $\text{Corr.}$  = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)  
 $\text{distance correction} = -20 * \text{LOG} (d_{\text{Limit}} / d_{\text{used}})$   
 Linear interpolation will be used for frequencies in between the values in the table.  
 Tables show an extract of values.

#### 7.4 ANTENNA R&S HF907 (1 GHZ – 18 GHZ)

| Frequency | AF<br>R&S<br>HF907 | Corr. |
|-----------|--------------------|-------|
| MHz       | dB (1/m)           | dB    |
| 1000      | 24.4               | -19.4 |
| 2000      | 28.5               | -17.4 |
| 3000      | 31.0               | -16.1 |
| 4000      | 33.1               | -14.7 |
| 5000      | 34.4               | -13.7 |
| 6000      | 34.7               | -12.7 |
| 7000      | 35.6               | -11.0 |

| cable<br>loss 1<br>(relay +<br>cable<br>inside<br>chamber) | cable<br>loss 2<br>(outside<br>chamber) | cable<br>loss 3<br>(switch<br>unit,<br>atten-<br>uator &<br>pre-amp) | cable<br>loss 4 (to<br>receiver) |  |  |
|------------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------|----------------------------------|--|--|
| dB                                                         | dB                                      | dB                                                                   | dB                               |  |  |
| 0.99                                                       | 0.31                                    | -21.51                                                               | 0.79                             |  |  |
| 1.44                                                       | 0.44                                    | -20.63                                                               | 1.38                             |  |  |
| 1.87                                                       | 0.53                                    | -19.85                                                               | 1.33                             |  |  |
| 2.41                                                       | 0.67                                    | -19.13                                                               | 1.31                             |  |  |
| 2.78                                                       | 0.86                                    | -18.71                                                               | 1.40                             |  |  |
| 2.74                                                       | 0.90                                    | -17.83                                                               | 1.47                             |  |  |
| 2.82                                                       | 0.86                                    | -16.19                                                               | 1.46                             |  |  |

| Frequency | AF<br>R&S<br>HF907 | Corr. |
|-----------|--------------------|-------|
| MHz       | dB (1/m)           | dB    |
| 3000      | 31.0               | -23.4 |
| 4000      | 33.1               | -23.3 |
| 5000      | 34.4               | -21.7 |
| 6000      | 34.7               | -21.2 |
| 7000      | 35.6               | -19.8 |

| cable<br>loss 1<br>(relay<br>inside<br>chamber) | cable<br>loss 2<br>(inside<br>chamber) | cable<br>loss 3<br>(outside<br>chamber) | cable<br>loss 4<br>(switch<br>unit,<br>atten-<br>uator &<br>pre-amp) | cable<br>loss 5 (to<br>receiver) | used<br>for<br>FCC<br>15.247 |
|-------------------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------------------------------------|----------------------------------|------------------------------|
| dB                                              | dB                                     | dB                                      | dB                                                                   | dB                               |                              |
| 0.47                                            | 1.87                                   | 0.53                                    | -27.58                                                               | 1.33                             |                              |
| 0.56                                            | 2.41                                   | 0.67                                    | -28.23                                                               | 1.31                             |                              |
| 0.61                                            | 2.78                                   | 0.86                                    | -27.35                                                               | 1.40                             |                              |
| 0.58                                            | 2.74                                   | 0.90                                    | -26.89                                                               | 1.47                             |                              |
| 0.66                                            | 2.82                                   | 0.86                                    | -25.58                                                               | 1.46                             |                              |

| Frequency | AF<br>R&S<br>HF907 | Corr. |
|-----------|--------------------|-------|
| MHz       | dB (1/m)           | dB    |
| 7000      | 35.6               | -57.3 |
| 8000      | 36.3               | -56.3 |
| 9000      | 37.1               | -55.3 |
| 10000     | 37.5               | -56.2 |
| 11000     | 37.5               | -55.3 |
| 12000     | 37.6               | -53.7 |
| 13000     | 38.2               | -53.5 |
| 14000     | 39.9               | -56.3 |
| 15000     | 40.9               | -54.1 |
| 16000     | 41.3               | -54.1 |
| 17000     | 42.8               | -54.4 |
| 18000     | 44.2               | -54.7 |

| cable<br>loss 1<br>(relay<br>inside<br>chamber) | cable<br>loss 2<br>(High<br>Pass) | cable<br>loss 3<br>(pre-<br>amp) | cable<br>loss 4<br>(inside<br>chamber) | cable<br>loss 5<br>(outside<br>chamber) | cable<br>loss 6<br>(to<br>receiver) |
|-------------------------------------------------|-----------------------------------|----------------------------------|----------------------------------------|-----------------------------------------|-------------------------------------|
| dB                                              | dB                                | dB                               | dB                                     | dB                                      | dB                                  |
| 0.56                                            | 1.28                              | -62.72                           | 2.66                                   | 0.94                                    | 1.46                                |
| 0.69                                            | 0.71                              | -61.49                           | 2.84                                   | 1.00                                    | 1.53                                |
| 0.68                                            | 0.65                              | -60.80                           | 3.06                                   | 1.09                                    | 1.60                                |
| 0.70                                            | 0.54                              | -61.91                           | 3.28                                   | 1.20                                    | 1.67                                |
| 0.80                                            | 0.61                              | -61.40                           | 3.43                                   | 1.27                                    | 1.70                                |
| 0.84                                            | 0.42                              | -59.70                           | 3.53                                   | 1.26                                    | 1.73                                |
| 0.83                                            | 0.44                              | -59.81                           | 3.75                                   | 1.32                                    | 1.83                                |
| 0.91                                            | 0.53                              | -63.03                           | 3.91                                   | 1.40                                    | 1.77                                |
| 0.98                                            | 0.54                              | -61.05                           | 4.02                                   | 1.44                                    | 1.83                                |
| 1.23                                            | 0.49                              | -61.51                           | 4.17                                   | 1.51                                    | 1.85                                |
| 1.36                                            | 0.76                              | -62.36                           | 4.34                                   | 1.53                                    | 2.00                                |
| 1.70                                            | 0.53                              | -62.88                           | 4.41                                   | 1.55                                    | 1.91                                |

#### Sample calculation

$E \text{ (dB } \mu\text{V/m)} = U \text{ (dB } \mu\text{V)} + AF \text{ (dB 1/m)} + Corr. \text{ (dB)}$

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)

Linear interpolation will be used for frequencies in between the values in the table.

Tables show an extract of values.

## 7.5 ANTENNA EMCO 3160-09 (18 GHZ – 26.5 GHZ)

| Frequency | AF<br>EMCO<br>3160-09 | Corr. | cable<br>loss 1<br>(inside<br>chamber) | cable<br>loss 2<br>(pre-<br>amp) | cable<br>loss 3<br>(inside<br>chamber) | cable<br>loss 4<br>(switch<br>unit) | cable<br>loss 5<br>(to<br>receiver) |
|-----------|-----------------------|-------|----------------------------------------|----------------------------------|----------------------------------------|-------------------------------------|-------------------------------------|
| MHz       | dB (1/m)              | dB    | dB                                     | dB                               | dB                                     | dB                                  | dB                                  |
| 18000     | 40.2                  | -23.5 | 0.72                                   | -35.85                           | 6.20                                   | 2.81                                | 2.65                                |
| 18500     | 40.2                  | -23.2 | 0.69                                   | -35.71                           | 6.46                                   | 2.76                                | 2.59                                |
| 19000     | 40.2                  | -22.0 | 0.76                                   | -35.44                           | 6.69                                   | 3.15                                | 2.79                                |
| 19500     | 40.3                  | -21.3 | 0.74                                   | -35.07                           | 7.04                                   | 3.11                                | 2.91                                |
| 20000     | 40.3                  | -20.3 | 0.72                                   | -34.49                           | 7.30                                   | 3.07                                | 3.05                                |
| 20500     | 40.3                  | -19.9 | 0.78                                   | -34.46                           | 7.48                                   | 3.12                                | 3.15                                |
| 21000     | 40.3                  | -19.1 | 0.87                                   | -34.07                           | 7.61                                   | 3.20                                | 3.33                                |
| 21500     | 40.3                  | -19.1 | 0.90                                   | -33.96                           | 7.47                                   | 3.28                                | 3.19                                |
| 22000     | 40.3                  | -18.7 | 0.89                                   | -33.57                           | 7.34                                   | 3.35                                | 3.28                                |
| 22500     | 40.4                  | -19.0 | 0.87                                   | -33.66                           | 7.06                                   | 3.75                                | 2.94                                |
| 23000     | 40.4                  | -19.5 | 0.88                                   | -33.75                           | 6.92                                   | 3.77                                | 2.70                                |
| 23500     | 40.4                  | -19.3 | 0.90                                   | -33.35                           | 6.99                                   | 3.52                                | 2.66                                |
| 24000     | 40.4                  | -19.8 | 0.88                                   | -33.99                           | 6.88                                   | 3.88                                | 2.58                                |
| 24500     | 40.4                  | -19.5 | 0.91                                   | -33.89                           | 7.01                                   | 3.93                                | 2.51                                |
| 25000     | 40.4                  | -19.3 | 0.88                                   | -33.00                           | 6.72                                   | 3.96                                | 2.14                                |
| 25500     | 40.5                  | -20.4 | 0.89                                   | -34.07                           | 6.90                                   | 3.66                                | 2.22                                |
| 26000     | 40.5                  | -21.3 | 0.86                                   | -35.11                           | 7.02                                   | 3.69                                | 2.28                                |
| 26500     | 40.5                  | -21.1 | 0.90                                   | -35.20                           | 7.15                                   | 3.91                                | 2.36                                |

### Sample calculation

$E \text{ (dB } \mu\text{V/m)} = U \text{ (dB } \mu\text{V)} + AF \text{ (dB 1/m)} + Corr. \text{ (dB)}$

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)

Linear interpolation will be used for frequencies in between the values in the table.

Table shows an extract of values.

## 7.6 ANTENNA EMCO 3160-10 (26.5 GHZ – 40 GHZ)

| Frequency<br>GHz | AF<br>EMCO<br>3160-10<br>dB (1/m) | Corr.<br>dB | cable<br>loss 1<br>(inside<br>chamber)<br>dB | cable<br>loss 2<br>(outside<br>chamber)<br>dB | cable<br>loss 3<br>(switch<br>unit)<br>dB | cable<br>loss 4<br>(to<br>receiver)<br>dB | distance<br>corr.<br>(-20 dB/<br>decade)<br>dB | d <sub>Limit</sub><br>(meas.<br>distance<br>(limit)<br>m | d <sub>used</sub><br>(meas.<br>distance<br>(used)<br>m |
|------------------|-----------------------------------|-------------|----------------------------------------------|-----------------------------------------------|-------------------------------------------|-------------------------------------------|------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------|
| 26.5             | 43.4                              | -11.2       | 4.4                                          |                                               |                                           |                                           | -9.5                                           | 3                                                        | 1.0                                                    |
| 27.0             | 43.4                              | -11.2       | 4.4                                          |                                               |                                           |                                           | -9.5                                           | 3                                                        | 1.0                                                    |
| 28.0             | 43.4                              | -11.1       | 4.5                                          |                                               |                                           |                                           | -9.5                                           | 3                                                        | 1.0                                                    |
| 29.0             | 43.5                              | -11.0       | 4.6                                          |                                               |                                           |                                           | -9.5                                           | 3                                                        | 1.0                                                    |
| 30.0             | 43.5                              | -10.9       | 4.7                                          |                                               |                                           |                                           | -9.5                                           | 3                                                        | 1.0                                                    |
| 31.0             | 43.5                              | -10.8       | 4.7                                          |                                               |                                           |                                           | -9.5                                           | 3                                                        | 1.0                                                    |
| 32.0             | 43.5                              | -10.7       | 4.8                                          |                                               |                                           |                                           | -9.5                                           | 3                                                        | 1.0                                                    |
| 33.0             | 43.6                              | -10.7       | 4.9                                          |                                               |                                           |                                           | -9.5                                           | 3                                                        | 1.0                                                    |
| 34.0             | 43.6                              | -10.6       | 5.0                                          |                                               |                                           |                                           | -9.5                                           | 3                                                        | 1.0                                                    |
| 35.0             | 43.6                              | -10.5       | 5.1                                          |                                               |                                           |                                           | -9.5                                           | 3                                                        | 1.0                                                    |
| 36.0             | 43.6                              | -10.4       | 5.1                                          |                                               |                                           |                                           | -9.5                                           | 3                                                        | 1.0                                                    |
| 37.0             | 43.7                              | -10.3       | 5.2                                          |                                               |                                           |                                           | -9.5                                           | 3                                                        | 1.0                                                    |
| 38.0             | 43.7                              | -10.2       | 5.3                                          |                                               |                                           |                                           | -9.5                                           | 3                                                        | 1.0                                                    |
| 39.0             | 43.7                              | -10.2       | 5.4                                          |                                               |                                           |                                           | -9.5                                           | 3                                                        | 1.0                                                    |
| 40.0             | 43.8                              | -10.1       | 5.5                                          |                                               |                                           |                                           | -9.5                                           | 3                                                        | 1.0                                                    |

### Sample calculation

$E \text{ (dB } \mu\text{V/m)} = U \text{ (dB } \mu\text{V)} + AF \text{ (dB 1/m)} + Corr. \text{ (dB)}$

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)

Linear interpolation will be used for frequencies in between the values in the table.

distance correction =  $-20 * \text{LOG} (d_{\text{Limit}} / d_{\text{used}})$

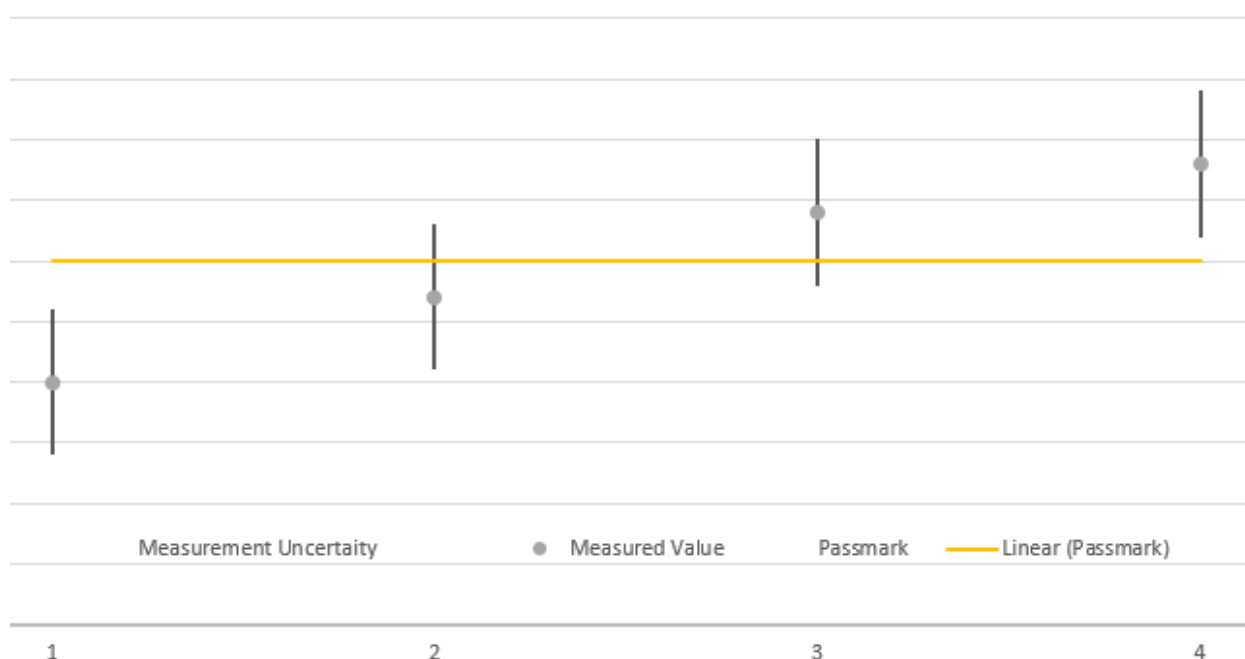
Linear interpolation will be used for frequencies in between the values in the table.

Table shows an extract of values.

## 8 MEASUREMENT UNCERTAINTIES

| Test Case                            | Parameter          | Uncertainty                    |
|--------------------------------------|--------------------|--------------------------------|
| AC Power Line                        | Power              | $\pm 3.4$ dB                   |
| Field Strength of spurious radiation | Power              | $\pm 5.5$ dB                   |
| 6 dB / 26 dB / 99% Bandwidth         | Power<br>Frequency | $\pm 2.9$ dB<br>$\pm 11.2$ kHz |
| Conducted Output Power               | Power              | $\pm 2.2$ dB                   |
| Band Edge Compliance                 | Power<br>Frequency | $\pm 2.2$ dB<br>$\pm 11.2$ kHz |
| Frequency Stability                  | Frequency          | $\pm 25$ Hz                    |
| Power Spectral Density               | Power              | $\pm 2.2$ dB                   |

The measurement uncertainties for all parameters are calculated with an expansion factor (coverage factor)  $k = 1.96$ . This means, that the true value is in the corresponding interval with a probability of 95 %.



The verdicts in this test report are given according the above diagram:

| Case | Measured Value  | Uncertainty Range | Verdict |
|------|-----------------|-------------------|---------|
| 1    | below pass mark | below pass mark   | Passed  |
| 2    | below pass mark | within pass mark  | Passed  |
| 3    | above pass mark | within pass mark  | Failed  |
| 4    | above pass mark | above pass mark   | Failed  |

That means, the laboratory applies, as decision rule (see ISO/IEC 17025:2017), the so called shared risk principle.

## 9 PHOTO REPORT

Please see separate photo report.