

# Test Report

No. 1-9816-25-01-05\_TR1-R02

June 01, 2026

|                   |                            |
|-------------------|----------------------------|
| Applicant         | Kadex B.V.                 |
| Product Model     | Gateway<br>Primary Locator |
| FCC ID            | 2BOAU-PL601                |
| Tested Technology | SRD                        |
| Test Standard(s)  | §15.247                    |

**Verdict** ☒ **PASS:** All applicable Test(s) acc. to the standard(s) are PASS/complies

The test results relate only to devices specified in this document

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

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|               |                                 |
|---------------|---------------------------------|
| authorized by | <b>B.Eng. Martin Nunier</b>     |
|               | Coordinator Area                |
|               | Compliance Testing & Innovation |

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|------------|---------------------------------|
| created by | <b>Timo Franke</b>              |
|            | Lab Manager                     |
|            | Compliance Testing & Innovation |

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# 1 Disclaimer

The test results of this test report relate exclusively to the test item specified in chapter "Test sample information". cetecom advanced does not assume responsibility for any conclusions and generalizations drawn from the test results regarding other specimens or samples of the type of the equipment represented by the test item.

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Also we refer on special conditions which the applicant should fulfill according §2.927 to §2.948, special focus regarding modification of the equipment and availability of sample equipment for market surveillance tests.

## 2 Related cetecom advanced documents

| Document  | Content                          | Reference                    | Total Pages |
|-----------|----------------------------------|------------------------------|-------------|
| Annex 101 | External photographs             | 1-9816-25-01-05_TR1-A101-R01 | 6           |
| Annex 102 | Internal photographs             | -                            | -           |
| Annex 103 | Test set-up photographs          | 1-9816-25-01-05_TR1-A103-R01 | 9           |
| Annex 201 | Results / Diagrams Conducted     | 1-9816-25-01-05_TR1-A201-R02 | 51          |
| Annex 202 | Results / Diagrams Radiated      | 1-9816-25-01-05_TR1-A202-R01 | 17          |
| Annex 301 | Declaration provided by customer | -                            | -           |

## 3 Document history

### 3.1 Current release

Release No.: R02  
 Date of release: June 1, 2026  
 Applied changes: chapter 6.1.2 updated antenna gain information from 4 dBi to 3.6 dBi  
 chapter 8.1: added standard references overview

A201-R02: updated unit in table from NI to dBm on pages 37, 39, 41, 43, 45, 47, 49 and 51

### 3.2 Previous releases

| Release No. | Applied changes | Date of release |
|-------------|-----------------|-----------------|
| R01         | Initial release | May 26, 2026    |

## 4 Test laboratory

### 4.1 Contact information

cetecom advanced GmbH  
 Untertuerkheimer Str. 6-10  
 66117 Saarbruecken  
 Germany

### 4.2 Involved test locations

☐ **Saarbruecken lab**  
 Untertuerkheimer Str. 6-10  
 66117 Saarbruecken  
 Germany

☒ **Essen lab**  
 Im Teelbruch 116  
 45219 Essen  
 Germany

### 4.3 Subcontracted laboratories

None.

### 4.4 Laboratory listings and recognitions

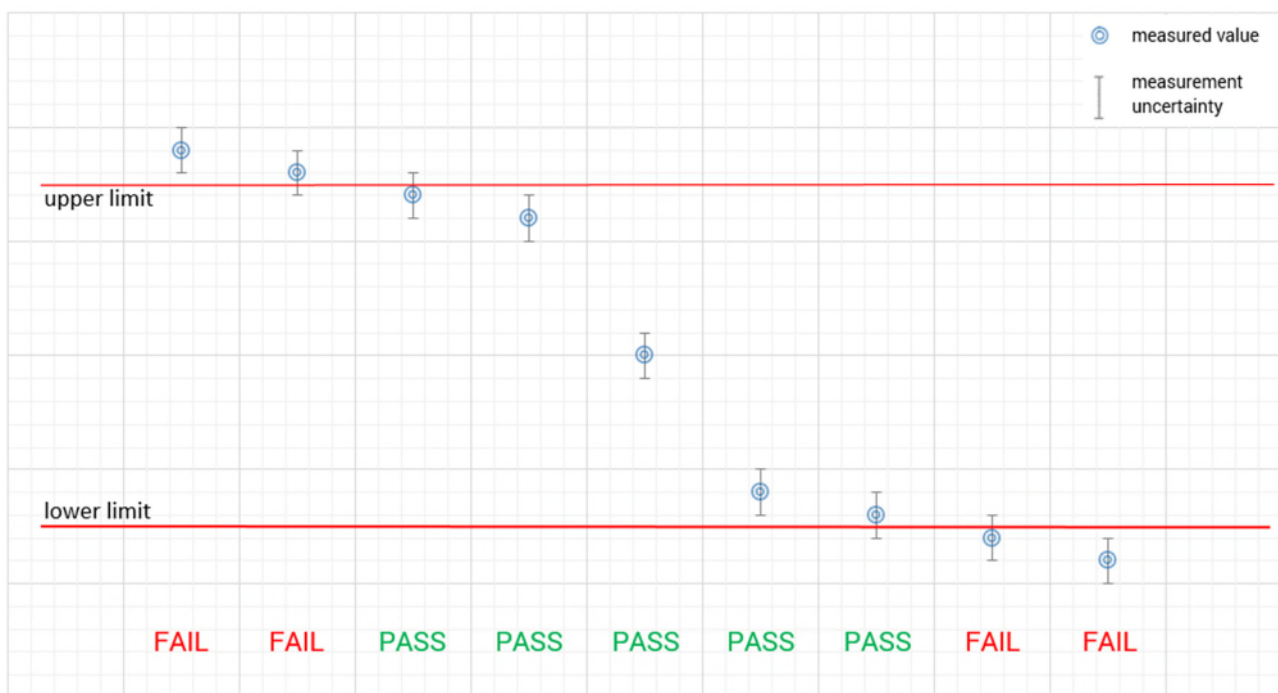
|     | Saarbruecken | Essen  |
|-----|--------------|--------|
| FCC | DE0002       | DE0003 |

## 4.5 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 8.1.

The measurement uncertainty is mentioned in this test report, see chapter 4.6, 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



### Decision Rule for emission testing:

cetecom advanced GmbH follows [ILAC G8:2019 chapter 4.2.1 \(Simple Acceptance Rule\)](#) according to CISPR 16-4-2:  $U_{Lab} < U_{CISPR}$ . Therefore, the uncertainty is not considered for the statement of conformity in this test report.

## 4.6 Measurement Uncertainty valid for conducted/radiated measurements

The reported uncertainties are calculated based on the standard uncertainty multiplied with the appropriate coverage factor k, such that a confidence level of approximately 95% is achieved. For uncertainty determination, each component used in the concrete measurement set-up was taken in account and its contribution to the overall uncertainty according its statistical distribution calculated.

**For the determination of the measurement uncertainty, every component and influencing factor present in the measurement chain is considered and statistically evaluated.**

| Issue No. | Measurement type               | References     | Frequency range of measurement |            | Calculated Uncertainty based on confidence level of 95.54% | Remarks                                                                        |
|-----------|--------------------------------|----------------|--------------------------------|------------|------------------------------------------------------------|--------------------------------------------------------------------------------|
|           |                                |                | Start [MHz]                    | Stop [MHz] |                                                            |                                                                                |
| 1         | Magnetic field strength        | EN/FCC/ISED/JP | 0.009                          | 30         | 4.86                                                       | Magnetic loop antenna, Pre-amp on                                              |
|           |                                |                | 30                             | 100        | 4.57                                                       | without Pre-Amp                                                                |
|           |                                |                | 30                             | 100        | 4.91                                                       | with PreAmp                                                                    |
|           |                                |                | 100                            | 1000       | 4.02                                                       | without Pre-Amp                                                                |
|           |                                |                | 100                            | 1000       | 4.26                                                       | with PreAmp                                                                    |
|           |                                |                | 1000                           | 18000      | 4.36                                                       | without Pre-Amp                                                                |
|           |                                |                | 1000                           | 18000      | 5.23                                                       | with PreAmp                                                                    |
| 2         | RF-Output power (eirp)         | EN/FCC/ISED/JP | 18000                          | 33000      | 4.92                                                       | Schwarzbeck BBHA9170 (#20302) Antenna set-up non-mixer set-up)                 |
|           | Unwanted emissions (eirp) [dB] |                | 33000                          | 50000      | 4.17                                                       | Set-up for Q-Band (WR-22), non-mixer set-up                                    |
|           |                                |                | 40000                          | 60000      | 4.69                                                       | Set-up U-Band (WR-19), non-mixer set-up                                        |
|           |                                |                | 50000                          | 75000      | 4.06                                                       | External Mixer set-up V-Band (WR-15)                                           |
|           |                                |                | 75000                          | 110000     | 4.17                                                       | External Mixer set-up W-Band (WR-6)                                            |
|           |                                |                | 90000                          | 140000     | 5.49                                                       | External Mixer set-up F-Band (WR-8)                                            |
|           |                                |                | 140000                         | 225000     | 6.22                                                       | External Mixer set-up G-Band (WR-5)                                            |
|           |                                |                | 225000                         | 325000     | 7.04                                                       | External Mixer set-up (WR-3)                                                   |
|           |                                |                | 325000                         | 500000     | 8.84                                                       | External Mixer set-up (WR-2.2)                                                 |
| 3         | Radiated Blocking [dB]         | EN             | 1000                           | 18000      | 2.85                                                       | Typical set-up with microwave generator and antenna, value for 7GHz calculated |
|           |                                |                | 18000                          | 33000      | 4.66                                                       | Typical set-up with microwave generator and antenna                            |
|           |                                |                | 33000                          | 50000      | 3.48                                                       | WR-22 set-up                                                                   |
|           |                                |                | 50000                          | 75000      | 3.73                                                       | WR-15 set-up                                                                   |
|           |                                |                | 75000                          | 110000     | 4.26                                                       | WR-6 set-up                                                                    |
| 4         | Frequency Error UWB/FMCW [kHz] | EN/FCC/ISED/JP | 116000                         | 123000     | 279.87                                                     | Calculated for 123GHz carrier (FMCW)                                           |
|           |                                |                | 40000                          | 77000      | 276.19                                                     | calculated for 77 GHz (FMCW) carrier                                           |
|           |                                |                | 6000                           | 7000       | 33.92                                                      | calculated for 6.5GHz UWB Ch.5                                                 |
|           | Frequency error [Hz]           |                | 11                             | 14         | 20.76                                                      | calculated for 13.56MHz carrier                                                |
| 6         | Conducted emissions AC-mains   | EN/FCC/ISED    | 0.009                          | 30         | 3.57                                                       | general EMI-measurements on AC/DC ports                                        |

## 5 Client information

### 5.1 Applicant

Name: Kadex B.V.

Address: Bijsterhuizen 2213  
6604 LC Wijchen  
The Netherlands

Contact Person: Jip Dorrestein  
Contact Person's Email: jip.dorrestein@assaabloy.com

### 5.2 Manufacturer

Name: Kadex B.V.

Address: Bijsterhuizen 2213  
6604 LC Wijchen  
The Netherlands



## 6 Test sample information

The data about the test samples is given/supplied by the customer and not under control by cetecom advanced GmbH.

### 6.1 Generic information sample

#### 6.1.1 General data of main EUT as declared by applicant

|                        |                                              |                                                                        |                           |
|------------------------|----------------------------------------------|------------------------------------------------------------------------|---------------------------|
| Firmware               | <input type="checkbox"/> Normal use          | <input checked="" type="checkbox"/> Special version for test execution |                           |
| Power supply           | <input type="checkbox"/> AC Mains            | -                                                                      |                           |
|                        | <input checked="" type="checkbox"/> DC Mains | 5 V DC <sup>1)</sup><br>PoE (44-54 V DC)                               |                           |
|                        | <input type="checkbox"/> Battery             | -                                                                      |                           |
| Operational conditions | T <sub>nom</sub> = +21 °C                    | T <sub>min</sub> = -10 °C                                              | T <sub>max</sub> = +40 °C |
| Weight                 | 0.279 kg                                     |                                                                        |                           |
| Size [LxWxH]           | 188 mm x 157 mm x 38 mm                      |                                                                        |                           |
| Interfaces/Ports       | -                                            |                                                                        |                           |
| Remarks                | 1) used for testing                          |                                                                        |                           |

#### 6.1.2 Detailed technical data of main EUT as declared by applicant

|                                    |                                                                                                                                                 |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Frequency band</b>              | 902 MHz – 928 MHz                                                                                                                               |
| <b>Number of channels</b>          | 64 (Hopping) <sup>1)</sup>                                                                                                                      |
| <b>Nominal channel bandwidth</b>   | 300                                                                                                                                             |
| <b>Type of modulation</b>          | FSK2                                                                                                                                            |
| <b>Max. conducted output power</b> | 21                                                                                                                                              |
| <b>Antenna Gain</b>                | max. 3.6 dBi                                                                                                                                    |
| <b>Antenna type</b>                | internal PCB-antenna                                                                                                                            |
| <b>FCC label attached</b>          | No                                                                                                                                              |
| <b>Remarks</b>                     | 1) The 64 channels are divided into 15 individual NETID settings each containing 25 channels. See 6.2.7 EUT operation mode for more information |

| Reference documents                     | Version    | Pages |
|-----------------------------------------|------------|-------|
| Kadex 915 MHz radio specifications.pdf  | -          | 2     |
| Kadex_Master_Locator_antenna_915MHz.pdf | 2026-03-10 | 3     |

## 6.2 Equipment under test

### 6.2.1 EUT

| EUT no. *) | Sample no. | Product | Model           | Type               | SN | HW    | SW                     |
|------------|------------|---------|-----------------|--------------------|----|-------|------------------------|
| EUT 1      | 36.415     | Gateway | Primary Locator | Art. No. 210307915 | -  | V6.01 | EFR32 (915 MHz): 07.16 |
| EUT 2      | 56.536     | Gateway | Primary Locator | Art. No. 210307915 | -  | V6.01 | EFR32 (915 MHz): 07.16 |
| EUT 3      | 48.479     | Gateway | Primary Locator | Art. No. 210307915 | -  | V6.01 | EFR32 (915 MHz): 07.16 |

\*) EUT short description is used to simplify the identification of the EUT in this test report.

### 6.2.2 Untested variants

| VAR no. *) | Sample no. | Product | Model | Type | SN | HW | SW |
|------------|------------|---------|-------|------|----|----|----|
| -          | -          | -       | -     | -    | -  | -  | -  |

\*) The listed additional untested model variant(s) (VAR) is/are not object of evaluation of compliance. For further information please see Annex 5: Declaration of applicant of model differences.

If the table above does not show any other line than the headline, no untested variants are available.

### 6.2.3 Auxiliary equipment

| AE no. *) | Sample no. | Auxiliary equipment | Model | SN | HW | SW |
|-----------|------------|---------------------|-------|----|----|----|
| AE 1      | 59.403     | Programming adapter | -     | -  | -  | -  |

\*) AE short description is used to simplify the identification of the auxiliary equipment in this test report.

If the table above does not show any other line than the headline, no AE was used during testing nor was considered for evaluation

### 6.2.4 Connected cables

| CAB no. *) | Sample no. | Cable type | Connectors / Details | Length |
|------------|------------|------------|----------------------|--------|
| -          | -          | -          | -                    | -      |

\*) CAB short description is used to simplify the identification of the connected cables in this test report.

If the table above does not show any other line than the headline, no cable was used during testing nor was considered for evaluation

### 6.2.5 Software

| SW no. *) | Sample no. | SW name | Description | SW status |
|-----------|------------|---------|-------------|-----------|
| -         | -          | -       | -           | -         |

\*) SW short description is used to simplify the identification of the used software in this test report.

If the table above does not show any other line than the headline, no SW was used during testing nor was considered for evaluation.

### 6.2.6 EUT set-ups

| Set-Up no. *) | Combination of EUT and AE | Description                                                                                                                                                               |
|---------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SET 1         | EUT 1 / EUT 2 (+ AE 1)    | Used for radiated measurements (EUT 1 and EUT 2 are identical and only changed because of parallel testing)<br>AE 1 is only used for setup and removed during measurement |
| SET 2         | EUT 3 (+ AE 1)            | Used for conducted measurements<br>AE 1 is only used for setup and removed during measurement                                                                             |

\*) EUT set-up no. is used to simplify the identification of the EUT set-up in this test report.

### 6.2.7 EUT operation mode

| EUT operating mode no. *) | Operating mode                    | Additional information                                                                            |
|---------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------|
| OP 1                      | TX Fix low                        | Continuous transmission at fixed a frequency: low 902.4 MHz; PWR setting 20                       |
| OP 2                      | TX Fix mid                        | Continuous transmission at fixed a frequency: mid 914.8 MHz; PWR setting 20                       |
| OP 3                      | TX Fix high                       | Continuous transmission at fixed a frequency: high 927.6 MHz; PWR setting 20                      |
| OP 4                      | TX Hopping NetID 0 <sup>1)</sup>  | Continuous transmission in hopping mode Channels 0 – 24 (902.4 MHz – 912.0 MHz)                   |
| OP 5                      | TX Hopping NetID 4 <sup>1)</sup>  | Continuous transmission in hopping mode Channels 16 – 40 (908.8 MHz – 918.4 MHz)                  |
| OP 6                      | TX Hopping NetID 10 <sup>1)</sup> | Continuous transmission in hopping mode Channels 40 – 63, 0 (918.4 MHz – 927.6 MHz and 902.4 MHz) |

\*) EUT operating mode no. is used to simplify the test report.

Remark 1): EUT implements 16 different hopping sets with 25 channels each. For testing only NetID 0, 4 and 10 was chosen to cover the whole frequency range with one set in in the lowest, middle and highest range.

| NetID Setting | Radio channels  | Frequency range           |
|---------------|-----------------|---------------------------|
| <b>0</b>      | <b>0-24</b>     | <b>902.4-912.0</b>        |
| 1             | 4-28            | 904.0-913.6               |
| 2             | 8-32            | 905.6-915.2               |
| 3             | 12-36           | 907.2-917.0               |
| <b>4</b>      | <b>16-40</b>    | <b>908.8-918.4</b>        |
| 5             | 20-44           | 910.4-920.0               |
| 6             | 24-48           | 912.0-921.6               |
| 7             | 28-52           | 913.6-923.2               |
| 8             | 32-56           | 915.2-924.8               |
| 9             | 36-60           | 916.8-926.4               |
| <b>10</b>     | <b>40-63, 0</b> | <b>918.4-927.6, 902.4</b> |
| 11            | 44-63, 0-4      | 920.0-927.6, 902.4-904.0  |
| 12            | 48-63, 0-8      | 921.6-927.6, 902.4-905.6  |
| 13            | 52-63, 0-12     | 923.2-927.6, 902.4-907.2  |
| 14            | 56-63, 0-16     | 924.8-927.6, 902.4-908.8  |
| 15            | 60-63, 0-20     | 926.4-927.6, 902.4-910.4  |

| Channel  | Frequency [MHz] | Channel | Frequency [MHz] | Channel   | Frequency [MHz] | Channel | Frequency [MHz] | Channel   | Frequency [MHz] |
|----------|-----------------|---------|-----------------|-----------|-----------------|---------|-----------------|-----------|-----------------|
| <b>0</b> | <b>902.4</b>    | 13      | 907.6           | 26        | 912.8           | 39      | 918             | 52        | 923.2           |
| 1        | 902.8           | 14      | 908             | 27        | 913.2           | 40      | 918.4           | 53        | 923.6           |
| 2        | 903.2           | 15      | 908.4           | 28        | 913.6           | 41      | 918.8           | 54        | 924             |
| 3        | 903.6           | 16      | 908.8           | 29        | 914             | 42      | 919.2           | 55        | 924.4           |
| 4        | 904             | 17      | 909.2           | 30        | 914.4           | 43      | 919.6           | 56        | 924.8           |
| 5        | 904.4           | 18      | 909.6           | <b>31</b> | <b>914.8</b>    | 44      | 920             | 57        | 925.2           |
| 6        | 904.8           | 19      | 910             | 32        | 915.2           | 45      | 920.4           | 58        | 925.6           |
| 7        | 905.2           | 20      | 910.4           | 33        | 915.6           | 46      | 920.8           | 59        | 926             |
| 8        | 905.6           | 21      | 910.8           | 34        | 916             | 47      | 921.2           | 60        | 926.4           |
| 9        | 906             | 22      | 911.2           | 35        | 916.4           | 48      | 921.6           | 61        | 926.8           |
| 10       | 906.4           | 23      | 911.6           | 36        | 916.8           | 49      | 922             | 62        | 927.2           |
| 11       | 906.8           | 24      | 912             | 37        | 917.2           | 50      | 922.4           | <b>63</b> | <b>927.6</b>    |
| 12       | 907.2           | 25      | 912.4           | 38        | 917.6           | 51      | 922.8           | -         | -               |

## 7 Application details

### 7.1 Scheduling

Date of sample reception: March 03, 2026  
Date(s) of test: April 22, 2026 to May 11, 2026

### 7.2 Climatic data

Temperature:  $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$   
Relative. humidity:  $50\%\text{rH} \pm 25\%\text{rH}$   
Barometric pressure:  $950\text{hPa} \pm 75\text{hPa}$

### 7.3 Opinions and interpretations

None.

## 8 Measurement details

### 8.1 Test methodology

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 with the registration number D-PL-12047-01-00.

| Test standard              | Date | Description                                                                                    |
|----------------------------|------|------------------------------------------------------------------------------------------------|
| FCC – Title 47 CFR Part 15 | -/-  | FCC – Title 47 of the Code of Federal Regulations; Chapter I; Subchapter A; Part 15; Subpart C |

| Guidance                                                                                                                                                             | Description                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| ANSI C63.4-2014<br>including:<br>- C63.4a-2017                                                                                                                       | American National Standard for Methods of Measurement for low-voltage electrical and electronic equipment, 9 kHz to 40 GHz |
| ANSI C63.10-2020<br>including:<br>- ANSI/USEMCSC C63.10-2020/Cor 1-2023<br>- ANSI/USEMCSC C63.10a-2024 Amendment 1<br>- ANSI/USEMCSC C63.10a-2024 Amendment 1 Errata | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices                             |

| Applied test method                               | Description                                                               |
|---------------------------------------------------|---------------------------------------------------------------------------|
| Duty-Cycle                                        | ANSI C63.10:2020 §11.6(b)                                                 |
| Radiated field strength emissions below 30 MHz    | ANSI C63.10-2020, chapter 6.4, 7.8, 11.12                                 |
| Radiated field strength emissions 30 MHz to 1 GHz | ANSI C63.10-2020, chapter 6.5, 7.8, 11.12                                 |
| Radiated field strength emissions above 1 GHz     | ANSI C63.10-2020, chapter 6.6, 7.8, 11.12                                 |
| Emissions in non-restricted frequency bands       | ANSI C63.10:2020 §11.11, §6.10.5, §7.8.7                                  |
| 99% bandwidth                                     | ANSI C63.10-2020, chapter 6.9<br>ANSI/USEMCSC C63.10a-2024, chapter 6.9   |
| (DTS) Emission bandwidth                          | ANSI C63.10-2020, chapter 11.8                                            |
| (DTS) Output power                                | ANSI C63.10-2020, chapter 11.9                                            |
| (DTS) Power spectral density                      | ANSI C63.10-2020, chapter 11.10                                           |
| (FHSS) Emission bandwidth                         | ANSI C63.10-2020, chapter 7.8                                             |
| (FHSS) Carrier frequency separation               | ANSI C63.10-2020, chapter 7.8.2<br>ANSI/USEMCSC C63.10a-2024, chapter 7.8 |
| (FHSS) Number of hopping frequencies              | ANSI C63.10-2020, chapter 7.8.3<br>ANSI/USEMCSC C63.10a-2024, chapter 7.8 |
| (FHSS) Time of occupancy                          | ANSI C63.10-2020, chapter 7.8.4                                           |
| (FHSS) Output power                               | ANSI C63.10-2020, chapter 7.8.5                                           |
| AC-Power Lines Conducted Emissions                | ANSI C63.4-2014 §7, ANSI C63.10-2020 § 6.2                                |

## 8.2 Test results summary

### 8.2.1 Conformance Requirements

| Conformance Requirements                                                                    | Reference Clause No                    | Remark | Result |
|---------------------------------------------------------------------------------------------|----------------------------------------|--------|--------|
| Duty cycle                                                                                  | §15.35(c)                              | -      | PASSED |
| Radiated field strength emissions below 30 MHz                                              | §15.209(a)<br>§15.205(a)               | -      | PASSED |
| Radiated field strength emissions 30 MHz to 1 GHz<br>(inclusive fundamental field strength) | §15.209(a)<br>§15.247(d)<br>§15.205(a) | -      | PASSED |
| Radiated field strength emissions above 1 GHz                                               | §15.209(a)<br>§15.247(d)<br>§15.205(a) | -      | PASSED |
| Emissions in non-restricted frequency bands                                                 | §15.247(d)                             | -      | PASSED |
| Conducted output power                                                                      | §15.247(b)(2)<br>§15.247(b)(3)         | -      | PASSED |
| Power spectral density                                                                      | §15.247(e)                             | -      | N/A    |
| Emission bandwidth 20 dB (FHSS)<br>Emission bandwidth 6 dB (DTS)                            | §15.247(a)(1)<br>§15.247(a)(2)         | -      | PASSED |
| Occupied channel bandwidth 99%                                                              | 2.1049(h)                              | -      | PASSED |
| Time of occupancy                                                                           | §15.247(a)(1)(i)                       | -      | PASSED |
| Transmitter peak output power radiated                                                      | §15.247(b)(4)                          | -      | N/A    |
| Carrier frequency separation                                                                | §15.247(a)(1)                          | -      | PASSED |
| Number of hopping frequencies                                                               | §15.247(a)(1)(i)                       | -      | PASSED |
| AC-power lines conducted emissions                                                          | §15.207                                | -      | N/A    |

|        |                                                                          |
|--------|--------------------------------------------------------------------------|
| PASSED | The EUT complies with the essential requirements in the standard.        |
| FAILED | The EUT does not comply with the essential requirements in the standard. |
| N/A    | Test case does not apply to the test object.                             |
| NP     | The test was not performed by the cetecom advanced GmbH laboratory.      |

## 8.3 Measurements

### 8.3.1 Duty Cycle

#### Testing method:

The measurement is made according to relevant reference clauses:  
(See Tables Measurement details on page 14)

The necessary duty-cycle correction factor is determined on nominal conditions on middle channel only. It is assumed that no noticeable changes occur when tested on other channels or climatic conditions.

#### EUT settings:

The EUT was instructed to send with maximum power (if adjustable) according applicants instructions. Different modulation characteristics have been checked, e.g. data rates which EUT can operate.

A special firmware program is used for test purposes. In opposite to normal operating mode a higher duty-cycle is set in order to facilitate the measurements. This is maximized at the extent possible.

The necessary duty-cycle correction factor is determined on nominal conditions on one channel in each operable frequency-band. It is assumed that no noticeable changes occur when tested on other channels or climatic conditions. The Duty-Cycle was constant, means without variations.

Duty cycle calculations:

$$x = \frac{TX_{ON}}{(TX_{ON} + TX_{OFF})}$$

Duty cycle factor: DC=

Regarding power:  $10 * \log\left(\frac{1}{x}\right)$  dB

Regarding field strength:  $20 * \log\left(\frac{1}{x}\right)$  dB

#### 8.3.1.1 Measurement Location

##### Test site

120910 - Radio Laboratory 1 (TS 8997)

#### 8.3.1.2 Result

| Duty-Cycle [%] | Duty-Cycle correction Power [dB] | Duty-Cycle correction Field Strength [dB] |
|----------------|----------------------------------|-------------------------------------------|
| > 98%          | n/a                              | n/a                                       |

Conclusion:

- ☐ Correction factor is applied where applicable  
☒ No correction necessary: Duty-Cycle > 98%



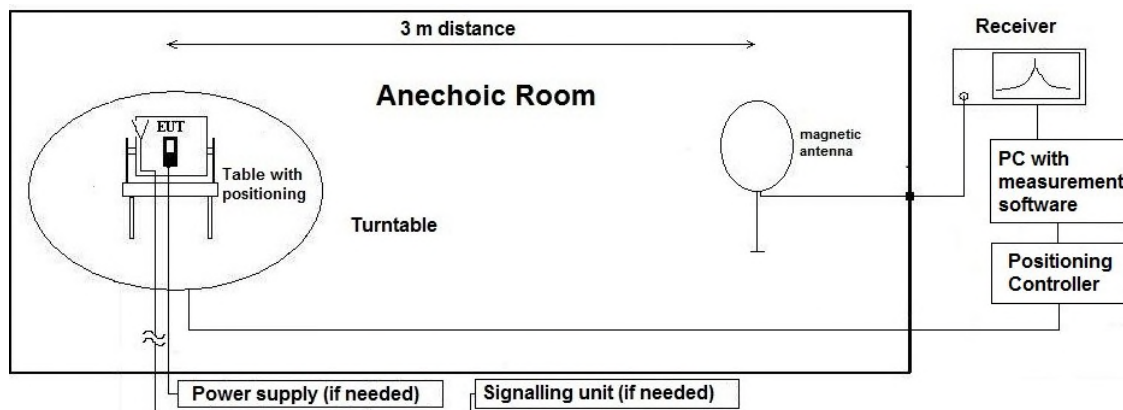
### 8.3.2 Radiated field strength emissions below 30 MHz

#### 8.3.2.1 Description of the general test setup and methodology, see below example:

Evaluating the radiated field emissions are done first by an exploratory emission measurement and a final measurement for most critical frequencies determined.

The loop antenna was placed at 1 m height above ground plane and 3 m measurement distance from set-up for investigations. Because of reduced measurement distance, correction data were applied, as stated in chapter "General Limit - Radiated field strength emissions below 30 MHz". The tests are performed in the semi anechoic room recognized by the regulatory commission.

#### Schematic:



#### Testing method:

The measurement is made according to relevant reference clauses:  
 (See Tables Measurement details on page 14)

#### Exploratory, preliminary measurements

The EUT and its associated accessories are placed on a non-conductive position manipulator (tipping device) of 0.8 m height which is placed on the turntable. By rotating the turntable (step 90°, range 0° to 360°) and the EUT itself either on 3-orthogonal axis (portable equipment) or 2-orthogonal axis (defined operational position of EUT), the emission spectrum was recorded.

The loop antenna was moved at least to 2-perpendicular axes (antenna vector in direction of EUT and parallel to EUT) in order to maximize the emissions. The results are documented in a diagram. Critical frequencies (low margin to limit) are saved within a data reduction table for further investigations. If various operating modes are supported, further investigations are made to find the worst-case. Also the interconnection cables and equipment position were varied in order to maximize the emissions.

#### Final measurement on critical frequencies

Based on the exploratory measurements, the most critical frequencies are re-measured by maintaining the EUT's worst-case operation mode, cable position, etc.

First a frequency zoom around the critical frequency is done to locate the frequency more precisely. After this step, for all identified critical frequencies, the maximum peak was determined.

Following parameters were varied: the turntable angle continuously in the range 0 to 360 degree, the EUT itself either over 3-orthogonal axis (not defined usage position) or 2-orthogonal axis (defined usage position).

On the determined worst-case position, a final measurement with necessary bandwidth and detector according standard has been carried out.

**Formula:**

$$E_C = E_R + AF + C_L + D_F - G_A$$

$$M = L_T - E_C$$

AF = Antenna factor

$C_L$  = Cable loss

$D_F$  = Distance correction factor (if used)

$E_C$  = Electrical field – corrected value

$E_R$  = Receiver reading

$G_A$  = Gain of pre-amplifier (if used)

$L_T$  = Limit

M = Margin

All units are dB-units, positive margin means value is below limit.

### 8.3.2.2 Sample calculation

| Raw-Value<br>[dBuV/m] | Antenna<br>factor | Distance<br>Correction<br>[dB] | Cable<br>Loss | Preamplifier | Resulting<br>correction value<br>[dB] | Final result<br>[dBuV/m] | Remarks                                                    |
|-----------------------|-------------------|--------------------------------|---------------|--------------|---------------------------------------|--------------------------|------------------------------------------------------------|
| 19.83                 | 18.9              | -70.75                         | 0.18          | –            | -51.67                                | -31.83                   | 30 to 3 m correction<br>used according<br>ANSI C63.10-2020 |

Remark: This calculation is based on an example value at 458 kHz

### 8.3.2.3 Correction factors due to reduced meas. distance ( $f < 30$ MHz):

The used correction factors when the measurement distance is reduced compared to regulatory measurement distance, are calculated according Extrapolation formulas valid for EUT's with maximum dimension of  $0.625 \times \text{Lambda}$ . Formula 2+3+4 as presented in ANSI C63.10, Chapter 6.4.4 are used for the calculations of proper extrapolation factors

| Frequency Range | f [kHz/MHz] | Lambda [m] | Far-Field Point [m] | Distance Limit accord. 15.209 [m] | 1st Condition (dmeas < Dnear-field) | 2nd Condition (Limit distance bigger dnear-field) | Distance Correction accord. Formula |
|-----------------|-------------|------------|---------------------|-----------------------------------|-------------------------------------|---------------------------------------------------|-------------------------------------|
| kHz             | 9           | 33333.33   | 5305.17             | 300                               | fulfilled                           | not fulfilled                                     | -80.00                              |
|                 | 10          | 30000.00   | 4774.65             |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |
|                 | 20          | 15000.00   | 2387.33             |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |
|                 | 30          | 10000.00   | 1591.55             |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |
|                 | 40          | 7500.00    | 1193.66             |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |
|                 | 50          | 6000.00    | 954.93              |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |
|                 | 60          | 5000.00    | 795.78              |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |
|                 | 70          | 4285.71    | 682.09              |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |
|                 | 80          | 3750.00    | 596.83              |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |
|                 | 90          | 3333.33    | 530.52              |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |
|                 | 100         | 3000.00    | 477.47              |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |
|                 | 125         | 2400.00    | 381.97              |                                   | fulfilled                           | not fulfilled                                     | -80.00                              |
|                 | 200         | 1500.00    | 238.73              |                                   | fulfilled                           | fulfilled                                         | -78.02                              |
|                 | 300         | 1000.00    | 159.16              |                                   | fulfilled                           | fulfilled                                         | -74.49                              |
|                 | 400         | 750.00     | 119.37              |                                   | fulfilled                           | fulfilled                                         | -72.00                              |
|                 | 490         | 612.24     | 97.44               |                                   | fulfilled                           | fulfilled                                         | -70.23                              |
|                 | 500         | 600.00     | 95.49               |                                   | fulfilled                           | not fulfilled                                     | -40.00                              |
|                 | 600         | 500.00     | 79.58               |                                   | fulfilled                           | not fulfilled                                     | -40.00                              |
|                 | 700         | 428.57     | 68.21               |                                   | fulfilled                           | not fulfilled                                     | -40.00                              |
|                 | 800         | 375.00     | 59.68               |                                   | fulfilled                           | not fulfilled                                     | -40.00                              |
| MHz             | 900         | 333.33     | 53.05               | 30                                | fulfilled                           | not fulfilled                                     | -40.00                              |
|                 | 1.00        | 300.00     | 47.75               |                                   | fulfilled                           | not fulfilled                                     | -40.00                              |
|                 | 1.59        | 188.50     | 30.00               |                                   | fulfilled                           | not fulfilled                                     | -40.00                              |
|                 | 2.00        | 150.00     | 23.87               |                                   | fulfilled                           | fulfilled                                         | -38.02                              |
|                 | 3.00        | 100.00     | 15.92               |                                   | fulfilled                           | fulfilled                                         | -34.49                              |
|                 | 4.00        | 75.00      | 11.94               |                                   | fulfilled                           | fulfilled                                         | -32.00                              |
|                 | 5.00        | 60.00      | 9.55                |                                   | fulfilled                           | fulfilled                                         | -30.06                              |
|                 | 6.00        | 50.00      | 7.96                |                                   | fulfilled                           | fulfilled                                         | -28.47                              |
|                 | 7.00        | 42.86      | 6.82                |                                   | fulfilled                           | fulfilled                                         | -27.13                              |
|                 | 8.00        | 37.50      | 5.97                |                                   | fulfilled                           | fulfilled                                         | -25.97                              |
|                 | 9.00        | 33.33      | 5.31                |                                   | fulfilled                           | fulfilled                                         | -24.95                              |
|                 | 10.00       | 30.00      | 4.77                |                                   | fulfilled                           | fulfilled                                         | -24.04                              |
|                 | 10.60       | 28.30      | 4.50                |                                   | fulfilled                           | fulfilled                                         | -23.53                              |
|                 | 11.00       | 27.27      | 4.34                |                                   | fulfilled                           | fulfilled                                         | -23.21                              |
|                 | 12.00       | 25.00      | 3.98                |                                   | fulfilled                           | fulfilled                                         | -22.45                              |
|                 | 13.56       | 22.12      | 3.52                |                                   | fulfilled                           | fulfilled                                         | -21.39                              |
|                 | 15.00       | 20.00      | 3.18                |                                   | fulfilled                           | fulfilled                                         | -20.51                              |
|                 | 15.92       | 18.85      | 3.00                |                                   | fulfilled                           | fulfilled                                         | -20.00                              |
|                 | 17.00       | 17.65      | 2.81                |                                   | not fulfilled                       | fulfilled                                         | -20.00                              |
|                 | 18.00       | 16.67      | 2.65                |                                   | not fulfilled                       | fulfilled                                         | -20.00                              |
|                 | 20.00       | 15.00      | 2.39                |                                   | not fulfilled                       | fulfilled                                         | -20.00                              |
|                 | 21.00       | 14.29      | 2.27                |                                   | not fulfilled                       | fulfilled                                         | -20.00                              |
|                 | 23.00       | 13.04      | 2.08                |                                   | not fulfilled                       | fulfilled                                         | -20.00                              |
|                 | 25.00       | 12.00      | 1.91                |                                   | not fulfilled                       | fulfilled                                         | -20.00                              |
|                 | 27.00       | 11.11      | 1.77                |                                   | not fulfilled                       | fulfilled                                         | -20.00                              |
|                 | 29.00       | 10.34      | 1.65                |                                   | not fulfilled                       | fulfilled                                         | -20.00                              |
|                 | 30.00       | 10.00      | 1.59                |                                   | not fulfilled                       | fulfilled                                         | -20.00                              |

#### 8.3.2.4 Measurement Location

##### Test site

120901 - ESS SAC3 - Radiated Emission <1GHz

#### 8.3.2.5 Limit

##### Radiated emissions limits, (3 meters)

| Frequency Range [MHz] | Limit [ $\mu$ V/m] | Limit [dB $\mu$ V/m] * | Distance [m] | Detector   | RBW [kHz] |
|-----------------------|--------------------|------------------------|--------------|------------|-----------|
| 0.009 – 0.09          | 2400 / f [kHz]     | 67.6 – 20Log(f) (kHz)  | 300          | Pk & Avg   | 0.2       |
| 0.09 – 0.11           | 2400 / f [kHz]     | 67.6 – 20Log(f) (kHz)  | 300          | Quasi peak | 0.2       |
| 0.11 – 0.15           | 2400 / f [kHz]     | 67.6 – 20Log(f) (kHz)  | 300          | Pk & Avg   | 0.2       |
| 0.15 – 0.49           | 2400 / f [kHz]     | 67.6 – 20Log(f) (kHz)  | 300          | Pk & Avg   | 9         |
| 0.49 – 1.705          | 24000 / f [kHz]    | 87.6 – 20Log(f) (kHz)  | 30           | Quasi peak | 9         |
| 1.705 - 30            | 30                 | 29.5                   | 30           | Quasi peak | 9         |

#### 8.3.2.6 Result

| Diagram | Channel | Mode                    | Maximum Level [dB $\mu$ V/m] | Result |
|---------|---------|-------------------------|------------------------------|--------|
| 2.01    | low     | SET 1 / OP 1 / standing | No peaks < 6 dB margin found | PASSED |
| 2.02    | low     | SET 1 / OP 1 / lying    | No peaks < 6 dB margin found | PASSED |
| 2.03    | mid     | SET 1 / OP 2 / standing | No peaks < 6 dB margin found | PASSED |
| 2.04    | mid     | SET 1 / OP 2 / lying    | No peaks < 6 dB margin found | PASSED |
| 2.05    | high    | SET 1 / OP 3 / standing | No peaks < 6 dB margin found | PASSED |
| 2.06    | high    | SET 1 / OP 3 / lying    | No peaks < 6 dB margin found | PASSED |

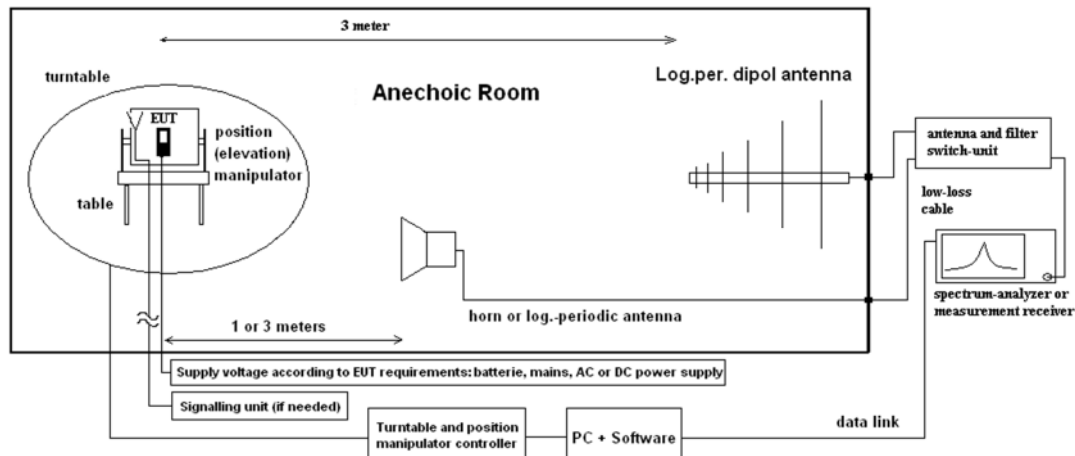
Remark: for more information and graphical plot see annex A202

### 8.3.3 Radiated field strength emissions 30 MHz – 1 GHz

#### 8.3.3.1 Description of the general test setup and methodology, see below example:

Evaluating the field emissions have to be done first by an exploratory emissions measurement and a final measurement for most critical frequencies. The tests are performed in a NSA-compliant semi anechoic room (SAR) recognized by the regulatory commissions.

##### Schematic:



##### Testing method:

The measurement is made according to relevant reference clauses:  
(See Tables Measurement details on page 14)

##### Exploratory, preliminary measurements

The EUT and its associated accessories are placed on a non-conductive position manipulator (tipping device) of 0.8 m height which is placed on the turntable. By rotating the turntable (range 0° to 360°, step 90°) and the EUT itself either on 3-orthogonal axis (portable equipment) or 2-orthogonal axis (defined operational position of EUT) the emission spectrum and its characteristics were recorded with an EMI-receiver, broadband antenna and software.

Measurement antenna: horizontal and vertical, heights: 1,0 m and 1,82 m as worst case determined by an exploratory emission measurement. The results are documented in a diagram. Critical frequencies (low margin to limit) are saved within a table for further investigations. If various operating modes are supported, further investigations are carried out to find the worst case of them. Also, the interconnection cables and equipment position were varied to maximize the emissions.

##### Final measurement on critical frequencies

Based on the exploration measurements, the most critical frequencies are re-measured by maintaining the EUT's worst-case operation mode, cable position, etc. either on 10m OATS or 3m semi-anechoic room.

First a frequency zoom around the critical frequency is done to locate the frequency more precisely. After this step, for all identified critical frequencies, the maximum peak was determined.

Following parameters were varied: the turntable angle continuously in the range 0 to 360 degree, the EUT itself either over 3-orthogonal axis (not defined usage position) or 2-orthogonal axis (defined usage position) and the measurement antenna height between 1 m and 4 m.

On the determined worst-case position, a final measurement with necessary bandwidth and detector according to standard has been carried out

**Formula:**

$$E_c = E_R + AF + C_L + D_F + G_A \quad (1)$$

$$M = L_T - E_c \quad (2)$$

AF = Antenna factor

C<sub>L</sub> = Cable loss

D<sub>F</sub> = Distance correction factor (if used)

E<sub>C</sub> = Electrical field – corrected value

E<sub>R</sub> = Receiver reading

G<sub>A</sub> = Gain of pre-amplifier (if used)

L<sub>T</sub> = Limit

M = Margin

All units are dB-units, positive margin means value is below limit.

### 8.3.3.2 Sample calculation

| Raw-Value<br>[dBuV/m] | Antenna factor | Distance Correction<br>[dB] | Cable Loss +<br>Preamplifier | Resulting correction value<br>[dB] | Final result<br>[dBuV/m] | Remarks                                               |
|-----------------------|----------------|-----------------------------|------------------------------|------------------------------------|--------------------------|-------------------------------------------------------|
| 29.37                 | 41.20          | --                          | 24.28                        | 16.92                              | 46.3                     | CableLoss and PreAmp data in one data correction file |

Remark: This calculation is based on an example value at 800.4MHz

### 8.3.3.3 Measurement Location

**Test site**

120901 - ESS SAC3 - Radiated Emission <1GHz

### 8.3.3.4 Limits

**Radiated emissions limits, (3 meters)**

| Frequency Range<br>[MHz] | Limit<br>[μV/m] | Limit<br>[dBμV/m] | Detector   | RBW / VBW<br>[kHz] |
|--------------------------|-----------------|-------------------|------------|--------------------|
| 30 - 88                  | 100             | 40.0              | Quasi peak | 100 / 300          |
| 88 - 216                 | 150             | 43.5              | Quasi peak | 100 / 300          |
| 216 - 960                | 200             | 46.0              | Quasi peak | 100 / 300          |
| 960 - 1000               | 500             | 54.0              | Quasi peak | 100 / 300          |

### 8.3.3.5 Result

| Diagram | Channel | Mode                    | Maximum Level<br>[dBμV/m]    | Result |
|---------|---------|-------------------------|------------------------------|--------|
| 3.01    | low     | SET 1 / OP 1 / standing | No peaks < 6 dB margin found | PASSED |
| 3.02    | low     | SET 1 / OP 1 / lying    | No peaks < 6 dB margin found | PASSED |
| 3.03    | mid     | SET 1 / OP 2 / standing | No peaks < 6 dB margin found | PASSED |
| 3.04    | mid     | SET 1 / OP 2 / lying    | No peaks < 6 dB margin found | PASSED |
| 3.05    | high    | SET 1 / OP 3 / standing | No peaks < 6 dB margin found | PASSED |
| 3.06    | high    | SET 1 / OP 3 / lying    | No peaks < 6 dB margin found | PASSED |

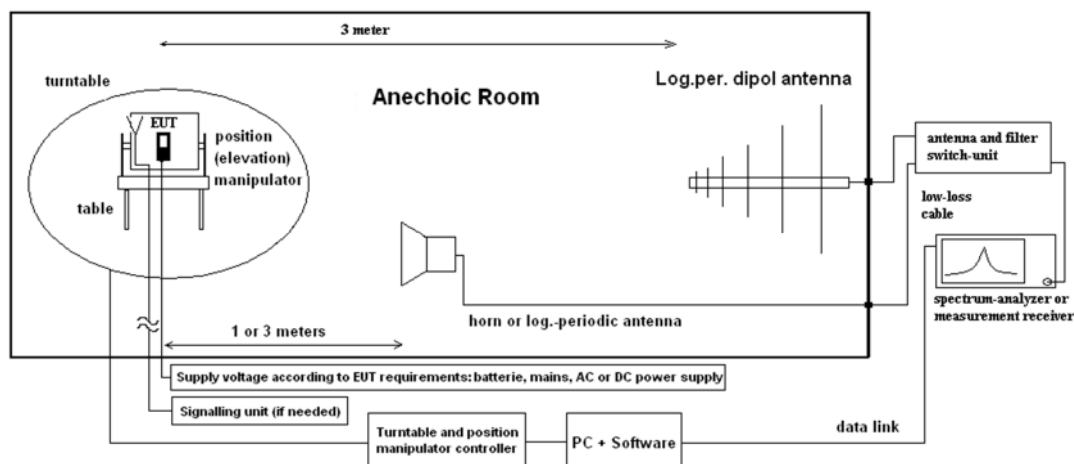
Remark: for more information and graphical plot see annex A202

### 8.3.4 Radiated field strength emissions above 1 GHz

#### 8.3.4.1 Description of the general test setup and methodology, see below example:

Evaluating the emissions have to be done first by an exploratory emissions measurement and a final measurement for most critical frequencies. The tests are performed in a CISPR 18-1-4:2010 compliant fully anechoic room (FAR) recognized by the regulatory commission. The measurement distance was set to 3 meters for frequencies up to 18 GHz and 2 meters above 18 GHz. A logarithmic periodic antenna is used for the frequency range 30 MHz to 1 GHz. Horn antennas are used for frequency range 1 GHz to 40 GHz. The EUT is aligned within 3 dB beam width of the measurement antenna with three orthogonal axis measurements on the EUT.

#### Schematic:



#### Testing method:

The measurement is made according to relevant reference clauses:  
(See Tables Measurement details on page 14)

#### Exploratory, preliminary measurements

The EUT and its associated accessories are placed on a non-conductive position manipulator (tipping device) of 1.55 m height which is placed on the turntable. By rotating the turntable (range 0° to 360°, step 15°) and the EUT itself either on 3-orthogonal axis (portable equipment) or 2-orthogonal axis (defined operational position of EUT) the emission spectrum and its characteristics were recorded with an EMI-receiver, broadband antenna and software.

The measurements are performed in horizontal and vertical polarization of the measurement antennas. The results are documented in a diagram. Critical frequencies (low margin to limit) are saved within a table for further investigations. If various operating modes are supported, further investigations are made to find the worst case of them. Also, the interconnection cables and equipment position were varied to maximize the emissions.

#### Final measurement on critical frequencies

Based on the exploratory measurements, the most critical frequencies are re-measured by maintaining the EUT's worst-case operation mode, cable position, etc.

First a frequency zoom around the critical frequency is done to locate the frequency more precisely. After this step, for all identified critical frequencies, the maximum peak was determined.

Following parameters were varied: the turntable angle continuously in the range 0 to 360 degree, the EUT itself over 3-orthogonal axis and the height for EUT with large dimensions or three axis scans for portable/small equipment.

On the determined worst-case position, a final measurement with necessary bandwidth and detector according to standard has been carried out.

**Formula:**

$$E_c = E_R + AF + C_L + D_F + G_A \quad (1)$$

$$M = L_T - E_C \quad (2)$$

AF = Antenna factor

C<sub>L</sub> = Cable loss

D<sub>F</sub> = Distance correction factor (if used)

E<sub>C</sub> = Electrical field – corrected value

E<sub>R</sub> = Receiver reading

G<sub>A</sub> = Gain of pre-amplifier (if used)

L<sub>T</sub> = Limit

M = Margin

All units are dB-units, positive margin means value is below limit.

#### 8.3.4.2 Measurement Location

##### Test site

120904 - FAC1 - Radiated Emissions

#### 8.3.4.3 Limit

| Frequency range [MHz] | Limit [µV/m] | Limit [dBµV/m] | Detector |
|-----------------------|--------------|----------------|----------|
| Above 1000            | 500          | 54             | Average  |
| Above 1000            | 5000         | 74             | Peak     |

#### 8.3.4.4 Result

| Diagram | Channel | SET / OP     | Maximum level [dBµV/m]   | Result |
|---------|---------|--------------|--------------------------|--------|
| 4.01    | low     | SET 1 / OP 1 | 49.68 (AV) @ 2706.85 MHz | PASSED |
| 4.02    | mid     | SET 1 / OP 2 | 52.51 (AV) @ 2744.05 MHz | PASSED |
| 4.03    | high    | SET 1 / OP 3 | 53.52 (AV) @ 2782.45 MHz | PASSED |

Remark: for more information and graphical plot see annex A202

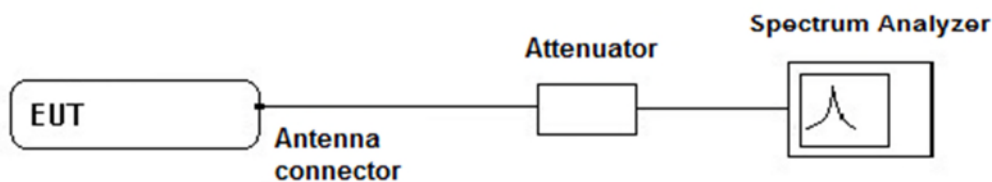


### 8.3.5 Emission in non-restricted frequency bands

#### 8.3.5.1 Description of the general conducted test setup and methodology, see below example:

The EUT's RF-signal is coupled out by a suitable antenna coupling connector (1). The signal is first attenuated (2) then connected to spectrum-analyzer (4) for RF-conducted measurements. The specific attenuation loss is determined prior to the measurement within a set-up attenuation measurement. These are then taken into account by correcting the measurement readings of the spectrum-analyzer.

#### Schematic:



#### Testing method:

The measurement is made according to relevant reference clauses:  
(See Tables Measurement details on page 14)

The measurements were performed with the RBW set to 100 kHz & maximum carrier level was indicated with MAX-Hold positive peak detector using markers. Then a frequency line was set 20 or 30 dB below this measured maximum carrier level.

Then using RBW 100 kHz & spectrum analyzer span from 150 kHz to 9.5 GHz in multiple steps. Spurious emissions were measured with MAX-Hold positive peak detector.

The sweep time set as long as necessary to capture the full signal burst per hopping channel. The burst on-period is captured by setting appropriate markers in the rising and falling edges.

#### EUT settings

The EUT was instructed to send with maximum power (if adjustable) according applicants instructions. Different modulation characteristics have been checked e.g. data rates which EUT can operate.

#### 8.3.5.2 Measurement Location

##### Test site

120910 - Radio Laboratory 1 (TS 8997)

### 8.3.5.3 Limit

| Frequency Range [MHz] | Mode     | Limit [dBc]     |
|-----------------------|----------|-----------------|
| 0.15 – 9500           | DTS/FHSS | 20 <sup>1</sup> |
|                       |          | 30 <sup>2</sup> |

Remark 1: limit where conducted power measurement complies based on peak detector

Remark 2: limit where conducted power measurement complies based on RMS detector

### 8.3.5.4 Result

| Diagram | Channel                    | SET / OP     | Maximum level [dBm]          | Limit [dBm] | Result |
|---------|----------------------------|--------------|------------------------------|-------------|--------|
| -       | low                        | SET 2 / OP 1 | No peaks < 6 dB margin found | -2.16       | PASSED |
| -       | mid                        | SET 2 / OP 2 | No peaks < 6 dB margin found | -1.67       | PASSED |
| -       | high                       | SET 2 / OP 3 | No peaks < 6 dB margin found | -1.56       | PASSED |
| -       | hopping low <sup>1)</sup>  | SET 2 / OP 4 | No peaks < 6 dB margin found | -5.25       | PASSED |
| -       | hopping high <sup>1)</sup> | SET 2 / OP 6 | No peaks < 6 dB margin found | -5.09       | PASSED |

Remark: for more information and graphical plot see annex A201. No restricted band nearby, therefore only dBc limit applies

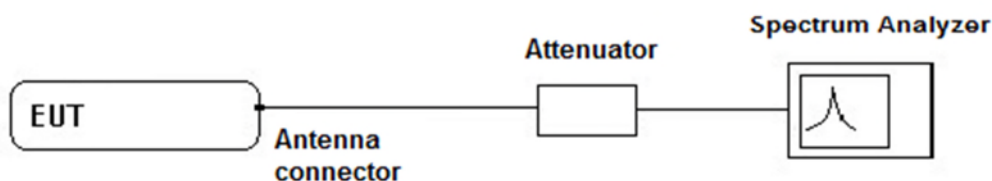
Remark 1): in hopping mode only the band-edge compliance is checked

### 8.3.6 Conducted output power

#### 8.3.6.1 Description of the general test setup and methodology, see below example:

The EUT's RF-signal is coupled out by a suitable antenna coupling connector (1). The signal is first attenuated (2) then connected to power meter (3) or spectrum-analyzer (4) for RF-conducted measurements. The specific attenuation loss is determined prior to the measurement within a set-up attenuation measurement. These are then taken into account by correcting the measurement readings.

#### Schematic:



#### Testing method:

The measurement is made according to relevant reference clauses:  
(See Tables Measurement details on page 14)

#### Test method

Peak Power with spectrum analyzer

#### EUT settings

The EUT was instructed to send with maximum power (if adjustable) according applicants instructions. Different modulation characteristics have been checked, e.g. data rates which EUT can operate

#### 8.3.6.2 Measurement Location

#### Test site

120910 - Radio Laboratory 1 (TS 8997)

#### 8.3.6.3 Limit

| Frequency Range [MHz] | Mode              | Limit [W] | Limit [dBm] |
|-----------------------|-------------------|-----------|-------------|
| 902 - 928             | DTS               | 1         | 30          |
|                       | FHSS > 50 channel | 1         | 30          |
|                       | FHSS < 50 channel | 0.25      | 24          |

#### 8.3.6.4 Result

| Diagram | Channel | Mode         | Peak power [dBm] | Result |
|---------|---------|--------------|------------------|--------|
| -       | low     | SET 2 / OP 1 | 17.93            | PASSED |
| -       | mid     | SET 2 / OP 2 | 18.37            | PASSED |
| -       | high    | SET 2 / OP 3 | 18.50            | PASSED |

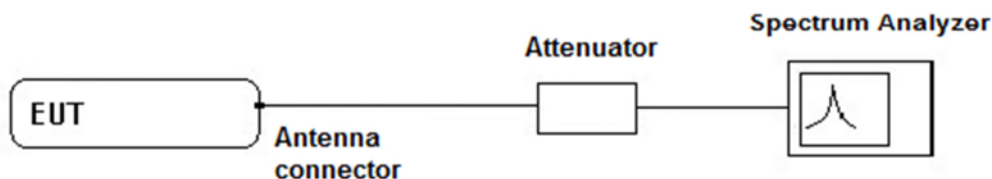
Remark: for more information and graphical plot see annex A201

### 8.3.7 Emission Bandwidth 20 dB / 6 dB

#### 8.3.7.1 Description of the general test setup and methodology, see below example:

The EUT's RF-signal is coupled out by a suitable antenna coupling connector (1). The signal is first attenuated (2) then connected to power meter (3) or spectrum-analyzer (4) for RF-conducted measurements. The specific attenuation loss is determined prior to the measurement within a set-up attenuation measurement. These are then taken into account by correcting the measurement readings.

#### Schematic:



#### Testing method:

The measurement is made according to relevant reference clauses:  
(See Tables Measurement details on page 14)

#### 8.3.7.2 Measurement Location

##### Test site

120910 - Radio Laboratory 1 (TS 8997)

#### 8.3.7.3 Limit

| Mode | Limit [dBm]             |
|------|-------------------------|
| DTS  | 6 dB BW $\geq$ 500 kHz  |
| FHSS | 20 dB BW $\leq$ 500 kHz |

#### 8.3.7.4 Result

| Diagram | Channel | Mode         | Bandwidth [kHz] | Result |
|---------|---------|--------------|-----------------|--------|
| -       | low     | SET 2 / OP 1 | 286             | PASSED |
| -       | mid     | SET 2 / OP 2 | 284             | PASSED |
| -       | high    | SET 2 / OP 3 | 285             | PASSED |

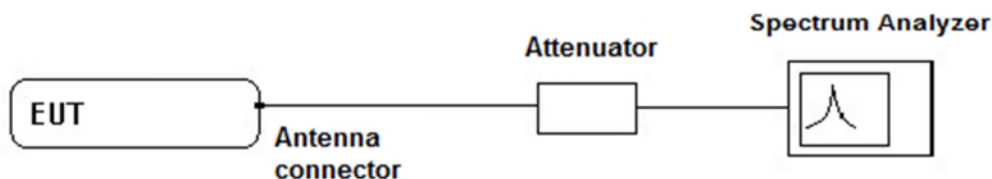
Remark: for more information and graphical plot see annex A201

### 8.3.8 Occupied channel bandwidth 99%

#### 8.3.8.1 Description of the general test setup and methodology, see below example:

The EUT's RF-signal is coupled out by a suitable antenna coupling connector (1). The signal is first attenuated (2) then connected to power meter (3) or spectrum-analyzer (4) for RF-conducted measurements. The specific attenuation loss is determined prior to the measurement within a set-up attenuation measurement. These are then taken into account by correcting the measurement readings.

#### Schematic:



#### Testing method:

The measurement is made according to relevant reference clauses:  
(See Tables Measurement details on page 14)

#### 8.3.8.2 Measurement Location

##### Test site

120910 - Radio Laboratory 1 (TS 8997)

#### 8.3.8.3 Limit

When the occupied bandwidth limit is not stated in the applicable reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

#### 8.3.8.4 Result

| Diagram | Channel | Mode         | Bandwidth [kHz] | Result |
|---------|---------|--------------|-----------------|--------|
| -       | low     | SET 2 / OP 1 | 285.318         | PASSED |
| -       | mid     | SET 2 / OP 2 | 284.798         | PASSED |
| -       | high    | SET 2 / OP 3 | 284.783         | PASSED |

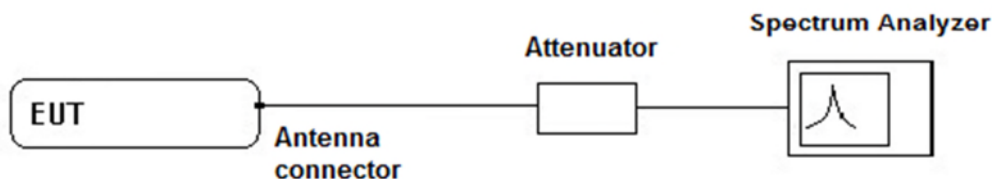
Remark: for more information and graphical plot see annex A201

### 8.3.9 Time of occupancy

#### 8.3.9.1 Description of the general test setup and methodology, see below example:

The EUT's RF-signal is coupled out by a suitable antenna coupling connector (1). The signal is first attenuated (2) then connected to power meter (3) or spectrum-analyzer (4) for RF-conducted measurements. The specific attenuation loss is determined prior to the measurement within a set-up attenuation measurement. These are then taken into account by correcting the measurement readings.

#### Schematic:



#### Testing method:

The measurement is made according to relevant reference clauses:  
(See Tables Measurement details on page 14)

#### 8.3.9.2 Measurement Location

##### Test site

120910 - Radio Laboratory 1 (TS 8997)

#### 8.3.9.3 Limit

| Bandwidth [kHz] | # Channel | Limit             |
|-----------------|-----------|-------------------|
| $\geq 250$      | $\geq 25$ | 0.4 s within 10 s |
| $\leq 250$      | $\geq 50$ | 0.4 s within 20 s |

#### 8.3.9.4 Result

| Diagram | Channel | Mode         | dwel time single [s] | # transmissions | dwel time 10 s [s] | Result |
|---------|---------|--------------|----------------------|-----------------|--------------------|--------|
| -       | Hopping | SET 2 / OP 4 | 0.00572              | 67              | 0.38               | PASSED |

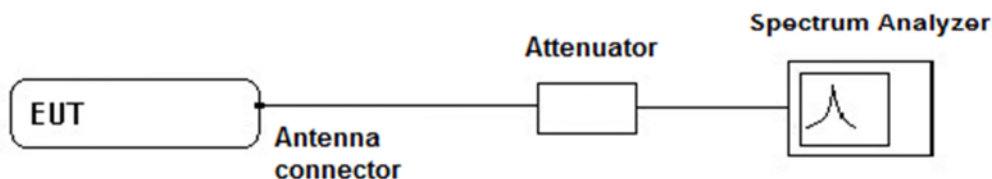
Remark: for more information and graphical plot see annex A201

### 8.3.10 Carrier frequency separation

#### 8.3.10.1 Description of the general test setup and methodology, see below example:

The EUT's RF-signal is coupled out by a suitable antenna coupling connector (1). The signal is first attenuated (2) then connected to power meter (3) or spectrum-analyzer (4) for RF-conducted measurements. The specific attenuation loss is determined prior to the measurement within a set-up attenuation measurement. These are then taken into account by correcting the measurement readings.

#### Schematic:



#### Testing method:

The measurement is made according to relevant reference clauses:  
(See Tables Measurement details on page 14)

#### 8.3.10.2 Measurement Location

##### Test site

120910 - Radio Laboratory 1 (TS 8997)

#### 8.3.10.3 Limit

| Limit [kHz]       |
|-------------------|
| 25                |
| ≥ 20 dB bandwidth |

#### 8.3.10.4 Result

| Diagram | Channel | Mode         | Frequency separation[kHz] | Limit [kHz] | Result |
|---------|---------|--------------|---------------------------|-------------|--------|
| -       | Hopping | SET 2 / OP 4 | 400.35                    | 286         | PASSED |
| -       | Hopping | SET 2 / OP 5 | 401.20                    | 284         | PASSED |
| -       | Hopping | SET 2 / OP 6 | 402.00                    | 285         | PASSED |

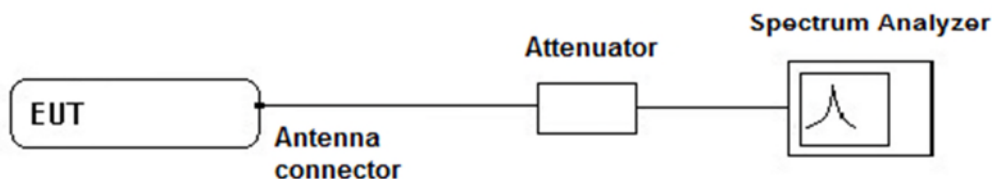
Remark: for more information and graphical plot see annex A201

### 8.3.11 Number of hopping frequencies

#### 8.3.11.1 Description of the general test setup and methodology, see below example:

The EUT's RF-signal is coupled out by a suitable antenna coupling connector (1). The signal is first attenuated (2) then connected to power meter (3) or spectrum-analyzer (4) for RF-conducted measurements. The specific attenuation loss is determined prior to the measurement within a set-up attenuation measurement. These are then taken into account by correcting the measurement readings.

#### Schematic:



#### Testing method:

The measurement is made according to relevant reference clauses:  
(See Tables Measurement details on page 14)

#### 8.3.11.2 Measurement Location

##### Test site

120910 - Radio Laboratory 1 (TS 8997)

#### 8.3.11.3 Limit

| 20 dB Bandwidth [kHz] | Limit [# frequencies] |
|-----------------------|-----------------------|
| < 250                 | ≥ 50                  |
| ≥ 250                 | ≥ 25                  |

#### 8.3.11.4 Result

| Diagram | Channel | Mode         | # of hopping channels | Result |
|---------|---------|--------------|-----------------------|--------|
| -       | Hopping | SET 2 / OP 4 | 25                    | PASSED |
| -       | Hopping | SET 2 / OP 5 | 25                    | PASSED |
| -       | Hopping | SET 2 / OP 6 | 25                    | PASSED |

Remark: for more information and graphical plot see annex A201



### 8.3.12 Equipment list

| ID    | Description                                           | Manufacturer                                        | SerNo          | CheckType | Last Check                           | Interval             | Next Check       |
|-------|-------------------------------------------------------|-----------------------------------------------------|----------------|-----------|--------------------------------------|----------------------|------------------|
|       | 120901 - ESS SAC3 - Radiated Emission <1GHz           |                                                     |                | chk       | chk: 2025-Mar-29                     | chk: 18M             | chk: 2026-Sep-29 |
| 20341 | Digital Multimeter Fluke 112                          | Fluke Deutschland GmbH / Glottertal                 | 81650455       | cal       | cal: 2024-May-13                     | cal: 24M             | cal: 2026-May-13 |
| 20442 | Semi Anechoic Chamber SAC3                            | ETS-Lindgren GmbH / Taufkirchen                     | without        | chk       | chk: 2025-Oct-09                     | chk: 12M             | chk: 2026-Oct-09 |
| 20482 | Filter Matrix SAC3                                    | cetecom advanced GmbH / Essen                       | without        | cnn       | cal: -<br>chk: -                     | cal: -<br>chk: -     | cal: -<br>chk: - |
| 20574 | Biconilog Hybrid Antenna BTA-L                        | Frankonia GmbH / Heideck                            | 980026L        | cal       | cal: 2025-Jun-06                     | cal: 36M             | cal: 2028-Jun-06 |
| 20620 | EMI Test Receiver ESU26                               | Rohde & Schwarz Messgerätebau GmbH / Memmingen      | 100362         | cal       | cal: 2025-May-06                     | cal: 12M             | cal: 2026-May-06 |
| 20885 | Power Supply EA3632A                                  | Agilent Technologies Deutschland GmbH               | 75305850       | cnn       | cal: -<br>chk: -                     | cal: -<br>chk: -     | cal: -<br>chk: - |
| 20979 | Loop Antenna HFH2-Z2                                  | Rohde & Schwarz Messgerätebau GmbH / Memmingen      | 872096/61      | cal       | cal: 2024-Sep-16                     | cal: 36M             | cal: 2027-Sep-16 |
|       | 120910 - Radio Laboratory 1 (TS 8997)                 |                                                     |                | chk       | chk: 2025-Jul-14                     | chk: 12M             | chk: 2026-Jul-14 |
| 20559 | Vector Signal Generator SMU200A                       | Rohde & Schwarz Messgerätebau GmbH / Memmingen      | 103736         | cal       | cal: 2025-May-07                     | cal: 24M             | cal: 2027-May-07 |
| 20691 | Open Switch and control Platform OSP157W 8 Port Plus  | Rohde & Schwarz Messgerätebau GmbH / Memmingen      | 100950         | cal       | cal: 2023-Jun-30                     | cal: 36M             | cal: 2026-Jun-30 |
| 20866 | Signal Analyzer FSV3030                               | Rohde & Schwarz Messgerätebau GmbH / Memmingen      | 101247         | cal       | cal: 2025-Jun-10                     | cal: 12M             | cal: 2026-Jun-10 |
| 20904 | Climatic Chamber ClimeEvent C/1000/70a/5              | Weiss Umwelttechnik GmbH / Reiskirchen-Lindenstruth | 58226223240010 | cal       | cal: 2025-Jan-23                     | cal: 24M             | cal: 2027-Jan-23 |
| 20978 | HMP2020 2-CH power Supply 188W                        | Rohde & Schwarz Messgerätebau GmbH / Memmingen      | 121649         | cal       | cal: 2024-Aug-06                     | cal: 24M             | cal: 2026-Aug-06 |
| 20980 | USB Wideband power Sensor U2021XA                     | Keysight Technologies Deutschland GmbH / Böblingen  | MY64330007     | cal       | cal: 2025-Jul-02                     | cal: 12M             | cal: 2026-Jul-02 |
| 80682 | USM Switch Matrix                                     | cetecom advanced GmbH / Saarbrücken                 | D001           | cnn       | cal: -<br>chk: -                     | cal: -<br>chk: -     | cal: -<br>chk: - |
|       | 120904 - FAC1 - Radiated Emissions                    |                                                     |                | chk       | chk: 2025-Mar-25                     | chk: 12M             | chk: 2026-Mar-25 |
| 20020 | Double-Ridged Waveguide Horn Antenna 3115 (Subst 1)   | EMCO Elektronik GmbH / Gilching                     | 9107-3699      | calchk    | cal: 2024-Sep-11<br>chk: 2013-Apr-20 | cal: 36M<br>chk: 12M | cal: 2027-Sep-11 |
| 20066 | Notch Filter WRCT 1900/2200-5/40-10EEK                | Wainwright Instruments GmbH / Andechs 5             |                | chk       | chk: 2025-Mar-21                     | chk: 12M             | chk: 2026-Mar-21 |
| 20121 | Notch Filter WRCB 1879,5/1880,5EE                     | Wainwright Instruments GmbH / Andechs 15            |                | chk       | chk: 2025-Mar-21                     | chk: 12M             | chk: 2026-Mar-21 |
| 20122 | Notch Filter WRCB 1747/1748                           | Wainwright Instruments GmbH / Andechs 12            |                | chk       | chk: 2025-Mar-21                     | chk: 12M             | chk: 2026-Mar-21 |
| 20254 | High Pass Filter 5HC 2600/12750-1.5KK                 | Trilithic                                           | 23042          | chk       | chk: 2025-Mar-21                     | chk: 12M             | chk: 2026-Mar-21 |
| 20287 | Pre-Amplifier 25MHz - 4GHz AMF-2D-100M4G-35-10P       | Miteq Inc.                                          | 379418         | chk       | chk: 2025-Mar-21                     | chk: 12M             | chk: 2026-Mar-21 |
| 20290 | Notch Filter WRCB 901,9/903,1SS                       | Wainwright Instruments GmbH / Andechs 3RR           |                | chk       | chk: 2025-Mar-21                     | chk: 12M             | chk: 2026-Mar-21 |
| 20291 | High Pass Filter WHJ 2200-4EE                         | Wainwright Instruments GmbH / Andechs 14            |                | chk       | chk: 2025-Mar-21                     | chk: 12M             | chk: 2026-Mar-21 |
| 20338 | Pre-Amplifier JS4-00102600-38-5P                      | Miteq Inc.                                          | 838697         | chk       | chk: 2025-Mar-21                     | chk: 12M             | chk: 2026-Mar-21 |
| 20341 | Digital Multimeter Fluke 112                          | Fluke Deutschland GmbH / Glottertal                 | 81650455       | cal       | cal: 2024-May-13                     | cal: 24M             | cal: 2026-May-13 |
| 20436 | Radio Communication Tester CMU200                     | Rohde & Schwarz Messgerätebau GmbH / Memmingen      | 103083         | cal       | cal: 2024-May-24                     | cal: 24M             | cal: 2026-May-24 |
| 20448 | Notch Filter WRCT 1850.0/2170.0-5/40-10SSK            | Wainwright Instruments GmbH / Andechs 5             |                | chk       | chk: 2025-Mar-21                     | chk: 12M             | chk: 2026-Mar-21 |
| 20449 | Notch Filter WRCT 824.0/894.0-5/40-8SSK               | Wainwright Instruments GmbH / Andechs 1             |                | chk       | chk: 2025-Mar-21                     | chk: 12M             | chk: 2026-Mar-21 |
| 20484 | Pre-Amplifier 2,5GHz - 18GHz AMF-5D-02501800-25-10P   | Miteq Inc.                                          | 1244554        | chk       | chk: 2025-Mar-21                     | chk: 12M             | chk: 2026-Mar-21 |
| 20489 | EMI Test Receiver ESU40                               | Rohde & Schwarz Messgerätebau GmbH / Memmingen      | 100030         | cal       | cal: 2026-May-08                     | cal: 12M             | cal: 2027-May-08 |
| 20512 | Notch Filter WRCB 800/960-02/40-6EEK (GSM 850)        | Wainwright Instruments GmbH / Andechs 24            |                | chk       | chk: 2025-Mar-21                     | chk: 12M             | chk: 2026-Mar-21 |
| 20549 | Log. Per. Antenna HL025                               | Rohde & Schwarz Messgerätebau GmbH / Memmingen      | 1000060        | calchk    | cal: 2024-Oct-08                     | cal: 36M<br>chk: 12M | cal: 2027-Oct-08 |
| 20558 | Fully Anechoic Chamber 1                              | ETS-Lindgren GmbH / Taufkirchen                     | without        | chk       | chk: 2025-Mar-28                     | chk: 24M             | chk: 2027-Mar-28 |
| 20608 | Ultrabroadband-Antenna HL562                          | Rohde & Schwarz Messgerätebau GmbH / Memmingen      | 830547/009     | cal       | cal: 2023-Jul-04                     | cal: 36M             | cal: 2026-Jul-04 |
| 20611 | Power Supply E3632A                                   | Agilent Technologies Deutschland GmbH               | KR 75305854    | cpu       |                                      |                      |                  |
| 20690 | Spectrum Analyzer FSU26                               | Rohde & Schwarz Messgerätebau GmbH / Memmingen      | 100302/026     | cal       | cal: 2025-May-07                     | cal: 24M             | cal: 2027-May-07 |
| 20720 | Measurement Software EMC32 [FAC]                      | Rohde & Schwarz Messgerätebau GmbH                  | V10.xx         | cnn       | cal: -<br>chk: -                     | cal: -<br>chk: -     | cal: -<br>chk: - |
| 20868 | High Pass Filter AFH-07000                            | AtlanTecRF / Braintree, Essex                       | 16071300004    | chk       | chk: 2025-Mar-21                     | chk: 12M             | chk: 2026-Mar-21 |
| 20883 | Open Switch and control Platform OSP-B200S2 Satellite | Rohde & Schwarz Messgerätebau GmbH / Memmingen      | 101432         | chk       | chk: 2025-Mar-21                     | chk: 12M             | chk: 2026-Mar-21 |
| 20884 | Open Switch and control Platform OSP320               | Rohde & Schwarz Messgerätebau GmbH / Memmingen      | 101391         | chk       | chk: 2025-Mar-21                     | chk: 12M             | chk: 2026-Mar-21 |
| 20977 | Wideband Radio Communication Tester CMW500            | Rohde & Schwarz Messgerätebau GmbH / Memmingen      | 172340         | cal       | cal: 2024-Jul-24                     | cal: 12M             | cal: 2026-Jul-24 |
| 20412 | Fully Anechoic Chamber 2                              | ETS-Lindgren GmbH / Taufkirchen                     | without        | chk       | chk: 2024-Oct-31                     | chk: 24M             | chk: 2026-Oct-31 |
| 20811 | Horn Antenna ASY-SGH-124-SMA                          | Antenna Systems Solutions S.L                       | 29F14182337    | cal       | cal: 2024-Oct-08                     | cal: 36M             | cal: 2027-Oct-08 |
| 20816 | SGH Antenna SGH-26-WR10                               | Antenal S.L.                                        | 1144           | cnn       | cal: -<br>chk: -                     | cal: -<br>chk: -     | cal: -<br>chk: - |

| ID    | Description                                    | Manufacturer                                | SerNo      | CheckType | Last Check       | Interval         | Next Check       |
|-------|------------------------------------------------|---------------------------------------------|------------|-----------|------------------|------------------|------------------|
| 20836 | 1-18 GHz Amplifier                             | Wright Technologies, Inc., Inc. / Roseville | 0001       | chk       | chk: 2024-Oct-18 | chk: 24M         | chk: 2026-Oct-18 |
| 20913 | Phase Amplitude Stable Cable Assembly DC-40GHz | RF-Lambda Europe GmbH                       | AC19040001 | cnn       | cal: -<br>chk: - | cal: -<br>chk: - | cal: -<br>chk: - |
| 25457 | DRG Horn Antenna SAS-574                       | A.H. Systems, Inc. / Chatsworth             | 383        | cal       | cal: 2025-Jun-03 | cal: 36M         | cal: 2028-Jun-03 |

| Note / remarks | Interval of calibration & Verification |
|----------------|----------------------------------------|
|----------------|----------------------------------------|

|     |           |
|-----|-----------|
| 12M | 12 months |
| 24M | 24 months |
| 36M | 36 months |
| 10Y | 10 Years  |

| Abbreviation Check Type | Description |
|-------------------------|-------------|
|-------------------------|-------------|

|        |                                            |
|--------|--------------------------------------------|
| cnn    | Calibration and verification not necessary |
| cal    | Calibration                                |
| calchk | Calibration plus intermediate Verification |
| chk    | Verification                               |
| cpu    | Verification before usage                  |

#### 8.4 Results from external laboratory

None -

#### 8.5 Opinions and interpretations

None -

#### 8.6 List of abbreviations

None -

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