

TEST REPORT

Test report no.: 1-3129/16-01-23



Testing laboratory

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Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) 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-12076-01-01

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Manufacturer

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Test standard/s

47 CFR Part 15

Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices

RSS - 210 Issue 9

Spectrum Management and Telecommunications Radio Standards Specification - Licence-Exempt Radio Apparatus: Category I Equipment

RSS - Gen Issue 4

Spectrum Management and Telecommunications Radio Standards Specifications - General Requirements and Information for the Certification of Radio Apparatus

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

Test Item

Kind of test item: Wireless hearing instrument

Model name: Phonak Audéo B90-Direct

FCC ID: KWC-BTD1

IC: 2262A-BTD1

Frequency: DTS band 2400 MHz to 2483.5 MHz

Technology tested: DM proprietary

Antenna: Integrated antenna

Power supply: 1.25 V DC by Zinc - Air battery

Temperature range: 0°C to +40°C



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

Test report authorized:

Andreas Luckenbill
Lab Manager
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Test performed:

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2 General information

2.1 Notes and disclaimer

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

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2.2 Application details

| | |
|------------------------------------|------------|
| Date of receipt of order: | 2017-02-02 |
| Date of receipt of test item: | 2017-03-08 |
| Start of test: | 2017-03-23 |
| End of test: | 2017-04-20 |
| Person(s) present during the test: | -/- |

2.3 Test laboratories sub-contracted

None

3 Test standard/s and references

| Test standard | Date | Description |
|-------------------|---------------|---|
| 47 CFR Part 15 | -/- | Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices |
| RSS - 210 Issue 9 | August 2016 | Spectrum Management and Telecommunications Radio Standards Specification - Licence-Exempt Radio Apparatus: Category I Equipment |
| RSS - Gen Issue 4 | November 2014 | Spectrum Management and Telecommunications Radio Standards Specifications - General Requirements and Information for the Certification of Radio Apparatus |

| Guidance | Version | Description |
|------------------|---------|---|
| ANSI C63.4-2014 | -/- | American national standard for methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz |
| ANSI C63.10-2013 | -/- | American national standard of procedures for compliance testing of unlicensed wireless devices |

4 Test environment

| | | |
|---------------------------|---|--|
| Temperature | : T _{nom} T _{max} T _{min} | +22 °C during room temperature tests No tests under extreme temperature conditions required! No tests under extreme temperature conditions required! |
| Relative humidity content | : 46 % | |
| Barometric pressure | : 1028 hpa | |
| Power supply | : V _{nom} V _{max} V _{min} | 1.25 V DC by Zinc - Air battery No tests under extreme voltage conditions required! No tests under extreme voltage conditions required! |

5 Test item

5.1 General description

| | |
|------------------------------|---|
| Kind of test item | : Wireless hearing instrument |
| Type identification | : Phonak Audéo B90-Direct |
| Series / additional variants | : Phonak Audéo B70-Direct Phonak Audéo B50-Direct Selectic Luna R9-C Selectic Luna R7-C |
| HMN | : -/ |
| PMN | : Phonak Audéo B-Direct |
| HVIN | : Phonak Audéo B90-Direct Phonak Audéo B70-Direct Phonak Audéo B50-Direct |
| FVIN | : -/ |
| S/N serial number | : Radiated unit: sample 57 Conducted unit: sample 54 Photos: sample 52 (external) |
| HW hardware status | : 050-0279 |
| SW software status | : Target 5.2 Beta 1 / RF test software |
| FW firmware status | : 067-1243 |
| Frequency band | : DTS band 2400 MHz to 2483.5 MHz (lowest channel 2402 MHz; highest channel 2480 MHz) |
| Type of radio transmission | : DSSS |
| Use of frequency spectrum | : DSSS |
| Type of modulation | : GFSK |
| Number of channels | : 40 |
| Antenna | : Integrated antenna |
| Power supply | : 1.25 V DC by Zinc - Air battery |
| Temperature range | : 0°C to +40°C |

5.2 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup- and EUT-photos are included in test report: 1-3129/16-01-01_AnnexA
 1-3129/16-01-01_AnnexB*
 1-3129/16-01-01_AnnexD

* Internal photos provided by the customer.

6 Description of the test setup

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

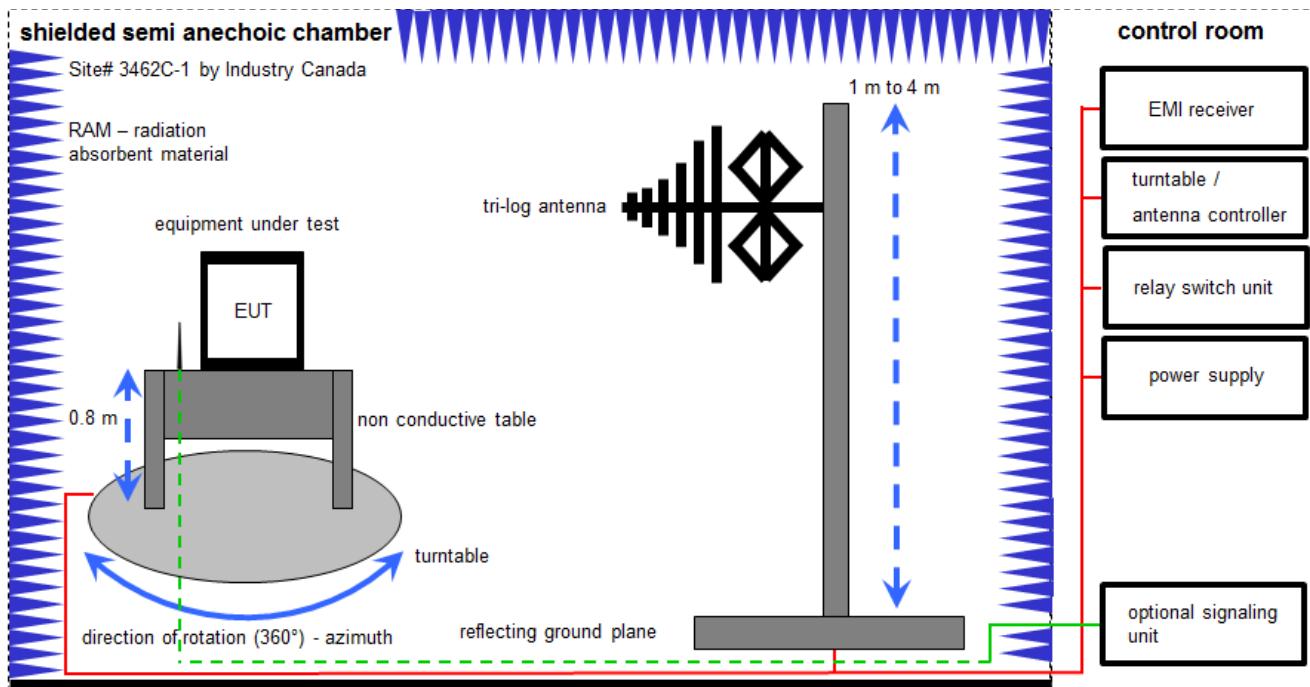
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

Agenda: Kind of Calibration

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

6.1 Shielded semi anechoic chamber

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are conform to specifications ANSI C63. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analyzers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.



Measurement distance: tri-log antenna 10 meter

$$FS = UR + CL + AF$$

(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

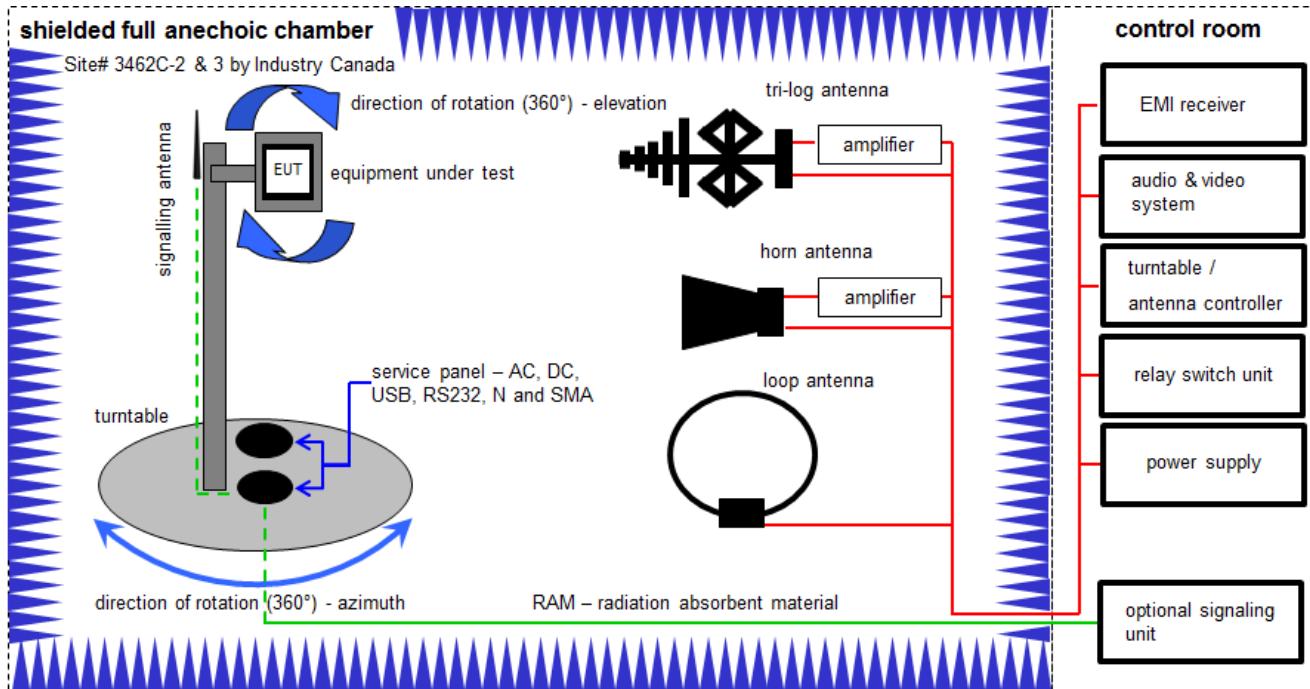
Example calculation:

$$FS [\text{dB}\mu\text{V}/\text{m}] = 12.35 [\text{dB}\mu\text{V}/\text{m}] + 1.90 [\text{dB}] + 16.80 [\text{dB}/\text{m}] = 31.05 [\text{dB}\mu\text{V}/\text{m}] (35.69 \mu\text{V}/\text{m})$$

Equipment table:

| No. | Lab / Item | Equipment | Type | Manufacturer | Serial No. | INV. No. | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|--|------------------|---------------|------------|-----------|---------------------|------------------|------------------|
| 1 | A | Meßkabine 1 | HF-Absorberhalle | MWB AG 300023 | | 300000551 | ne | -/- | -/- |
| 2 | A | EMI Test Receiver | ESCI 3 | R&S | 100083 | 300003312 | k | 01.02.2017 | 31.01.2018 |
| 3 | A | Antenna Tower | Model 2175 | ETS-Lindgren | 64762 | 300003745 | izw | -/- | -/- |
| 4 | A | Positioning Controller | Model 2090 | ETS-Lindgren | 64672 | 300003746 | izw | -/- | -/- |
| 5 | A | Turntable Interface-Box | Model 105637 | ETS-Lindgren | 44583 | 300003747 | izw | -/- | -/- |
| 6 | A | TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbeck | 295 | 300003787 | k | 25.04.2016 | 25.04.2018 |

6.2 Shielded fully anechoic chamber



Measurement distance: tri-log antenna and horn antenna 3 meter; loop antenna 3 meter / 1 meter

FS = UR + CA + AF

(FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

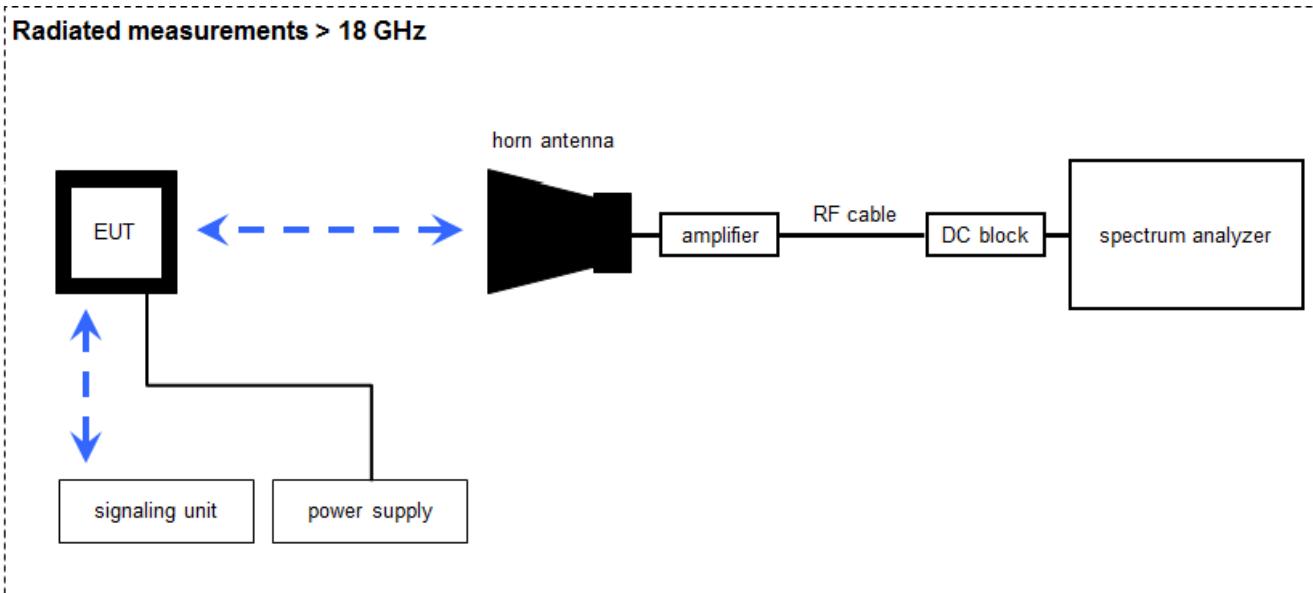
Example calculation:

FS [dB μ V/m] = 40.0 [dB μ V/m] + (-35.8) [dB] + 32.9 [dB/m] = 37.1 [dB μ V/m] (71.61 μ V/m)

Equipment table:

| No. | Lab / Item | Equipment | Type | Manufacturer | Serial No. | INV. No. | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|--|---------------------------------------|----------------------|-----------------|-----------|---------------------|------------------|------------------|
| 1 | C | Active Loop Antenna 10 kHz to 30 MHz | 6502 | EMCO | 2210 | 300001015 | k | 20.05.2015 | 20.05.2017 |
| 2 | A, B | Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115 | EMCO | 9709-5290 | 300000212 | k | 13.08.2015 | 13.08.2017 |
| 3 | B | Highpass Filter WHK1.1/15G-10SS | Wainwright | 37 | 400000148 | ne | -/- | -/- | -/- |
| 4 | B | Highpass Filter WHKX7.0/18G-8SS | Wainwright | 18 | 300003789 | ne | -/- | -/- | -/- |
| 5 | B | Band Reject Filter WRCG2400/2483-2375/2505-50/10SS | Wainwright | 26 | 300003792 | ne | -/- | -/- | -/- |
| 6 | A, B, C | 4U RF Switch Platform | L4491A | Agilent Technologies | MY50000032 | 300004510 | ne | -/- | -/- |
| 7 | A, B, C | Computer | Intel Core i3 3220/3,3 GHz, Processor | -/- | 2V2403033A54 21 | 300004591 | ne | -/- | -/- |
| 8 | A, B, C | NEXIO EMV-Software | BAT EMC V3.16.0.49 | EMCO | -/- | 300004682 | ne | -/- | -/- |
| 9 | A, B, C | Anechoic chamber | | TDK | -/- | 300003726 | ne | -/- | -/- |
| 10 | A, B, C | EMI Test Receiver 9kHz-26,5GHz | ESR26 | R&S | 101376 | 300005063 | vIKI! | 13.09.2016 | 13.03.2018 |
| 11 | B | RF Amplifier AFS4-00100800-28-20P-4-R | | MITEQ | 2008992 | 300005204 | ne | -/- | -/- |
| 12 | B | RF-Amplifier AMF-6F06001800-30-10P-R | | NARDA-MITEQ Inc | 2011571 | 300005240 | ev | -/- | -/- |
| 13 | A, B, C | Switch-Unit | 3488A | HP | 2719A14505 | 300000368 | ev | -/- | -/- |

6.3 Radiated measurements > 18 GHz



Measurement distance: horn antenna 50 cm

$$FS = U_R + CA + AF$$

(FS-field strength; U_R -voltage at the receiver; CA-loss signal path & distance correction; AF-antenna factor)

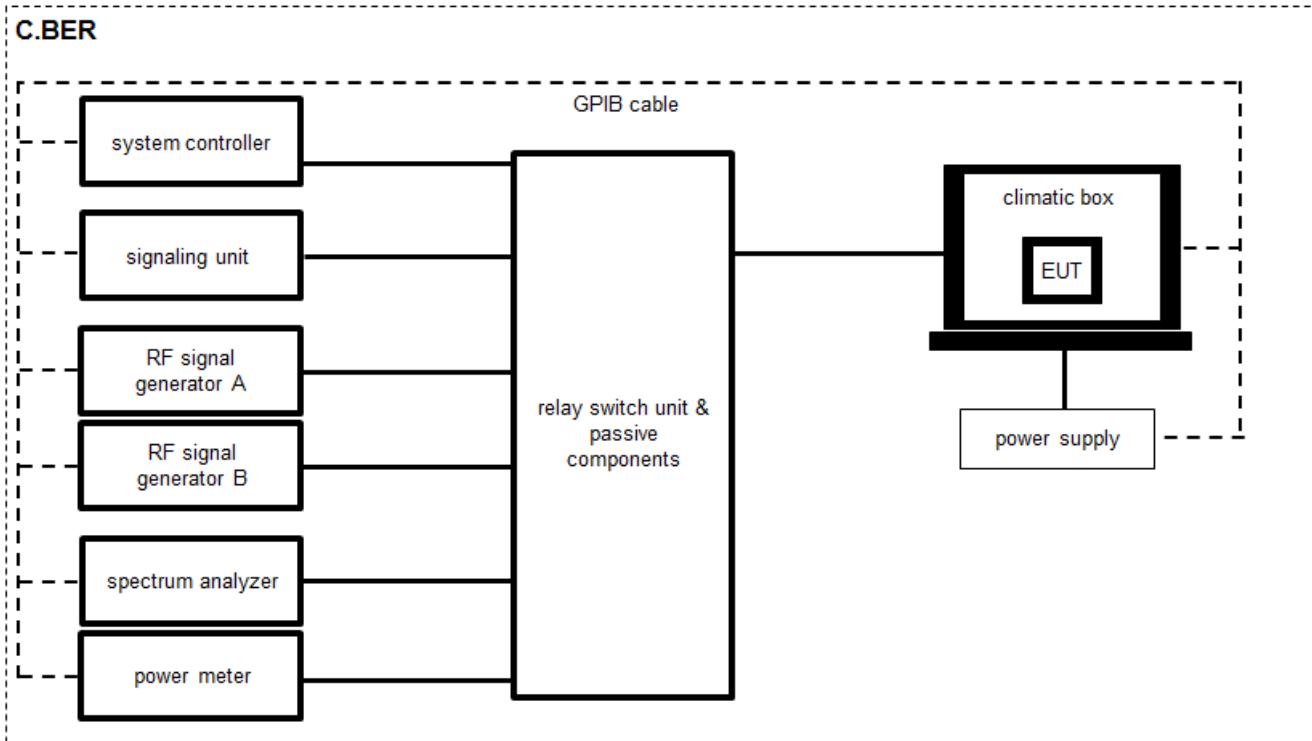
Example calculation:

$$FS [dB\mu V/m] = 40.0 [dB\mu V/m] + (-60.1) [dB] + 36.74 [dB/m] = 16.64 [dB\mu V/m] (6.79 \mu V/m)$$

Equipment table:

| No. | Lab / Item | Equipment | Type | Manufacturer | Serial No. | INV. No. | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|---|---------------------|----------------|------------------|-----------|---------------------|------------------|------------------|
| 1 | A | Std. Gain Horn Antenna 18.0 to 26.5 GHz | 638 | Narda | -/- | 300000486 | k | 10.09.2015 | 10.09.2017 |
| 2 | A | Signal Analyzer 40 GHz | FSV40 | R&S | 101042 | 300004517 | k | 27.01.2017 | 26.01.2018 |
| 3 | A | Amplifier 2-40 GHz | JS32-02004000-57-5P | MITEQ | 1777200 | 300004541 | ev | -/- | -/- |
| 4 | A | RF-Cable | ST18/SMAm/SMAm/48 | Huber & Suhner | Batch no. 600918 | 400001182 | ev | -/- | -/- |
| 5 | A | RF-Cable | ST18/SMAm/SMAm/48 | Huber & Suhner | Batch no. 127377 | 400001183 | ev | -/- | -/- |
| 6 | A | DC-Blocker 0.1-40 GHz | 8141A | Inmet | -/- | 400001185 | ev | -/- | -/- |

6.4 Conducted measurements C.BER system



OP = AV + CA
 (OP-output power; AV-analyzer value; CA-loss signal path)

Example calculation:

$$\text{OP [dBm]} = 6.0 \text{ [dBm]} + 11.7 \text{ [dB]} = 17.7 \text{ [dBm]} (58.88 \text{ mW})$$

Equipment table:

| No. | Lab / Item | Equipment | Type | Manufacturer | Serial No. | INV. No. | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|-----------------------|-------------------|----------------------|------------------|-----------|---------------------|------------------|------------------|
| 1 | A | Switch / Control Unit | 3488A | HP | -/- | 300000929 | ne | -/- | -/- |
| 2 | A | USB/GPIB interface | 82357B | Agilent Technologies | MY52103346 | 300004390 | ne | -/- | -/- |
| 3 | A | Signal Analyzer 30GHz | FSV30 | R&S | 103170 | 300004855 | k | 30.01.2017 | 29.01.2019 |
| 4 | A | DC-Blocker | 8143 | Inmet Corp. | none | 300002842 | ne | -/- | -/- |
| 5 | A | Powersplitter | 6005-3 | Inmet Corp. | -/- | 300002841 | ev | -/- | -/- |
| 6 | A | Messplatzrechner | Tecline | F+W | -/- | 300003580 | ne | -/- | -/- |
| 7 | A | RF-Cable | ST18/SMAm/SMAm/72 | Huber & Suhner | Batch no. 605505 | 400001187 | ev | -/- | -/- |
| 8 | A | RF-Cable | Sucoflex 104 | Huber & Suhner | 147636/4 | 400001188 | ev | -/- | -/- |
| 9 | A | RF-Cable | ST18/SMAm/SMAm/48 | Huber & Suhner | Batch no. 699866 | 400001189 | ev | -/- | -/- |
| 10 | A | RF-Cable | ST18/SMAm/SMAm/48 | Huber & Suhner | Batch no. 14844 | 400001190 | ev | -/- | -/- |

7 Sequence of testing

7.1 Sequence of testing radiated spurious 9 kHz to 30 MHz

Setup

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

Premasurement

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

Final measurement

- Identified emissions during the premeasurement are maximized by the software by rotating the turntable from 0° to 360°. In case of the 2-axis positioner is used the elevation axis is also rotated from 0° to 360°.
- The final measurement is done in the position (turntable and elevation) causing the highest emissions with quasi-peak (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. A plot with the graph of the premeasurement and the limit is stored.

7.2 Sequence of testing radiated spurious 30 MHz to 1 GHz

Setup

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

Premereasurement

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

Final measurement

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

7.3 Sequence of testing radiated spurious 1 GHz to 18 GHz

Setup

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

Premereasurement

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

Final measurement

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

7.4 Sequence of testing radiated spurious above 18 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet.
- The measurement distance is as appropriate (e.g. 0.5 m).
- The EUT is set into operation.

Premeasurement

- The test antenna is handheld and moved carefully over the EUT to cover the EUT's whole sphere and different polarizations of the antenna.

Final measurement

- The final measurement is performed at the position and antenna orientation causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement and the limit is stored.

8 Measurement uncertainty

| Measurement uncertainty | |
|--|--|
| Test case | Uncertainty |
| Antenna gain | ± 3 dB |
| Spectrum bandwidth | ± 21.5 kHz absolute; ± 15.0 kHz relative |
| Maximum output power | ± 1 dB |
| Detailed conducted spurious emissions @ the band edge | ± 1 dB |
| Band edge compliance radiated | ± 3 dB |
| Spurious emissions conducted | ± 3 dB |
| Spurious emissions radiated below 30 MHz | ± 3 dB |
| Spurious emissions radiated 30 MHz to 1 GHz | ± 3 dB |
| Spurious emissions radiated 1 GHz to 12.75 GHz | ± 3.7 dB |
| Spurious emissions radiated above 12.75 GHz | ± 4.5 dB |
| Spurious emissions conducted below 30 MHz (AC conducted) | ± 2.6 dB |

9 Summary of measurement results

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

| TC Identifier | Description | Verdict | Date | Remark |
|---------------|---------------------------------|------------|------------|--------|
| RF-Testing | CFR Part 15 RSS 247, Issue 2 | See table! | 2017-06-29 | -/- |

| Test specification clause | Test case | Temperature conditions | Power source voltages | Mode | C | NC | NA | NP | Remark |
|-------------------------------|---------------------------------------|------------------------|-----------------------|---------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|------------------|
| CFR 15.35 RSS Gen | Timing of the transmitter | Nominal | Nominal | TX | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/- |
| RSS Gen | 99% - Occupied Bandwidth | Nominal | Nominal | TX | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/-! |
| §15.249 RSS-210 | Maximum field strength | Nominal | Nominal | TX | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/- |
| §15.249 RSS-210 | Band edge compliance radiated | Nominal | Nominal | TX | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/-s |
| §15.249 RSS-210 | TX spurious emissions radiated | Nominal | Nominal | TX | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/- |
| §15.109 RSS-Gen | RX spurious emissions radiated | Nominal | Nominal | Idle | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/- |
| §15.209 RSS-Gen | Spurious emissions radiated < 30 MHz | Nominal | Nominal | TX/Idle | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/- |
| §15.107 §15.207 RSS-Gen | Spurious emissions conducted < 30 MHz | Nominal | Nominal | TX/Idle | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Battery operated |

Note: C = Compliant; NC = Not compliant; NA = Not applicable; NP = Not performed

10 Additional comments

Reference documents: Customer Questionnaire 1-3129-16-1 (3)

Test report no.1-3129/16-01-10

Special test descriptions: None

Configuration descriptions: Used power setting: 0 dBm

Test mode: Special software is used.
EUT is transmitting pseudo random data by itself

Antennas and transmit operating modes: Operating mode 1 (single antenna)
- Equipment with 1 antenna,
- Equipment with 2 diversity antennas operating in switched diversity mode by which at any moment in time only 1 antenna is used,
- Smart antenna system with 2 or more transmit/receive chains, but operating in a mode where only 1 transmit/receive chain is used)

11 Measurement results

11.1 Antenna gain

Measurement:

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

| Measurement parameters | |
|-------------------------|---|
| Detector | Peak |
| Sweep time | Auto |
| Resolution bandwidth | 3 MHz |
| Video bandwidth | 3 MHz |
| Span | 5 MHz |
| Trace mode | Max hold |
| Test setup | See sub clause 6.2 B (radiated) See sub clause 6.4 A (conducted) |
| Measurement uncertainty | See sub clause 8 |

Limits:

| FCC | IC |
|---|----|
| 6 dBi / > 6 dBi output power and power density reduction required | |

Results:

| T _{nom} | V _{nom} | lowest channel 2402 MHz | middle channel 2440 MHz | highest channel 2480 MHz |
|--|------------------|----------------------------|----------------------------|-----------------------------|
| Antenna gain added from CTC advanced test report 1-3129/16-01-10 | | -11.7 | -8.1 | -10.6 |

11.2 Timing of the transmitter

Measurement:

| Measurement parameter | |
|-----------------------|----------|
| Detector: | Peak |
| Sweep time: | See plot |
| Resolution bandwidth: | See plot |
| Video bandwidth: | See plot |
| Span: | Zero |
| Trace mode: | Single |

Limits:

| FCC | IC |
|--|----|
| Timing of the transmitter | |
| (c) Unless otherwise specified, e.g. Section 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification. | |

Result: Bursts larger than 100 ms supported – Therefore no correction between Peak and Average usable.

11.3 Occupied bandwidth – 99% bandwidth

Description:

Measurement of the 99% bandwidth of the modulated signal acc. RSS-GEN.

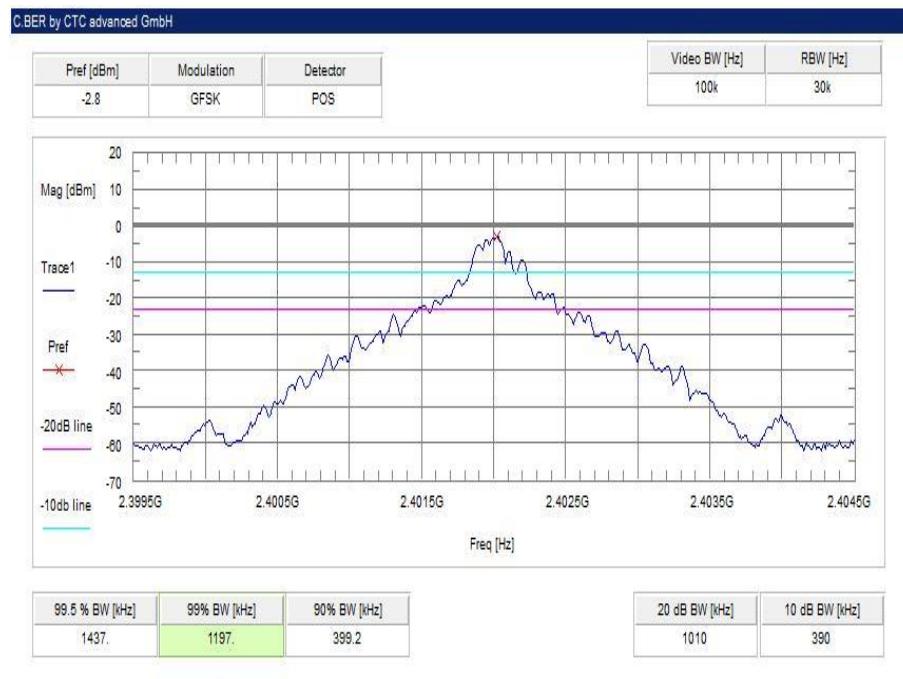
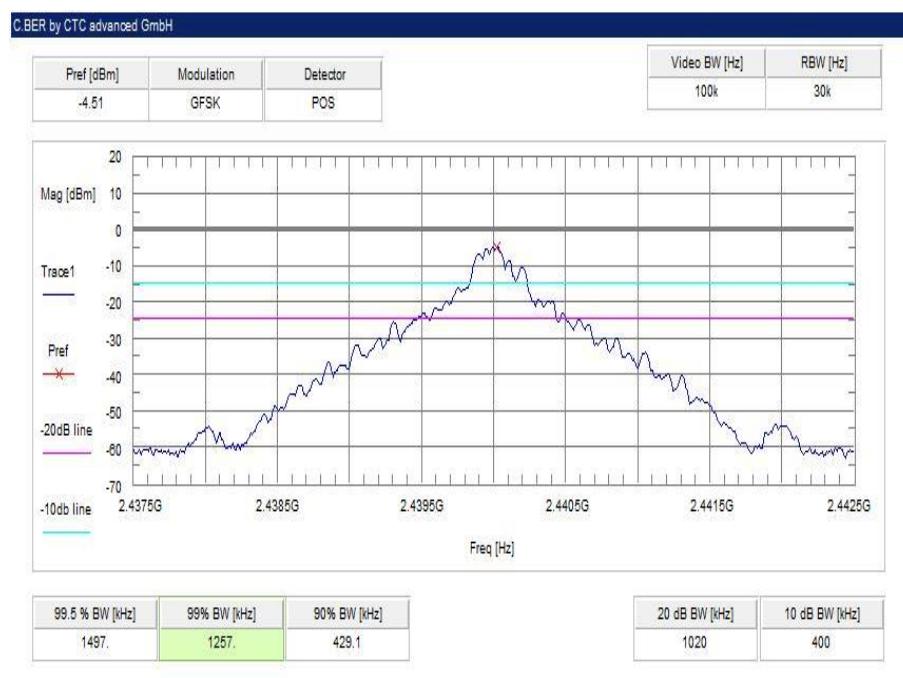
| Measurement parameters | |
|-------------------------|---|
| Detector | Peak |
| Sweep time | Auto |
| Resolution bandwidth | 30 kHz |
| Video bandwidth | 100 kHz |
| Span | 5 MHz |
| Measurement procedure | Measurement of the 99% bandwidth using the integration function of the analyzer |
| Trace mode | Max hold (allow trace to stabilize) |
| Test setup | See sub clause 6.4 A |
| Measurement uncertainty | See sub clause 8 |

Usage:

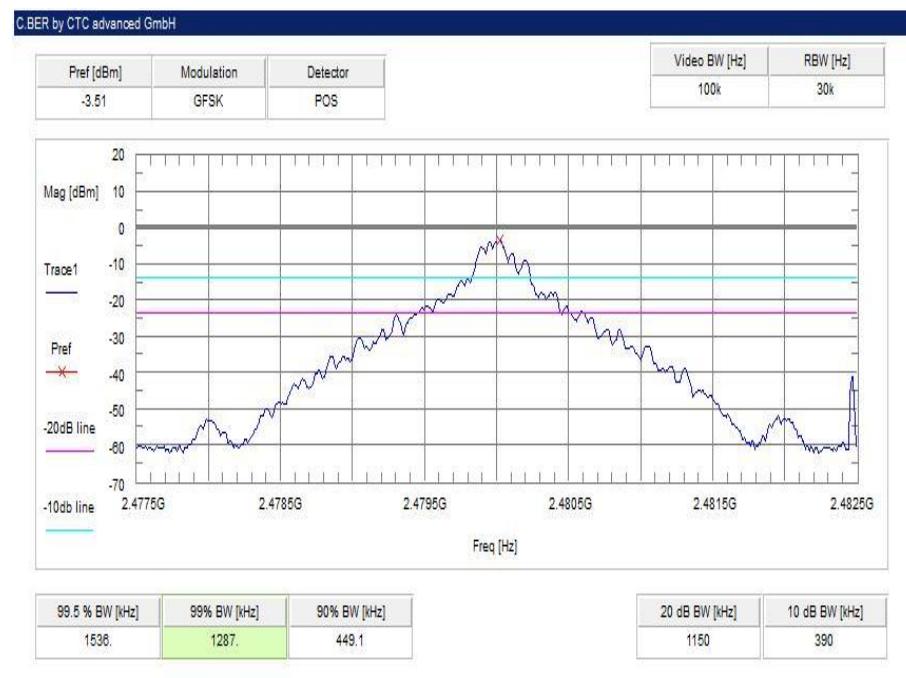
| | |
|---|----|
| -/- | IC |
| Occupied bandwidth – 99% emission bandwidth | |
| OBW is necessary for emission designator | |

Results:

| | Frequency | | |
|----------------------------|-----------|----------|----------|
| | 2402 MHz | 2440 MHz | 2480 MHz |
| 99% bandwidth [kHz] | 1197 | 1257 | 1287 |

Plots:**Plot 1: lowest channel – 2402 MHz****Plot 2: middle channel – 2440 MHz**

Plot 3: high channel – 2480 MHz



11.4 Maximum field strength

Description:

Measurement of the maximum field strength radiated.

Measurement:

| Measurement parameter | |
|-------------------------|----------------------|
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 3 MHz |
| Video bandwidth: | 3 MHz |
| Span: | 5 MHz |
| Trace mode: | Max Hold |
| Measurement distance: | 3 m |
| Test setup | See sub clause 6.2 B |
| Measurement uncertainty | See sub clause 8 |

Limits:

| FCC | IC |
|---|----|
| Maximum field strength | |
| The field strength of emissions of intentional radiators shall comply with the following: Field strength of fundamental: 50 mV/m / (94 dB μ V/m) @ 3 m (AVG FCC) 500 mV/m / (114 dB μ V/m) @ 3 m (Peak FCC) / (AVG IC) | |

Result:

| Modulation | Maximum field strength [dB μ V/m @ 3 m] | | | |
|------------|---|----------------|----------------|-----------------|
| | Frequency | Lowest channel | Middle channel | Highest channel |
| Peak | | 81.6 | 85.9 | 82.1 |
| AVG*) | | 81.6 | 85.9 | 82.1 |

*) Average value calculated with duty cycle correction factor. (see chapter 9.1)

11.5 Band edge compliance radiated

Description:

Measurement of the radiated band edge compliance. The EUT is turned in the position that results in the maximum level at the band edge. Then a sweep over the corresponding restricted band is performed. The EUT is set to single channel mode and the transmit channel is channel 00 for the lower restricted band and channel 39 for the upper restricted band. Measurement distance is 3m.

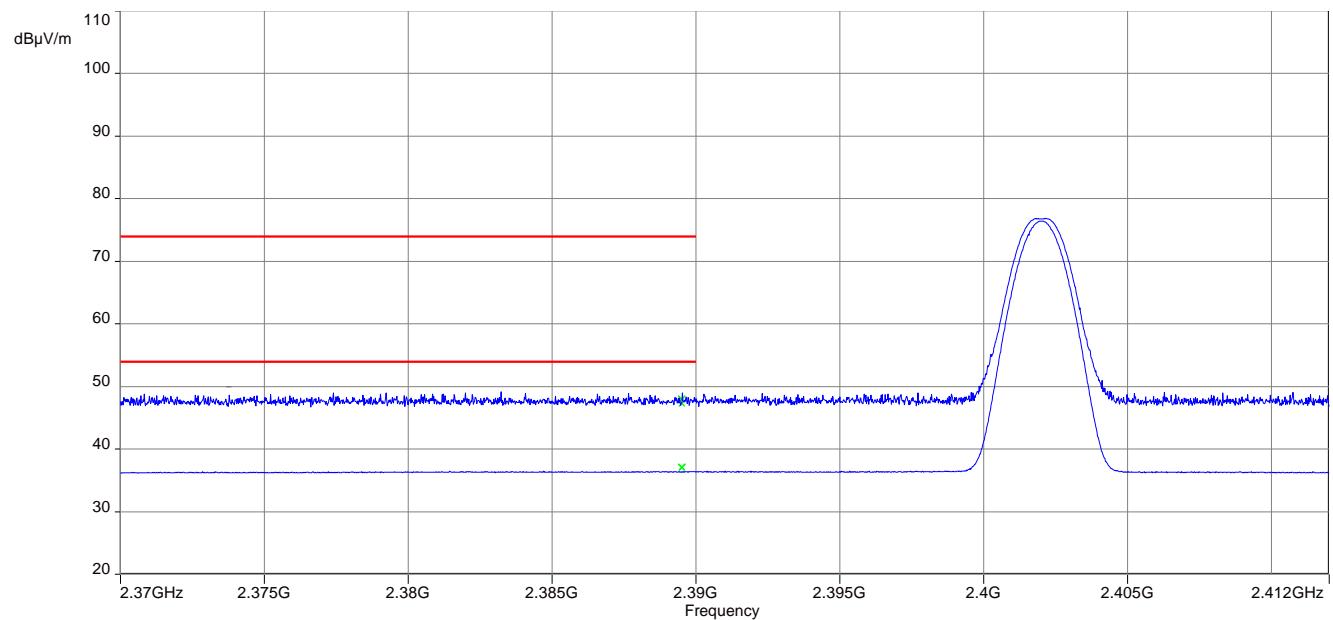
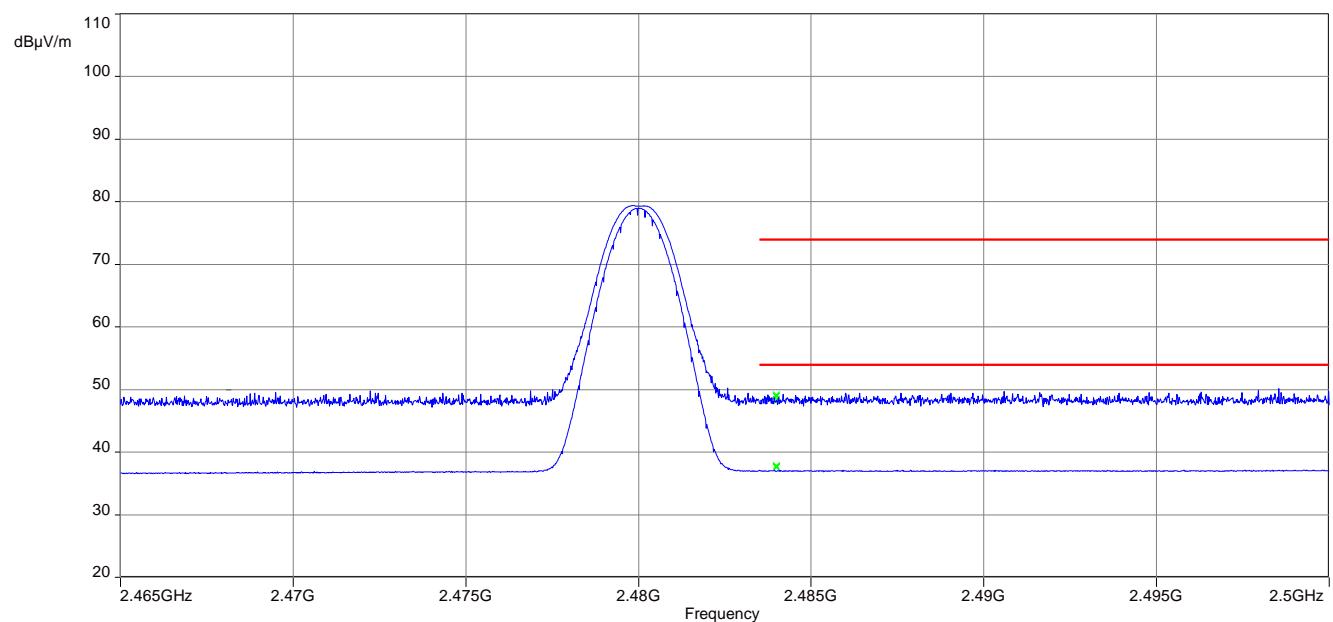
| Measurement parameters | |
|-------------------------|--|
| Detector | Peak / RMS |
| Sweep time | Auto |
| Resolution bandwidth | 1 MHz |
| Video bandwidth | 3 MHz |
| Span | Lower Band: 2370 – 2400 MHz Upper Band: 2480 – 2500 MHz |
| Trace mode | Max hold |
| Test setup | See sub clause 6.2 B |
| Measurement uncertainty | See sub clause 8 |

Limits:

| FCC | IC |
|--|----|
| Band edge compliance radiated | |
| In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)). | |
| 54 dB μ V/m AVG 74 dB μ V/m Peak | |

Results:

| Scenario | Band edge compliance radiated [dB μ V/m] |
|-----------------------|--|
| Lower restricted band | < 54 AVG / < 74 PP |
| Upper restricted band | < 54 AVG / < 74 PP |

Plots:**Plot 1:** Lower band edge, vertical & horizontal polarization**Plot 2:** Upper band edge, vertical & horizontal polarization

11.6 Spurious emissions radiated below 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to single channel mode and the transmit channels are 00; 19 and 39. The measurement is performed in the mode with the highest output power. The limits are recalculated to a measurement distance of 3 m according the ANSI C63.10.

| Measurement parameters | |
|-------------------------|--|
| Detector | Peak / Quasi peak |
| Sweep time | Auto |
| Resolution bandwidth | F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz |
| Video bandwidth | F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz |
| Span | 9 kHz to 30 MHz |
| Trace mode | Max hold |
| Test setup | See sub clause 6.2 C |
| Measurement uncertainty | See sub clause 8 |

Limits:

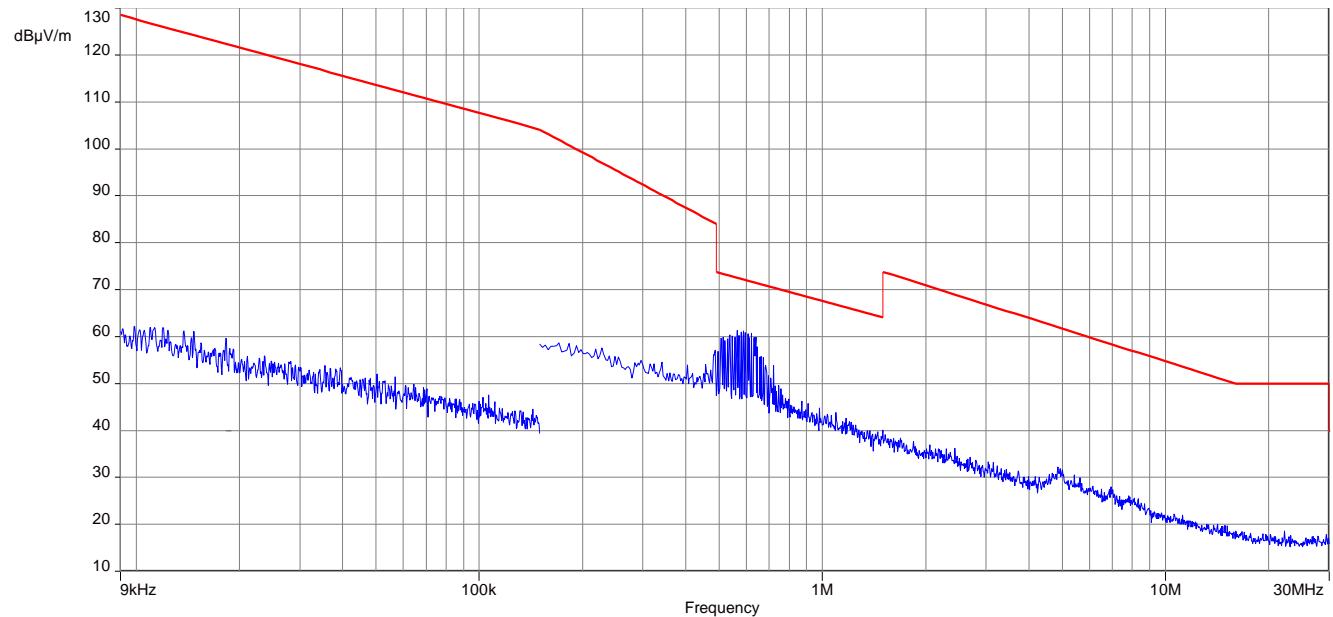
| FCC | IC | |
|---|-------------------------------|----------------------|
| TX spurious emissions radiated below 30 MHz | | |
| Frequency (MHz) | Field strength (dB μ V/m) | Measurement distance |
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |

Results:

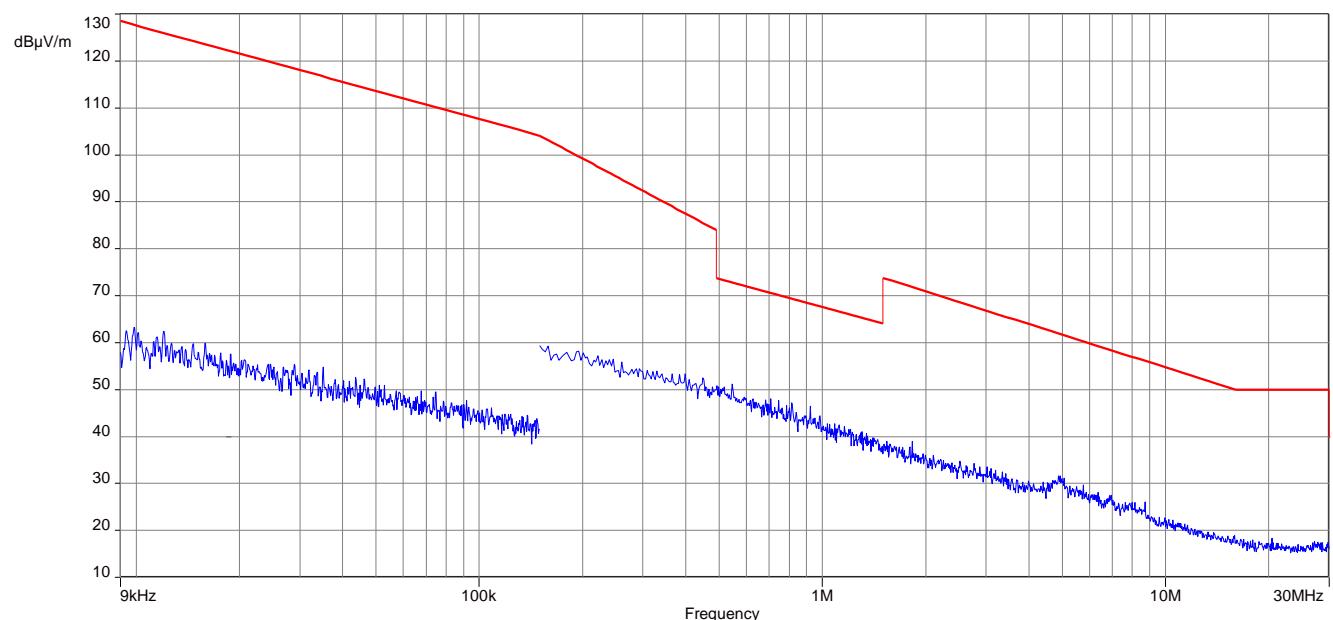
| TX spurious emissions radiated below 30 MHz [dB μ V/m] | | |
|---|----------|----------------------|
| F [MHz] | Detector | Level [dB μ V/m] |
| All detected emissions are more than 10 dB below the limit. | | |
| | | |
| | | |

Plots:

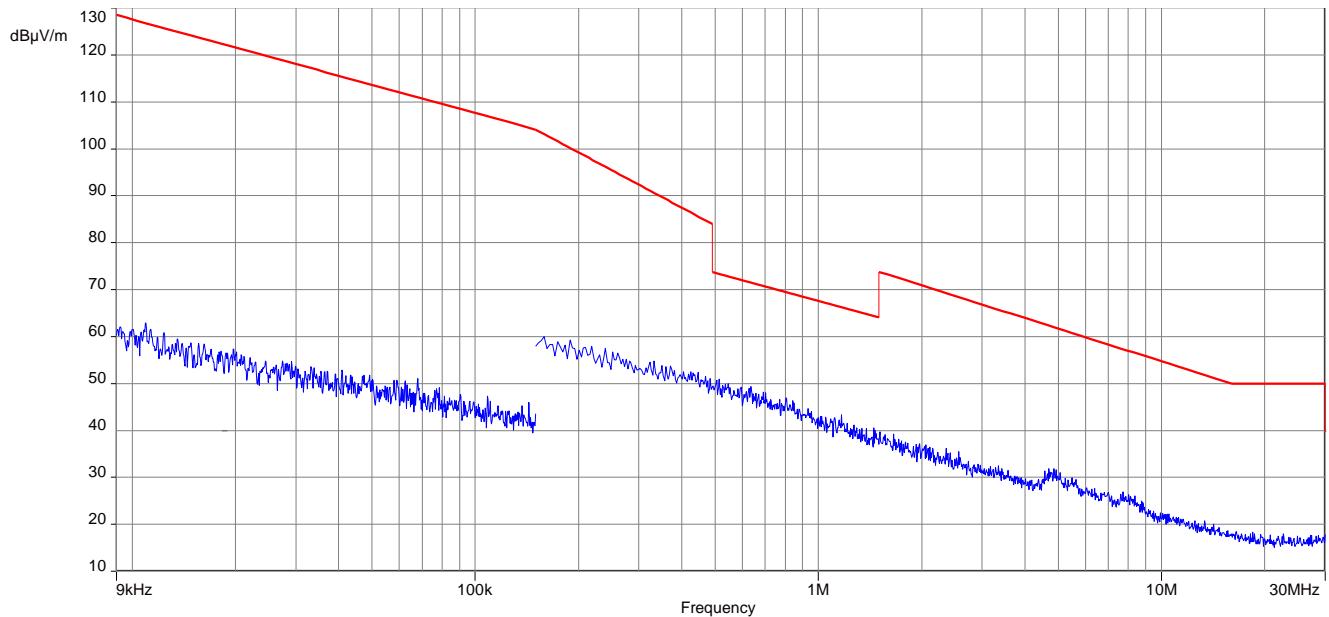
Plot 1: 9 kHz to 30 MHz, channel 00, transmit mode



Plot 2: 9 kHz to 30 MHz, channel 19, transmit mode



Plot 3: 9 kHz to 30 MHz, channel 39, transmit mode



11.7 Spurious emissions radiated 30 MHz to 1 GHz

Description:

Measurement of the radiated spurious emissions in transmit mode. The EUT is set to single channel mode and the transmit channel is channel 00, channel 19 and channel 39. The measurement is performed in the mode with the highest output power.

| Measurement parameters | |
|-------------------------|----------------------|
| Detector | Peak / Quasi Peak |
| Sweep time | Auto |
| Resolution bandwidth | 120 kHz |
| Video bandwidth | 3 x RBW |
| Span | 30 MHz to 1 GHz |
| Trace mode | Max hold |
| Test setup | See sub clause 6.1 A |
| Measurement uncertainty | See sub clause 8 |

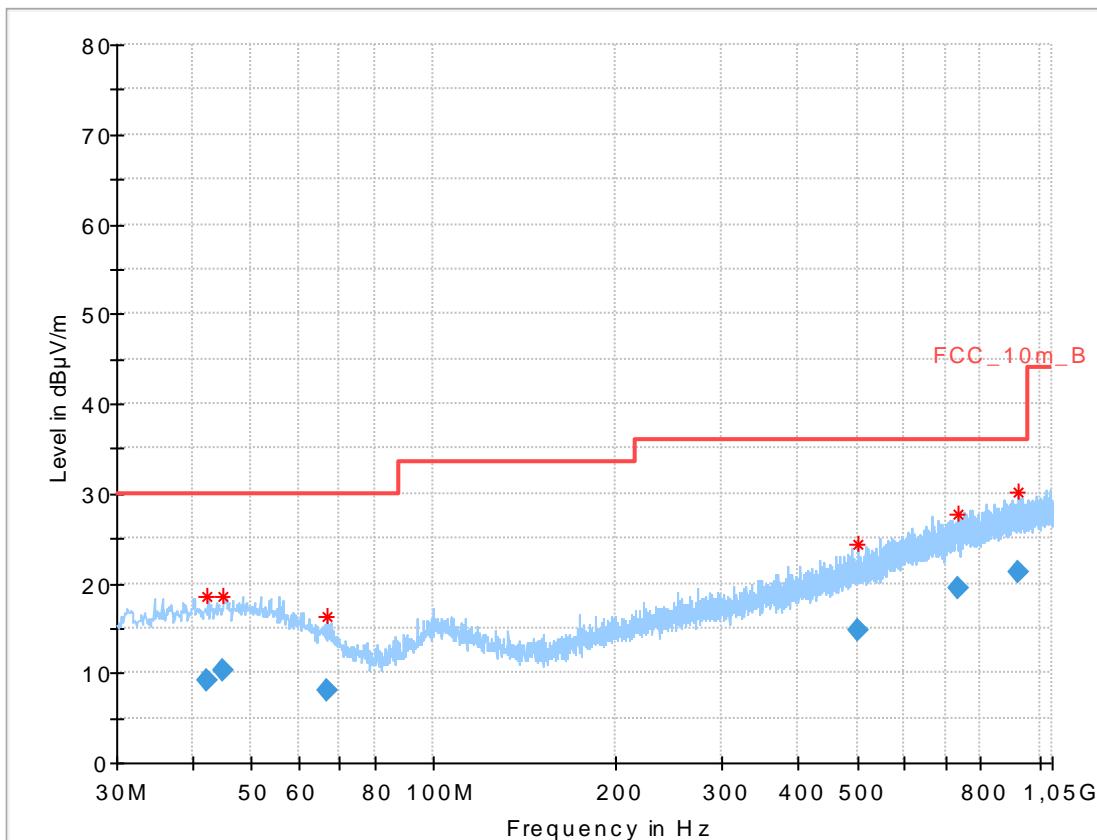
The modulation with the highest output power was used to perform the transmitter spurious emissions. If spurious were detected a re-measurement was performed on the detected frequency with each modulation.

Limits:

| FCC | IC | | | | | | | | | | | | | | | |
|--|-------------------------------|----------------------|-------------------------------|----------------------|---------|------|----|----------|------|----|-----------|------|----|-----------|------|---|
| TX spurious emissions radiated | | | | | | | | | | | | | | | | |
| In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). | | | | | | | | | | | | | | | | |
| §15.209 | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Frequency (MHz)</th><th style="text-align: center;">Field strength (dBμV/m)</th><th style="text-align: center;">Measurement distance</th></tr> </thead> <tbody> <tr> <td style="text-align: center;">30 - 88</td><td style="text-align: center;">30.0</td><td style="text-align: center;">10</td></tr> <tr> <td style="text-align: center;">88 - 216</td><td style="text-align: center;">33.5</td><td style="text-align: center;">10</td></tr> <tr> <td style="text-align: center;">216 - 960</td><td style="text-align: center;">36.0</td><td style="text-align: center;">10</td></tr> <tr> <td style="text-align: center;">Above 960</td><td style="text-align: center;">54.0</td><td style="text-align: center;">3</td></tr> </tbody> </table> | | Frequency (MHz) | Field strength (dB μ V/m) | Measurement distance | 30 - 88 | 30.0 | 10 | 88 - 216 | 33.5 | 10 | 216 - 960 | 36.0 | 10 | Above 960 | 54.0 | 3 |
| Frequency (MHz) | Field strength (dB μ V/m) | Measurement distance | | | | | | | | | | | | | | |
| 30 - 88 | 30.0 | 10 | | | | | | | | | | | | | | |
| 88 - 216 | 33.5 | 10 | | | | | | | | | | | | | | |
| 216 - 960 | 36.0 | 10 | | | | | | | | | | | | | | |
| Above 960 | 54.0 | 3 | | | | | | | | | | | | | | |

Plots: Transmit mode

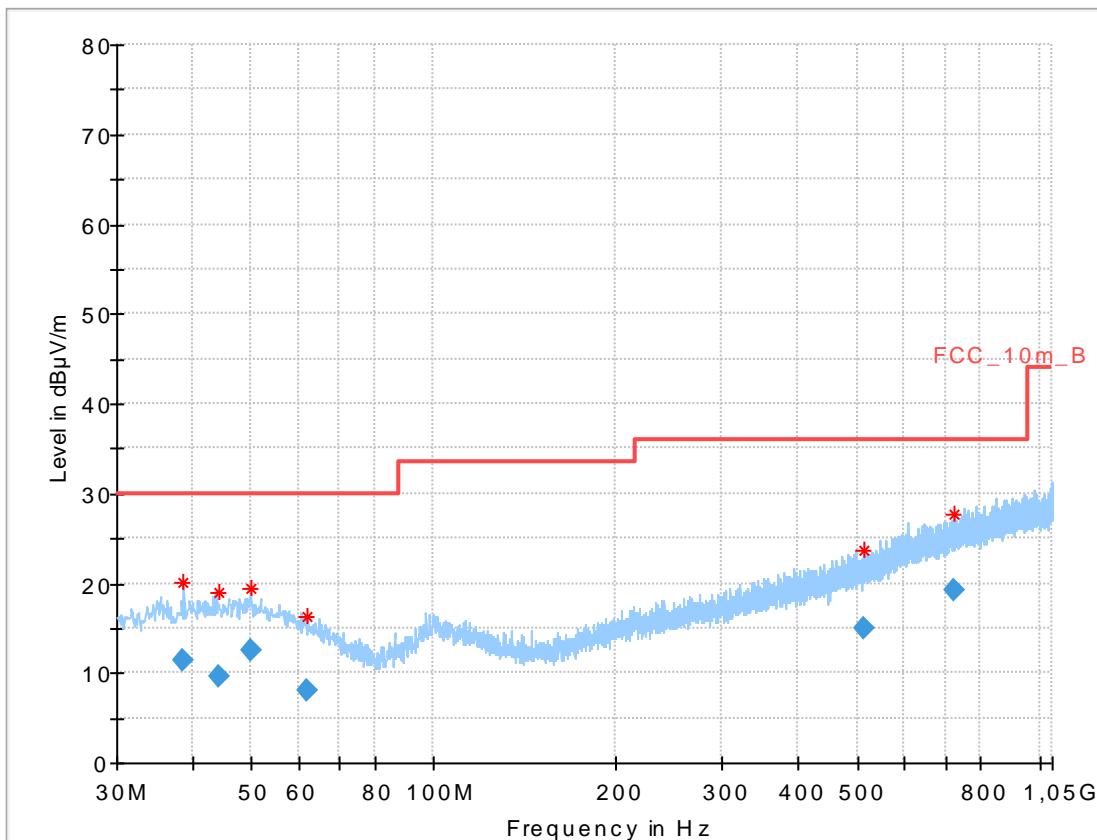
Plot 1: 30 MHz to 1 GHz, TX mode, channel 00, vertical & horizontal polarization



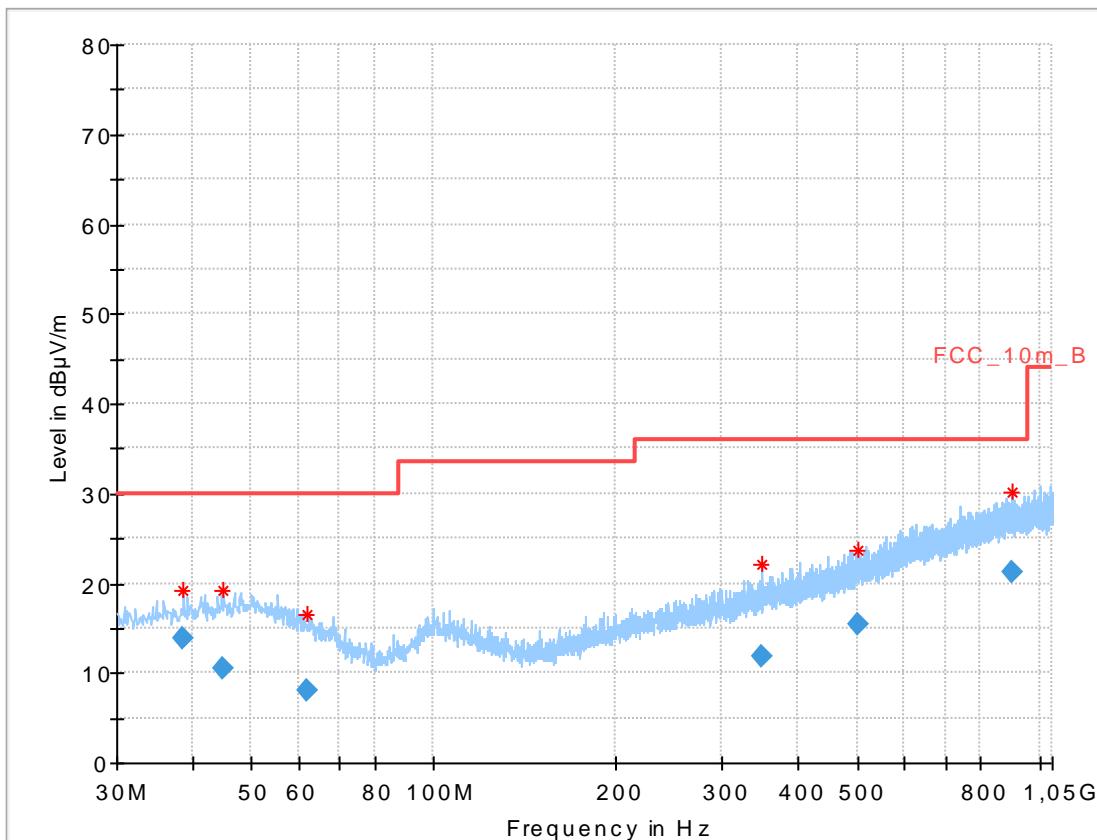
Final results:

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 42.231750 | 9.21 | 30.00 | 20.79 | 1000.0 | 120.000 | 178.0 | H | 170.0 | 13.4 |
| 44.959650 | 10.17 | 30.00 | 19.83 | 1000.0 | 120.000 | 185.0 | H | 142.0 | 13.6 |
| 66.978300 | 8.09 | 30.00 | 21.91 | 1000.0 | 120.000 | 178.0 | H | 346.0 | 10.3 |
| 503.563350 | 14.68 | 36.00 | 21.32 | 1000.0 | 120.000 | 98.0 | V | 233.0 | 18.8 |
| 734.359200 | 19.54 | 36.00 | 16.46 | 1000.0 | 120.000 | 98.0 | H | 326.0 | 22.4 |
| 925.323000 | 21.28 | 36.00 | 14.72 | 1000.0 | 120.000 | 101.0 | H | 305.0 | 24.3 |

Plot 2: 30 MHz to 1 GHz, TX mode, channel 19, vertical & horizontal polarization

**Final results:**

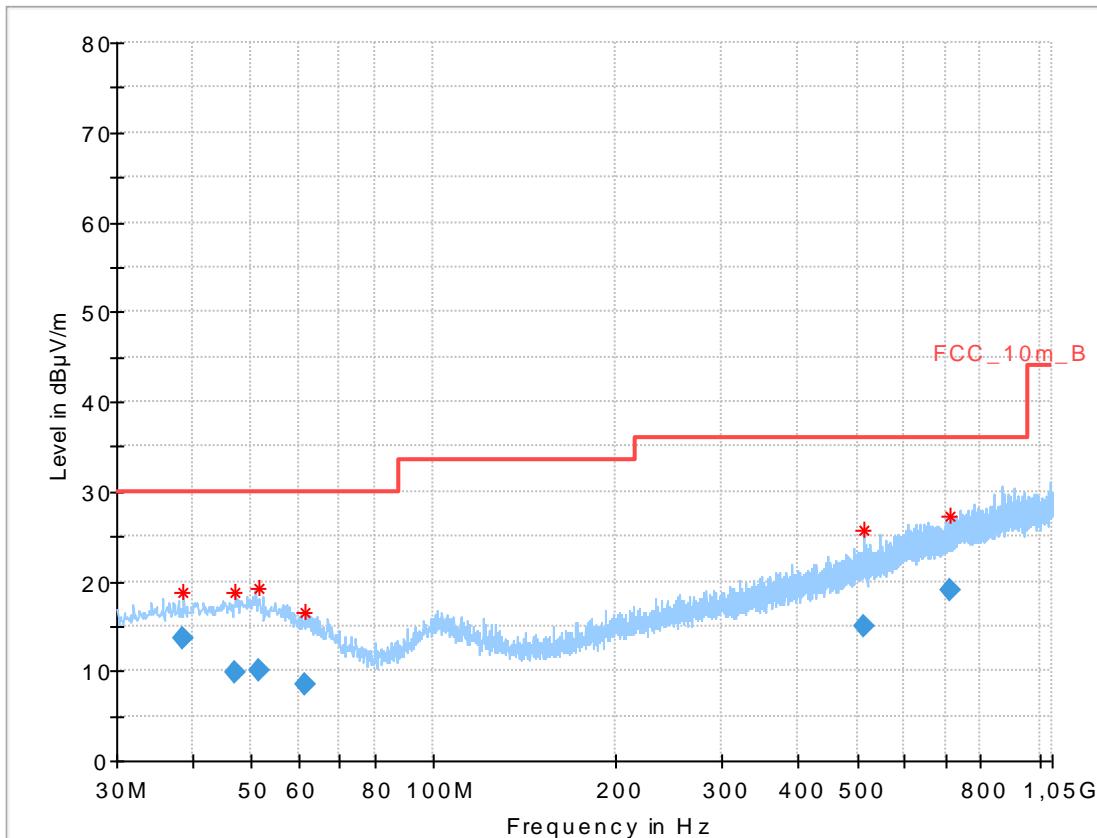
| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 38.663400 | 11.43 | 30.00 | 18.57 | 1000.0 | 120.000 | 179.0 | V | 148.0 | 13.1 |
| 44.108700 | 9.60 | 30.00 | 20.40 | 1000.0 | 120.000 | 101.0 | H | 216.0 | 13.6 |
| 49.991250 | 12.45 | 30.00 | 17.55 | 1000.0 | 120.000 | 101.0 | V | 75.0 | 13.7 |
| 61.991250 | 7.95 | 30.00 | 22.05 | 1000.0 | 120.000 | 179.0 | H | 304.0 | 11.4 |
| 513.309300 | 15.00 | 36.00 | 21.00 | 1000.0 | 120.000 | 185.0 | H | 8.0 | 18.9 |
| 722.037600 | 19.26 | 36.00 | 16.74 | 1000.0 | 120.000 | 101.0 | H | 245.0 | 22.1 |

Plot 3: 30 MHz to 1 GHz, TX mode, channel 39, vertical & horizontal polarization**Final results:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 38.697300 | 13.86 | 30.00 | 16.14 | 1000.0 | 120.000 | 100.0 | V | 39.0 | 13.1 |
| 44.938650 | 10.47 | 30.00 | 19.53 | 1000.0 | 120.000 | 101.0 | V | 181.0 | 13.6 |
| 61.827750 | 8.12 | 30.00 | 21.88 | 1000.0 | 120.000 | 101.0 | V | 251.0 | 11.4 |
| 347.357100 | 11.84 | 36.00 | 24.16 | 1000.0 | 120.000 | 98.0 | H | 300.0 | 15.9 |
| 500.089800 | 15.45 | 36.00 | 20.55 | 1000.0 | 120.000 | 101.0 | H | 60.0 | 18.7 |
| 898.725750 | 21.28 | 36.00 | 14.72 | 1000.0 | 120.000 | 185.0 | H | 251.0 | 24.2 |

Plots: Receiver mode

Plot 1: 30 MHz to 1 GHz, RX / idle – mode, vertical & horizontal polarization



Final results:

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 38.691750 | 13.71 | 30.00 | 16.29 | 1000.0 | 120.000 | 101.0 | V | 317.0 | 13.1 |
| 46.836600 | 9.81 | 30.00 | 20.19 | 1000.0 | 120.000 | 101.0 | V | 260.0 | 13.7 |
| 51.391650 | 9.95 | 30.00 | 20.05 | 1000.0 | 120.000 | 101.0 | H | 350.0 | 13.6 |
| 61.363350 | 8.55 | 30.00 | 21.45 | 1000.0 | 120.000 | 185.0 | V | 2.0 | 11.5 |
| 514.006950 | 14.94 | 36.00 | 21.06 | 1000.0 | 120.000 | 178.0 | H | 96.0 | 18.9 |
| 713.600400 | 19.06 | 36.00 | 16.94 | 1000.0 | 120.000 | 185.0 | V | 25.0 | 21.9 |

11.8 Spurious emissions radiated above 1 GHz

Description:

Measurement of the radiated spurious emissions in transmit mode. The EUT is set to single channel mode and the transmit channel is channel 00, channel 19 and channel 39. The measurement is performed in the mode with the highest output power.

| Measurement parameters | |
|-------------------------|---|
| Detector | Peak / RMS |
| Sweep time | Auto |
| Resolution bandwidth | 1 MHz |
| Video bandwidth | 3 x RBW |
| Span | 1 GHz to 26 GHz |
| Trace mode | Max hold |
| Test setup | See sub clause 6.2 A (1 GHz - 18 GHz) See sub clause 6.3 A (18 GHz - 26 GHz) |
| Measurement uncertainty | See sub clause 8 |

The modulation with the highest output power was used to perform the transmitter spurious emissions. If spurious were detected a re-measurement was performed on the detected frequency with each modulation.

Limits:

| FCC | IC | |
|--|-------------------------------|----------------------|
| TX spurious emissions radiated | | |
| In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). | | |
| §15.209 | | |
| Frequency (MHz) | Field strength (dB μ V/m) | Measurement distance |
| Above 960 | 54.0 (Avg) | 3 |
| Above 960 | 74.0 (Peak) | 3 |

| RSS-210 | | |
|-----------------|-------------------------------|----------------------|
| Frequency (MHz) | Field strength (dB μ V/m) | Measurement distance |
| Harmonics | 64.1 (Average) | 3 |

Results: Transmitter mode

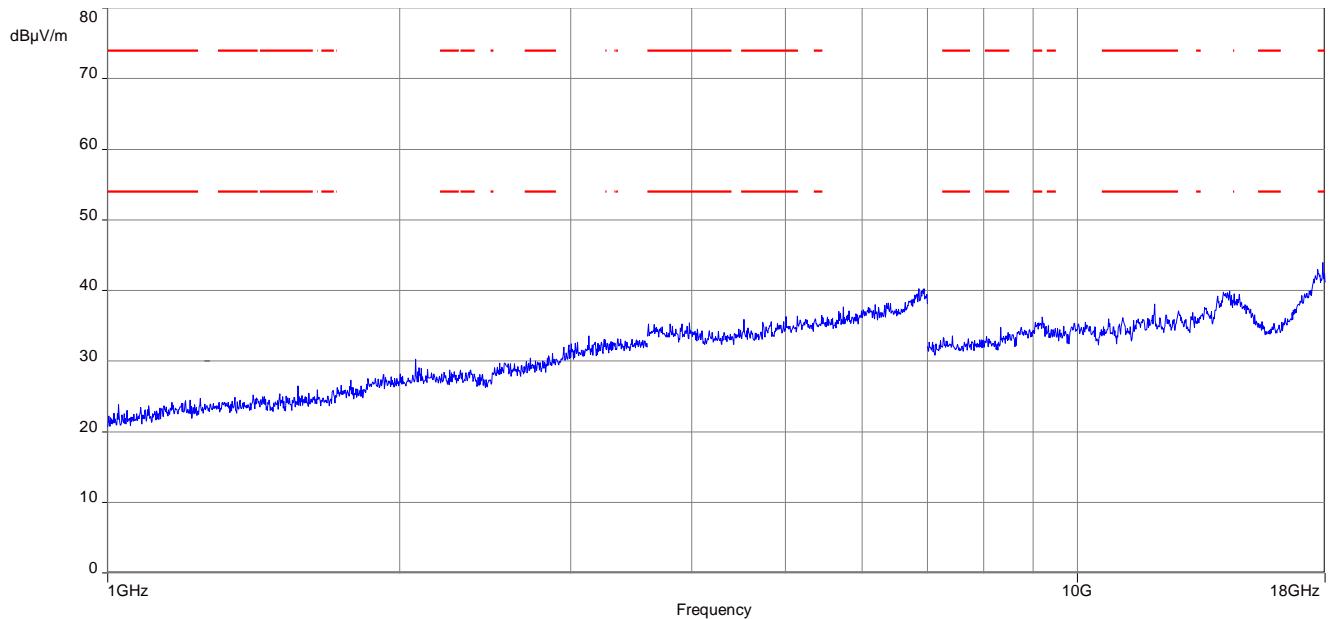
| TX spurious emissions radiated [dB μ V/m] | | | | | | | | |
|---|----------|----------------------|----------|----------|----------------------|----------|----------|----------------------|
| 2402 MHz | | | 2440 MHz | | | 2480 MHz | | |
| F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] |
| -/- | Peak | -/- | -/- | Peak | -/- | -/- | Peak | -/- |
| | AVG | -/- | | AVG | -/- | | AVG | -/- |
| -/- | Peak | -/- | -/- | Peak | -/- | -/- | Peak | -/- |
| | AVG | -/- | | AVG | -/- | | AVG | -/- |
| -/- | Peak | -/- | -/- | Peak | -/- | -/- | Peak | -/- |
| | AVG | -/- | | AVG | -/- | | AVG | -/- |

Results: Receiver mode

| RX spurious emissions radiated [dB μ V/m] | | |
|---|----------|----------------------|
| F [MHz] | Detector | Level [dB μ V/m] |
| All detected emissions are more than 20 dB below the limit. | | |
| -/- | Peak | -/- |
| -/- | AVG | -/- |

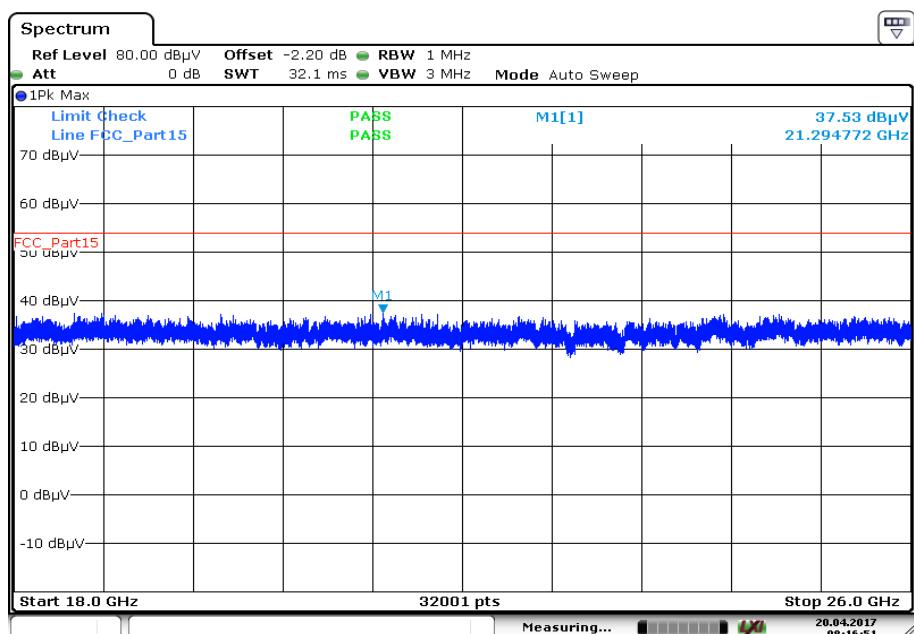
Plots: Transmitter mode

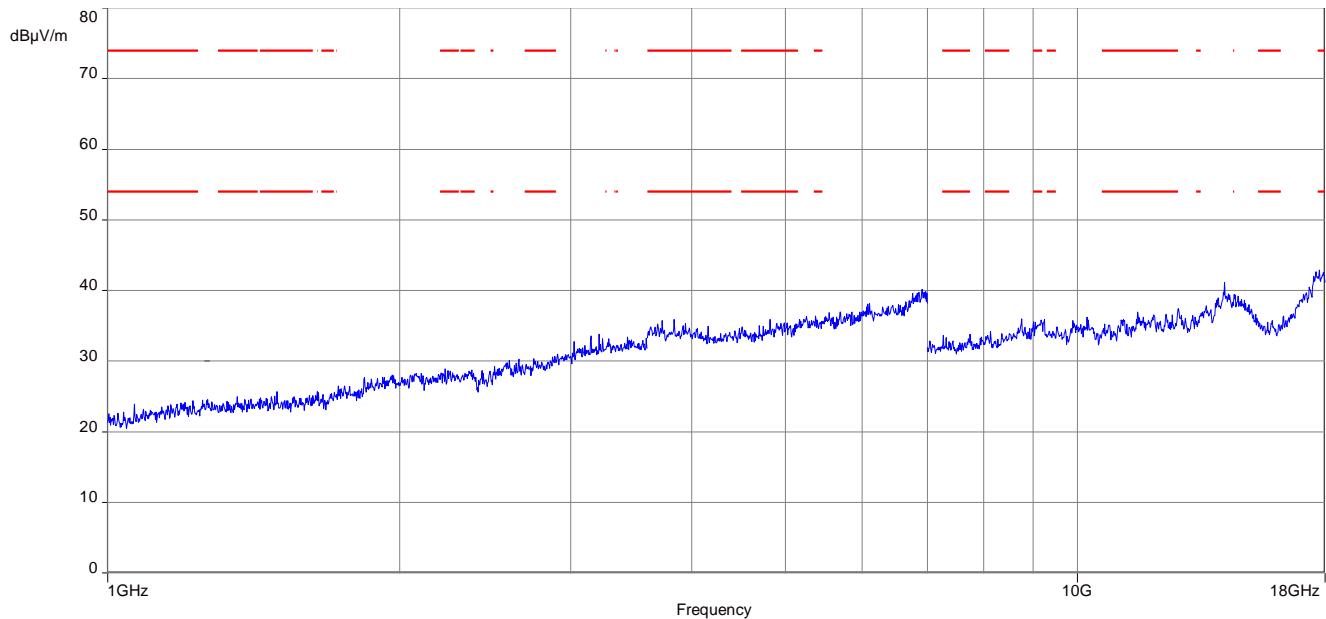
Plot 1: 1 GHz to 18 GHz, TX mode, channel 00, vertical & horizontal polarization



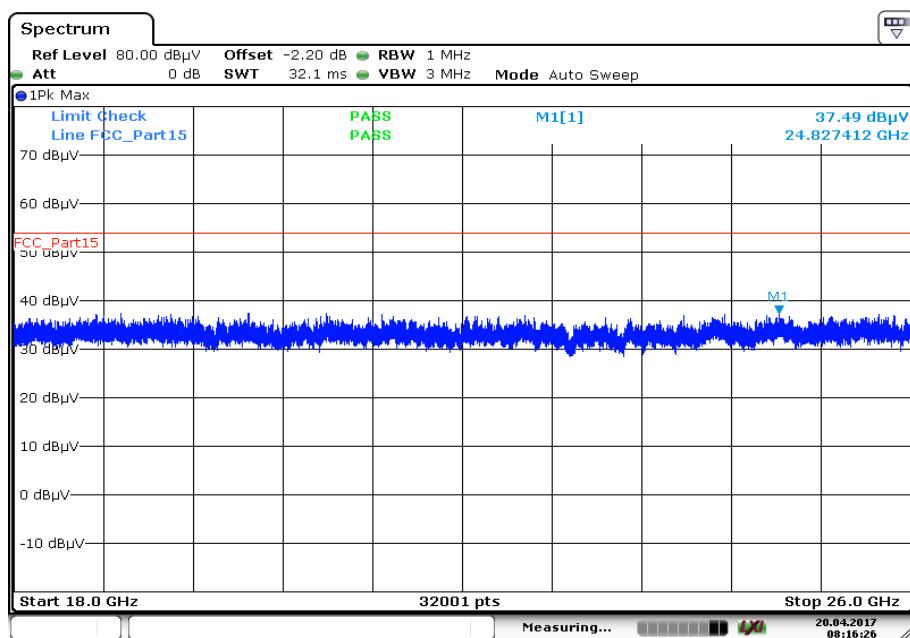
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 2: 18 GHz to 26 GHz, TX mode, channel 00, vertical & horizontal polarization

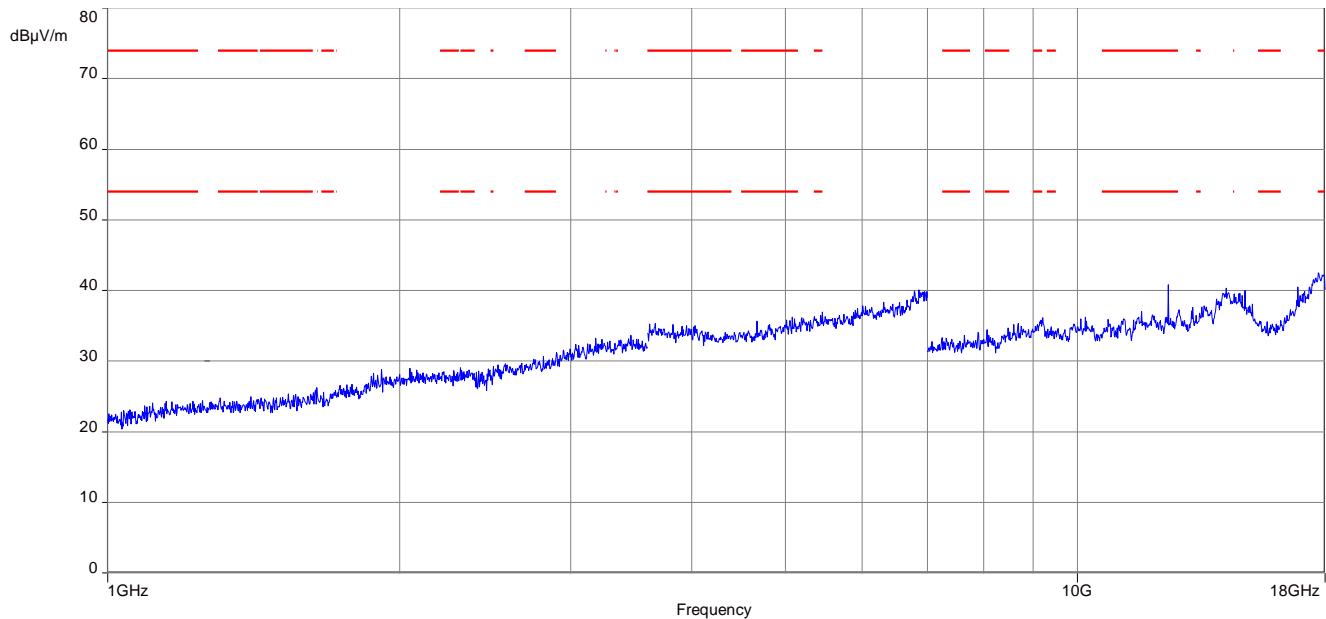


Plot 3: 1 GHz to 18 GHz, TX mode, channel 19, vertical & horizontal polarization

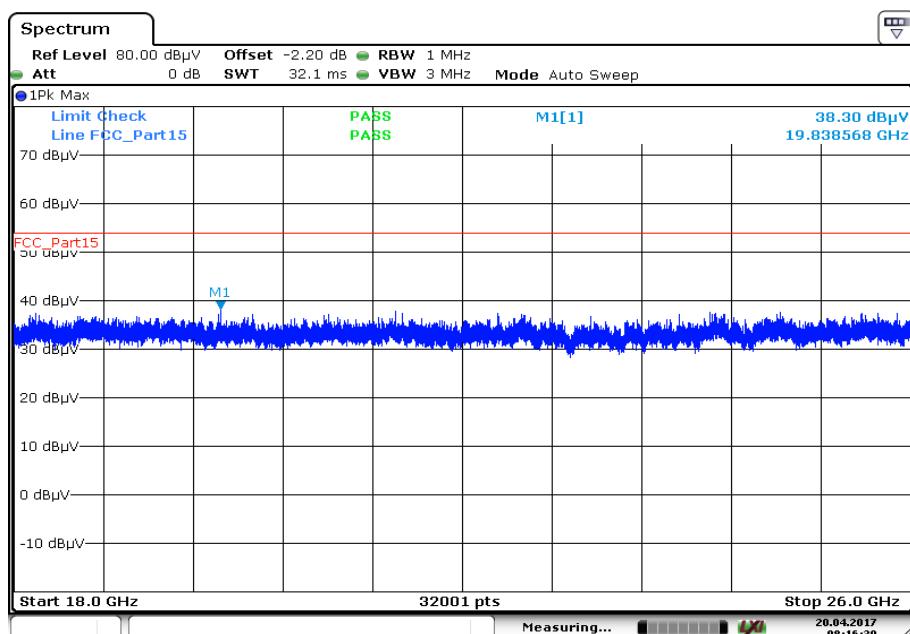
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 4: 18 GHz to 26 GHz, TX mode, channel 19, vertical & horizontal polarization

Date: 20.APR.2017 08:16:26

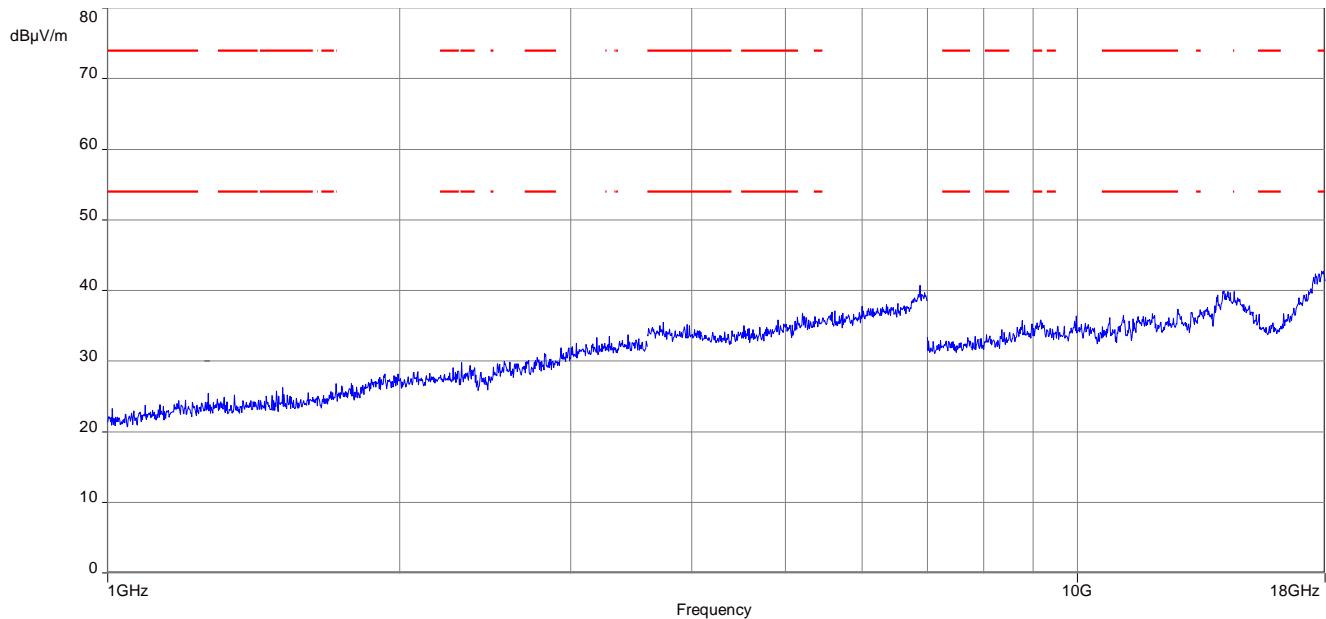
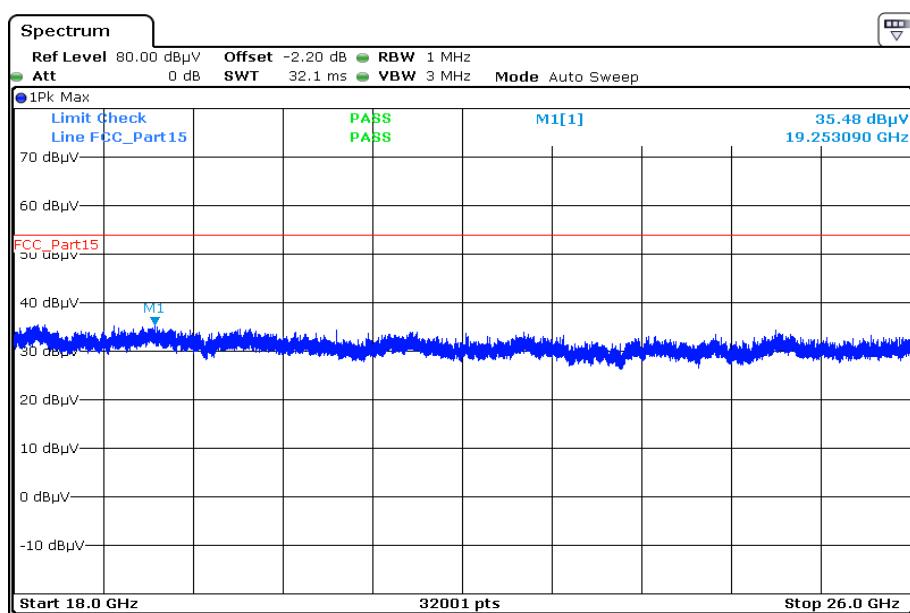
Plot 5: 1 GHz to 18 GHz, TX mode, channel 39, vertical & horizontal polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 6: 18 GHz to 26 GHz, TX mode, channel 39, vertical & horizontal polarization

Date: 20.APR.2017 08:16:39

Plots: Receiver mode

Plot 1: 1 GHz to 18 GHz, RX / idle – mode, vertical & horizontal polarization

Plot 2: 18 GHz to 26 GHz, RX / idle – mode, vertical & horizontal polarization


12 Observations

No observations except those reported with the single test cases have been made.

Annex A Glossary

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

Annex B Document history

| Version | Applied changes | Date of release |
|---------|-----------------|-----------------|
| -/- | Initial release | 2017-06-29 |

Annex C Accreditation Certificate

| first page | last page |
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|  Deutsche Akkreditierungsstelle GmbH Beleihene gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV Unterzeichnerin der Multilateralen Abkommen von EA, ILAC und IAF zur gegenseitigen Anerkennung  Akkreditierung Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium CTC advanced GmbH Untertürkheimer Straße 6-10, 66117 Saarbrücken die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen: Funk Mobilfunk (GSM / DCS) + OTA Elektromagnetische Verträglichkeit (EMV) Produktsicherheit SAR / EMF Umwelt Smart Card Technology Bluetooth® Automotive Wi-Fi-Services Kanadische Anforderungen US-Anforderungen Akustik Near Field Communication (NFC) Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 25.11.2016 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig bis 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 63 Seiten. Registrierungsnummer der Urkunde: D-PL-12076-01-01  Frankfurt, 25.11.2016 Im Auftrag Dipl.-Ing. (FH) Ralf Egner Abteilungsleiter <small>Seite Hinweise auf der Rückseite</small> | Deutsche Akkreditierungsstelle GmbH Standort Berlin Spittelmarkt 10 10117 Berlin Standort Frankfurt am Main Europa-Allee 52 60327 Frankfurt am Main Standort Braunschweig Bundesallee 100 38116 Braunschweig Die auszugsweise Veröffentlichung der Akkreditierungsurkunde bedarf der vorherigen schriftlichen Zustimmung der Deutsche Akkreditierungsstelle GmbH (DAkkS). Ausgenommen davon ist die separate Weiterverbreitung des Deckblattes durch die umsetzung genannte Konformitätsbewertungsstelle in unveränderter Form. Es darf nicht der Anschein erweckt werden, dass sich die Akkreditierung auch auf Bereiche erstreckt, die über den durch die DAkkS bestätigten Akkreditierungsbereich hinausgehen. Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom 31. Juli 2009 (BGBl. I S. 2625) sowie der Verordnung (EG) Nr. 765/2008 des Europäischen Parlaments und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung im Zusammenhang mit der Vermarktung von Produkten (Abl. L 218 vom 9. Juli 2008, S. 30). Die DAkkS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der European co-operation for Accreditation (EA), des International Accreditation Forum (IAF) und der International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen erkennen ihre Akkreditierungen gegenseitig an. Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden: EA: www.european-accreditation.org ILAC: www.ilac.org IAF: www.iaf.nu |

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

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