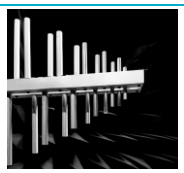
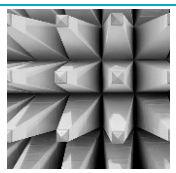




Bundesnetzagentur

BNetzA-CAB-02/21-102

# TEST REPORT

**Test report no.: 1-5667_23-01-02-B**

## Testing laboratory


**CTC advanced GmbH**
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: https://www.ctcadvanced.com
e-mail: mail@ctcadvanced.com


**Accredited Testing Laboratory:**
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2018-03) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate starting with the registration number: D-PL-12076-01.

## Applicant


**Philips Medizin Systeme Böblingen GmbH**
Hewlett-Packard-Strasse 2
71034 Böblingen / GERMANY
Phone: -/-
Contact: Hansjörg Geywitz
e-mail: hansjoerg.geywitz@philips.com


## Manufacturer

**Philips Medizin Systeme Böblingen GmbH**
Hewlett-Packard-Strasse 2
71034 Böblingen / GERMANY

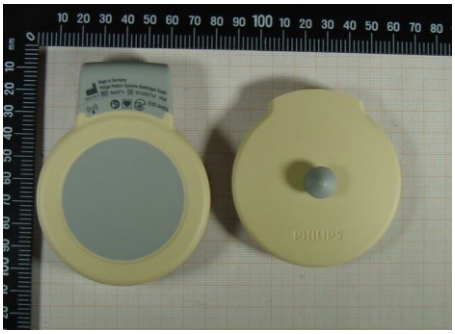
## Test standard/s

| | |
|---|---|
| FCC - Title 47 CFR Part 95 | FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 95 - Personal Radio Services |
| RSS - 210 Issue 10 incl. Amendment | Spectrum Management and Telecommunications Radio Standards Specification - Licence-Exempt Radio Apparatus: Category I Equipment |

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

## Test Item

| | |
|---|---|
| **Kind of test item:** | **Cableless Transducer** |
| **Model name:** | **866075 Avalon CL Toco+MP Transducer**<br>**866076 Avalon CL US Transducer**<br>**866077 Avalon CL EGP/IUP Transducer** |
| **FCC ID:** | **PQC-OBRTBV1** |
| **ISED certification number:** | **3549C-OBRTBV1** |
| Frequency: | 608 MHz to 614 MHz |
| Technology tested: | proprietary |
| Antenna: | Integrated antenna |
| Power supply: | 3.5 V to 4.1 V DC, by Li-Ion battery |
| Temperature range: | -20°C to +55°C |



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

## Test report authorized:

cn=Christoph Schneider, o=cetecom advanced GmbH, ou=SND-230601, email=christoph.schneider@cetecomadvanced.com, c=DE
2023.12.14 07:32:34 +01'00'

Christoph Schneider
Lab Manager
Radio Labs

## Test performed:

cn=Joachim Wolsdorfer, o=cetecom advanced GmbH, ou=WLD-230605, email=joachim.wolsdorfer@cetecomadvanced.com, c=DE
2023.12.14 07:15:03 +01'00'

Hans-Joachim Wolsdorfer
Lab Manager
Radio Labs

# 1 Table of contents

# 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.
The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CTC advanced GmbH.
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In no case this test report can be considered as a Letter of Approval.

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

This test report replaces the test report with the number 1-5667_23-01-02 and dated 2023-06-22

## 2.2 Application details

| | |
|---|---|
| Date of receipt of order: | 2023-05-10 |
| Date of receipt of test item: | 2023-05-12 |
| Start of test:* | 2023-05-15 |
| End of test:* | 2023-05-17 |
| Person(s) present during the test: | -/- |

*Date of each measurement, if not shown in the plot, can be requested. Dates are stored in the measurement software.

## 2.3 Test laboratories sub-contracted

None

## 3 Test standard/s, references and accreditations

| Test standard | Date | Description |
|---|---|---|
| FCC - Title 47 CFR Part 95 | | FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 95 - Personal Radio Services |
| RSS - 210 Issue 10 incl. Amendment | April 2020 | Spectrum Management and Telecommunications Radio Standards Specification - Licence-Exempt Radio Apparatus: Category I Equipment |
| RSS - Gen Issue 5 incl. Amendment 1 & 2 | February 2021 | Spectrum Management and Telecommunications Radio Standards Specification - General Requirements for Compliance of Radio Apparatus |

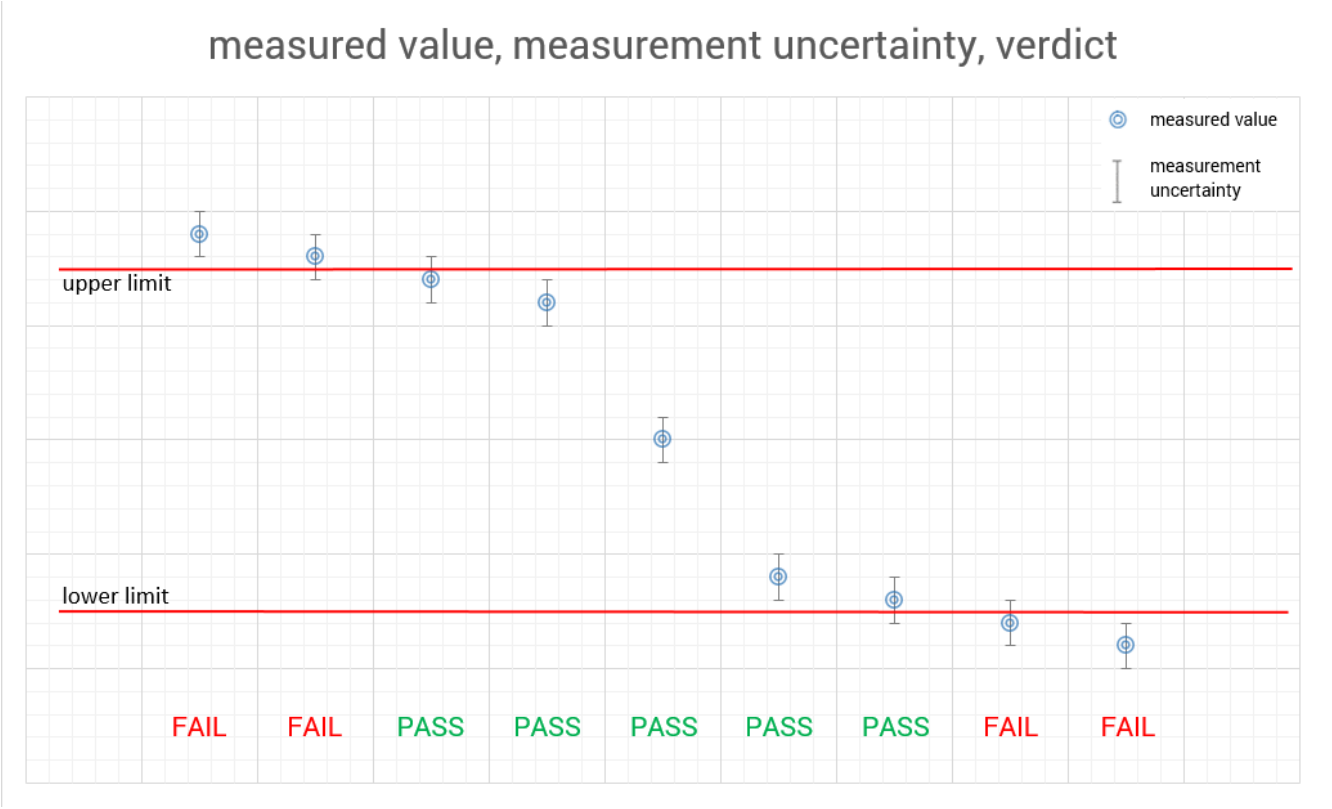
| Guidance | Version | Description |
|---|---|---|
| ANSI C63.4-2014 | -/- | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |
| ANSI C63.10-2013 | -/- | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices |

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

ISED Testing Laboratory Recognized Listing Number: DE0001
FCC designation number: DE0002

## 4 Reporting statements of conformity – decision rule

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3.
The measurement uncertainty is mentioned in this test report, see chapter 9, 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."



# 5 Test environment

| | | | |
|---|---|---|---|
| Temperature | : | $T_{nom}$<br>$T_{max}$<br>$T_{min}$ | +22 °C during room temperature tests<br>+55 °C all tests performed at room temperature<br>-20 °C all tests performed at room temperature |
| Relative humidity content | : | | 55 % |
| Barometric pressure | : | | 1021 hpa |
| Power supply | : | $V_{nom}$<br>$V_{max}$<br>$V_{min}$ | 3.7 V DC, by Li-Ion battery<br>4.1 V<br>3.5 V |

# 6 Test item

## 6.1 General description

| | | |
|---|---|---|
| Kind of test item | : | Cableless Transducer |
| Model name | : | 866075 Avalon CL Toco+MP Transducer<br>866076 Avalon CL US Transducer<br>866077 Avalon CL EGP/IUP Transducer |
| HMN | : | -/- |
| PMN | : | 866075 / 866076 / 866077 |
| HVIN | : | 866075 / 866076 / 866077 |
| FVIN | : | -/- |
| S/N serial number | : | DE45032816 (866076); DE44921565 (866075) |
| Hardware status | : | 2304 |
| Software status | : | -/- |
| Firmware status | : | B.01.07 |
| Frequency band | : | 608 MHz to 614 MHz |
| Type of radio transmission<br>Use of frequency spectrum | :<br>: | modulated carrier |
| Type of modulation | : | GFSK |
| Number of channels | : | 36 |
| Antenna | : | Integrated antenna |
| Power supply | : | 3.5 V to 4.1 V DC, by Li-Ion battery |
| Temperature range | : | -20°C to +55°C |

## 6.2 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: 1-5667_23-01-01_AnnexA
1-5667_23-01-01_AnnexB
1-5667_23-01-01_AnnexD

# 7 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).

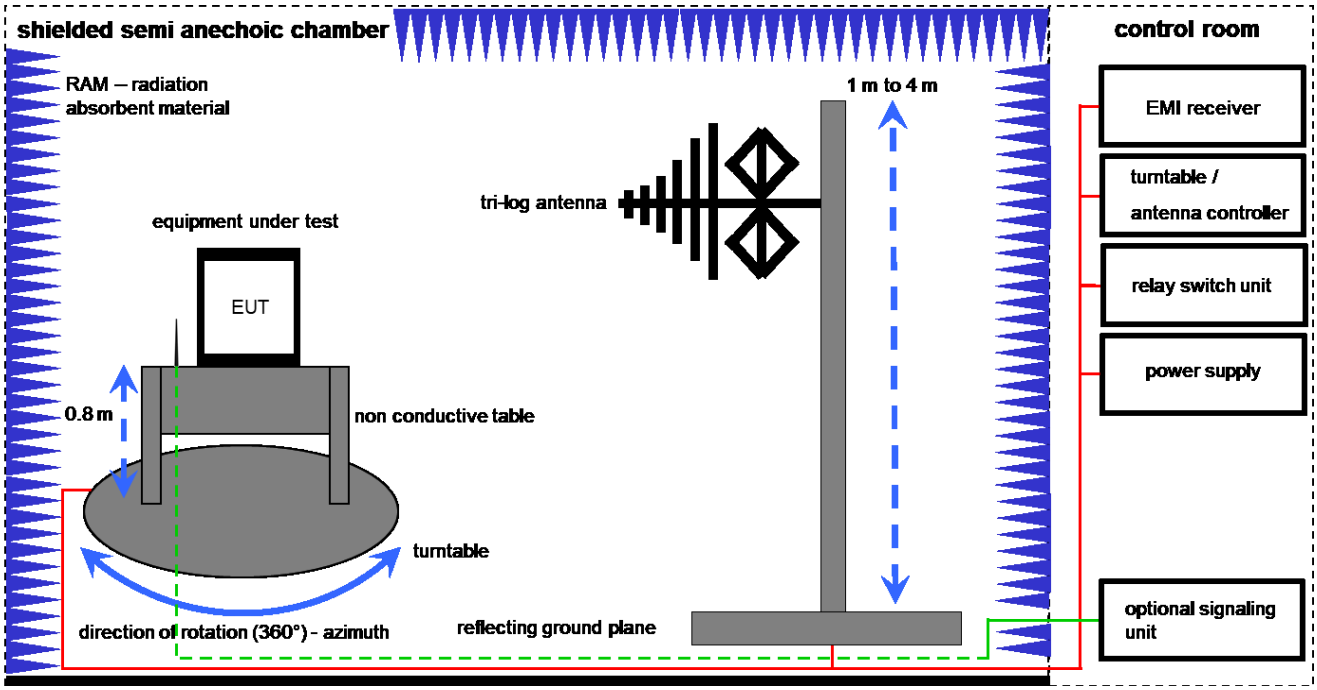
Each block diagram listed can contain several test setup configurations. All devices belonging to a test setup are identified with the same letter syntax. For example: Column Setup and all devices with an A.

**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 |
| vlkl! | Attention: extended calibration interval | | |
| NK! | Attention: not calibrated | *) | next calibration ordered / currently in progress |

## 7.1 Shielded semi anechoic chamber

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 30 MHz 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
EMC32 software version: 10.59.00

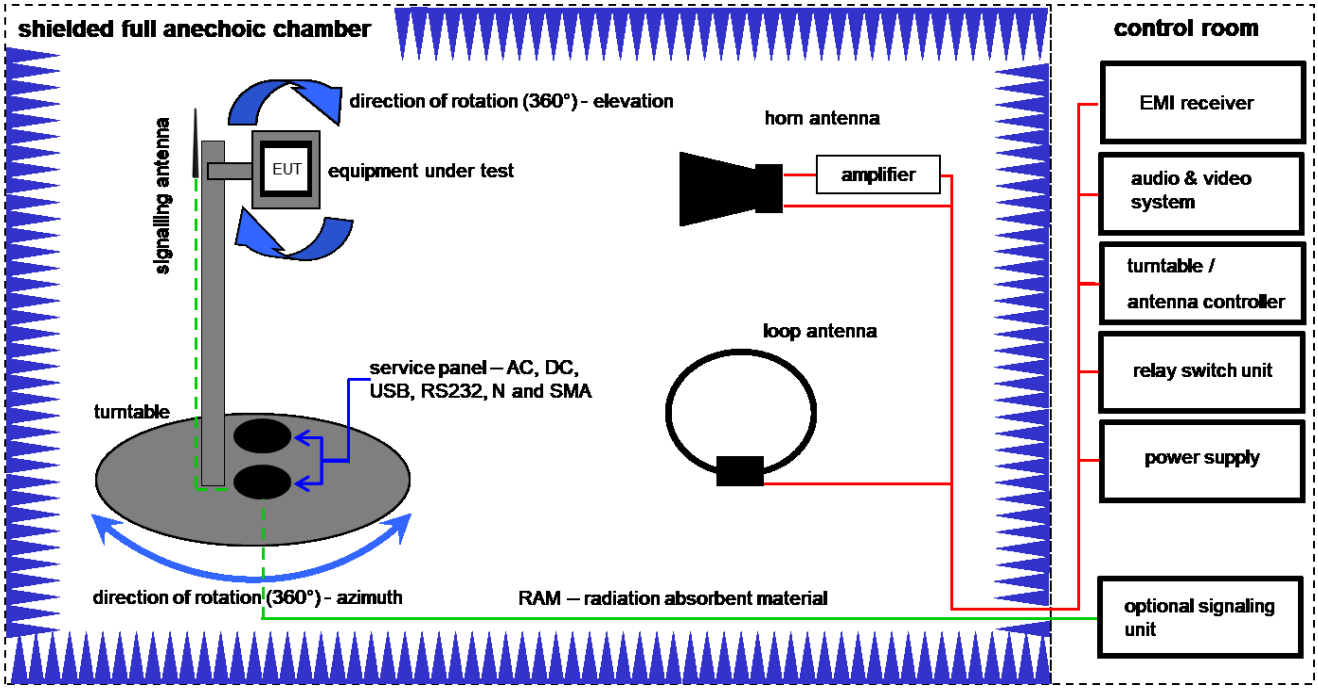
FS = UR + CL + AF
(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

*Example calculation:*
FS [dBµV/m] = 12.35 [dBµV/m] + 1.90 [dB] + 16.80 [dB/m] = 31.05 [dBµV/m] (35.69 µV/m)

## Equipment table:

| No. | Setup | Equipment | Type | Manufacturer | Serial No. | INV. No. | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A | Switch-Unit | 3488A | HP | 2719A14505 | 300000368 | ev | -/- | -/- |
| 2 | A | Semi anechoic chamber | 3000023 | MWB AG | -/- | 300000551 | ne | -/- | -/- |
| 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 Mess - Elektronik | 318 | 300003696 | vIKI! | 30.09.2021 | 29.09.2023 |
| 7 | A | Turntable | 2089-4.0 | EMCO | -/- | 300004394 | ne | -/- | -/- |
| 8 | A | PC | TecLine | F+W | -/- | 300004388 | ne | -/- | -/- |
| 9 | A | EMI Test Receiver | ESR3 | Rohde & Schwarz | 102587 | 300005771 | k | 09.12.2022 | 31.12.2023 |

## 7.2 Shielded fully anechoic chamber




Measurement distance: horn antenna 3 meter; loop antenna 3 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 [dBµV/m] = 40.0 [dBµV/m] + (-35.8) [dB] + 32.9 [dB/m] = 37.1 [dBµV/m] (71.61 µV/m)

**Equipment table:**

| No. | Setup | Equipment | Type | Manufacturer | Serial No. | INV. No. | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A | Active Loop Antenna 9 kHz to 30 MHz | 6502 | EMCO | 2210 | 300001015 | vlKl! | 01.07.2021 | 31.07.2023 |
| 2 | A,B | Anechoic chamber | FAC 3/5m | MWB / TDK | 87400/02 | 300000996 | ev | -/- | -/- |
| 3 | A,B | Switch / Control Unit | 3488A | HP | -/- | 300000199 | ne | -/- | -/- |
| 4 | B | Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115 | EMCO | 8812-3089 | 300000307 | vlKl! | 11.02.2022 | 29.02.2024 |
| 5 | A,B | EMI Test Receiver 20Hz- 26,5GHz | ESU26 | R&S | 100037 | 300003555 | k | 07.12.2022 | 31.12.2023 |
| 6 | B | Highpass Filter | WHK1.1/15G-10SS | Wainwright | 3 | 300003255 | ev | -/- | -/- |
| 7 | B | Broadband Amplifier 0.5-18 GHz | CBLU5184540 | CERNEX | 22049 | 300004481 | ev | -/- | -/- |
| 8 | A,B | 4U RF Switch Platform | L4491A | Agilent Technologies | MY50000037 | 300004509 | ne | -/- | -/- |
| 9 | A,B | NEXIO EMV-Software | BAT EMC V2022.0.22.0 | Nexio | -/- | 300004682 | ne | -/- | -/- |

# 8 Sequence of testing

## 8.1 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, it is placed on a table with 0.8 m height.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

**Premeasurement***

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 1 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 pre-measurement are maximized by the software by rotating the turntable from 0° to 360°.
- Loop antenna is rotated about its vertical axis for maximum response at each azimuth about the EUT. (For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT)
- 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.

*)Note: The sequence will be repeated three times with different EUT orientations.

## 8.2 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.

**Premeasurement**

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

**Final measurement**

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable position ± 45° 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.

## 8.3 Sequence of testing radiated spurious 1 GHz to 7 GHz

**Setup**

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

**Premeasurement**

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

**Final measurement**

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

# 9 Measurement uncertainty

| Measurement uncertainty | |
|---|---|
| **Test case** | **Uncertainty** |
| Occupied bandwidth | ± used RBW |
| Field strength of the fundamental | ± 3 dB |
| Field strength of the harmonics and spurious | ± 3 dB |
| Receiver spurious emissions and cabinet radiations | ± 3 dB |
| Conducted limits | ± 2.6 dB |

## 10 Summary of measurement results

| | |
|---|---|
| ☐ | No deviations from the technical specifications were ascertained |
| ☐ | There were deviations from the technical specifications ascertained |
| ☒ | This test report is only a partial test report.<br>The content and verdict of the performed test cases are listed below. |

| TC Identifier | Description | Verdict | Date | Remark |
|---|---|---|---|---|
| RF-Testing | 47 CFR Part 2<br>47 CFR Part 95 H<br>RSS Gen Issue 5 A2<br>RSS 210 Issue 10, Annex C.3 | Passed | 2023-12-14 | -/- |

| Test Specification Clause | Test Case | Temperature Conditions | Power Source Voltages | Pass | Fail | NA | NP | Results (max.) |
|---|---|---|---|---|---|---|---|---|
| FCC 47 CFR<br>§ 2.1046<br>§ 95.2369(a)<br>RSS 210 Issue 10, Annex C.3 | Radiated field strength | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | complies |
| FCC 47 CFR<br>§ 2.1055<br>§ 95.2363<br>RSS Gen Issue 5 A2 6.11 | Frequency stability | Nominal | Extreme | ☐ | ☐ | ☐ | ☒ | -/- |
| | | Extreme | Nominal | ☐ | ☐ | ☐ | ☒ | |
| FCC 47 CFR<br>§ 2.1049 (1)<br>RSS Gen Issue 5 A2 6.7 | Occupied bandwidth | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | No Pass/Fail criteria |
| FCC 47 CFR<br>§ 2.1053<br>§ 95.2379 (a) + (b)<br>RSS Gen Issue 5 A2 6.13 | Field strength of spurious radiation<br>Transmitter unwanted emissions | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | complies |
| FCC 47 CFR<br>§ 15.209<br>RSS Gen Issue 5 A2 7.3 | Receiver spurious emissions (radiated) | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |

**Note:** NA = Not Applicable; NP = Not Performed

# 11 RF measurements

## 11.1 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: power setting:
866075: +4dBm
866076: +7dBm

# 12 Measurement results

## 12.1 Radiated field strength

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Quasi peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 120kHz |
| Video bandwidth: | Auto |
| Span: | > EBW |
| Trace-Mode: | Max. hold |

**Limits:**

| FCC | IC |
|---|---|
| CFR § 2.1046<br>CFR § 95.1115 (a) | RSS 210 Issue 10, Annex C.3 |
| Radiated field strength | |
| 200 mV/m @ 3 m (106 dBµV/m @ 3 m) | |

**Result:**

866076 (power setting +7 dBm):

| Frequency | Radiated field strength |
|---|---|
| 608.075 MHz | 93.46 dBµV/m @ 3m |
| 613.925 MHz | 91.95 dBµV/m @ 3m |

866075 (power setting +4 dBm):

| Frequency | Radiated field strength |
|---|---|
| 608.075 MHz | 89.19 dBµV/m @ 3m |
| 613.925 MHz | 89.72 dBµV/m @ 3m |

## 12.2 Field strength of spurious radiation

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Peak / AVG |
| Sweep time: | Auto |
| Resolution bandwidth: | f < 1 GHz : 100 kHz<br>f ≥ 1GHz : 1 MHz |
| Video bandwidth: | f < 1 GHz : 100 kHz<br>f ≥ 1GHz : 1 MHz |
| Span: | -/- |
| Trace-Mode: | Max. hold |

**Limits:**

| FCC | IC |
|---|---|
| 47 CFR § 2.1053<br>47 CFR § 95.1115 (b) | RSS Gen Issue 5 4.9 |
| Out-of band emissions below 960 MHz are limited to 200 microvolts/meter, as measured at a distance of 3 meters, using measuring instrumentation with a CISPR quasi-peak detector.<br>Out-of-band emissions above 960 MHz are limited to 500 microvolts/meter as measured at a distance of 3 meters, using measuring equipment with an averaging detector and a 1 MHz measurement bandwidth. | |

**866076 (power setting +7 dBm):**

| Fundamental Frequency | Spurious Frequency | Detector | Limit max. allowed [dBµV/m] | Amplitude of emission [dBµV/m] |
|---|---|---|---|---|
| 608.375MHz | 2433.52MHz | Peak | -/- | 56.06 |
| | | AVG* | 54 | 48.76 |
| | 3650.37MHz | Peak | -/- | 58.87 |
| | | AVG* | 54 | 51.57 |
| | 4258.36MHz | Peak | -/- | 56.75 |
| | | AVG* | 54 | 49.45 |

*Duty cycle correction according cetecom test report no 1-0988_20-01-02: **-7.3dB**

| Fundamental Frequency | Spurious Frequency | Detector | Limit max. allowed [dBµV/m] | Amplitude of emission [dBµV/m] |
|---|---|---|---|---|
| 613.625MHz | 2454.35MHz | Peak | -/- | 56.47 |
| | | AVG* | 54 | 49.17 |
| | 3067.93MHz | Peak | -/- | 50.52 |
| | | AVG* | 54 | 43.22 |
| | 3682.00MHz | Peak | -/- | 57.91 |
| | | AVG* | 54 | 50.61 |
| | 4295.05 | Peak | -/- | 59.84 |
| | | AVG* | 54 | 52.54 |

*Duty cycle correction according cetecom test report no 1-0988_20-01-02: **-7.3dB**

**866075 (power setting +4 dBm):**

| Fundamental Frequency | Spurious Frequency | Detector | Limit max. allowed [dBµV/m] | Amplitude of emission [dBµV/m] |
|---|---|---|---|---|
| 608.375MHz | 2433.28MHz | Peak | -/- | 55.56 |
| | | AVG* | 54 | 48.26 |
| | 3650.50MHz | Peak | -/- | 54.89 |
| | | AVG* | 54 | 47.59 |
| | 4258.30MHz | Peak | -/- | 59.38 |
| | | AVG* | 54 | 52.08 |

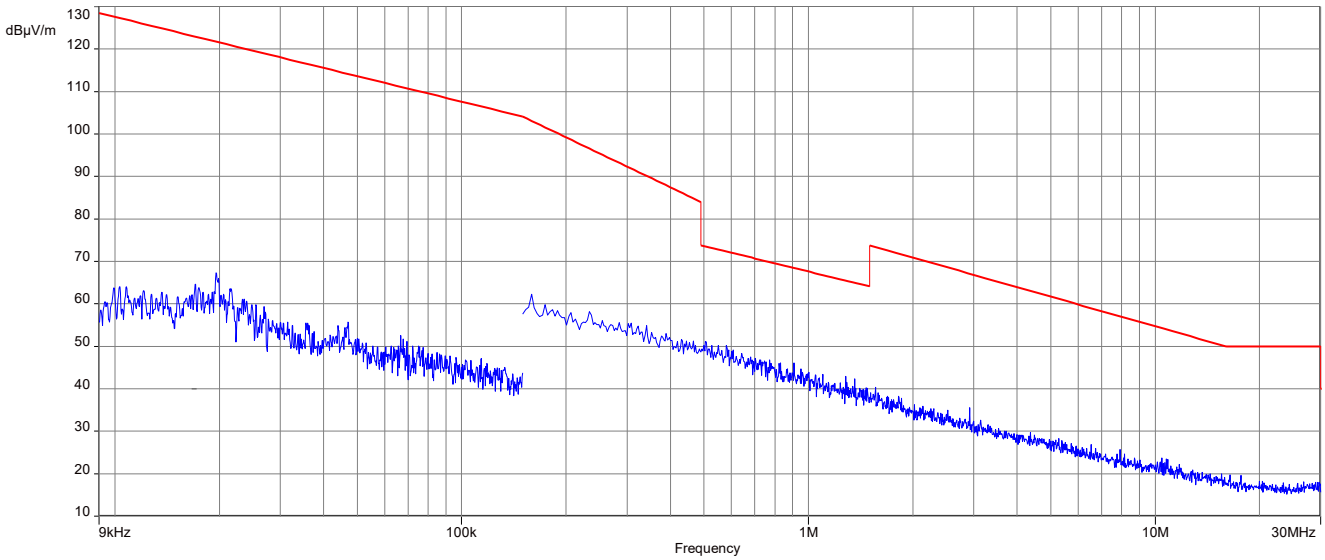
*Duty cycle correction according cetecom test report no 1-0988_20-01-02: **-7.3dB**

| Fundamental Frequency | Spurious Frequency | Detector | Limit max. allowed [dBµV/m] | Amplitude of emission [dBµV/m] |
|---|---|---|---|---|
| 613.625MHz | 2454.56MHz | Peak | -/- | 55.58 |
| | | AVG* | 54 | 48.28 |
| | 3681.66MHz | Peak | -/- | 54.90 |
| | | AVG* | 54 | 47.60 |
| | 4294.90MHz | Peak | -/- | 60.24 |
| | | AVG* | 54 | 52.94 |

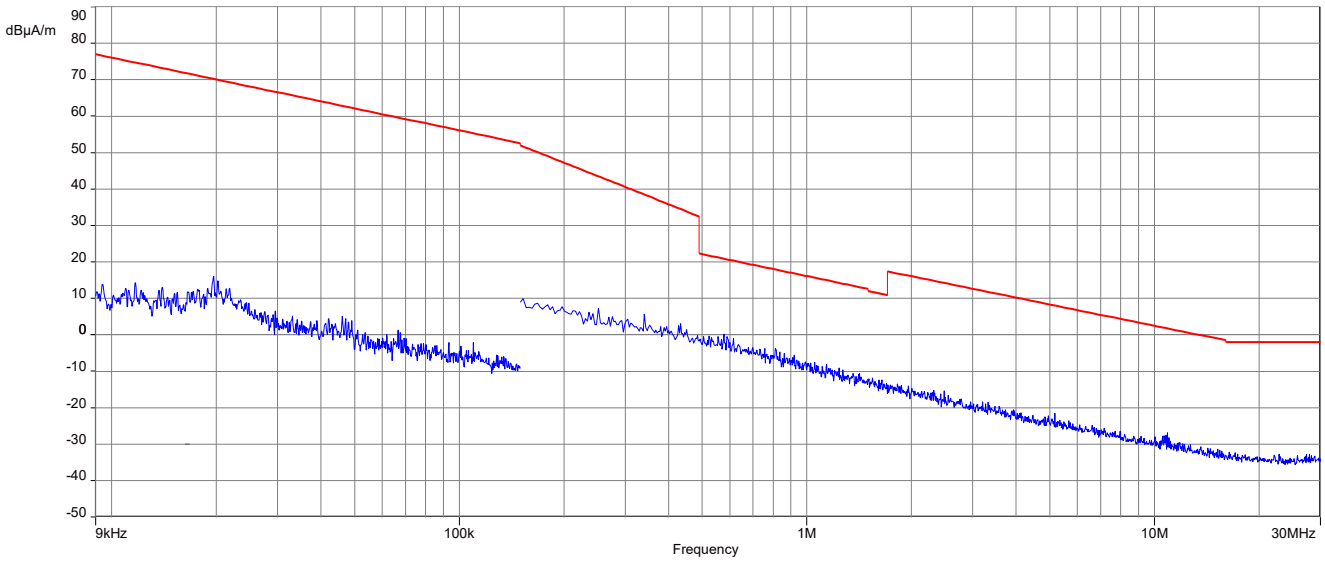
*Duty cycle correction according cetecom test report no 1-0988_20-01-02: **-7.3dB**

**Plots of the measurements 866076**

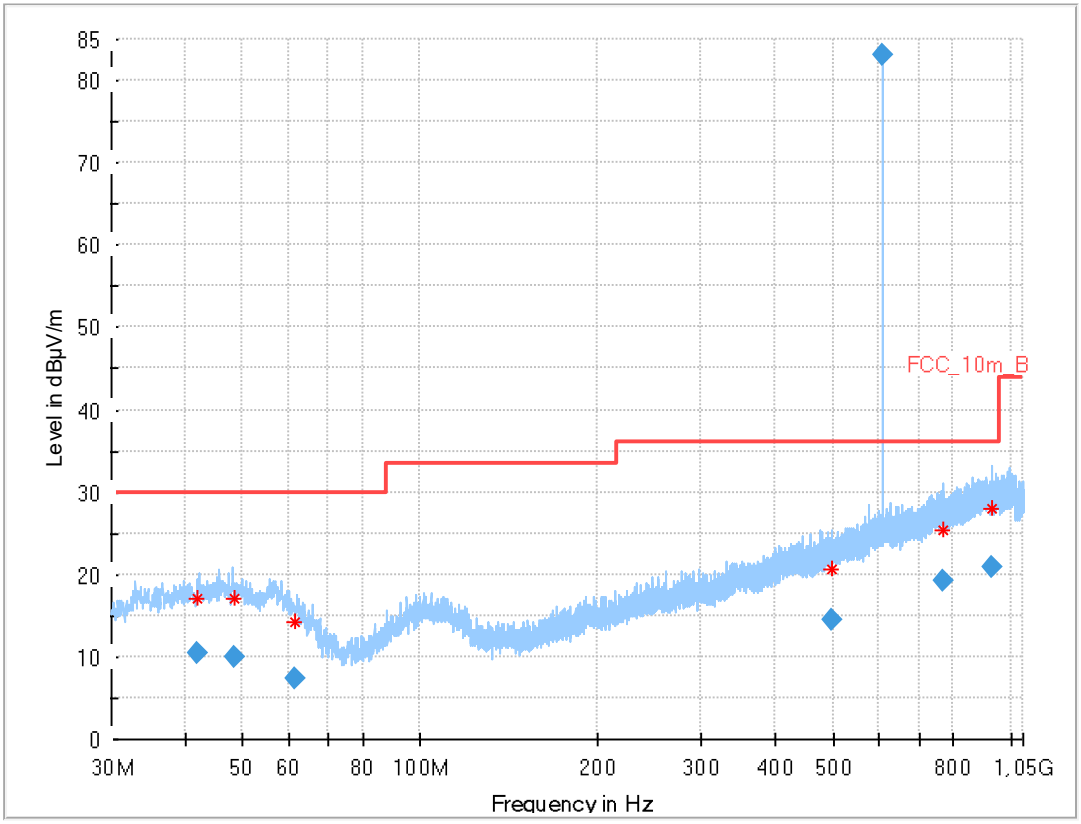
Plot 1: 9 kHz – 30 MHz, low channel, FCC




Plot 2: 9 kHz – 30 MHz, low channel, IC



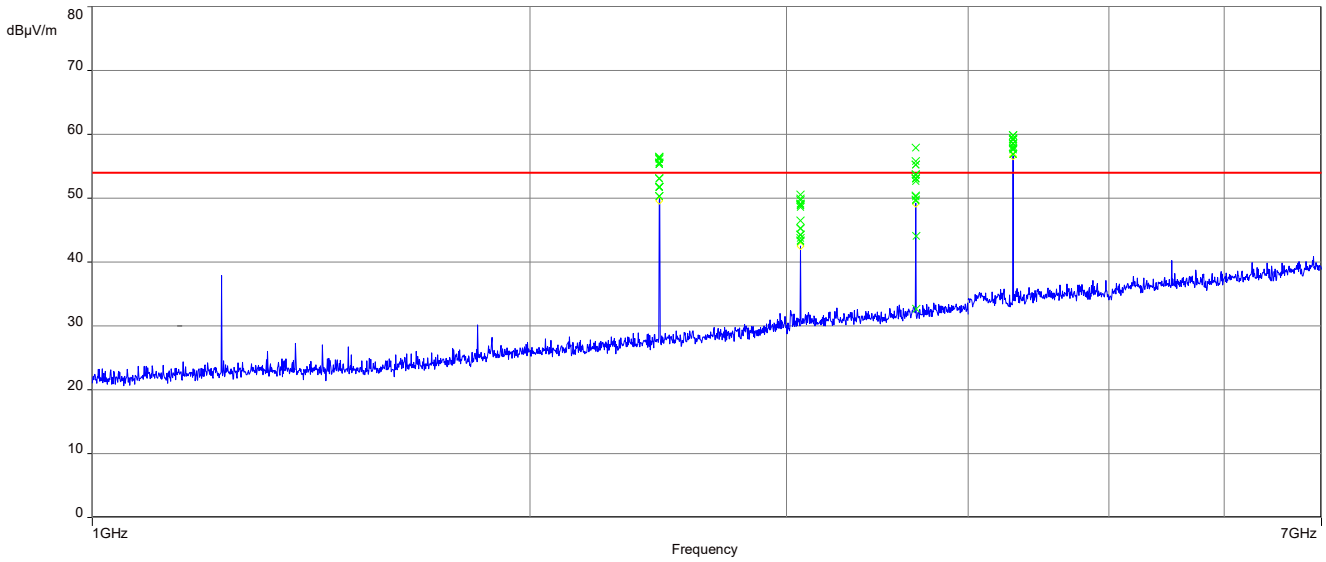
Plot 3: 30 MHz – 1 GHz, low channel



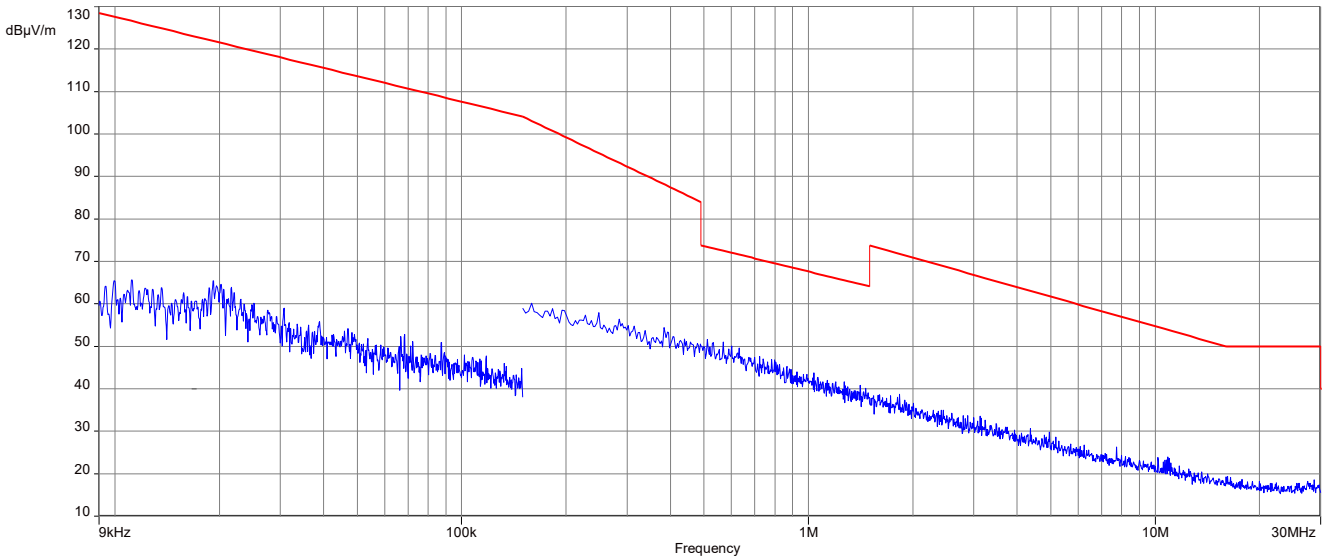

**Final_Result**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|---|
| 41.974 | 10.41 | 30.0 | 19.6 | 1000 | 120.0 | 124.0 | H | 191 | 16 |
| 48.391 | 10.08 | 30.0 | 19.9 | 1000 | 120.0 | 111.0 | V | 103 | 16 |
| 61.168 | 7.47 | 30.0 | 22.5 | 1000 | 120.0 | 169.0 | V | 225 | 13 |
| 499.356 | 14.38 | 36.0 | 21.6 | 1000 | 120.0 | 157.0 | H | -45 | 20 |
| 769.760 | 19.31 | 36.0 | 16.7 | 1000 | 120.0 | 165.0 | V | 0 | 24 |
| 926.490 | 20.97 | 36.0 | 15.0 | 1000 | 120.0 | 150.0 | H | 135 | 26 |

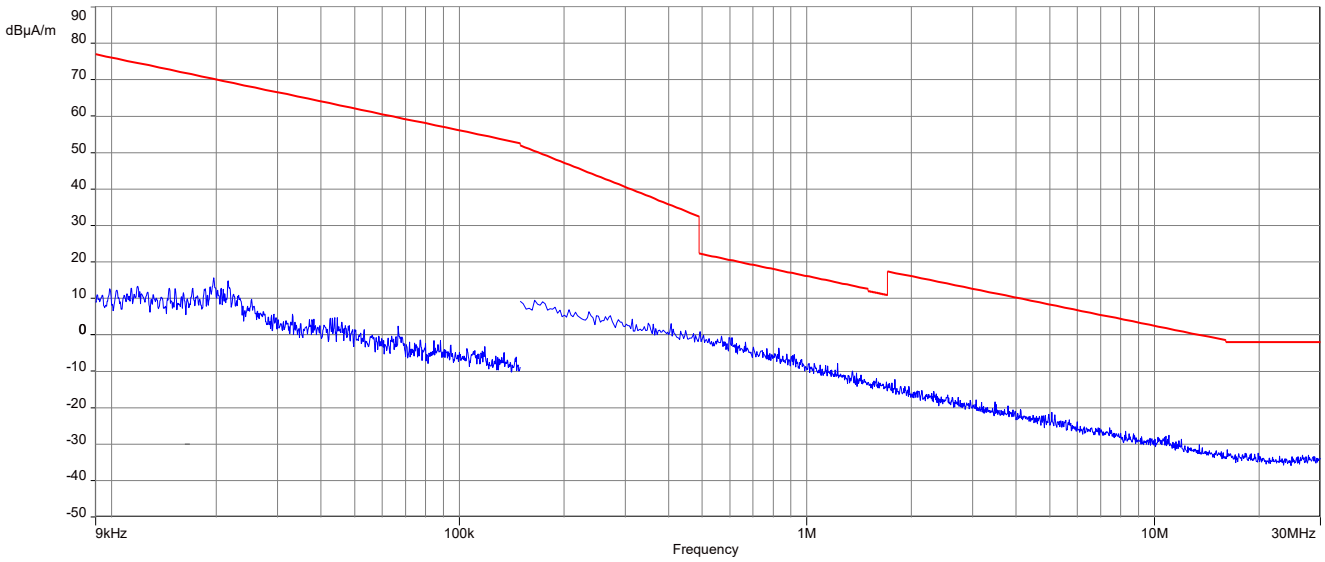
Plot 4: 1 GHz – 7 GHz, low channel, antenna horizontal/vertical



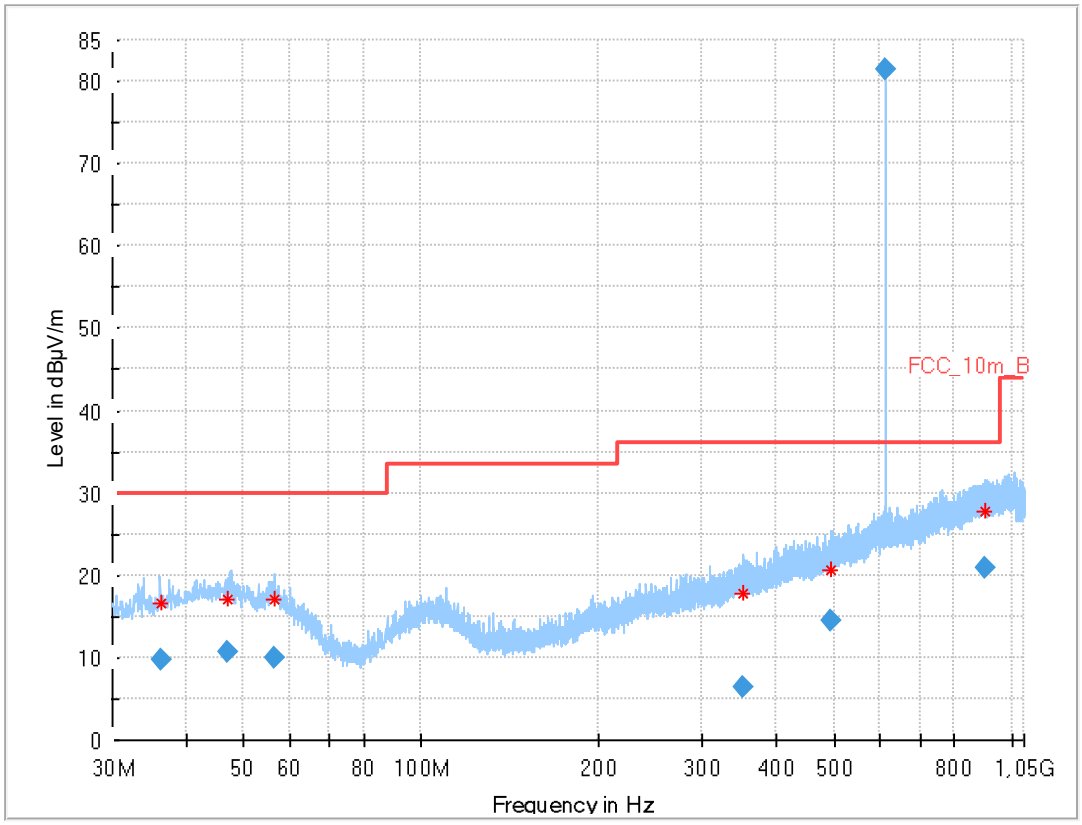
Plot 1: 9 kHz – 30 MHz, high channel, FCC




Plot 2: 9 kHz – 30 MHz, high channel, IC



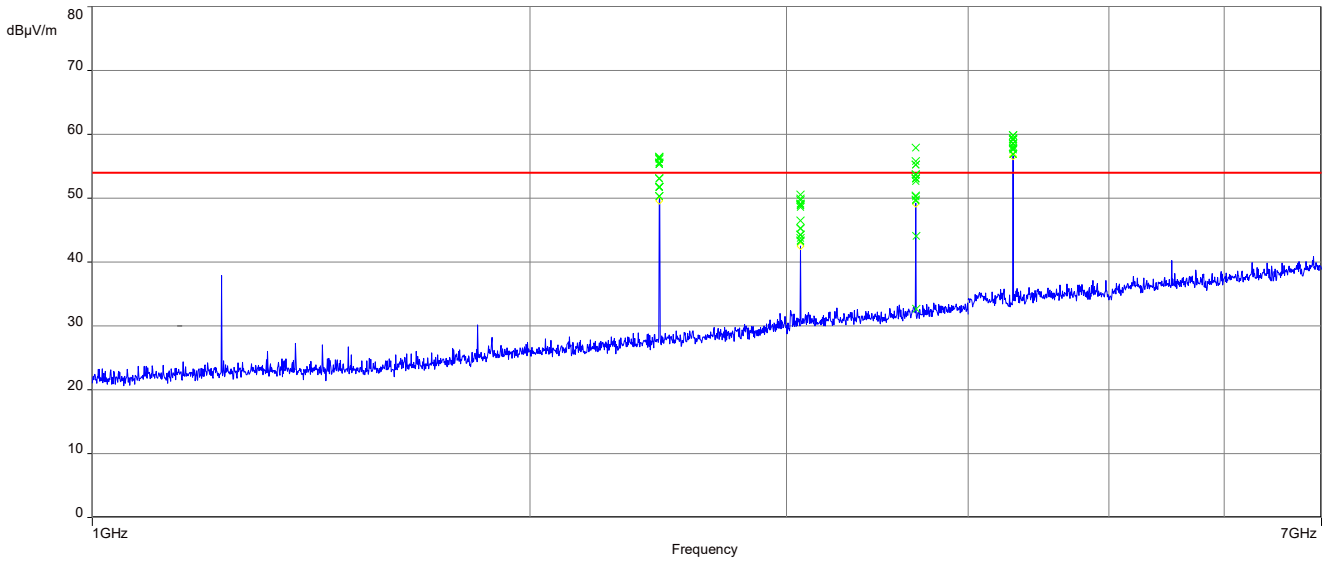
Plot 3: 30 MHz – 1 GHz, high channel




**Final_Result**

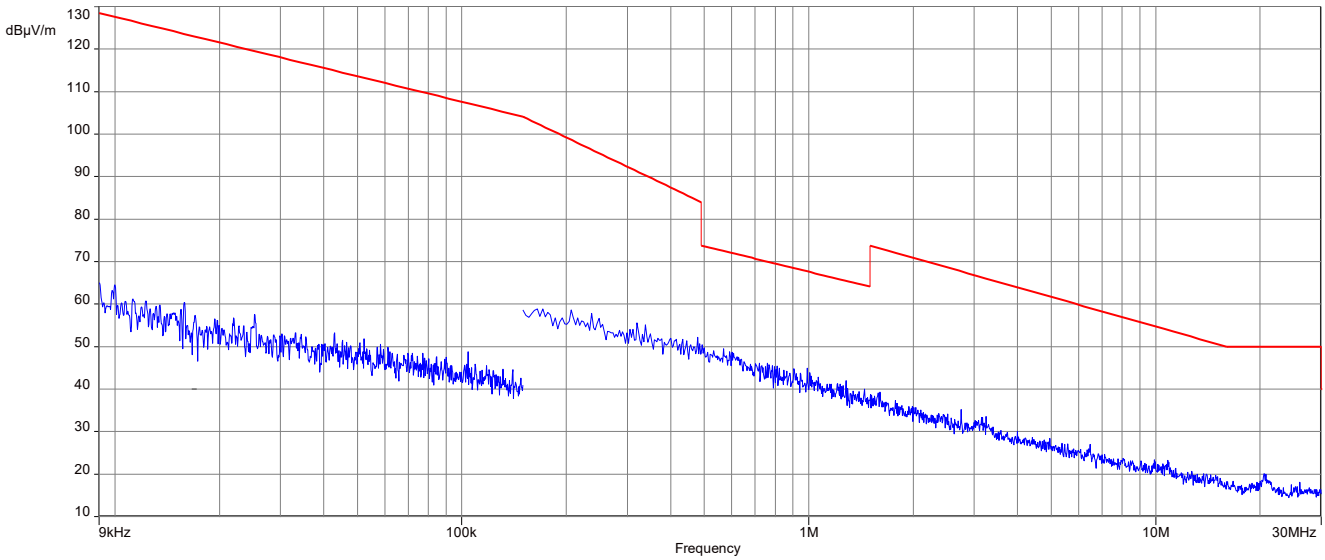
| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|---|
| 36.383 | 9.68 | 30.0 | 20.3 | 1000 | 120.0 | 104.0 | V | 40 | 15 |
| 46.996 | 10.61 | 30.0 | 19.4 | 1000 | 120.0 | 236.0 | H | -45 | 16 |
| 56.569 | 9.89 | 30.0 | 20.1 | 1000 | 120.0 | 286.0 | H | 286 | 16 |
| 349.757 | 6.35 | 36.0 | 29.7 | 1000 | 120.0 | 400.0 | H | 45 | 17 |
| 494.973 | 14.55 | 36.0 | 21.5 | 1000 | 120.0 | 400.0 | V | 180 | 20 |
| 905.018 | 20.98 | 36.0 | 15.0 | 1000 | 120.0 | 106.0 | H | 225 | 26 |

Plot 4: 1 GHz – 7 GHz, high channel, antenna horizontal/vertical

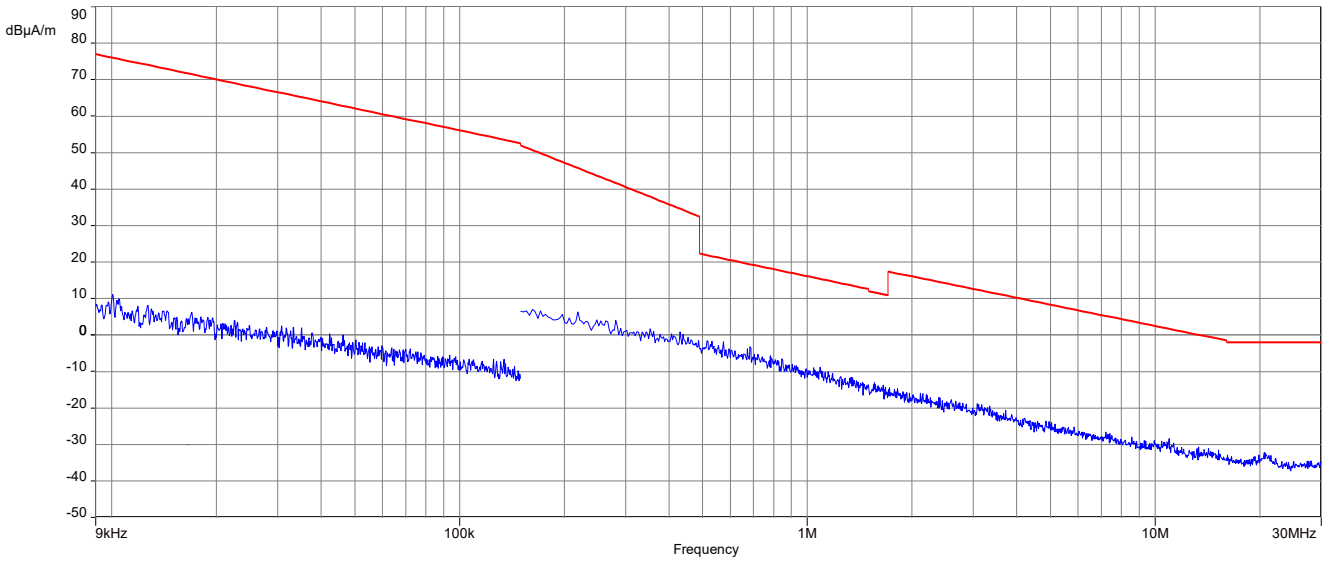


## Plots of the measurements 866075

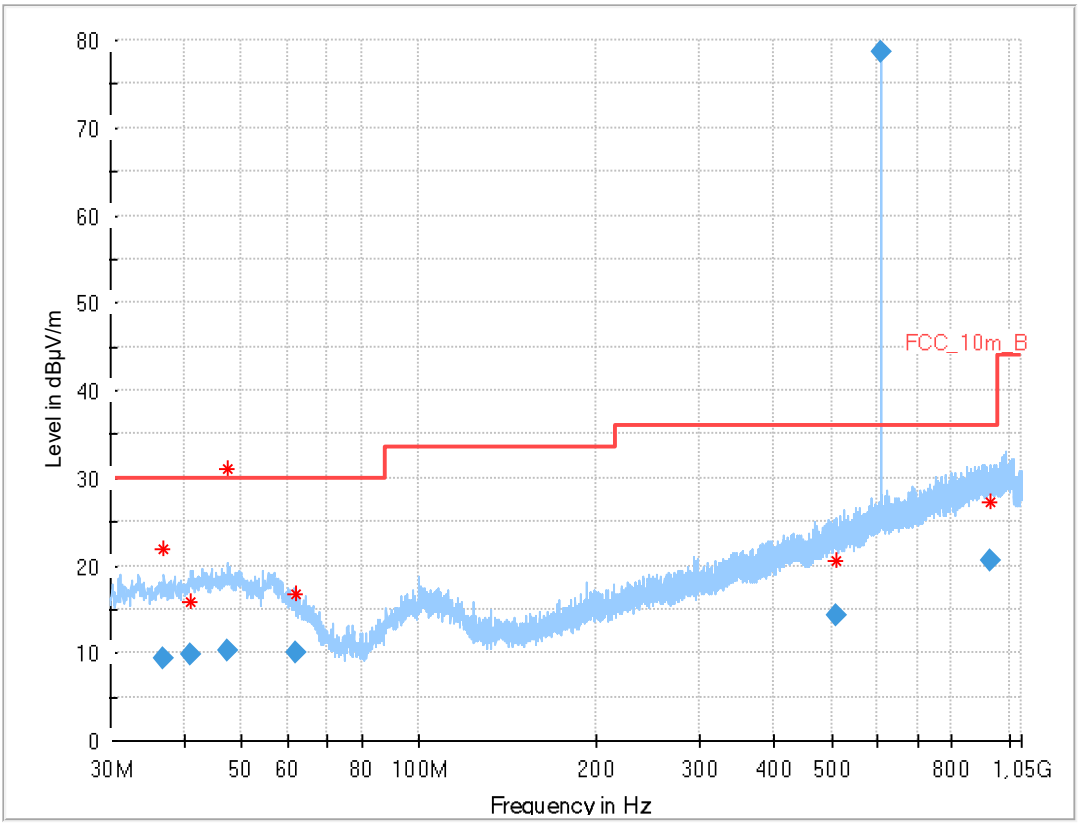
Plot 1: 9 kHz – 30 MHz, low channel, FCC




Plot 2: 9 kHz – 30 MHz, low channel, IC

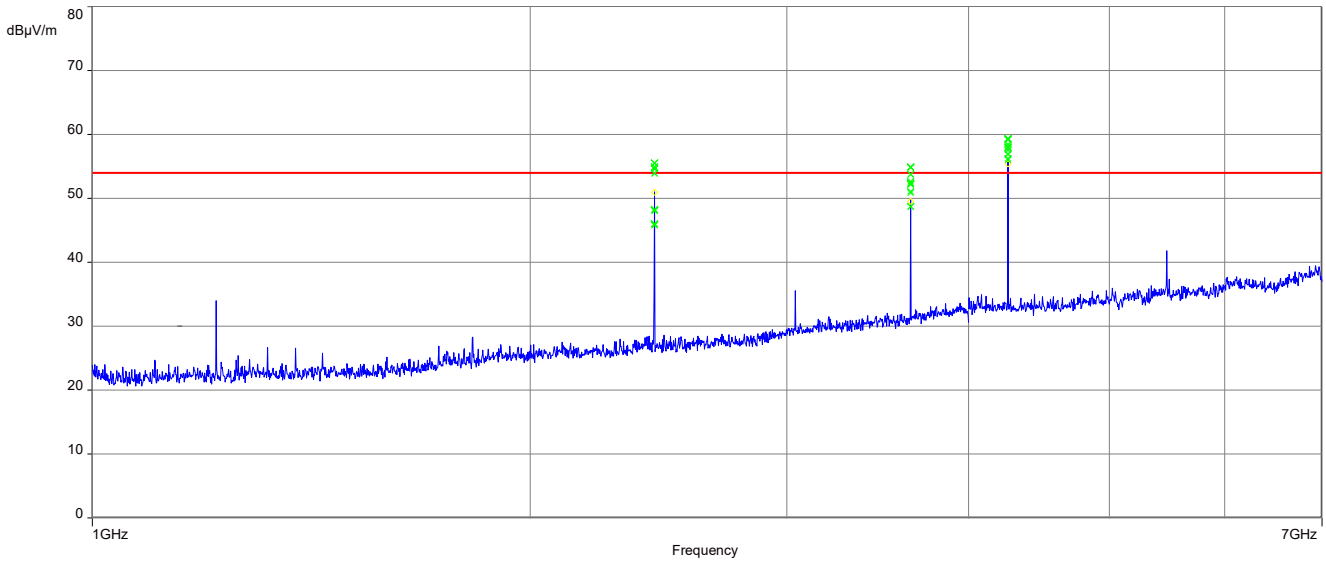


Plot 3: 30 MHz – 1 GHz, low channel

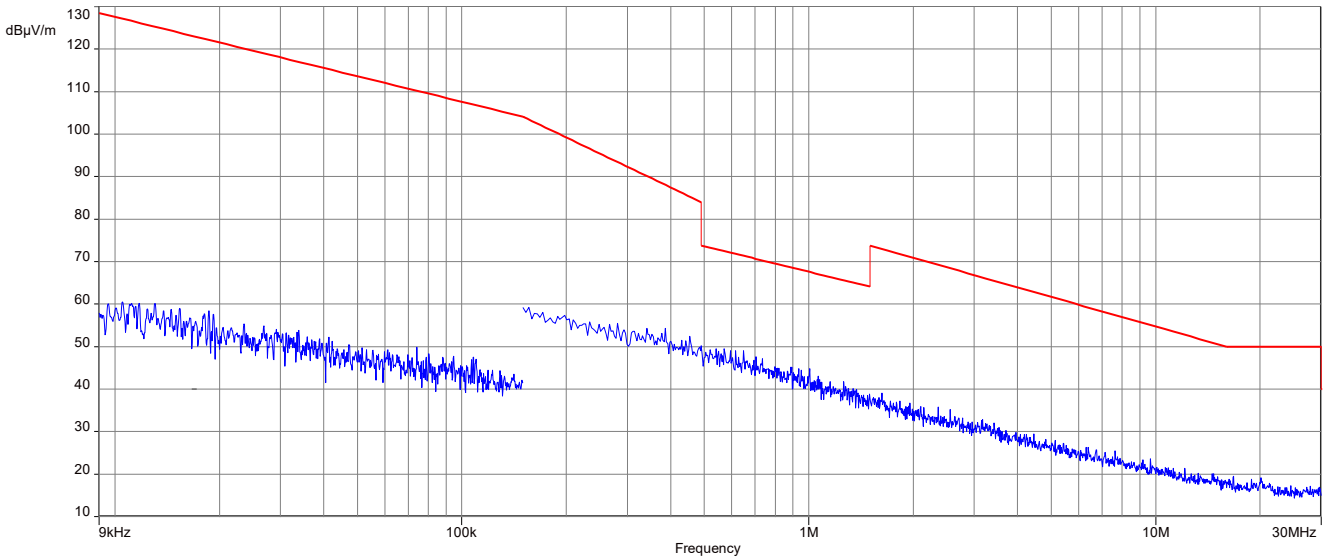



| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|---|
| 36.804 | 9.35 | 30.0 | 20.7 | 1000 | 120.0 | 364.0 | H | 225 | 15 |
| 40.920 | 9.74 | 30.0 | 20.3 | 1000 | 120.0 | 151.0 | H | 135 | 15 |
| 47.210 | 10.39 | 30.0 | 19.6 | 1000 | 120.0 | 369.0 | V | 19 | 16 |
| 62.000 | 10.11 | 30.0 | 19.9 | 1000 | 120.0 | 268.0 | V | 90 | 13 |
| 510.983 | 14.21 | 36.0 | 21.8 | 1000 | 120.0 | 200.0 | H | -45 | 20 |
| 928.088 | 20.50 | 36.0 | 15.5 | 1000 | 120.0 | 328.0 | V | 45 | 26 |

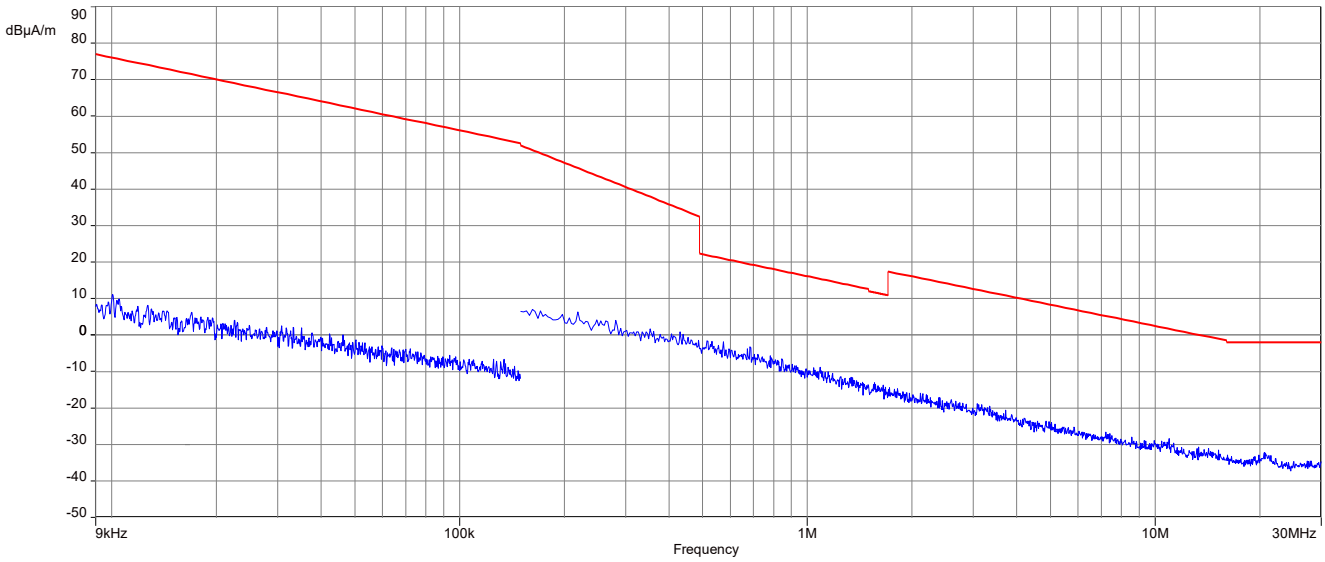
Plot 4: 1 GHz – 7 GHz, low channel, antenna horizontal/vertical



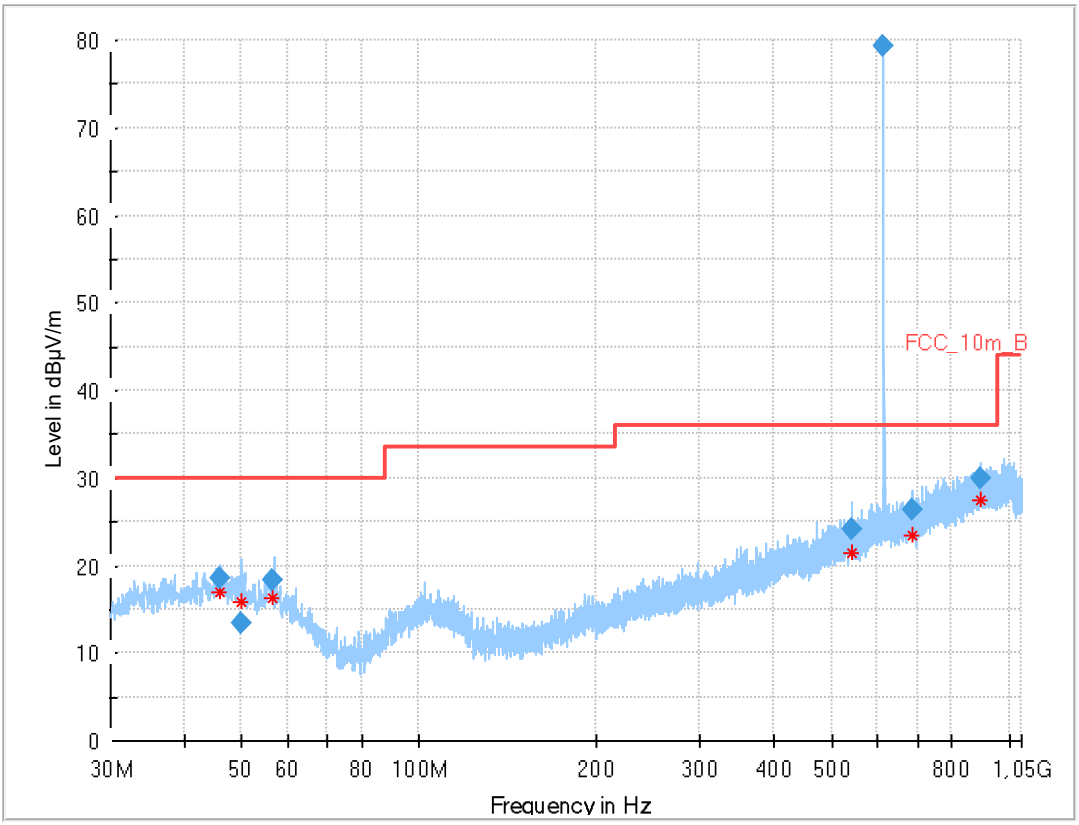
Plot 1: 9 kHz – 30 MHz, high channel, FCC




Plot 2: 9 kHz – 30 MHz, high channel, IC



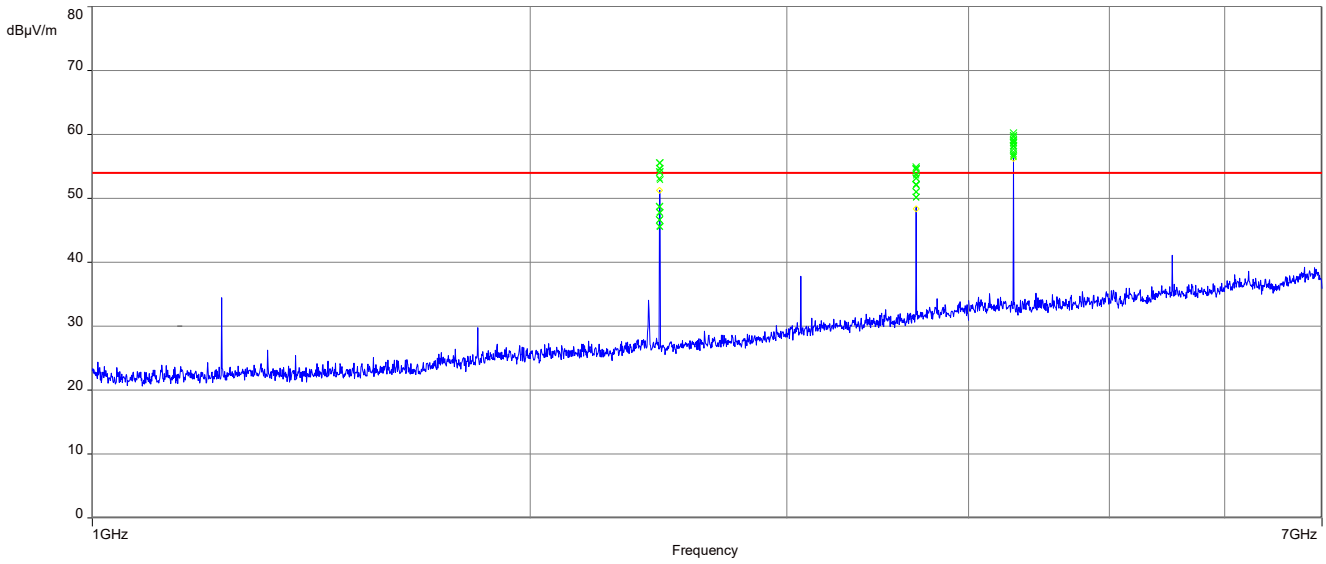
Plot 3: 30 MHz – 1 GHz, high channel




## Final_Result

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|---|
| 46.010 | 18.53 | 30.0 | 11.5 | 1000 | 120.0 | 101.0 | V | 108 | 16 |
| 50.142 | 13.43 | 30.0 | 16.6 | 1000 | 120.0 | 190.0 | V | 101 | 16 |
| 56.400 | 18.36 | 30.0 | 11.6 | 1000 | 120.0 | 195.0 | H | 248 | 16 |
| 541.191 | 24.15 | 36.0 | 11.9 | 1000 | 120.0 | 195.0 | V | 81 | 20 |
| 685.208 | 26.26 | 36.0 | 9.7 | 1000 | 120.0 | 173.0 | H | 142 | 22 |
| 897.334 | 29.86 | 36.0 | 6.1 | 1000 | 120.0 | 195.0 | V | -37 | 25 |

Plot 4: 1 GHz – 7 GHz, high channel, antenna horizontal/vertical



## 13 Glossary

| | |
|---|---|
| **EUT** | Equipment under test |
| **DUT** | Device under test |
| **UUT** | Unit under test |
| **GUE** | GNSS User Equipment |
| **ETSI** | European Telecommunications Standards Institute |
| **EN** | European Standard |
| **FCC** | Federal Communications 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 |
| **GNSS** | Global Navigation Satellite System |
| **$C/N_0$** | Carrier to noise-density ratio, expressed in dB-Hz |

## 14 Document history

| Version | Applied changes | Date of release |
|---|---|---|
| -/- | Initial release | 2023-06-22 |
| A | Editorial Changes | 2023-06-22 |
| B | update reference standards in test summary table on page 15 | 2023-12-14 |

################################ END OF TEST REPORT ################################