

EMC TEST REPORT

No. 2202277STO-102

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment: Radio Unit
Type/Model: AIR 6419 B77G
Product number: KRD 901 238/3
Additional product number*: KRD 901 238/1, KRD 901 238/11,
KRD 901 238/31

Product configuration: NR

Manufacturer: Ericsson AB

Tested by request of: Ericsson AB

*See opinions and interpretations clause 2.6

SUMMARY

Referring to the emission limits, and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards:

FCC 47 CFR Part 15: Radio frequency devices, Subpart B: Unintentional radiators.
Class B equipment.

ICES-003 Issue 7: Information Technology Equipment (Including Digital Apparatus) –
Limits and Methods of Measurement, Class B.

For details, see clause 2 – 4.

Date of issue: May 4, 2022

Issued by:



Martin Erwe

Approved by:



Per Larsson

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Revision History

| Test report number | Date | Description | Changes |
|--------------------|-------------|---------------|-------------------|
| 2202277STO-102 | May 4, 2022 | First release | Basic test report |

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1. CLIENT INFORMATION

The EUT has been tested by request of

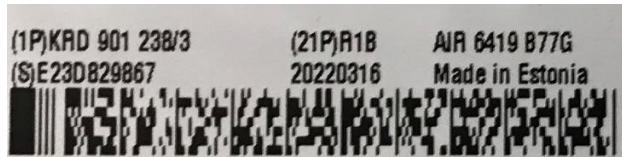
Company: Ericsson AB
164 80 Stockholm
Sweden

Name of contact: Krister Andersen
BNEW DNEW RA RPSE1 IVC
Phone +46 722 44 19 44

Client observer: Haji Akbar Babar

2. EQUIPMENT UNDER TEST (EUT)**2.1 Identification of the EUT**

| | |
|----------------------------|---|
| Equipment | Radio Unit |
| Type/Model | AIR 6419 B77G |
| Product number: | KRD 901 238/3 |
| Additional product number: | KRD 901 238/1, KRD 901 238/11, KRD 901 238/31 |
| Product configuration: | NR |
| Brand name | Ericsson |
| Manufacturer | Ericsson |
| Rating | -48VDC max: 30A |
| Class | III |
| Highest clock frequency | CPRI 25,78 GHz |



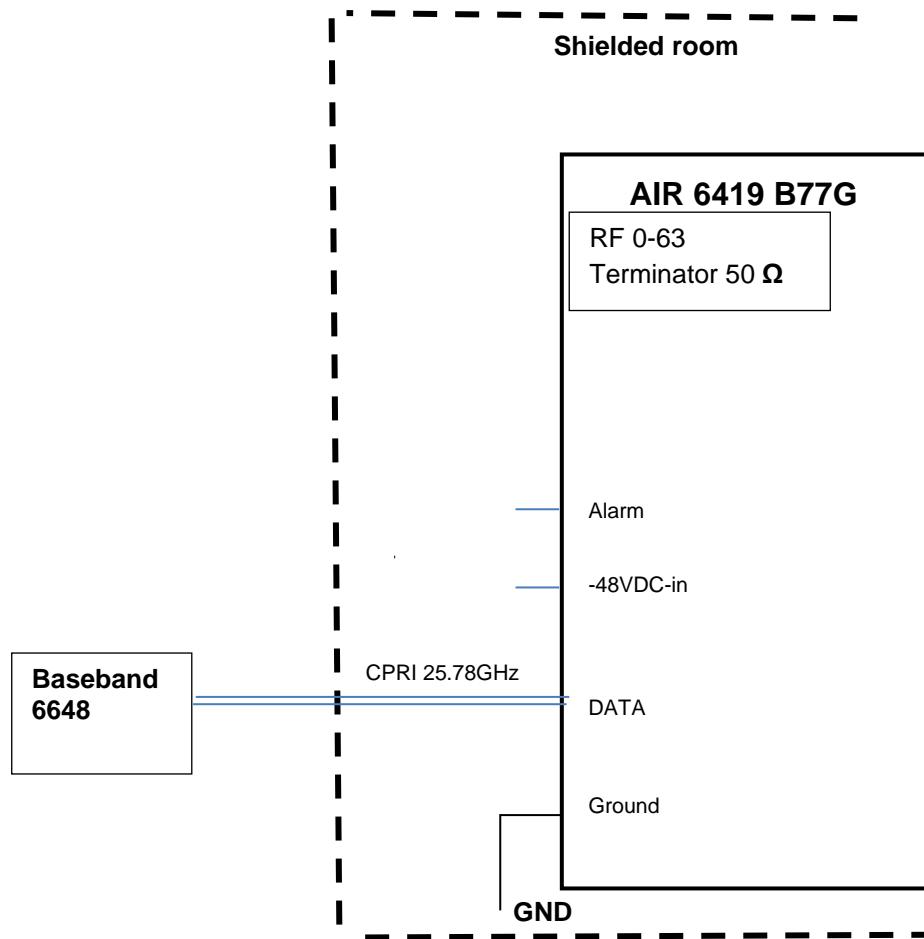
Photos of marking and EUT



2.2 Description of the EUT

The test object is an Antenna Integrated Radio (AIR 6419) for a base station with NR. It is designed to provide mobile users with a connection to a mobile network.

2.3 Test setup- block diagram



Block diagram of EUT during the tests

2.4 External cables connected to the EUT

| Port | Type | Length [m] | Specifications |
|-----------------|------------------|------------|--------------------------------|
| DC in | DC power | 3.0 | Two-core |
| Earth | Ground | 3.0 | Single wire, 35mm ² |
| External alarm | Signal cable | 5.0 | RPM 513 2350/1 |
| Data_1 & Data_2 | RPM 253 1610/20M | 20.0 | Optical fibre cable |

2.5 Auxiliary equipment (AE)

Auxiliary equipment is equipment needed for correct operation of the EUT, but not included as part of the testing and evaluation of the EUT.

| Equipment | Type / Model | Manufacturer | Serial no. |
|------------------------|-------------------|--------------|-----------------|
| Computer | MacBook Pro | Apple | BAMS1002122808 |
| PSU | LP1400 | PA Emilsson | BAMS-1017033679 |
| Baseband 6648 | KDU 137 00 15/1 | Ericsson | (S)E23D149536 |
| SFP module | RDH 102 75/3 R1A | Ericsson | EA61XL17BF |
| SFP module | RDH 102 75/3 R1A | Ericsson | EA61XL0E8F |
| Power supply (for EUT) | SGA 60/250 | Sorensen | BAMS-1000234866 |
| Switch | Prosafe M4100-26G | Netgear | 3922435D0010A |

2.6 Opinions and interpretations

The following types are also included as additional types in this test report:

The differences between the models are (according to the manufacturer):

| Type/Model | Product numbers | Comment |
|---------------|-----------------|--|
| AIR 6419 B77G | KRD 901 238/1 | With un-security software and antenna |
| | KRD 901 238/11 | With security software and antenna |
| | KRD 901 238/3 * | With un-security software and RDNB board for testing |
| | KRD 901 238/31 | With security software and RDNB board for testing |

* Tested model. The tests were performed on KRD 901 238/3 (AIR 6419 B77G with un-security software and RDNB board for testing purpose).

The hardware and software (except for the security software) are identical for all types above. The difference is considered not to imply different EMC-characteristics when compared to the tested type.

2.7 Decision rule

The statements of conformity are reported as:

Passed – When the measured values are within the specified limits.

Failed – When one or more measured values are outside the specified limits.

3. TEST SPECIFICATIONS

3.1 Standards

Requirements:

FCC 47 CFR Part 15: Radio frequency devices, Subpart B: Unintentional radiators (2015).

ICES-003 Issue 7: Information Technology Equipment (Including Digital Apparatus) (2020).

Test methods:

ANSI C63.4: 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

3.2 Additions, deviations and exclusions from standards and accreditation

No additions, deviations or exclusions have been made from standards and accreditation.

3.3 Test site

Measurements were performed at:

Intertek Semko AB.
Torshamnsgatan 43,
P.O. Box 1103
SE-164 22 Kista

Intertek Semko AB is a FCC listed test site with site registration number 90913

Intertek Semko AB is a FCC accredited conformity assessment body with designation number SE0002

Intertek Semko AB is an Industry Canada listed test facility with IC assigned code 2042G

Measurement chambers

| Measurement Chamber | Type of chamber | IC Site filing # |
|---------------------|----------------------|------------------|
| 5 m CHAMBER | Semi-anechoic 5 m | 2042G-3 |

3.4 Mode of operation during the test

The EUT was tested with – 53 V DC, up to 20 A. Output Power: 8W/MHz up to max 320W.

Transmission band B77G: 3450 – 3550 MHz.

Radio Configuration**NR:**

The test object was transmitting test model FR1-TM1.1as defined in ETSI TS 138 141/3GPP TS 38.141-1.

All the RF ports are activated for maximum transmit power. See table below for detailed radio configurations.

Radio configuration emission (NR)

| Configuration No. | Type of Carrier | Channel BW (MHz) | RF power (Watt) | Test Model | Carrier Frequency (DL) |
|-------------------|-----------------|------------------|-----------------|------------|------------------------|
| | | | | | MHz |
| 1 RF port 0-63 | NR | 20 | 80 | FR1-TM1.1 | 3460 |
| | NR | 20 | 80 | FR1-TM1.1 | 3540 |
| | NR | 20 | 80 | FR1-TM1.1 | 3480 |

3.5 Compliance

The EUT shall comply with the emission limits according to the standards as listed below.

Conducted emission requirements:

The EUT shall meet the limits for the standards.

Reference: 47 CFR §15.107

ICES-003, section 6.1

Limits for conducted emission according to FCC and ICES-003

Class B

| Frequency range [MHz] | Limits [dB μ V] | |
|--------------------------|---------------------|---------|
| | Quasi-Peak | Average |
| 0.15 – 0.50 | 66 – 56 | 56 – 46 |
| 0.50 – 5.00 | 56 | 46 |
| 5.00 – 30.0 | 60 | 50 |

Radiated Emission requirements:

The EUT shall meet the limits for the standards.

Reference: 47 CFR §15.109

ICES-003, section 6.2

Class B FCC

| Frequency range [MHz] | Field strength at 3 m (dB μ V/m) | Field strength at 10 m (dB μ V/m) | Detector |
|--------------------------|--|---|----------------|
| 30 – 88 | 40.0 | 29.5 | Quasi Peak |
| 88 – 216 | 43.5 | 33.1 | Quasi Peak |
| 216 – 960 | 46.0 | 35.6 | Quasi Peak |
| 960 – 1000 | 54.0 | 43.5 | Quasi Peak |
| Above 1000 | 54.0 / 74.0 | 43.5 / 63.5 | Average / Peak |

The values for 10 m measuring distance are calculated by subtracting 10.5 dB from the 3 m limit.
(i.e. an extrapolation factor of 20 dB/decade according to §15.31(f)(1))

Class B ICES-003

| Frequency range [MHz] | Field strength at 3 m (dB μ V/m) | Field strength at 10 m (dB μ V/m) | Detector |
|--------------------------|--|---|----------------|
| 30 – 88 | 40.0 | 30.0 | Quasi Peak |
| 88 – 216 | 43.5 | 33.1 | Quasi Peak |
| 216 – 230 | 46.0 | 35.6 | Quasi Peak |
| 230 - 960 | 47.0 | 37.0 | Quasi Peak |
| 960 – 1000 | 54.0 | 43.5 | Quasi Peak |
| Above 1000 | 54.0 / 74.0 | 43.5 / 63.5 | Average / Peak |

4. TEST SUMMARY

The results in this report apply only to sample tested:

| Standard | Description | Result |
|------------------------------|---|-------------|
| | Emission | |
| FCC Part 15 subpart B | Conducted continuous emission in the frequency range 0.150 – 30 MHz, AC Power input port | PASS |
| ICES-003 | The EUT complies with the Class B limits. The margin to the limit was at least 12.6 dB at 4.77 MHz. See clause 5.4. | |
| FCC Part 15 subpart B | Radiated emission of electromagnetic fields in the frequency range 30 – 1000 MHz | PASS |
| ICES-003 | The EUT complies with the Class B limits. The margin to the limit was at least 5.9 dB at 188.73 MHz See clause 6.5. | |
| FCC Part 15 subpart B | Radiated emission of electromagnetic fields in the frequency range 1 – 18 GHz | PASS |
| ICES-003 | The EUT complies with the Class B limits. The margin to the limit was at least 20 dB. See clause 6.6 | |
| FCC Part 15 subpart B | Radiated emission of electromagnetic fields in the frequency range 18 – 26.5 GHz | PASS |
| ICES-003 | The EUT complies with the Class B limits. The margin to the limit was at least 16.5 dB at 25781.25 MHz See clause 6.7 | |
| FCC Part 15 subpart B | Radiated emission of electromagnetic fields in the frequency range 26.5 – 40 GHz | PASS |
| ICES-003 | The EUT complies with the Class B limits. The margin to the limit was at least 15.4 dB at 37003.25 MHz See clause 6.8 | |

5. CONDUCTED CONTINUOUS DISTURBANCES in the frequency-range 0.15 – 30 MHz

5.1 Operating environment

| Date of test | Temperature [°C] | Relative Humidity [%] |
|----------------|------------------|-----------------------|
| April 14, 2022 | 22 | 30 |

5.2 Test set-up and test procedure

The test method is in accordance with ANSI C63.4.

The EUT was connected to the power via Artificial Mains Networks AMN and an external power supply.

The PSU was placed on an insulating support 0.4 m above the floor and the EUT, 0.4 m from the vertical reference ground plane (RGP) and 0.8 m from the AMN/ISN.

Overview sweeps were performed for each lead.

During the tests the EUT was operated according to the mode of operation mentioned in clause 3.4.

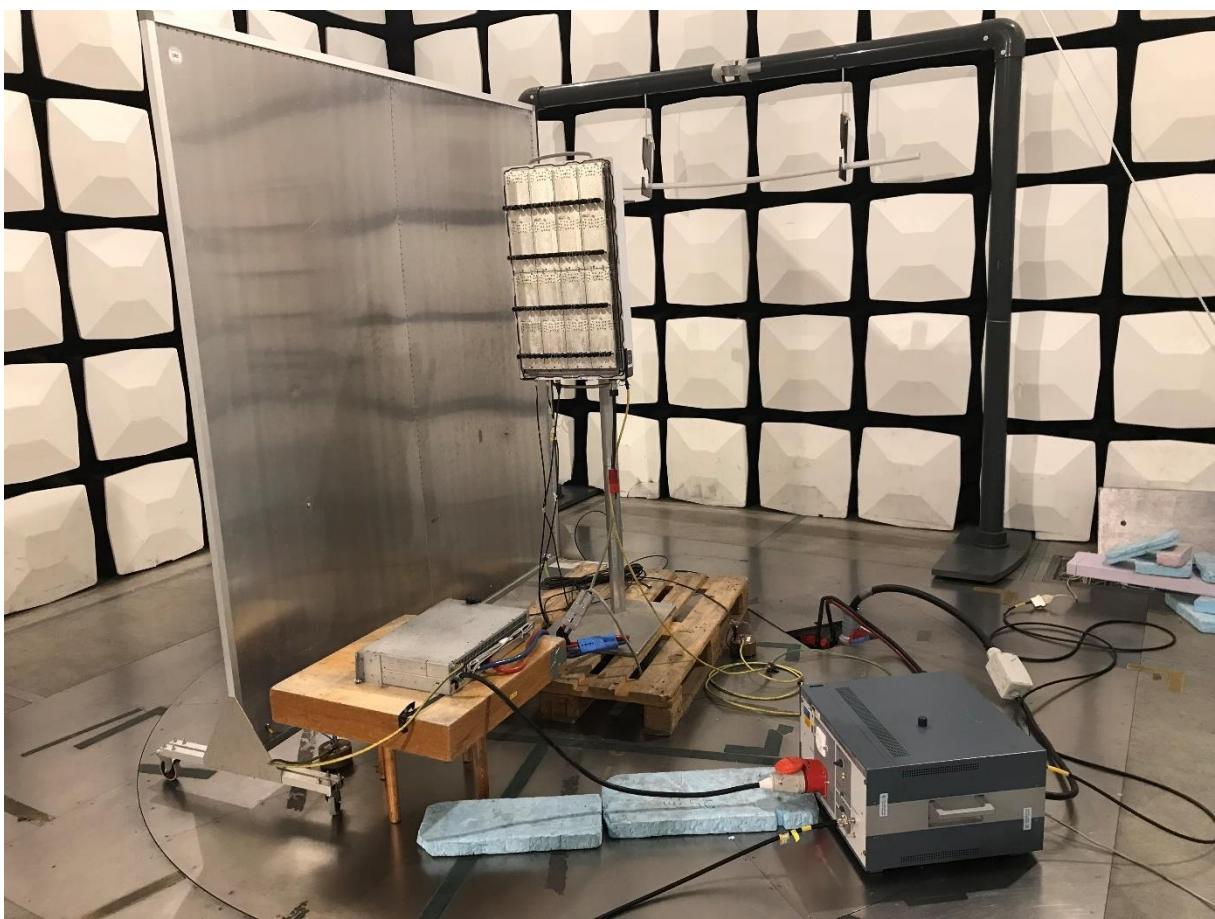


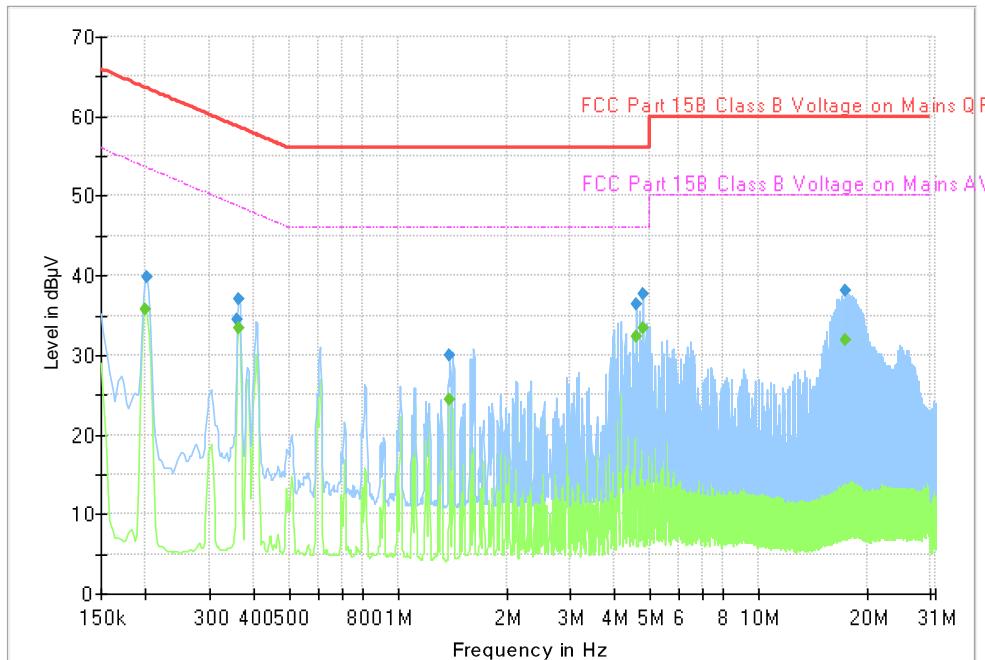
Photo of the test set-up for conducted emission

5.3 Measurement uncertainty

Continuous conducted disturbances with AMN
in the frequency range 150 kHz to 30 MHz ± 3.3 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2: 2011.
The measurement uncertainty is given with a confidence of 95 %.

5.4 Test results, AC Power input port, Class B



Diagram, Peak and Average overview sweep

Measurement results, Quasi-peak, Class B

| Frequency [MHz] | Level [dB μ V] | Limit [dB μ V] | Margin [dB] | Line L/N |
|-----------------|--------------------|--------------------|-------------|----------|
| 4.57125 | 36.37 | 56.00 | 19.63 | L1 |
| 4.77375 | 37.76 | 56.00 | 18.24 | L1 |

Measurement results, Average, Class B

| Frequency [MHz] | Level [dB μ V] | Limit [dB μ V] | Margin [dB] | Line L/N |
|-----------------|--------------------|--------------------|-------------|----------|
| 0.19950 | 35.79 | 53.63 | 17.85 | L1 |
| 0.36150 | 33.44 | 48.69 | 15.25 | L1 |
| 4.57125 | 32.27 | 46.00 | 13.73 | L1 |
| 4.77375 | 33.40 | 46.00 | 12.60 | L1 |
| 17.37150 | 31.92 | 50.00 | 18.08 | L1 |

All other measured disturbances have a margin of more than 20 dB to the limits.

Result [dB μ V] = Analyser reading [dB μ V] + cable loss [dB] + LISN insertion loss [dB]

5.5 Test equipment

| Equipment type | Manufacturer | Model | Inv. No. | Last Cal. date | Next Cal. |
|----------------------|-----------------|------------------|----------|----------------|-----------|
| Measurement software | Rohde & Schwarz | EMC32 – 10.50.40 | -- | -- | -- |
| Measurement Receiver | Rohde & Schwarz | ESW44 | 33950 | 28 July 2021 | 1 year |
| Transient protection | Rohde & Schwarz | ESH3-Z2 | 32456 | 13 July 2021 | 1 year |
| AMN | Rohde & Schwarz | ESH2-Z5 | 32326 | 25 June 2019 | 3 year |
| Coaxial cable | Huber & Suhner | SUCOFLEX 104 | 9752 | 28 August 2021 | 1 year |
| Coaxial cable | Rohde & Schwarz | LMR400UF | 9986 | 27 May 2021 | 1 year |

6. RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHZ – 18 -26.5 - 40 GHZ

6.1 Operating environment

| Date of test | Temperature [°C] | Relative Humidity [%] |
|----------------|------------------|-----------------------|
| April 12, 2022 | 21 | 20 |
| April 5, 2022 | 20 | 21 |
| April 6, 2022 | 21 | 15 |

6.2 Test set-up and test procedure

The test method is in accordance with ANSI C63.4.

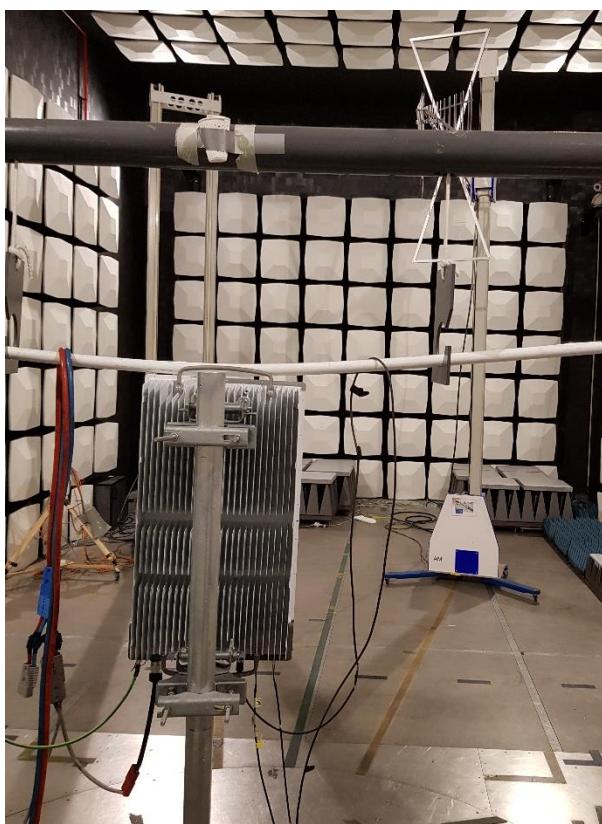
The EUT was set up in order to emit maximum disturbances.

The EUT was placed on a pole support 0.8 m above the turntable which is part of the reference ground plane.

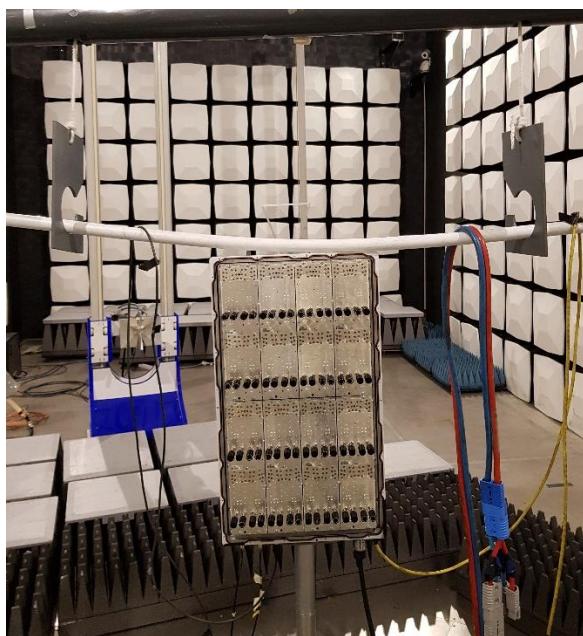
Overview sweeps were performed with the measurement receiver in max-hold mode and the peak detector activated in the frequency-range 30 – 1000 MHz

Above 1 GHz additionally the average detector was activated.

During height scan above 1 GHz the EUT was kept in antennas cone of radiation.

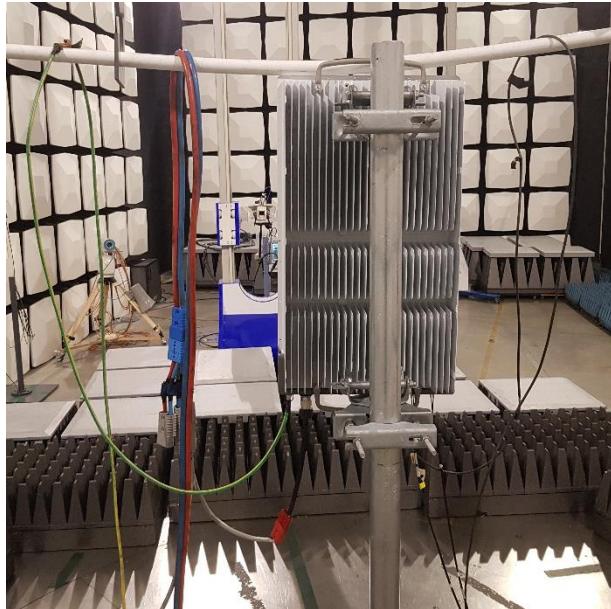


30 – 1000 MHz



1 – 18 GHz

Photos of the test set-up for radiated emission



18 – 26.5 GHz



26.5 - 40 GHz

Photos of the test set-up for radiated emission

6.3 Test conditions

Test set-up:

30 – 1000 MHz

Test receiver set-up:

Preview test:

Peak, RBW 120 kHz

VBW 1 MHz

Final test:

Quasi-Peak, RBW 120 kHz

Measuring distance:

3 m

Measuring angle:

0 – 359°

Antenna

Height above ground plane:

1 – 4 m

Polarisation:

Vertical and Horizontal

Type:

Bilog

Test set-up:

1 – 18 – 26.5 - 40 GHz

Test receiver set-up:

Preview test:

Peak, RBW 1 MHz

VBW 3 MHz

Final test:

Average, RBW 1 MHz

Peak, RBW 1 MHz

Measuring distance:

3 m

Measuring angle:

0 – 359°

Antenna

Height above ground plane:

1 – 4 m

Polarisation:

Vertical and Horizontal

Type:

Horn

Antenna tilt:

Activated

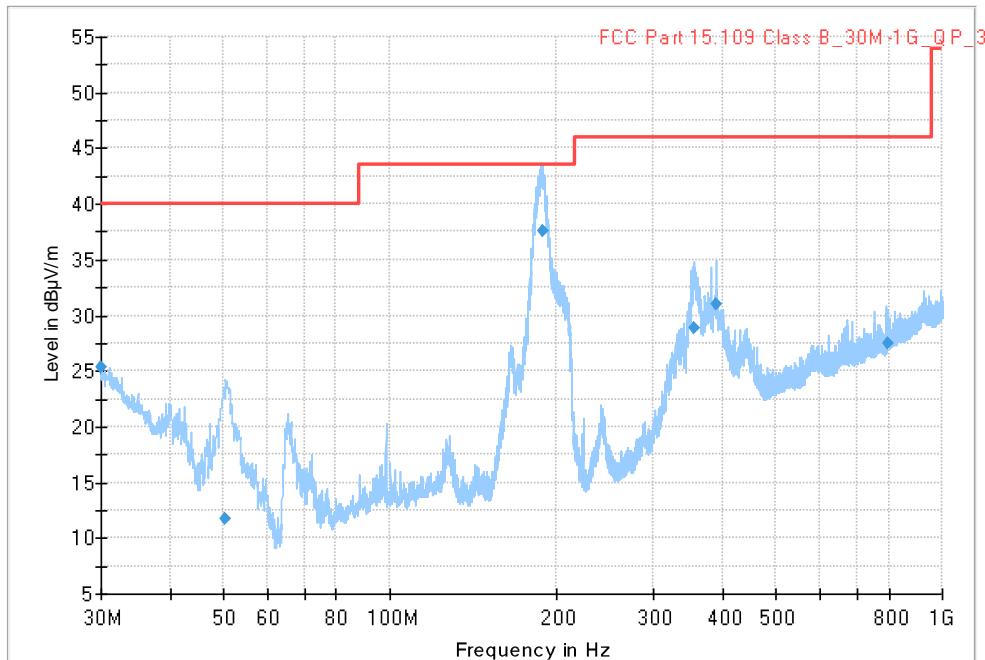
6.4 Measurement uncertainty

Measurement uncertainty for radiated disturbance

| | |
|---|----------|
| Uncertainty for the frequency range 30 to 1000 MHz at 3 m | ± 5.1 dB |
| Uncertainty for the frequency range 1.0 to 18 GHz at 3 m | ± 4.5 dB |
| Uncertainty for the frequency range 18 to 26 GHz at 3 m | ± 4.8 dB |
| Uncertainty for the frequency range 26 to 40 GHz at 3 m | ± 5.7 dB |

Measurement uncertainty is calculated in accordance with CISPR 16-4-2: 2011.
The measurement uncertainty is given with a confidence of 95 %.

6.5 Test results, 30 – 1000 MHz, Class B



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance.

Measurement results, Quasi Peak, Class B

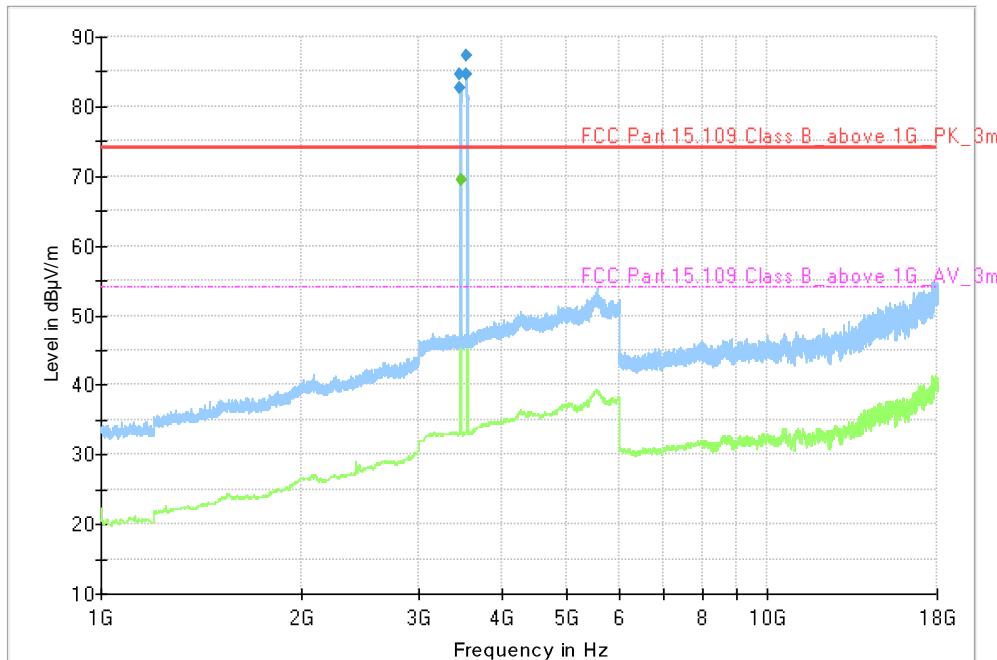
| Frequency [MHz] | Level [dB μ V/m] | Limit FCC [dB μ V/m] | Limit ICES [dB μ V/m] | Margin* [dB] | Polarization H/V |
|-----------------|----------------------|--------------------------|---------------------------|--------------|------------------|
| 30.090 | 25.4 | 40.0 | 40.0 | 14.6 | H |
| 188.730 | 37.6 | 43.5 | 43.5 | 5.9 | H |
| 355.530 | 28.8 | 46.0 | 47.0 | 17.2 | V |
| 390.540 | 30.9 | 46.0 | 47.0 | 15.1 | V |
| 797.650 | 27.5 | 46.0 | 47.0 | 18.5 | V |

*Note: Only margin to FCC is calculated, ICES is considered to comply.

All other measured disturbances have a margin of more than 20 dB to the limits.

Result [dB μ V/m] = Analyser reading [dB μ V] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

6.6 Test results, 1 – 18 GHz, Class B



Diagram, Peak and average overview sweep, 1 – 18 GHz at 3 m distance.

Disturbances between 3450 – 3550 MHz (B77G) belongs to the transmission bands and should be ignored.

Measurement results, Peak, Class B

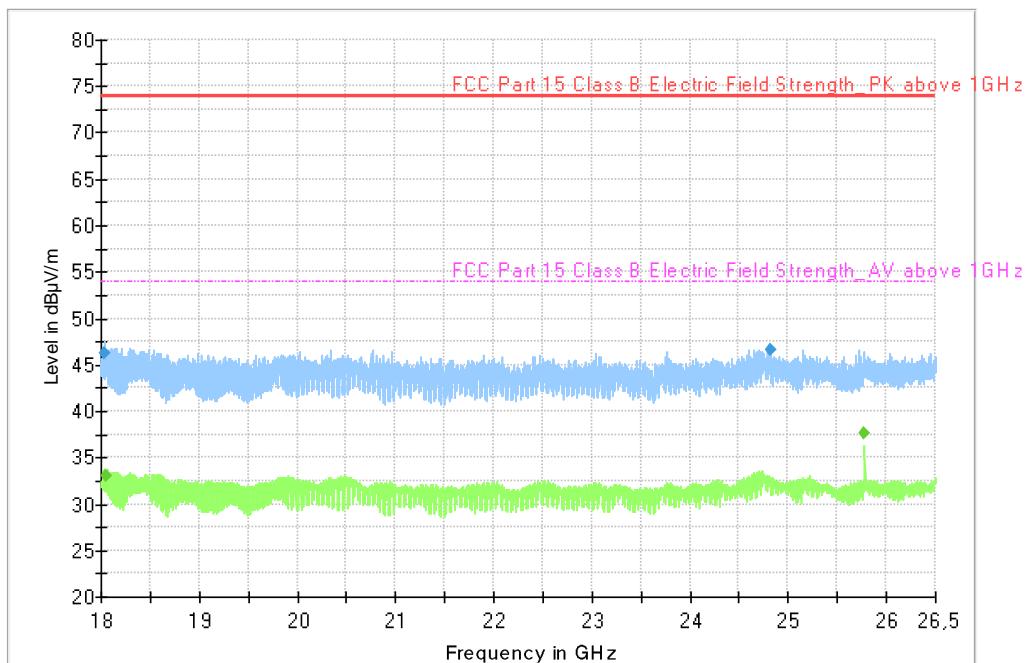
All other measured disturbances have a margin of more than 20 dB to the limits.

Measurement results, Average, Class B

All other measured disturbances have a margin of more than 20 dB to the limits.

Result [dBµV/m] = Analyser reading [dBµV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

6.7 Test results, 18 – 26.5 GHz, Class B



Diagram, Peak and average overview sweep, 18 – 26.5 GHz at 3 m distance.

Measurement results, Peak, Class B

All measured disturbances have a margin of more than 20 dB to the limits.

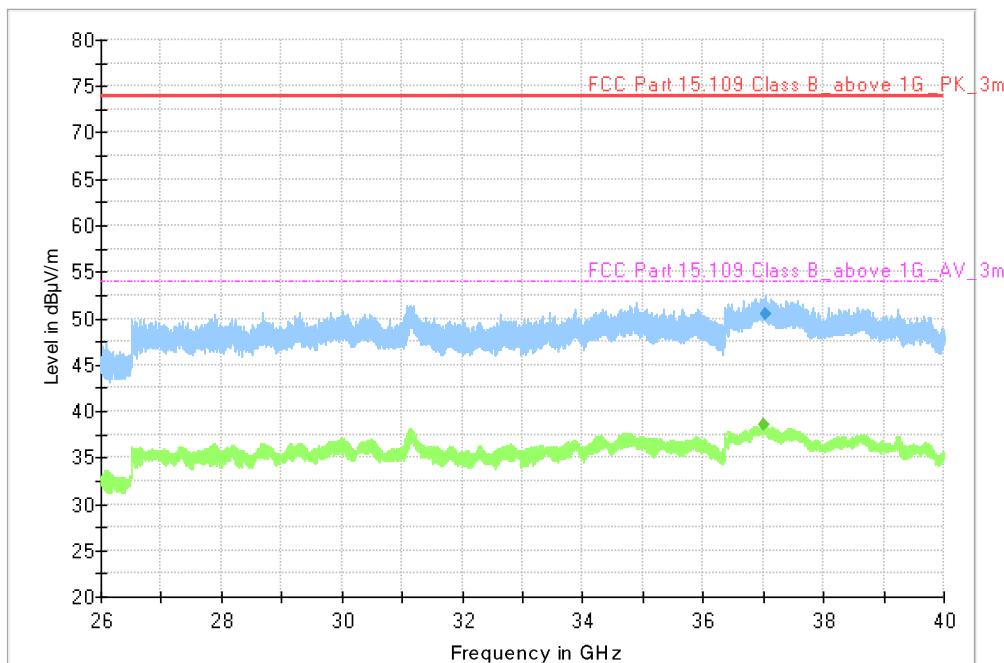
Measurement results, Average, Class B

| Frequency [MHz] | Level [dB μ V/m] | Limit FCC & ICES [dB μ V/m] | Margin [dB] | Polarization |
|--------------------|-------------------------|---------------------------------------|----------------|--------------|
| 25781.25 | 37.5 | 54.0 | 16.5 | H/V |

All other measured disturbances have a margin of more than 20 dB to the limits.

Result [dB μ V/m] = Analyser reading [dB μ V] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

6.8 Test results, 26.5 – 40 GHz, Class B



Diagram, Peak and average overview sweep, 26.5 – 40 GHz at 3 m distance.

Measurement results, Peak, Class B

All measured disturbances have a margin of more than 20 dB to the limits.

Measurement results, Average, Class B

| Frequency [MHz] | Level [dB μ V/m] | Limit FCC & ICES [dB μ V/m] | Margin [dB] | Polarization |
|--------------------|-------------------------|---------------------------------------|----------------|--------------|
| 37003.25 | 38.6 | 54.0 | 15.4 | H/V |

All other measured disturbances have a margin of more than 20 dB to the limits.

Result [dB μ V/m] = Analyser reading [dB μ V] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

6.9 Test equipment

| Equipment type | Manufacturer | Model | Inv. No. | Last Cal. date | Next Cal. |
|------------------------|-----------------|------------------|----------|------------------|-----------|
| Measurement software | Rohde & Schwarz | EMC32 – 10.50.40 | -- | -- | -- |
| Measurement Receiver | Rohde & Schwarz | ESW44 | 33950 | July 28, 2021 | 1 year |
| Antenna ultralog | Rohde & Schwarz | HL562 | 32310 | May 6, 2019 | 3 years |
| Coaxial cable | Rosenberger | UFB311A | 39053 | May 28, 2021 | 1 year |
| Horn antenna | Rohde & Schwarz | HF907 | 32550 | July 5, 2019 | 3 years |
| Coaxial cable 1-6 GHz | Rosenberger | UFB311A | 39141 | April 5, 2022 | 1 year |
| Coaxial cable 6-18 GHz | Rosenberger | UFB311A | 39142 | April 5, 2022 | 1 year |
| Horn antenna | Bonn | BLMA 18 26-5A | 31247 | August 26, 2020 | 3 years |
| Horn antenna | Bonn | BLMA 26 40-5A | 31248 | August 27, 2020 | 3 years |
| Coaxial cable | Megaphase | GC12-K1K1-315 | 39128 | August 20, 2021 | 1 year |
| Temp & RH meter | Vaisala | HM41 | 32403 | October 18, 2021 | 1 year |

7. EUT SOFTWARE

Software radio: CXP 2030039/7 R18BD27
Software baseband: CXP 2020666/1 R45B17

8. EUT HARDWARE LIST

| Product | Product No, | R-State | Serial Number |
|---------------------|---------------|---------|---------------|
| AIR 6419 B77G | KRD 901 238/3 | R1B | E23D829867 |
| SFP module Sumitomo | RDH 102 75/3 | R1A | 02T704900277 |
| SFP module Sumitomo | RDH 102 75/3 | R1A | 02T704900279 |