

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

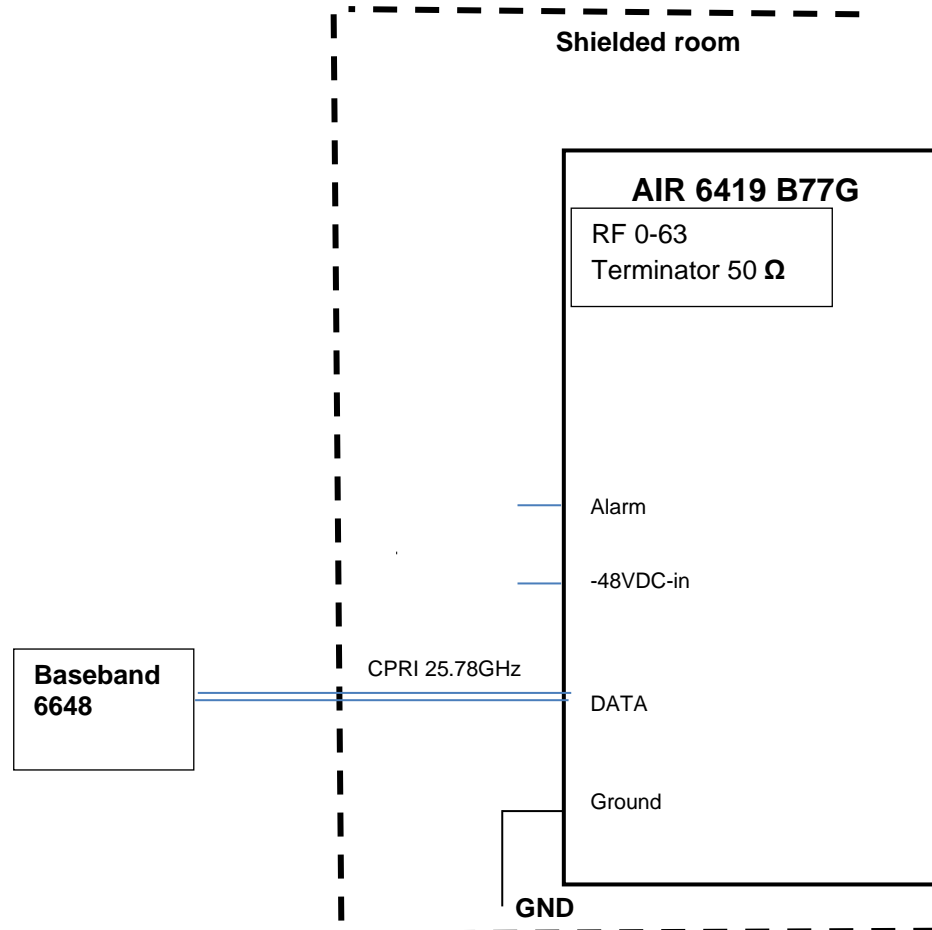


Photos of marking and EUT

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 measures 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-TM1.1 as 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 ICES-003	Conducted continuous emission in the frequency range 0.150 – 30 MHz, AC Power input port 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.	PASS
FCC Part 15 subpart B ICES-003	Radiated emission of electromagnetic fields in the frequency range 30 – 1000 MHz 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.	PASS
FCC Part 15 subpart B ICES-003	Radiated emission of electromagnetic fields in the frequency range 1 – 18 GHz The EUT complies with the Class B limits. The margin to the limit was at least 20 dB. See clause 6.6	PASS
FCC Part 15 subpart B ICES-003	Radiated emission of electromagnetic fields in the frequency range 18 – 26.5 GHz 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	PASS
FCC Part 15 subpart B ICES-003	Radiated emission of electromagnetic fields in the frequency range 26.5 – 40 GHz 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	PASS

**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.

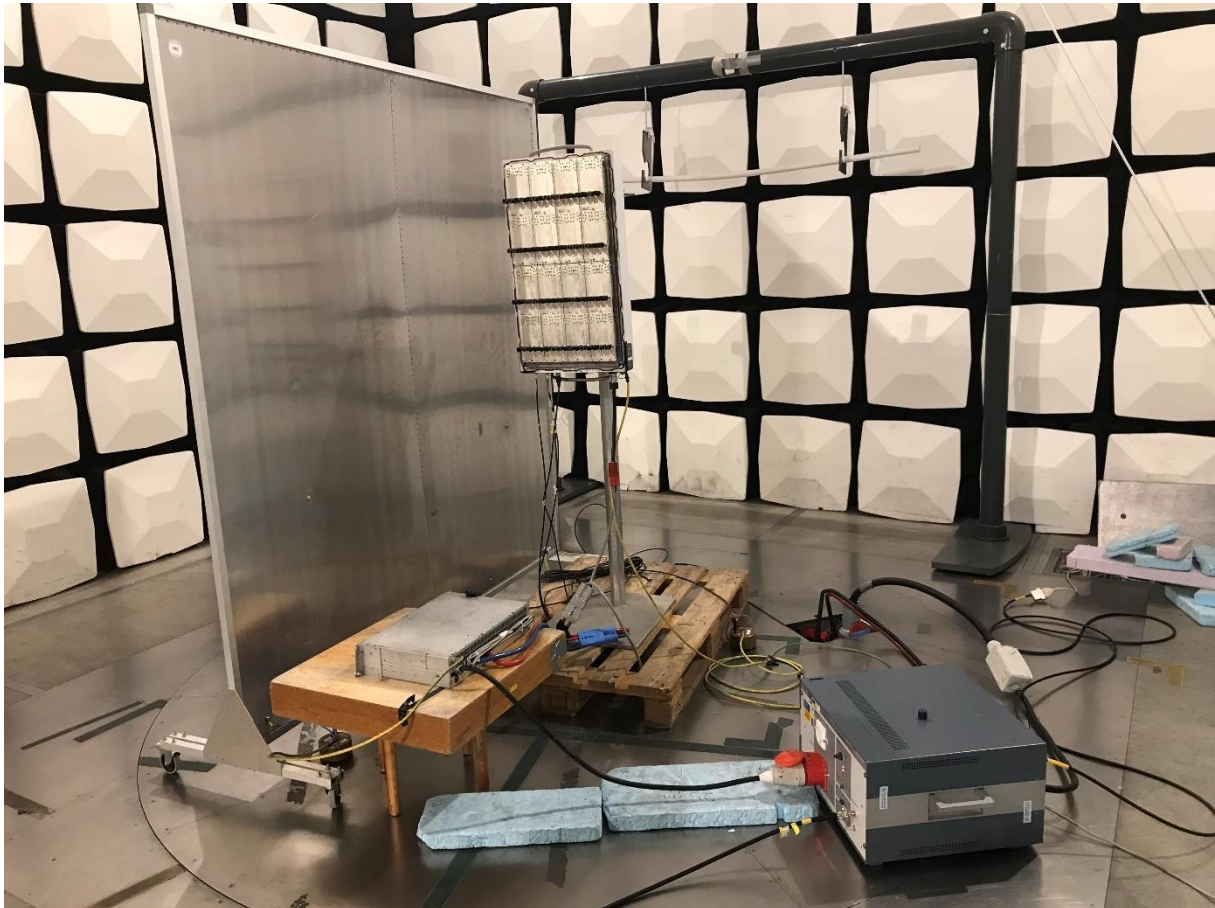


Photo of the test set-up for conducted emission

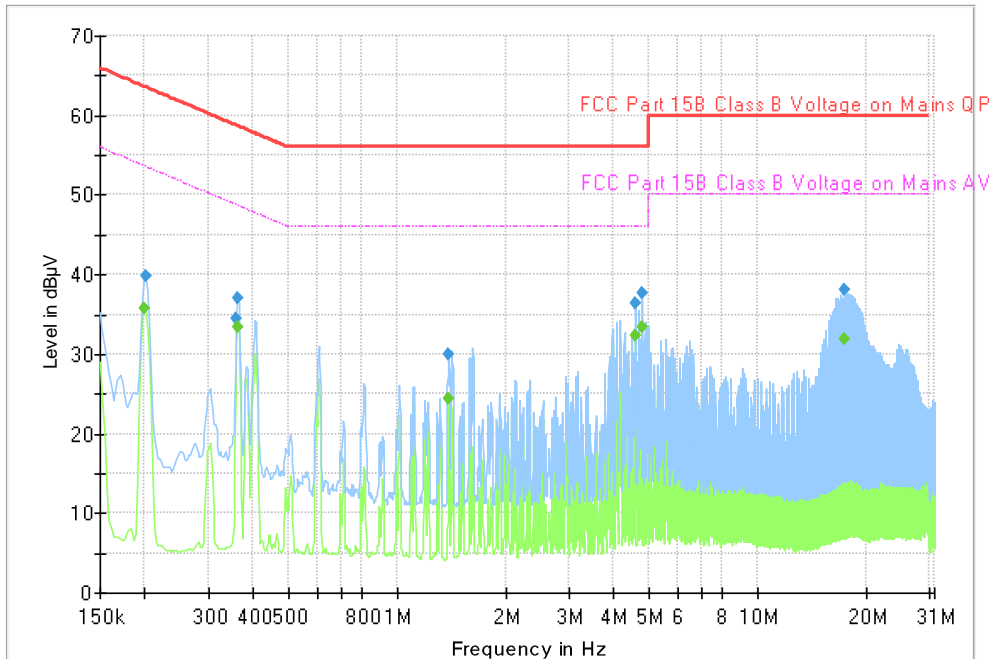
5.3 Measurement uncertainty

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 [dBµV]	Limit [dBµV]	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 [dBµV]	Limit [dBµV]	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 [dBµV] = Analyser reading [dBµV] + 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.

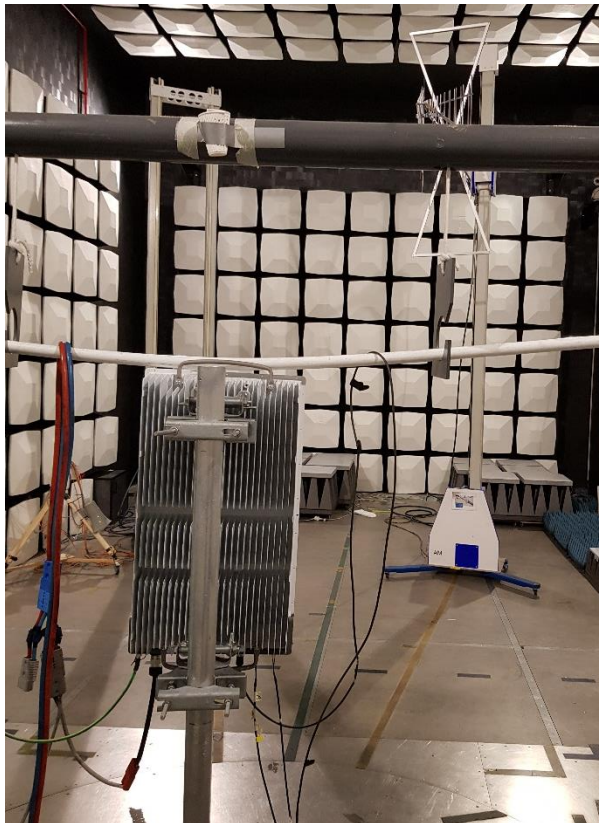
The EUT was set up in order to emit maximum disturbances.

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

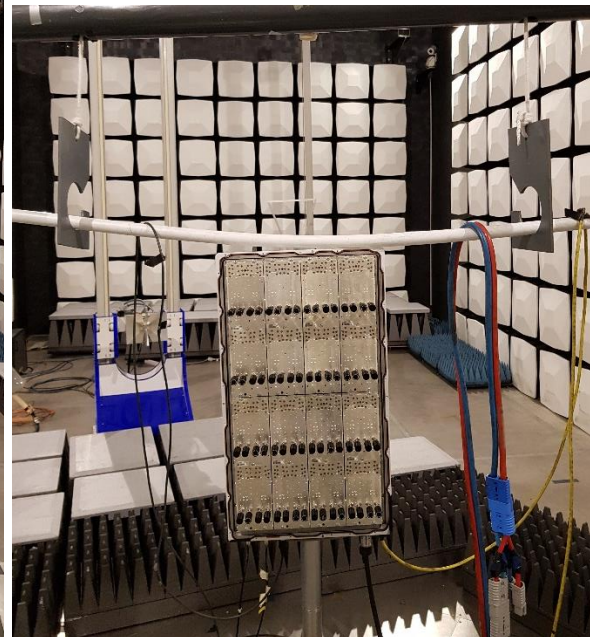
Overview sweeps were performed with the measurement receiver in max-hold mode and the peak detector activated in the frequency-range 30 – 1000 MHz

Above 1 GHz additionally the average detector was activated.

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

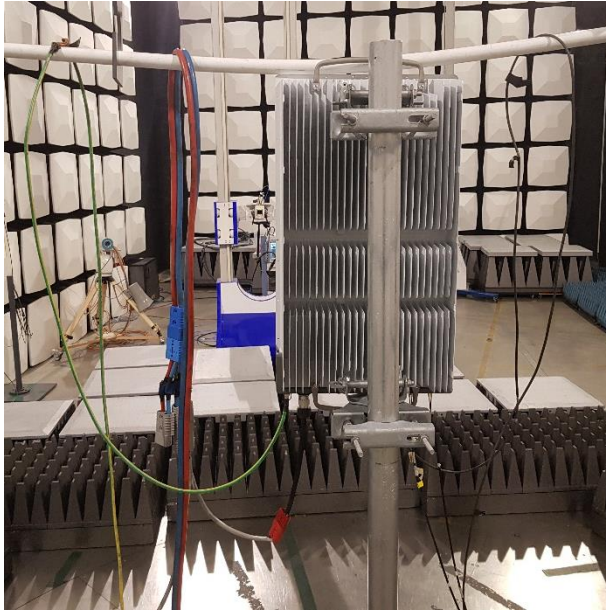


30 – 1000 MHz



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:

Test receiver set-up:

Preview test:

Final test:

30 – 1000 MHz

Peak,

RBW 120 kHz

VBW 1 MHz

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:

Test receiver set-up:

Preview test:

Final test:

1 – 18 – 26.5 - 40 GHz

Peak,

RBW 1 MHz

VBW 3 MHz

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

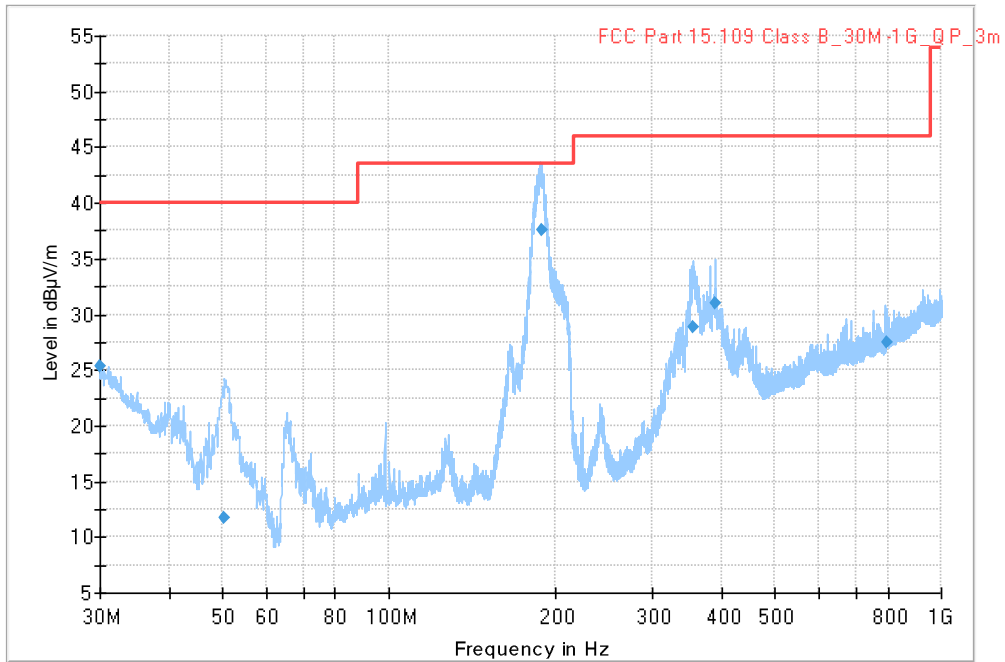
Measurement uncertainty for radiated disturbance

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

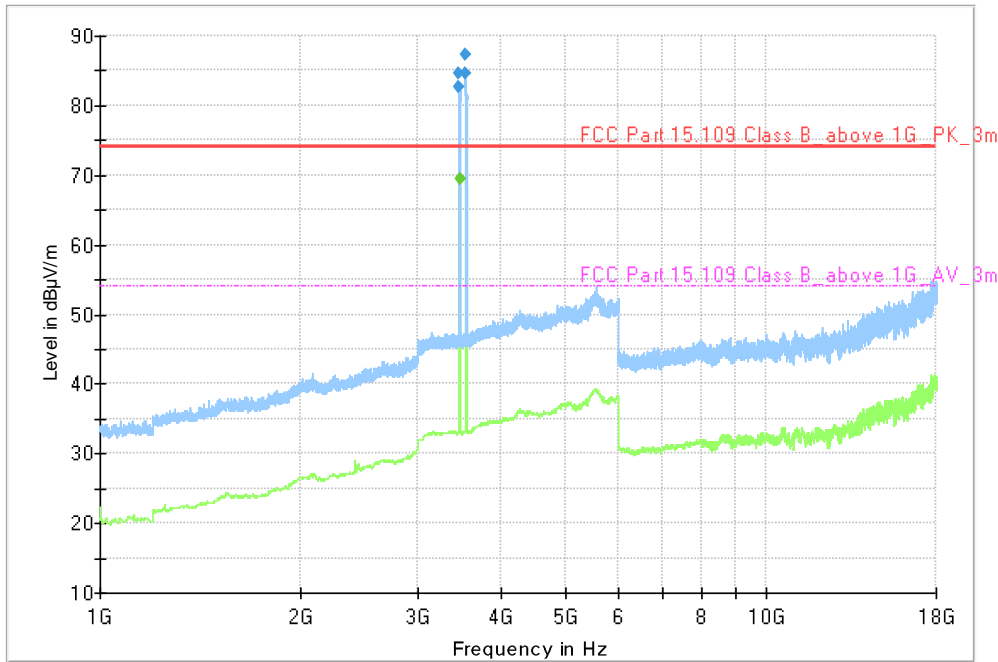
Frequency [MHz]	Level [dBµV/m]	Limit FCC [dBµV/m]	Limit ICES [dBµV/m]	Margin* [dB]	Polarization H/V
30.090	25.4	40.0	40.0	14.6	H
188.730	37.6	43.5	43.5	5.9	H
355.530	28.8	46.0	47.0	17.2	V
390.540	30.9	46.0	47.0	15.1	V
797.650	27.5	46.0	47.0	18.5	V

*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 [dBµV/m] = Analyser reading [dBµV] + 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

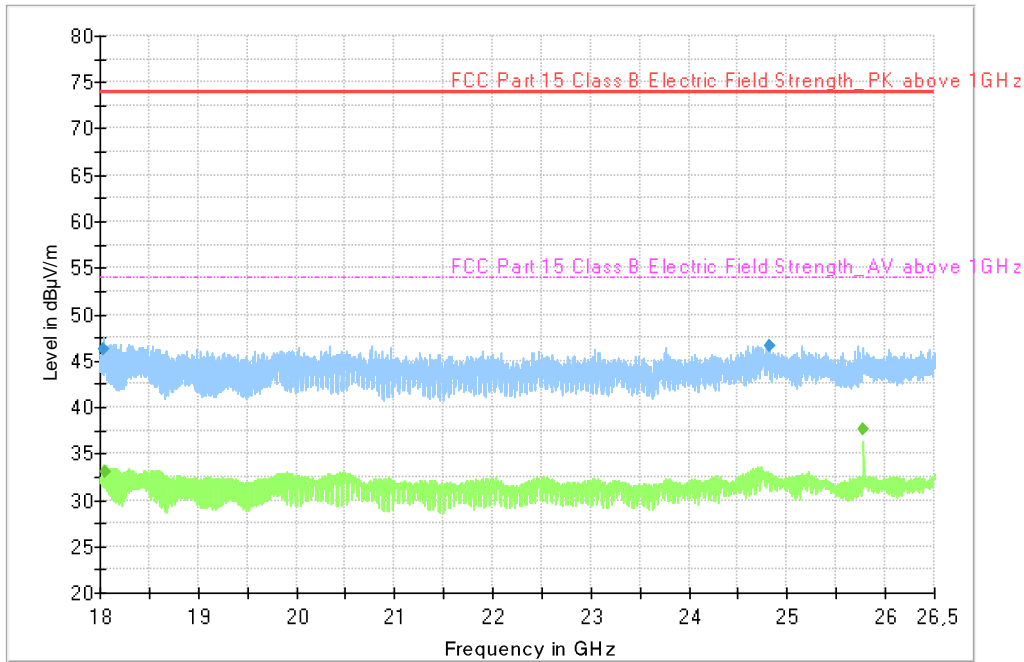
All other measured disturbances have a margin of more than 20 dB to the limits.

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.

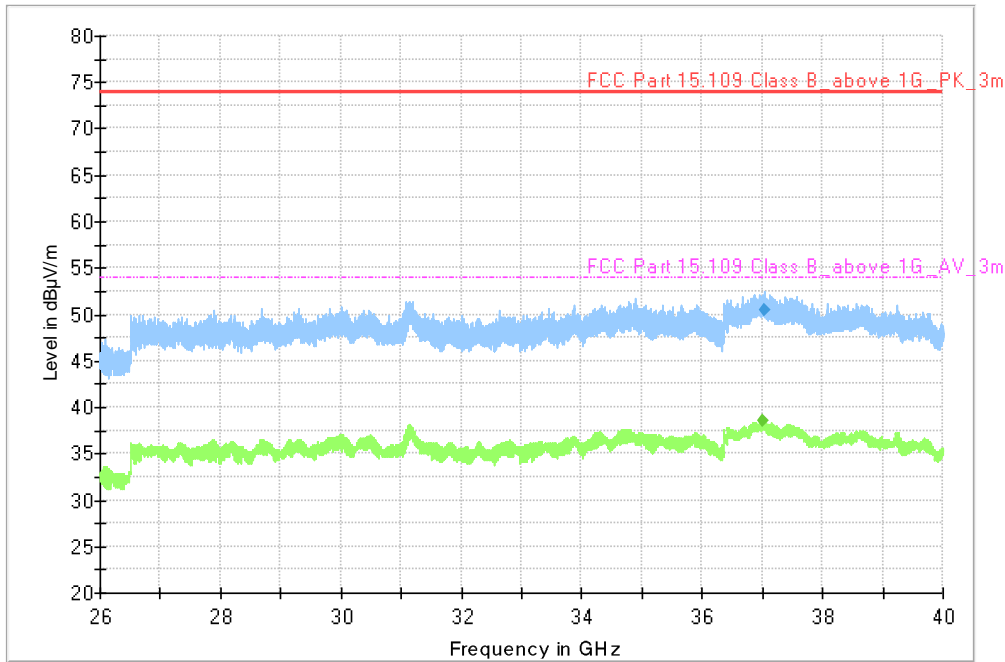
Measurement results, Average, Class B

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

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]

6.8 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 [dBµV/m]	Limit FCC & ICES [dBµV/m]	Margin [dB]	Polarization H/V
37003.25	38.6	54.0	15.4	V

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]

6.9 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