

EMC TEST REPORT

No. 2104108STO-111

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment: Radio Unit
Type/Model: RRUS 32A B4
Product number: KRC 118 050/1
Product configuration: ESS
Manufacturer: Ericsson AB
Tested by request of: Ericsson AB

SUMMARY

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

47 CFR Part 2, subpart J
47 CFR Part 27 Subpart C
RSS-GEN Issue 5 Amendment 1 + 2
RSS-139 Issue 3

For details, see clause 2 – 4.

Date of issue: August 26, 2021

Issued by:


Anna Karin Cedergren


Per Larsson

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Approved by:


Matti Virkki

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Revision History

| Test report number | Date | Description | Changes |
|--------------------|-----------------|---------------|---------|
| 2104108STO-111 | August 26, 2021 | First release | |

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1. CLIENT INFORMATION

The EUT has been tested by request of

Company: Ericsson AB
164 80 Stockholm
Sweden

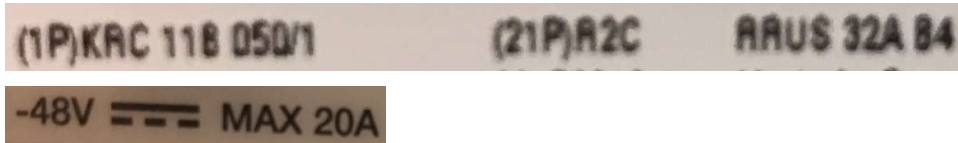
Name of contact: Tomas Sjökvist
BNEW DNEW RA RPSE1 IVC
Phone +46 70 986 2008

Client observer: Per Sjöberg & Tomas Johansson

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

| | |
|------------------------|----------------|
| Equipment | Radio Unit |
| Type/Model | RRUS 32A B4 |
| Product number: | KRC 118 050/1 |
| Product configuration: | ESS |
| Brand name | Ericsson |
| Manufacturer | Ericsson |
| Rating | -48VDC max 20A |
| Class | III |



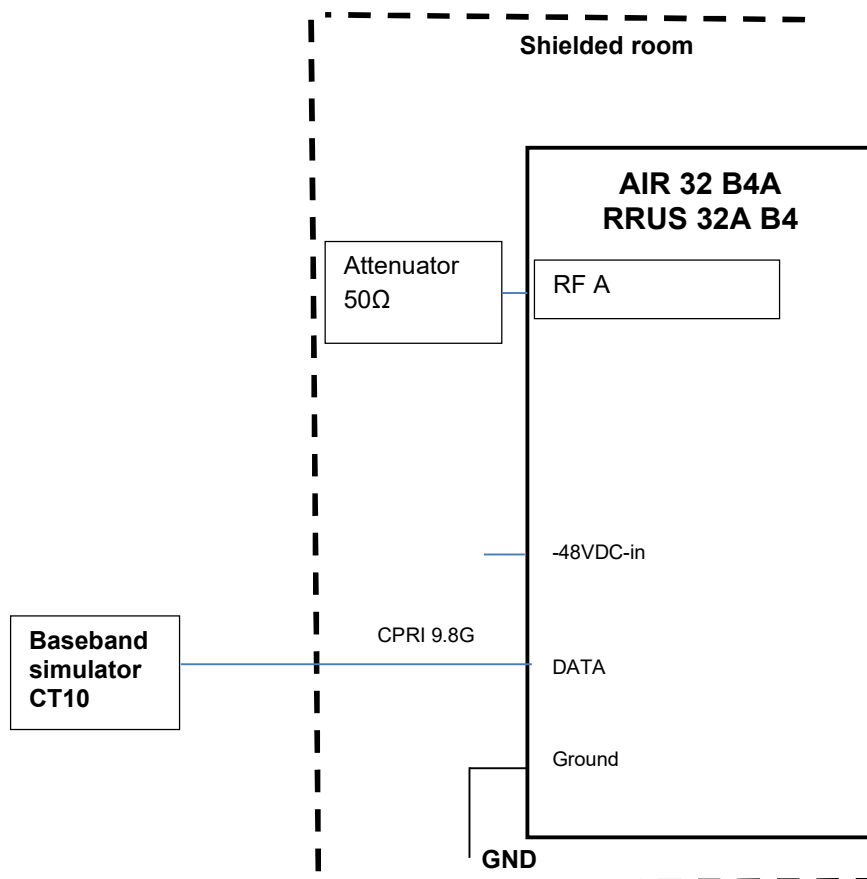
EUT and markings

2.2 Description of the EUT

The test object is a RRUS 32A B4 and it is a part of a Radio Base station supporting GSM, WCDMA, LTE, NR, ESS and NB IoT technologies. It is designed to provide mobile users with a connection to a mobile network.

In this case, the RRUS 32A B4 has been hosted in an AIR 32 B4A. It has been tested in an ESS; Ericsson Shared Spectrum, configuration.

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 |
| Data | RPM2531610/20M | 20.0 | Optical fibre cable |
| Antenna A | RF cable | 3.0 | Coaxial |

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 | EliteBook | HP | BAMS-1001233323 |
| Baseband simulator CT10 | LPC 102 487/1 | Ericsson | BAMS-10014666801 |
| SFP module | RDH 102 65/3 | Delta | 1836091A0500880 |
| Power supply (for EUT) | SGA 60/250 | Sorensen | BAMS-1000234866 |

2.6 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 2 Subpart J
FCC 47 CFR Part 27 Subpart C
RSS-GEN Issue 5 Amendment 1 + 2
RSS-139 Issue 3

Test methods:

KDB971168 D01 Power Meas License Digital Systems v03r01
ANSI C63.26: 2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

3.2 Additions, deviations and exclusions from standards and accreditation

The following deviation from standards and accreditation was made: only the radiated spurious emission performed according to manufacturer's request.

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
Intertek Semko AB is an Innovation, Science and Economic Development Canada recognized wireless device testing laboratory with CAB identifier SE0003

Measurement chambers

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

3.4 Mode of operation during the test

The EUT was tested with –53 V DC; 5 A.

Radio Configuration

Transmission band B4: Downlink (DL): 2110-2155 MHz

ESS

The test object was transmitting test model ESS, Ericsson Shared Spectrum, where the carrier is NR and LTE combined.

One configuration with NR performed according to FR1-TM1.1 as defined in ETSI TS 138 141/ 3GPP TS 38.141-1.

The following configurations were tested:

1. 40% NR and 60% LTE, middle channel
2. 10% NR and 90% LTE, middle channel
3. 90% NR and 10% LTE, middle channel
4. NR 3GPP test model, middle channel

1 carrier in all configurations

The radio was activated for maximum transmit power of 30 W. See below table for detailed radio configurations of the radio unit.

| Configura- tion No. | Carrier No. | Channel BW (MHz) | RF power (W/MHz) | Test Model | Carrier Frequency (DL) MHz |
|---------------------------|----------------|---------------------|---------------------|--------------|-------------------------------|
| 1 | 1 | 10 | 30 | ESS 40/60 | 2132,5 |
| 2 | 1 | 10 | 30 | ESS 10/90 | 2132,5 |
| 3 | 1 | 10 | 30 | ESS 90/10 | 2132,5 |
| 4 | 1 | 10 | 30 | NR-FR1-TM1.1 | 2132,5 |

3.5 Compliance

The EUT shall comply with the emission limit as listed below

Field strength of spurious emissions

CFR47 §2.1053 and §27.53(l)(1)

RSS-GEN 4.6.1

RSS-139 6.6

The power of any emission outside the licensee's authorized bandwidth shall not exceed –13 dBm/MHz

4. TEST SUMMARY

The results in this report apply only to sample tested:

| Standard | Description | Result |
|---|---|-------------|
| | Emission | |
| CFR47 §27.53(I)(1) RSS-139 6.6 | Field strength of spurious radiation | PASS |
| | The EUT complies with the limit. | |

5. RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHz – 1 – 18 – 26.5 GHz

| Date of test | Temperature [°C] | Relative Humidity [%] |
|----------------|------------------|-----------------------|
| August 4, 2021 | 22 | 45 |
| August 5, 2021 | 22 | 51 |
| August 6, 2021 | 22 | 50 |
| August 9, 2021 | 22 | 64 |

5.1 Test set-up and test procedure

The test method is in accordance with ANSI C63.26 clause 5.5.

The EUT was set up to emit maximum disturbances.

30 – 1000 MHz: The EUT was placed on a pole 0.8 m above the turntable which is part of the reference ground plane.

> 1000 MHz: The EUT was placed on a pole 1.5 m above the turntable which is part of the reference ground plane. Absorbers were placed on the floor between the EUT and measurement antenna.

Overview sweeps were performed with the measurement receiver in max-hold mode and the peak and average detectors activated in the frequency-range.

The EUT is continuously rotated 360°.

| | | |
|--------------------------------|-------------------------|----------------------|
| Test set-up: | 30 MHz –26.5 GHz | |
| Test receiver set-up: | | |
| Preview test: | Peak | RBW 1 MHz, VBW 3 MHz |
| | Average | RBW 1 MHz, VBW 3 MHz |
| Final test: | RMS, | RBW 1 MHz, VBW 3 MHz |
| Measuring distance: | 3 m | |
| Measuring angle: | 0 – 359° | |
| EUT height above ground plane: | 0.8 m | 1.5 m |
| Antenna | 30 – 1000 MHz | 1 – 26.5 GHz |
| Type: | Bilog | Horn |
| Antenna tilt: | Not Activated | Activated |
| Height above ground plane: | 1 – 4 m | |
| Polarisation: | Vertical and Horizontal | |

$E[\text{dB}\mu\text{V}/\text{m}] = \text{Analyser reading} [\text{dB}\mu\text{V}] + \text{Antenna factor} [1/\text{m}] - \text{Amplifier gain} [\text{dB}] + \text{Cable loss} [\text{dB}]$

$\text{EIRP} [\text{dBm}] = E[\text{dB}\mu\text{V}/\text{m}] + 20\log[3] - 104.8$

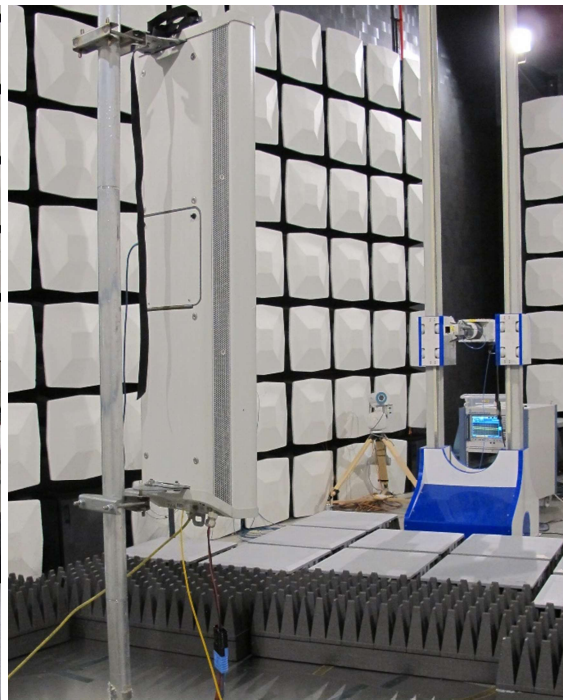
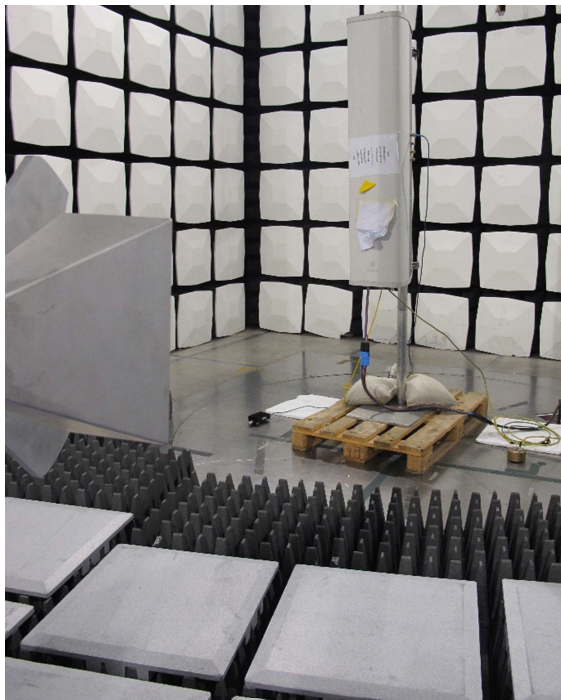
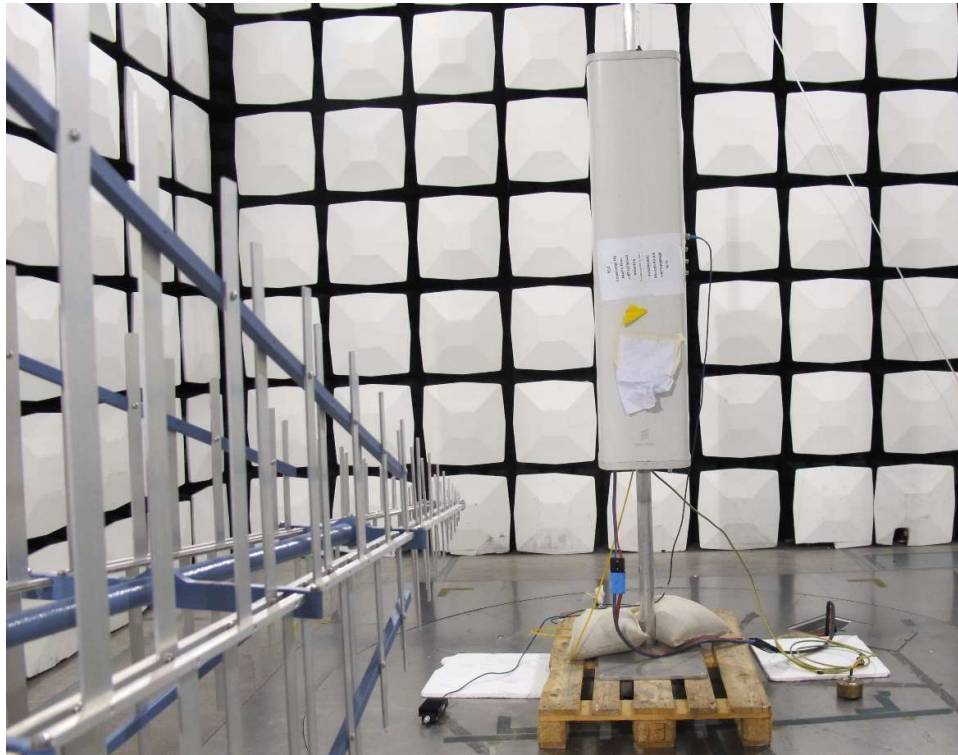
5.2 Measurement uncertainty

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 |

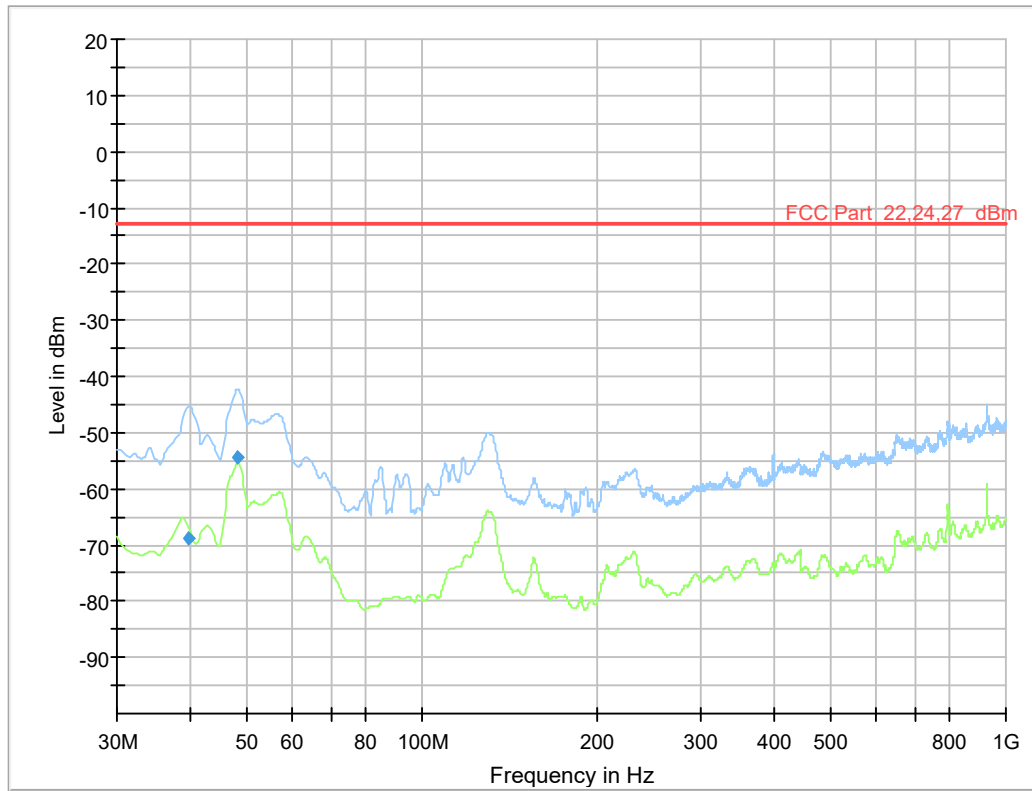
Measurement uncertainty is calculated in accordance with CISPR 16-4-2: 2011.

The measurement uncertainty is given with a confidence of 95 %.



Photos of the test set up

5.3 Test results, 30 – 1000 MHz, Configuration 1

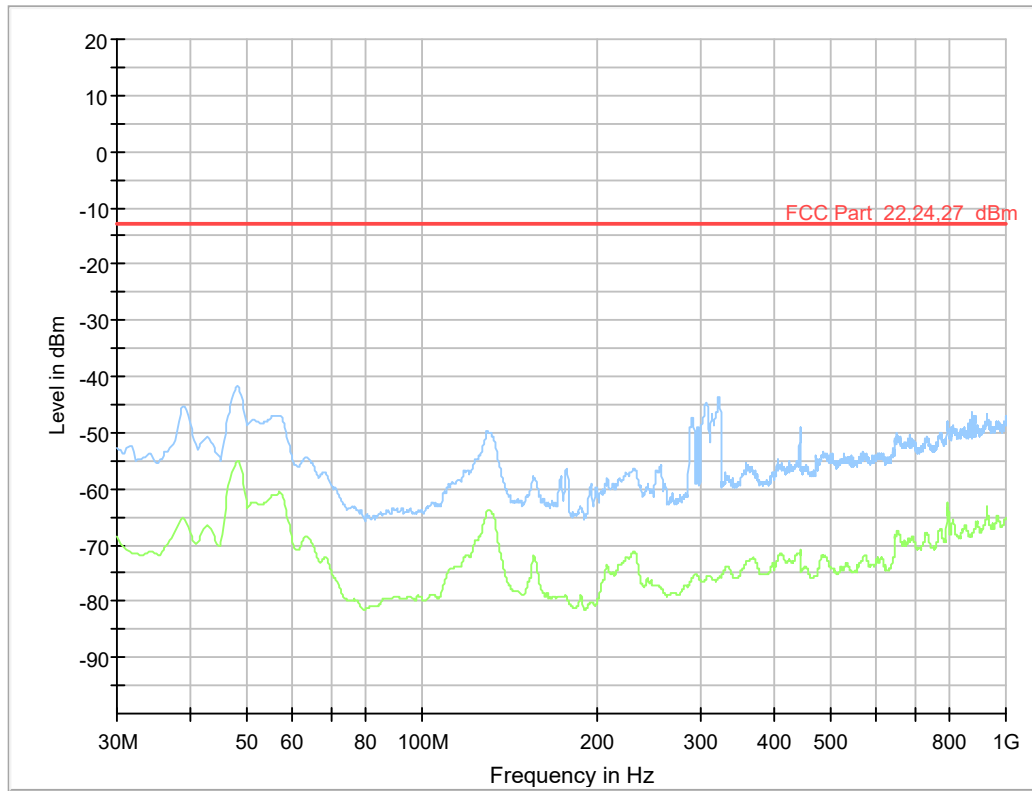


Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance.

Measurement results

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

5.4 Test results, 30 – 1000 MHz, Configuration 2

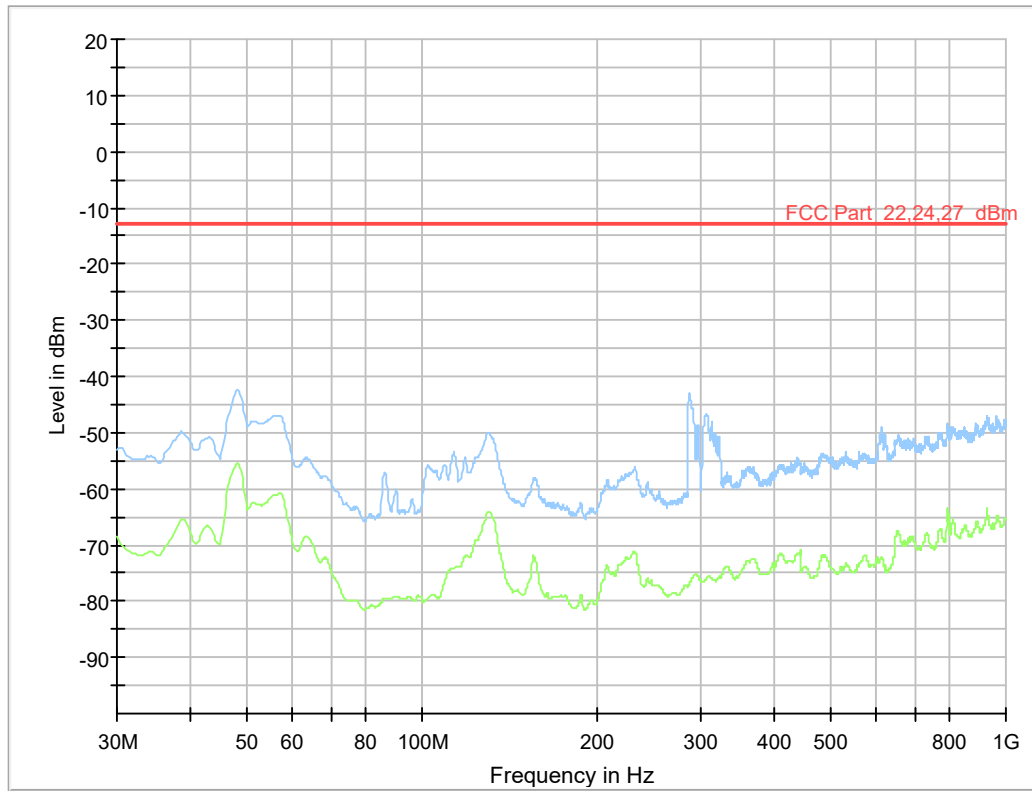


Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance

Measurement results

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

5.5 Test results, 30 – 1000 MHz, Configuration 3

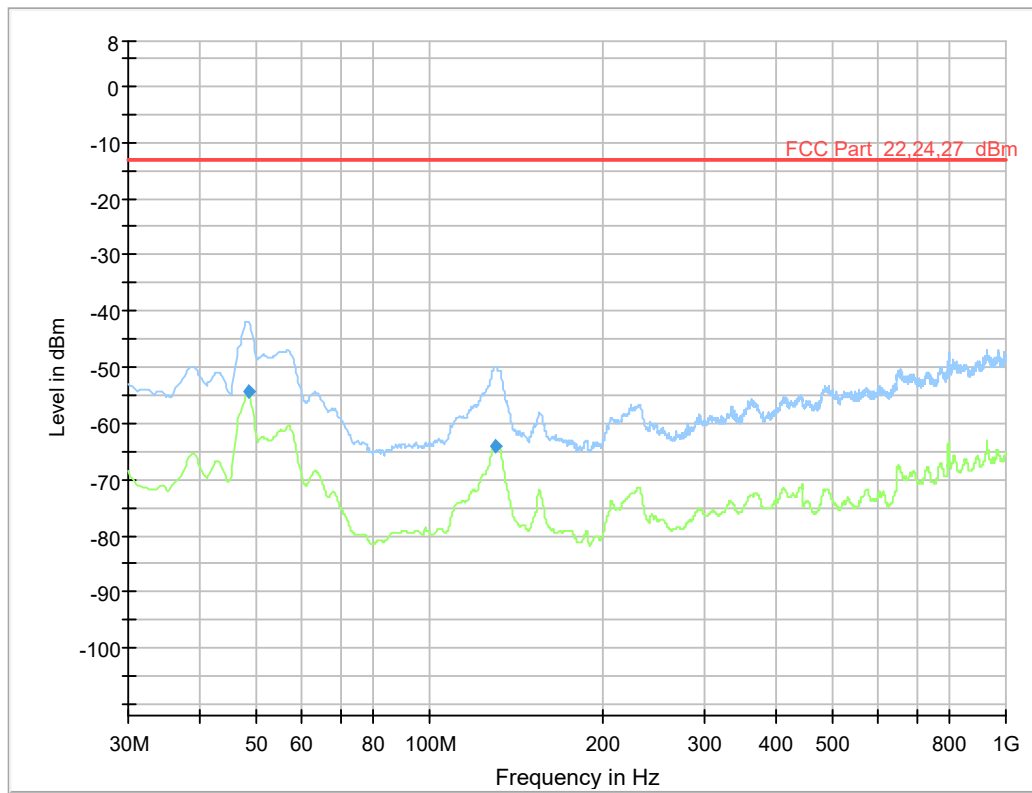


Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance

Measurement results

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

5.6 Test results, 30 – 1000 MHz, Configuration 4

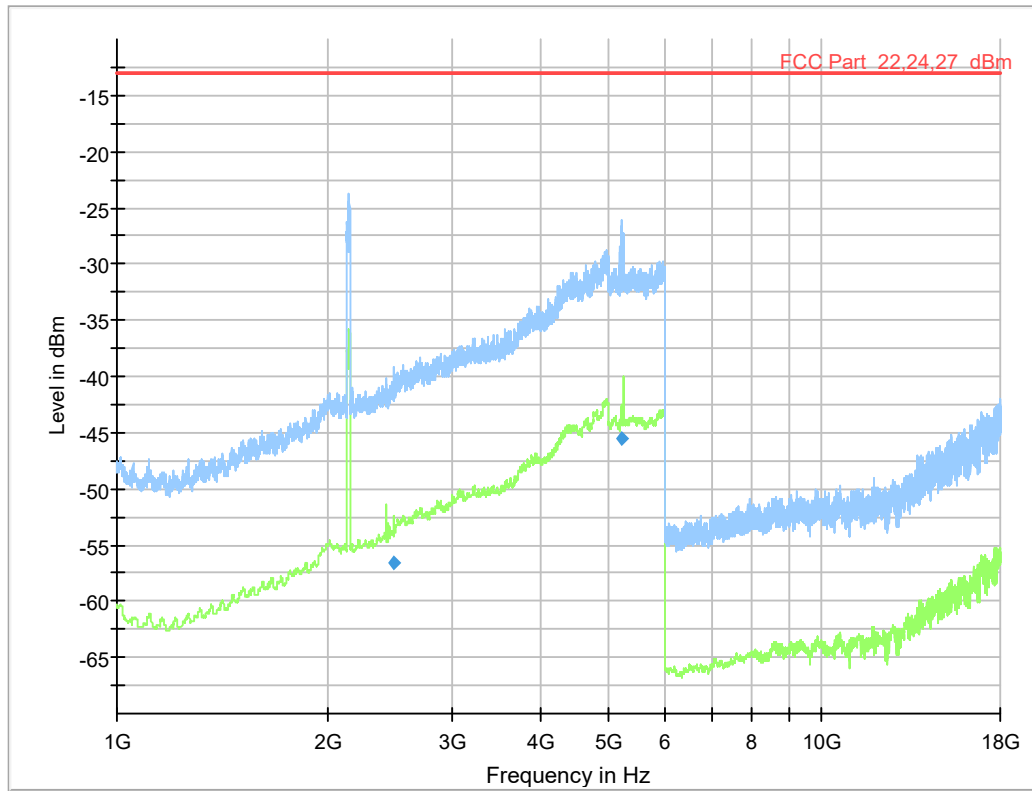


Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance

Measurement results

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

5.7 Test results, 1 – 18 GHz Configuration 1



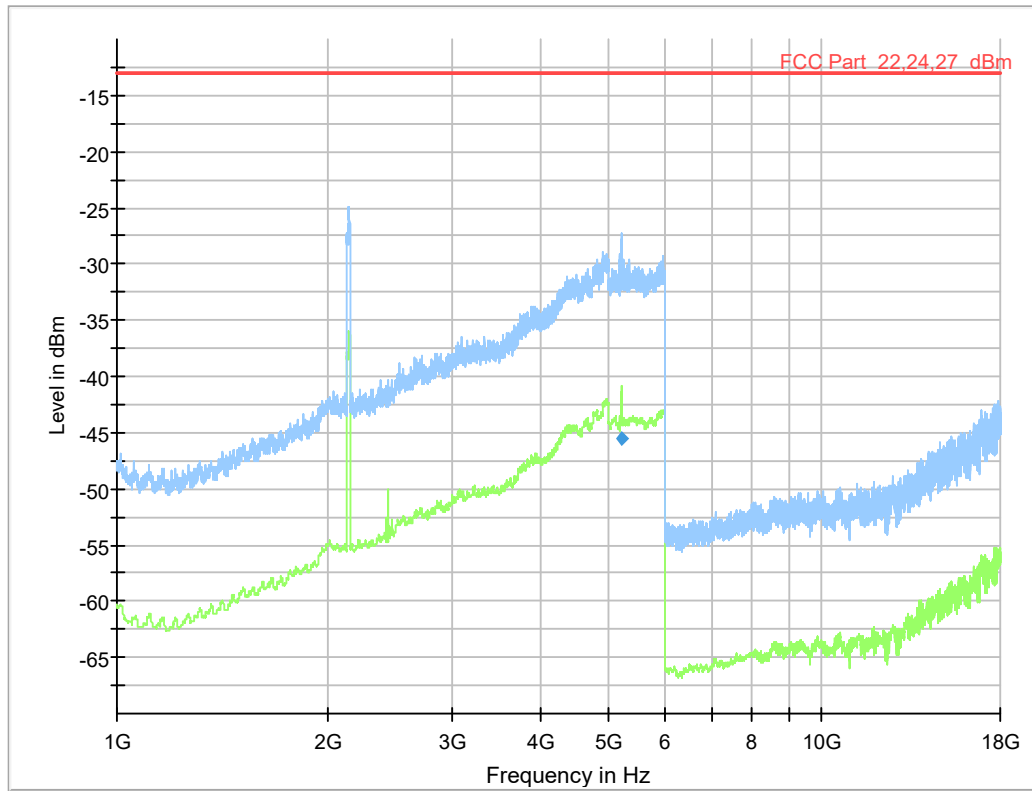
Diagram, Peak and average overview sweep, 1 – 18 GHz at 3 m distance.

Measurement results, RMS

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

No disturbances outside the transmission band B4 Downlink: 2110-2155MHz.

5.8 Test results, 1 – 18 GHz Configuration 2



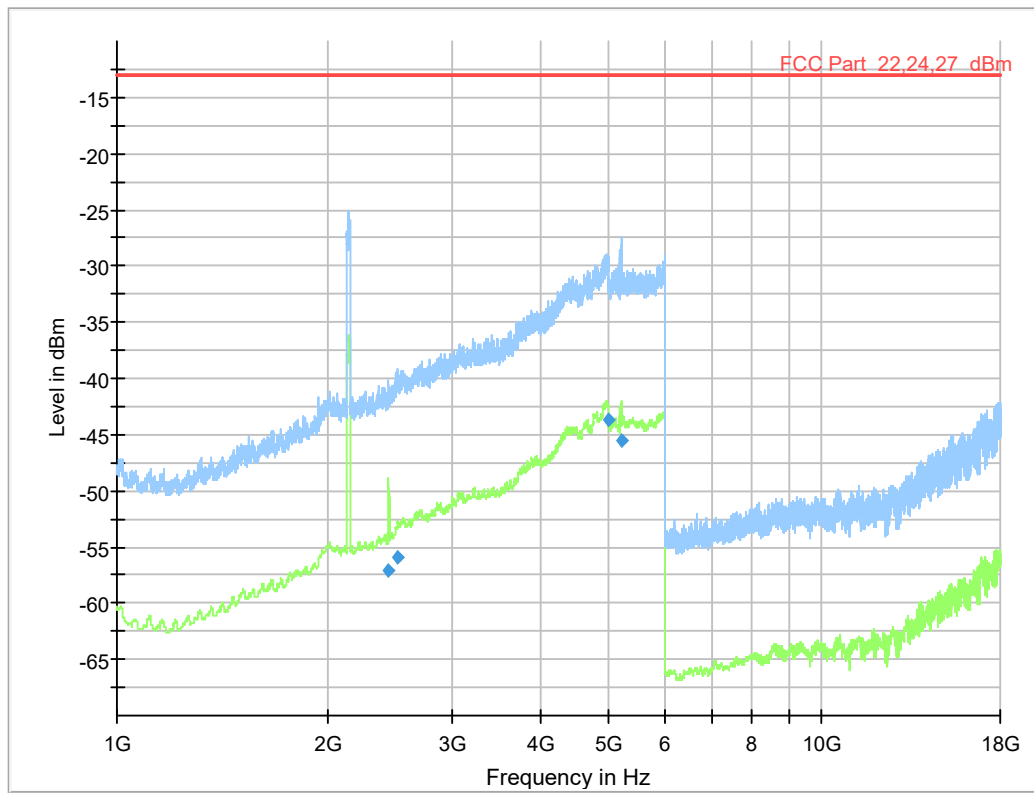
Diagram, Peak and average overview sweep, 1 – 18 GHz at 3 m distance.

Measurement results, RMS

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

No disturbances outside the transmission band B4 Downlink: 2110-2155MHz.

5.9 Test results, 1 – 18 GHz Configuration 3



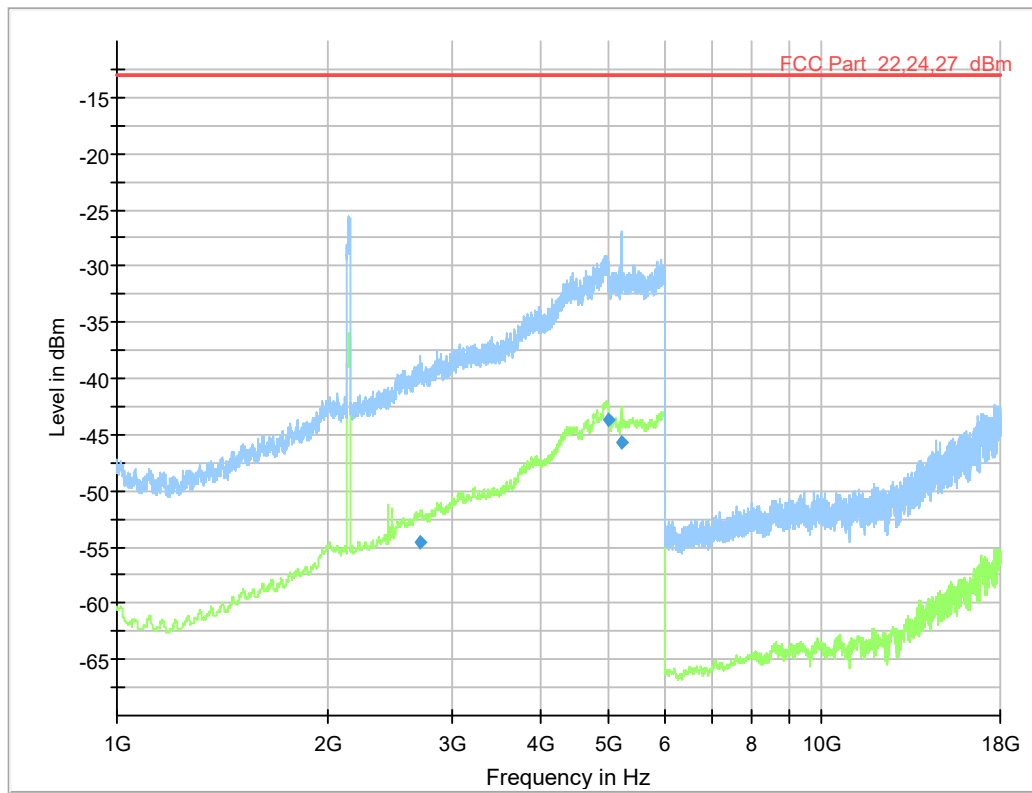
Diagram, Peak and average overview sweep, 1 – 18 GHz at 3 m distance.

Measurement results, RMS

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

No disturbances outside the transmission band B4 Downlink: 2110-2155MHz.

5.10 Test results, 1 – 18 GHz Configuration 4



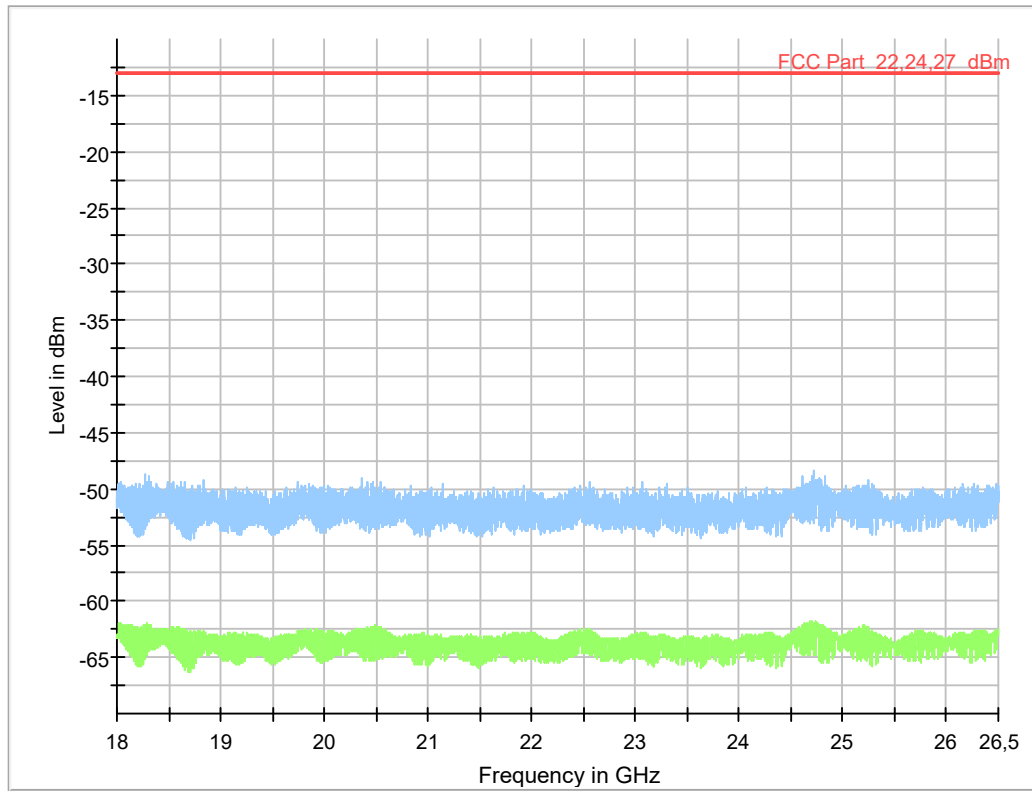
Diagram, Peak and average overview sweep, 1 – 18 GHz at 3 m distance.

Measurement results, RMS

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

No disturbances outside the transmission band B4 Downlink: 2110-2155MHz.

5.11 Test results, 18 – 26.5 GHz, Configuration 1

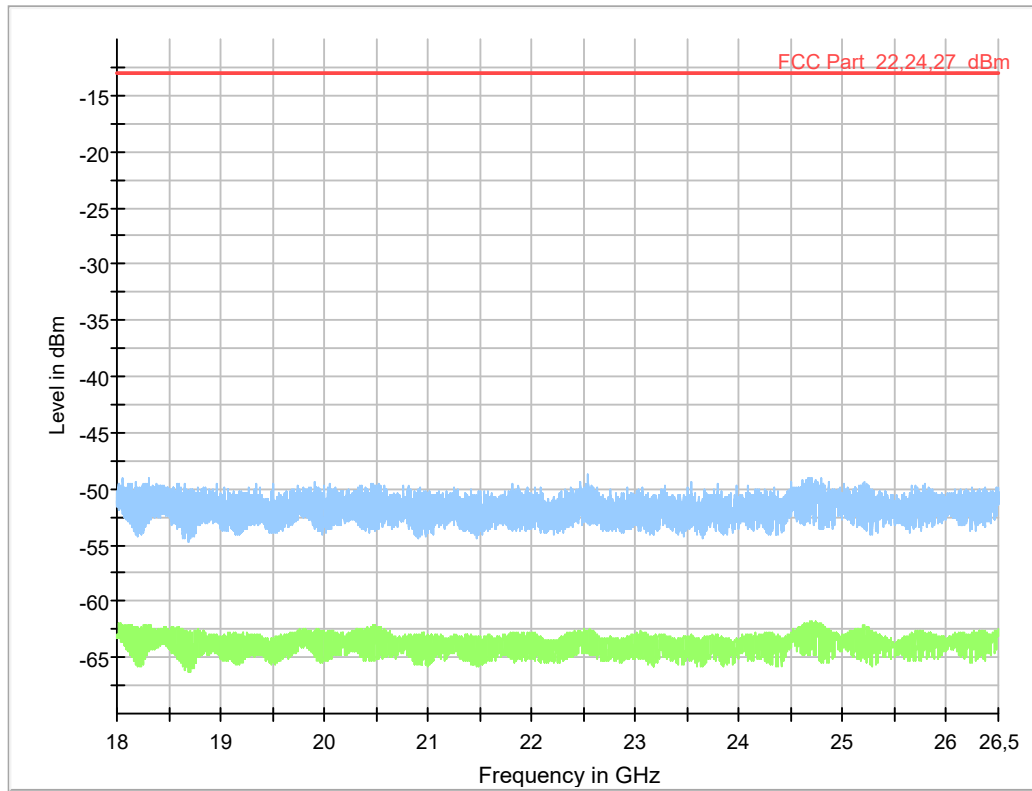


Diagram, Peak and average overview sweep, 18 – 26.5 GHz at 3 m distance.

Measurement results, RMS

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

5.12 Test results, 18 – 26.5 GHz, Configuration 2

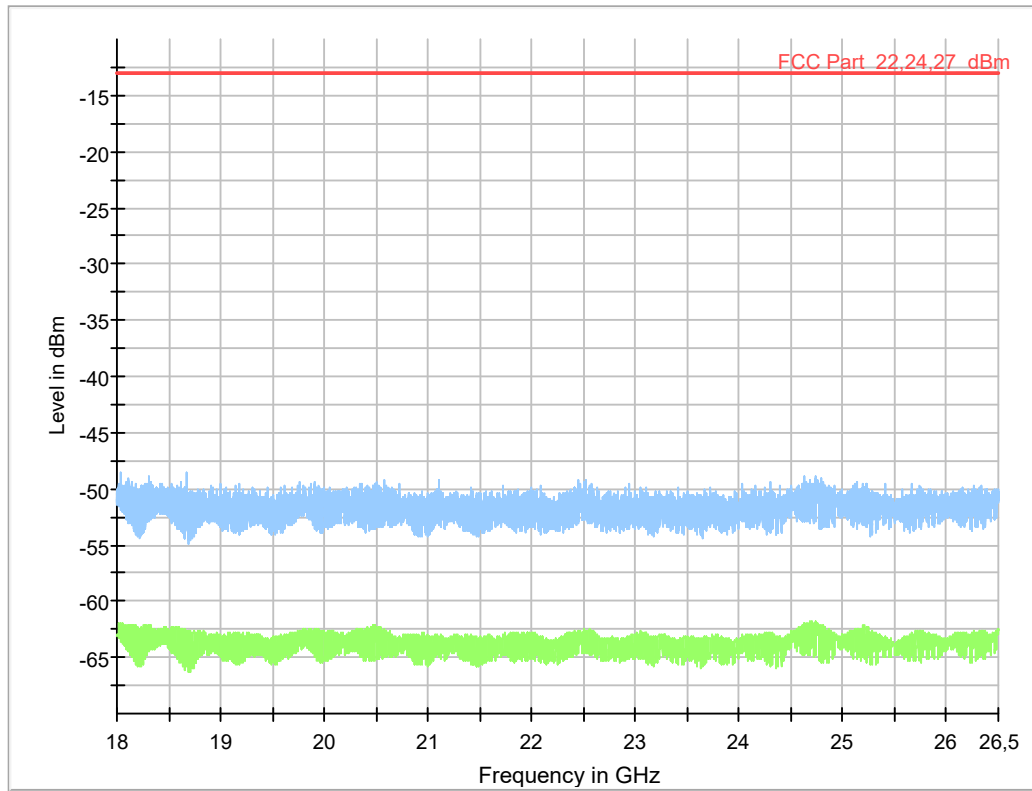


Diagram, Peak and average overview sweep, 18 – 26.5 GHz at 3 m distance.

Measurement results, RMS

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

5.13 Test results, 18 – 26.5 GHz, Configuration 3

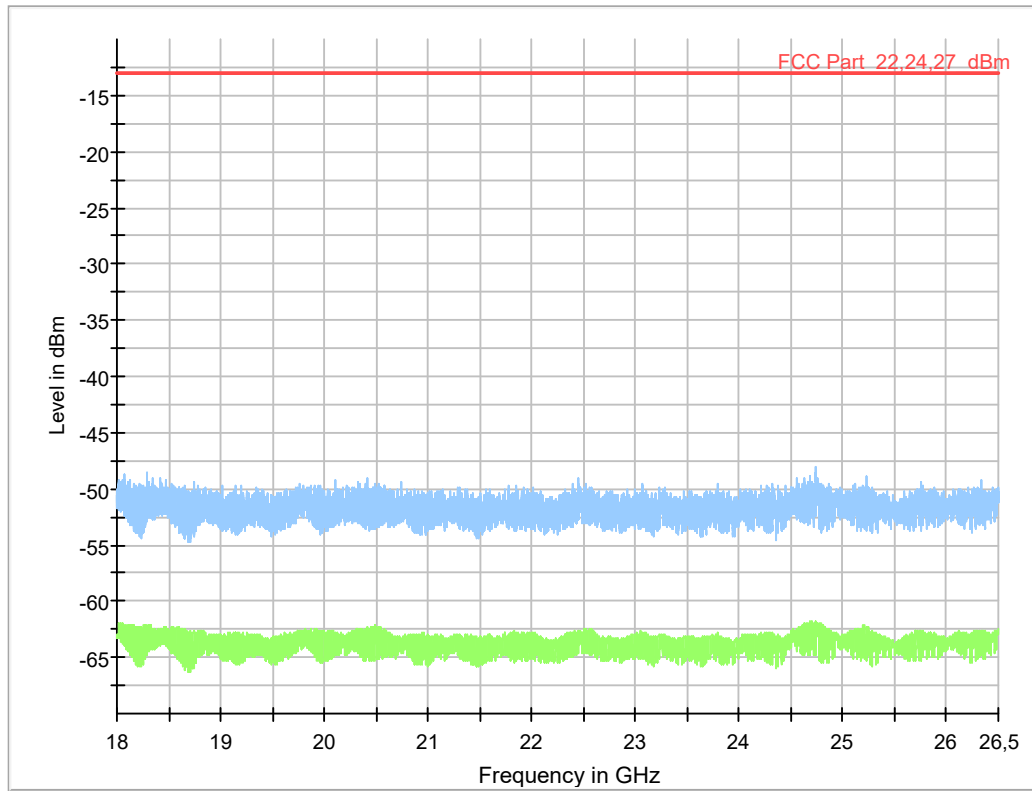


Diagram, Peak and average overview sweep, 18 – 26.5 GHz at 3 m distance

Measurement results, RMS

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

5.14 Test results, 18 – 26.5 GHz, Configuration 4



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

Measurement results, RMS

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

5.15 Test equipment

| Equipment type | Manufacturer | Model | Inv. No. | Last Cal. date | Next Cal. date |
|--------------------------------|-----------------|------------------|---------------|----------------|----------------|
| Measurement software | Rohde & Schwarz | EMC32 – 10.50.40 | -- | -- | -- |
| Measurement Receiver | Rohde & Schwarz | ESW44 | 33950 | 2020-08-16 | 1 year |
| Antenna | Rohde & Schwarz | HL562 | 32310 | 2019-05-06 | 3 years |
| Measurement cable | Schuner | SUCOFLEX 104 | 39003 | 2020-09-22 | 1 year |
| Preamplifier | Rohde & Schwarz | TS-PRE1 | 39150 | 2020-09-22 | 1 year |
| Measurement cable | Rosenberger | JFB293C | 39141 & 39142 | 2020-12-15 | 1 year |
| Horn antenna | Rohde & Schwarz | HF907 | 32296 | 2019-04-01 | 3 years |
| Horn antenna with Preamplifier | Bonn | BLMA 1826-5A | 31247 | 2020-08-26 | 3 years |
| Horn antenna with Preamplifier | Bonn | BLMA 2640-5A | 31248 | 2020-08-27 | 3 years |
| Measurement cable | Megaphase | GC12-K1K1-315 | 39128 | 2020-08-06 | 1 year |

7. EUT SOFTWARE

Software Radio: CXP 901 3268/12 R82CM

8. EUT HARDWARE LIST

| EUT | Product No | R-State | Manufacturer | Serial Number |
|-------------|---------------|---------|--------------|---------------|
| RRUS 32A B4 | KRC 118 050/1 | R1C | Ericsson | C828422384 |
| SFP module | RDH 102 65/3 | - | Finisar | ARJ2AFR |

| Host | Product No | R-State | Manufacturer | Serial Number |
|----------------|---------------|---------|--------------|---------------|
| AIR 32 B4A B2P | KRD 901 044/1 | R1B | Ericsson | D240161114 |