



RF - TEST REPORT

- FCC Part 15.255, RSS210 -

Type / Model Name : MB1

Product Description : Mediaboard with 60 GHz short range radar

Applicant : Schindler

Address : Via della Pace 22

6600 LOCARNO, SWITZERLAND

Manufacturer : Schindler

Address : Via della Pace 22

6600 LOCARNO, SWITZERLAND

Test Result according to the standards listed in clause 1 test standards:	POSITIVE
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Test Report No. :	80192188-04 Rev_1	02. October 2024
		Date of issue



Deutsche
Akkreditierungsstelle
D-PL-12030-01-00

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ATTACHMENTs A, B as separate supplements

1 TEST STANDARDS

The tests were performed **partly** according to following standards:

FCC Rules and Regulations (October 2024)

Part 15, Subpart A	General
Part 15, Subpart C, Section 15.255	Operation within the band 57-71 GHz.
ANSI C63.10: 2013	Testing Unlicensed Wireless Devices

ISED Canada Rules and Regulations

RSS-Gen, Issue 5 + Amendment 1 + 2	General Requirements for Compliance of Radio Apparatus
RSS-210, Issue 11	Licence-Exempt Radio Apparatus: Category I Equipment
ANSI C63.10: 2013	Testing Unlicensed Wireless Devices

2 EQUIPMENT UNDER TEST

2.1 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

2.2 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according his/her instructions.

2.3 Photo documentation of the EUT – see Attachment A

2.4 Equipment category

The EUT qualifies under FCC §15.255(c)(2)(v) as a field disturbance sensor, and under RSS-210 J.3.2.a as a field disturbance sensor.

2.5 Short description of the equipment under test (EUT)

The EUT is a mediaboard equipped with a field disturbance sensor in the operating band of 61.0 GHz to 61.5 GHz (BGT60LTR11AIP) and is used in elevator panels for the destination control of elevators.

Number of tested samples: 3
Serial number: #1 (CH1 pulsed), #3 (CH3 pulsed), #4 (CH4 pulsed)
Firmware version: V1.0.05
HVIN: PMB
PMN: PMBL
FCC ID: XFIPMB
IC ID: 9114A-PMB

2.6 Variants of the EUT

There are 2 different variants of the MB1:

1. Fully assembled - PMN: PMB
2. Only the radar part is assembled - PMN: PMBL

Note: In this test report only variant 2 (PMBL) is covered.

2.7 Operation frequency and channel plan

The operating frequency is 61.0 GHz to 61.5 GHz.

Channel	Frequency (GHz)
1	61.1
2	61.2
3	61.3
4	61.4

2.8 Transmit operating modes

TX modulated

2.9 Antenna

The following integrated antennas are used with the EUT:

Number	Characteristic	Model number	Plug	Frequency range (GHz)	Gain (dBi)
1	linear	On chip patch antenna for TX	-	61.0-61.5	6
2	linear	On chip patch antenna for RX	-	61.0-61.5	6

The antennas cannot be unattached by the user.

2.10 Power supply system utilised

Power supply voltage V_{nom} : 3.3 V/DC

2.11 Peripheral devices and interface cables

The following peripheral devices and interface cables are connected during the measurements:

- Power supply cable Model : custom-built

2.12 Determination of worst case conditions for final measurement

Exploratory measurements have been made in all three orthogonal axes and the settings of the EUT are changed to locate at which position and at what setting of the EUT produce the maximum of the emissions.

As worst case, the following channels and test modes are selected for the final test:

Available channels	Tested channels	Power setting	Modulation	Modulation type
1 - 4	1, 3, 4	P_{max}	digital	OOK

2.12.1 Test jig

No test jig used.

2.12.2 Test software

The test software allows to select a channel in TX pulsed mode.

3 TEST RESULT SUMMARY

3.1 General remarks

This report covers the measurements of the variant PMBL.

Performed tests:

- Conducted emissions
- EIRP
- Spurious emissions

For measurements of fully assembled variant PMB please refer to test report 80192188-02 issued by CSA Group Bayern GmbH.

3.2 Summary for all tests

Operating in the 61 GHz – 61.5 GHz band:

FCC Rule Part	RSS Rule Part	Description	Result
15.207(a)	RSS-Gen 8.8	AC power line conducted emissions	passed
15.255(c)(2)(v)	RSS-210 J.3.2.a	EIRP	passed
15.255(d) 15.209(a)	RSS-210 J.4 RSS-Gen 8.9	Spurious emissions	passed
15.255(e)	RSS-210 J.3.3.d	Peak conducted output power	not applicable ¹
15.255(c)(2)(v) 15.255(e)(1)	RSS-Gen, 6.7	Emission bandwidth, 99% bandwidth	not tested
15.255(f)	RSS-210 J.6	Frequency stability	not tested
15.203	-	Antenna requirement	passed
15.35(c)	RSS-Gen 8.2	Pulsed operation	not tested

Note 1: Not applicable, no peak conducted output power limit defined for FDS which operate in compliance with FCC 15.255(c)(2)(v) or RSS-210 J.3.2.

3.3 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80192188-04	0	16 April 2024	Initial test report
80192188-04	1	02 October 2024	1: RSS-210 updated to Issue 11; 2.4: updated to RSS-210 J.3.2.a; 2.9: antenna gain corrected; 4.5.3.2.4 + 4.5.3.2.5: EUT height and distance corrected; 5.3: after update of RSS-210 to Issue 11 now N/A;

The test report with the highest revision number replaces the previous test reports.

3.4 Final assessment

The equipment under test fulfils the requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 11 March 2024

Testing concluded on : 04 April 2024

Checked by:

Tested by:

Thomas Weise
Laboratory Manager

Sabine Kugler
Radio Team

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15 - 35 ° C

Humidity: 30 - 60 %

Atmospheric pressure: 86 - 106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 / 11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern GmbH, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Measurement Type	Range	Confidence Level	Calculated Uncertainty
AC power line conducted emissions	0.15 MHz to 30 MHz	95%	± 3.29 dB
Output power ERP, radiated	40000 MHz to 110000 MHz	95%	± 5.41 dB
Field strength of the fundamental	1000 MHz to 40000 MHz	95%	± 2.34 dB
Field strength of the fundamental	40000 MHz to 110000 MHz	95%	± 5.41 dB
Power spectral density	40000 MHz to 110000 MHz	95%	± 5.41 dB
Spurious Emissions, conducted	9 kHz to 10000 MHz	95%	± 2.15 dB
Spurious Emissions, conducted	10000 MHz to 40000 MHz	95%	± 3.47 dB
Spurious Emissions, radiated	9 kHz to 30 MHz	95%	± 3.53 dB
Spurious Emissions, radiated	30 MHz to 1000 MHz	95%	± 4.44 dB
Spurious Emissions, radiated	1000 MHz to 40000 MHz	95%	± 2.89 dB
Spurious Emissions, radiated	40000 MHz to 60000 MHz	95%	± 5.04 dB
Spurious Emissions, radiated	60000 MHz to 90000 MHz	95%	± 5.04 dB
Spurious Emissions, radiated	75000 MHz to 110000 MHz	95%	± 5.04 dB
Spurious Emissions, radiated	110000 MHz to 170000 MHz	95%	± 5.04 dB
Spurious Emissions, radiated	140000 MHz to 220000 MHz	95%	± 5.04 dB

4.4 Conformity Decision Rule

The conformity decision rule is based on the ILAC G8 published at the time of reporting.

4.5 Measurement protocol for FCC and ISED

4.5.1 General information

CSA Group Bayern GmbH is recognized as wireless testing laboratory under the CAB identifier:

FCC: DE 0011
ISED: DE0009

4.5.2 General Standard information

The test methods used comply with ANSI C63.10 - "Testing Unlicensed Wireless Devices".

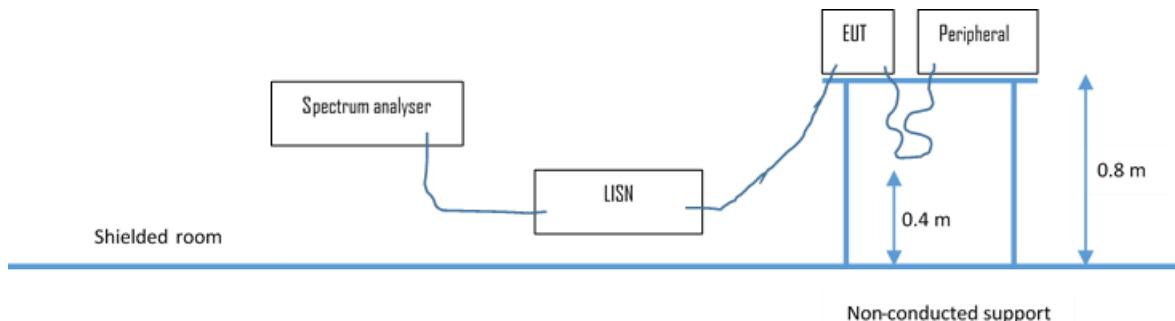
4.5.2.1 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions.

4.5.3 Details of test procedures

4.5.3.1 Conducted emission

Test setup according ANSI C63.10



The final level, expressed in $\text{dB}\mu\text{V}$, is arrived at by taking the reading directly from the Spectrum analyser. This level is compared to the limit.

To convert between $\text{dB}\mu\text{V}$ and μV , the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

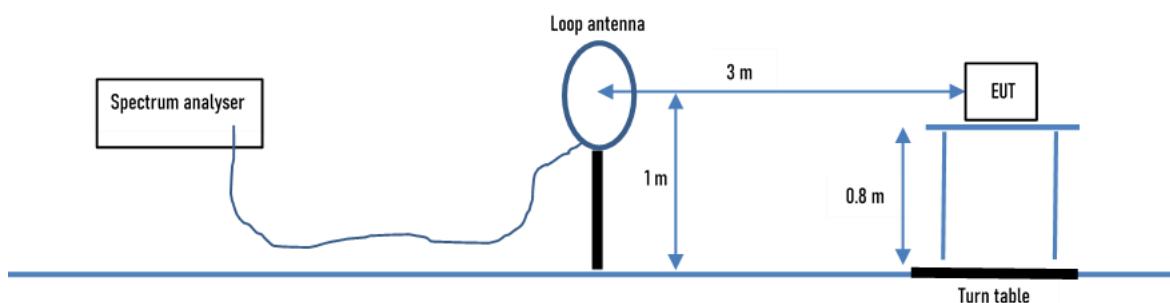
$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with $50 \Omega / 50 \mu\text{H}$ (CISPR 16) characteristics. The receiver is protected by means of an impedance matched pulse limiter connected directly to the RF input. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emission is re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

4.5.3.2 Radiated emission

4.5.3.2.1 **OATS1 test site (9 kHz - 30 MHz):**

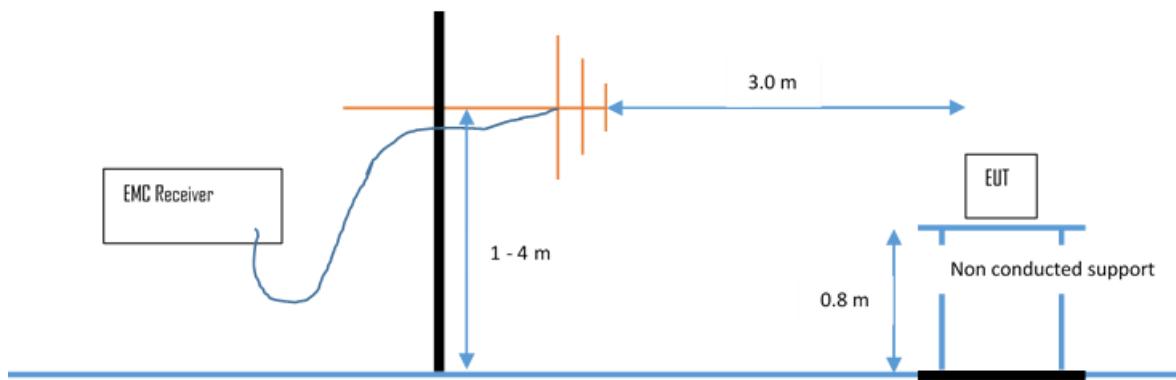
Test setup according ANSI C63.10



Emissions from the EUT are measured in the frequency range of 9 MHz to 30 MHz using a tuned receiver and a calibrated loop antenna. Table top equipment is placed on a $1.0 \times 1.5 \text{ m}$ non-conducting table 80 centimetres above the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied along the site axis and the EUT is rotated 360 degrees.

4.5.3.2.2 OATS1 test site (30 MHz - 1 GHz):

Test setup according ANSI C63.10.



Spurious emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees. The final level in dB μ V/m is calculated by taking the reading from the EMI receiver (Level dB μ V) and adding the correction factors and cable loss factor (dB). The FCC limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting:

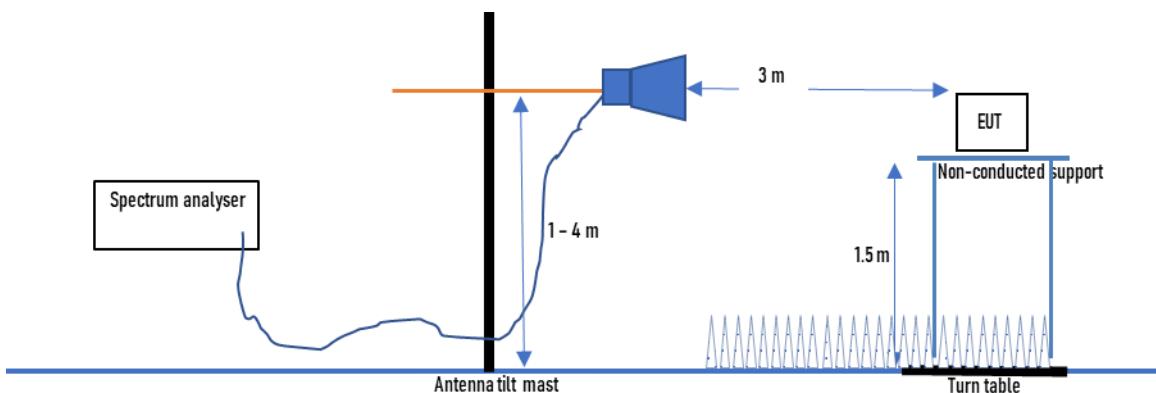
30 MHz – 1000 MHz: RBW: 120 kHz

Example:

Frequency (MHz)	Level (dB μ V)	+	Factor (dB)	=	Level (dB μ V/m)	-	Limit (dB μ V/m)	=	Delta (dB)
719.0	75.0	+	32.6	=	107.6	-	110.0	=	-2.4

4.5.3.2.3 Anechoic chamber 1 (1000 MHz – 18000 MHz)

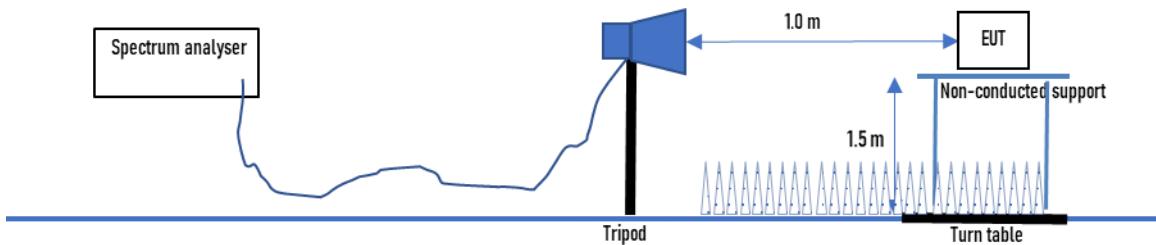
Test setup according ANSI C63.10.



Radiated emissions from the EUT are measured in the frequency range 1 GHz up to 18 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded

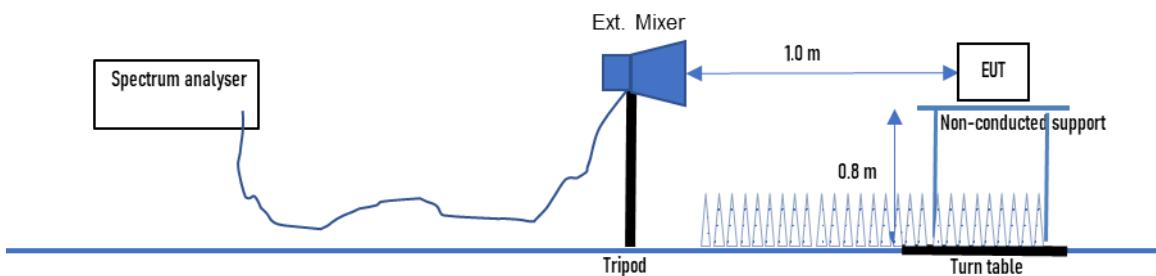
back and forth in the center, forming a bundle 30 cm to 40 cm long. Measurements are made in in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements.

4.5.3.2.4 Anechoic chamber 1 (18 GHz – 40 GHz)



Emissions from the EUT are measured in the frequency range 18 GHz up to 40 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the center, forming a bundle 30 cm to 40 cm long. Measurements are made in in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty. The limit are adopted.

4.5.3.2.5 Anechoic chamber 1 (40 GHz – 200 GHz)



Emissions from the EUT are measured in the frequency range 40 GHz up to 200 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and external mixer with standard gain horn. Table top equipment is placed on a non-conducting table, 0.8 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the center, forming a bundle 30 cm to 40 cm long. Measurements are made in in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty. The limit are adopted.

5 TEST CONDITIONS AND RESULTS

5.1 AC power line conducted emissions

For test instruments and accessories used see section 6 Part **A 4**.

5.1.1 Description of the test location

Test location: Shielded Room S2

5.1.2 Photo documentation of the test set-up

See Attachment B for detailed photo documentation of the test set-up.

5.1.3 Applicable standard

According to FCC Part 15, Section 15.207(a):

Except as shown in paragraphs (b) and (c) of this Section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the given limits.

According to RSS-Gen 8.8:

Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in table 4, as measured using a 50 μ H / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

5.1.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10 described under item 4.4.3. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

5.1.5 Test result

Frequency range: 0.15 MHz - 30 MHz
Min. limit margin 27.0 dB at 15.351 MHz

Limit according to FCC Part 15, Section 15.207(a):

Frequency of Emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency

The requirements are **FULFILLED**.

Remarks: For detailed test result please refer to following test protocols.

Tests performed with commercially available laboratory DC power supply HM8143.

5.1.6 Test protocol

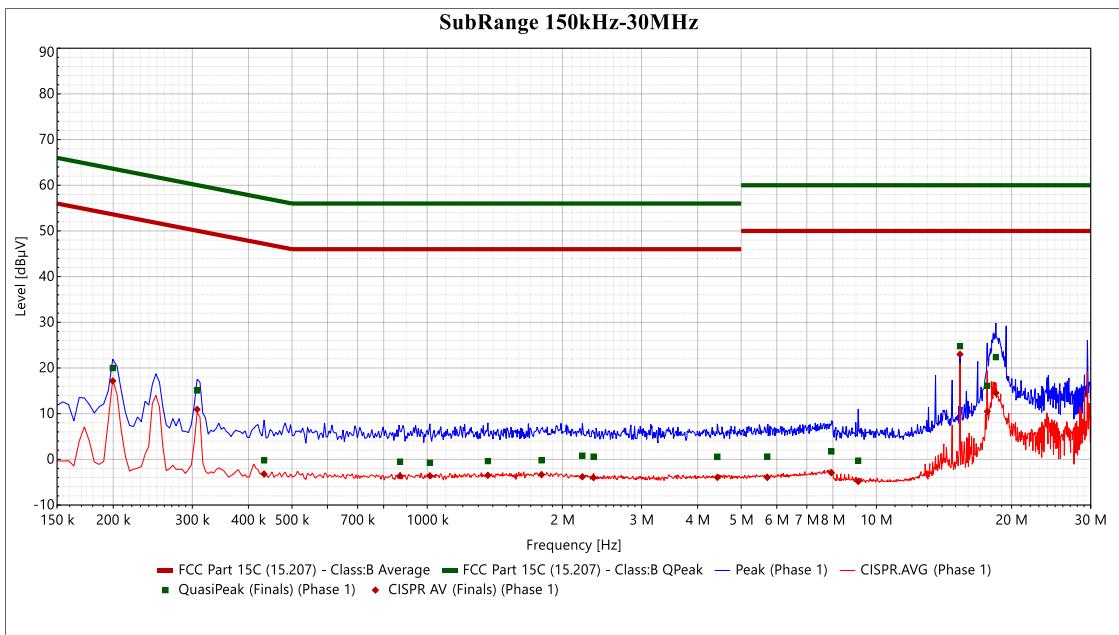
Test point

L1

Operation mode:

TX

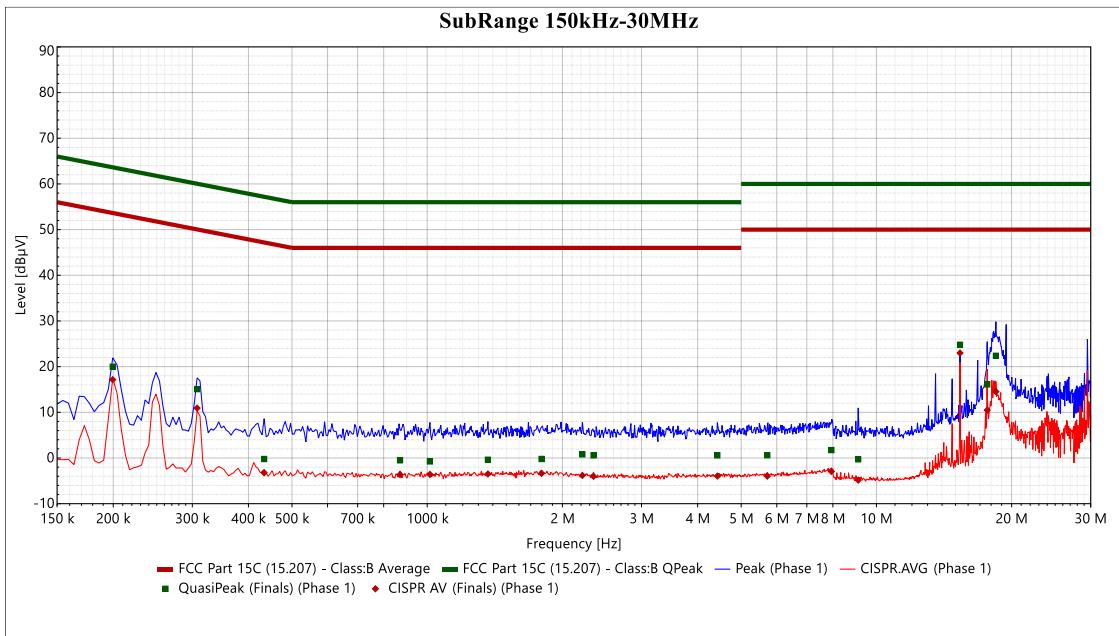
Result: passed



Frequency (Hz)	QuasiPeak (dB μ V)	QP Margin	QP Limit (dB μ V)	CISPR AV (dB μ V)	CISPR AV Margin	AV Limit (dB μ V)	Line	Correction (dB)
199.5 k	19.978	-43.653	63.631	17.15	-36.481	53.631	Phase 1	10.099
307.5 k	15.082	-44.955	60.038	10.932	-39.105	50.038	Phase 1	10.131
433.5 k	-0.218	-57.404	57.185	-3.226	-50.411	47.185	Phase 1	10.16
870 k	-0.506	-56.506	56	-3.624	-49.624	46	Phase 1	10.186
1.014 M	-0.748	-56.748	56	-3.59	-49.59	46	Phase 1	10.186
1.365 M	-0.381	-56.381	56	-3.503	-49.503	46	Phase 1	10.231
1.797 M	-0.206	-56.206	56	-3.362	-49.362	46	Phase 1	10.25
2.2155 M	0.796	-55.204	56	-3.812	-49.812	46	Phase 1	10.268
2.346 M	0.588	-55.412	56	-4.014	-50.014	46	Phase 1	10.281
4.425 M	0.584	-55.416	56	-3.958	-49.958	46	Phase 1	10.39
5.7165 M	0.606	-59.394	60	-3.97	-53.97	50	Phase 1	10.458
7.9395 M	1.726	-58.274	60	-2.96	-52.96	50	Phase 1	10.545
9.1095 M	-0.285	-60.285	60	-4.846	-54.846	50	Phase 1	10.558
15.351 M	24.787	-35.213	60	22.99	-27.01	50	Phase 1	10.848
17.6505 M	16.107	-43.893	60	10.477	-39.523	50	Phase 1	10.902
18.4515 M	22.377	-37.623	60	14.528	-35.472	50	Phase 1	10.916

Test point: **N**
Operation mode: **TX**

Result: passed



Frequency (Hz)	QuasiPeak (dB μ V)	QP Margin	QP Limit (dB μ V)	CISPR AV (dB μ V)	CISPR AV Margin	AV Limit (dB μ V)	Line	Correction (dB)
199.5 k	20.202	-43.429	63.631	17.304	-36.327	53.631	Neutral	10.145
307.5 k	14.988	-45.049	60.038	10.78	-39.258	50.038	Neutral	10.17
694.5 k	-0.664	-56.664	56	-3.542	-49.542	46	Neutral	10.188
1.0275 M	-0.141	-56.141	56	-3.334	-49.334	46	Neutral	10.237
1.221 M	-0.353	-56.353	56	-3.416	-49.416	46	Neutral	10.259
1.4415 M	-0.175	-56.175	56	-3.31	-49.31	46	Neutral	10.28
2.1255 M	0.907	-55.093	56	-3.69	-49.69	46	Neutral	10.292
2.4045 M	0.711	-55.289	56	-3.88	-49.88	46	Neutral	10.315
7.7595 M	1.714	-58.286	60	-2.733	-52.733	50	Neutral	10.574
7.908 M	1.633	-58.367	60	-2.987	-52.987	50	Neutral	10.575
15.342 M	3.294	-56.706	60	0.339	-49.661	50	Neutral	10.902
15.351 M	16.211	-43.789	60	13.295	-36.705	50	Neutral	10.902
18.2445 M	24.226	-35.774	60	18.051	-31.949	50	Neutral	10.944
29.4945 M	23.258	-36.742	60	19.73	-30.27	50	Neutral	10.784

5.2 EIRP

For test instruments and accessories used see section 6 Part **CPR 3**.

5.2.1 Description of the test location

Test location: Anechoic chamber 1
Test distance: 1 m

5.2.2 Photo documentation of the test set-up

See Attachment B for detailed photo documentation of the test set-up.

5.2.3 Applicable standard

According to FCC Part 15C, Section 15.255(c)(2)(v):

For field disturbance sensors/radars that occupy 500 MHz bandwidth or less that are contained wholly within the frequency band 61.0–61.5 GHz, the average power of any emission, measured during the transmit interval, shall not exceed 40 dBm, and the peak power of any emission shall not exceed 43 dBm. In addition, the average power of any emission outside of the 61.0–61.5 GHz band, measured during the transmit interval, but still within the 57–71 GHz band, shall not exceed 10 dBm, and the peak power of any emission shall not exceed 13 dBm.

According to RSS-210 J.3.2.a:

FDS devices that occupy a bandwidth of 500 MHz or less and where this bandwidth is contained wholly within the frequency band 61.0-61.5 GHz shall comply with the following limits: the equipment shall not exceed 40 dBm average e.i.r.p. and 43 dBm peak e.i.r.p. in the 61.0-61.5 GHz band. In addition, the average and peak e.i.r.p. of any emission outside of the band 61.0-61.5 GHz, but still within the band 57-71 GHz, shall not exceed 10 dBm average e.i.r.p. and 13 dBm peak e.i.r.p.

5.2.4 Description of Measurement

The radiated emission of the fundamental wave from the EUT is measured using a spectrum analyser and appropriate linear polarized antennas. The setup of the EUT and the measurement procedure is in accordance to ANSI C63.10, Item 9.8 and 9.11. The EUT is measured in TX continuous unmodulated under normal conditions.

Analyser settings:

PK measurement:	RBW: 30 MHz	VBW: 80 MHz	Detector: PK	Trace. Max hold
AV measurement:	RBW: 30 MHz	VBW: 80 MHz	Detector: RMS	Trace. Max hold

5.2.5 Test result

Channel	Frequency	Level PK	Limit PK	Margin PK	Level AV	Limit AV	Margin AV
(#)	(GHz)	(dBm)	(dBm)	(dB)	(dBm)	(dBm)	(dB)
CH1	61.1	12.0	43.0	-31.0	8.6	40.0	-31.5
CH3	61.3	12.0	43.0	-31.0	8.4	40.0	-31.7
CH4	61.4	12.1	43.0	-30.9	8.5	40.0	-31.5

EIRP limit according to FCC Part 15C, Section 15.255(c)(2)(v):

For field disturbance sensors/radars that occupy 500 MHz bandwidth or less that are contained wholly within the frequency band 61.0–61.5 GHz, the average power of any emission, measured during the transmit interval, shall not exceed 40 dBm, and the peak power of any emission shall not exceed 43 dBm. In addition, the average power of any emission outside of the 61.0–61.5 GHz band, measured during the transmit interval, but still within the 57–71 GHz band, shall not exceed 10 dBm, and the peak power of any emission shall not exceed 13 dBm.

Limit according to RSS-210 J.3.2.a:

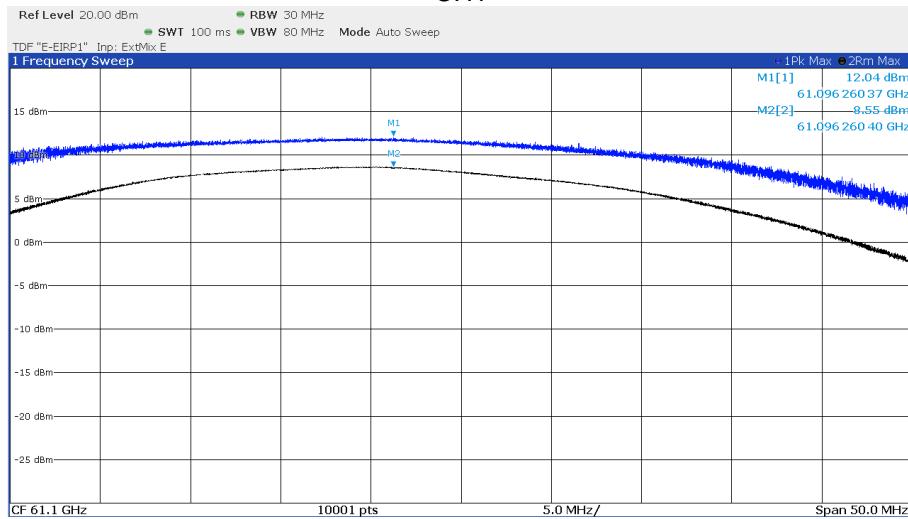
FDS devices that occupy a bandwidth of 500 MHz or less and where this bandwidth is contained wholly within the frequency band 61.0-61.5 GHz shall comply with the following limits: the equipment shall not exceed 40 dBm average e.i.r.p. and 43 dBm peak e.i.r.p. in the 61.0-61.5 GHz band. In addition, the average and peak e.i.r.p. of any emission outside of the band 61.0-61.5 GHz, but still within the band 57-71 GHz, shall not exceed 10 dBm average e.i.r.p. and 13 dBm peak e.i.r.p.

The requirements are **FULFILLED**.

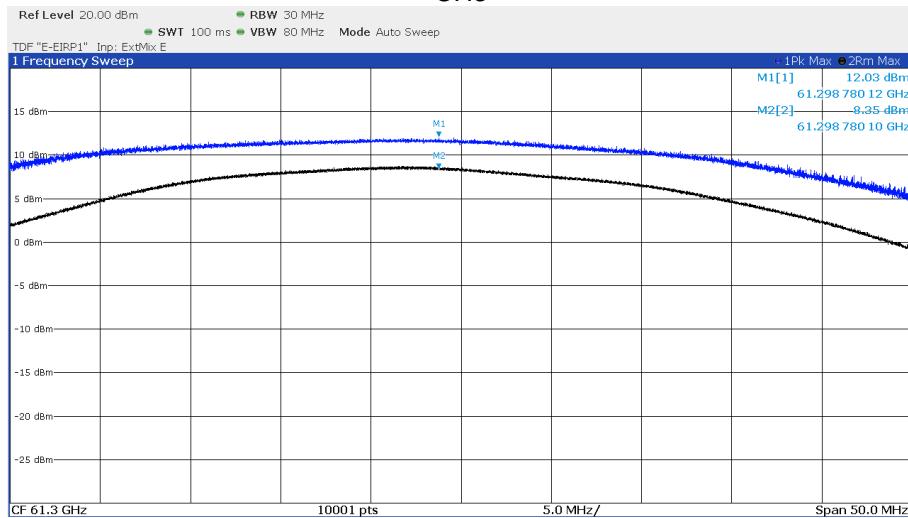
Remarks: For detailed test results please refer to following test protocols.

5.2.6 Test protocols

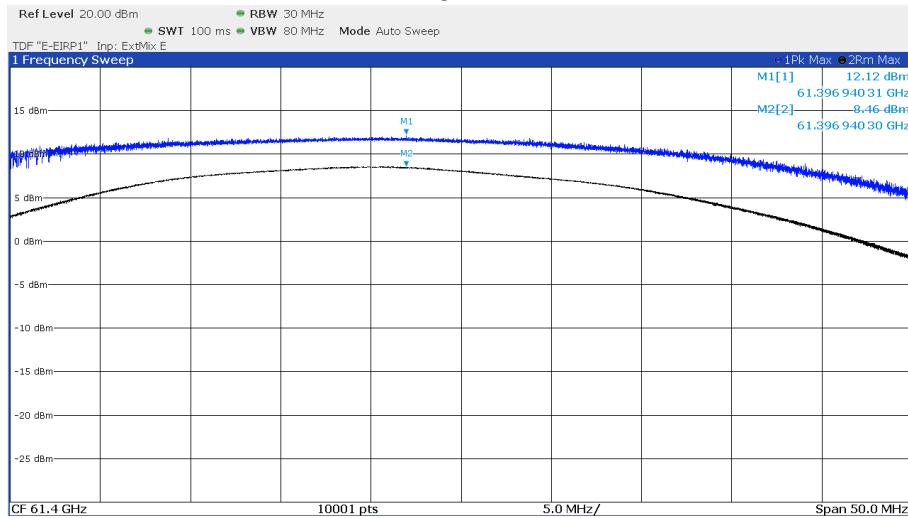
CH1



CH3



CH4



5.3 Peak conducted output power

Remarks: Not applicable, no peak conducted output power limit defined for FDS which operate in
compliance with 15.255(c)(2)(v) or RSS-210 J.3.2.

5.4 Spurious emissions

For test instruments and accessories used see section 6 Part **SER1, SER 2, SER 3**.

5.4.1 Description of the test location

Test location: OATS 1
Test distance: 3 m

Test location: Anechoic chamber 1
Test distance: 3 m (1 GHz – 18 GHz)
Test distance: 1 m (18 GHz – 40 GHz)
Test distance: 1 m (40 GHz – 200 GHz)

5.4.2 Photo documentation of the test set-up

See Attachment B for detailed photo documentation of the test set-up.

5.4.3 Applicable standard

According to FCC Part 15C, Section 15.255 (d):

- (1) The power density of any emissions outside the 57-71 GHz band shall consist solely of spurious emissions.
- (2) Radiated emissions below 40 GHz shall not exceed the general limits in §15.209.
- (3) Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm² at a distance of 3 meters.
- (4) The levels of the spurious emissions shall not exceed the level of the fundamental emission.

According to RSS-210 J.4:

Any emissions outside the band 57-71 GHz shall consist solely of spurious emissions and shall not exceed:

- a. the fundamental emission levels
- b. the general field strength limits specified in RSS-Gen for emissions below 40 GHz
- c. 90 pW/cm² at a distance of 3 m for emissions between 40 GHz and 200 GHz

5.4.4 Description of Measurement

The radiated emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. The setup of the EUT and the measurement procedure is in accordance to ANSI C63.10, Item 9. In the frequency range above 1 GHz a spectrum analyser is used with appropriate linear polarized antennas. If the emission level in peak mode complies with the average limit testing is stopped and peak values will be reported, otherwise, the emission is measured in average mode again and reported. The EUT is measured in TX continuous mode under normal conditions.

Instrument settings:

9 kHz – 150 kHz:	RBW: 200 Hz,	Detector: Quasi peak, Mes. Time: 1 s,
150 kHz – 30 MHz:	RBW: 9 kHz,	Detector: Quasi peak, Mes. Time: 1 s,
30 MHz – 1 GHz:	RBW: 120 MHz,	Detector: Quasi peak, Mes. Time: 1 s,
1 GHz – 40 GHz:	RBW: 1 MHz, VBW: 3 MHz,	Detector: Max. peak, Trace: Max. hold, Sweep: Auto
40 GHz – 200 GHz:	RBW: 1 MHz, VBW: 3 MHz,	Detector: RMS, Trace: Max. hold, Sweep: Auto

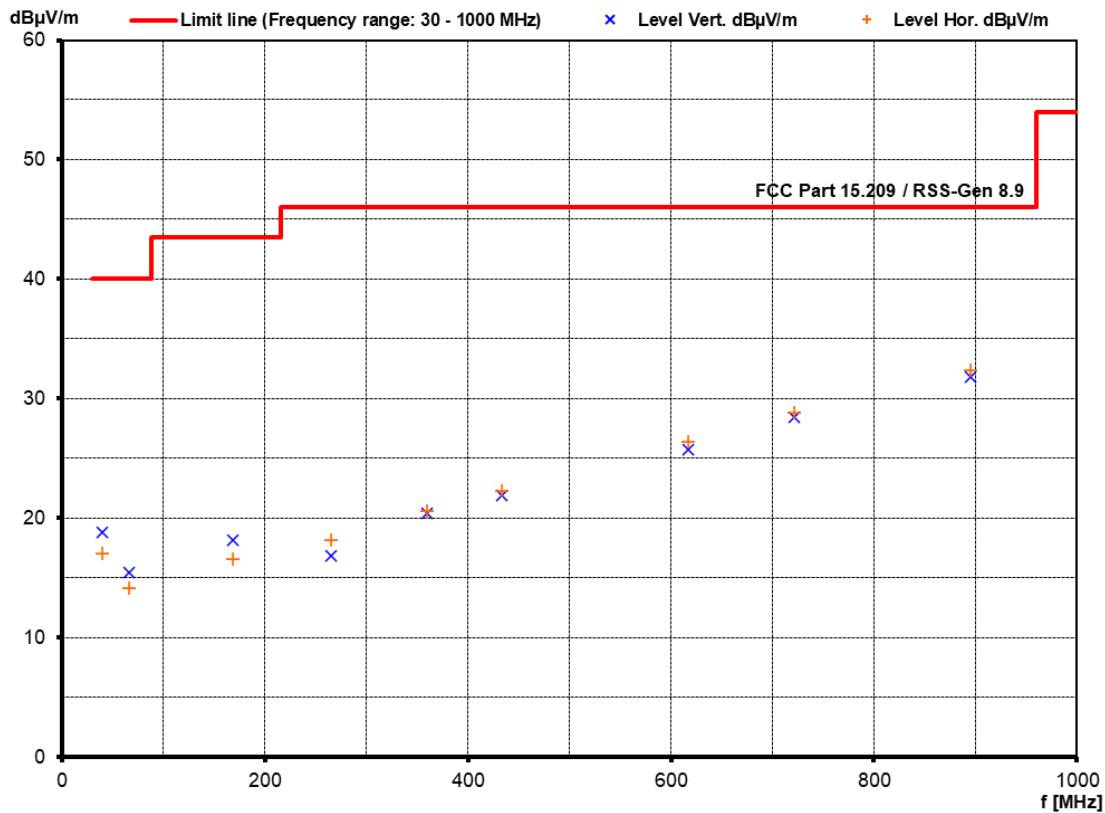
5.4.5 Test result f < 1 GHz

According to FCC 15.209					
Frequency (MHz)	Reading (dB μ V)	Correction (dB)*	Field strength (dB μ V/m)	Limit (dB μ V/m)	Dlimit (dB)
0.010	37.8	-59.4	-21.6	47.6	-69.2
0.032	37.0	19.2	-23.8	37.5	-61.3
0.200	31.7	17.6	-30.7	21.6	-52.3
4.000	8.7	17.9	-13.4	30.0	-43.4
15.350	9.2	18.2	-12.6	30.0	-42.6
26.000	2.4	17.6	-20.0	30.0	-50.0

* Correction = Antenna factor + Δ alternative test site + distance extrapolation factor

According to RSS-Gen 8.9				
Frequency (kHz)	Field strength (dB μ V/m)	QP calc. (dB μ A/m)	Limit (dB μ A/m)	Dlimit (dB)
10	-21.6	-73.1	16.1	-89.2
32	-23.8	-75.3	6.0	-81.3
200	-30.7	-82.2	-9.9	-72.3
4000	-13.4	-64.9	-21.9	-43.0
15350	-12.6	-64.1	-21.9	-42.2
26000	-20.0	-71.5	-21.9	-49.6

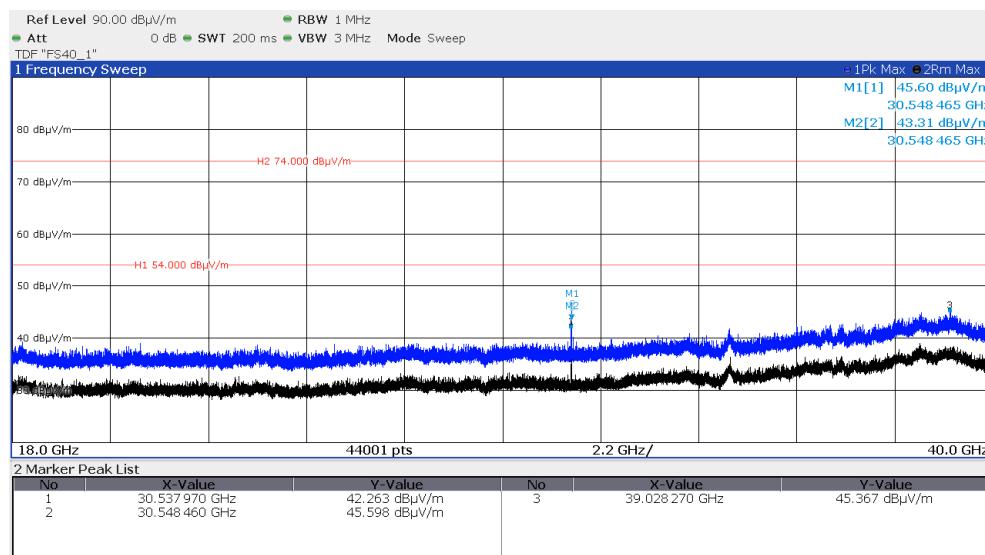
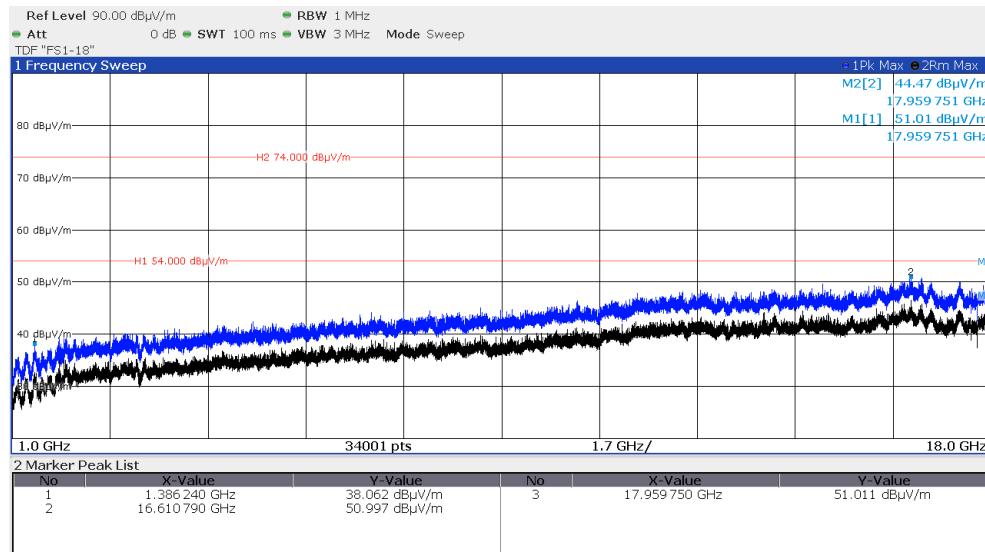
According to FCC 15.209 / RSS-Gen 8.9								
Frequency (MHz)	Reading Vert. (dB μ V)	Reading Hor. (dB μ V)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dB μ V/m)	Level Hor. (dB μ V/m)	Limit (dB μ V/m)	Dlimit (dB)
39.50	2.1	-0.9	16.7	17.9	18.8	17.0	40.0	-21.2
66.00	-0.9	-2.8	16.3	17.0	15.4	14.2	40.0	-24.6
168.10	-1.0	-2.1	19.2	18.7	18.2	16.6	43.5	-25.3
265.00	-2.4	-1.2	19.2	19.3	16.8	18.1	46.0	-27.9
360.00	-1.7	-1.9	22.1	22.5	20.4	20.6	46.0	-25.4
433.00	-2.2	-2.2	24.1	24.4	21.9	22.2	46.0	-23.8
617.00	-2.8	-2.5	28.6	28.9	25.8	26.4	46.0	-19.6
721.30	-1.7	-1.8	30.2	30.6	28.5	28.8	46.0	-17.2
895.00	-1.0	-1.0	32.8	33.3	31.8	32.3	46.0	-13.7



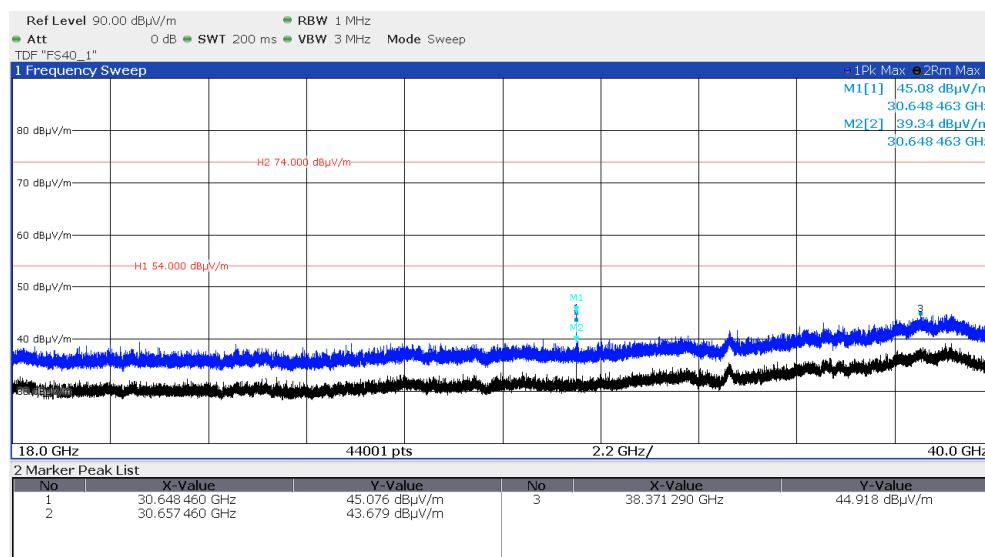
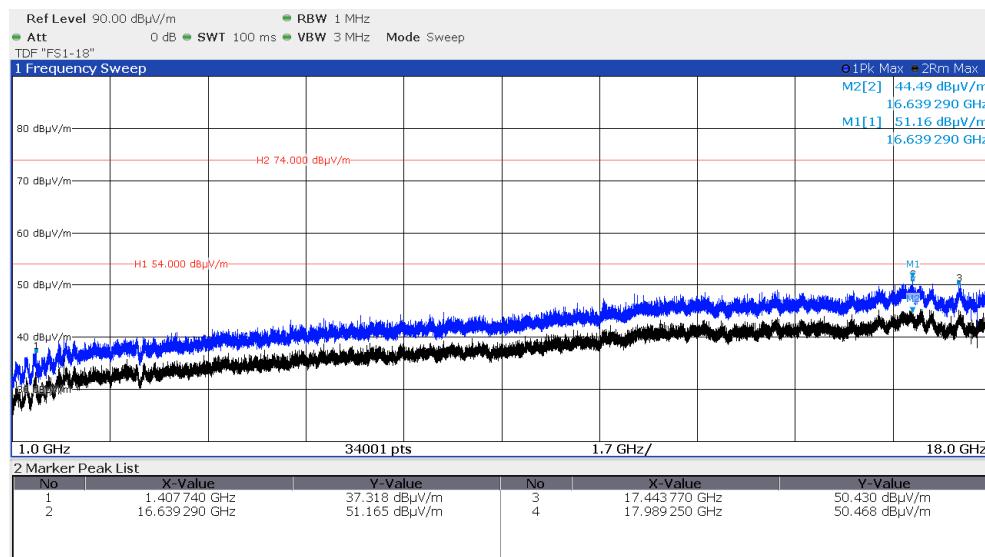
Note: For frequencies < 1 GHz the general radiated limits has been applied. During the measurements no emissions from the EUT could be detected in the frequency range 9 kHz to 30 MHz, given values only represent the noise floor.

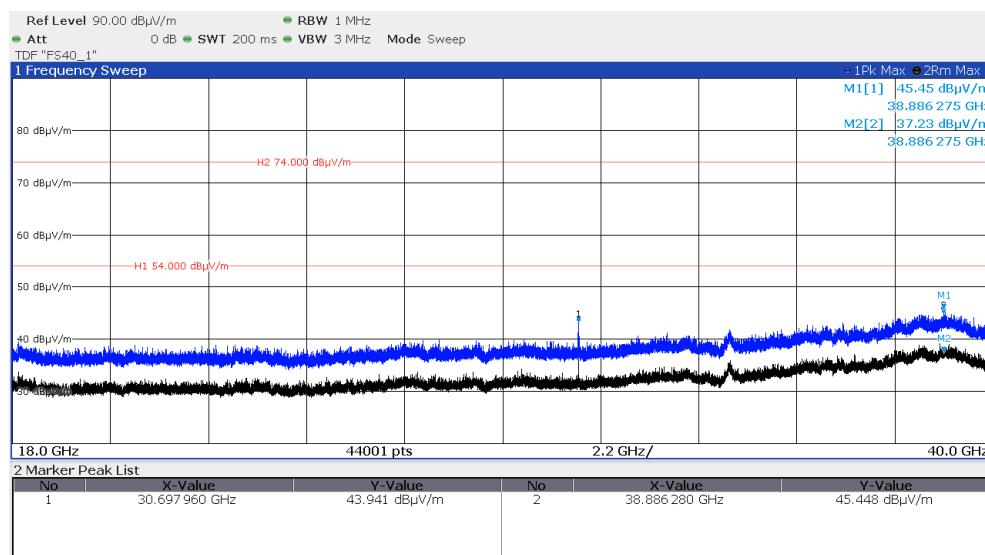
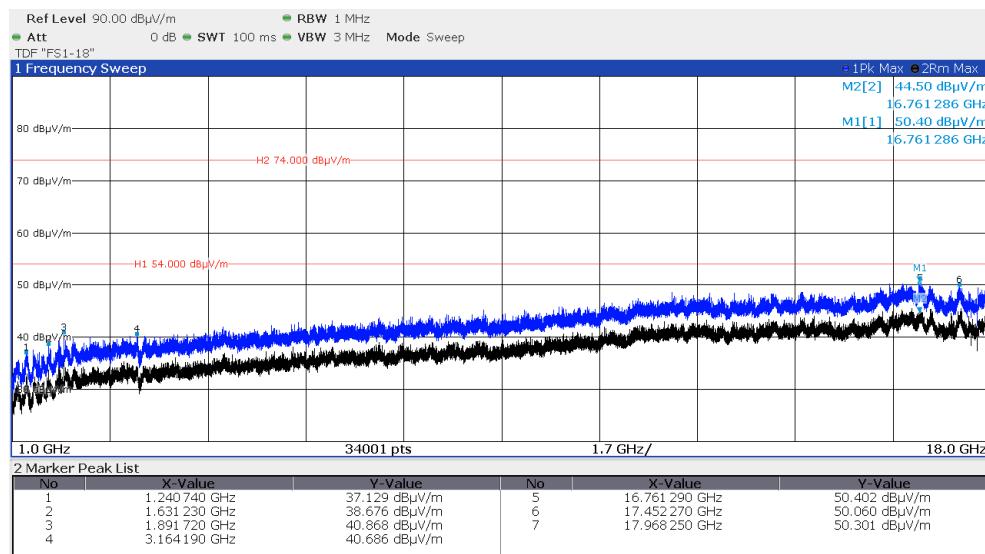
5.4.6 Test result 1 GHz < f < 40 GHz

CH1, 61.1 GHz:



CH3, 61.3 GHz:



CH4, 61.4 GHz:


Note: For frequencies < 40 GHz the general radiated limits has been applied. For 18-40 GHz measurement distance was changed to 1 m, transducer factor is corrected accordingly for 3 m limits.

5.4.7 Test result f > 40 GHz

Determination of the EIRP emission limit for f > 40 GHz:

For calculation of the limit the friis formula is used.

$$P_d = \frac{P_{out} * G}{4 * \pi * r^2}$$

$P_{out} * G = \text{EIRP}$;

Therefore

$$\text{EIRP} = P_d * 4 * \pi * r^2$$

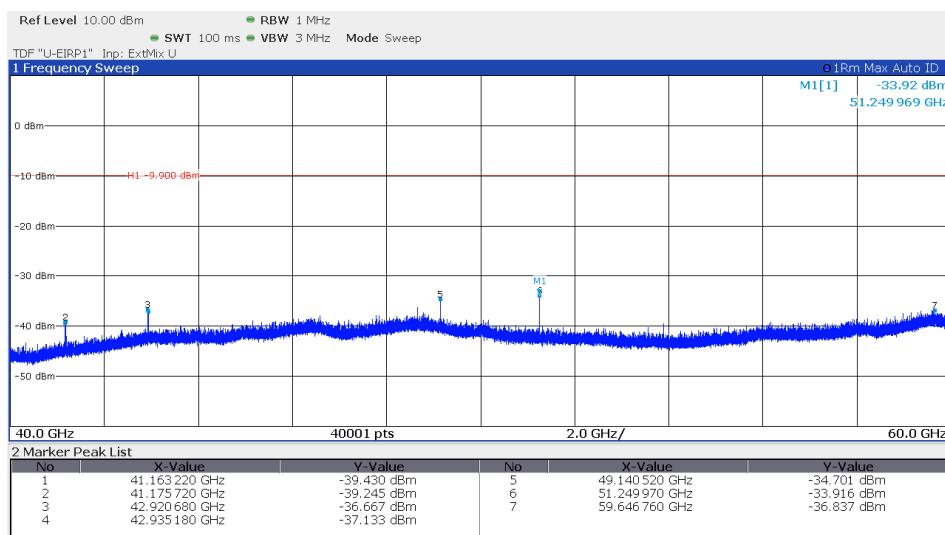
$$\text{EIRP} = -9.9 \text{ dBm}$$

where

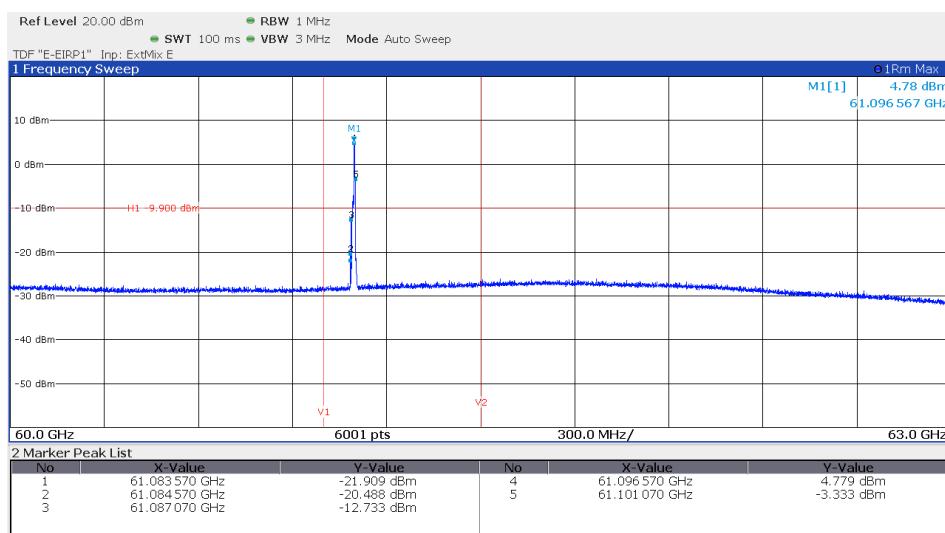
r is the measurement distance (3 m)

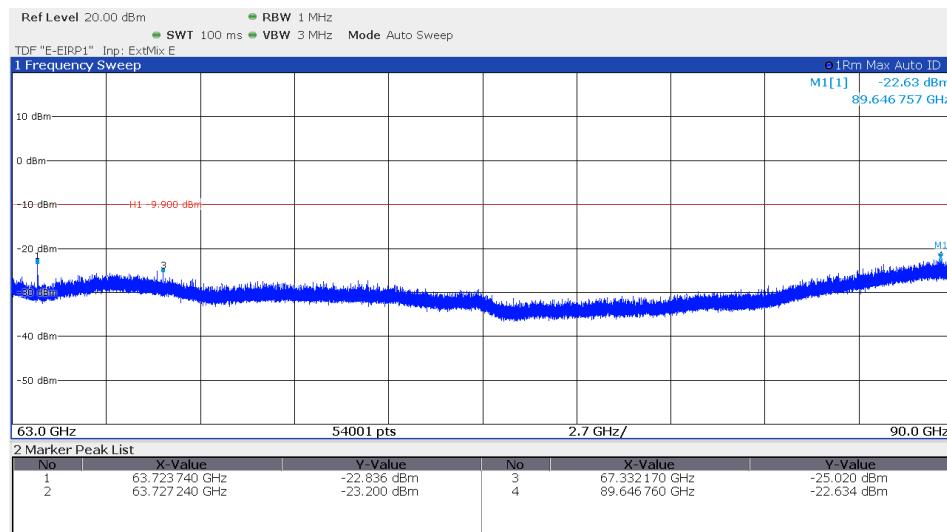
P_d is the emission density (90 pW/cm²)

CH1, 61.1 GHz:

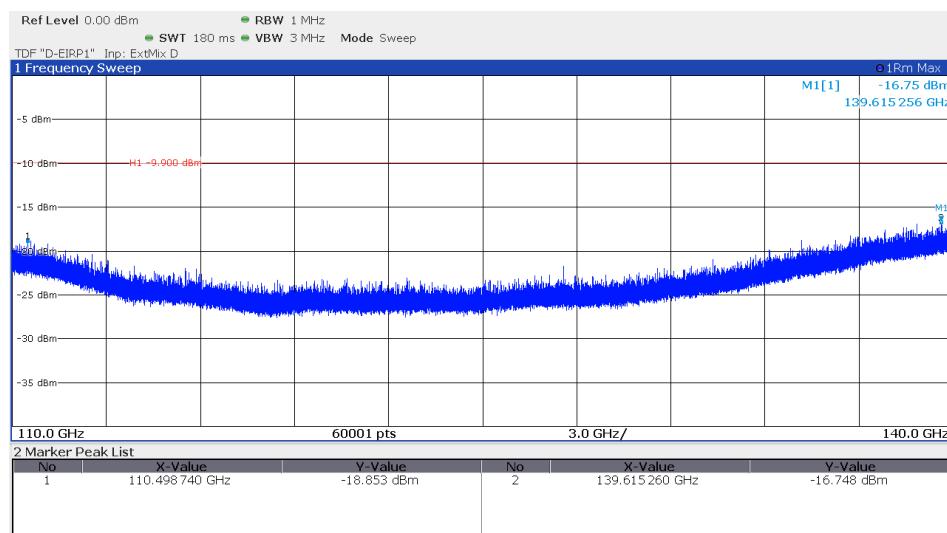
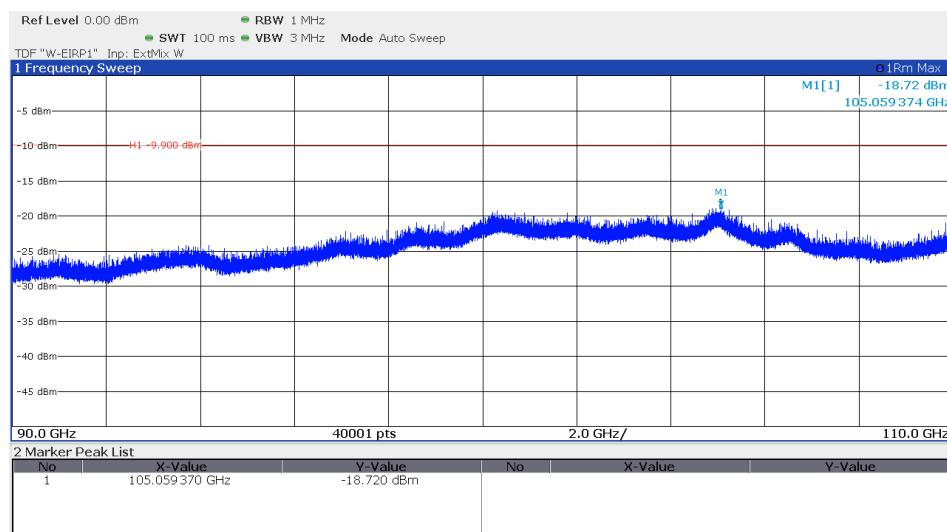


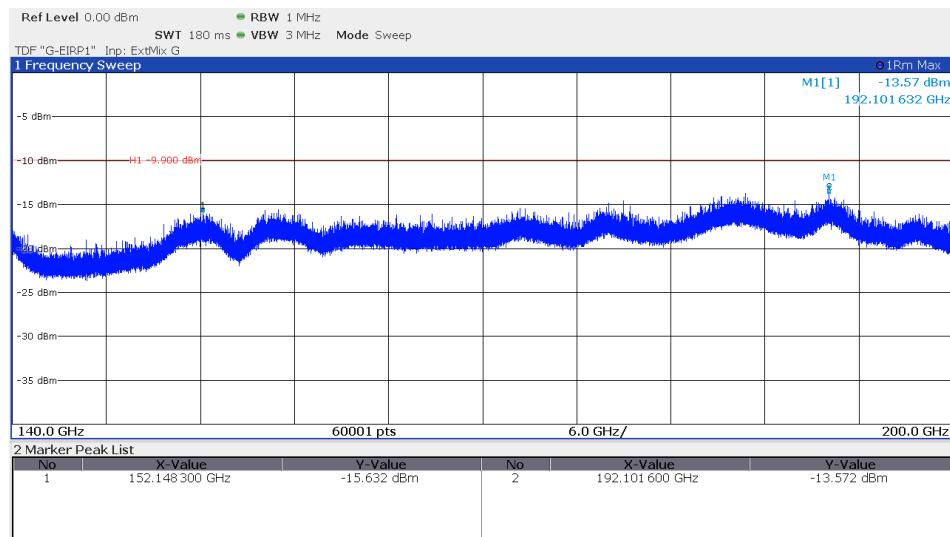
Note: To minimize unintended mixing products generated by the external mixer the AutoID function was used.



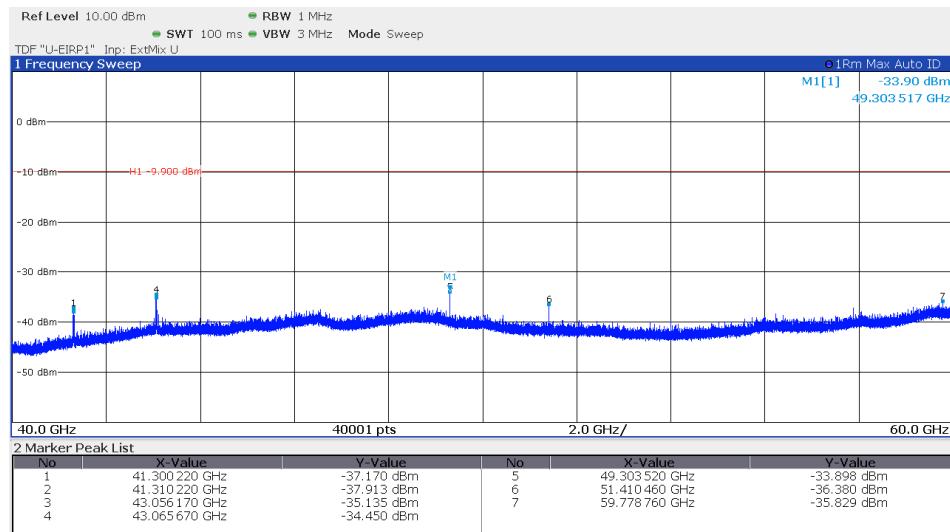


Note: To minimize unintended mixing products generated by the external mixer the AutoID function was used.

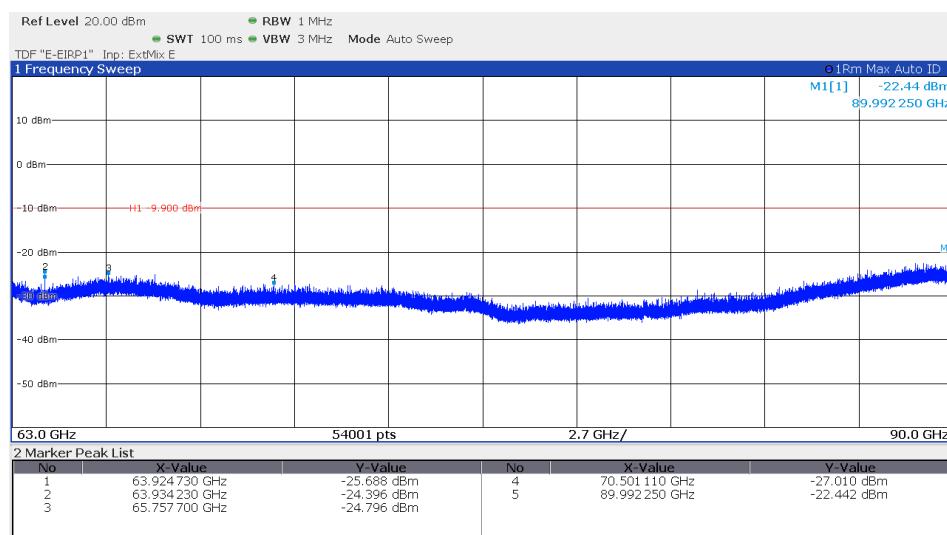
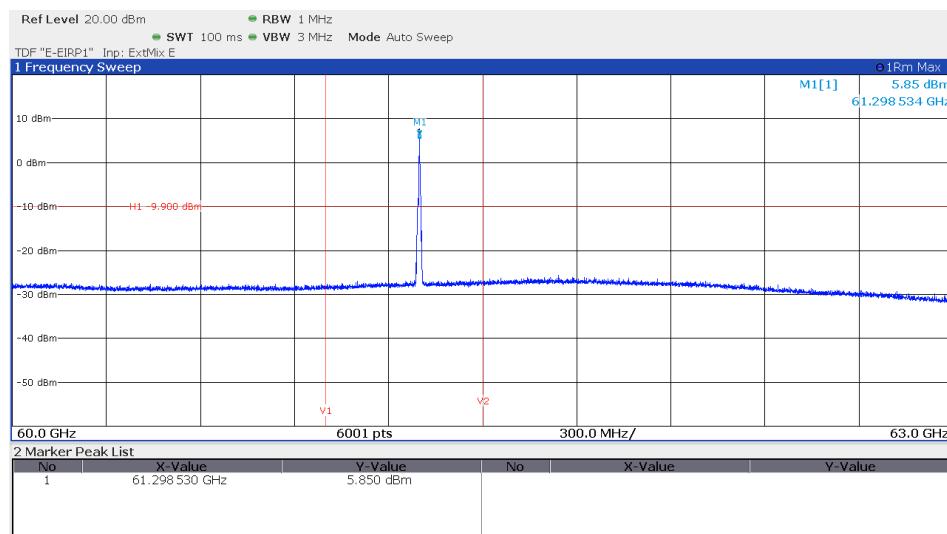




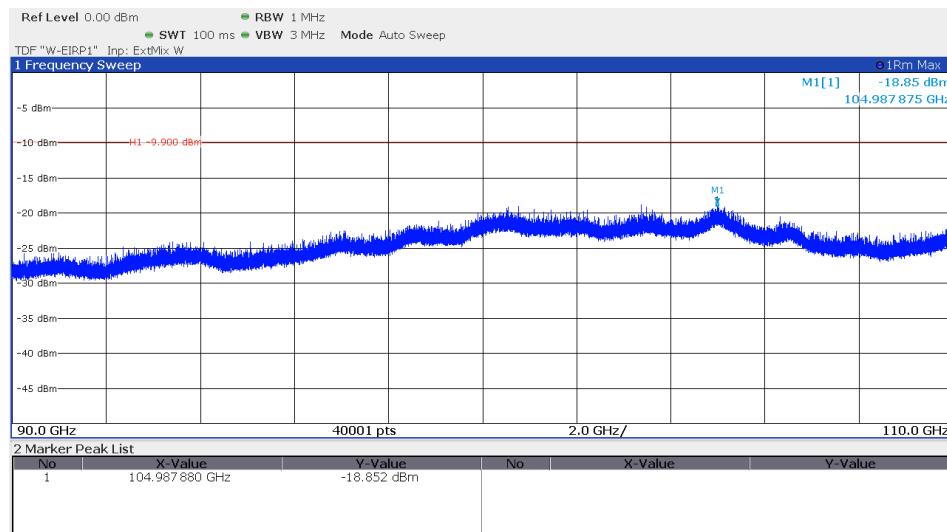
CH3, 61.3 GHz:

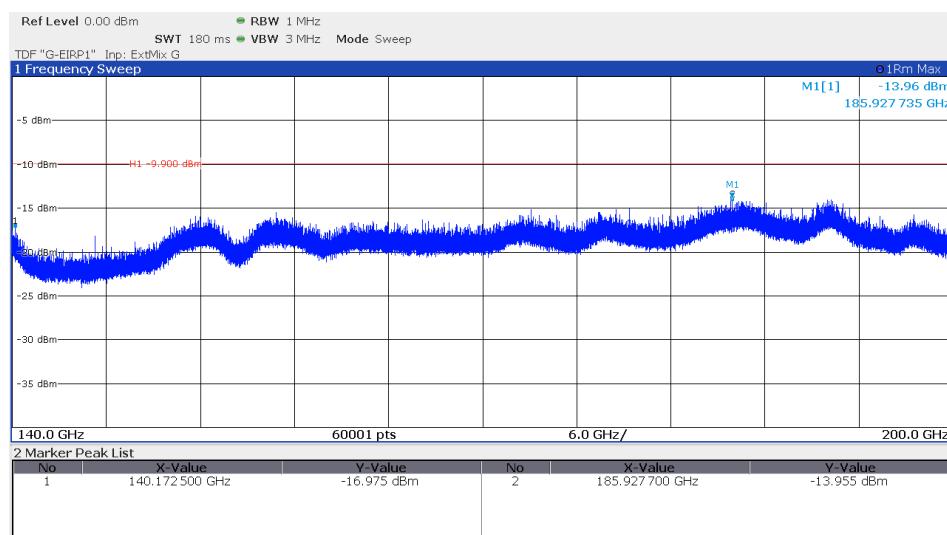
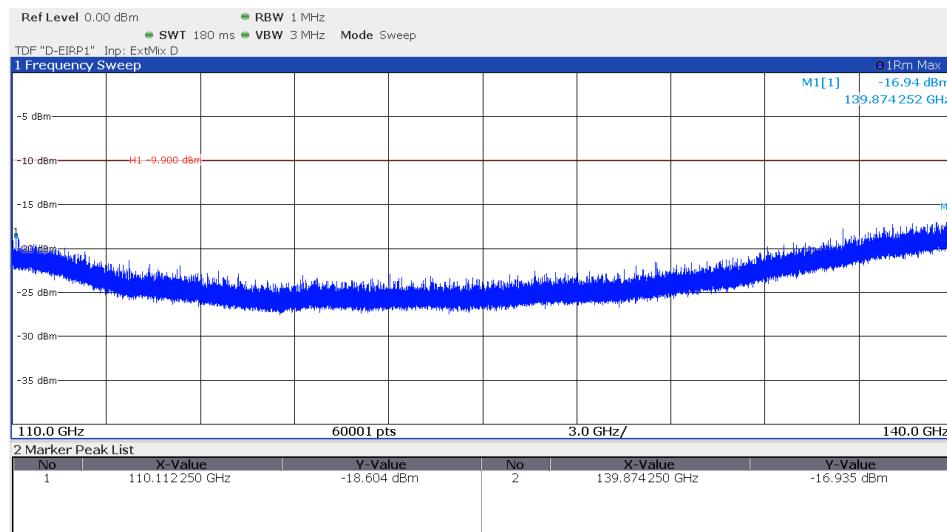


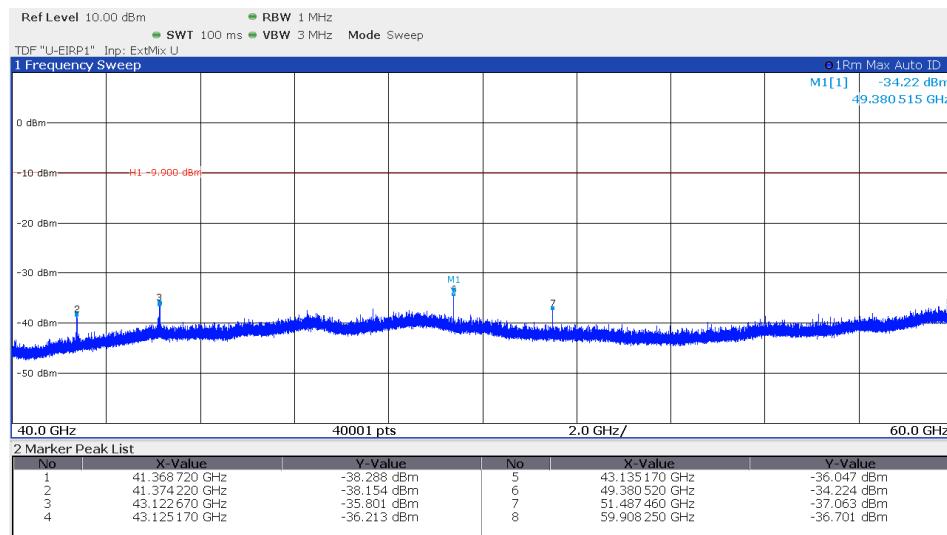
Note: To minimize unintended mixing products generated by the external mixer the AutoID function was used.



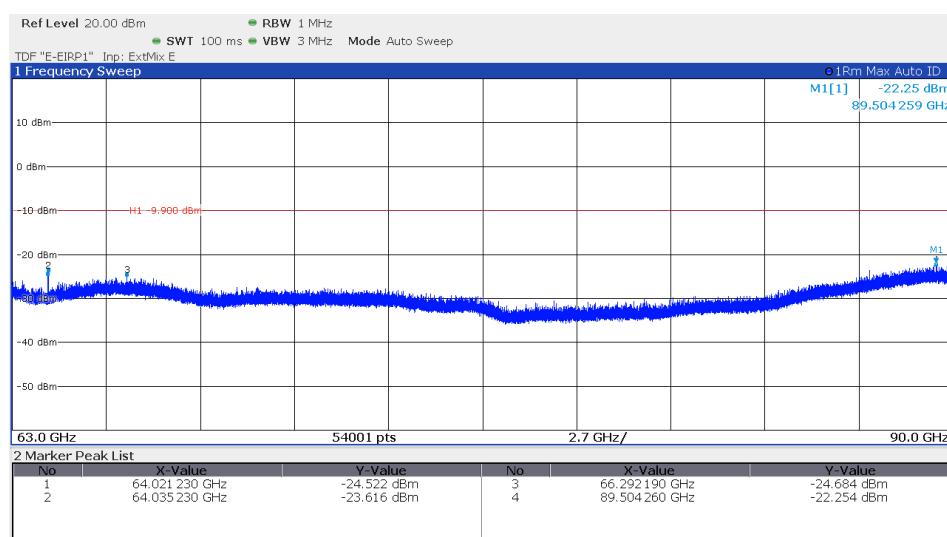
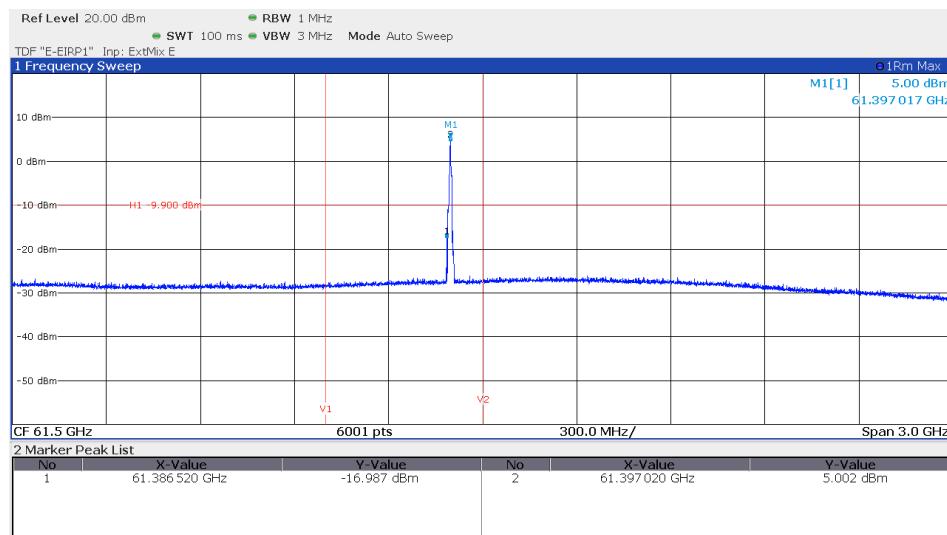
Note: To minimize unintended mixing products generated by the external mixer the AutoID function was used.



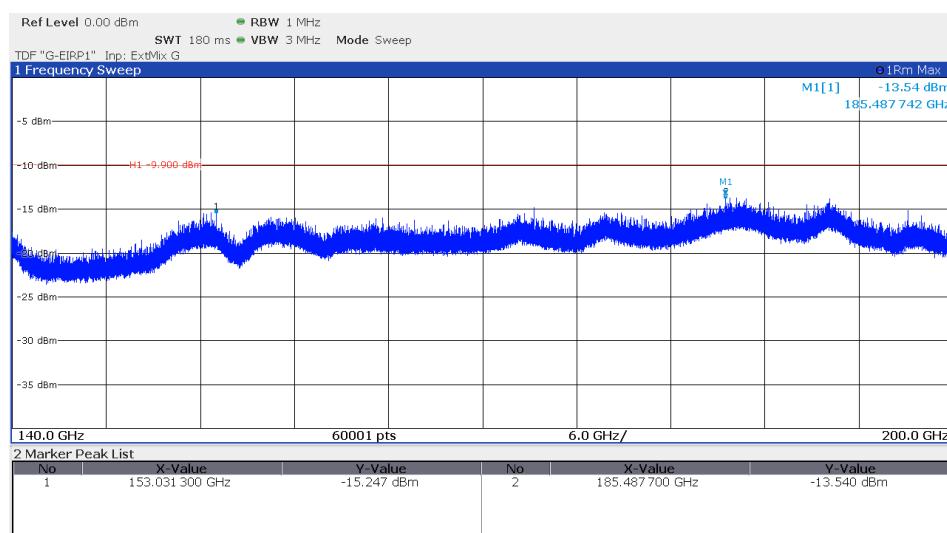
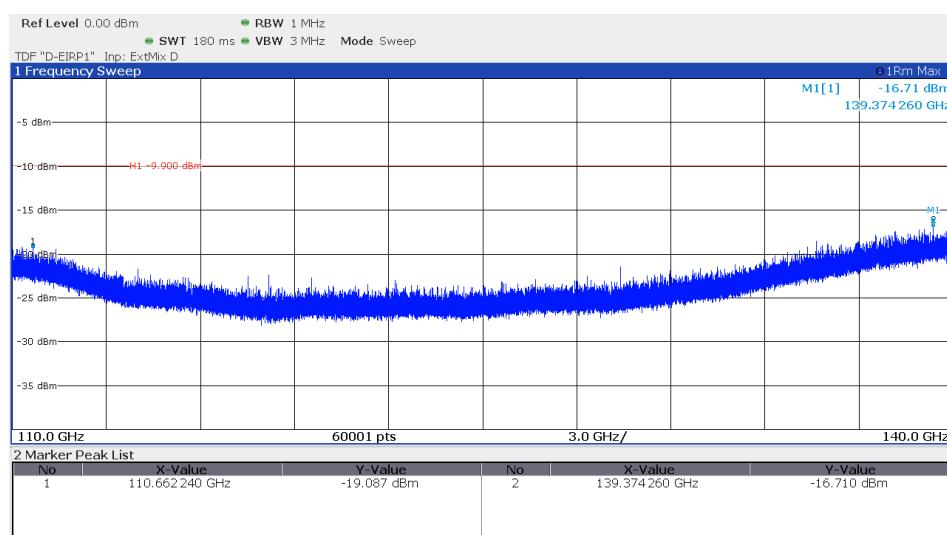
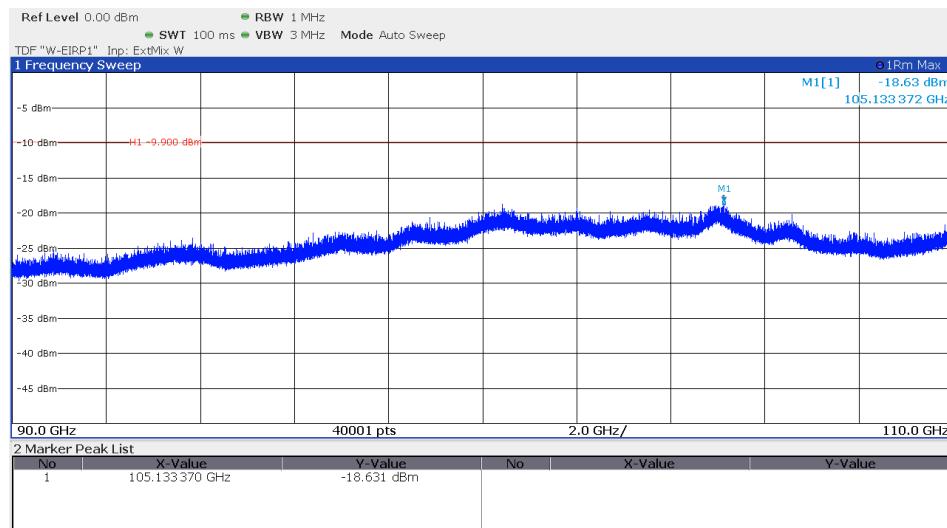


CH4, 61.4 GHz:


Note: To minimize unintended mixing products generated by the external mixer the AutoID function was used.



Note: To minimize unintended mixing products generated by the external mixer the AutoID function was used.



Average limit according to FCC Part 15C, Section 15.255(d):

- (1) The power density of any emissions outside the 57-71 GHz band shall consist solely of spurious emissions.
- (2) Radiated emissions below 40 GHz shall not exceed the general limits in §15.209.
- (3) Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm² at a distance of 3 meters.
- (4) The levels of the spurious emissions shall not exceed the level of the fundamental emission.

General radiated limit according to FCC Part 15C, Section 15.209:

Frequency (MHz)	15.209 Limits (μ V/m)	Measurement distance (m)
0.009 - -0.49	2400/f(kHz)	300
0.49 – 1.705	24000/f(kHz)	30
1.705 – 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Limit according to RSS-210 J.4:

Any emissions outside the band 57-71 GHz shall consist solely of spurious emissions and shall not exceed:

- a. the fundamental emission levels
- b. the general field strength limits specified in RSS-Gen for emissions below 40 GHz
- c. 90 pW/cm² at a distance of 3 m for emissions between 40 GHz and 200 GHz

General radiated limit according to RSS-Gen 8.9:

Frequency (MHz)	RSS-Gen Limits (μ A/m)	Measurement distance (m)
0.009 - -0.49	63.7/f(kHz)	300
0.49 – 1.705	63.7/f(kHz)	30
1.705 – 30.0	0.08	30

Frequency (MHz)	RSS-Gen Limits (μ V/m)	Measurement distance (m)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

The requirements are **FULFILLED**.

Remarks: The measurement was performed up to 200 GHz.

5.5 Antenna requirement

According to FCC Part 15C, Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit that broken antennas can be replaced by the user, but the use of a standard antenna jack is prohibited. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

The EUT has an integrated antenna. No other antenna can be used with the device.

The supplied antenna meets the requirements of part 15.203.

Remarks: None

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
A 4	BAT-EMC 2023.0.8.0	01-02/68-13-001				
	ESCI	02-02/03-15-001	03/07/2024	03/07/2023		
	ESH 2 - Z 5	02-02/20-05-004	13/10/2025	13/10/2022	17/04/2024	17/04/2023
	N-4000-BNC	02-02/50-05-138				
	ESH 3 - Z 2	02-02/50-05-185	27/10/2025	27/10/2022	19/04/2024	19/10/2023
	HM 8143	02-02/50-10-016				
CPR 3	6430	02-02/50-13-014				
	FS-Z90	02-02/11-14-003	08/05/2024	08/05/2023	08/05/2024	08/05/2023
	FSW43	02-02/11-15-001	04/05/2024	04/05/2023		
	QWH-EPRR00/WR-12/60-90	02-02/24-14-004				
	HM 8143	02-02/50-10-016				
	UFA210A (LU7-022-1000)	02-02/50-17-030				
SER 1	UFA210A (LU7-022-1000)	02-02/50-17-031				
	ESR 7	02-02/03-17-001	01/08/2024	01/08/2023		
	HFH 2 - Z 2	02-02/24-05-020	01/06/2025	01/06/2022	05/09/2024	05/09/2023
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
SER 2	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
	ESVS 30	02-02/03-05-006	27/07/2024	27/07/2023		
	VULB 9168	02-02/24-05-005	20/04/2024	20/04/2023	03/05/2024	03/05/2023
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
SER 3	50F-003 N 3 dB	02-02/50-21-010				
	FS-Z110	02-02/11-14-002	08/05/2024	08/05/2023	08/05/2024	08/05/2023
	FS-Z90	02-02/11-14-003	08/05/2024	08/05/2023	08/05/2024	08/05/2023
	FSW43	02-02/11-15-001	04/05/2024	04/05/2023		
	RPG FS-Z170	02-02/11-17-001	05/06/2024	05/06/2023		
	RPG FS-Z220	02-02/11-17-002	10/05/2024	10/05/2023		
	FS-Z60	02-02/11-18-001	08/05/2024	08/05/2023	08/05/2024	08/05/2023
	AFS5-12001800-18-10P-6	02-02/17-06-002				
	AFS4-01000400-10-10P-4	02-02/17-13-002				
	AMF-4F-04001200-15-10P	02-02/17-13-003				
	LNA-40-18004000-33-5P	02-02/17-20-002				
	BBHA 9170	02-02/24-05-013	21/03/2026	21/03/2023	22/01/2025	22/01/2024
	QWH-UPRR00/WR-19/40-60	02-02/24-14-001				
	QWH-EPRR00/WR-12/60-90	02-02/24-14-004				
	QWH-WPRR00/WR-10/75-11	02-02/24-14-006				
	FH-SG-170/WR6/110-170	02-02/24-17-002				
	05-HA25/WR5/140-220	02-02/24-17-004				
	3117	02-02/24-20-007	15/11/2024	15/11/2023		
	Sucoflex N-2000-SMA	02-02/50-05-075				
	HM 8143	02-02/50-10-016				
	UFA210A (LU7-022-1000)	02-02/50-17-030				
	UFA210A (LU7-022-1000)	02-02/50-17-031				
	KMS116-GL140SE-KMS116-	02-02/50-20-026				