EMI – TEST REPORT

- FCC Part 15.225 & RSS 210-

Type / Model Name : Quattro Vanguard Solo dB

Product Description : Macerator with integrated 13.56MHz RFID module

Applicant : The Haigh Engineering Company Limited

Address : Alton Road

Ross-On-Wye, Herefordshire HR9 5NG

UNITED KINGDOM

Manufacturer : The Haigh Engineering Company Limited

Address : Alton Road

Ross-On-Wye, Herefordshire HR9 5NG

UNITED KINGDOM

Test Result according to the standards listed in clause 1 test standards:	**POSITIVE**

Test Report No. :	**T44844-00-00JP**	21. May 2019 Date of issue

Deutsche Akkreditierungsstelle D-PL-12030-01-00

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (May, 2019)

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (May, 2019)

Part 15, Subpart C, Section 15.207	Conducted limits
Part 15, Subpart C, Section 15.209	Radiated emission limits, general requirements
Part 15, Subpart C, Section 15.225	Operation within the band 13.110 - 14.010 MHz

RSS-Gen Issue 5, March 2019	General Requirements and Information for the Certification of Radiocommunication Equipment
RSS-210 Issue 9, August 2016	Low Power Licence – Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment
ANSI C63.10: 2013	Testing Unlicensed Wireless Devices

2 SUMMARY

2.1 TEST RESULTS:

FCC Rule Part	RSS Rule Part	Description	Result
15.207	RSS Gen, 8.8	AC power line conducted emissions	passed
15.225	RSS-210, B.6	Field strength of fundamental	passed
15.209	RSS Gen, 8.9	Spurious emissions	passed
15.225	RSS-210, B.6	Frequency tolerance	passed
15.215	RSS-Gen, 6.7	Occupied bandwidth	passed
15.225	RSS-210, B.6	Transmitter spectrum mask	passed

2.2 FINAL ASSESSMENT

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

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

Testing commenced on : 12 February 2018

Testing concluded on : 21 May 2019

Checked by:

Klaus Gegenfurtner
2019.05.22 07:38:15
+02'00'

Klaus Gegenfurtner
Teamleader Radio

Tested by:

Juergen Pessinger
2019.05.21 16:40:13
+02'00'

Jürgen Pessinger
Radio Team

3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EUT

See attachment B to this report for external piuctures of the EuT and attachment C to this report for internal pictures of the EuT.

3.2 Power supply system utilised

Power supply voltage : 120V / 60 Hz

3.3 Short description of the equipment under test (EUT)

The EuT is a macerator for clinic use. The RFID functionality ensures that only authorized persons can use the macerator.

Number of tested samples: 1
Serial number: RD-29

EUT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- continous 13.56MHz RFID reading mode

EUT configuration:

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

- TAG Model : Supplied by applicant

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 Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	± 3.29 dB
20 dB Bandwidth	Center frequency of EuT	95%	$\pm 2.5 \times 10^{-7}$
99% Occupied Bandwidth	Center frequency of EuT	95%	$\pm 2.5 \times 10^{-7}$
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	± 3.53 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	± 3.71 dB
Radiated Spurious Emissions	1000 MHz to 10000 MHz	95%	± 2.34 dB
Peak conducted output power	902 MHz to 928 MHz	95%	± 0.35 dB
Conducted Spurious Emissions	9 kHz to 10000 MHz	95%	± 2.15 dB

4.1 Measurement Protocol for FCC

4.1.1 GENERAL INFORMATION

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

FCC: DE 0011 ISED: DE0009

4.1.1.1 Test methodology

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

4.1.1.2 Justification

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

4.1.2 Conducted emission

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 Ω / 50 µH (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 are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

4.1.3 Radiated emission

Spurious emission from the EUT is measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized 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 metre non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is established in accordance with ANSI C63.4. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the centre in a serpentine fashion so that they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the centre 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. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres, measurement scans are made with both horizontal and vertical antenna polarization planes and the EUT is rotated 360 degrees.

4.1.4 Calculation Example

Frequency	Reading level	+	Correction Factor*	=	Level	-	CISPR Limit	=	Delta
(MHz)	(dBµV)		(dB/m)		(dBµV/m)		(dBµV/m)		(dB)
719.0	75.0	+	32.6	=	107.6	-	110.0	=	-2.4

*Correction Factor = Antenna Factor + Cable Attenuation = 30 dB/m + 2.6 dB = 32.6 dB/m

5 TEST CONDITIONS AND RESULTS

5.1 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 A to this report

5.1.3 Applicable standard

FCC Part 15, Section 15.207 and RSS-Gen clause 8.8

5.1.4 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin

Limit according to FCC Part 15, Section 15.207 and RSS-Gen clause 8.8

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	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

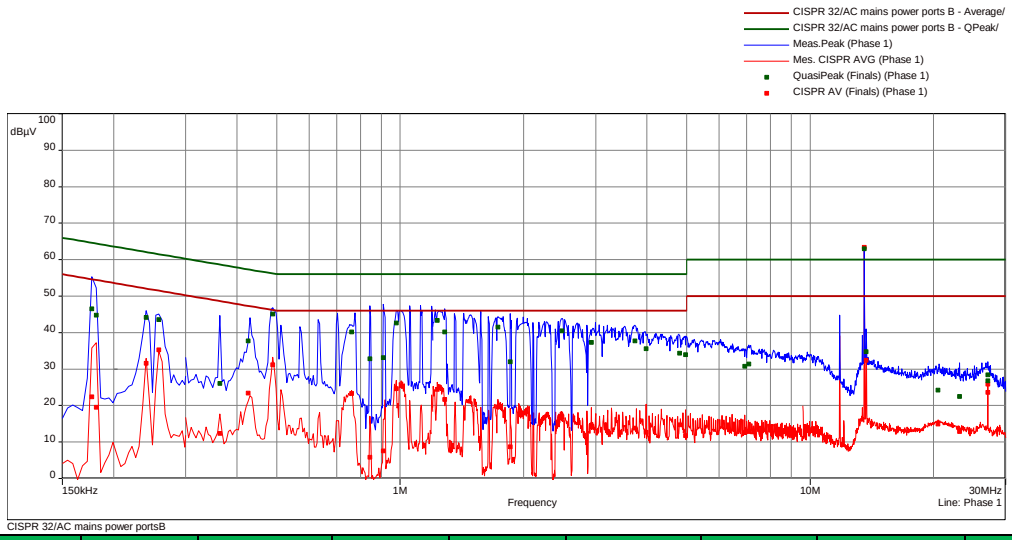
For measurement in the transmitter fundamental frequency band the integrated antenna was replaced with a suitable dummy load to show compliance in the fundamental frequency band.

See KDB 174176 D01 Line Conducted FAQ v01r01.

Picture of the RFID board with dummy load can be found in the attachment C to this report.

5.1.5 Test protocol

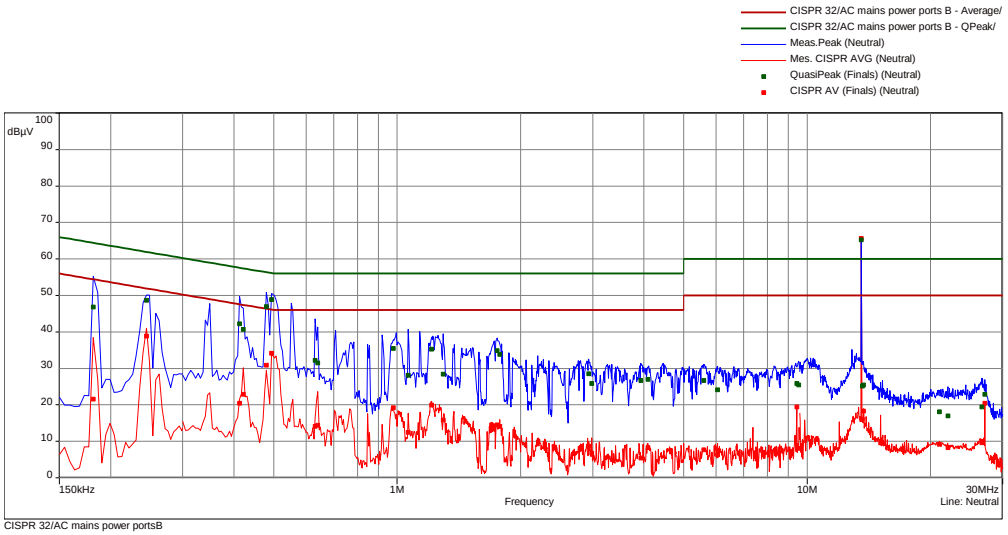
Test point L1 Result: Passed
Operation mode: continous 13.56MHz RFID reading mode
Remarks: with integrated antenna



freq	QP	margin	limit	AV	margin	limit	line	corr
MHz	dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.177	46.57	-18.06	64.63	22.38	-32.25	54.63	Phase 1	10.08
0.1815	44.84	-19.58	64.42	19.54	-34.88	54.42	Phase 1	10.08
0.24	44.13	-17.96	62.10	31.65	-20.45	52.10	Phase 1	10.10
0.258	43.62	-17.88	61.50	35.25	-16.25	51.50	Phase 1	10.11
0.363	26.11	-32.55	58.66	12.40	-36.26	48.66	Phase 1	10.14
0.426	37.78	-19.55	57.33	23.40	-23.93	47.33	Phase 1	10.14
0.489	45.15	-11.04	56.18	31.20	-14.98	46.18	Phase 1	10.14
0.762	40.22	-15.78	56.00	23.34	-22.66	46.00	Phase 1	10.18
0.843	32.84	-23.16	56.00	5.88	-40.12	46.00	Phase 1	10.18
0.9105	33.17	-22.83	56.00	7.52	-38.48	46.00	Phase 1	10.18
0.978	42.67	-13.33	56.00	24.69	-21.31	46.00	Phase 1	10.19
1.2315	43.32	-12.68	56.00	24.43	-21.57	46.00	Phase 1	10.22
1.2855	40.16	-15.84	56.00	21.73	-24.27	46.00	Phase 1	10.23
1.731	41.48	-14.52	56.00	19.63	-26.37	46.00	Phase 1	10.27
1.857	32.00	-24.00	56.00	8.71	-37.29	46.00	Phase 1	10.26
2.481	40.50	-15.50	56.00	17.03	-28.97	46.00	Phase 1	10.31
2.9265	37.34	-18.66	56.00	14.46	-31.54	46.00	Phase 1	10.34
3.7365	37.74	-18.26	56.00	13.82	-32.18	46.00	Phase 1	10.38
3.9795	35.55	-20.45	56.00	12.70	-33.30	46.00	Phase 1	10.39
4.8045	34.36	-21.64	56.00	14.76	-31.24	46.00	Phase 1	10.44
4.971	33.96	-22.04	56.00	11.78	-34.22	46.00	Phase 1	10.45
6.9285	30.78	-29.22	60.00	12.61	-37.39	50.00	Phase 1	10.60
7.086	31.43	-28.57	60.00	12.90	-37.10	50.00	Phase 1	10.61
13.56*	63.00	3.00	60.00	63.36	13.36	50.00	Phase 1	11.06
13.7085	34.75	-25.25	60.00	32.45	-17.55	50.00	Phase 1	11.07
20.505	24.23	-35.77	60.00	14.98	-35.02	50.00	Phase 1	11.48
23.151	22.47	-37.53	60.00	12.93	-37.07	50.00	Phase 1	11.61
27.12	28.40	-31.60	60.00	25.83	-24.17	50.00	Phase 1	11.70
27.1245	26.80	-33.20	60.00	23.62	-26.38	50.00	Phase 1	11.70

*fundamental Frequency see retest with dummy load

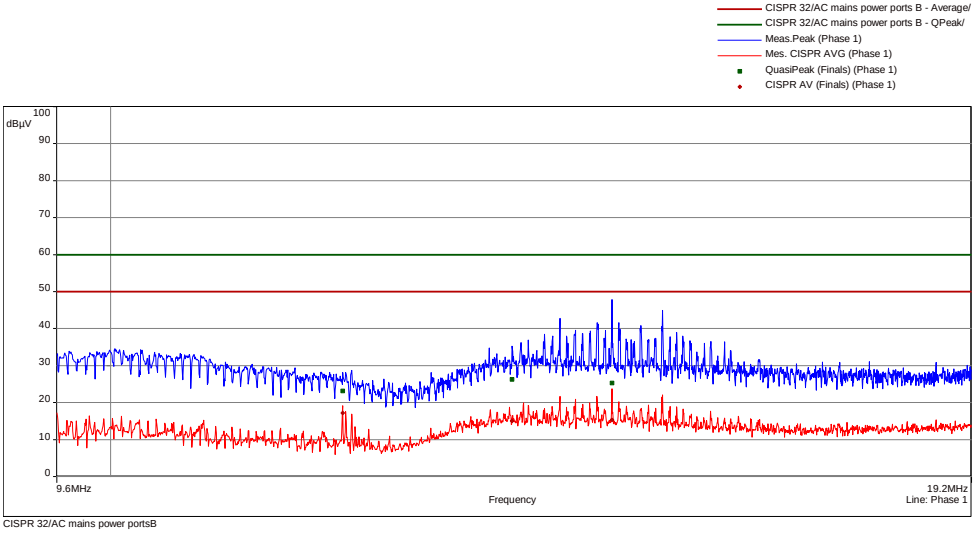
Test point N Result: Passed
Operation mode: continous 13.56MHz RFID reading mode
Remarks: with integrated antenna



freq	QP	margin	limit	AV	margin	limit	line	corr
MHz	dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.1815	46.80	-17.62	64.42	21.62	-32.79	54.42	Neutral	10.09
0.2445	48.70	-13.24	61.94	38.85	-13.09	51.94	Neutral	10.11
0.4125	42.28	-15.32	57.60	20.48	-27.11	47.60	Neutral	10.14
0.4215	40.73	-16.69	57.42	22.88	-24.54	47.42	Neutral	10.14
0.48	46.95	-9.38	56.34	30.89	-15.45	46.34	Neutral	10.14
0.4935	48.89	-7.22	56.11	34.17	-11.94	46.11	Neutral	10.14
0.6315	32.23	-23.77	56.00	14.14	-31.86	46.00	Neutral	10.16
0.6405	31.54	-24.46	56.00	14.46	-31.54	46.00	Neutral	10.16
0.978	35.45	-20.55	56.00	19.25	-26.75	46.00	Neutral	10.19
1.0635	28.11	-27.89	56.00	12.43	-33.57	46.00	Neutral	10.20
1.2135	35.32	-20.68	56.00	19.95	-26.05	46.00	Neutral	10.22
1.2945	28.45	-27.55	56.00	15.84	-30.16	46.00	Neutral	10.23
1.7535	34.90	-21.10	56.00	14.54	-31.46	46.00	Neutral	10.27
1.7805	33.81	-22.19	56.00	14.07	-31.93	46.00	Neutral	10.26
2.931	28.51	-27.49	56.00	8.73	-37.27	46.00	Neutral	10.34
2.985	25.89	-30.11	56.00	6.74	-39.26	46.00	Neutral	10.34
3.9345	26.67	-29.33	56.00	5.46	-40.54	46.00	Neutral	10.38
4.0875	26.99	-29.01	56.00	8.29	-37.71	46.00	Neutral	10.40
5.592	26.65	-33.35	60.00	7.66	-42.34	50.00	Neutral	10.49
6.042	24.17	-35.83	60.00	6.33	-43.67	50.00	Neutral	10.52
9.435	25.84	-34.16	60.00	19.41	-30.59	50.00	Neutral	10.66
9.534	25.42	-34.58	60.00	8.08	-41.92	50.00	Neutral	10.66
13.56*	65.27	5.27	60.00	65.63	15.63	50.00	Neutral	10.91
13.6455	25.14	-34.86	60.00	16.04	-33.96	50.00	Neutral	10.92
13.74	25.47	-34.53	60.00	18.36	-31.64	50.00	Neutral	10.92
21.0045	18.11	-41.89	60.00	9.17	-40.83	50.00	Neutral	11.25
22.071	16.95	-43.05	60.00	8.27	-41.73	50.00	Neutral	11.26
26.679	19.44	-40.56	60.00	9.64	-40.36	50.00	Neutral	11.21
27.12	22.86	-37.14	60.00	20.46	-29.54	50.00	Neutral	11.19

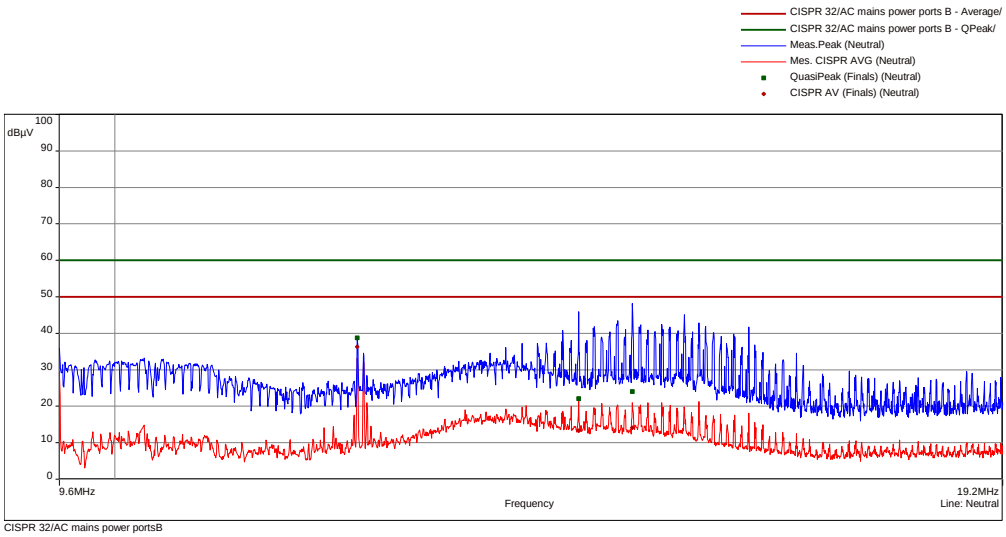
*fundamental Frequency see retest with dummy load

Test point L1 Result: Passed
Operation mode: continous 13.56MHz RFID reading mode
Remarks: with dummy load



MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
11.922	1	23.16	-36.84	60.00	17.22	-32.78	50.00	Phase 1	10.92
13.5555	1	26.32	-33.68	60.00	15.07	-34.93	50.00	Phase 1	11.06
14.622	1	25.26	-34.74	60.00	15.35	-34.65	50.00	Phase 1	11.14

Test point N Result: Passed
Operation mode: continous 13.56MHz RFID reading mode
Remarks: with dummy load



freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
11.949	2	38.79	-21.21	60.00	36.27	-13.73	50.00	Neutral	10.81
14.0595	2	22.06	-37.94	60.00	13.28	-36.72	50.00	Neutral	10.95
14.6265	2	24.02	-35.98	60.00	14.09	-35.91	50.00	Neutral	10.97

5.2 Field strength of the fundamental wave

For test instruments and accessories used see section 6 Part **CPR 1**.

5.2.1 Description of the test location

Test location: OATS1
Test distance: 3 metres

5.2.2 Photo documentation of the test set-up

See attachment A to this report

5.2.3 Applicable standard

FCC Part 15, Section 15.225(a) and RSS-210 clause B.6(a)

5.2.4 Test result

a) Result at a measurement distance of 3m

Frequency (MHz)	Reading (dBµV)	Ant. factor (dB 1/m)	Field strength dB(µV/m)
13.56	31.1	20.5	51.6

b) Result extrapolated to a distance of 30 m

Frequency (MHz)	Reading (dBµV)	Ant. factor (dB 1/m)	Field strength dB(µV/m)	Limit dB(µV/m)	Delta (dB)
13.56	-8.9	20.5	11.6	84.0	-72.4

Limit according to FCC Part 15, Section 15.225(a): and RSS-210 clause B.6(a)

Frequency	Field strength of fundamental wave		Measurement distance
(MHz)	(µV/m)	dB(µV/m)	(metres)
13.553 - 13.567	15848	84.0	30

The requirements are **FULFILLED.**

Remarks: Limit is extrapolated according to FCC Part 15.31(f)(2).

5.3 Spurious emissions

For test instruments and accessories used see section 6 Part **SER 1, SER 2**.

5.3.1 Description of the test location

Test location: OATS1
Test distance: 3 metres

5.3.2 Photo documentation of the test set-up

See attachment A to this report

5.3.3 Applicable standard

FCC Part 15, Section 15.209 and RSS-Gen clause 8.9
The resolution bandwidth during the measurement is as follows:

9 kHz – 150 kHz:	RBW:	200 Hz
150 kHz – 30 MHz:	RBW:	9 kHz
30 MHz – 1000 MHz:	RBW:	120 kHz

5.3.4 Test result

Results at a measurement distance of 3m

Frequency [MHz]	Reading: QP [dBµV]	Correct. [dB]	Level: QP [dBµV/m]	Limit [dBµV/m]	Delta [dB]
27.12	6.7	20.5	27.2	69.5	-42.3
40.68	8.3	13.7	22.0	40.0	-18.0

Limit according to FCC Part 15 Subpart 15.209(a) and RSS-Gen clause 8.9

Frequency	Field strength of spurious emissions		Measurement distance
(MHz)	(µV/m)	dB(µV/m)	(metres)
0.009 - 0.490	2400/F(kHz)	--	300
0.490 - 1.705	24000/F (kHz)	--	30
1.705 - 30.0	30	29.5	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

The requirements are **FULFILLED.**

Remarks: Measurement has been performed up to 1000MHz

The limit was extrapolated to 3m test distance according to FCC Part 15.31(f)(2).

5.4 Frequency tolerance

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

5.4.1 Description of the test location

Test location: AREA4 (Climatic Chamber)

5.4.2 Photo documentation of the test set-up

See attachment A to this report

5.4.3 Applicable standard

According to FCC Part 15, Section 15.225(e) and RSS-210 clause B.6

5.4.4 Test result

Test conditions		Test result	Tolerance	Limit
		Frequency (MHz)	(kHz)	(kHz)
T_{min} (-20)°C	V_{nom} (120.0 V)	13.56068	+ 0.68	± 1.356
T (-10)°C	V_{nom} (120.0 V)	13.56072	+ 0.72	± 1.356
T (0)°C	V_{nom} (120.0 V)	13.56072	+ 0.72	± 1.356
T (10)°C	V_{nom} (120.0 V)	13.56072	+0.72	± 1.356
T_{nom} (20)°C	V_{min} (102.0 V)	13.56068	+ 0.68	± 1.356
	V_{nom} (120.0 V)	13.56070	+ 0.70	± 1.356
	V_{max} (138.0 V)	13.56068	+ 0.68	± 1.356
T (30)°C	V_{nom} (120.0 V)	13.56068	+ 0.68	± 1.356
T (40)°C	V_{nom} (120.0 V)	13.56064	+ 0.64	± 1.356
T_{max} (50)°C	V_{nom} (120.0 V)	13.56064	+ 0.64	± 1.356
Measurement uncertainty		± 10 Hz		

Limit Calculation:
Carrier frequency: f_c = 13.56 MHz
Max. tolerance: ± 0.01 % of 13.56 MHz = ± 1.356 kHz

Limit according to FCC Part 15, Section 15.225(e) and RSS-210 clause B.6:
The frequency tolerance of the carrier signal shall be maintained within ±0.01 % of the operating frequency.

The requirements are **FULFILLED.**

Remarks: Due to the size of the product is was not possible to place the whole EuT in the climatic chamber. The RFID Board which incporporates all parts of the transmitter function was placed in the climatic chamber. The connection cable (UART connector) to the remaining EuT was extended

5.5 Bandwidth

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

5.5.1 Description of the test location

Test location: Shielded Room S6

5.5.2 Photo documentation of the test set-up

See attachment A to this report

5.5.3 Applicable standard

According to FCC Part 15, Section 15.215(c) and RSS-Gen 6.7

5.5.4 Test result

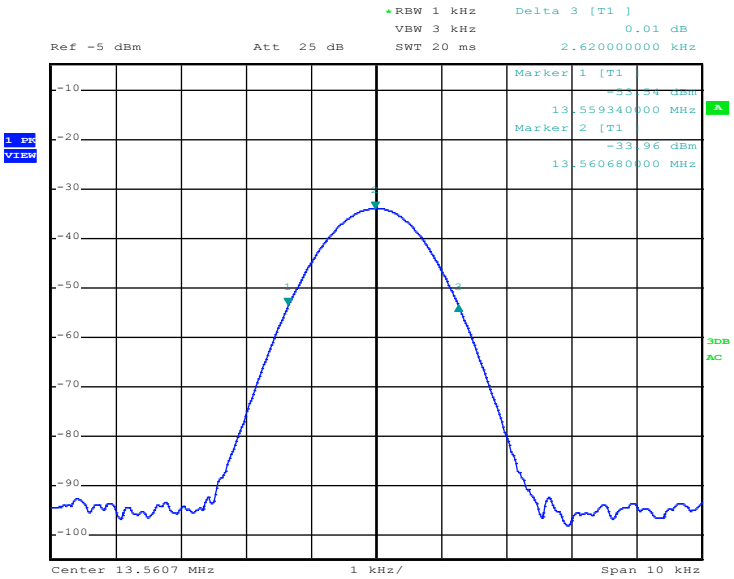
Measured Bandwidth	result (kHz)	Limit (kHz)
20dB	2,62	--
99%	2,26	--

The requirements are **FULFILLED.**

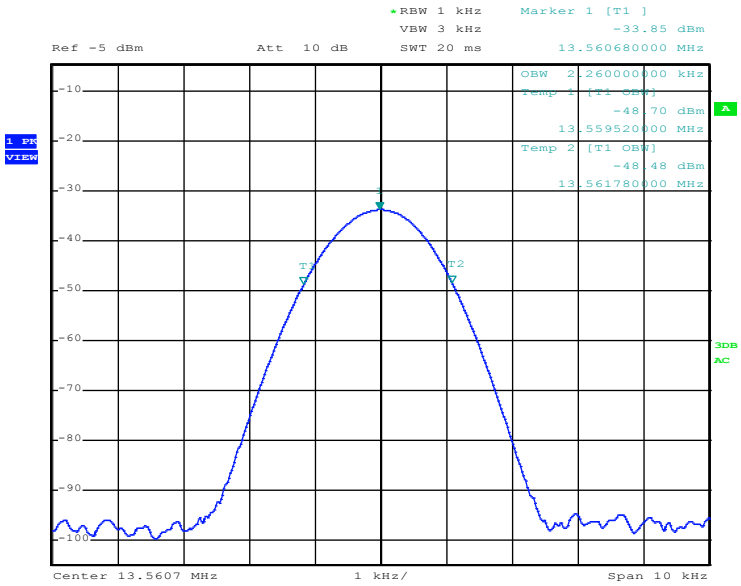
Remarks: For detailed test result please refer to following test protocol.

5.5.5 Test protocol

20 dB bandwidth



99% Bandwidth



5.6 Transmitter spectrum mask

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

5.6.1 Description of the test location

Test location: AREA4

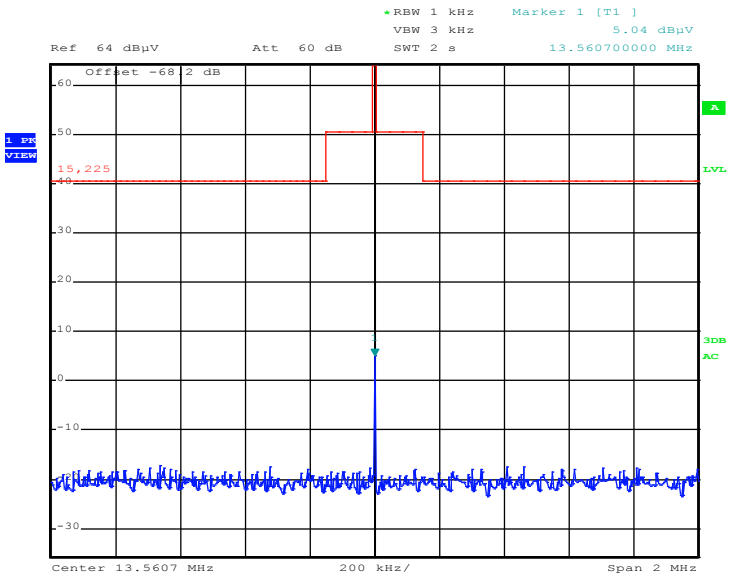
5.6.2 Photo documentation of the test set-up

See attachment A to this report

5.6.3 Applicable standard

According to FCC Part 15, Section 15.225 (a-d) and RSS-210 clause B.6 (a-d)

5.6.4 Test result



Limits according to FCC Part 15, Section 15.225(a-d) and RSS-210 clause B.6 (a-d)

Frequency band (MHz)	Emission level limit at 30 m (µV/m)	Emission level limit at 30 m (dBµV/m)
13.110 – 13.410	106	40.5
13.410 - 13.553	334	50.5
13.553 - 13.567	15.848	84.0
13.567 – 13.710	334	50.5
13.710 – 14.010	106	40.5
outside of 13.110 – 14.010	30	29.5

The requirements are **FULFILLED.**

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 3.18.0.26	01-02/68-13-001				
	ESCI	02-02/03-15-001	11/06/2019	11/06/2018		
	ESH 2 - Z 5	02-02/20-05-004	25/10/2019	25/10/2017	30/10/2019	30/04/2019
	N-4000-BNC	02-02/50-05-138				
	N-1500-N	02-02/50-05-140				
	ESH 3 - Z 2	02-02/50-05-155	18/11/2019	18/11/2016	13/11/2019	13/05/2019
	6430	02-02/50-13-014				
CPR 1	ESCI	02-02/03-05-005	11/12/2019	11/12/2018		
	HFH 2 - Z 2	02-02/24-05-020	09/08/2020	09/08/2017	15/01/2020	15/01/2019
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	6430	02-02/50-13-014				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
FE	ESCI	02-02/03-05-005	11/12/2019	11/12/2018		
	HFRAE 5161 _ 50 kHz-120	02-02/24-11-004				
	WK-340/40	02-02/45-05-001	06/04/2019	06/04/2018		
	6430	02-02/50-13-014				
	METRAHIT 29S	02-03/32-08-002				
MB	ESCI	02-02/03-05-005	11/12/2019	11/12/2018		
	HFRAE 5161 _ 50 kHz-120	02-02/24-11-004				
	6430	02-02/50-13-014				
SER 1	ESCI	02-02/03-05-005	11/12/2019	11/12/2018		
	HFH 2 - Z 2	02-02/24-05-020	09/08/2020	09/08/2017	15/01/2020	15/01/2019
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	6430	02-02/50-13-014				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
SER 2	ESVS 30	02-02/03-05-006	06/06/2019	06/06/2018		
	VULB 9168	02-02/24-05-005	18/04/2019	18/04/2018		
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	6430	02-02/50-13-014				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				