

Test Report

Product	Handheld RFID reader with Bluetooth module and battery charger
Name and address of the applicant	BioControl AS Gaustadveien 75 1894 Rakkestad, Norway
Name and address of the manufacturer	BioControl AS Gaustadveien 75 1894 Rakkestad, Norway
Model	HHR5000LN, HHR5000SN
Rating	Secondary Battery (7.4V, 2600mAh, Li-Ion)
Trademark	
Serial number	See page 3
Additional information	ISO reader, Bluetooth, RFID
Tested according to	FCC Part 15.209 Low Power Transceiver Industry Canada RSS-210, Issue 10 Low Power Transceiver
Order number	405631
Tested in period	2020-10-13 to 2020-10-23 and 2021-09-07 and 2021-11-17
Issue date	2021-11-17
Name and address of the testing laboratory	 Instituttveien 6 Kjeller, Norway www.nemko.com CAB Number: FCC: NO0001 ISED: NO0470 TEL: +47 22 96 03 30 FAX: +47 22 96 05 50   An accredited technical test executed under the Norwegian accreditation scheme
 Prepared by [Frode Sveinsen]  Approved by [G.Suhanthakumar]	
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1 INFORMATION

1.1 Test Item

Name	BioControl
Model/version	HHR5000SN HHR5000LN
FCC ID	VW2-107378
ISED ID	7523A-107378
Serial number	2040-2 (HHR5000SN) 2040-7 (HHR5000LN) 2040-1 (HGC2)
Hardware identity and/or version	HHR5000 0.05, IsoModule 0.03, NFCReader 0.01, HandgripCharger 0.01
Software identity and/or version	HHR5000: 60.2, ISO_Module: 9.10, NFCReader: 6.6
Frequency Range	131 kHz / 134.2 kHz
Number of Channels	2
Type of Modulation	AM/PSK when transmit/receive FDK, FSK when receive HDX
Conducted Output Power	N/A
Antenna Connector	None (Integral Antenna)
Number of Antennas	1
Antenna Type	Open Coil
Power Supply	Secondary Battery (Li-Ion, 7.4V, 2600mAh)

Description of Test Item

The EUT is a RFID reader with ISO reader.

The EUT also contains a certified BLE Module from Ublox (FCC ID: XPYNINAB1; IC: 8595A-NINAB1).

The tested model was a HHR5000LN with LCD display and NFC reader, however the ISO reader is identical on all models.

Model Comparison

Feature	HHR5000S	HHR5000L	HHR5000SN	HHR5000LN
LCD	No	Yes	No	Yes
Smartphone holder	Yes	No	Yes	No
ISO Reader	Yes	Yes	Yes	Yes
NFC Reader	No	No	Yes	Yes
BLE Module	Yes	Yes	Yes	Yes
HandGrip Charger	HGC2			
FCC ID	VW2-107377		VW2-107378	
IC	7523A-107377		7523A-107378	

1.2 Normal test condition

Temperature: 20 - 24 °C
Relative humidity: 20 - 50 %
Normal test voltage: 7.4 V DC

The values are the limit registered during the test period.

1.3 Test Engineer(s)

Frode Sveinsen

1.4 Antenna Requirement

Does the EUT have detachable antenna(s)?	☐ YES	☒ NO
If detachable, is the antenna connector(s) non-standard?	☐ YES	☐ NO
The tested equipment has only integral antennas.		

Requirement: FCC 15.203, 15.204

1.5 EUT Operating Modes

Description of operating modes	Continuous TX
Additional information	The EUT was programmed to transmit continuously from the LCD Interface by using a special test software. It was only possible to select the transmit frequency, no power or modulation settings were available.

1.6 Comments

The EUT is an ISO reader with 131 kHz and 134.2 kHz.

The EUT also contains a certified BLE Module.

All measurements were done with the EUT powered by a fully charged battery.

Measurements with BT and ISO transmitting at the same time were performed with the EUT charging from 120V 60Hz.

2 TEST REPORT SUMMARY

2.1 General

All measurements are traceable to national standards.

The tests were conducted for demonstrating compliance with FCC CFR 47 Part 15, paragraph 15.225 and Industry Canada RSS-210 Issue 10 and RSS-GEN Issue 5.

Tests were performed in accordance with ANSI C63.4-2014 and ANSI C63.10-2013.

Radiated tests were made in a semi-anechoic chamber at measuring distance of 10m.

A description of the test facility is on file with FCC and ISED.

☒ New Submission

☒ Production Unit

☐ Class II Permissive Change

☐ Pre-production Unit

DCD Equipment Code

☐ Family Listing



THIS TEST REPORT APPLIES ONLY TO THE ITEM(S) AND CONFIGURATIONS TESTED.

Deviations from, additions to, or exclusions from the test specifications are described in "Summary of Test Data".

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2.2 Test Summary

Name of test	FCC Part 15 reference	RSS-210 Issue 10 ICES-003 Issue 7 RSS-GEN Issue 5 reference	ANSI C63.10-2013 Reference	Result
Supply Voltage Variations	15.31(e)	6.11 (RSS-GEN)	5.13	N/A*
Antenna Requirement	15.203	6.8 (RSS-GEN)	5.8	Complies
Power Line Conducted Emission	15.207	3.2 (ICES-003) 8.8 (RSS-GEN)	7.3 (C63.4-2014) 6.2	Complies
Occupied Bandwidth (99% BW)	N/A	6.7 (RSS-GEN)	6.9.3	Complies
Radiated Emissions at Fundamental	15.209(a)	7.3 (RSS-210)	6.4	Complies
Spurious Emissions (Radiated)	15.225(c)(d) 15.109(a) 15.209(a)	7.3 (RSS-210) 8.9 (RSS-GEN)	6.3, 6.4, 6.5, 6.6	Complies

*This is a battery-operated device.

Revision history

Revision	Date	Comment	Sign
00	2021-02-11	First edition	FS
01	2021-03-04	Corrected Measuring distance and added Class A comment.	FS
02	2021-03-10	Updated Conducted Emissions test	FS
03	2021-10-14	Updated with interoperability tests for BT	FS
04	2021-11-17	Updated Setup diagrams and interoperability plots	FS

3 TEST RESULTS

3.1 Power Line Conducted Emissions

FCC Part 15.207

ISED ICES-003 Issue 7, Clause 3.2

RSS-GEN Issue 5, Clause 8.8

Measurement procedure: ANSI C63.4-2014 using 50 μ H/50 ohms LISN.

Test Results: Complies with Class B limits

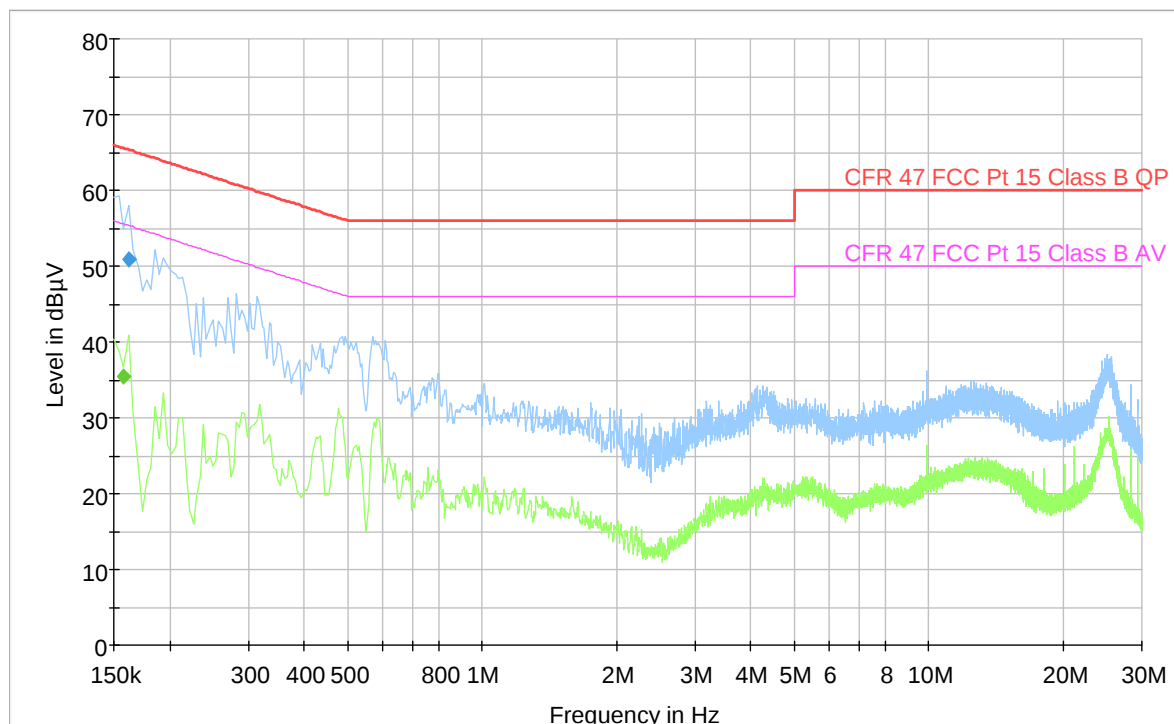
Measurement Data: See attached plots.

Highest measured value (L1 and N):

Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.158	---	35.45	55.57	20.12	1000	9	N	OFF
0.162	50.84	---	65.36	14.52	1000	9	N	OFF

Charging, 120V 60Hz

Full Spectrum



3.2 Occupied Bandwidth (99% BW)

ISED Canada RSS-GEN Issue 5, Clause 6.7

Measurement procedure: ANSI C63.10-2013 Clause 6.9.3

Test Results: Complies

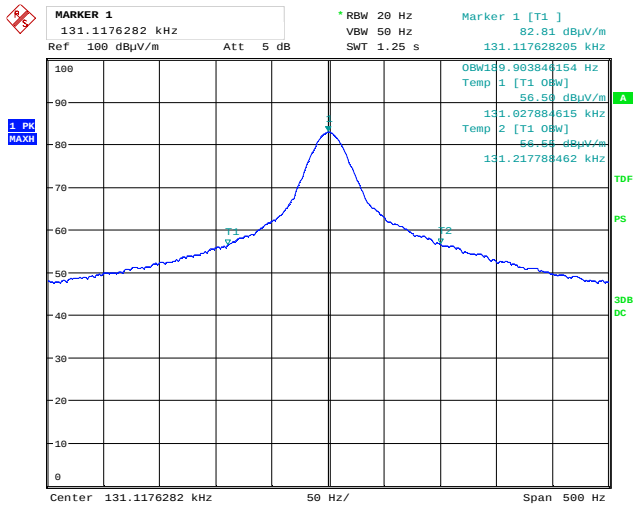
Measurement Data:

Carrier Frequency	Occupied Bandwidth (99% BW)
131 kHz	190 Hz
134 kHz	209 Hz

See attached plots.

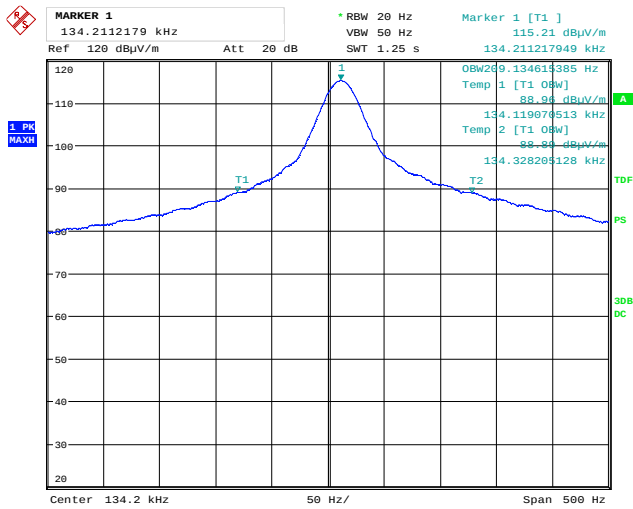
Requirements:

No requirement for 99% BW, reported for information only.



Date: 15.OCT.2020 10:32:55

99% Occupied Bandwidth, 131 kHz



Date: 15.OCT.2020 09:46:19

99% Occupied Bandwidth, 134 kHz

3.3 Frequency Tolerance

FCC Part 15.209

ISED Canada RSS-GEN Issue 5, Clause 6.11

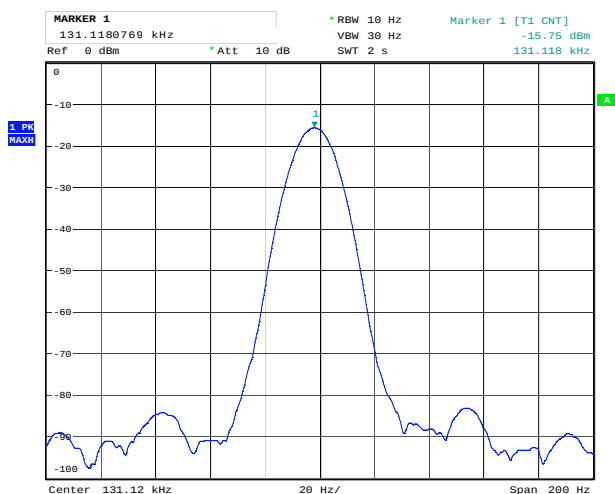
Measurement procedure: ANSI C63.10-2013 Clause 6.8.1

Test Results: Complies

Measurement Data:

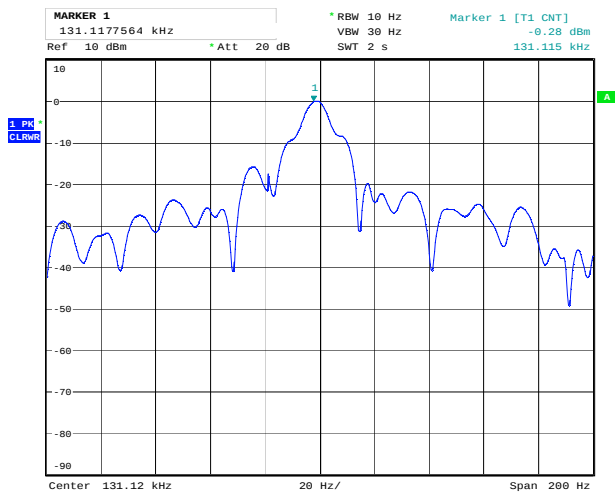
Temperature	Nominal Freq (kHz)	Measured Freq (kHz)	Deviation (%)	Requirement (%)
Nominal (+20 °C)	131.000	131.118	0.090	No requirement
-20 °C	131.000	131.115	0.088	
+50 °C	131.000	131.116	0.089	
Nominal (+20 °C)	134.000	134.212	0.158	
-20 °C	134.000	134.212	0.158	
+50 °C	134.000	134.211	0.157	

Measured with the counter function of the Spectrum Analyzer.



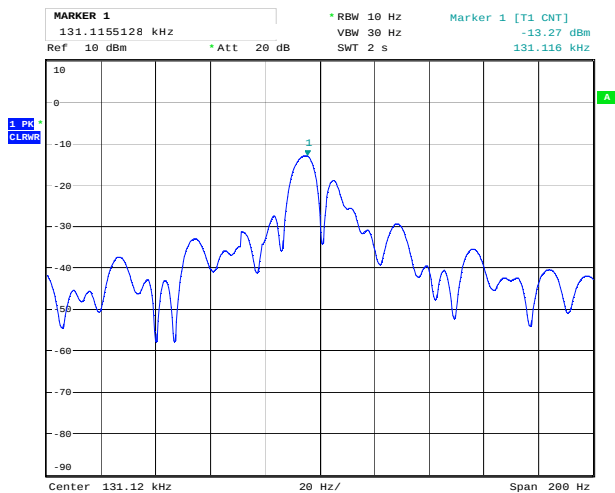
Date: 19.OCT.2020 12:47:13

Frequency Tolerance +20 °C, 131 kHz



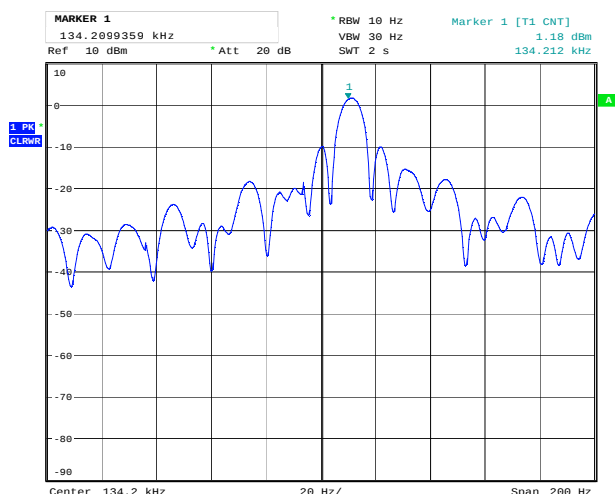
Date: 19.OCT.2020 15:40:55

Frequency Tolerance -20 °C, 131 kHz



Date: 19.OCT.2020 14:37:29

Frequency Tolerance +50 °C, 131 kHz



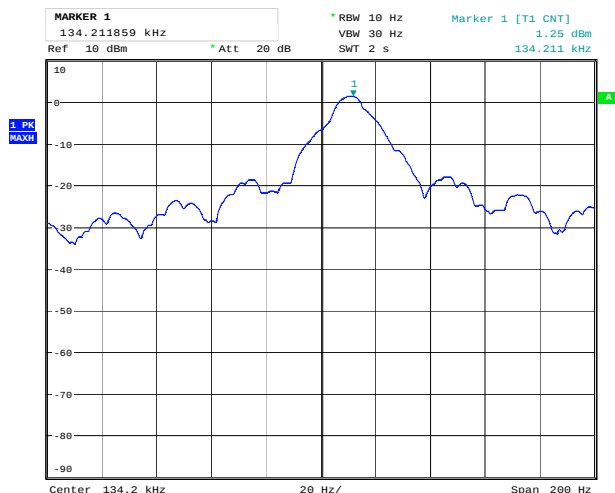
Date: 19.OCT.2020 15:07:52

Frequency Tolerance +20 °C, 134 kHz



Date: 19.OCT.2020 15:39:35

Frequency Tolerance -20 °C, 134 kHz



Date: 19.OCT.2020 14:33:21

Frequency Tolerance +50 °C, 134 kHz

3.4 Peak Power Output

FCC Part 15.225 (b)(c)

ISED Canada RSS-210 Issue 10, Clause B.6 (a)

Measurement procedure: ANSI C63.10-2013 Clause 6.4

Test Results: Complies

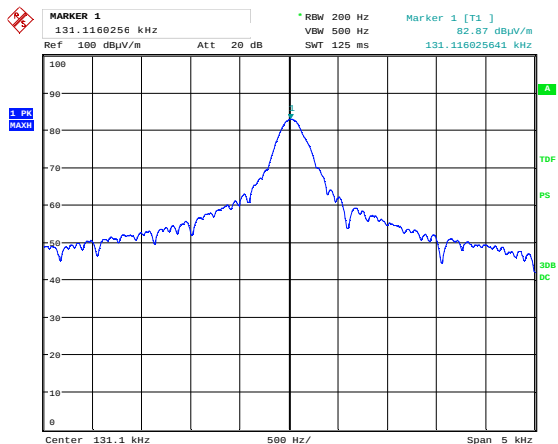
Measurement Data:

Carrier Frequency (kHz)	Measuring Distance (m)	Field Strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
131	10	82.9	84.3	1.4
134	10	82.7	84.1	1.4

See attached plots.

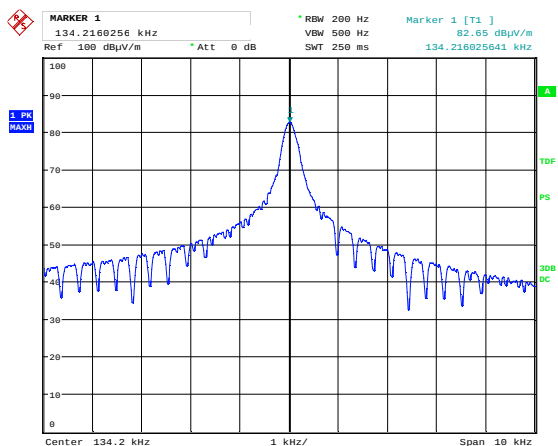
Requirements:

The maximum radiated field strength shall not exceed the following limits:



Date: 15.OCT.2020 10:31:41

Fundamental Emissions 131 kHz, HP @10m, Maximum



Date: 15.OCT.2020 10:01:12

Fundamental Emissions 134 kHz, HP @10m, Maximum

3.5 Restricted Bands of operation

Restricted Bands of operation for FCC and ISSED are defined in FCC Part 15.205 and ISSED RSS-GEN, Issue 5 clause 8.10.

Generally, no fundamentals are allowed in the restricted bands and all emissions must comply with the limits in FCC 15.209 or RSS-GEN, Issue 5, clause 8.9.

FCC (MHz)	ISSED Canada (MHz)	FCC (GHz)	ISSED Canada (GHz)
0.090-0.110		0.96-1.24 1.3-1.427	0.96-1.427
0.495-0.505		1.435-1.6265	
2.1735-2.1905		1.6455-1.6465	
	3.020-3.026	1.660-1.710	
4.125-4.128		1.7188-1.7222	
4.17725-4.17775		2.2-2.3	
4.20725-4.20775		2.31-2.39	
	5.677-5.683	2.4835-2.5	
6.215-6.218		2.69-2.9	2.655-2.9
6.26775-6.26825		3.26-3.267	
6.31175-6.31225		3.332-3.339	
8.291-8.294		3.3458-3.358	
8.362-8.366		3.6-4.4	3.5-4.4
8.37625-8.38675		4.5-5.15	
8.41425-8.41475		5.35-5.46	
12.29-12.293		7.25-7.75	
12.51975-12.52025		8.025-8.5	
12.57675-12.57725		9.0-9.2	
13.36-13.41		9.3-9.5	
16.42-16.423		10.6-12.7	
16.69475-16.69525		13.25-13.4	
16.80425-16.80475		14.47-14.5	
25.5-25.67		15.35-16.2	
37.5-38.25		17.7-21.4	
73-74.6		22.01-23.12	
74.8-75.2		23.6-24.0	
108-121.94 123-138	108-138	31.2-31.8	
149.9-150.05		36.43-36.5	
156.52475-156.52525		Above 38.6	
156.7-156.9			
162.0125-167.17			
167.72-173.2			
240-285			
322-335.4			
399.9-410			
608-614			

Frequencies in **Bold** text are specific for FCC or ISSED, all other frequencies are common.

3.6 Radiated Emissions, 9 kHz – 30 MHz.

FCC Part 15.209 (a)

ISED Canada RSS-GEN Issue 5, Clause 8.9

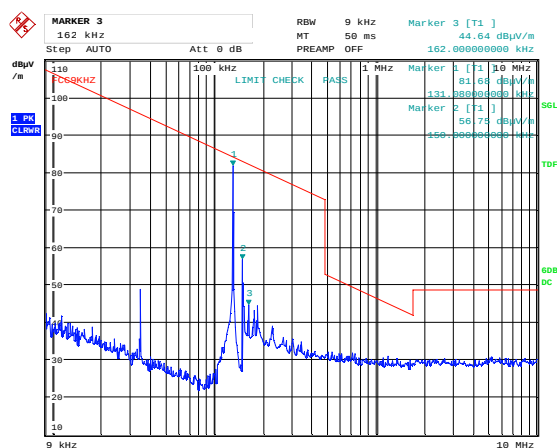
Measurement procedure: ANSI C63.10-2013 Clause 6.4

Test Results: Complies

Measuring distance 10m, Peak detector.

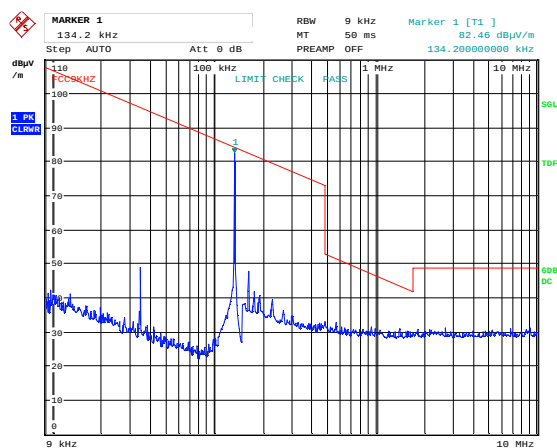
No components detected, see attached plots.

Limit is converted to 10m using 40 dB/decade according to 15.31 (f) (2).



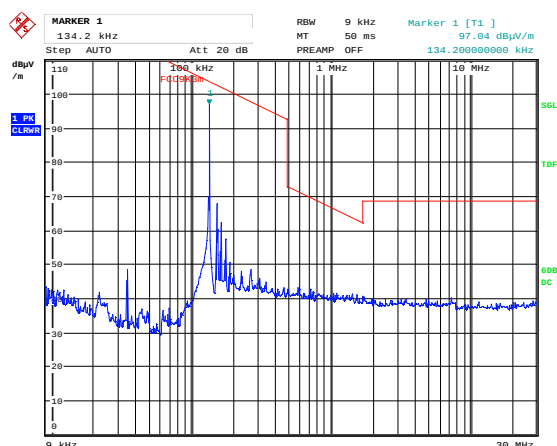
Date: 15.OCT.2020 10:38:42

Radiated Emissions 9 kHz - 10 MHz, 131kHz, HP @10m



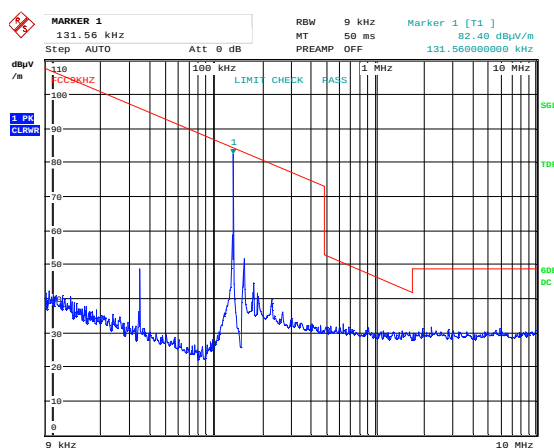
Date: 15.OCT.2020 09:59:24

Radiated Emissions 9 kHz - 10 MHz, 134kHz, HP @10m



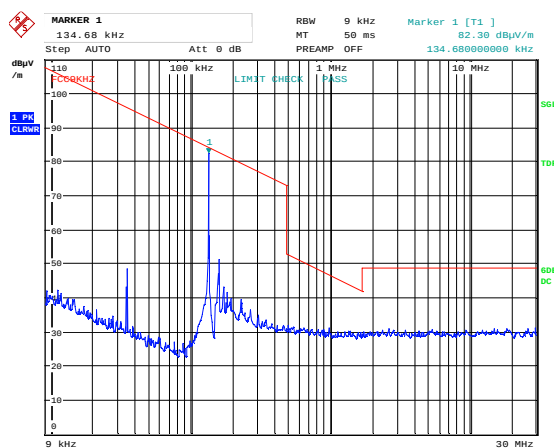
Date: 17.NOV.2021 13:35:12

Radiated Emissions 9 kHz - 30 MHz, 134kHz+BT, HP @3m, EUT Charging



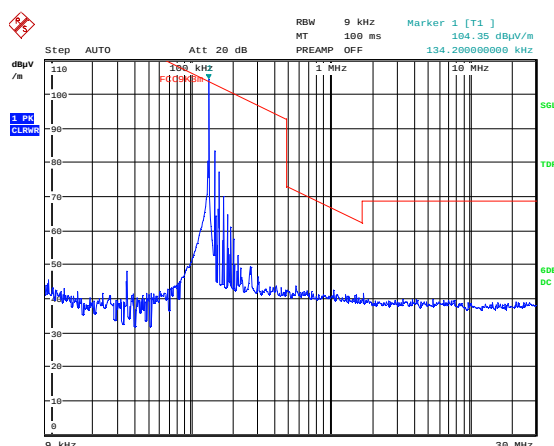
Date: 13.OCT.2020 14:07:08

Radiated Emissions 9 kHz - 10 MHz, 131kHz, LP @10m



Date: 13.OCT.2020 12:33:31

Radiated Emissions 9 kHz - 30 MHz, 134kHz, LP @10m



Date: 17.NOV.2021 13:14:45

Radiated Emissions 9 kHz - 30 MHz, 134kHz+BT, LP @3m, EUT Charging

4 Measurement Uncertainty

Measurement Uncertainty Values		
Test Item		Uncertainty
Output Power		±0.5 dB
Power Spectral Density		±0.5 dB
Out of Band Emissions, Conducted	< 3.6 GHz	±0.6 dB
	> 3.6 GHz	±0.9 dB
Spurious Emissions, Radiated	< 1 GHz	±2.5 dB
	> 1 GHz	±2.2 dB
Emission Bandwidth		±4 %
Power Line Conducted Emissions		+2.9 / -4.1 dB
Spectrum Mask Measurements	Frequency	±5 %
	Amplitude	±1.0 dB
Frequency Error		±0.6 ppm
Temperature Uncertainty		±1 °C

All uncertainty values are expanded standard uncertainty to give a confidence level of 95%, based on coverage factor k=2

5 LIST OF TEST EQUIPMENT

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the Test Laboratory.

No.	Model number	Description	Manufacturer	Ref. no.	Cal. date	Cal. Due
1	FSU26	Spectrum Analyzer	Rohde & Schwarz	LR 1504	2020-01	2021-01
2	ESU40	Measuring Receiver	Rohde & Schwarz	LR 1639	2020-01	2021-01
3	HFH2-Z2	Loop Antenna	Rohde & Schwarz	LR 1660	2019-06	2022.06
4	6502	Active Loop	EMCO	N 3488	N/A	
5	RG223	RF Cables	Suhner	N/A	COU	
6	ENV216	LISN	Rohde & Schwarz	LR 1665	2019-11	2021-11
7	ESCI3	EMI Receiver	Rohde & Schwarz	N 4259	2019-10	2021-10*

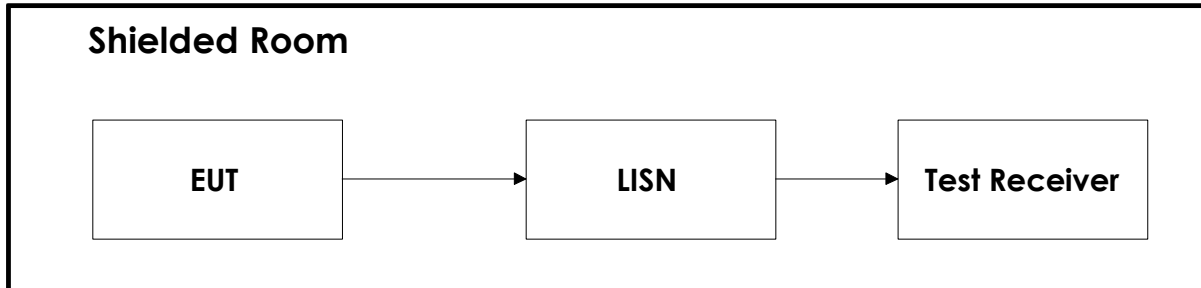
*Only used for Power-Line Conducted Tests, not used after 2020-10

The software listed below has been used for one or more tests.

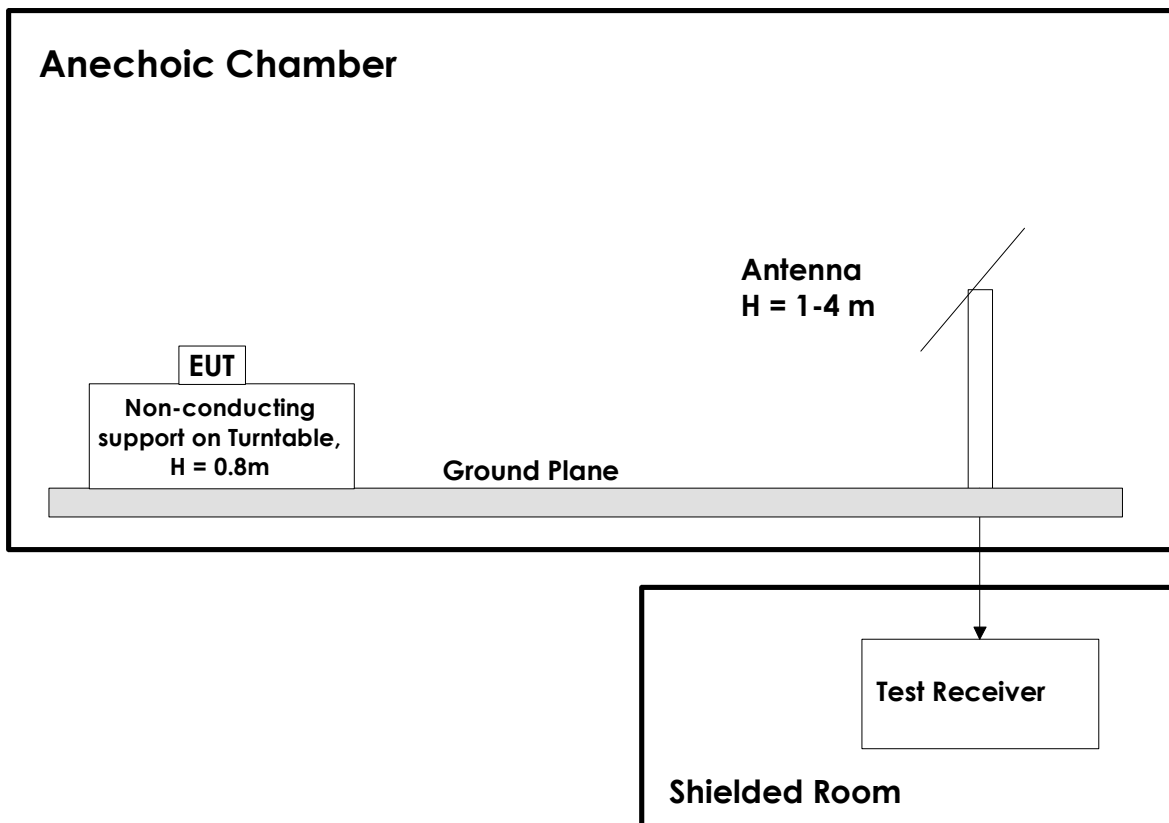
No.	Manufacturer	Name	Version	Comment
1	Rohde & Schwarz	EMC32	10.30.10	Power Line Conducted test software
2	Nemko AS	RSPlot	1.0.10.0	Screenshots from R&S Spectrum Analyzers

6 Test Setups

6.1 Power Line Conducted Emission



6.2 Test Site Radiated Emission



This test setup is used for all radiated emissions tests. For frequencies below 30 MHz the measuring distance is 10m, for all other frequencies it is 3m or 1m. Emissions above 1 GHz are measured with a Spectrum Analyzer and Horn Antenna. For measurements above 18 GHz the test receiver is moved inside the anechoic chamber and located next to the antenna to minimize the cable loss. All measurements at 1GHz and above were performed with turntable height 1.5m and with the ground plane covered by absorbers. A pre-amplifier is used for all measurements above 30 MHz, and High-Pass or Band-Pass filter is used for all harmonics.