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Test Report

Report Number: 147045E2

Applicant:

Kistler Lorch GmbH

Manufacturer:

Kistler Lorch GmbH

Equipment under Test (EUT):

KiTorq Rotor

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-17186-01-01
D-PL-17186-01-02
D-PL-17186-01-03

Laboratory (CAB) accredited by
Deutsche Akkreditierungsstelle GmbH (DAkkS)
in compliance with DIN EN ISO/IEC 17025
under the Reg. No. D-PL-17186-01-02,
FCC Test site registration number 90877

REFERENCES

[1] **ANSI C63.4:2009** American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

[2] **FCC 47 CFR Part 15** Radio Frequency Devices

TEST RESULT

The requirements of the tests performed as shown in the overview (chapter 4 of this test report) were fulfilled by the equipment under test.
The complete test results are presented in the following.

	Name	Signature	Date
Test engineer:	Thomas KÜHN		05 March 2015
Authorized reviewer:	Bernd STEINER		05 March 2015

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1 Identification

1.1 Applicant

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Applicant represented during the test by the following person:	-

1.2 Manufacturer

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Address:	Maierhofstraße 35 73547 Lorch
Country:	Germany
Name for contact purposes:	Mr. Michael HEINEMANN
Phone:	+49 71 72 – 184 – 139
Fax:	+49 71 72 – 184 – 439
eMail Address:	michael.heinemann@kistler.com
Manufacturer represented during the test by the following person:	-

1.3 Test laboratory

The tests were carried out at:

PHOENIX TESTLAB GmbH
Königswinkel 10
32825 Blomberg
Germany

Test Laboratory (CAB) accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025 under the Reg. No. D-PL-17186-01-02,
recognized by Bundesnetzagentur under the Reg.-No. BNetzA-CAB-02/21-104,
listed by FCC 31040/SIT1300F2.

1.4 EUT (Equipment Under Test)

Equipment under test: *	Short Range Device
Model name: *	KiTorq Rotor
Type of equipment: *	Contactless torque measurement system
Serial number: *	4734233
PCB identifier: *	05 06 0392 (4550A1K0S10N1WA (Rotor))
Hardware version: *	Revision B
Software version: *	V8.27
Highest / lowest internal frequency: *	13.56 MHz
FCC ID:	2AELL-KITORQ455X

*: Declared by the applicant.

1.5 Technical data of equipment

Rated RF output power: *	0.1 mW					
Emission classification: *	F1D					
Antenna type: *	Integral					
Power supply: *	U_{nom}=	9.3 V DC	U_{min}=	8.9 V DC	U_{max}=	9.7 V DC
Type of modulation: *	PSK					
Operating frequency range:*	13.561 MHz					
Number of channels: *	1					
Temperature range: *	10 °C to +60 °C					

*: Declared by the applicant.

The following external I/O cables were used:

Identification	Connector		Length
	EUT	Ancillary	
-	No cables are connectable to the EUT	-	-
-		-	-
-	-	-	-

*: Length during the test if no other specified.

1.6 Dates

Date of receipt of test sample:	09 December 2014
Start of test:	13 January 2015
End of test:	17 January 2015

2 Operational states and physical boundaries

All tests were carried out with unmodified samples, which were operating in normal operation mode. The KiTorq system consists of two parts:

- EUT:
  A 13.56 MHz transmitter (4550A1K0S10N1WA (Rotor)). This device will be powered by the 120 kHz carrier and transmits data to the 120 kHz transmitter. It will be not able to transmit, if no 120 kHz signal is received.
- Auxiliary equipment:
  A 120 kHz transmitter (4541AN1(Stator)). This device transmits an unmodulated carrier and will be supplied with 24 V DC. It contains also a 13.56 MHz receiver. As declared by the applicant, the 120 kHz transmission will be stopped, if no 13.56 MHz signal is received.

Because the functionality from the other system part is necessary for operation both devices could only tested together. Therefore no separate measurements of the receiver emissions could be carried out, because the receiver needs the signal from the collocated simultaneously operating transmitter.

The measurement results of the auxiliary equipment (120 kHz transmitter) are not object of this test report, they will be documented in a separate test report (F147045E1).

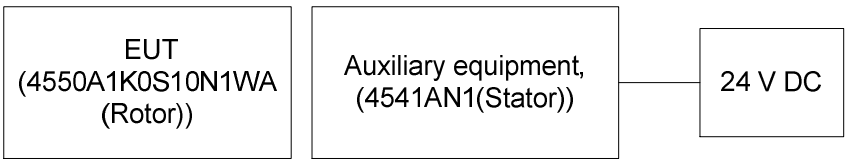
Both parts of the system were positioned in its maximum distance to each other (1 mm) on a wooden support. With higher distances both parts of the system will cease function.

During all tests the EUT part (4550A1K0S10N1WA (Rotor)) of the system was powered by the ancillary equipment (4541AN1(Stator)) wireless. The correct transmitting of data will be displayed by a green LED on the ancillary equipment.

The system was positioned in two orthogonal directions in order to find the highest emission. The positions were defined as follows:
Pos. 1: The axis of the rotor is orientated horizontal.
Pos. 2: The axis of the rotor is orientated vertical.

The worst case position is documented with the measuring results.

The drawing below shows the setup schematically:



Physical boundaries of the EUT:

3 ADDITIONAL INFORMATION

During the tests, the EUT was not labeled as required by the FCC.

4 Overview

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	Status	Refer page
Conducted emissions on supply line	0.15 - 30	15.207 (a)	Not applicable *	----
Radiated emissions	0.009 - 25,000	15.205 (a) 15.209 (a)	Passed	13 et seq.

*: Not applicable, because the 4550A1K0S10N1WA has no power supply connector. It will be supplied wireless by the 4541AN1. The emissions from this device will be documented in separate test report (F147045E1).

5 Test results

5.1 Radiated emissions

5.1.1 Method of measurement (radiated emissions)

The radiated emission measurement is subdivided into five stages.

- A preliminary measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 9 kHz to 1 GHz.
- A final measurement carried out on an outdoor test side without reflecting ground plane and a fixed antenna height in the frequency range 9 kHz to 30 MHz.
- A final measurement carried out on an open area test side with reflecting ground plane and various antenna height in the frequency range 30 MHz to 1 GHz.
- A preliminary measurement carried out in a fully anechoic chamber with a variable antenna distance and height in the frequency range 1 GHz to 110 GHz.
- A final measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 1 GHz to 110 GHz.

All measurements will be carried out with the EUT working on the middle and upper and lower edge of the assigned frequency band.

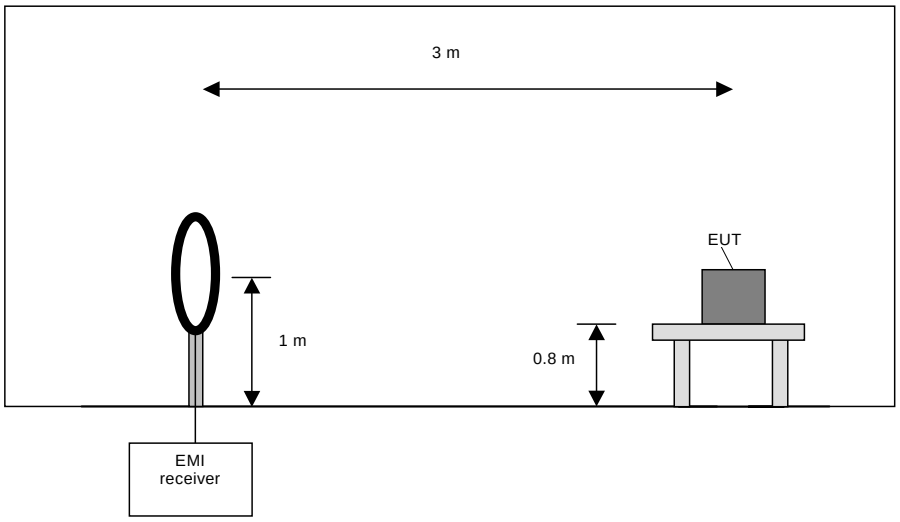
Preliminary measurement (9 kHz to 30 MHz):

In the first stage a preliminary measurement will be performed in a shielded room with a measuring distance of 3 meters. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2009 [1].].

The frequency range 9 kHz to 30 MHz will be monitored with a spectrum analyser while the system and its cables will be manipulated to find out the configuration with the maximum emission levels if applicable. The EMI Receiver will be set to MAX Hold mode. The EUT and the measuring antenna will be rotated around their vertical axis to found the maximum emissions.

The resolution bandwidth of the spectrum analyser will be set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	10 kHz



Preliminary measurement procedure:

Prescans were performed in the frequency range 9 kHz to 150 kHz and 150 kHz to 30 MHz.

The following procedure will be used:

1) Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2) Manipulate the system cables within the range to produce the maximum level of emission.
3) Rotate the EUT by 360 ° to maximize the detected signals.
4) Make a hardcopy of the spectrum.
5) Measure the frequencies of highest detected emission with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
6) Repeat steps 1) to 5) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).
7) Rotate the measuring antenna and repeat steps 1) to 5).

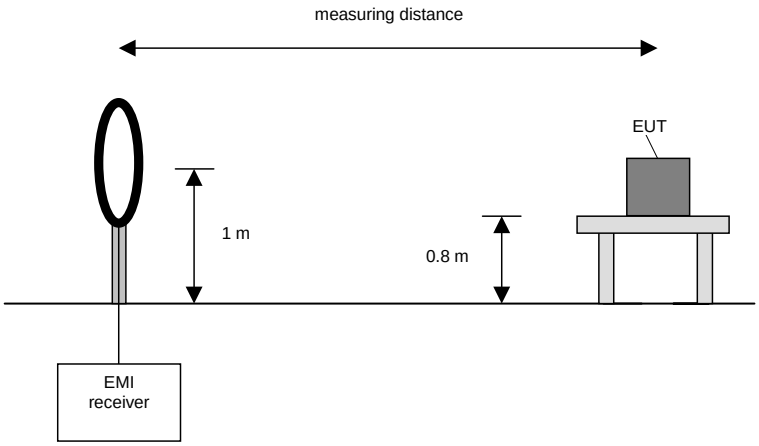
Final measurement (9 kHz to 30 MHz):

In the second stage a final measurement will be performed on an open area test site with no conducting ground plane in a measuring distances of 3 m, 10 m and 30 m. In the case where larger measuring distances are required the results will be extrapolated based on the values measured on the closer distances according to Section 15.31 (f) (2) [2]. The final measurement will be performed with a EMI Receiver set to Quasi Peak detector except for the frequency bands 9 kHz to 90 kHz and 110 kHz to 490 kHz where an average detector will be used according Section 15.209 (d) [2].

On the during the preliminary measurement detected frequencies the final measurement will be performed while rotating the EUT and the measuring antenna in the range of 0 ° to 360 ° around their vertical axis until the maximum value is found.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz



Final measurement procedure:

The following procedure will be used:

1) Monitor the frequency range with the measuring antenna at vertical orientation parallel to the EUT at an azimuth of 0 °.
2) Rotate the EUT by 360 ° to maximize the detected signals and note the azimuth and orientation.
3) Rotate the measuring antenna to find the maximum and note the value.
4) Rotate the measuring antenna and repeat steps 1) to 3) until the maximum value is found.
5) Repeat steps 1) to 4) with the other orthogonal axes of the EUT (because of EUT is a module and it has various intended operation positions).

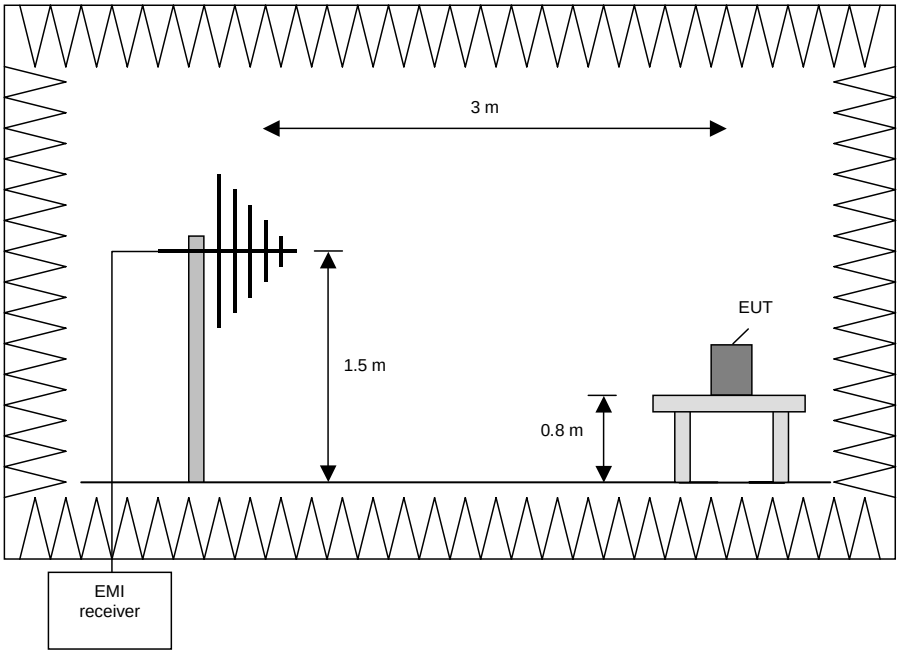
Preliminary measurement (30 MHz to 1 GHz)

In the first stage a preliminary measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter. Table top devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The setup of the Equipment under test will be in accordance to ANSI C63.4-2009 [1].

The frequency range 30 MHz to 1 GHz will be measured with an EMI Receiver set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 °.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 230 MHz	100 kHz
230 MHz to 1 GHz	100 kHz



Procedure preliminary measurement:

Prescans were performed in the frequency range 30 MHz to 230 MHz and 230 MHz to 1 GHz.
The following procedure will be used:

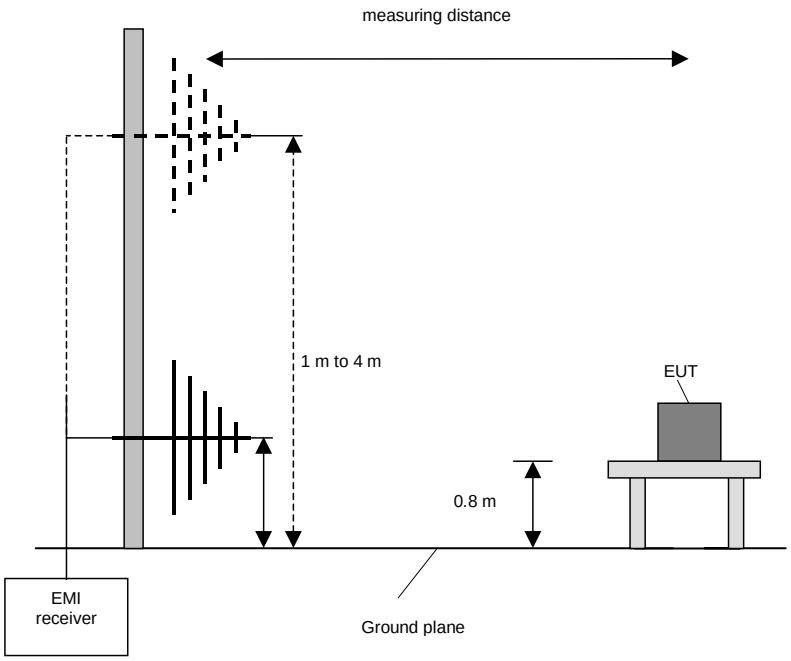
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
6. Repeat 1) to 4) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).
7. Repeat 1) to 5) with the vertical polarisation of the measuring antenna.

Final measurement (30 MHz to 1 GHz)

A final measurement on an open area test site will be performed on selected frequencies found in the preliminary measurement. During this test the EUT will be rotated in the range of 0 ° to 360 °, the measuring antenna will be set to horizontal and vertical polarisation and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	120 kHz



Procedure final measurement:

The following procedure will be used:

1) Measure on the selected frequencies at an antenna height of 1 m and a EUT azimuth of 23 °.
2) Move the antenna from 1 m to 4 m and note the maximum value at each frequency.
3) Rotate the EUT by 45 ° and repeat 2) until an azimuth of 337 ° is reached.
4) Repeat 1) to 3) for the other orthogonal antenna polarization.
5) Move the antenna and the turntable to the position where the maximum value is detected.
6) Measure while moving the antenna slowly +/- 1 m.
7) Set the antenna to the position where the maximum value is found.
8) Measure while moving the turntable +/- 45 °.
9) Set the turntable to the azimuth where the maximum value is found.
10) Measure with Final detector (QP and AV) and note the value.
11) Repeat 5) to 10) for each frequency.
12) Repeat 1) to 11) for each orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).

Preliminary and final measurement (1 GHz to 110 GHz)

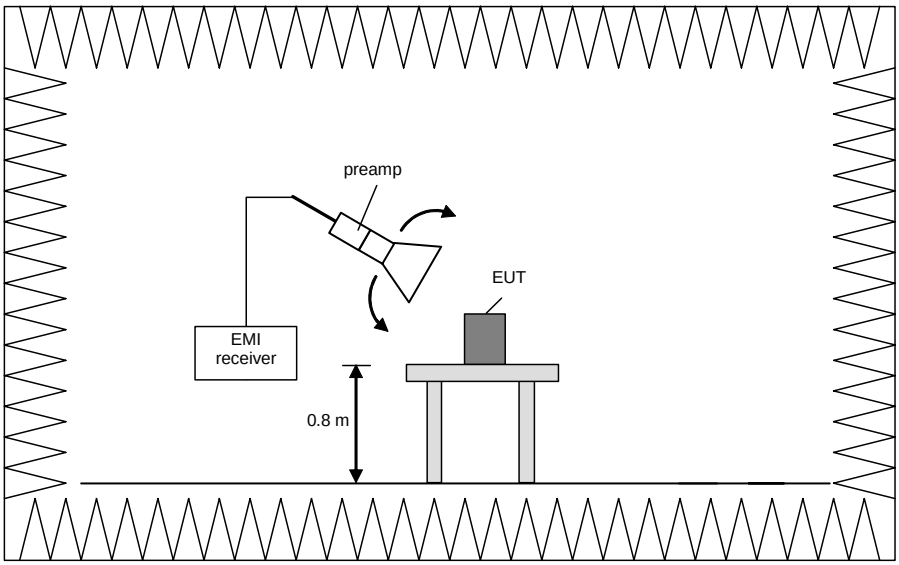
This measurement will be performed in a fully anechoic chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The setup of the Equipment under test will be in accordance to ANSI C63.4-2009 [1].

Preliminary measurement (1 GHz to 110 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The spectrum analyser set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna, the antenna close to the EUT and while moving the antenna over all sides of the EUT. With the spectrum analyser in CLEAR / WRITE mode the cone of the emission should be found and then the measuring distance will be set to 3 m with the receiving antenna moving in this cone of emission. At this position the final measurement will be carried out.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	100 kHz
4 GHz to 12 GHz	100 kHz
12 GHz to 18 GHz	100 kHz
18 GHz to 26.5 GHz	100 kHz
26.5 GHz to 40 GHz	100 kHz
40 GHz to 60 GHz	100 kHz
50 GHz to 75 GHz	100 kHz
75 GHz to 110 GHz	100 kHz

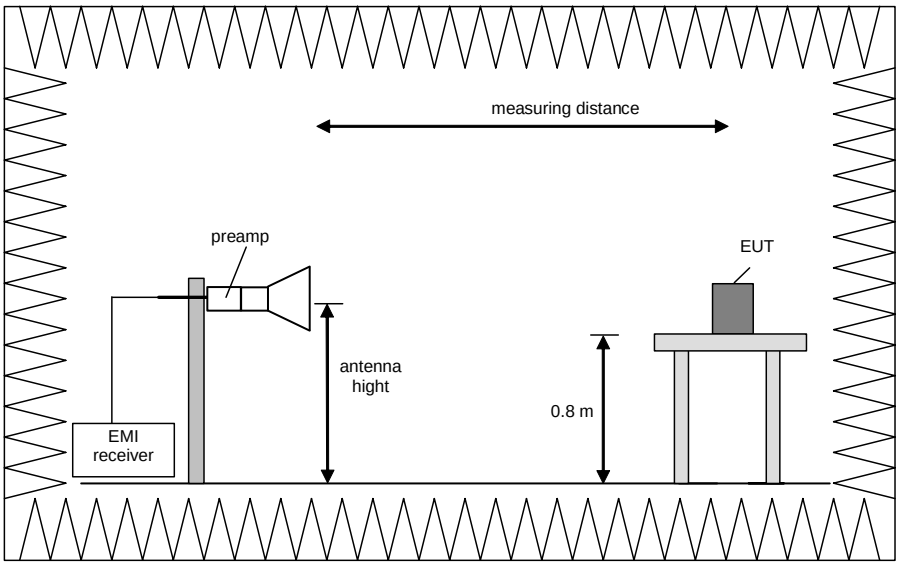


Final measurement (1 GHz to 110 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1 MHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 ° in order to have the antenna inside the cone of radiation.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	1 MHz
4 GHz to 12 GHz	1 MHz
12 GHz to 18 GHz	1 MHz
18 GHz to 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz
40 GHz to 60 GHz	1 MHz
50 GHz to 75 GHz	1 MHz
75 GHz to 110 GHz	1 MHz



Procedure of measurement:

The measurements were performed in the frequency range 1 GHz to 4 GHz, 4 GHz to 12 GHz, 12 GHz to 18 GHz, 18 GHz to 26.5 GHz, 26.5 GHz to 40 GHz, 40 GHz to 60 GHz, 60 GHz to 75 GHz and 75 GHz to 110 GHz.
The following procedure will be used:

1) Monitor the frequency range at horizontal polarisation and move the antenna over all sides of the EUT (if necessary move the EUT to another orthogonal axis).
2) Change the antenna polarisation and repeat 1) with vertical polarisation.
3) Make a hardcopy of the spectrum.
4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
5) Change the analyser mode to Clear / Write and found the cone of emission.
6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3 m and the antenna will be still inside the cone of emission.
7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarisation and azimuth and the peak and average detector, which causes the maximum emission.
8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.

Step 1) to 6) are defined as preliminary measurement.

5.1.2 Preliminary radiated emission tests (1 MHz to 30 MHz)

Ambient temperature:	22 °C	Relative humidity:	30 %

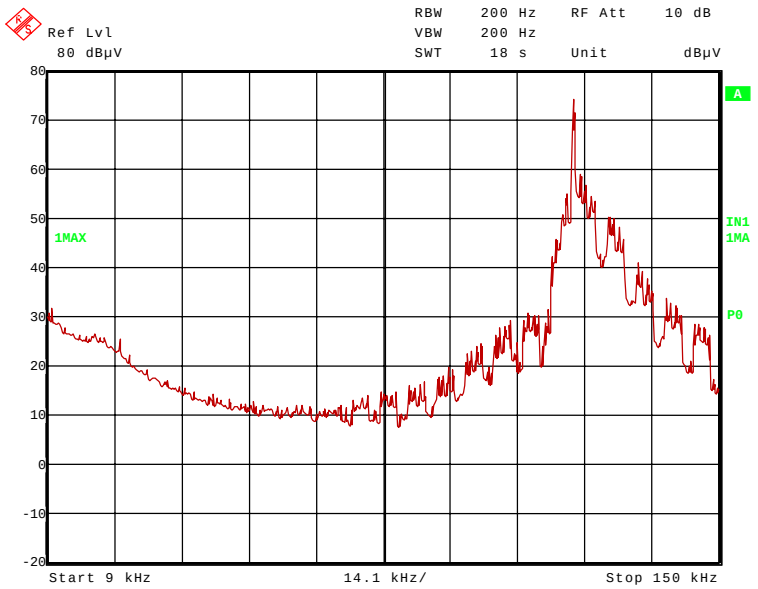
Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m.

Cable guide: The cable of the ancillary equipment was fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: The test was carried out in normal operation mode of the EUT (refer also clause 2 of this test report). All results are shown in the following.

Power supply: During this test the EUT was powered with 9.3 V DC via wireless power transfer.

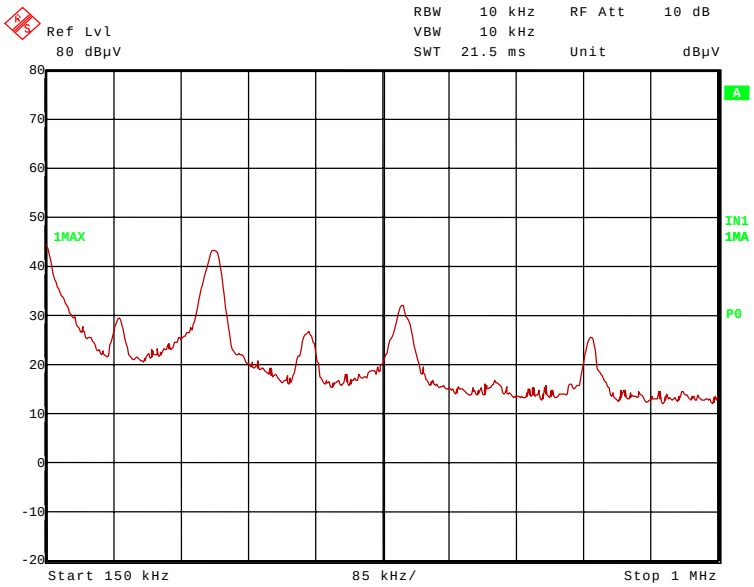
147045_3.wmf: Spurious emissions from 9 kHz to 150 kHz:



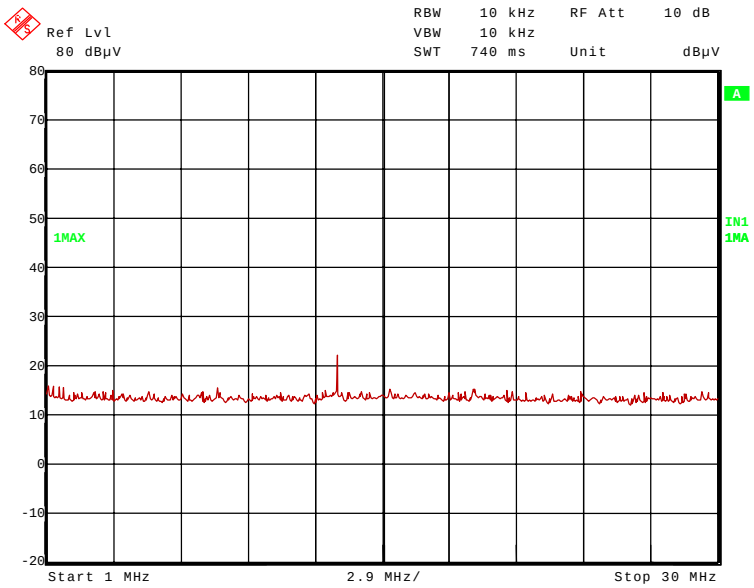
Test equipment used (refer clause 6):

29, 31, 32, 33, 34, 35, 43, 53

147045_4.wmf: Spurious emissions from 150 kHz to 1 MHz:



147045_5.wmf: Spurious emissions from 1 MHz to 30 MHz:



The following frequencies were caused by the 120 kHz transmitter (4541AN1(Stator) and are documented under PHOENIX TESTLAB test report reference F147045E1:

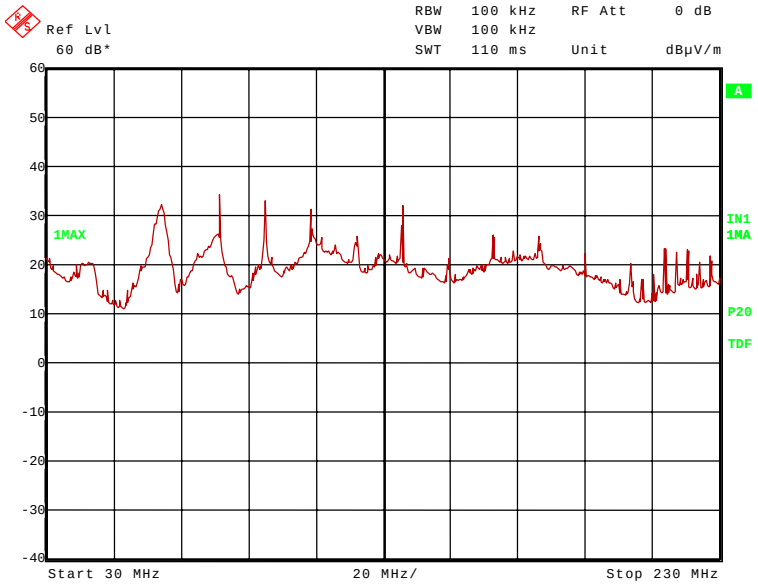
- 120.4 kHz, 240.8 kHz, 361.2 kHz, 481.6 kHz and 842.8 kHz

The following frequency, which was caused by the EUT, was found during the preliminary radiated emission test:

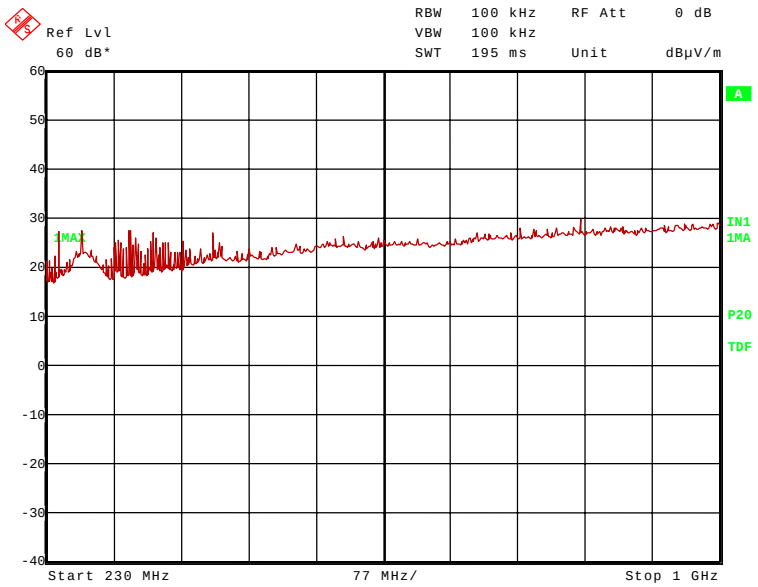
- 13.561 MHz.

This frequency has to be measured on an outdoor test site. The results were presented in the following.

147045_1.wmf: Spurious emissions from 30 MHz to 230 MHz:



147045_2.wmf: Spurious emissions from 230 MHz to 1 GHz:



The following frequencies were found inside the restricted bands during the preliminary radiated emission test:

- 40.680 MHz, 63.904 MHz, 81.360 MHz, 94.920 MHz, 213.570 MHz, 220.360 MHz, 420.360 MHz and 840.720 MHz.

The following frequencies were found inside the restricted bands during the preliminary radiated emission test:

- 108.480 MHz, 135.600 MHz, 244.080 MHz, 271.200 MHz and 325.440 MHz.

These frequencies have to be measured on the open area test site. The results were presented in the following.

5.1.3 Final radiated emission test (9 kHz to 30 MHz)

Ambient temperature:	12 °C	Relative humidity:	48 %

Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m.

Cable guide: The cable of the EUT was fixed on the wooden table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: The test was carried out in normal operation mode of the EUT (refer also clause 2 of this test report). All results are shown in the following.

Power supply: During this test the EUT was powered with 9.3 V DC via wireless power transfer.

Test results: The test results were calculated with the following formula:

Result [dBµV/m] = reading [dBµV] + antenna factor [dB/m]

Results with measuring distance of 3 m						
Frequency MHz	Result dBµV/m	Limit [2] dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor [1] dB/m
13.561	40.4	69.5	29.1	QP	20.4	20.0
Signal was below the noise floor of the measuring system at 10 m or 30 m distance						
Measurement uncertainty: +2.2 dB / -3.6 dB						

[1]: Cable loss included
[2]: Limits according to cfr 15.209, extrapolated with a factor (40 dB/decade) from the result at 3 m according to Part 15.31 (f)(2)

Test: Passed

Test equipment used (refer clause 6):

8 – 9, 10, 53

5.1.4 Final radiated emission test (30 MHz to 1 GHz)

Ambient temperature:	15 °C	Relative humidity:	45 %

Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m.

Cable guide: The cable of the EUT was fixed on the wooden table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: The test was carried out in normal operation mode of the EUT (refer also clause 2 of this test report). All results are shown in the following.

Power supply: During this test the EUT was powered with 9.3 V DC via wireless power transfer.

Test results: The test results were calculated with the following formula:

Result [dBµV/m] = reading [dBµV] + cable loss [dB] + antenna factor [dB/m]

The results of the standard subsequent measurement on the open area test site are indicated in the table below. The limits as well as the measured results (levels) refer to the above mentioned standard while taking account of the specified requirements for a 3 m measuring distance.

Result measured with the quasi-peak detector:

Spurious emissions outside restricted bands										
Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.	Position
40.680	38.2	40.0	1.8	23.2	14.3	0.7	102	127	Vert.	2
63.904	36.2	40.0	3.8	29.2	6.1	0.9	100	5	Vert.	2
81.360	29.1	40.0	10.9	19.9	8.2	1.0	225	107	Hor.	1
94.920	33.6	43.5	9.9	22.0	10.5	1.1	340	259	Hor.	1
213.570	25.0	43.5	18.5	14.0	9.4	1.6	148	23	Hor.	1
220.360	26.1	46.0	19.9	14.7	9.8	1.6	100	227	Hor.	2
420.360	23.0	46.0	23.0	4.7	16.0	2.3	100	293	Hor.	1
840.720	29.9	46.0	16.1	4.0	22.7	3.2	244	262	Hor.	1
Spurious emissions inside restricted bands										
Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.	Position
108.480	33.5	43.5	10.0	20.8	11.6	1.1	100	113	Vert.	1
135.600	39.2	43.5	4.3	26.0	11.9	1.3	103	153	Vert.	1
244.080	25.6	46.0	20.4	12.2	11.7	1.7	112	234	Hor.	1
271.200	23.7	46.0	22.3	9.5	12.3	1.9	159	40	Vert.	1
325.440	24.9	46.0	21.1	9.5	13.5	1.9	100	90	Hor.	1
Measurement uncertainty				+2.2 dB / -3.6 dB						

Test: Passed

Test equipment used (refer clause 6):

8, 14 - 20

6 Test equipment and ancillaries used for tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. due
8	Power supply	TOE8752-32	Toellner Electronic Inst.	31566	480010	-	-
9	Outdoor test site	-	Phoenix Test-Lab	-	480293	-	-
10	EMI Receiver	ESPC	Rohde & Schwarz	843756/006	480150	02/24/2014	02/2016
14	Open area test site	-	Phoenix Test-Lab	-	480085	Weekly verification (system cal.)	
15	EMI Receiver	ESIB 26	Rohde & Schwarz	1088.7490	481182	03/21/2014	03/2016
16	Controller	HD100	Deisel	100/670	480139	-	-
17	Turntable	DS420HE	Deisel	420/620/80	480087	-	-
18	Antenna support	AS615P	Deisel	615/310	480086	-	-
19	Antenna	CBL6111 D	Chase	25761	480894	09/18/2014	09/2017
20	EMI Software	ES-K1	Rohde & Schwarz	-	480111	-	-
29	Fully anechoic chamber M20	-	Albatross Projects	B83107-E2439-T232	480303	Weekly verification (system cal.)	
31	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355	02/16/14	02/2016
32	Controller	MCU	Maturo	MCU/043/971107	480832	-	-
33	Turntable	DS420HE	Deisel	420/620/80	480315	-	-
34	Antenna support	AS615P	Deisel	615/310	480187	-	-
35	Antenna	CBL6112 B	Chase	2688	480328	04/14/2014	04/2017
43	RF-cable No. 36	Sucoflex 106B	Suhner	0522/6B	480571	Weekly verification (system cal.)	
53	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059	02/18/2014	02/2016
60	RF cable	-	Insulated Wire	KPS-1533-800-KPS	480302	Monthly verification (system cal.)	

7 Report history

Report Number	Date	Comment
F147045E2	05 March 2015	Document created

8 List of annexes

Annex A	Test setup photographs	6 pages

147045_1.JPG: 4541AN1 and 4550A1K0S10N1WA, test set-up fully anechoic chamber, pos. 1
147045_4.JPG: 4541AN1 and 4550A1K0S10N1WA, test set-up fully anechoic chamber, pos. 2
147045_5.JPG: 4541AN1 and 4550A1K0S10N1WA, test set-up fully anechoic chamber
147045_2.JPG: 4541AN1 and 4550A1K0S10N1WA, test set-up fully anechoic chamber
147045_11.JPG: 4541AN1 and 4550A1K0S10N1WA, test set-up outdoor test site (3 m)
147045_10.JPG: 4541AN1 and 4550A1K0S10N1WA, test set-up open area test site

Annex B	External photographs	3 pages

147045_d.JPG: 4550A1K0S10N1WA, front view
147045_e.JPG: 4550A1K0S10N1WA, rear view
147045_h.JPG: 4550A1K0S10N1WA, side view

Annex C	Internal photographs	2 pages

147045_m.JPG: 4550A1K0S10N1WA, PCB, top view
147045_n.JPG: 4550A1K0S10N1WA, PCB, bottom view