CSA Group

Bundesnetzagentur

BNetzA-CAB-13/21-07

EMC – TEST REPORT

Type / Model Name : COR C-300-RI

Product Description : Portable radio interface for COR MS-3 & COR PT-3

Applicant : Seba Dynatronic Mess- und Ortungstechnik GmbH

Address : Dr.-Herbert-Iann-Str. 6

96148 BAUNACH, GERMANY

Manufacturer : Seba Dynatronic Mess- und Ortungstechnik GmbH

Address : Dr.-Herbert-Iann-Str. 6

96148 BAUNACH, GERMANY

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

Test Report No. :	**T42314-00-01KJ**	29. March 2017 Date of issue

ilac-MRA

DAkkS Deutsche Akkreditierungsstelle D-PL-12030-01-01 D-PL-12030-01-02

Contents

Attachment A as separatly supplement

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15 Subpart B - Unintentional Radiators (October, 2016)

Part 15, Subpart B, Section 15.107	AC Line conducted emission ☐ Class A device ☒ Class B device
Part 15, Subpart B, Section 15.109	Radiated emission, general requirements ☐ Class A device ☒ Class B device
ANSI C63.4: 2014	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
CISPR 16-4-2: 2011 + A1: 2014 EN 55016-4-2: 2011	Uncertainty in EMC measurement
CISPR 22: 1997 EN 55022: 1998	Information technology equipment

2 SUMMARY

2.1 General remarks

The measurement has been performed in receive mode.

2.2 Summary for all EMC tests

Type of test		Test result
Emission:		
A4	Conducted emission (AC mains power)	passed
A5	Radiated emission (< 1 GHz)	passed
SER 3	Radiated emission (> 1 GHz)	passed

2.3 Final assessment

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

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

Testing commenced on : 07 March 2017

Testing concluded on : 16 March 2017

Checked by:

Klaus Gegenfurtner
I confirm the correctness and
Integrity of this document
2017.03.29 13:53:53 +02'00'

Klaus Gegenfurtner
Teamleader Radio

Tested by:

Josef Knab
I'm the autor of this document
2017.03.29 13:49:49 +02'00'

Josef Knab
Radio Team

3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EUT – Detailed photos see ATTACHMENT A

3.2 Short description of the equipment under test (EUT)

The COR C-300-RI is a portable device, acting as a radio interface between a PC or laptop and the sensor devices of the COR C-3 system. With the C-300-RI it is possible to program/configure the Multisensors (COR MS-3) and receive the analog signal of the Power-Transmitters (COR PT-3).

The digital communication (programming/configuring) is done at a frequency of 913 MHz. The receiving of analog audio signals from the Power-Transmitter is done at a frequency of 469 MHz. The C-300-RI has two external connectors to connect two different antennas – one for digital communication and one for long range analog communication.

Number of tested samples: 1
Serial number: 12065920002

3.3 Variants of the EUT

- There are no other variants.

3.4 Test Jig

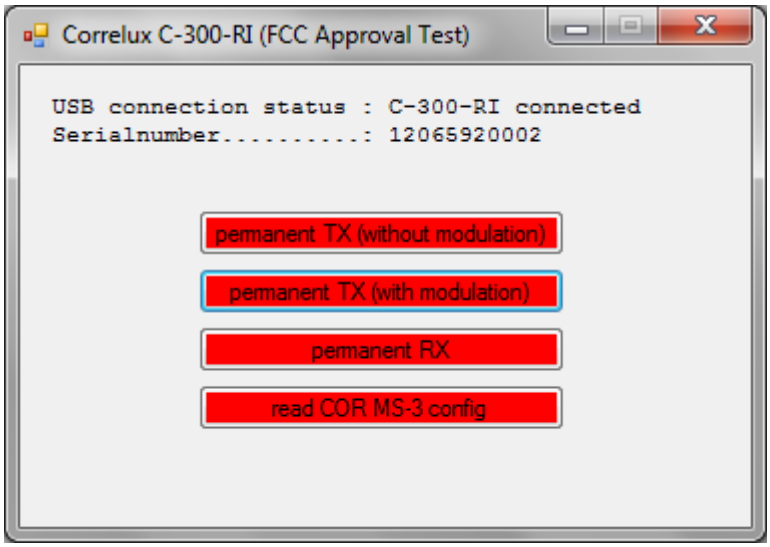
- No test jig is used.

3.5 Technical description of the equipment under test (EUT)

Items	Description
Power supply	V_{nom} = 5.0 V DC (USB) (V_{min} = 4.3 V DC, V_{max} = 5.8 V DC)
Digital radio:	
Type of modulation	FSK
Operating frequency	913.02 MHz
Frequency band	902 MHz to 928 MHz
Data rate	9.6 kBd
Channel spacing	-
Number of channels	1
Antenna type	stub antenna
Antenna connector	TNC
Antenna gain	0 dBi
Digital radio (only RX):	
Type of modulation	analog FM
Operating frequency digital radio	468.5 MHz / 469.6 MHz
Frequency band	468.5 – 496.6 MHz
Data rate	
Channel spacing	25 kHz
Number of channels	1 per Transmitter UNIT
Antenna type	Antenne lambda 1/2 460MHz
Antenna connector	BNC
Antenna gain	7 dBi
Lowest internal frequency	32.768 kHz
Highest internal frequency	26.000 MHz
Serial number	0859000294
Firmware version	1.00.00
Number of tested samples	1

3.6 Test software

- A special test software was used, to performe the different radio tests.



3.7 Transmit operating modes

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

- cont. RX mode

-

-

3.8 Peripheral devices and interface cables

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

- USB adapter cable (A to B) Model : Seba
- Headphone Model : Sennheiser – HD 215
- Laptop Model : Toshiba Tecra A11-127

3.9 Determination of worst case conditions for final measurement

Measurements have been made in all three orthogonal axes and the settings of the EUT were changed to locate at which position and at what setting of the EUT produce the maximum of the emissions.
For the further measurement, the EUT is set in horizontal position with TX antenna in vertical orientation.

Modifications during the EMC test: None

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY

4.2 Accreditation and Recognition of the test laboratory

Within the framework of the Mutual Recognition Agreement (MRA) between the European Community and the USA the EMC test laboratory listed above has been approved as a Conformity Assessment Body (CAB) designated by the EU member states through the conclusion of the MRA on the basis of Article 133 of the treaty

The site is accredited/registered by

- the German accreditation body DAkkS-Registration No.: D-PL-12030-01-01
- the Federal Communications Commission (FCC) Registration Number: 0013864798
- the German Federal Network Agency as Conformity assessment body (CAB) Registration No: BnetzA-CAB-13/21-07

4.3 Statement regarding the usage of logos in test reports

The accreditation and notification body logos displayed in this test report are only valid for standards listed in the accreditation or notification scope of CSA Group Bayern GmbH.

4.4 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

4.5 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 / 2011 + A1 / 2014 „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.

4.6 Measurement protocol for FCC

4.6.1 General information

4.6.1.1 Test methodology

In compliance with 47 CFR Part 15 Subpart A Section 15.38 testing for FCC compliance may be done following the ANSI C63.4 procedures and using the CISPR 22 Limits.

4.6.1.2 Justification

The Equipment under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.6.2 Details of test procedures

4.6.2.1 General standard information

The test methods used comply with ANSI C63.4 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

4.6.3 Conducted emission

4.6.3.1 Description of measurement

The final level, expressed in dBμV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC Limit or to the CISPR limit.

To convert between dBμV and μV, the following conversions apply:

dBμV = 20(log μV)
μV = Inverse log (dBμV/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 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 re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

4.6.4 Radiated emission (electrical field 30 MHz - 1 GHz)

4.6.4.1 Description of measurement

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.

The final level, expressed in dBµV/m, is arrived at by taking the reading from the EMI receiver (Level dBµV) and adding the correction factors and cable loss factor (Factor dB) to it. This is done automatically in the EMI receiver where the correction factors are stored. The FCC or CISPR limit is subtracted from this result in order to provide the limit margins listed in the measurement protocols.

The resolution bandwidth during the measurement is as follows:
30 MHz – 1000 MHz: ResBW: 120 kHz

Example:

Frequency (MHz)	Reading level (dBµV)	+	Correction Factor* (dB/m)	=	Level (dBµV/m)	-	CISPR Limit (dBµV/m)	=	Delta (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

4.6.4.2 Sequence of measurement

After preparation of the test setup, the measurement has to be conducted as follows:
The turntable has to be moved forwards and backwards 360° until the test receiver displays the maximum level at the observed frequency.
Than the antenna mast has to be moved from 1m up to 4m and back to maximize the value.
After that the turntable has to be moved again until the absolute maximum of the emission value has to be fixed.
This result has to be filled in the table of results.
This procedure has to be repeated until all relevant frequencies checked.

4.6.5 Radiated emission (electrical field 1 GHz - 30 GHz)

4.6.5.1 Description of measurement

Radiated emission from the EUT are measured in the frequency range of 1 GHz to the maximum frequency as specified in 47 CFR Part 15 Subpart A section 15.33, using a tuned receiver (Spectrum Analyser) and appropriate linearly polarized antennas. Table top equipment is placed on a 0.65 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 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 metres horizontally from the EUT.

Measurements are made in both the horizontal and vertical polarization planes in a fully anechoic room using a spectrum analyser set to a peak detector function and a resolution and video bandwidth of 1 MHz. All tests are performed at a test distance of 3 metres. Hand-held or body-worn devices are rotated around three orthogonal axes in order to determine the position, angle and configuration having the maximum emission. The cables and equipment are placed and moved within the range of their likely positioning to find the maximum emission. These conditions will then be used for the final measurements. When the EUT is larger than the bandwidth of the measuring antenna it will be moved over the surface for the four sides of the equipment. Where appropriate, the test distance may be reduced in order to demonstrate that emissions are under the limits at the specified test distance.

5 TEST CONDITIONS AND RESULTS

5.1 Conducted emission

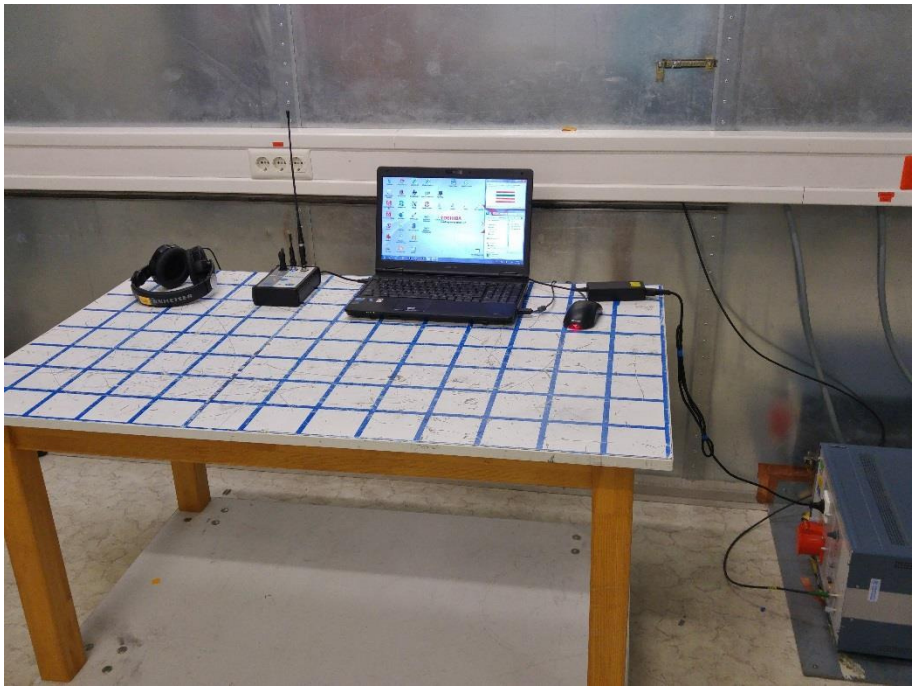
For test instruments and accessories used see section 7 Part **A 4**.

Legend for tables:

QP-L … QuasiPeak reading including correction factor
AV-L … Average reading including correction factor
D-Limit… Measured value to limit delta (margin)

Test location: Shielded Room S2

5.1.1 Photo documentation of the test set-up



5.1.2 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin > 10 dB

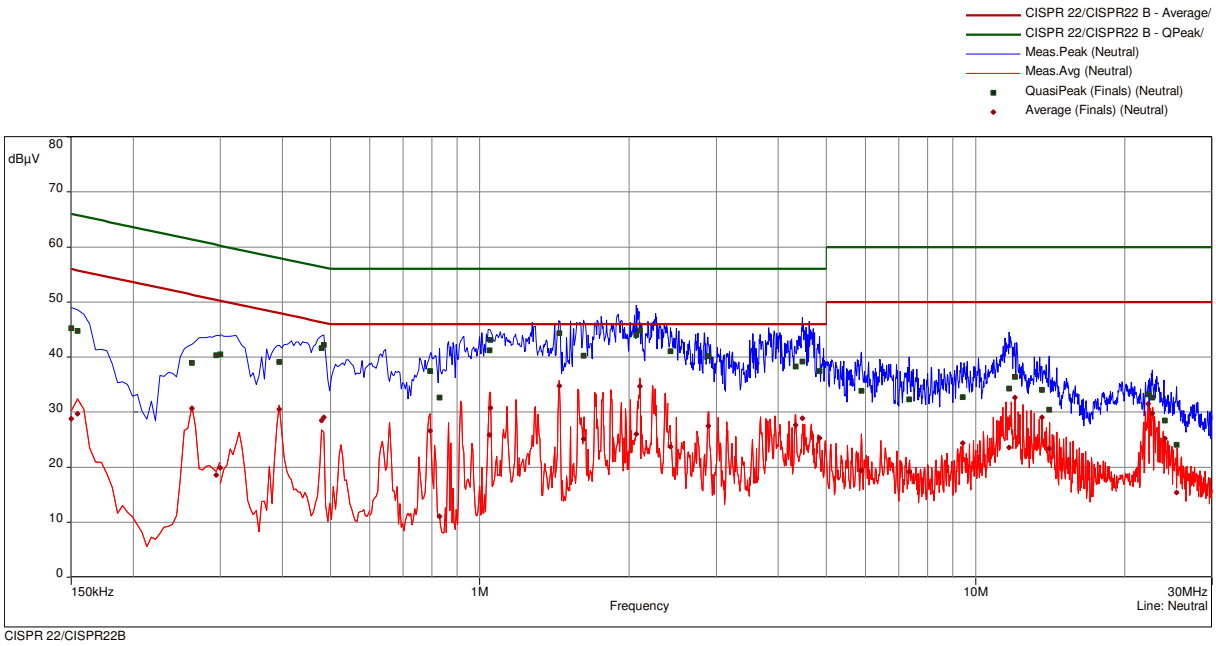
The requirements are **FULFILLED.**

Remarks: For detailed results, please see the following page(s).

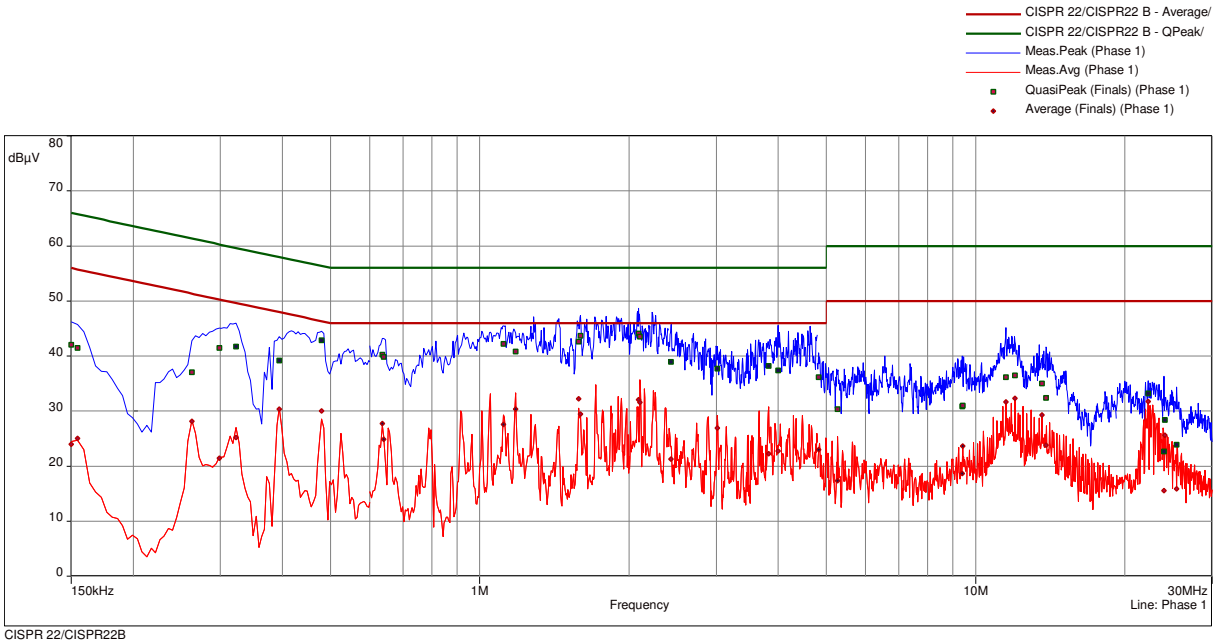
For description of the measurement see 4.6.3.

5.1.3 Test protocol

Test point	L1 & N	Result: passed
Operation mode:	cont. RX mode	
Remarks:	None	
Date:	16 March 2017	
Tested by:	Josef Knab	



CISPR 22/CISPR22B



CISPR 22/CISPR22B

freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.15	1	42.08	23.92	66.00	23.96	32.04	56.00	Phase 1	9.80
0.1545	1	41.51	24.25	65.75	25.06	30.69	55.75	Phase 1	9.80
0.2625	1	37.06	24.29	61.35	28.13	23.22	51.35	Phase 1	9.78
0.2985	1	41.45	18.83	60.28	21.46	28.83	50.28	Phase 1	9.77
0.3225	2	41.72	17.92	59.64	25.24	24.41	49.64	Phase 1	9.77
0.3945	2	39.22	18.75	57.97	30.32	17.65	47.97	Phase 1	9.77
0.48	2	42.87	13.47	56.34	29.99	16.35	46.34	Phase 1	9.77
0.636	3	40.27	15.73	56.00	27.74	18.26	46.00	Phase 1	9.77
0.6405	3	39.87	16.13	56.00	24.89	21.11	46.00	Phase 1	9.77
1.1175	3	42.24	13.76	56.00	27.56	18.44	46.00	Phase 1	9.75
1.1805	3	40.81	15.19	56.00	30.38	15.62	46.00	Phase 1	9.75
1.5825	4	42.65	13.35	56.00	32.24	13.76	46.00	Phase 1	9.73
1.596	4	43.70	12.30	56.00	29.43	16.57	46.00	Phase 1	9.73
2.091	4	44.11	11.89	56.00	32.08	13.92	46.00	Phase 1	9.75
2.1045	4	43.56	12.44	56.00	31.60	14.40	46.00	Phase 1	9.75
2.4315	5	38.98	17.02	56.00	21.30	24.70	46.00	Phase 1	9.73
3.0165	5	37.69	18.31	56.00	26.88	19.12	46.00	Phase 1	9.73
3.822	5	38.22	17.78	56.00	22.28	23.72	46.00	Phase 1	9.74
3.9975	5	37.35	18.65	56.00	22.76	23.24	46.00	Phase 1	9.74
4.8225	6	36.14	19.86	56.00	22.99	23.01	46.00	Phase 1	9.74
5.2635	6	30.37	29.63	60.00	17.33	32.67	50.00	Phase 1	9.75
9.3945	6	30.87	29.13	60.00	18.64	31.36	50.00	Phase 1	9.78
9.4305	6	31.02	28.98	60.00	23.65	26.35	50.00	Phase 1	9.78
11.526	7	36.14	23.86	60.00	31.62	18.38	50.00	Phase 1	9.85
12.003	7	36.49	23.51	60.00	32.33	17.67	50.00	Phase 1	9.87
13.623	7	35.04	24.96	60.00	29.27	20.73	50.00	Phase 1	9.94
13.8795	7	32.42	27.58	60.00	23.78	26.22	50.00	Phase 1	9.95
22.2915	8	33.20	26.80	60.00	31.75	18.25	50.00	Phase 1	10.20
23.997	8	22.70	37.30	60.00	15.55	34.45	50.00	Phase 1	10.20
24.069	8	28.39	31.61	60.00	25.62	24.38	50.00	Phase 1	10.21
25.419	8	23.88	36.12	60.00	15.91	34.09	50.00	Phase 1	10.21
0.15	9	45.23	20.77	66.00	28.78	27.22	56.00	Neutral	9.80
0.1545	9	44.71	21.04	65.75	29.70	26.06	55.75	Neutral	9.80
0.2625	9	38.93	22.42	61.35	30.70	20.65	51.35	Neutral	9.79
0.294	9	40.37	20.04	60.41	18.54	31.87	50.41	Neutral	9.78
0.3	10	40.47	19.78	60.24	19.88	30.36	50.24	Neutral	9.77
0.3945	10	39.14	18.83	57.97	30.52	17.45	47.97	Neutral	9.77
0.48	10	41.61	14.73	56.34	28.44	17.90	46.34	Neutral	9.77
0.4845	10	42.23	14.04	56.26	29.03	17.23	46.26	Neutral	9.77
0.7935	11	37.51	18.49	56.00	26.63	19.37	46.00	Neutral	9.75
0.8295	11	32.66	23.34	56.00	11.03	34.97	46.00	Neutral	9.76
1.0455	11	41.24	14.76	56.00	25.86	20.14	46.00	Neutral	9.76
1.05	11	43.15	12.85	56.00	30.79	15.21	46.00	Neutral	9.76
1.4475	12	44.38	11.62	56.00	34.76	11.24	46.00	Neutral	9.73
1.6185	12	40.26	15.74	56.00	25.09	20.91	46.00	Neutral	9.73
2.0685	12	43.97	12.03	56.00	26.01	19.99	46.00	Neutral	9.75
2.1045	12	44.80	11.20	56.00	34.67	11.33	46.00	Neutral	9.75
2.427	13	41.08	14.92	56.00	23.75	22.25	46.00	Neutral	9.73
2.8905	13	40.14	15.86	56.00	27.49	18.51	46.00	Neutral	9.72
4.3395	13	38.25	17.75	56.00	27.61	18.39	46.00	Neutral	9.73
4.4745	13	39.20	16.80	56.00	28.89	17.11	46.00	Neutral	9.73
4.8405	14	37.45	18.55	56.00	25.30	20.70	46.00	Neutral	9.73
5.889	14	33.86	26.14	60.00	19.37	30.63	50.00	Neutral	9.73
7.3515	14	32.33	27.67	60.00	19.14	30.86	50.00	Neutral	9.73
9.4305	14	32.73	27.27	60.00	24.41	25.59	50.00	Neutral	9.72
11.6745	15	34.27	25.73	60.00	23.58	26.42	50.00	Neutral	9.75
12.003	15	36.38	23.62	60.00	32.66	17.34	50.00	Neutral	9.76
13.623	15	34.03	25.97	60.00	29.07	20.93	50.00	Neutral	9.79
14.0685	15	30.41	29.59	60.00	23.39	26.61	50.00	Neutral	9.80
22.2915	16	33.22	26.78	60.00	31.52	18.48	50.00	Neutral	9.89
22.737	16	32.60	27.40	60.00	29.77	20.23	50.00	Neutral	9.87
24.069	16	28.45	31.55	60.00	25.18	24.82	50.00	Neutral	9.83
25.4325	16	24.04	35.96	60.00	15.37	34.63	50.00	Neutral	9.77

5.2 Radiated emission < 1 GHz (electric field)

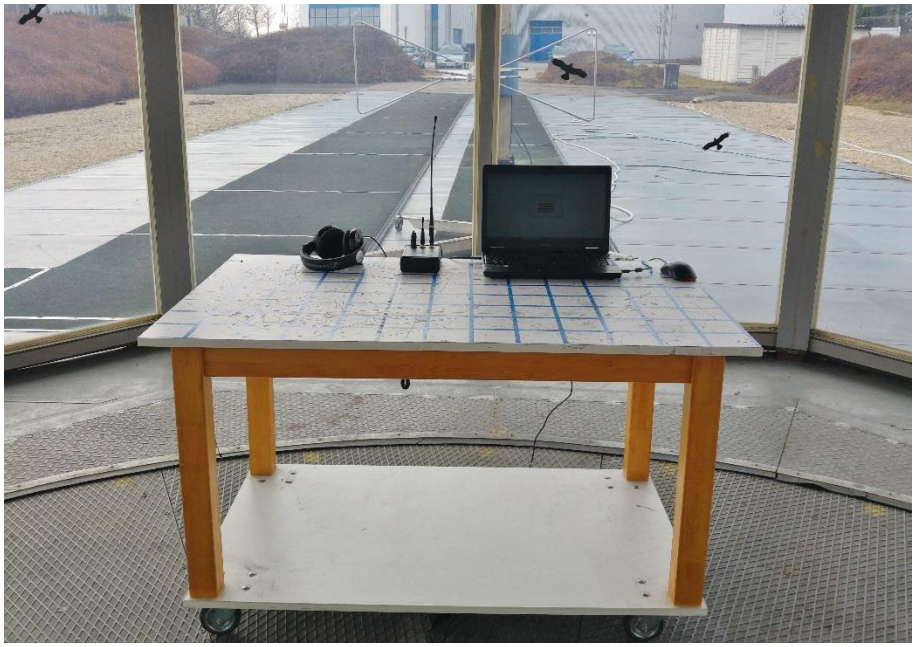
For test instruments and accessories used see section 7 Part **A 5**.
Legend for tables:
Level vert. QuasiPeak reading including correction factor for vertically polarised antenna
Level hor. QuasiPeak reading including correction factor for horizontally polarised antenna
Limit Limit referred to the appropriate standard
DLimit… Delta between limit and result (margin)
Noise Characteristic of disturbance (narrowband or broadband)

5.2.1 Description of the test location

Test location: OATS 1

Test distance: 3 metres

5.2.2 Photo documentation of the test setup



OATS1 – 10 m – 30 MHz to 1000 MHz

5.2.3 Test result

Frequency range: 30 MHz - 1000 MHz

Min. limit margin > 10 dB

The requirements are **FULFILLED.**

Remarks: For detailed results, please see the following page(s).

For description of the measurement see 4.6.4.

5.2.4 Test result

Operation mode:	cont. RX mode	Result: passed
Remarks:	None	
Date:	8 March 2017	
Tested by:	Josef Knab	

EuT in horizontal position – TX antenna vertrical

Frequency (MHz)	Level QP (dBµV)	Level AV (dBµV)	Bandwidth (kHz)	Correct. factor (dB)	Level QP (dBµV/m)	Level AV (dBµV/m)	Limit (dBµV/m)	Delta (dB)
120.00	13.2	-	120	12.4	25.6	-	43.5	-17.9
144.00	3.6	-	120	13.6	17.2	-	43.5	-26.3
192.00	7.8	-	120	12.1	19.9	-	43.5	-23.6

5.3 Radiated emission > 1 GHz (electric field)

For test instruments and accessories used see section 7 Part **SER 3**.

5.3.1 Description of the test location

Test location: Anechoic chamber 1

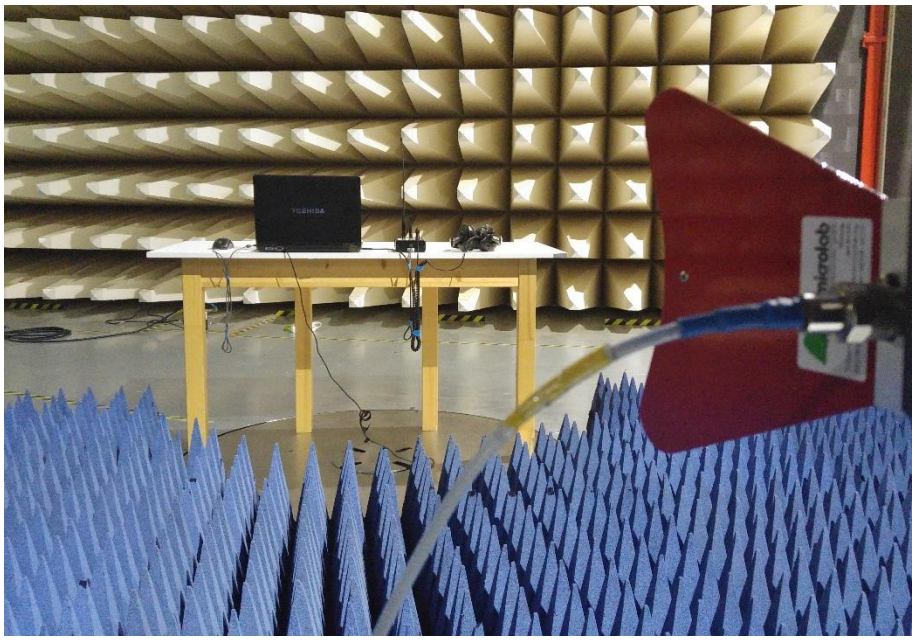
Test distance: 3 metres

ETS Lindgren 3117:
Dimension of the line tangent to the EUT according to CISPR 16-2-3:2010

Note: The Θ 3dB min values were given by the antenna manufacturer

Frequenz GHz	Θ 3dB min	Measurement distance	***w*** min
1	88	3 m	5.79 m
2	67	3 m	3.97 m
4	69	3 m	4.12 m
6	53	3 m	2.99 m

5.3.2 Photo documentation of the test setup



5.3.3 Test result

Frequency range: 1 GHz - 5 GHz

Min. limit margin > 10 dB

The requirements are **FULFILLED.**

Remarks: For description of the measurement see 4.6.5.

The measurement was performed according to FCC Part 15A, Section 15.33(b), up to 5 GHz.

5.3.4 Test result

Operation mode: cont. RX mode Result: passed
Remarks: None
Date: 7 March 2017
Tested by: Josef Knab

EuT in horizontal position – TX antenna vertrical

Frequency (MHz)	Level PK (dBµV)	Level AV (dBµV)	Bandwidth (kHz)	Correct. factor (dB)	Level PK (dBµV/m)	Level AV (dBµV/m)	Limit AV (dBµV/m)	Delta (dB)
1018.45	56.6	-	1000	-20.6	36.0	-	54.0	-18.0
1320.84	56.5	-	1000	-19.4	37.1	-	54.0	-16.9
1594.08	57.3	-	1000	-20.9	36.4	-	54.0	-17.6
1780.49	56.8	-	1000	-18.1	38.7	-	54.0	-15.3
2203.43	55.1	-	1000	-15.9	39.2	-	54.0	-14.8
4041.68	41.2	-	1000	0.2	41.4	-	54.0	-12.6
4193.36	40.6	-	1000	0.8	41.4	-	54.0	-12.6
4387.91	40.3	-	1000	0.7	41.0	-	54.0	-13.0
4521.51	40.0	-	1000	1.5	41.5	-	54.0	-12.5

6 USED TEST EQUIPMENT AND ACCESSORIES

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

Following software was used: Nexio BAT EMC (2015 Version 3.15.0.12)

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
A 4	ESCI	02-02/03-15-001	23/05/2017	23/05/2016		
	ESH 2 - Z 5	02-02/20-05-004	26/10/2017	26/10/2015	24/05/2017	24/11/2016
	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	18/05/2017	18/11/2016
A 5	ESVS 30	02-02/03-05-003	08/07/2017	08/07/2016		
	VULB 9168	02-02/24-05-005	20/04/2017	20/04/2016	01/03/2017	01/09/2016
	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	FSP 40	02-02/11-11-001	13/10/2017	13/10/2016		
	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				
	3117	02-02/24-05-009	24/05/2017	24/05/2016		
	Sucoflex N-2000-SMA	02-02/50-05-075				
	SF104/11N/11N/1500MM	02-02/50-13-015				

7 Detailed measurement uncertainty

7.1 Overview

Measurement instrumentation uncertainty shall be taken into account when determining compliance or non-compliance with a disturbance limit.
The measurement instrumentation uncertainty for a test laboratory shall be evaluated. The standard uncertainty $u(x_i)$ in decibels and the sensitivity coefficient c_i shall be evaluated for the estimate x_i of each quantity. The combined standard uncertainty $u_c(y)$ of the estimate y of the measured shall be calculated as

$$u_c(y) = \sqrt{\sum_i c_i^2 \; u^2(x_i)}$$

The expanded measurement instrumentation uncertainty U_{lab} for a test laboratory shall be calculated as $U_{lab} = 2\, u_c(y)$

$$U_{lab} = 2\, u_c(y)$$

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cispr} in the table below, then:
- compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} in the table below, then:
- compliance is deemed to occur if no measured disturbance, increased by ($U_{lab} – U_{cispr}$), exceeds the disturbance limit.
- non-compliance is deemed to occur if any measured disturbance, increased by ($U_{lab} – U_{cispr}$), exceeds the disturbance limit.

7.2 Definitions and symbols

X_i	Input quantity
x_i	estimate of X_i
$u(x_i)$	standard uncertainty of x_i
c_i	sensitivity coefficient
$u_c(y)$	(combined) standard uncertainty of y
Y	result of a measurement, (the estimate of the measured), corrected for all recognized significant systematic effects
U	expanded uncertainty of y

7.3 Measurement uncertainty

Measurement	U_{lab} [dB]
Conducted disturbance	+ 3.29 / - 3.29
Radiated disturbance (electric field) - 10 m test distance - 3 m test distance - Frequency range: 30 MHz – 300 MHz	 + 3.86 / - 3.91 + 4.14 / - 4.78
Radiated disturbance (electric field) - 10 m test distance - 3 m test distance - Frequency range: 300 MHz – 1000 MHz	 + 4.11 / - 4.11 + 4.13 / - 4.14
Radiated disturbance (electric field) - 3 m test distance - Frequency range: 1 GHz – 30 GHz	 + 2.89 / -2.89