FCC ID: XUY0YX0ME01016

EMI – TEST REPORT

- FCC Part 15.209 -

Test Report No. : **T38387-00-00GK**	01. October 2014 Date of issue

Type / Model Name : ME01016

Product Description : External reader module ASK FSK

Applicant : Y SOFT Corporation, a.s.

Address : Czech Technology Park, Podnikatelska 2902/4

612 00 BRNO, Czech Republic

Manufacturer : Y SOFT Corporation, a.s.

Address : Czech Technology Park, Podnikatelska 2902/4

612 00 BRNO, Czech Republic

Licence holder : Y SOFT Corporation, a.s.

Address : Czech Technology Park, Podnikatelska 2902/4

612 00 BRNO, Czech Republic

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

DAkkS Deutsche Akkreditierungsstelle D-PL-12030-01-00

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (September, 2013)

Part 15, Subpart A, Section 15.31	Measurement standards
Part 15, Subpart A, Section 15.33	Frequency range of radiated measurements
Part 15, Subpart A, Section 15.35	Measurement detector functions and bandwidths

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (September, 2013)

Part 15, Subpart C, Section 15.203	Antenna requirement
Part 15, Subpart C, Section 15.204	External radio frequency power amplifiers and antenna modifications
Part 15, Subpart C, Section 15.205	Restricted bands of operation
Part 15, Subpart C, Section 15.209	Radiated emission limits, general requirements
ANSI C63.4: 2003	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI C95.1:1992	IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
CISPR 16-4-2: 2003	Uncertainty in EMC measurement

2 SUMMARY

GENERAL REMARKS:

The carrier frequency is 125.0 kHz.

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 : 24. June 2014

Testing concluded on : 23. July 2014

Checked by:

Klaus Gegenfurtner
I confirm the correctness and Integrity of this documents
2014.10.01 08:33:17 +02'00'

Klaus Gegenfurtner
Teamleader Radio

Tested by:

Konrad Graßl
I am the author of this document
2014.10.01 08:13:27 +02'00'

Konrad Graßl

3 EQUIPMENT UNDER TEST

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

3.2 Power supply system utilised

Power supply voltage: : 100-240 V AC / 12.0 V DC / 50-60 Hz

3.3 Short description of the Equipment under Test (EUT)

The EuT is a card reading terminal for reading of authentication cards.

Number of tested samples: 1
Serial number: See photo documentation of the EuT in Attachment A

EUT operation mode:

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

- Continuous Tx mode at 125 kHz

-

-

EUT configuration:

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

- _____ Model : _____

- _____ Model : _____

- _____ Model : _____

- customer specific cables

- unscreened power cables

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY

4.2 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.

4.3 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

4.4 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.

4.5 Measurement Protocol for FCC, VCCI and AUSTEL

4.5.1 GENERAL INFORMATION

4.5.1.1 Test Methodology

Conducted and radiated disturbance testing is performed according to the procedures set out by the International Special Committee on Radio Interference (CISPR) Publication 22, European Standard EN 55022 as shown under section 1 of this report.
The test methods used comply with CISPR Publication 22, EN 55022 - " Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement" and 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."
In compliance with 47 CFR Part 15 Subpart A, Section 15.38 testing for FCC compliance may be achieved by following the procedures set out in ANSI C63.4 and applying the CISPR 22 limits.

4.5.1.2 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.

5 TEST CONDITIONS AND RESULTS

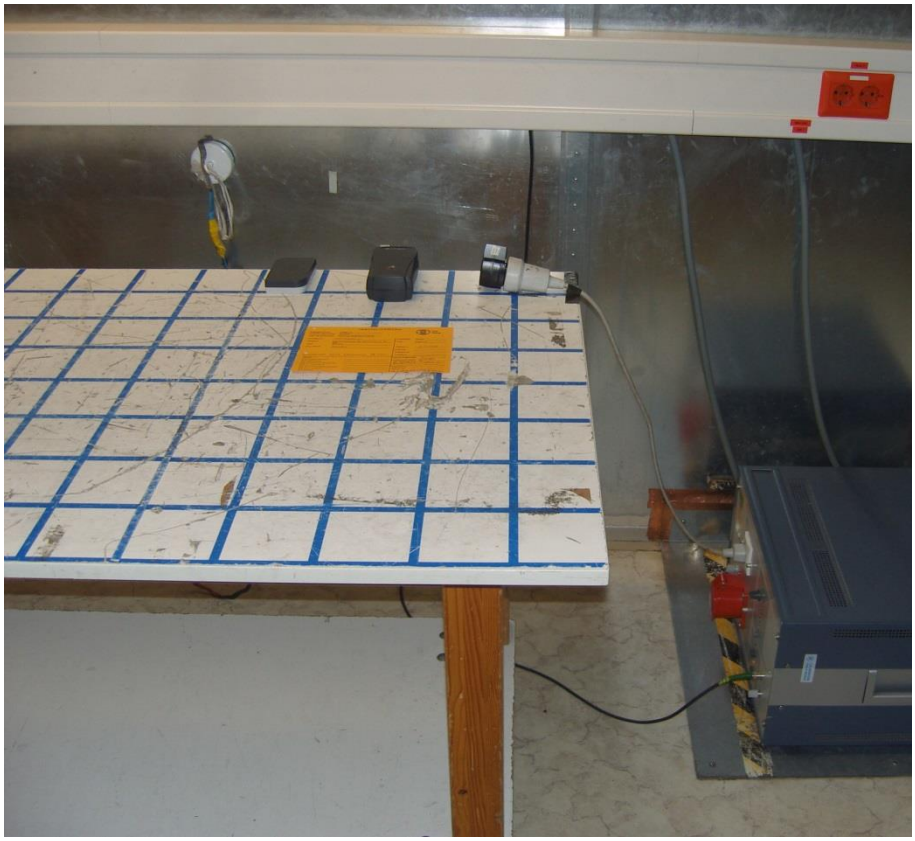
5.1 Conducted emissions

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



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 limits in the following table.

5.1.4 Description of Measurement

The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a line impedance stabilization network (LISN) with 50Ω/50 µH (CISPR 16) characteristics. 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 emissions are remeasured 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 6.12 dB at 0.426 MHz

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

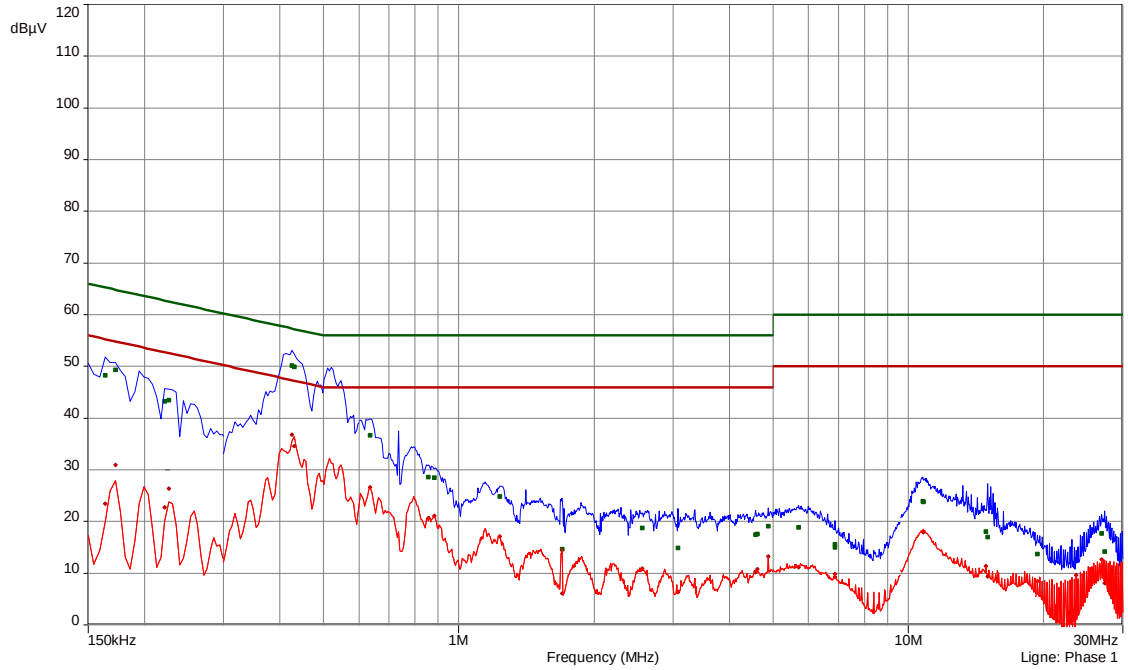
* Decreases with the logarithm of the frequency

The requirements are **FULFILLED.**

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

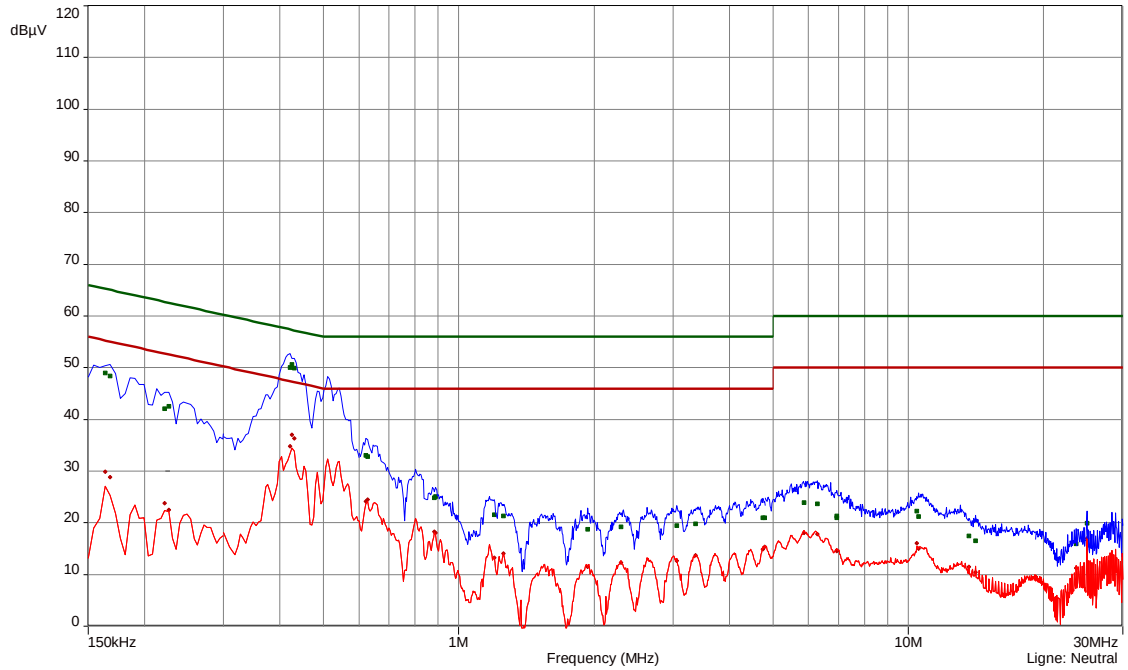
5.1.6 Test protocol

Test point L1 Result: Passed
Operation mode: Continuous Tx mode at 125 kHz
Remarks: 115V / 60Hz



freq	SR	QP	margin	limit	AV	margin	limit	line
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB	
0.1635	1	49.22	16.06	65.28	29.82	25.46	55.28	Phase 1
0.2175	1	42.96	19.95	62.91	24.08	28.83	52.91	Phase 1
0.426	2	51.21	6.12	57.33	37.83	9.5	47.33	Phase 1
0.4305	2	50.46	6.78	57.24	37.3	9.94	47.24	Phase 1
0.627	3	33.31	22.69	56	23.96	22.04	46	Phase 1
0.8025	3	31.44	24.56	56	24.51	21.49	46	Phase 1
0.888	3	28.82	27.18	56	21.89	24.11	46	Phase 1
1.254	4	26.07	29.93	56	18.95	27.05	46	Phase 1
1.2585	4	25.87	30.13	56	19.04	26.96	46	Phase 1
1.92	4	22.43	33.57	56	15.71	30.29	46	Phase 1
1.938	4	21.93	34.07	56	14.77	31.23	46	Phase 1
2.6115	5	21.16	34.84	56	14.53	31.47	46	Phase 1
2.625	5	21.39	34.61	56	14.86	31.14	46	Phase 1
4.1055	5	19.8	36.2	56	12.01	33.99	46	Phase 1
4.3755	5	20.67	35.33	56	14.59	31.41	46	Phase 1
5.8305	6	21.29	38.71	60	14.85	35.15	50	Phase 1
5.871	6	21.31	38.69	60	14.36	35.64	50	Phase 1
6.8295	6	16.96	43.04	60	10.55	39.45	50	Phase 1
6.978	6	16.63	43.37	60	10.85	39.15	50	Phase 1
10.7835	7	23.86	36.14	60	17.79	32.21	50	Phase 1
10.905	7	23.87	36.13	60	17.94	32.06	50	Phase 1
13.623	7	17.48	42.52	60	11.11	38.89	50	Phase 1
14.6445	7	16.46	43.54	60	9.3	40.7	50	Phase 1
19.497	8	13.5	46.5	60	7.85	42.15	50	Phase 1
23.6235	8	14.22	45.78	60	10.7	39.3	50	Phase 1
24.996	8	20.29	39.71	60	17.42	32.58	50	Phase 1

Test point N Result: Passed
Operation mode: Continuous Tx mode at 125 kHz
Remarks: 115 V/60Hz



freq	SR	QP	margin	limit	AV	margin	limit	line
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB	
0.1635	9	49.04	16.24	65.28	29.95	25.33	55.28	Neutral
0.168	9	48.38	16.68	65.06	28.89	26.17	55.06	Neutral
0.222	9	42.12	20.62	62.74	23.83	28.91	52.74	Neutral
0.2265	9	42.52	20.06	62.58	22.56	30.02	52.58	Neutral
0.4215	10	50.03	7.39	57.42	34.78	12.64	47.42	Neutral
0.426	10	50.69	6.64	57.33	37.07	10.26	47.33	Neutral
0.4305	10	49.96	7.28	57.24	36.33	10.91	47.24	Neutral
0.6225	11	33.03	22.97	56	24.19	21.81	46	Neutral
0.627	11	32.87	23.13	56	24.49	21.51	46	Neutral
0.8835	11	24.89	31.11	56	18.28	27.72	46	Neutral
0.888	11	25.08	30.92	56	18.07	27.93	46	Neutral
1.2	12	21.56	34.44	56	13.26	32.74	46	Neutral
1.2585	12	21.38	34.62	56	14.09	31.91	46	Neutral
1.938	12	18.78	37.22	56	11.46	34.54	46	Neutral
2.298	12	19.28	36.72	56	12.34	33.66	46	Neutral
3.057	13	19.51	36.49	56	12.64	33.36	46	Neutral
3.363	13	19.81	36.19	56	13.75	32.25	46	Neutral
4.749	13	20.95	35.05	56	14.9	31.1	46	Neutral
4.794	13	20.97	35.03	56	15.31	30.69	46	Neutral
5.862	14	23.87	36.13	60	18.11	31.89	50	Neutral
6.2805	14	23.63	36.37	60	17.78	32.22	50	Neutral
6.9285	14	21.31	38.69	60	14.71	35.29	50	Neutral
6.942	14	20.97	39.03	60	14.57	35.43	50	Neutral
10.455	15	22.26	37.74	60	16.11	33.89	50	Neutral
10.536	15	21.25	38.75	60	14.99	35.01	50	Neutral
13.623	15	17.42	42.58	60	11.54	38.46	50	Neutral
14.127	15	16.49	43.51	60	10.46	39.54	50	Neutral
23.6235	16	16	44	60	11.31	38.69	50	Neutral
24.996	16	19.93	40.07	60	17.05	32.95	50	Neutral

5.2 Field strength of the fundamental wave

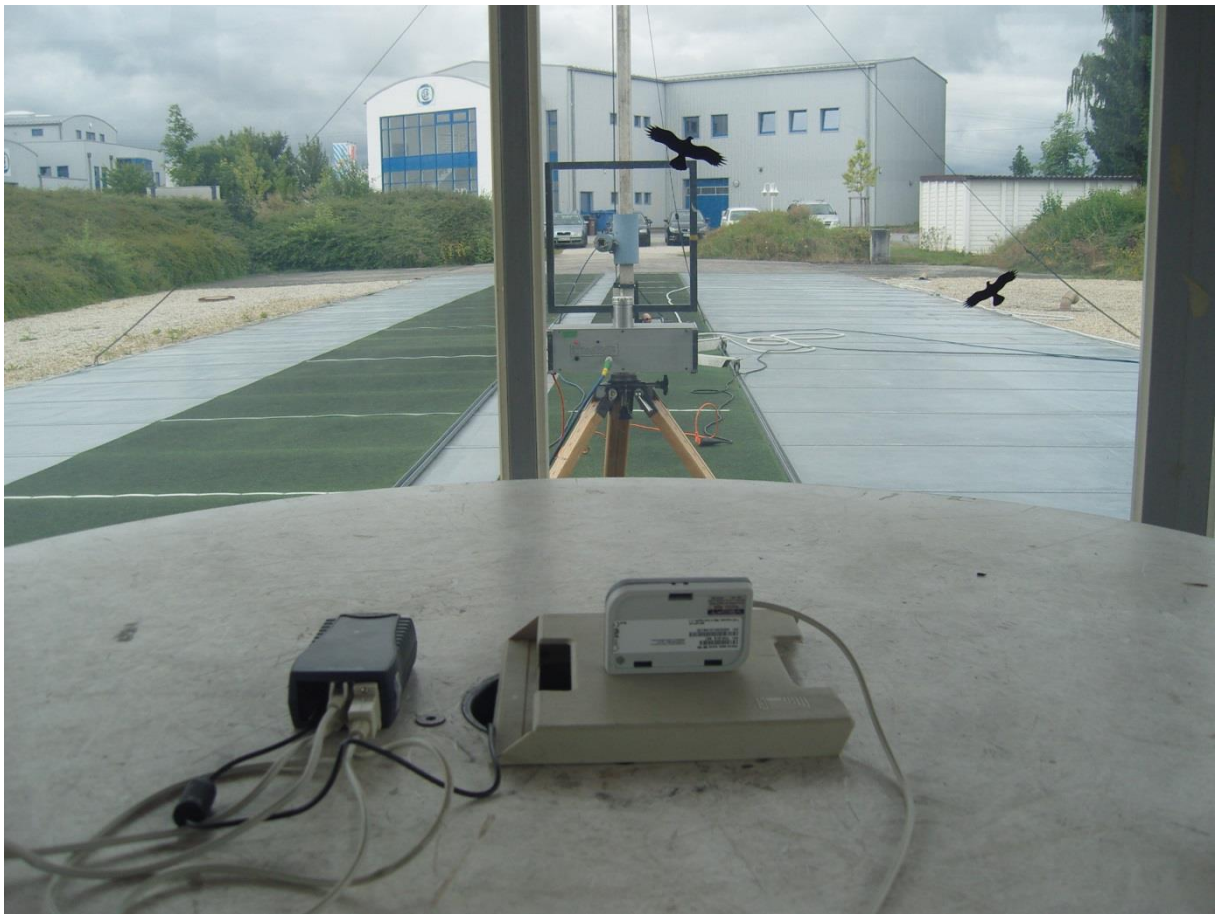
For test instruments and accessories used see section 6 Part **CPR 1**.

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



5.2.1 Applicable standard

According to FCC Part 15C, Section 15.209:
The emissions from intentional radiators shall not exceed the effective field strength limits.

5.2.2 Description of Measurement

The spurious emissions of the EUT have to be measured at an open area test site in the frequency range from 9 kHz to 1000 MHz using a tuned EMI receiver. The set up of the equipment under test will be in accordance with ANSI C63.4. The measurement has been performed at 3 m. The results have been compared to the limits defined at 30 m or 300 m distances according to FCC Part 15C, Section 15.31(f)(2) using an inverse linear distance extrapolation factor of 40 dB/decade. The final measurement has been performed with the EMI receiver using Quasi peak detector except for the frequency bands 9 kHz to 90 kHz and 110 to 490 kHz where an average detector will be used, according to Section 15.209(d).
The resolution bandwidth during the measurement is as follows:
9 kHz – 150 kHz: RBW: 200 Hz
150 kHz – 30 MHz: RBW: 9 kHz

Example:

Frequency (MHz)	Level (dBµV)	+	Factor (dB)	=	Level dB(µV/m)	-	Limit dB(µV/m)	=	Delta (dB)
1.705	5	+	20	=	25	-	30	=	-5

5.2.3 Test result

Measurement distance: 3 m

Frequency (MHz)	Level PK (dBµV)	Level AV (dBµV)	Level QP (dBµV)	Band-width (kHz)	Correct. factor (dB)	Corrected Level PK dB(µV/m)	Corrected Level AV dB(µV/m)	Corrected Level QP dB(µV/m)	Limit AV dB(µV/m)	Delta (dB)
0.125	73.7	73.7	73.6	0.2	20	93.7	93.7	93.6	105.0	-11.3

Calculated value at distance: 300 m

Frequency (MHz)	Level PK (dBµV)	Level AV (dBµV)	Level QP (dBµV)	Band-width (kHz)	Correct. factor (dB)	Corrected Level PK dB(µV/m)	Corrected Level AV dB(µV/m)	Corrected Level QP dB(µV/m)	Limit AV dB(µV/m)	Delta (dB)
0.125	-6.3	-6.3	-6.4	0.2	20	13.7	13.7	13.6	25.0	-11.3

Limit according to FCC Part 15C, Section 15.209(a):

Frequency	Field strength of fundamental wave		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

The requirements are **FULFILLED.**

Remarks: _____

5.3 Spurious emissions (magnetic field) 9 kHz – 30 MHz

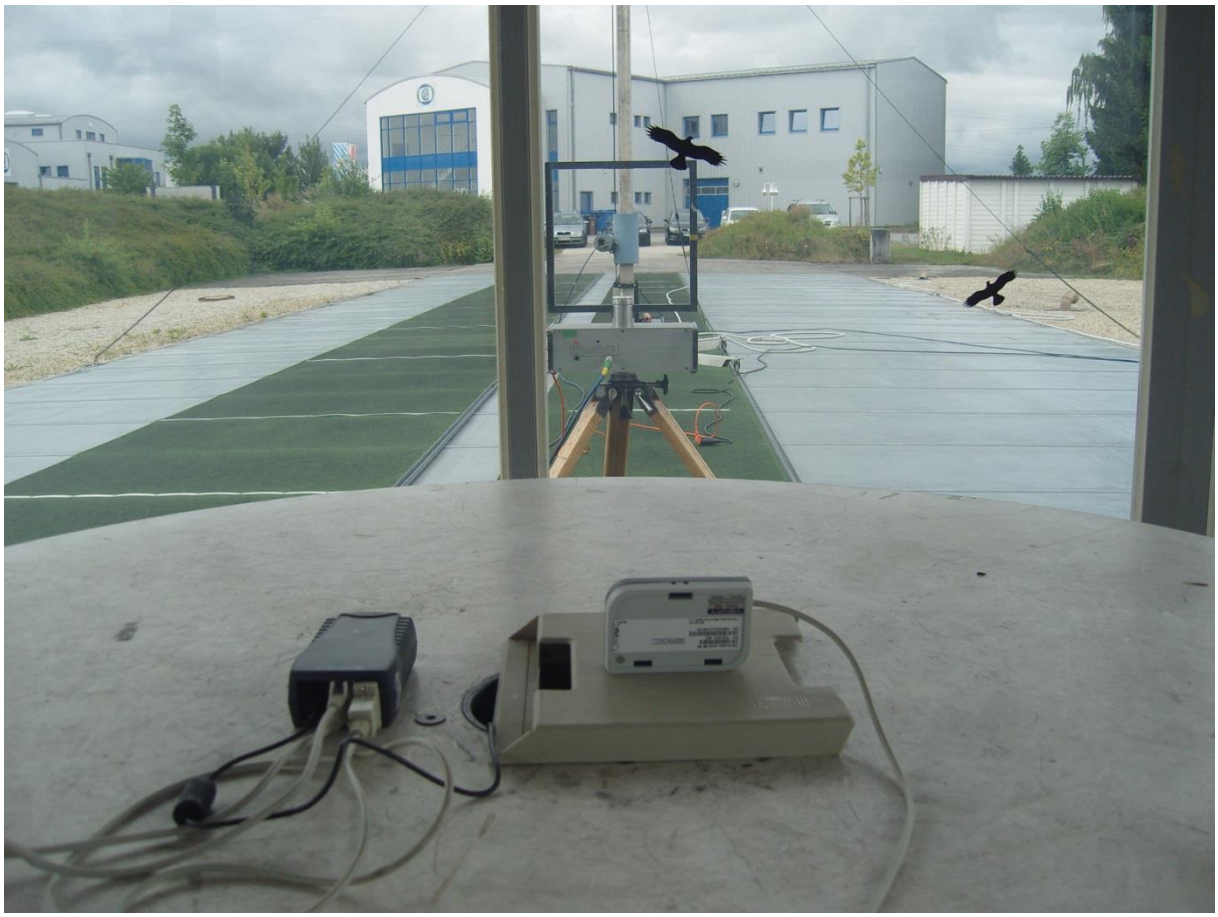
For test instruments and accessories used see section 6 Part **SER 1**.

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



5.3.3 Applicable standard

According to FCC Part 15C, Section 15.209:
The emissions from intentional radiators shall not exceed the effective field strength limits.

5.3.4 Description of Measurement

The spurious emissions of the EUT have to be measured at an open area test site in the frequency range from 9 kHz to 1000 MHz using a tuned EMI receiver. The set up of the equipment under test will be in accordance with ANSI C63.4. The measurement has been performed at 3 m. The results have been compared to the limits defined at 30 m or 300 m distances according to FCC Part 15C, Section 15.31(f)(2) using an inverse linear distance extrapolation factor of 40 dB/decade. The final measurement has been performed with the EMI receiver using Quasi peak detector except for the frequency bands 9 kHz to 90 kHz and 110 to 490 kHz where an average detector will be used, according to Section 15.209(d).
The resolution bandwidth during the measurement is as follows:
9 kHz – 150 kHz: RBW: 200 Hz
150 kHz – 30 MHz: RBW: 9 kHz

5.3.5 Test result

Measurement distance: 3 m

Frequency (MHz)	Level PK (dBµV)	Level AV (dBµV)	Level QP (dBµV)	Band-width (kHz)	Correct. factor (dB)	Corrected Level PK dB(µV/m)	Corrected Level AV dB(µV/m)	Corrected Level QP dB(µV/m)	Limit AV dB(µV/m)	Delta (dB)
0.375	36.4	34.1	33.6	9	20	56.2	54.1	53.6	95.5	-41.4

Calculated value at distance: 300m

Frequency (MHz)	Level PK (dBµV)	Level AV (dBµV)	Level QP (dBµV)	Band-width (kHz)	Correct. factor (dB)	Corrected Level PK dB(µV/m)	Corrected Level AV dB(µV/m)	Corrected Level QP dB(µV/m)	Limit AV dB(µV/m)	Delta (dB)
0.375	-43.6	-45.9	-46.4	9	20	-23.8	-25.9	-26.4	15.5	-41.4

Values at distance: 30m

Frequency (MHz)	Level PK (dBµV)	Level AV (dBµV)	Level QP (dBµV)	Band-width (kHz)	Correct. factor (dB)	Corrected Level PK dB(µV/m)	Corrected Level AV dB(µV/m)	Corrected Level QP dB(µV/m)	Limit dB(µV/m)	Delta (dB)
0.49 – 30.0				9	20				29.5	> 40

Limit according to FCC Part 15 Subpart 15.209(a):

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

The requirements are **FULFILLED.**

Remarks: All other unwanted emissions in the frequency range from 9 kHz to 30 MHz were below < -10.5 dBµV/m.

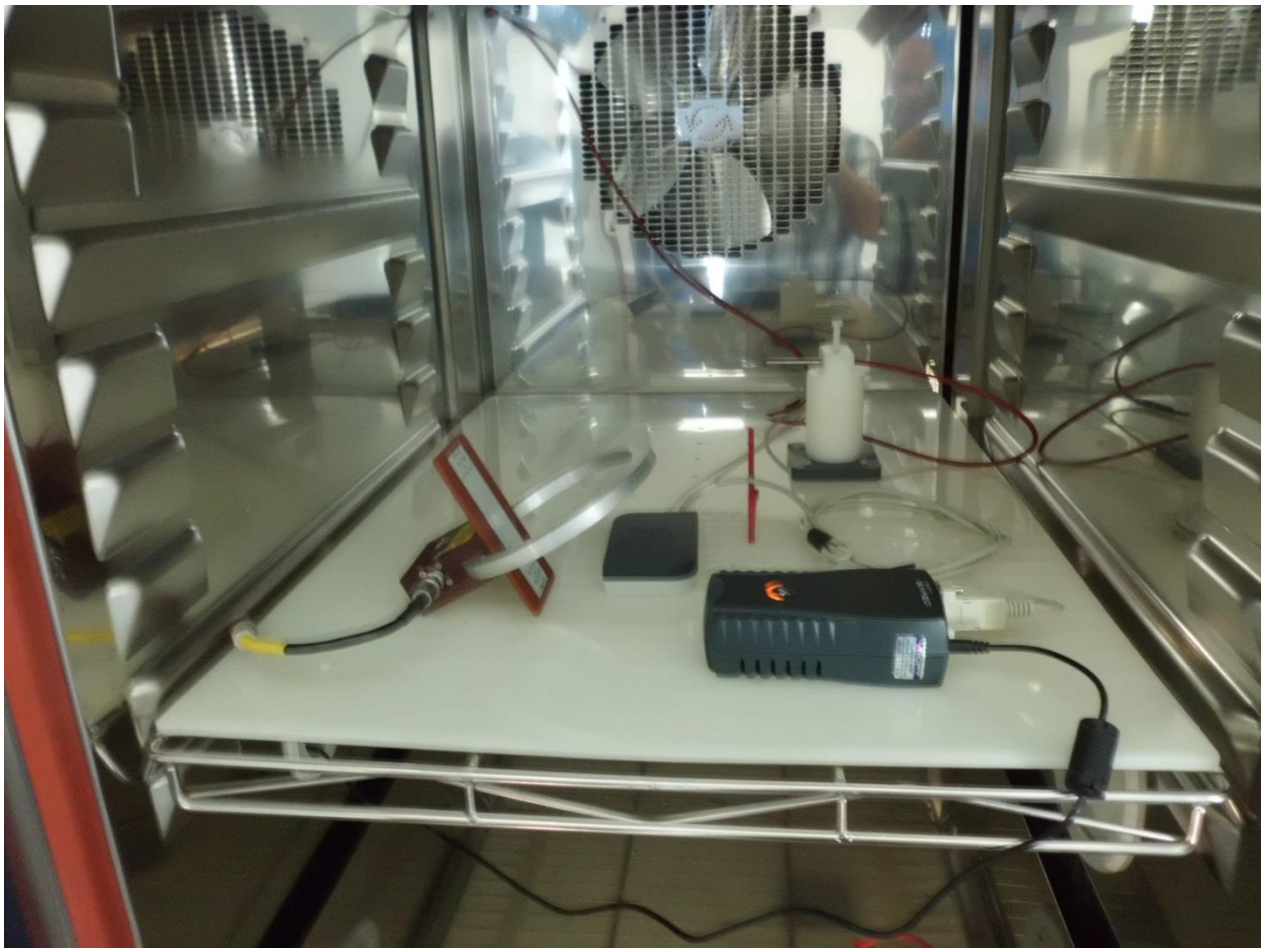
5.4 Emission Bandwidth

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

5.4.1 Description of the test location

Test location: AREA4

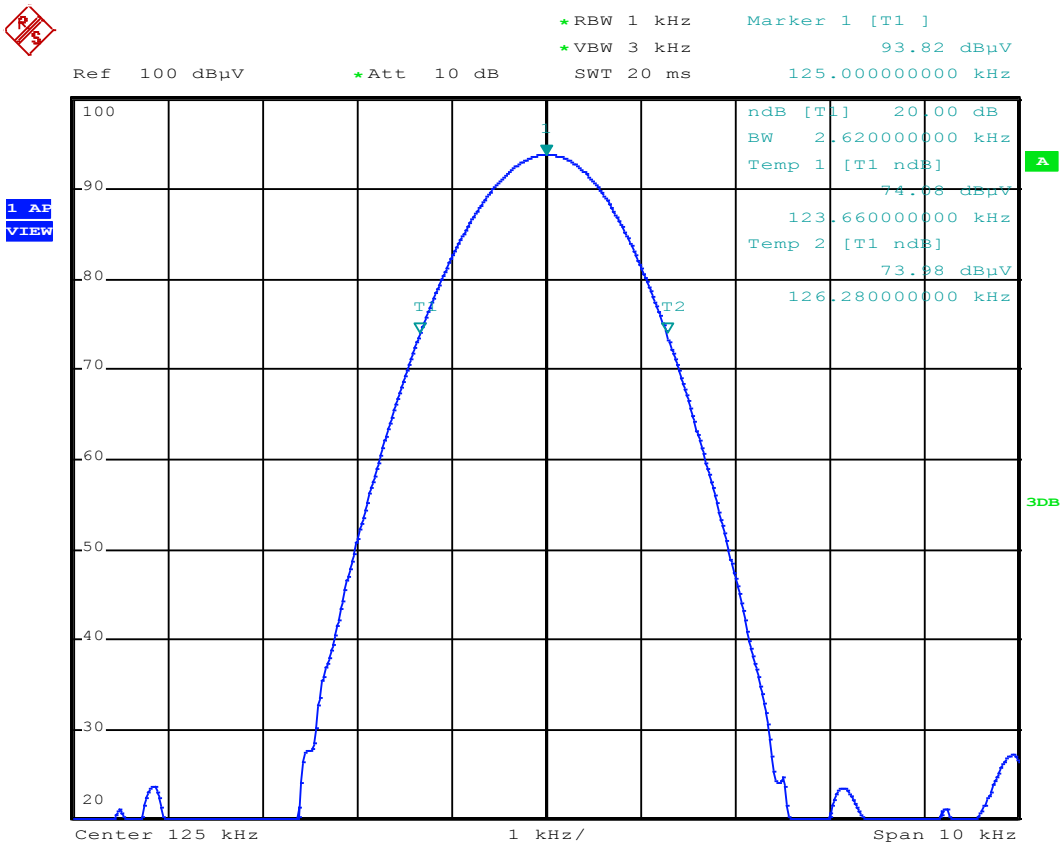
5.4.2 Photo documentation of the test set-up



Fundamental [kHz] See Plot 1	20dB Bandwidth F1	20dB Bandwidth F2	Measured Bandwidth [kHz]
125.00	123.66	126.28	2.62

5.4.3 Test protocol

Emission Bandwidth plots



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	Kind of Equipment	Equipment No.
A 4	ESHS 30	EMI Test Receiver	02-02/03-05-002
	ESH 2 - Z 5	LISN	02-02/20-05-004
	N-4000-BNC	RF Cable	02-02/50-05-138
	N-1500-N	RF Cable	02-02/50-05-140
	ESH 3 - Z 2	Pulse Limiter	02-02/50-05-155
CPR 1	FMZB 1516	Magnetic Field Antenna	01-02/24-01-018
	ESCI	EMI Test Receiver	02-02/03-05-005
	S10162-B	RF Cable 33 m	02-02/50-05-031
	KK-EF393-21N-16	RF Cable 20 m	02-02/50-05-033
	NW-2000-NB	RF Cable	02-02/50-05-113
MB	FSP 30	Spectrum Analyser	02-02/11-05-001
	HZ-10	Magnetic Field Antenna	02-02/24-05-012
SER 1	FMZB 1516	Magnetic Field Antenna	01-02/24-01-018
	ESCI	EMI Test Receiver	02-02/03-05-005
	S10162-B	RF Cable 33 m	02-02/50-05-031
	KK-EF393-21N-16	RF Cable 20 m	02-02/50-05-033
	NW-2000-NB	RF Cable	02-02/50-05-113

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
A 4	ESHS 30	02-02/03-05-002	17/07/2015	17/07/2014		
	ESH 2 - Z 5	02-02/20-05-004	18/10/2014	18/10/2013	28/08/2014	28/02/2014
	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			10/10/2014	10/04/2014
CPR 1	FMZB 1516	01-02/24-01-018			13/02/2015	13/02/2014
	ESCI	02-02/03-05-005	12/12/2014	12/12/2013		
	S10162-B	02-02/50-05-031				
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				
MB	FSP 30	02-02/11-05-001	24/10/2014	24/10/2013		
	HZ-10	02-02/24-05-012				
SER 1	FMZB 1516	01-02/24-01-018			13/02/2015	13/02/2014
	ESCI	02-02/03-05-005	12/12/2014	12/12/2013		
	S10162-B	02-02/50-05-031				
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				