

FCC ID: YMY030180

EMI - TEST REPORT

- FCC Part 15.209 -



Test Report No. : T34707-00-00HU	21. April 2011 Date of issue
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Type / Model Name : 030180

Product Description : Programming Tool Unit

Applicant : LDL Technology

Address : Parc Technologique du Canal, 3 rue Hermès
31520 Ramonville St-Agne, France

Manufacturer : ALLIGATOR Ventilfabrik GmbH

Address : Richard-Steiff-Str. 4
D-89537 Giengen/Brenz

Licence holder : ALLIGATOR Ventilfabrik GmbH

Address : Richard-Steiff-Str. 4
D-89537 Giengen/Brenz

Test Result according to the standards listed in clause 1 test standards:	POSITIVE
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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 (October, 2010)

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 (October, 2010)

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.
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ANSI C95.1:1992	IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
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CISPR 16-4-2: 2003	Uncertainty in EMC measurement
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2 SUMMARY

GENERAL REMARKS:

The carrier frequency is 125.0 kHz

The EuT has a print on antenna on the PCB.

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 : 18. January 2011

Testing concluded on : 19. April 2011

Checked by:

Tested by:

Klaus Gegenfurtner
Dipl.-Ing.(FH)
Manager: Radio Group

Huber Markus

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3 EQUIPMENT UNDER TEST

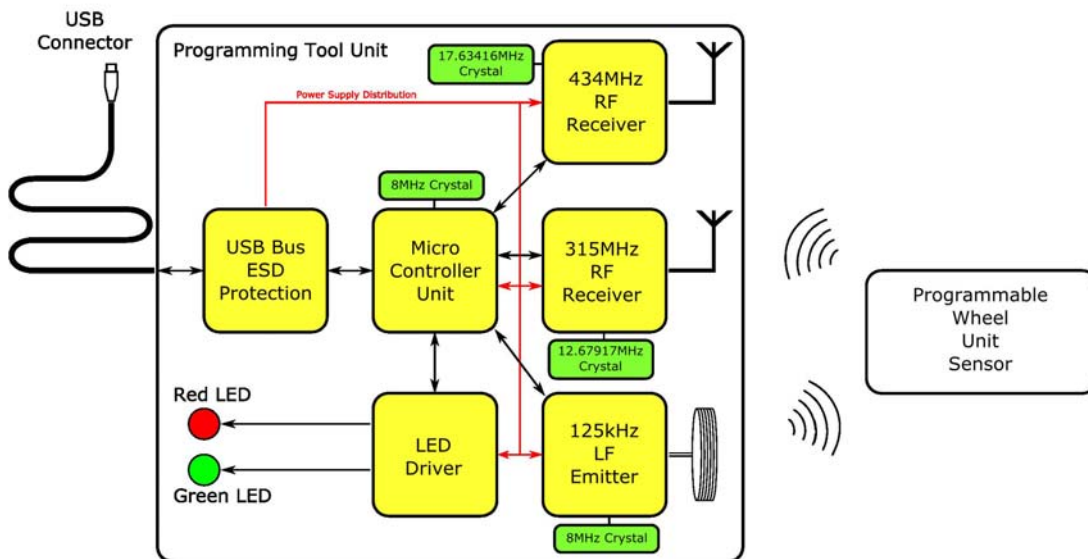
3.1 Photo documentation of the EUT – Detailed photos see Attachment A

3.2 Power supply system utilised

Power supply voltage: : 5.0 V / DC (Powered Hub or Host USB port)

3.3 Short description of the Equipment under Test (EUT)

BLOCK DIAGRAM



OPERATION SUMMARY

The PTU (Programming Tool Unit) is a device which allows the wireless programming and re-programming of Wheel Unit Sensor's firmware. The power supply of the PTU is performed by its USB cable, no other external power supply is needed. Once the Boot-loader built-in WUS is installed on the top cover of the PTU (fitting holes are present to allow easy positioning), programming can be performed using an appropriate PC software. Using this kind of wireless device allows an easy and fast way to upload any firmware without having to open the WUS.

Wireless communication with the Wheel Unit Sensor is performed using 125kHz Low Frequency emitter for up-streaming data (PTU → WUS) and two 433.92/315MHz High Frequency receivers (depending of the WUS region) for down-streaming data (WUS → PTU). Using Low Frequency emitter aims in reducing the programming range area. This avoids programming WUS not located in direct proximity of the PTU.

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Number of tested samples: 2
Serial number: Sample ID: 00000018
Sample ID: 00000019

EUT operation mode:

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

- Tx mode at 125 kHz - Continuous Wave Emitter Sample (unmodulated)

- Tx mode at 125 kHz - Continuous Frame Emitter Sample (modulated)

-

EUT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

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

- USB Power Supply Block Model : Fa. LDL

- Model :

- Model :

- Model :

- Model :

- Model :

- customer specific cables

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

**mikes-testingpartners gmbh
Ohmstrasse 2-4
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. The reader may notice that tolerances within the calibration of the equipment and facilities may cause additional uncertainty. The measurement uncertainty is calculated for all measurements listed in this test report acc. to CISPR 16-4-2 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurement“ and documented in the mikes-testingpartners gmbh quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, mikes-testingpartners 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 diversity and modifications in production process of devices may result in additional deviation. If necessary, refer to the test lab for the actual measurement uncertainty for the specific test. The manufacturer has the sole responsibility of continued compliance of the EUT.

4.4 Measurement Protocol for FCC, VCCI and AUSTEL

4.4.1 GENERAL INFORMATION

4.4.1.1 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.

4.4.1.2 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.

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5 TEST CONDITIONS AND RESULTS

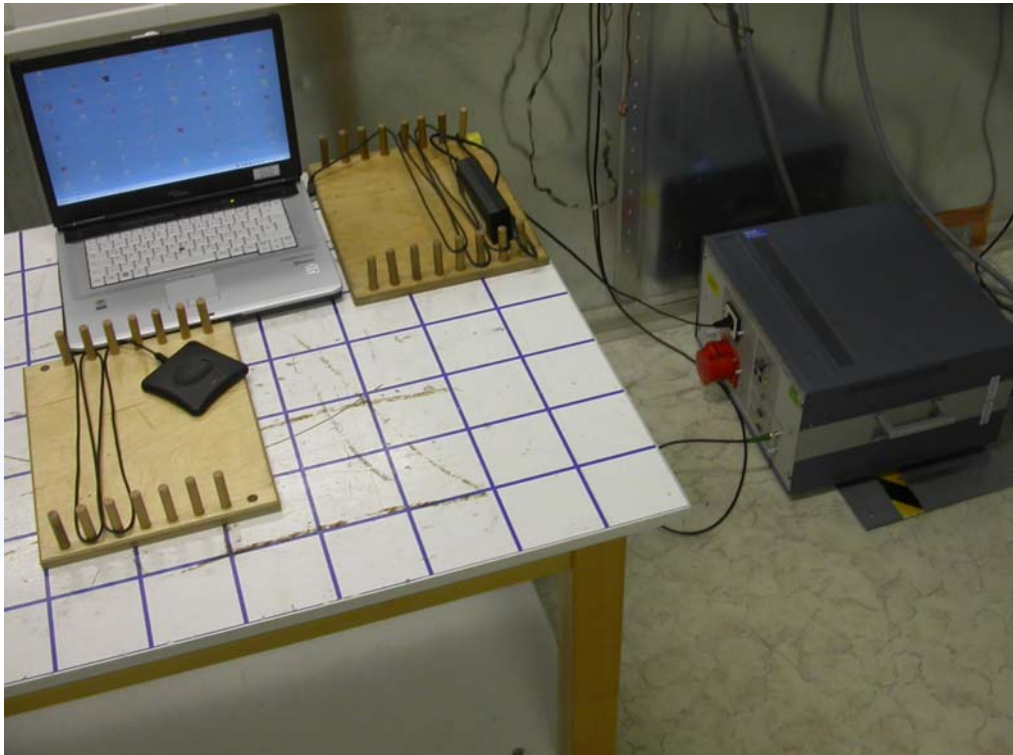
5.1 Conducted emissions

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.

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

5.1.4 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin 16.9 dB at 1.275 MHz

The requirements are **FULFILLED**.

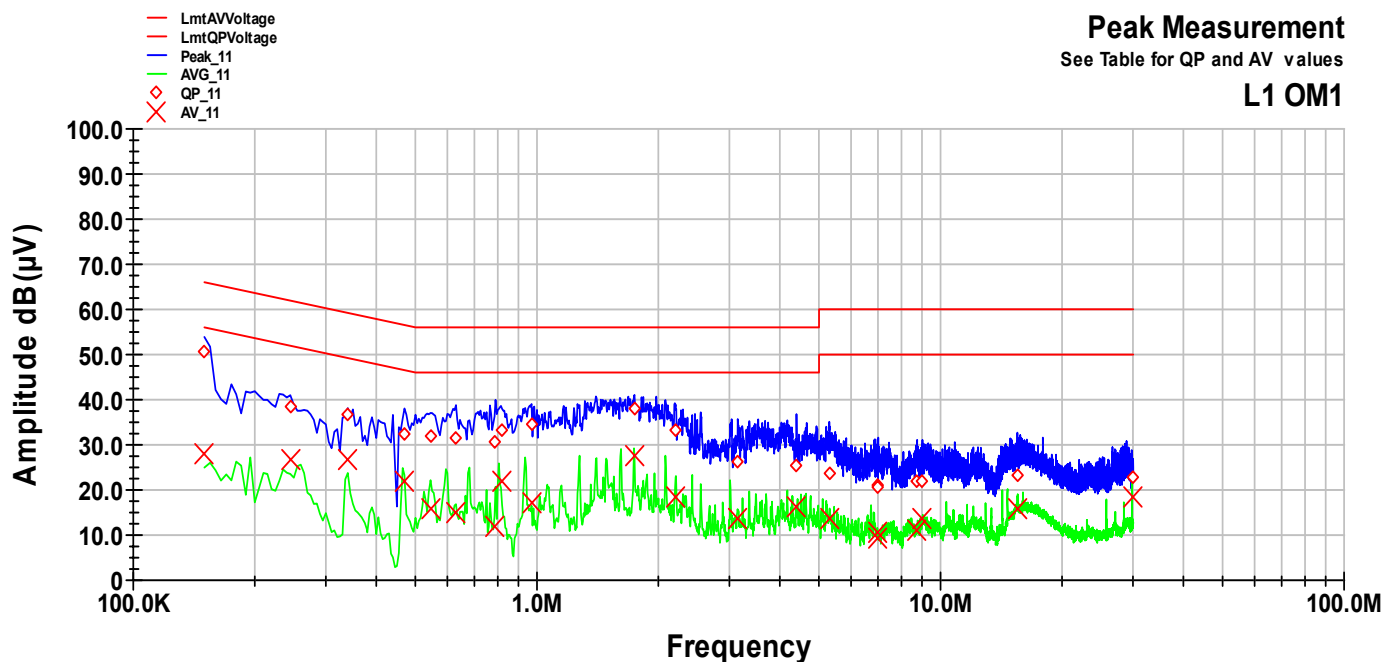
Remarks: For detailed test result please refer to following test protocols.
Test was performed with Lap Top Fa. mikes intern (02-01/01-07-007).

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5.1.5 Test protocol

Test point: L1
 Operation mode: Tx mode at 125 kHz - Continuous Wave Emitter
 Sample (unmodulated)
 Result: passed
 Remarks:
 Date:

Peak Measurement
 See Table for QP and AV values
L1 0M1



Frequency MHz	QP Level dB(µV)	QP Margin dB	QP Limit dB	AV Level dB(µV)	AV Margin dB	AV Limit dB
0.15	50.5	-15.5	66.0	28.2	-27.8	56.0
0.245	38.5	-23.5	61.9	26.9	-25.0	51.9
0.34	36.7	-22.5	59.2	26.5	-22.7	49.2
0.47	32.5	-24.0	56.5	21.8	-24.7	46.5
0.545	31.8	-24.2	56.0	15.7	-30.3	46.0
0.63	31.5	-24.5	56.0	14.8	-31.2	46.0
0.79	30.4	-25.6	56.0	11.7	-34.3	46.0
0.815	33.3	-22.8	56.0	21.9	-24.1	46.0
0.97	34.7	-21.3	56.0	17.0	-29.0	46.0
1.745	38.2	-17.8	56.0	27.4	-18.6	46.0
2.195	33.3	-22.7	56.0	18.4	-27.6	46.0
3.145	26.4	-29.6	56.0	13.7	-32.3	46.0
4.395	25.6	-30.4	56.0	16.4	-29.6	46.0
5.3	23.7	-36.3	60.0	13.6	-36.4	50.0
6.98	21.0	-39.0	60.0	10.6	-39.4	50.0
7.005	20.8	-39.3	60.0	9.4	-40.6	50.0
8.745	21.8	-38.2	60.0	11.1	-38.9	50.0
9.015	21.8	-38.2	60.0	13.4	-36.5	50.0
15.495	23.2	-36.8	60.0	15.9	-34.1	50.0
29.795	23.0	-37.0	60.0	18.5	-31.5	50.0

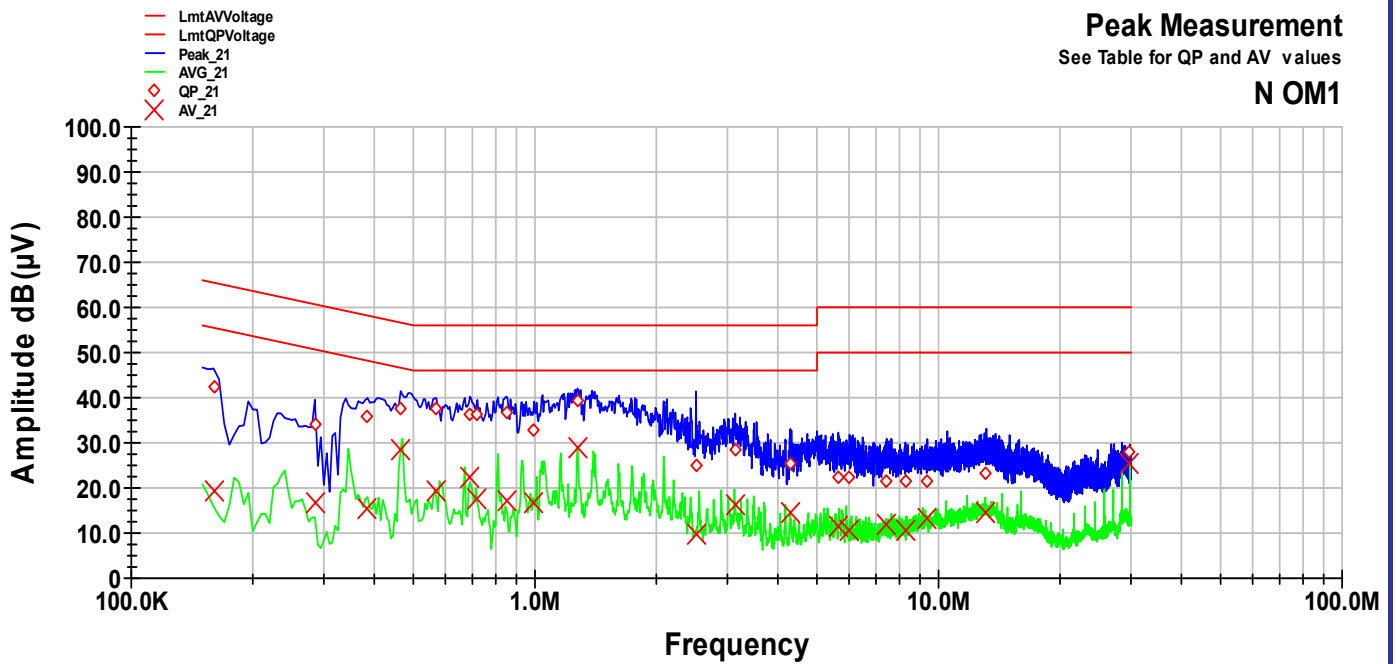
FCC ID: YMY030180

Test point: N
Operation mode: Tx mode at 125 kHz - Continuous Wave Emitter
Sample (unmodulated)

Result: passed

Remarks:
Date:

Peak Measurement
See Table for QP and AV values
N OM1



Frequency MHz	QP Level dB(µV)	QP Margin dB	QP Limit dB	AV Level dB(µV)	AV Margin dB	AV Limit dB
0.16	42.4	-23.1	65.5	19.3	-36.1	55.5
0.285	34.2	-26.4	60.7	16.7	-34.0	50.7
0.385	35.8	-22.4	58.2	15.5	-32.7	48.2
0.465	37.6	-19.0	56.6	28.6	-18.0	46.6
0.57	37.6	-18.4	56.0	19.2	-26.8	46.0
0.69	36.4	-19.6	56.0	22.5	-23.5	46.0
0.72	36.3	-19.7	56.0	17.7	-28.3	46.0
0.85	36.7	-19.3	56.0	17.0	-29.0	46.0
0.995	32.9	-23.1	56.0	16.8	-29.2	46.0
1.275	39.1	-16.9	56.0	28.9	-17.1	46.0
2.505	24.9	-31.1	56.0	9.9	-36.2	46.0
3.135	28.6	-27.4	56.0	16.5	-29.5	46.0
4.29	25.5	-30.5	56.0	14.3	-31.7	46.0
5.645	22.6	-37.4	60.0	11.6	-38.5	50.0
6.015	22.4	-37.6	60.0	10.6	-39.4	50.0
7.43	21.7	-38.3	60.0	12.1	-37.9	50.0
8.275	21.6	-38.4	60.0	10.6	-39.3	50.0
9.38	21.3	-38.7	60.0	13.4	-36.6	50.0
13.13	23.4	-36.6	60.0	14.7	-35.3	50.0
29.79	27.8	-32.2	60.0	25.6	-24.4	50.0

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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



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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:

$$\begin{array}{rclclclclclcl}
 \text{Frequency} & & \text{Level} & + & \text{Factor} & = & \text{Level} & - & \text{Limit} & = & \text{Delta} \\
 \text{(MHz)} & & \text{(dB}\mu\text{V)} & & \text{(dB)} & & \text{dB}(\mu\text{V/m)} & & \text{dB}(\mu\text{V/m)} & & \text{(dB)} \\
 1.705 & & 5 & + & 20 & = & 25 & - & 30 & = & -5
 \end{array}$$

5.2.3 Test result

Measurement distance: 3 m

Frequency (MHz)	Level PK (dBμV)	Level AV (dBμV)	Level QP (dBμV)	Bandwidth (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	59.2	57.4	52.7	0.2	20	79.2	77.4	72.7	105.0	-27.6

Calculated value at distance: 300 m

Frequency (MHz)	Level PK (dBμV)	Level AV (dBμV)	Level QP (dBμV)	Bandwidth (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	-20.8	-22.6	-27.3	0.2	20	-0.8	-2.6	-7.3	25.0	-27.6

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

Frequency (MHz)	Field strength of fundamental wave (μV/m)	Field strength of fundamental wave dB(μV/m)	Measurement distance (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

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The requirements are **FULFILLED**.

Remarks:

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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



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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

Example:

$$\begin{array}{rclclclclclcl}
 \text{Frequency} & & \text{Level} & + & \text{Factor} & = & \text{Level} & - & \text{Limit} & = & \text{Delta} \\
 \text{(MHz)} & & \text{(dB}\mu\text{V)} & & \text{(dB)} & & \text{dB}(\mu\text{V/m)} & & \text{dB}(\mu\text{V/m)} & & \text{(dB)} \\
 1.705 & & 5 & + & 20 & = & 25 & - & 30 & = & -5
 \end{array}$$

5.3.5 Test result

Measurement distance: 3 m

Frequency (MHz)	Level PK (dBμV)	Level AV (dBμV)	Level QP (dBμV)	Bandwidth (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	30.82	4.37	19.68	9	20	50.82	24.37	39.68	96.12	-71.7

Calculated value at distance: 300m

Frequency (MHz)	Level PK (dBμV)	Level AV (dBμV)	Level QP (dBμV)	Bandwidth (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	-49.18	-75.63	-60.32	9	20	-29.18	-55.63	-40.32	16.12	-71.7

Values at distance: 30m

Frequency (MHz)	Level PK (dBμV)	Level AV (dBμV)	Level QP (dBμV)	Bandwidth (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)
0.49 – 30.0				9	20				29.5	> 40

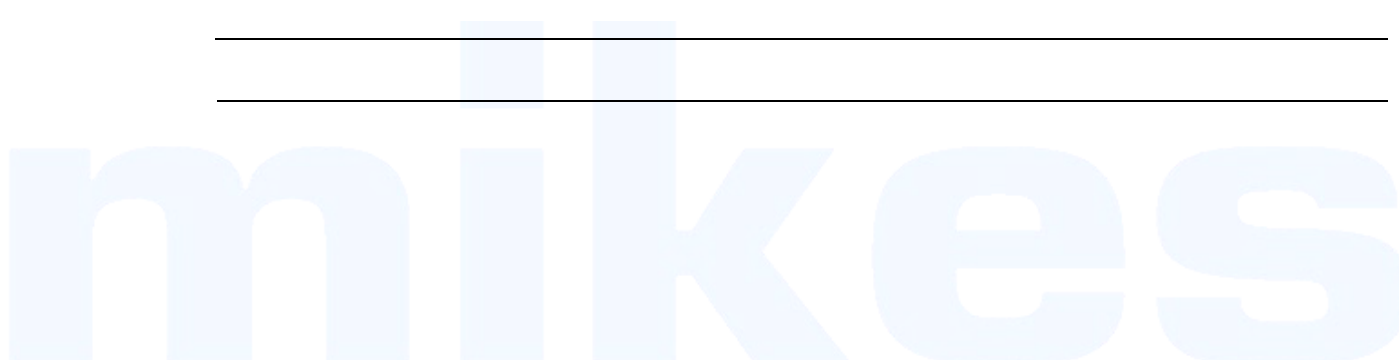
FCC ID: YMY030180

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

Frequency (MHz)	Field strength of spurious emissions		Measurement distance (metres)
	(μ V/m)	dB(μ V/m)	
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
below < -10.5 dB μ V/m at 3m test distance.



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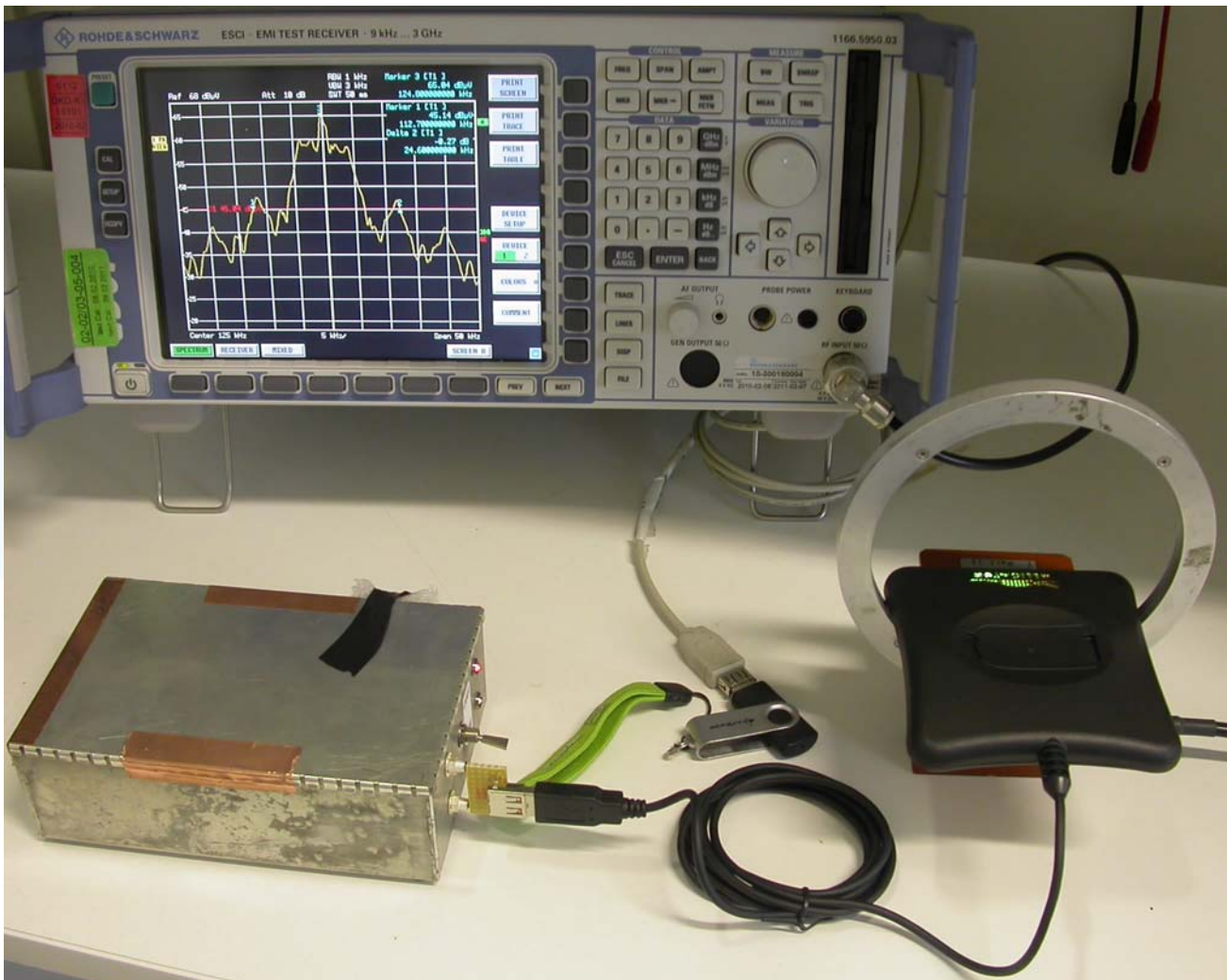
5.4 Emission Bandwidth

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

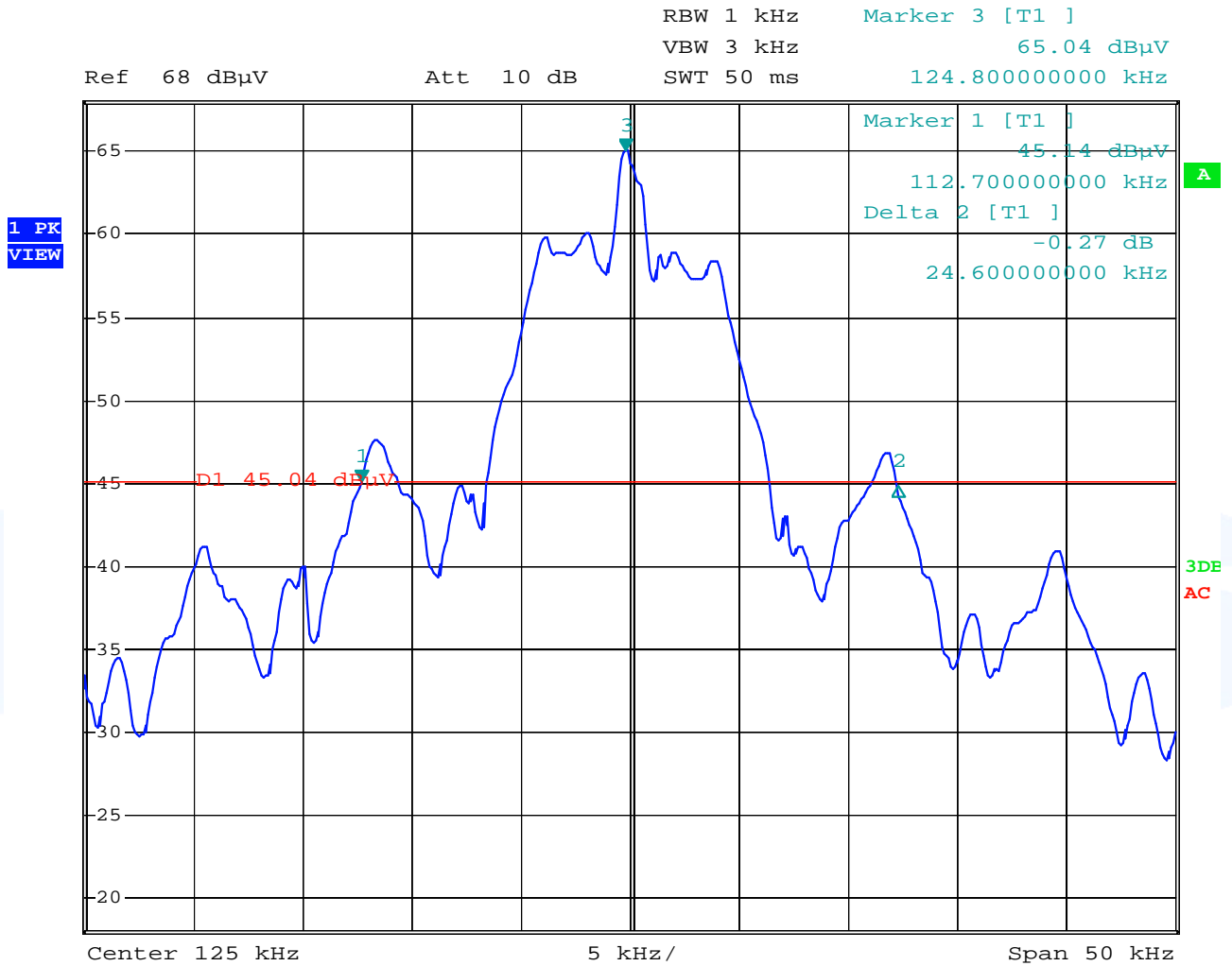


Fundamental [kHz] See Plot 1	20dB Bandwidth F1	20dB Bandwidth F2	Measured Bandwidth [kHz]
125.00	112.70	137.30	24.6

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5.4.3 Test protocol

Emission Bandwidth plots



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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	ESHS 30	02-02/03-05-002	18/06/2011	18/06/2010		
	ESH 2 - Z 5	02-02/20-05-004	13/03/2011	13/03/2008	22/06/2011	22/12/2010
	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			06/10/2011	06/04/2011
	SP 103 /3.5-60	02-02/50-05-182				
CPR 1	FMZB 1516	01-02/24-01-018			16/02/2012	16/02/2011
	ESCI	02-02/03-05-004	21/02/2012	21/02/2011		
	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	ESCI	02-02/03-05-004	21/02/2012	21/02/2011		
	HZ-10	02-02/24-05-012				
SER 1	FMZB 1516	01-02/24-01-018			16/02/2012	16/02/2011
	ESCI	02-02/03-05-004	21/02/2012	21/02/2011		
	S10162-B	02-02/50-05-031				
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				