



InterLab®

FCC Measurement/Technical Report on

Safety sensor

AZM300Z-ST-1P2P

RFID tag reader

FCC ID: 2AF09-AZM

IC ID: 20745-AZM

Report Reference: MDE_SCHMER_1501_FCCb

Test Laboratory:

7layers GmbH
Borsigstrasse 11
40880 Ratingen
Germany



Note:

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the test laboratory.

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0 Summary

0.1 Technical Report Summary

Type of Authorization

Certification for an intentional radiator: 125 kHz RFID tag reader

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 2 (10-1-14 Edition). The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

Part 15, Subpart C – Intentional Radiators

§ 15.205 Restricted bands of operation

§ 15.207 Conducted limits

§ 15.209 Radiated emission limits; general requirements

§ 15.215 Additional provisions to the general radiated emission limitations

Note:

ANSI C63.10-2013 applied

Summary Test Results:

The EUT complied with all performed tests as listed in chapter 0.2 Measurement Summary.



0.2 Measurement Summary

FCC Part 15, Subpart C §15.209

Radiated Emissions

The measurement was performed according to ANSI C63.10

OP-Mode	Setup	Port	Final Result
op-mode 1	Setup_01	Enclosure	passed

FCC Part 15, Subpart C § 15.209

Peak Output Power

The measurement was performed according to ANSI C63.10

OP-Mode	Setup	Port	Final Result
op-mode 1	Setup_01	Enclosure	passed

FCC Part 15, Subpart C § 15.207

Conducted Emissions AC Power line

The measurement shall be performed according to ANSI C63.10

OP-Mode	Setup	Port	Final Result
–	–	–	–

N/A ⁽¹⁾

FCC Part 15, Subpart C § 15.215

Occupied Bandwidth

The measurement was performed according to ANSI C63.10

OP-Mode	Setup	Port	Final Result
op-mode 1	Setup_01	Enclosure	passed

Notes:

N/A = Not applicable

(1) The EUT is DC powered

Revision History

Report version control			
Version	Release date	Change Description	Version validity
MDE_SCHMER_1501_FCCa	2015-11-05	Initial version	invalid
MDE_SCHMER_1501_FCCa_Rev.1	2016-08-30	On front page FCC ID and IC ID are changed. On page 8: in subclause 2.8.2 HVIN added.	invalid
MDE_SCHMER_1501_FCCb	2016-10-26	This report relays to AZM safety sensors only. MDE_SCHMER_1501_FCCa_Rev.1 was used as a reference report.	valid

Responsible for
Accreditation Scope: _____

Responsible
for Test Report: _____

1 Administrative Data

1.1 Testing Laboratory

Company Name: 7layers GmbH

Address Borsigstr. 11
40880 Ratingen
Germany

This facility has been fully described in a report submitted to the FCC and accepted under the registration number 96716.

The test facility is also accredited by the following accreditation organisation:
Laboratory accreditation no.: DAKkS D-PL-12140-01-00

Responsible for Accreditation Scope: Dipl.-Ing. Bernhard Retka
Dipl.-Ing. Robert Machulec
Dipl.-Ing. Andreas Petz
Dipl. Ing. Marco Kullik

Report Template Version: 2013-03-14

1.2 Project Data

Responsible for testing and report: Dipl. Ing. Dobrin Dobrinov

Date of Test(s): 2015-05-21 to 2015-05-26

Date of Report: 2016-10-26

1.3 Applicant Data

Company Name: K.A. Schmersal GmbH & Co. KG

Address: Möddinghofe 30
42279 Wuppertal
Germany

Contact Person: Mr. Frank Schmidt
Phone: +49 (0)202 6474-767
Fax:
E-Mail: fschmidt@schmersal.com

1.4 Manufacturer Data

Company Name: please see applicant data

Address:

Contact Person:

2 Test object Data

2.1 General EUT Description

Equipment under Test	Safety sensor
Type Designation:	AZM300Z-ST-1P2P
Kind of Device:	125 kHz RFID tag reader
Voltage Type:	DC
Voltage level:	24 V DC

General product description:

The RFID safety sensors are designed for applications in safety circuits and are used for monitoring the position of movable separating safety guards.

Specific product description for the EUT:

The EUT is a SRD RFID tag reader, operating in 125 kHz frequency range.

The EUT provides the following ports:

Ports

- Enclosure
- DC in (24 V)

The main components of the EUT are listed and described in Chapter 2.



2.2 EUT Main components

Type, S/N, Short Descriptions etc. used in this Test Report

Short Description	Equipment under Test	Type Designation	Serial No.	HW Status	SW Status	Date of Receipt
EUT A (Code: DE1137000aa01)	Safety sensor	AZM300Z-ST 1P2P	103001435	"G"	1.1	-
Remark: EUT A is equipped with an integral antenna.						

NOTE: The short description is used to simplify the identification of the EUT in this test report.

2.3 Ancillary Equipment

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless, Ancillary Equipment can influence the test results.

Short Description	Equipment under Test	Type Designation	Serial No.	HW Status	SW Status	FCC ID
AE 1	tag	AZ/AZM300-B1	101218025	M02 1A9		-

2.4 Auxiliary Equipment

For the purposes of this test report, auxiliary equipment is defined as equipment which is used temporarily to enable operational and control features especially used for the tests of the EUT which is not used during normal operation or equipment that is used during the tests in combination with the EUT but is not subject of this test report. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless, Auxiliary Equipment can influence the test results.

Short Description	Equipment under Test	Type Designation	Serial no.	HW Status	SW Status	FCC ID
-	-	-	-	-	-	-

2.5 EUT Setups

This chapter describes the combination of EUTs and equipment used for testing. The rationale for selecting the EUTs, ancillary and auxiliary equipment and interconnecting cables, is to test a representative configuration meeting the requirements of the referenced standards.

Setup No.	Combination of EUTs	Description and Rationale
Setup_01	EUT A + AE 1	EUT A reading the tag

2.6 Operating Modes

This chapter describes the operating modes of the EUTs used for testing.

Op. Mode	Description of Operating Modes	Remarks
op-mode 1	continuous modulation	EUT is transmitting a periodic modulated signal, continuously reading tag information.

2.7 Special software used for testing

None.

2.8 Product labelling

2.8.1 FCC ID label

FCC ID: 2AFO9-AZM

2.8.2 IC ID label

IC ID: 20745-AZM

HVIN: AZM300Z-ST 1P2P

2.8.3 Location of the label on the EUT

Please refer to the documentation of the applicant.

3 Test Results

3.1 Spurious radiated emissions

Standard FCC Part 15, Subpart C

The test was performed according to: ANSI C63.10

3.1.1. Test Description

The test set-up was made in accordance to the general provisions of ANSI C63.10 in a typical installation configuration. The Equipment Under Test (EUT) was set up on a non-conductive table 1.0 x 2.0 m² in the semi-anechoic chamber. The influence of the EUT support table that is used between 30–1000 MHz was evaluated.

The measurement procedure is implemented into the EMI test software ES-K1 from R&S. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body-worn or handheld EUT. The final test on all kind of EUTs is performed at 2 axes.

1. Measurement up to 30 MHz

The Loop antenna HFH2-Z2 is used.

Step 1: pre-measurement

- Anechoic chamber
- Antenna distance: 10 m
- Detector: Peak-Maxhold
- Frequency range: 0.009 – 0.15 and 0.15 – 30 MHz
- Frequency steps: 0.1 kHz and 5 kHz
- IF-Bandwidth: 0.2 kHz and 10 kHz
- Measuring time / Frequency step: 100 ms

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: final measurement

For the relevant emissions determined in step 1, an additional measurement with the following settings will be performed. Intention of this step is to find the maximum emission level.

- Open area test side
- Antenna distance: according to the Standard
- Detector: Quasi-Peak
- Frequency range: 0.009 – 30 MHz
- Frequency steps: measurement at frequencies detected in step 1
- IF-Bandwidth: 200 Hz – 10 kHz
- Measuring time / Frequency step: 100 ms

2. Measurement above 30 MHz and up to 1 GHz

Step 1: Preliminary scan

Preliminary test to identify the highest amplitudes relative to the limit.

Settings for step 1:

- Antenna distance: 3 m
- Detector: Peak-Maxhold
- Frequency range: 30 – 1000 MHz
- Frequency steps: 60 kHz
- IF-Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 μ s
- Turntable angle range: -180° to 180°
- Turntable step size: 90°
- Height variation range: 1 – 3 m
- Height variation step size: 2 m
- Polarisation: Horizontal + Vertical

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: second measurement

For the relevant emissions determined in step 1, an additional measurement with the following settings will be performed. Intention of this step is, to find out the approximate turntable angle and antenna height for each frequency.

- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100 ms
- Turntable angle range: -180° to 180°
- Turntable step size: 45°
- Height variation range: 1 – 4 m
- Height variation step size: 0.5 m
- Polarisation: horizontal + vertical

After this step the EMI test system has determined the following values for each frequency (of step 1):

- Frequency
- Azimuth value (of turntable)
- Antenna height

The last two values have now the following accuracy:

- Azimuth value (of turntable): 45°
- Antenna height: 0.5 m

Step 3: final measurement

In this step the accuracy of the turntable azimuth and antenna height will be improved.

This is necessary to find out the maximum value of every frequency.

For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will be slowly varied by $\pm 22.5^{\circ}$ around this value. During this action the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position the antenna height is also slowly varied by ± 25 cm around the antenna height determined. During this action the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.

- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100 ms
- Turntable angle range: -22.5° to $+22.5^{\circ}$ around the determined value
- Height variation range: -0.25 m to $+0.25$ m around the determined value

Step 4: final measurement with QP detector

With the settings determined in step 3, the final measurement will be performed:

EMI receiver settings for step 4:

- Detector: Quasi-Peak(< 1 GHz)
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 1 s

After the measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

3.1.2. Test Requirements / Limits

FCC Part 15, Subpart C, §15.209, Radiated Emission Limits

Frequency in MHz	Limit (μV/m)	Measurement distance (m)	Limit(dBμV/m @10m)
0.009 – 0.49	2400/F(kHz)	300	Limit (dBμV/m)+59.1dB
0.49 – 1.705	24000/F(kHz)	30	Limit (dBμV/m)+19.1dB
1.705 – 30	30	30	Limit (dBμV/m)+19.1dB

Frequency in MHz	Limit (μV/m)	Measurement distance (m)	Limit (dBμV/m)
30 – 88	100	3	40.0
88 – 216	150	3	43.5
216 – 960	200	3	46.0
above 960	500	3	54.0

§15.35(b)

..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor: $\text{Limit (dB}\mu\text{V/m)} = 20 \log (\text{Limit } (\mu\text{V/m})/1\mu\text{V/m})$

3.1.3. Test Protocol

Temperature: 23 °C
Air Pressure: 1009 hPa
Humidity: 38 %

3.1.1.1 Measurement up to 30 MHz

Op. Mode	Setup	Port
op-mode 1	Setup_01	Enclosure

Polarisation	Frequency MHz	Corrected value dBµV/m			Limit dBµV/m	Limit dBµV/m	Limit dBµV/m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
-	-	-	-	-	-	-	-	-	-

Remark: No relevant spurious emissions found, therefore step 2 was not performed.
Please see annex for the measurement plots.

3.1.2.1 Measurement above 30 MHz

Op. Mode	Setup	Port
op-mode 1	Setup_01	Enclosure

Polarisation	Frequency MHz	Corrected value dBµV/m			Limit dBµV/m	Limit dBµV/m	Limit dBµV/m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
vertical	36.8	30.8	-	-	40.0	-	-	9.2	-
vertical	63.0	28.7	-	-	40.0	-	-	11.3	-
vertical	82.4	17.0	-	-	40.0	-	-	23.0	-
vertical	87.9	29.0	-	-	40.0	-	-	11.0	-
vertical	168.2	29.2	-	-	43.5	-	-	14.3	-
vertical	198.6	27.4	-	-	43.5	-	-	16.1	-
vertical	914.0	37.6	-	-	46.0	-	-	8.4	-

Remarks: The EUTs transmitted a continuously modulated signal.
Please see annex for the measurement plot.

3.1.4. Test result: Spurious radiated emissions

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	passed

3.2 Peak power output

Standard FCC Part 15, Subpart C

The test was performed according to: ANSI C63.10

3.2.1 Test Description

Please refer to sub-clause 3.1.1.

3.2.2 Test Limits

Please refer to sub-clause 3.1.2.

3.2.3 Test Protocol

Temperature: 22 °C
Air Pressure: 1015 hPa
Humidity: 33 %

Op. Mode	Setup	Port
op-mode 1	Setup_01	Enclosure

Output power dBμV/m	Frequency kHz	Limit dBμV/m at fundamental frequency for 10 m distance	Remarks
57.6	124.5	84.8	Maximum radiated field strength at fundamental frequency

Note: The EUT transmitted a continuously modulated signal.

Remark: Please see annex for the measurement plots.

3.2.4 Test result: Peak power output

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	passed

3.3 Occupied bandwidth

Standard FCC Part 15, Subpart C

The test was performed according to: ANSI C63.10

3.3.1. Test Description

The Equipment Under Test (EUT) was setup in a shielded room to perform the occupied bandwidth measurements.

The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.

The results recorded were measured with the modulation which produces the worst-case (widest) occupied bandwidth.

3.3.2 Test Requirements / Limits

FCC Part 15, Subpart C, §15.215 (c)

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. ...

3.3.3 Test Protocol

Temperature: 23 °C
Air Pressure: 1015 hPa
Humidity: 33 %

Op. Mode	Setup	Port
op-mode 1	Setup_01	Enclosure

20 dB bandwidth kHz	99% bandwidth kHz	Remarks
9.551	12.156295	The carrier is ASK modulated

Remark: Please see annex for the measurement plots.

3.3.4 Test result: Occupied bandwidth

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	Passed

4 Measurement uncertainty

Test Case	Parameter	Uncertainty
Peak power output	Power	± 4.5 dB
Occupied bandwidth	Power Frequency:	± 4.5 dB ± 0.125 kHz
Spurious radiated emissions	Power Frequency:	± 4.5 dB ± 11.2 kHz

5 Test equipment

The calibration, hardware and software states are shown for the testing period.

Test Equipment Anechoic Chamber

Lab ID:	Lab 2		
Manufacturer:	Frankonia		
Description:	Anechoic Chamber for radiated testing		
Type:	10.58x6.38x6.00 m ³		
	NSA (FCC)	2014/01/09	2017/01/09

Single Devices for Anechoic Chamber

Single Device Name	Type	Serial Number	Manufacturer
Air compressor	none	-	Atlas Copco
Anechoic Chamber	10.58 x 6.38 x 6.00 m ³ FCC listing 96716 3m Part15/18	none	Frankonia 2014/01/09 2017/01/08
Controller Maturo	MCU	961208	Maturo GmbH
EMC camera	CE-CAM/1	-	CE-SYS
EMC camera Nr.2	CCD-400E	0005033	Mitsubishi
Filter ISDN	B84312-C110-E1		Siemens&Matsushita
Filter Universal 1A	BB4312-C30-H3	-	Siemens&Matsushita

Test Equipment Auxiliary Equipment for Conducted emissions

Lab ID:	Lab 1
Manufacturer:	Rohde & Schwarz GmbH & Co.KG
Description:	EMI Conducted Auxiliary Equipment

Single Devices for Auxiliary Equipment for Conducted emissions

Single Device Name	Type	Serial Number	Manufacturer
Cable "LISN to ESI"	RG214	W18.03+W48.03	Huber&Suhner
Impedance Stabilization Network	ISN T800	36159	Teseq GmbH
	<u>Calibration Details</u>		<u>Last Execution</u> <u>Next Exec.</u>
	Standard Calibration		2014/02/06 2016/02/28
Impedance Stabilization Network, Coupling Decoupling Network	ISN/CDN ST08	36292	Teseq GmbH
	<u>Calibration Details</u>		<u>Last Execution</u> <u>Next Exec.</u>
	Standard calibration		2014/01/10 2016/01/31
Impedance Stabilization Network, Coupling Decoupling Network	ISN/CDN T8-Cat6	32187	Teseq GmbH
	<u>Calibration Details</u>		<u>Last Execution</u> <u>Next Exec.</u>
	Standard Calibration		2014/01/08 2016/01/31

Test Equipment Auxiliary Equipment for Radiated emissions

Lab ID: Lab 2

Description: Equipment for emission measurements

Serial Number: see single devices

Single Devices for Auxiliary Equipment for Radiated emissions

Single Device Name	Type	Serial Number	Manufacturer		
Antenna mast	AM 4.0	AM4.0/180/119205 13	Maturo GmbH		
Antenna mast	AS 620 P	620/37	HD GmbH		
Biconical dipole	VUBA 9117	9117-108	Schwarzbeck		
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>	
	Standard Calibration		2012/05/18	2015/05/17	
Broadband Amplifier 18MHz-26GHz	JS4-18002600-32-5P	849785	Miteq		
Broadband Amplifier 1GHz-4GHz	AFS4-01000400-1Q-10P-4	-	Miteq		
Broadband Amplifier 30MHz-18GHz	JS4-00101800-35-5P	896037	Miteq		
Cable "ESI to EMI Antenna"	EcoFlex10	W18.01-2+W38.01- 2	Kabel Kusch		
Cable "ESI to Horn Antenna"	UFB311A+UFB293C	W18.02-2+W38.02- 2	Rosenberger Micro-Coax		
Double-ridged horn	HF 906	357357/002	Rohde & Schwarz GmbH & Co. KG		
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>	
	Standard Calibration		2012/06/26	2015/06/25	
High Pass Filter	4HC1600/12750-1.5-KK	9942011	Trilithic		
High Pass Filter	5HC2700/12750-1.5-KK	9942012	Trilithic		
High Pass Filter	5HC3500/12750-1.2-KK	200035008	Trilithic		
High Pass Filter	WHKX 7.0/18G-8SS	09	Wainwright		
Horn Antenna Schwarzbeck 15-26 GHz BBHA 9170	BBHA 9170				
Log.-per. Antenna	HL 562 Ultralog	100609	Rohde & Schwarz GmbH & Co. KG		
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>	
	Standard Calibration		2012/12/18	2015/12/17	
Log.-per. Antenna	HL 562 Ultralog	830547/003	Rohde & Schwarz GmbH & Co. KG		
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz GmbH & Co. KG		
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>	
	Standard calibration		2011/11/27	2017/11/27	

Single Devices for Auxiliary Equipment for Radiated emissions (continued)

Single Device Name	Type	Serial Number	Manufacturer
Pyramidal Horn Antenna 26,5 GHz	3160-09	00083069	EMCO Elektronik GmbH
Pyramidal Horn Antenna 40 GHz	3160-10	00086675	EMCO Elektronik GmbH
Tilt device Maturo (Rohacell)	Antrieb TD1.5-10kg	TD1.5-10kg/024/3790709	Maturo GmbH

Test Equipment Auxiliary Test Equipment

Lab ID:	Lab 2, Lab 3
Manufacturer:	see single devices
Description:	Single Devices for various Test Equipment
Type:	various
Serial Number:	none

Single Devices for Auxiliary Test Equipment

Single Device Name	Type	Serial Number	Manufacturer
Broadband Power Divider N (Aux)	1506A / 93459	LM390	Weinschel Associates
Broadband Power Divider SMA	WA1515	A855	Weinschel Associates
Digital Multimeter 03 (Multimeter)	Fluke 177	86670383	Fluke Europe B.V.
<u>Calibration Details</u>			<u>Last Execution</u> <u>Next Exec.</u>
Customized calibration			2013/12/04 2015/12/03
Fibre optic link Satellite (Aux)	FO RS232 Link	181-018	Pontis
Fibre optic link Transceiver (Aux)	FO RS232 Link	182-018	Pontis
Isolating Transformer	LTS 604	1888	Thalheimer Transformatorenwerke GmbH
Notch Filter Ultra Stable (Aux)	WRCA800/960-6EEK	24	Wainwright
Signal Analyzer	FSV30	103005	Rohde & Schwarz GmbH & Co. KG
<u>Calibration Details</u>			<u>Last Execution</u> <u>Next Exec.</u>
Standard			2014/02/10 2016/02/09
Spectrum Analyser	FSP3	836722/011	Rohde & Schwarz GmbH & Co. KG
<u>Calibration Details</u>			<u>Last Execution</u> <u>Next Exec.</u>
Standard			2012/06/13 2015/06/12
Spectrum Analyser	FSU26	200418	Rohde & Schwarz GmbH & Co. KG
<u>Calibration Details</u>			<u>Last Execution</u> <u>Next Exec.</u>
Standard calibration			2014/07/29 2015/07/28
Vector Signal Generator	SMIQ 03B	832492/061	Rohde & Schwarz GmbH & Co. KG

2016/03/10

Test Equipment Radio Lab Test Equipment

Lab ID: Lab 3
Description: Radio Lab Test Equipment

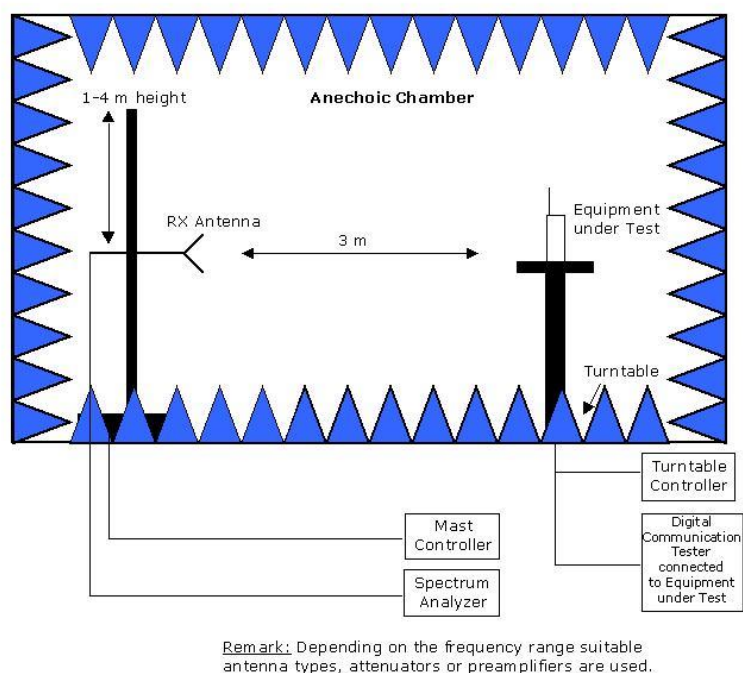
Single Devices for Radio Lab Test Equipment

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>
Broadband Power DividerWA1515 SMA		A856	Weinschel Associates
Coax Attenuator 10dB SMA 2W	4T-10	F9401	Weinschel Associates
Coax Attenuator 10dB SMA 2W	56-10	W3702	Weinschel Associates
Coax Attenuator 10dB SMA 2W	56-10	W3711	Weinschel Associates
Coax Cable Huber&Suhner	Sucotest 2,0m		Huber&Suhner
Coax Cable Rosenberger Micro Coax FA210A0010003030 SMA/SMA 1,0m	FA210A0010003030	54491-2	Rosenberger Micro-Coax
Signal Generator SME	SME03	827460/016	Rohde & Schwarz GmbH & Co.KG
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Standard calibration			2014/12/02 2017/12/01
Signal Generator SMP	SMP02	836402/008	Rohde & Schwarz GmbH & Co. KG
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Standard calibration			2013/05/06 2016/05/05
Signal Analyser	FSV30	103005	Rohde & Schwarz GmbH & Co. KG
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Standard Calibration			2014/02/10 2016/02/09
Temperature Chamber Vötsch 03	VT 4002	58566002150010	Vötsch
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Customized calibration			2014/03/11

6 Photo Report

Photos are included in an external report.

7 Setup Drawings



Drawing 1: Setup in the Anechoic chamber. For measurements below 1 GHz the ground was replaced by a conducting ground plane.

8 FCC and IC Correlation of measurement requirements for General Radio Equipment from FCC and IC

General radio equipment

Measurement	FCC reference	IC reference
Conducted emissions on AC Mains	§ 15.207	RSS-Gen Issue 4: 8.8
Transmitter spurious radiated emissions	§ 15.209	RSS-Gen Issue 4: 6.13/8.9/8.10; RSS-210 Issue 8: 2.5
Spurious radiated emissions below 490 kHz and restricted to emission level	§ 15.201, CFR47, Part 2, Subpart J; if all emissions \leq 40 dB below the limit listed in §15.209	RSS-Gen Issue 4: 8.9/8.10; RSS-210 Issue 8: 2.5.1; RSS-310 Issue 3; if all emissions \leq 40 dB below the limit listed in RSS-Gen
Wanted Emission (Carrier)	§ 15.209	RSS-210 Issue 8: 2.5.1 RSS-Gen Issue 4: 6.12, 8.9
Other requirements, e.g. Transmitter frequency stability	§15.215	RSS- Gen, Issue 4: 6.11/8.11
Antenna requirement	§ 15.203 / 15.204	RSS-Gen Issue 4: 8.3
Receiver spurious emissions	–	RSS-210 Issue 8: 2.3; RSS Gen Issue 4: 5/7 *)

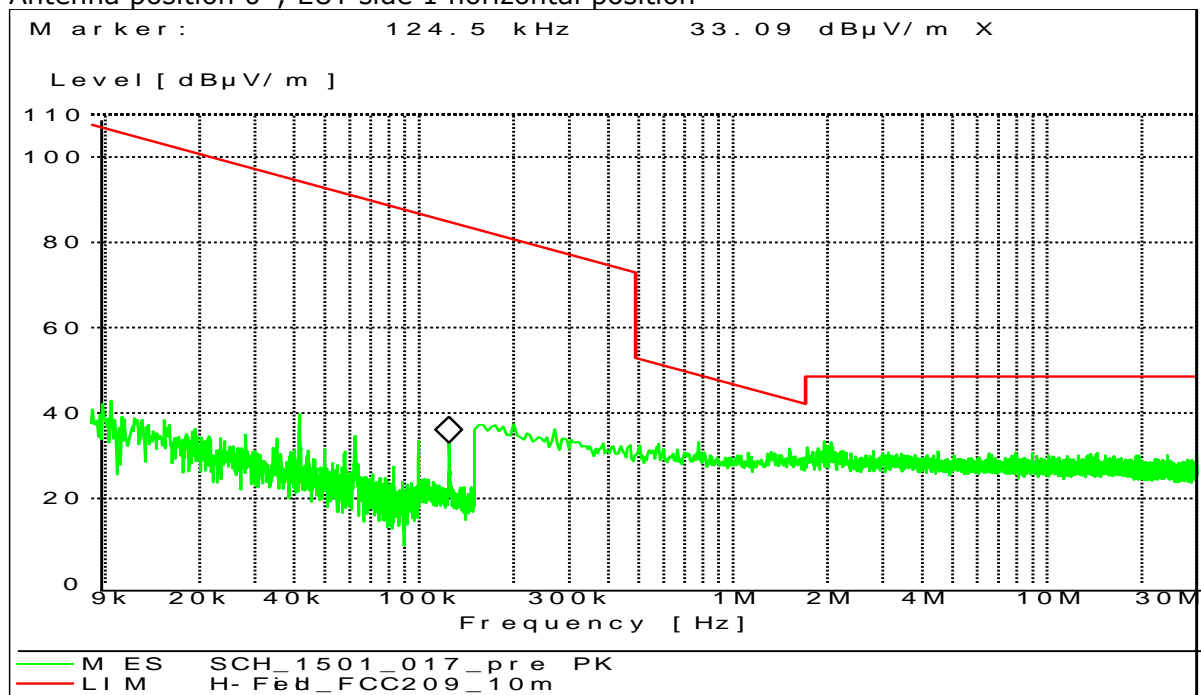
*) Receivers are exempted from certification besides if operating in stand-alone mode in the frequency range 30–960 MHz or if these are scanner receivers.

9 Annex measurement plots

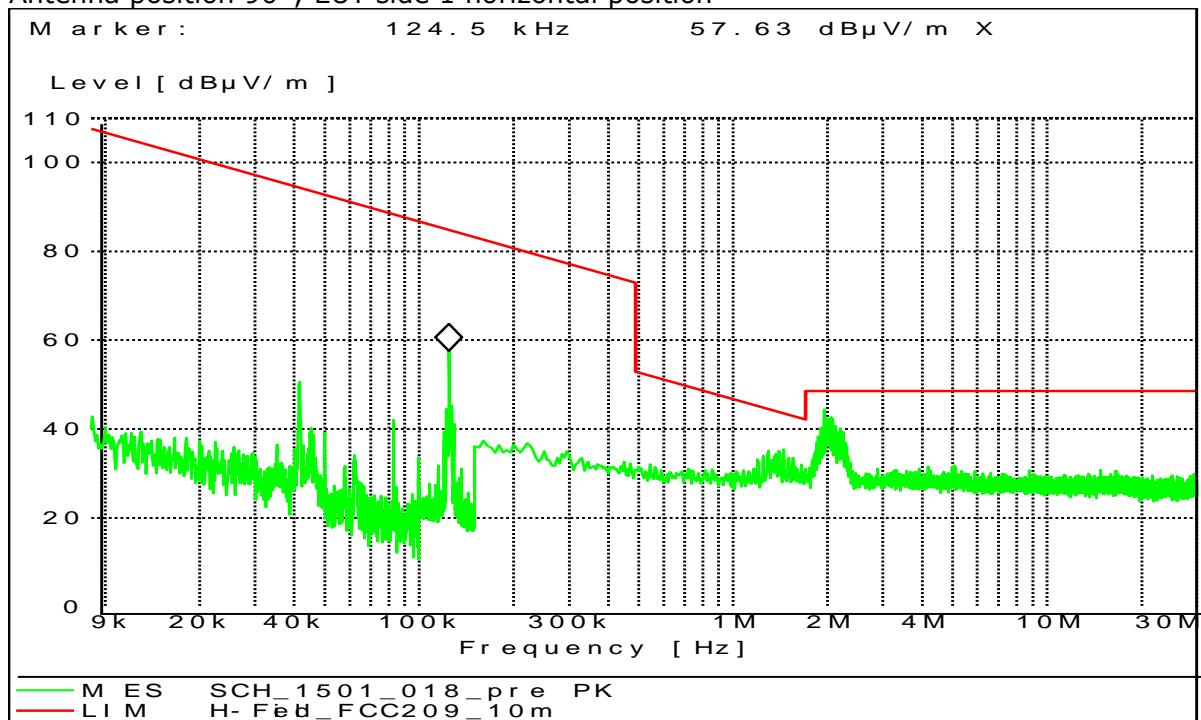
9.1 Radiated emissions and peak output power

9.1.1 Spurious radiated emissions up to 30 MHz – Op-Mode 1

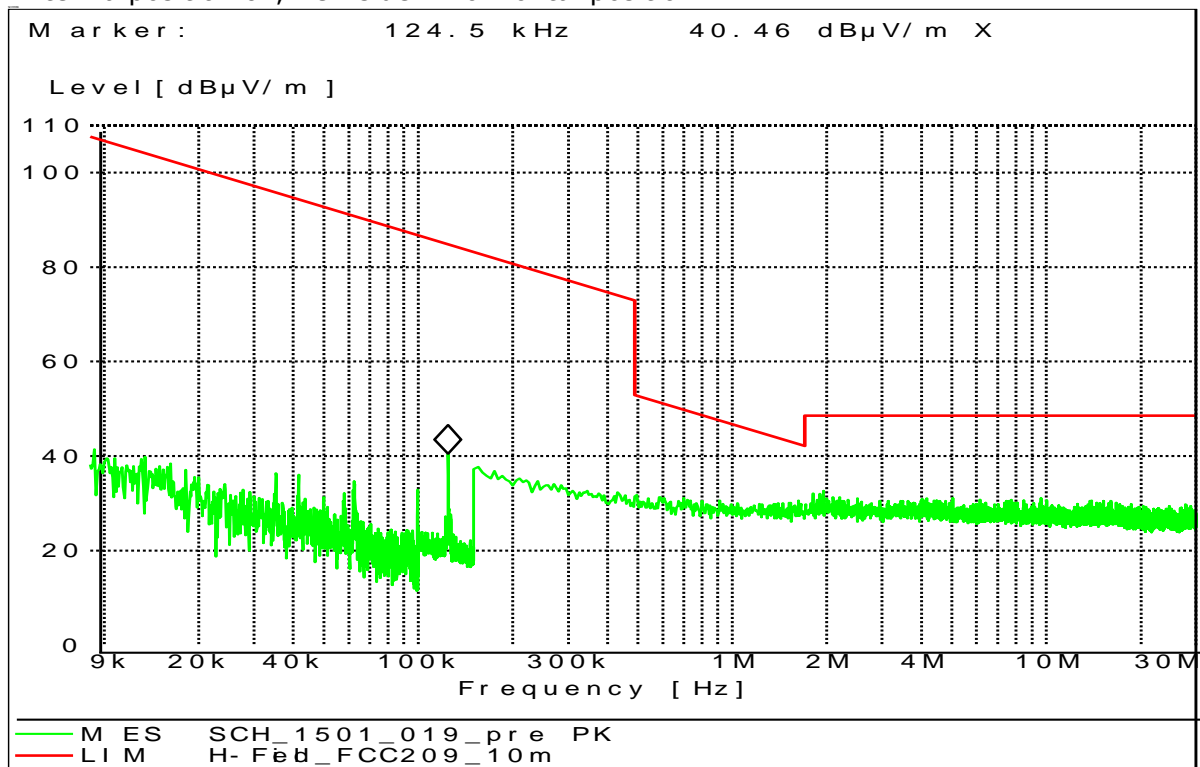
Antenna position 0°; EUT side 1 horizontal position



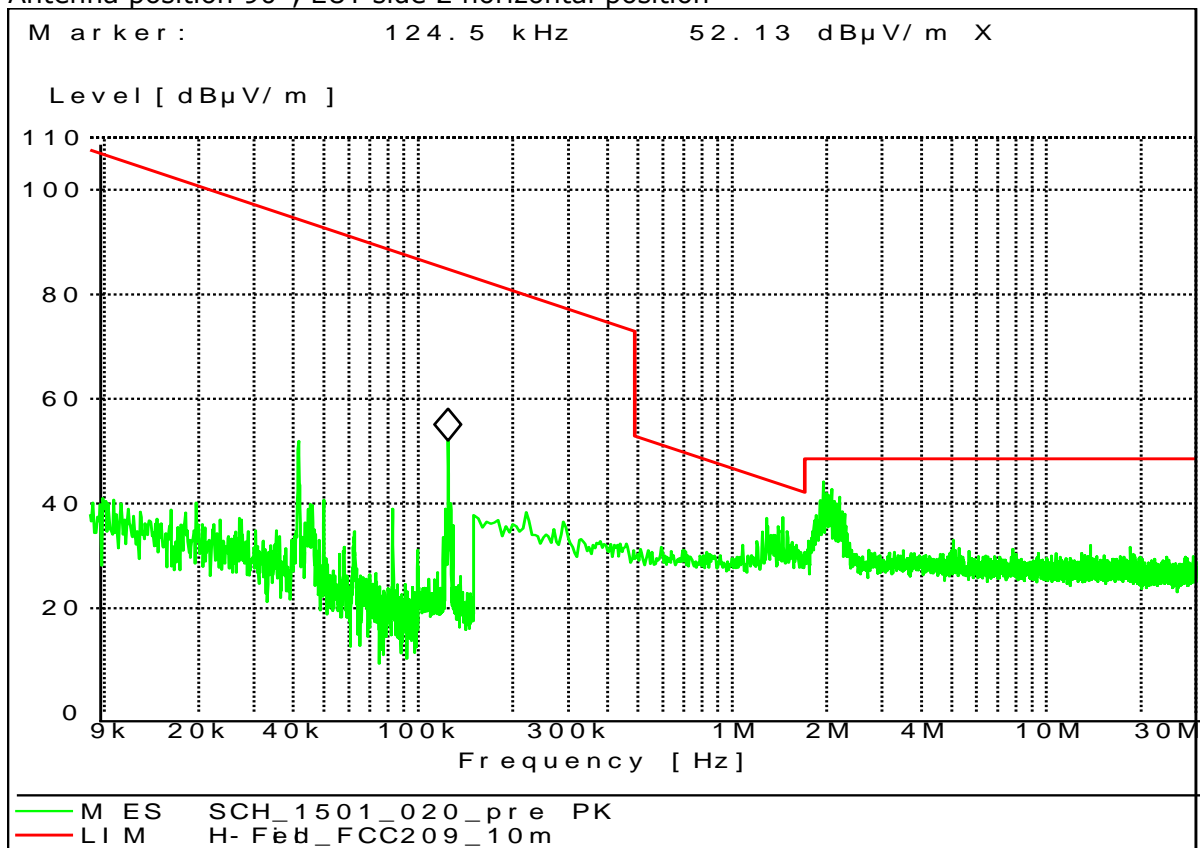
Antenna position 90°; EUT side 1 horizontal position



Antenna position 0°; EUT side 2 horizontal position



Antenna position 90°, EUT side 2 horizontal position



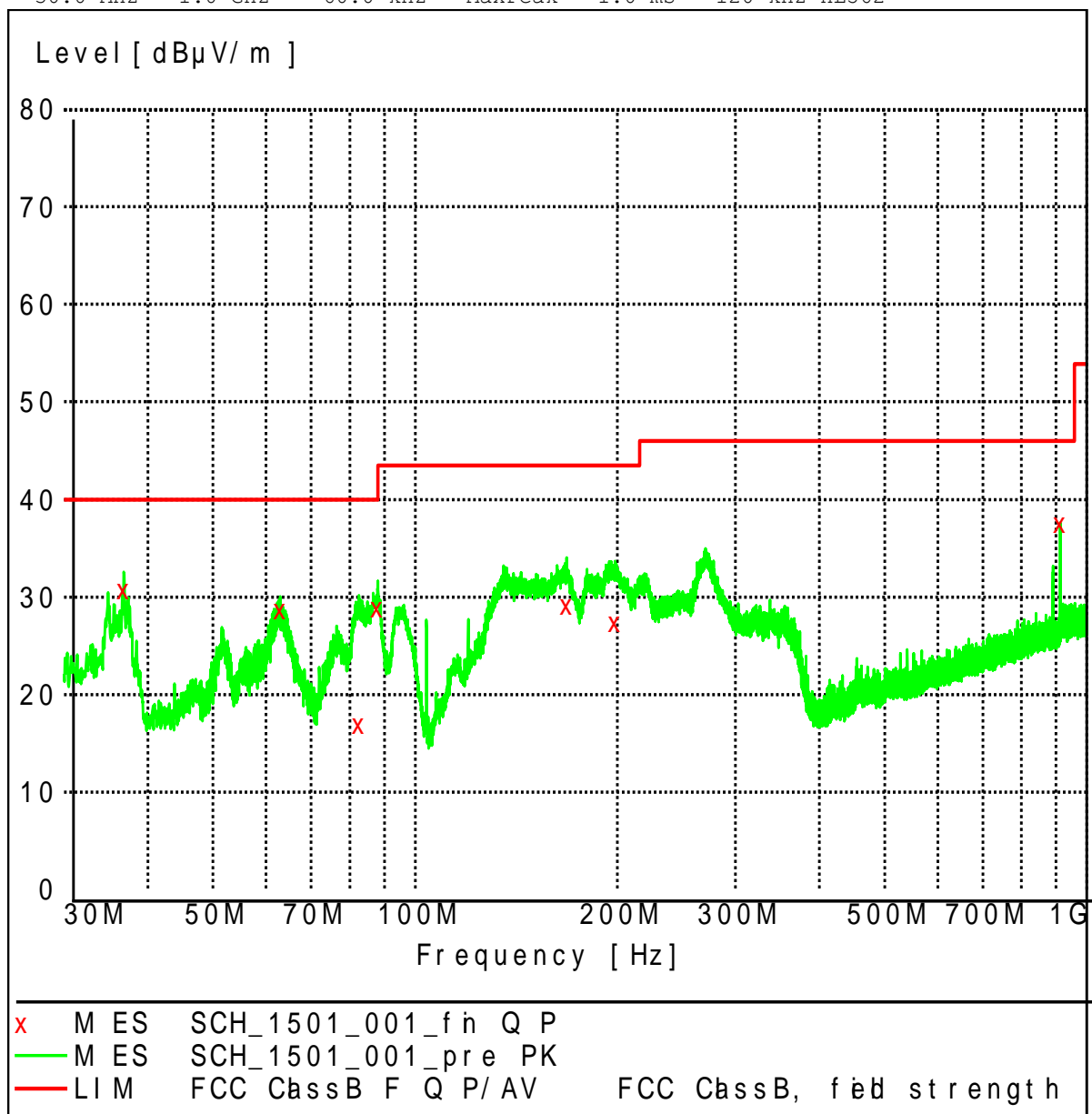
9.1.2 Spurious radiated emissions above 30 MHz – Op_Mode 1

EMI RADIATED TEST

EUT: (DE1137001aa01)
 Manufacturer:
 Operating Condition: TX 125KHz; 120V/60Hz
 Test Site: 7 layers, Ratingen
 Test Specification: FCC Part 15 C Class B
 Comment: Horizontal EUT position, Horizontal+Vertical antenna polaris
 Start of Test: 21.05.2015 / 14:10:54

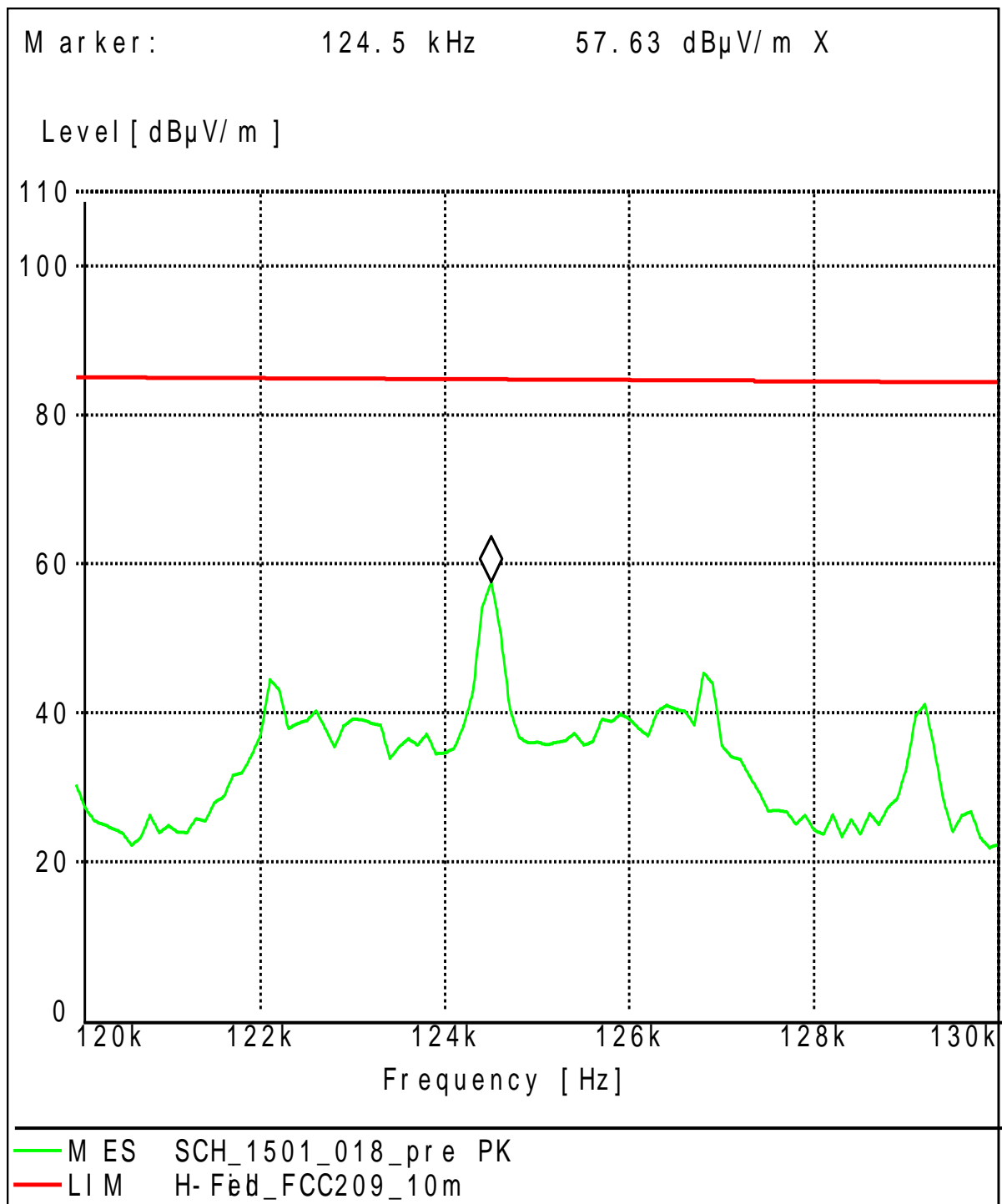
SCAN TABLE: "FCC part 15 c"

Short Description:			FCC part 15 b			
Start	Stop	Step	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
30.0 MHz	1.0 GHz	60.0 kHz	MaxPeak	1.0 ms	120 kHz	HL562



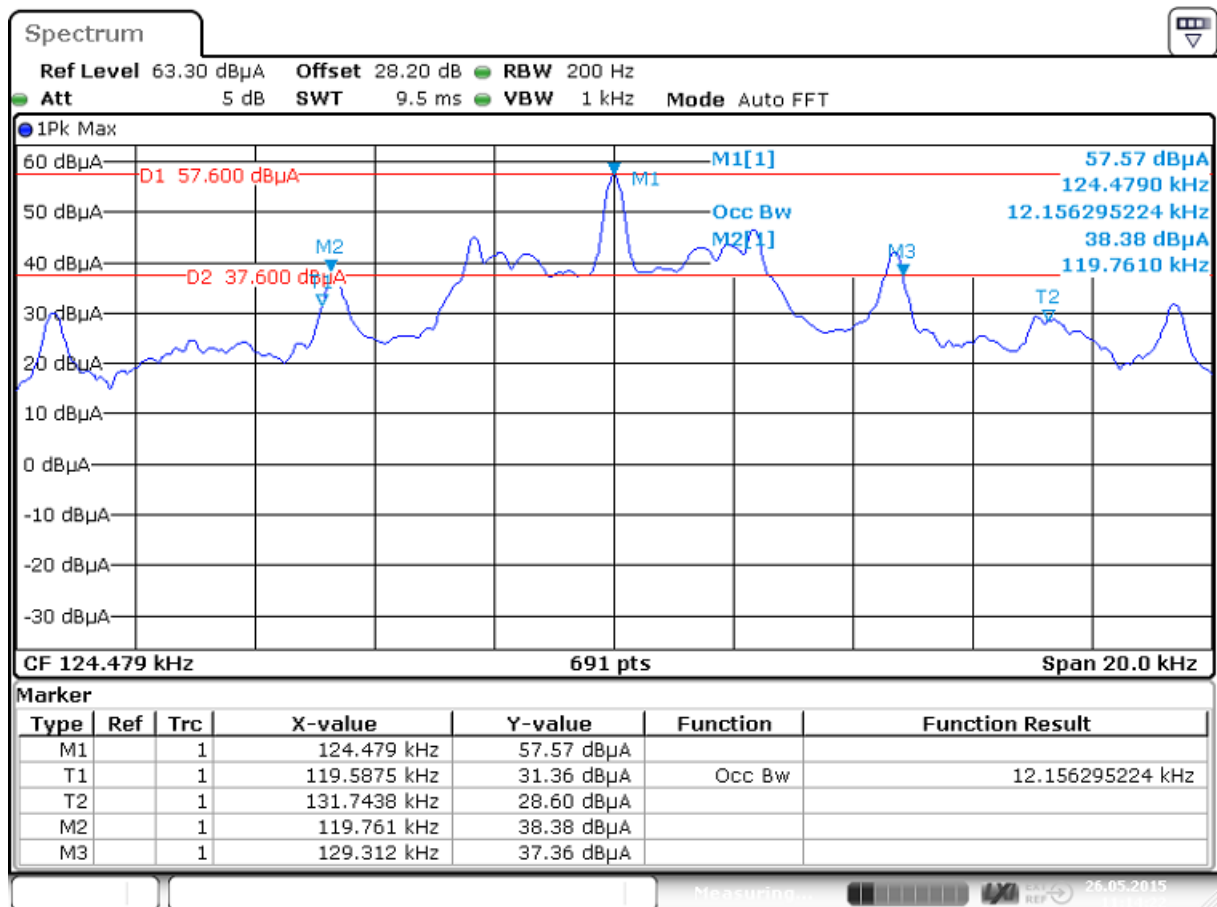
9.1.3 Peak output power

EUT: (DE1137001aa01)
 Manufacturer: SCHMERSAL
 Operating Condition: TX 125KHz; 24V DC
 Test Site: 7 layers, Ratingen
 Test Specification: FCC 15.209
 Comment: Antenna position 90°
 Side 2 horizontal EUT position



9.2 Occupied Bandwidth

9.1.2 EUT A



Date: 26 MAY 2015 11:14:22

Notes: 20 dB occupied bandwidth = 9.551 kHz (M3 – M2)
 99% occupied power bandwidth = 12.156295 kHz (T2 – T1)