

Test Report

Report Number:

F191514E1

Equipment under Test (EUT):

**Safety solenoid interlock with RFID reader
AZM201B-ST-T-AS-A-P**

Applicant:

K.A. Schmersal GmbH & Co. KG

Manufacturer:

K.A. Schmersal GmbH & Co. KG



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

References

- [1] **ANSI C63.10: 2013** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
- [2] **FCC CFR 47 Part 15** Radio Frequency Devices
- [3] **RSS-210 Issue 10 (December 2019)**
Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment
- [4] **RSS-Gen Issue 5 (March 2019) Amendment 1**
General Requirements for Compliance of Radio Apparatus

Test Result

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

Tested and
written by:

Michael DINTER

Name



Signature

21.04.2020

Date

Reviewed
and approved
by:

Manuel BASTERT

Name



Signature

21.04.2020

Date

This test report is only valid in its original form.

Any reproduction of its contents in extracts without written permission of the accredited test laboratory PHOENIX TESTLAB GmbH is prohibited.

The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT NUMBER.

Contents:	Page
1 Identification	4
1.1 Applicant.....	4
1.2 Manufacturer	4
1.3 Test Laboratory	4
1.4 EUT (Equipment under Test)	5
1.5 Technical Data of Equipment	6
1.6 Dates	7
2 Operational States	8
3 Additional Information	9
4 Overview.....	9
5 Results.....	10
5.1 Conducted emissions on power supply lines	10
5.1.1 Test method.....	10
5.1.2 Results conducted emission measurement on AC mains	11
5.2 Radiated emissions	12
5.2.1 Test method.....	12
5.2.2 Results preliminary measurement 9 kHz to 30 MHz	17
5.2.3 Results preliminary measurement 30 MHz to 1 GHz	18
5.2.4 Result final measurement from 9 kHz to 30 MHz	19
5.2.5 Result final measurement from 30 MHz to 1 GHz	20
5.3 99 % bandwidth.....	21
5.3.1 Test method.....	21
5.3.2 Test results	22
6 Test Equipment used for Tests	23
7 Test site Validation	24
8 Report History.....	24
9 List of Annexes	24

1 Identification

1.1 Applicant

Name:	K.A. Schmersal GmbH & Co. KG
Address:	Möddinghofe 30, 42279 Wuppertal
Country:	Germany
Name for contact purposes:	Mr. Bastian ZIMMERMANN
Phone:	+49 (0)202 / 6474-197
eMail address:	BZimmermann@schmersal.com
Applicant represented during the test by the following person:	-

1.2 Manufacturer

Name:	K.A. Schmersal GmbH & Co. KG
Address:	Möddinghofe 30, 42279 Wuppertal
Country:	Germany
Name for contact purposes:	Mr. Bastian ZIMMERMANN
Phone:	+49 (0)202 / 6474-197
eMail address:	BZimmermann@schmersal.com
Applicant represented during the test by the following person:	-

1.3 Test Laboratory

The tests were carried out by: **PHOENIX TESTLAB GmbH**
Königswinkel 10
32825 Blomberg
Germany

Accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025 under Reg. No. D-PL-17186-01-06 and D-PL-17186-01-05, FCC Test Firm Designation Number DE0004, FCC Test Firm Registration Number 469623, CAB Identifier DE0003 and ISD# 3469A.

1.4 EUT (Equipment under Test)

Type of equipment: *	Safety solenoid interlock with RFID reader for ASi Field Bus
Model Series: *	AZM201 Series
Model Name: *	AZM201B-ST-T-AS-A-P
HVIN: *	AC
Order number: *	103025301
Serial number: *	-
FCC ID: *	2AFO9-AZ0
IC certification number: *	20745-AZ0
PCB identifier: *	#LP AZ/AZM 201ASi, identifier: 50220-82V900, Index: E #LP-AZM 200 Lichtschranke, identifier: 50220-20V900, Index: E
Hardware version: *	#BEST.PL. AZ/AZM201 AS, identifier: 50220-U85V_, Index: D #BEST.PL. AZM 200 LICHTSCHRANKE, identifier: 50220-U3V_, Index: A
Software version (FVIN): *	-

* Declared by the applicant

Note: PHOENIX Testlab GmbH does not take samples. The samples used for tests are provided exclusively by the applicant.

1.5 Technical Data of Equipment

Power supply EUT: *	24 VDC					
Supply voltage EUT: *	U _{nom} =	24 V DC	U _{min} =	20.4 V DC	U _{max} =	26.4 V DC
Temperature range: *	-25 °C to +60 °C					
Lowest / highest internal frequency: *	1 Hz / 16 MHz					

RFID part:

EUT data						
Operating frequency: *	125 kHz					
Power supply: *	Internal DC/DC interface					
Rated output power: *	<250 mW					
Power supply EUT: *	DC					
Supply voltage EUT: *	U _{nom} =	5.0 V DC	U _{min} =	4.9 V DC	U _{max} =	5.1 V DC
Type of modulation: *	ASK 100% to TAG					
Antenna connector: *	Internal					
Number of channels: *	1					
Antenna type: *	Wired coil antenna					
Data rate: *	4 kbit/s					
Temperature range: *	-40 °C to +85 °C					

* Declared by the applicant

Ports / Connectors				
Identification			Length during test	Shielding (Yes / No)
	EUT	Ancillary		
24 V DC supply	M12 (4 Pin)	Customized	2 m	No
-	-	-	-	-

Ancillary Equipment		
AC adapter* ¹	MINI-PS.100-240AC/24DC/1	Phoenix Contact Order-No:2938840
TAG* ²	AZ/AZM201-B1-LT	Schmersal

*¹ Provided by the laboratory

*² Provided by the applicant

1.6 Dates

Date of receipt of test sample:	08.11.2019
Start of test:	22.11.2019
End of test:	14.02.2020

2 Operational States

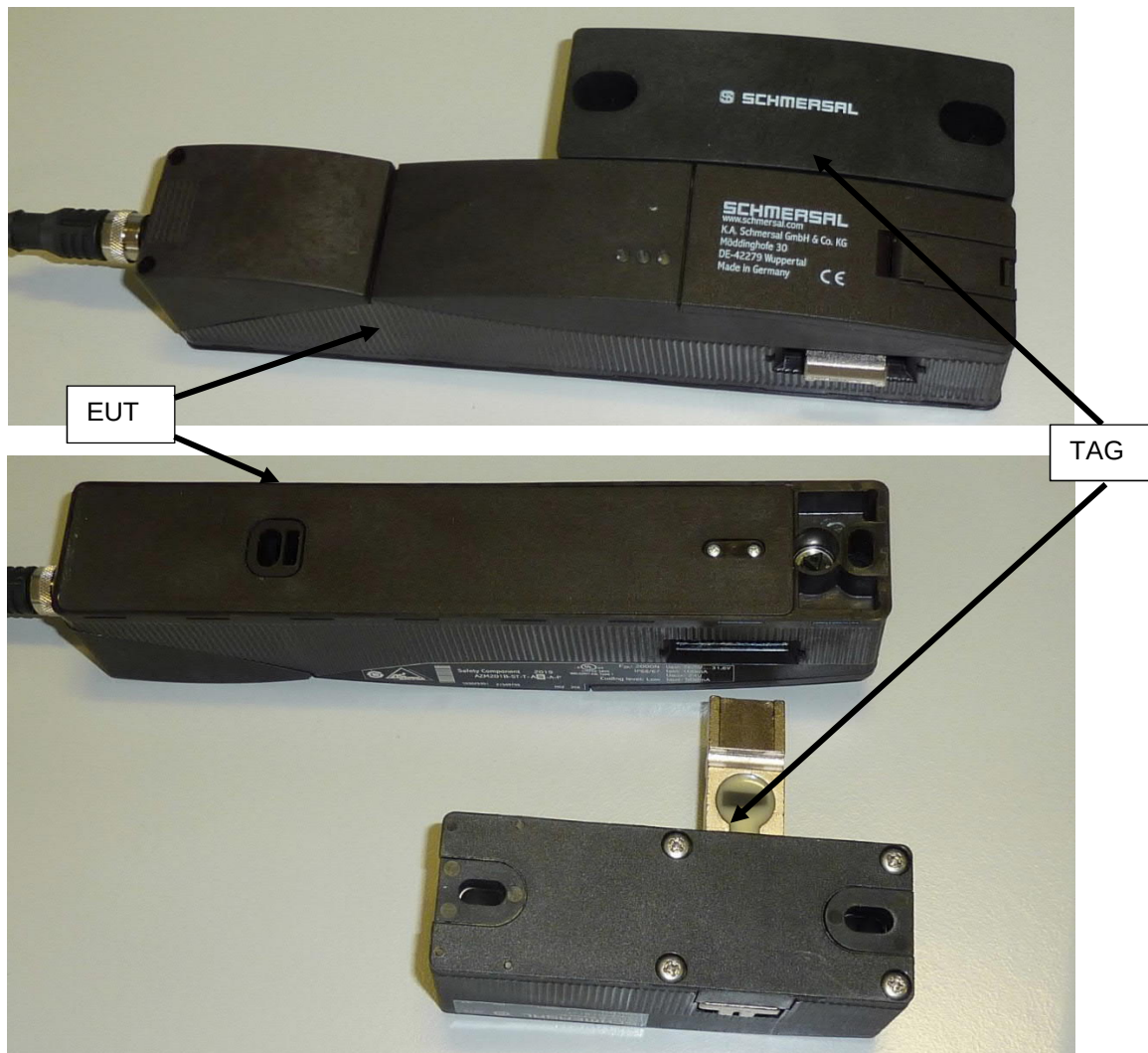
Description of function of the EUT:

The EUT is an RFID reader for door locks in safety applications.
The lock is supplied by 24 V DC.

The following states were defined as the operating conditions:

The tests were carried out with reading the TAG or without TAG as described in the tests below.
The conducted emission measurement was carried out with an AC/DC adapter MINI-PS.100-240AC/24DC/1
Phoenix Contact.
No other peripheral devices were connected during the test.

The system was setup as follows:



3 Additional Information

The EUT was not labeled as required by FCC / IC.

All tests were carried out with RFID function only, no other peripheral devices were connected.

4 Overview

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	RSS-Gen, Issue 5 [4] and RSS-210, Issue 10 [3]	Status	Refer page
Conducted emissions on supply line	0.15 – 30	15.207 (a)	8.8 [4]	Passed	10 et seq
Radiated emissions	0.009 – 1000**	15.205 (a) 15.209 (a)	8.9 and 8.10 [4] 4.1 and 4.4 [3]	Passed	12 et seq.
99 % bandwidth	0.125	-	6.7 [4]	Passed	22 et seq.
Antenna requirement	-	15.203 [2]	6.8 [4]	Passed *	-

*: Integrated antenna only, requirement fulfilled.

**:
As declared by the applicant the highest radio clock frequency is 0.125 MHz.
Therefore the radiated emission measurement must be carried out up to 10th of the highest radio clock frequency in this case the test was carried out up to 1 GHz because of the highest internal frequency of the digital part is below 108 MHz.

5 Results

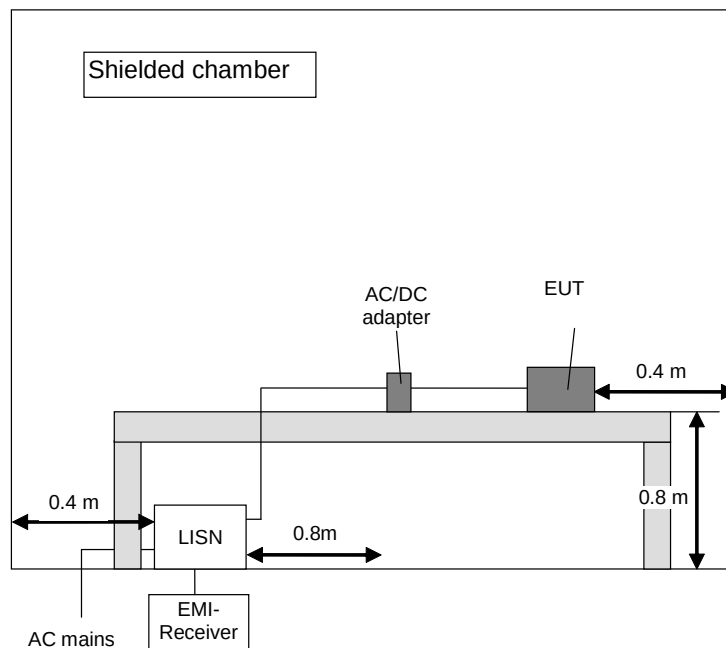
5.1 Conducted emissions on power supply lines

5.1.1 Test method

This test will be carried out in a shielded chamber. Table top devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm above the ground plane. Floor-standing devices will be placed directly on the ground plane. The setup of the Equipment under test will be in accordance to [1].

The frequency range 150 kHz to 30 MHz will be measured with an EMI Receiver set to MAX Hold mode with peak and average detector and a resolution bandwidth of 9 kHz. A scan will be carried out on the phase (or plus pole in case of DC powered devices) of the AC mains network. If levels detected 10 dB below the appropriate limit, this emission will be measured with the average and quasi-peak detector on all lines.

Frequency range	Resolution bandwidth
150 kHz to 30 MHz	9 kHz

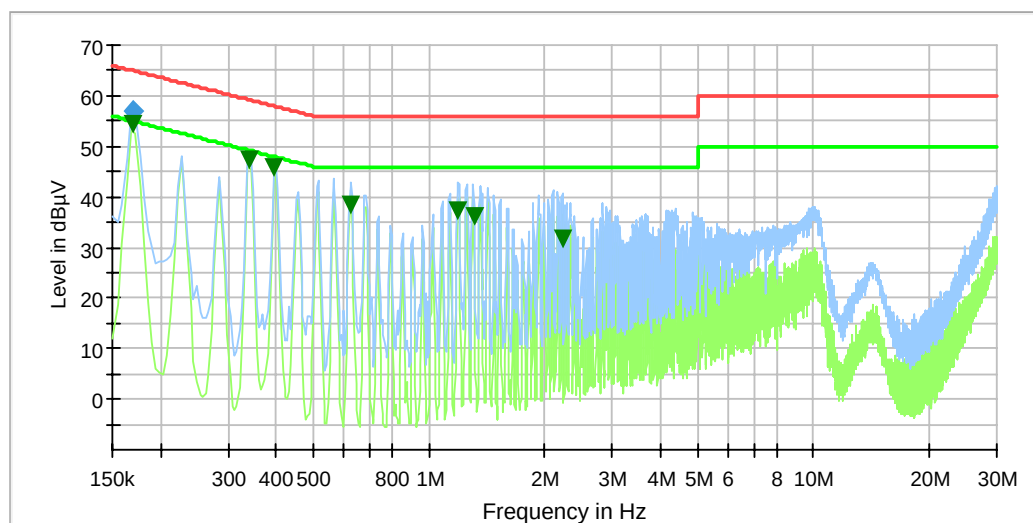


5.1.2 Results conducted emission measurement on AC mains

Ambient temperature:	22°C	Relative humidity:	31%
----------------------	------	--------------------	-----

Test description: Conducted emission measurement
 EUT: AZM 201B-ST-T-AS-A-P
 Manufacturer: K.A. Schmersal GmbH & Co. KG
 Operating conditions: Reading TAG AZ/AZM201-B1-LT
 Test site: PHOENIX TESTLAB GmbH, shielded room M4
 Operator: M. DINTER
 Comment: 24 V DC via AC adapter at 120 VAC / 60 Hz Mains
 Date of test: 14.02.2020

The curves in the diagrams below only represent for each frequency point the maximum measured value of all preliminary measurements which were made for each power supply line. The top measured curve represents the peak measurement and the bottom measured curve the average measurement. The quasi-peak measured points are marked by ◆ and the average measured ▼ points by ▼.



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Transducer (dB)
0.169800	---	54.27	54.97	0.71	5000.0	9.000	L1	FLO	9.8
0.170700	56.93	---	64.93	8.00	5000.0	9.000	L1	FLO	9.8
0.341700	---	47.20	49.16	1.96	5000.0	9.000	L1	FLO	9.9
0.396600	---	45.80	47.92	2.13	5000.0	9.000	L1	FLO	9.9
0.626100	---	38.22	46.00	7.78	5000.0	9.000	N	FLO	9.9
1.189500	---	37.33	46.00	8.67	5000.0	9.000	L1	FLO	9.9
1.309200	---	36.31	46.00	9.69	5000.0	9.000	L1	FLO	9.9
2.220000	---	31.58	46.00	14.42	5000.0	9.000	L1	FLO	10.1
Measurement uncertainty				+2.76 dB / -2.76 dB					

Test result Passed

Test equipment (please refer to chapter 6 for details)
1 - 5

5.2 Radiated emissions

5.2.1 Test method

The radiated emission measurement is subdivided into six stages.

- A preliminary measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 9 kHz to 1 GHz.
- A final measurement carried out on an outdoor test site without reflecting ground plane and a fixed antenna height in the frequency range 9 kHz to 30 MHz.
- A preliminary and final measurement carried out in a semi anechoic chamber with a varying antenna height in the frequency range 30 MHz to 1 GHz.
- A preliminary and final measurement carried out in a fully anechoic chamber with a various antenna height at a distance of 3 m to the EUT position in the frequency range 1 GHz to 13 GHz.

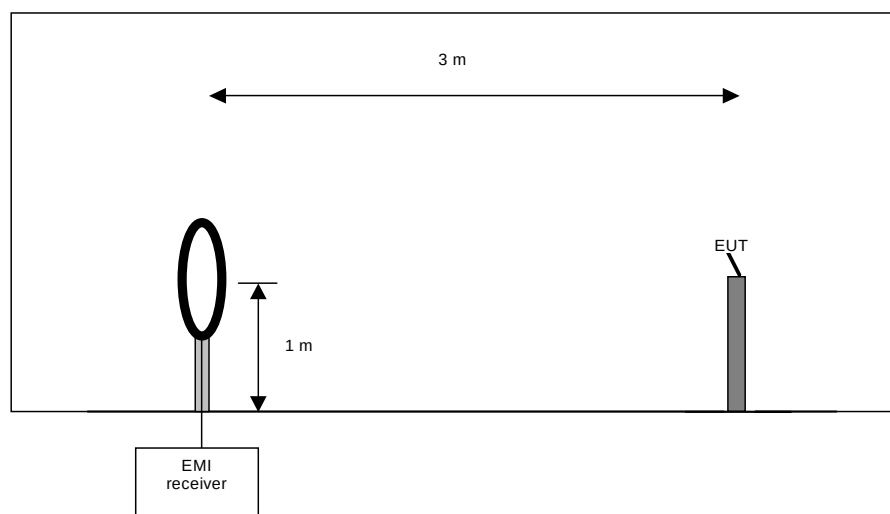
Preliminary measurement (9 kHz to 30 MHz):

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

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

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

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



Preliminary measurement procedure:

Pre-scans were performed in the frequency range 9 kHz to 150 kHz and 150 kHz to 30 MHz.

The following procedure will be used:

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

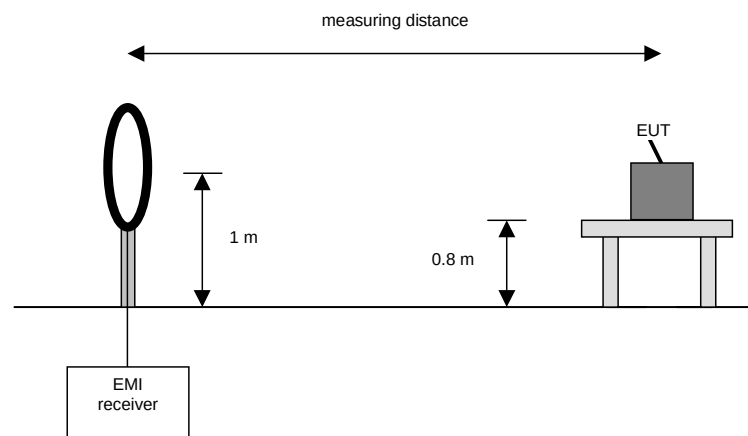
Final measurement (9 kHz to 30 MHz):

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

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

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

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



Final measurement procedure:

The following procedure will be used:

- 1) Monitor the frequency range with the measuring antenna at vertical orientation parallel to the EUT at an azimuth of 0 °.
- 2) Rotate the EUT by 360 ° to maximize the detected signals and note the azimuth and orientation.
- 3) Rotate the measuring antenna to find the maximum and note the value.
- 4) Rotate the measuring antenna and repeat steps 1) to 3) until the maximum value is found.
- 5) Repeat steps 1) to 4) with the other orthogonal axes of the EUT (if the EUT is a module and might be used in a handheld equipment application).

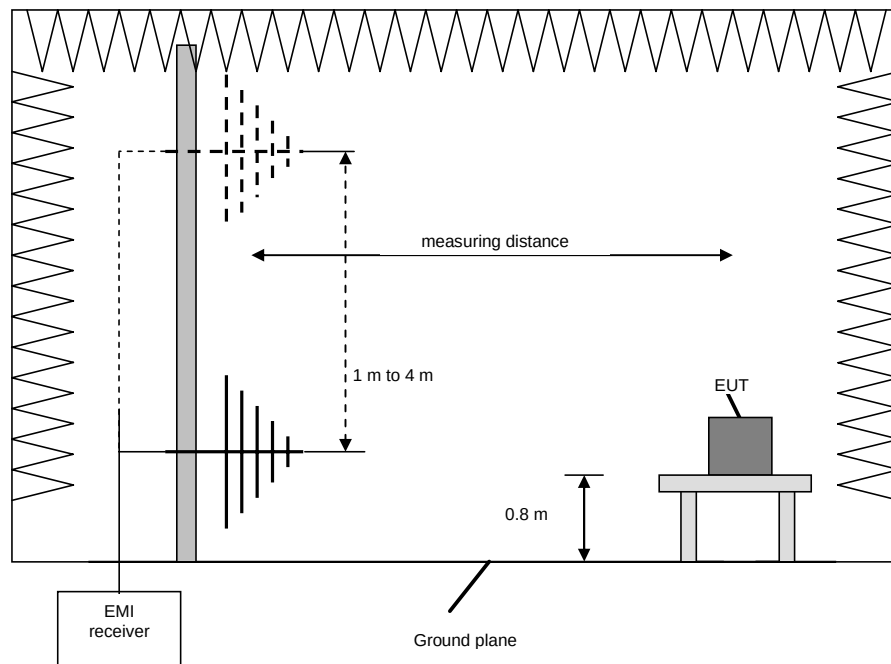
Preliminary and final measurement (30 MHz to 1 GHz)

The preliminary and final measurements were conducted in a semi-anechoic chamber with a metal ground plane in a 3 m distance.

During the test the EUT will be rotated in the range of 0 ° to 360 °, the measuring antenna will be set to horizontal and vertical polarization and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions.

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

Test	Frequency range	Resolution bandwidth
Preliminary measurement	30 MHz to 1 GHz	100 kHz
Frequency peak search	+ / - 1 MHz	10 kHz
Final measurement	30 MHz to 1 GHz	120 kHz



Procedure preliminary measurement:

The following procedure is used:

1. Set the measurement antenna to 1 m height.
2. Monitor the frequency range at vertical polarisation and a EUT azimuth of 0 °.
3. Rotate the EUT by 360° to maximize the detected signals.
4. Repeat 1) to 2) with the vertical polarisation of the measuring antenna.
5. Increase the height of the antenna for 0.5 m and repeat steps 2 – 4 until the final height of 4 m is reached.
6. The highest values for each frequency will be saved by the software, including the antenna height, measurement antenna polarization and turntable azimuth for that value.

Procedure final measurement:

The following procedure is used:

1. Select the highest frequency peaks to the limit for the final measurement.
2. The software will determine the exact peak frequencies by doing a partial scan with reduced RBW with +/- 10 times the RBW of the pre-scan of the selected peaks.
3. If the EUT is portable or ceiling mounted, find the worst case EUT position (x,y,z) for the final test.
4. The worst measurement antenna height is found by the measurement software by varying the measurement antenna height by +/- 0.5 m from the value obtained in the preliminary measurement, and to monitor the emission level.
5. The worst azimuth turntable position is found by varying the turntable azimuth by +/- 30° from the value obtained in the preliminary measurement, and to monitor the emission level.
6. The final measurement is performed at the worst-case antenna height and the worst-case turntable azimuth
7. Steps 2 – 6 will be repeated for each frequency peak selected in step 1.

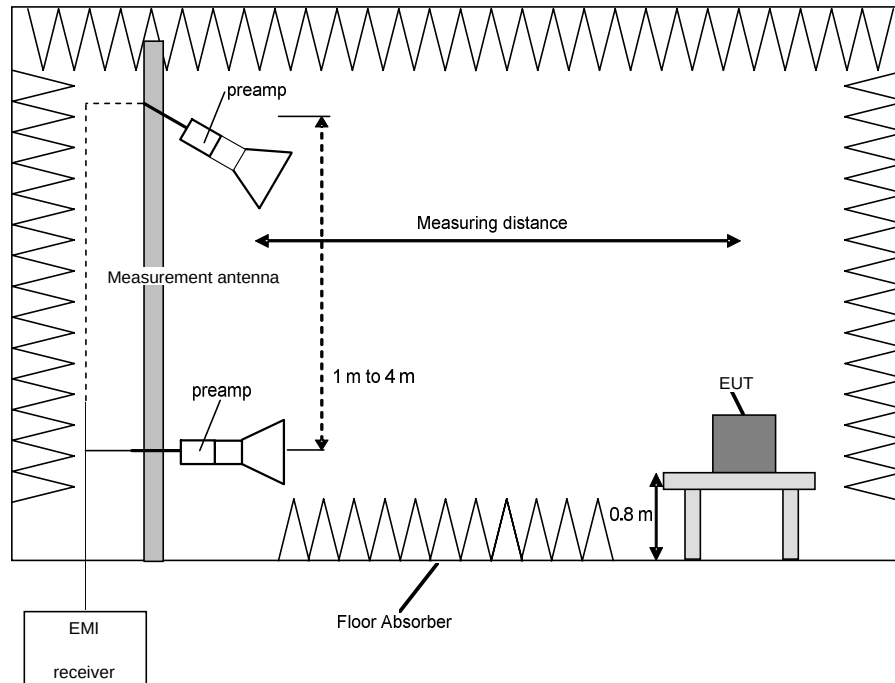
Preliminary and final measurement (1 – 40 GHz)

The preliminary and final measurements were conducted in a semi-anechoic chamber with floor absorbers between EUT and measurement antenna.

During the test the EUT will be rotated in the range of 0 ° to 360 °, the measuring antenna will be set to horizontal and vertical polarization and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions. For each height the angle of the antenna will be tilted so that the measurement antenna is always aiming at the EUT.

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

Test	Frequency range	Resolution bandwidth
Preliminary measurement	1 - 40 GHz	1 MHz
Frequency peak search	+ / - 10 MHz	100 kHz
Final measurement	1 - 40 GHz	1 MHz



Procedure preliminary measurement:

The following procedure is used:

1. Set the measurement antenna to 1 m height.
2. Monitor the frequency range at vertical polarisation and a EUT azimuth of 0 °.
3. Rotate the EUT by 360° to maximize the detected signals.
4. Repeat 1) to 2) with the vertical polarisation of the measuring antenna.
5. Increase the height of the antenna for 0.5 m and repeat steps 2 – 4 until the final height of 4 m is reached.
6. The highest values for each frequency will be saved by the software, including the antenna height, measurement antenna polarization and turntable azimuth for the highest value.

Procedure final measurement:

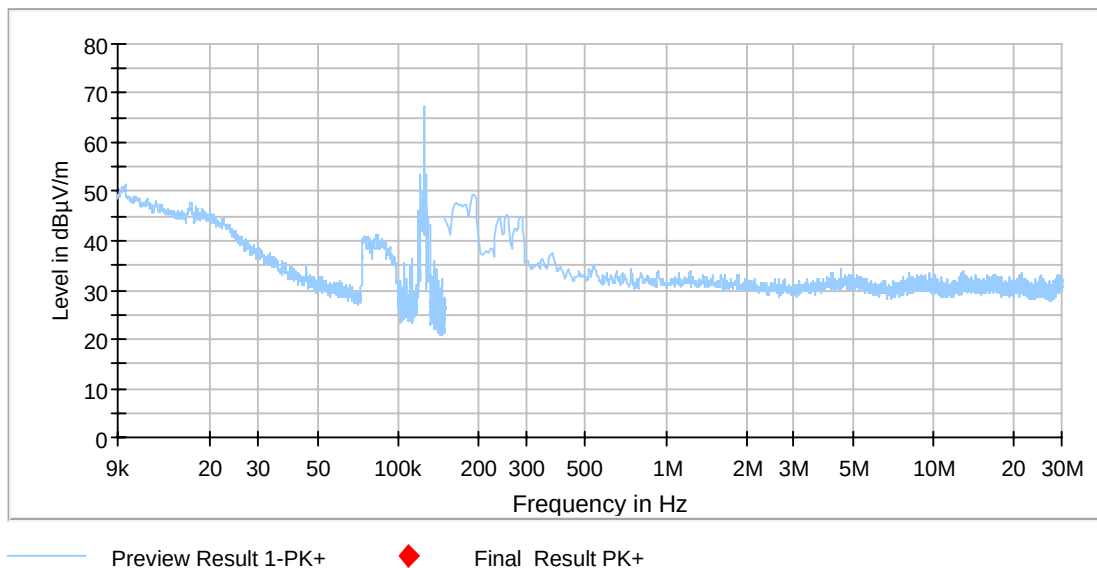
The following procedure is used:

1. Select the highest frequency peaks to the limit for the final measurement.
2. The software will determine the exact peak frequencies by doing a partial scan with reduced RBW with +/- 10 times the RBW of the pre-scan of the selected peaks.
3. If the EUT is portable or ceiling mounted, find the worst case EUT orientation (x,y,z) for the final test.
4. The worst measurement antenna height is found by the measurement software by varying the measurement antenna height by +/- 0.5 m from the worst-case value obtained in the preliminary measurement, and to monitor the emission level.
5. The worst azimuth turntable position is found by varying the turntable azimuth by +/- 30° from the worst-case value obtained in the preliminary measurement, and to monitor the emission level.
6. The final measurement is performed at the worst-case antenna height and the worst-case turntable azimuth.
7. Steps 2 – 6 will be repeated for each frequency peak selected in step 1.

5.2.2 Results preliminary measurement 9 kHz to 30 MHz

Ambient temperature:	20 °C	Relative humidity:	24 %
----------------------	-------	--------------------	------

Test description:	Radiated emission measurement
EUT:	AZM 201B-ST-T-AS-A-P
Manufacturer:	K.A. Schmersal GmbH & Co. KG
Operating conditions:	Reading TAG AZM AZ/AZM201-B1-LT
Test site:	PHOENIX TESTLAB GmbH, semi anechoic chamber M276
Operator:	M. DINTER
Comment:	24 V DC supply
Date of test	04.12.2019



The following emissions were found according to [2] and [3].
(Fundamental of transmitter): 125 kHz.

The following frequencies were found outside and inside the restricted bands found according to FCC 47 CFR Part 15 section 15.209.

Frequency (kHz)
88.620
91.000
125.150

These frequencies have to be measured with in a final measurement.

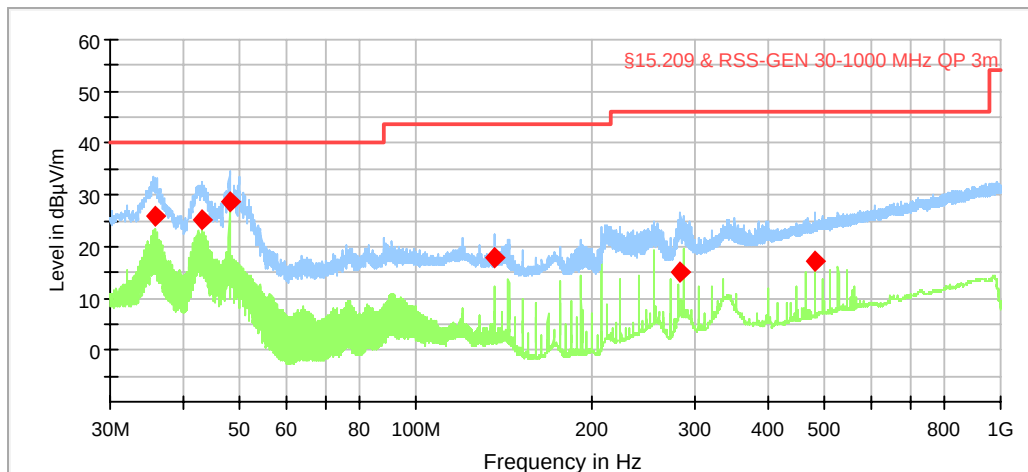
Test equipment (please refer to chapter 6 for details)
6 - 13

5.2.3 Results preliminary measurement 30 MHz to 1 GHz

Ambient temperature:	20 °C	Relative humidity:	24 %
----------------------	-------	--------------------	------

Test description: Radiated emission measurement
 EUT: AZM 201B-ST-T-AS-A-P
 Manufacturer: K.A. Schmiersal GmbH & Co. KG
 Operating conditions: Reading TAG AZM AZ/AZM201-B1-LT
 Test site: PHOENIX TESTLAB GmbH, semi anechoic chamber M276
 Operator: M. DINTER
 Comment: 24 V DC supply
 Date of test: 04.12.2019

Full Spectrum



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

Frequency (MHz)
35.790000
43.070000
48.020000
136.140000
283.410000
480.000000

These frequencies have to be measured with in a final measurement.

Test equipment (please refer to chapter 6 for details)
7 - 15

5.2.4 Result final measurement from 9 kHz to 30 MHz

Ambient temperature	10 °C	Relative humidity	41 %
---------------------	-------	-------------------	------

Test description: Radiated emission measurement according to FCC PART 15
 EUT: AZM 201B-ST-T-AS-A-P
 Manufacturer: K.A. Schmersal GmbH & Co. KG
 Operating conditions: Reading TAG AZM AZ/AZM201-B1-LT
 Test site: PHOENIX TESTLAB GmbH, outdoor test site
 Operator: M. DINTER
 Comment: 24V DC supply
 Date of test: 19.12.2019

The results of the standard subsequent measurement on the outdoor test site are indicated in the table below. The limits as well as the measured results (levels) refer to the above-mentioned standard while taking account of the specified requirements for a 300 m measuring distance.

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

$$\text{Result [dB}\mu\text{V/m]} = \text{reading [dB}\mu\text{V]} + \text{antenna factor [dB/m]} + \text{Distance correction dB}$$

$$\text{Result [dB}\mu\text{A/m]} = \text{Result [dB}\mu\text{V/m]} - 51.5$$

Results with measuring distance of 3 m									
Frequency [MHz]	Result [dBμV/m]	Result [dBμA/m]	Limit [dBμV/m]	Limit [dBμA/m]	Margin [dB]	Distance correction ²⁾ [dB]	Readings [dBμV]	Detector	Antenna factor ¹⁾ [dB/m]
0.088620	-23.7 @ 300m	-75.2 @ 300m	28.7	-22,8	52.4	80.0	36.4	AV	19.9
0.091000	-33.9 @ 300m	-85.4 @ 300m	28.4	-23,1	62.3	80.0	25.9	QP	20.2
0.125150	-7.3 @ 300m	-58.8 @ 300m	25.7	-18,5	25.7	80.0	52.4	AV	20.3
Measurement uncertainty:						±4.7 dB			

¹⁾: Cable loss included

²⁾: Correction Factor according to [2] and [3] extrapolated with a factor of 40 dB/decade according to [2]

Remark: At 10m measuring distance the signal of the EUT was below the sensitivity of the measuring system.

Test: Passed

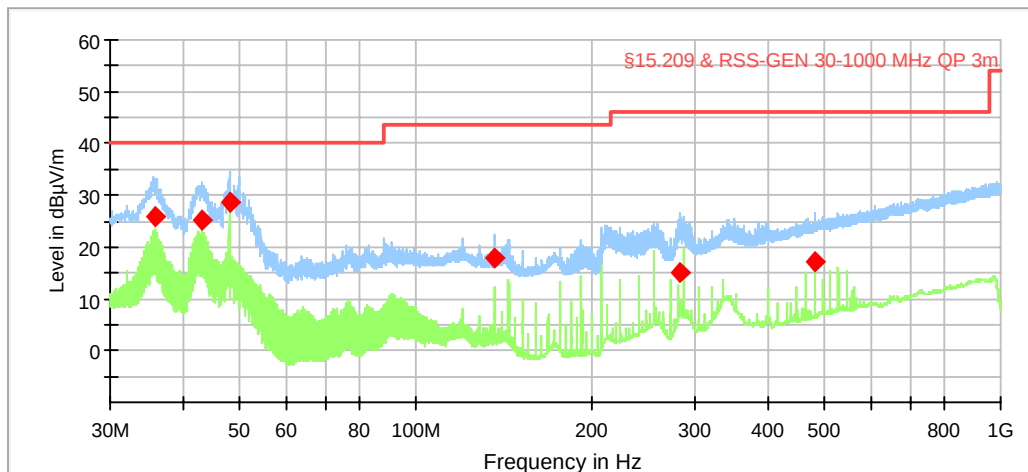
Test equipment (please refer to chapter 6 for details)
6, 16 – 17

5.2.5 Result final measurement from 30 MHz to 1 GHz

Ambient temperature	20°C	Relative humidity	24 %
---------------------	------	-------------------	------

Test description: Radiated emission measurement according to FCC PART 15
 EUT: AZM 201B-ST-T-AS-A-P
 Manufacturer: K.A. Schmiersal GmbH & Co. KG
 Operating conditions: Reading TAG AZM AZ/AZM201-B1-LT
 Test site: PHOENIX TESTLAB GmbH, semi anechoic chamber M276
 Operator: M. DINTER
 Comment: 24 V DC supply
 Date of test: 16.12.2020

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
35.790000	25.94	40.00	14.06	1000.0	120.000	107.0	V	320.0	22.3
43.070000	25.22	40.00	14.78	1000.0	120.000	102.0	V	8.0	17.8
48.020000	28.81	40.00	11.19	1000.0	120.000	105.0	V	82.0	14.8
136.140000	17.73	43.52	25.79	1000.0	120.000	102.0	V	246.0	16.5
283.410000	15.12	46.02	30.90	1000.0	120.000	155.0	V	170.0	18.8
480.000000	17.19	46.02	28.83	1000.0	120.000	115.0	V	54.0	24.2
Measurement uncertainty				+/- 4.78 dB					

Test: Passed

The correction factor was calculated as follows.

Corr. (dB) = cable attenuation (dB) + 6 dB attenuator (dB) + antenna factor (dB)

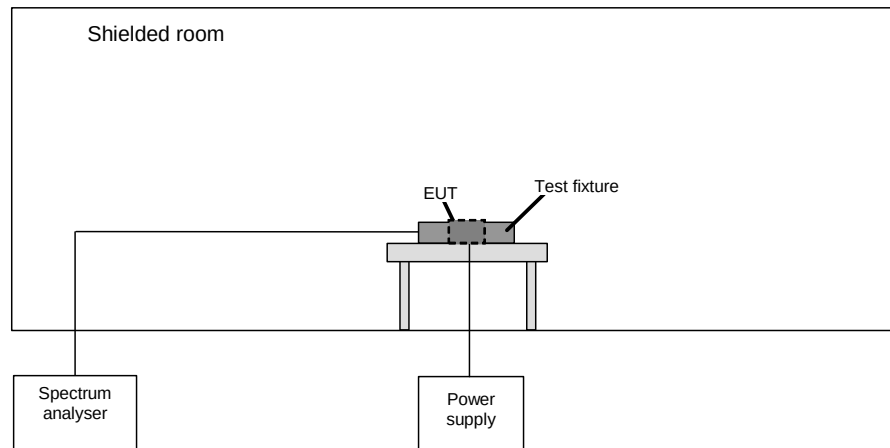
Therefore, the reading can be calculated as follows:

Reading (dBµV/m) = result QuasiPeak (dBµV/m) - Corr. (dB)

Test equipment (please refer to chapter 6 for details)
7 - 15

5.3 99 % bandwidth

5.3.1 Test method



The following procedure will be used for the occupied bandwidth measurement according to [1]:

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

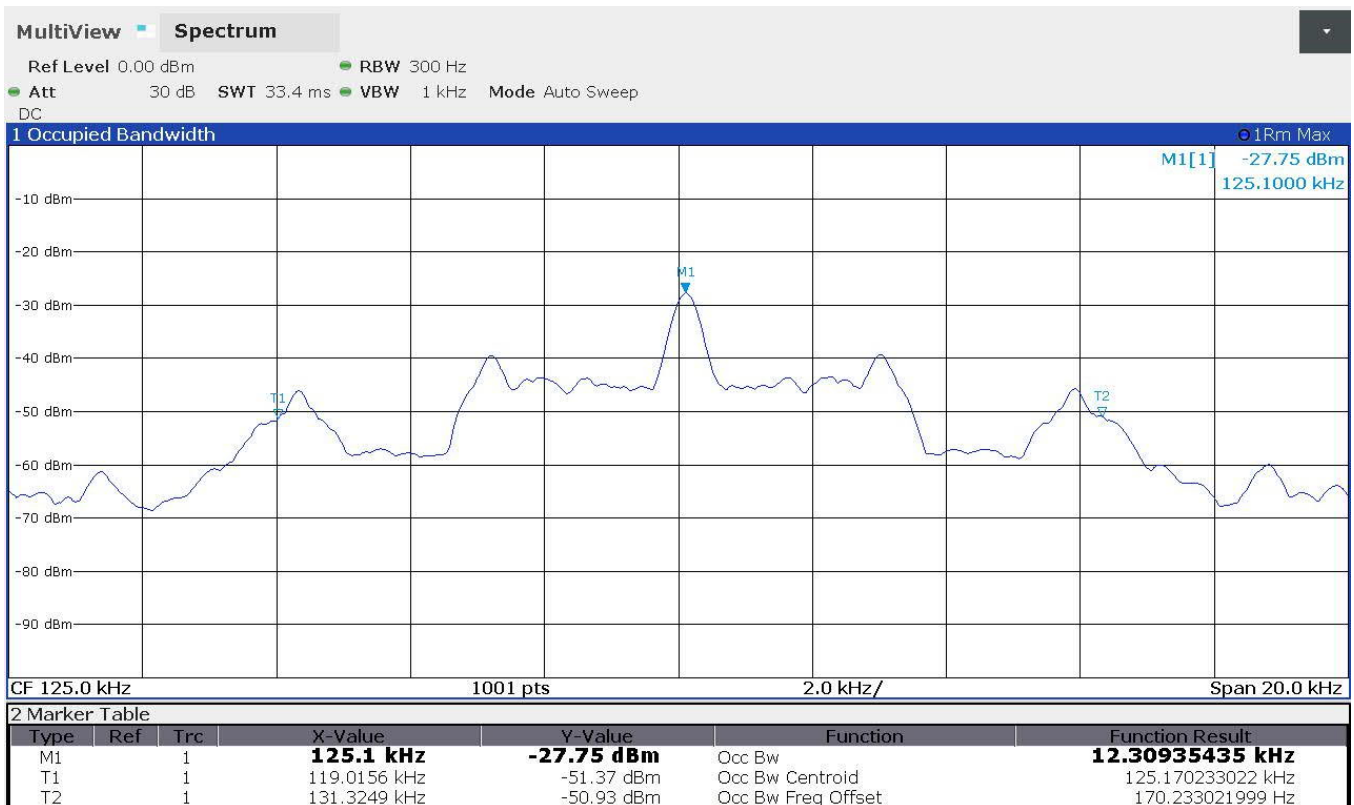
- The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.5.2.
- Step a) through step c) might require iteration to adjust within the specified range.

5.3.2 Test results

Ambient temperature:	23 °C	Relative humidity:	33 %
----------------------	-------	--------------------	------

Test description: 99 % measurement
 EUT: AZM 201B-ST-T-AS-A-P
 Manufacturer: K.A. Schmiersal GmbH & Co. KG
 Operating conditions: Reading TAG AZM AZ/AZM201-B1-LT
 Test site: PHOENIX TESTLAB GmbH, shielded room
 Operator: M. DINTER
 Comment: 24 V DC supply
 Date of test: 14.02.2020

99 % bandwidth:



F _L	F _U	BW (F _U - F _L)
119.016 kHz	131.325 kHz	12.309 kHz
Measurement uncertainty		< 1*10 ⁻⁷

Test: Passed

Test equipment (please refer to chapter 6 for details)
18 - 19

6 Test Equipment used for Tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
1	Transient Filter Limiter	CFL 9206A	Teseq GmbH	38268	481982	14.03.2018	03.2020
2	Software	EMC32	Rohde & Schwarz	100061	481022	Calibration not necessary	
3	Shielded chamber M4	B83117-S1-X158	Siemens	190075	480088	Calibration not necessary	
4	EMI Receiver / Spectrum Analyser	ESIB 26	Rohde & Schwarz	100292	481182	28.02.2018	02.2020
5	LISN	NSLK8128	Schwarzbeck	8128155	480058	14.03.2018	03.2020
6	Loop antenna	HFH2-Z2	Rohde & Schwarz	100417	481912	10.01.2019	01.2020
7	Systemsoftware EMC32 M276	EMC32	Rohde & Schwarz	100970	482972	Calibration not necessary	
8	RF Switch Matrix	OSP220	Rohde & Schwarz		482976	Calibration not necessary	
9	Turntable	TT3.0-3t	Maturo	825/2612/.01	483224	Calibration not necessary	
10	Antenna support	BAM 4.5-P-10kg	Maturo	222/2612.01	483225	Calibration not necessary	
11	Controller	NCD	Maturo	474/2612.01	483226	Calibration not necessary	
12	Semi anechoic chamber M276	SAC5-2	Albatross Projects	C62128-A540-A138-10-0006	483227	Calibration not necessary	
13	EMI Test receiver ESW	ESW44	Rohde & Schwarz	101828	482979	12.04.2019	04.2021
14	Attenuator 6 dB	WA2-6	Weinschel	8254	410119	Calibration not necessary	
15	Ultralog Antenna	HL562E	Rohde & Schwarz		482978	07.08.2019	08.2022
16	Outdoor test site	-	PHOENIX TESTLAB GmbH	-	480293	Calibration not necessary	
17	EMI Receiver / Spectrum Analyser	ESI 40	Rohde & Schwarz	100064/040	480355	03.04.2019	04.2020
18	Signal & Spectrum Analyzer	FSW43	Rohde & Schwarz	100586 & 100926	481720	15.03.2018	03.2020
19	Loop antenna	Loop antenna 11cm	PHOENIX TESTLAB GmbH	-	410084	Calibration not necessary	

7 Test site Validation

Test equipment	PM. No.	Frequency range	Type of validation	According to	Val. Date	Val Due
OATS Outdoor	480293	9 kHz – 30 MHz	-	ANSI C63.4-2014	-	-
Semi anechoic chamber M276	483227	30 – 1000 MHz	NSA	ANSI C63.4a-2017	19.09.2019	18.09.2021
Shielded chamber M4	480088	9 kHz – 30 MHz	GND-Plane	ANSI C63.4-2014	06.11.2018	05.11.2020

8 Report History

Report Number	Date	Comment
F191514E1	21.04.2020	Initial Test Report
-	-	-
-	-	-

9 List of Annexes

Annex A	Test Setup Photos	4 pages
Annex B	EUT External Photos	4 pages
Annex C	EUT Internal Photos	4 pages