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LAB N° 0168

Independent Testing Laboratory
Accredited by ACCREDIA according to UNI CEI EN ISO/IEC 17025 cert. nr. 0168

TEST REPORT
Nr. R19190501

Federal Communication Commission (FCC)

Report Reference No. ..... :	R19190501
Date of issue: ..... :	29.01.2020
Total number pages: ..... :	47
Applicant´s name ..... :	Tecnolab del Lago Maggiore S.r.l.
Address ..... :	Via dell'Industria, 20 – 28924 Verbania (VB) – Italy
Test specification:	
Standards ..... :	FCC Rules & Regulations, Title 47:2018 Part 15 paragraph(s): 203, 204, 205, 207, 209, 215 and 225
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	15_225CMC
Test Report Form(s) Originator .. :	CMC Centro Misure Compatibilità S.r.l.
Master TRF ..... :	2020-01

General disclaimer:

The test results presented in this report relate only to the object tested.
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Test item description ..... :	GTV RFID 13,56 module
Trademark ..... :	Madic Italia
Manufacturer ..... :	Madic Italia S.p.A.
Model / Type reference ..... :	BV1000GTV
FCC ID ..... :	2AKMT-GTV222A
Rating(s) ..... :	9-42 Vdc

Report

Tested by (name + signature) ..... :	A. Bertezzolo	.....
Approved by (name + signature) ..... :	R. Beghetto	.....

1 Summary

2 Reference standard	
FCC Rules and Regulation Title 47 part 15:2018	--
3 List of attachments	
Attachment 1: Instruments list, measurement uncertainty, judgement of compliance and quality manual references	
4 Deviation(s) from test specification	
None	
5 Testing location	
CMC Centro Misure Compatibilità S.r.l. Via della Fisica, 20 – 36016 Thiene (VI) – Italy Test site facility's FCC registration number: 182474	

Testing and sampling:	
Date of receipt of test item	03.09.2019
Testing start date	23.01.2020
Testing end date	27.01.2020
Sampling procedure	Equipment used for testing was picked up by the manufacturer, at the end of the production process with random criterion. The results relate to the sample as it has been received.
Internal identification	Adhesive label with the product number P191032
General remarks:	
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Possible test case verdicts:	
Test case does not apply to the test object:	N/A (Not Applicable)
Test object does meet the requirement:	P (Pass)
Test object does not meet the requirement:	F (Fail)
Test object does not performed:	N/E (Not Executed)
Definition of symbols used in this test report:	
☒ Indicates that the listed condition, standard or equipment is applicable for this report. ☐ Indicates that the listed condition, standard or equipment is not applicable for this report.	

6 General description of test item(s)

Description ..... :	GTV RFID 13,56 module						
Model Number ..... :	BV1000GTV						
FCC ID ..... :	2AKMT-GTV222A						
Serial Number ..... :	--						
Brand name ..... :	Madic Italia						
Nominal frequency ..... :	13,56 MHz						
Rated power supply ..... :		Voltage and Frequency	Reference poles				
			N	L1	L2	L3	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 9-42 V					☐
Unconnected EUT ports list ..... :	Serial port (S2 connector) has been used to enable the EUT but it has been unconnected during the test as provided by the manufacturer's documentation						
Software version ..... :	ch_env_R01-01						
General mounting position ..... :	☐	Table top equipment					
	☒	Wall/ceiling mounted equipment					
	☐	Floor standing equipment					
	☐	Hand-held equipment					
Type of equipment ..... :	☒	Transmitter unit					
	☒	Receiver unit					
Type of station ..... :	☒	Fixed station					
	☐	Portable station					
	☐	Mobile station					
Operating modes ..... :	No.	Operating mode of test item					
	1	TX mode, continuous transmission at 13,56 MHz obtained with "rf_antenna_on" command from auxiliary tera term					
	2	TX dummy mode, continuous transmission at 13,56 MHz with dummy antenna prepared by the manufacturer. Transmission obtained with "rf_antenna_on" command from auxiliary tera term					
Accessories (not part of the test item) ..... :	PC with tera term provided by the manufacturer						

6.1 Photos of the test item






7 Verdict summary section

FCC Rules & Regulations, Title 47:2018 Part 15 paragraph(s): 203, 204, 205, 207, 209, 215 and 225			
Clause	**Requirement – Test case**	**Basic standard**	**Verdict**
Part 15.203	Antenna requirements	--	**P**
Part 15.207	Conducted emissions	ANSI C63.10	**P**
Part 15.209	Radiated emissions	ANSI C63.10	**P**
Part 15.225	Field strength with the assigned band	ANSI C63.10	**P**
Part 15.225 (e)	Frequency tolerance	ANSI C63.10	**P**
Part 15.215	20 dB bandwidth	ANSI C63.10	**P**

Normative references	
Reference no.	***Description***
FCC Rules and Regulation Title 47 part 15:2018	--
ANSI C63.4:2014	American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz
ANSI C63.10:2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

8 Test conditions

8.1 General

Environmental reference conditions.....:	The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Temperature	Humidity	Atmospheric pressure
15 °C – 35 °C	30 % - 60 %	800 hPa – 1060 hPa
If explicitly required in the basic standard or applied product standard the climatic values are recorded and documented separately in this test report.		

Measurement uncertainties .....:	Attachment 1

9 Test results

9.1 Antenna requirements

Tested by ..... :	A. Bertezzolo	
Test date ..... :	23.01.2020	
Reference standards ..... :	FCC Rules and Regulation; Titles 47 Part. 15.203 and 15.204	
Test specification ..... :	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded	
Antenna type ..... :	☒	Integral antenna
	☐	External antenna
Antenna gain ..... :	0 dBi	
External R.F. power amplifier ..... :	Not Present	

9.2 Conducted emission

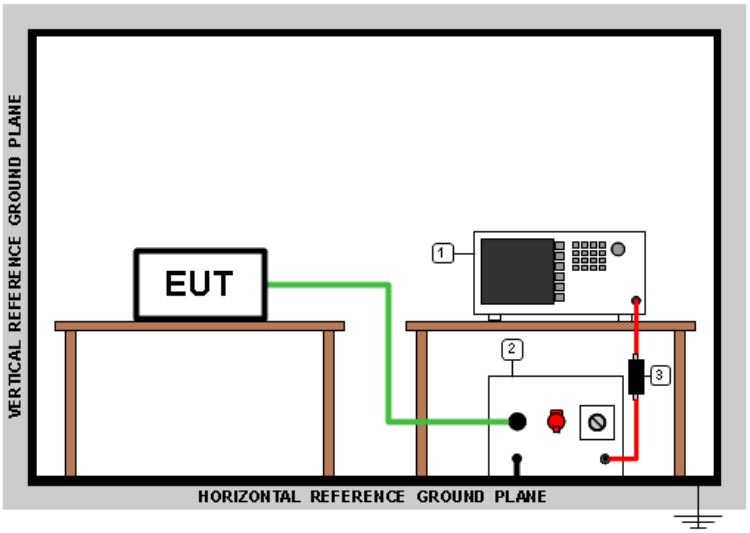
Tested by ..... :	A. Bertezzolo	
Test date ..... :	23.01.2020	
Test location (stand) ..... :	Shielded chamber (CMC A001)	
Reference standards ..... :	FCC Rules and Regulation; Titles 47 Part. 15.207 ANSI C63.10 cl. 6.2	
Test set-up description ..... :	☒	Table top equipment set-up (80 cm above the reference ground plane)
	☐	Floor standing equipment set-up (insulating material up to 12 mm thick)
	☐	False floor installation equipment set-up (insulating material up to 34 cm above the reference ground plane)
Supplementary Test set-up description ..... :	--	
Test method applied ..... :	☒	Artificial mains network, 50 µH/50 Ω LISN
	☐	Other:

Acceptance limits

Frequency range (MHz)	*dB(µV) Quasi-peak*	*dB(µV) Average*
0,15 to 0,50	66 to 56	56 to 46
0,5 to 5	56	46
5 to 30	60	50

Test setup

Mains terminal disturbance for table-top equipment



Test setup PE001_01				
Nr.	*Id. Number*	*Manufacturer*	*Model*	*Description*
3	CMC S010	Rohde & Schwarz	ESH3-Z2	Pulse limiter
2	CMC S200	Schwarzbeck	NSLK 8128	V-LISN
1	CMC S206	Rohde & Schwarz	ESCI 7	EMC Receiver 9KHz-7GHz

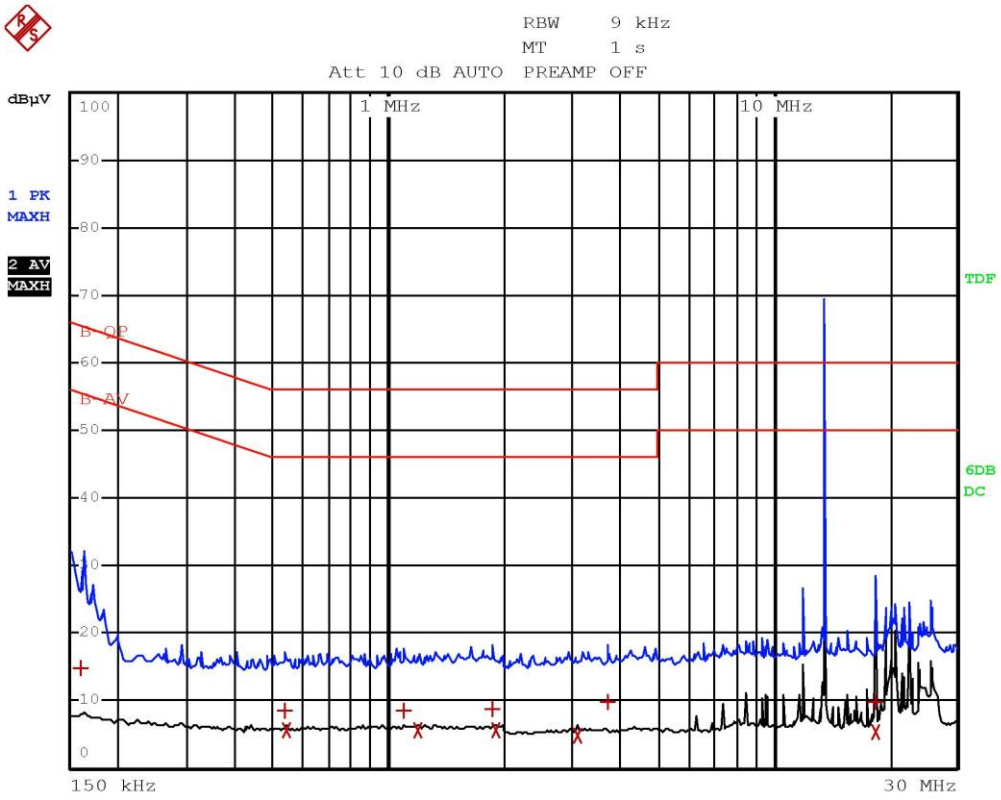
Result

Line	*Frequency Range (MHz)*	*Graphs*	*Remarks*	*Result*
N	0,15 – 30	G19190501	TX mode	P
L1	0,15 – 30	G19190502	TX mode	P
L1	0,15 – 30	G19190503	TX dummy mode	P
N	0,15 – 30	G19190504	TX dummy mode	P

Remarks: tests performed on 120 Vac side of AC/DC power unit, the graphs show the highest emission detected on the full supply voltage range 9-42 Vdc

Graphs Legend
PK: Peak; QP [1s] (quasi-peak at 1 second) values are marked with a +
AV: Average; AV [1s] (average at 1 second) values are marked with a X

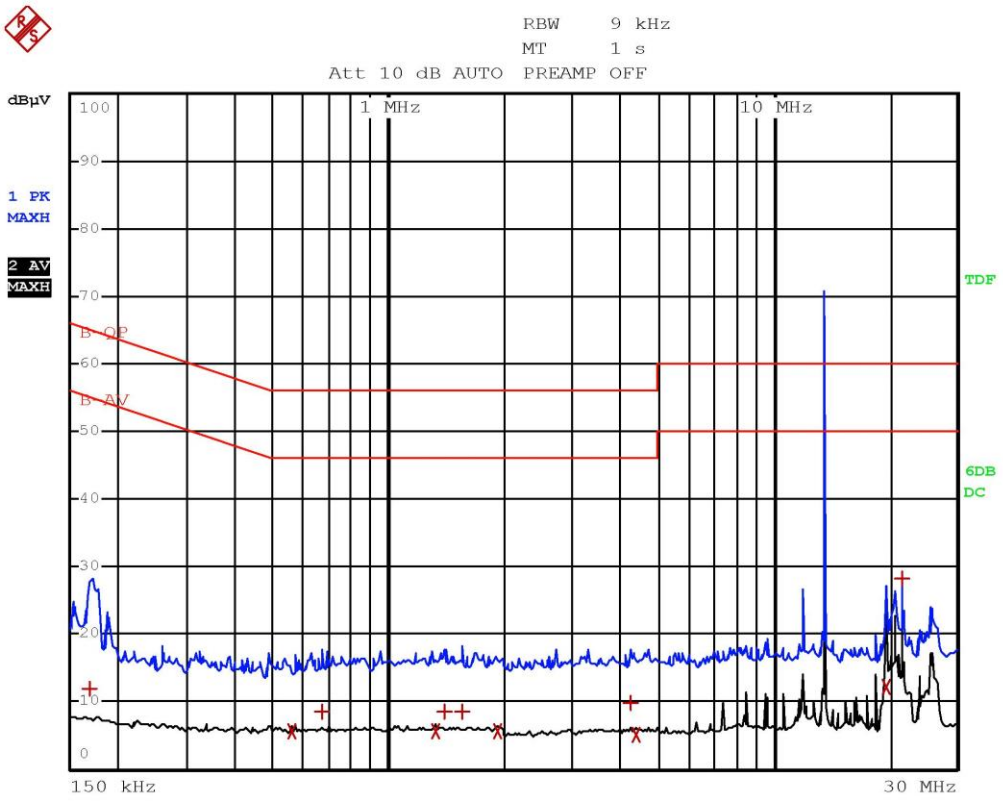
Graphs



Bertezzolo 19190501

EDIT PEAK LIST (Final Measurement Results)			
Trace1:	B-QP		
Trace2:	B-AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Quasi Peak	162 kHz	14.73	-50.63
1 Quasi Peak	534 kHz	8.58	-47.41
2 Average	542 kHz	5.55	-40.44
1 Quasi Peak	1.09 MHz	8.58	-47.41
2 Average	1.194 MHz	5.57	-40.42
1 Quasi Peak	1.866 MHz	8.83	-47.16
2 Average	1.894 MHz	5.61	-40.38
2 Average	3.118 MHz	4.96	-41.03
1 Quasi Peak	3.702 MHz	9.82	-46.17
1 Quasi Peak	18.434 MHz	9.77	-50.22
2 Average	18.434 MHz	5.26	-44.73

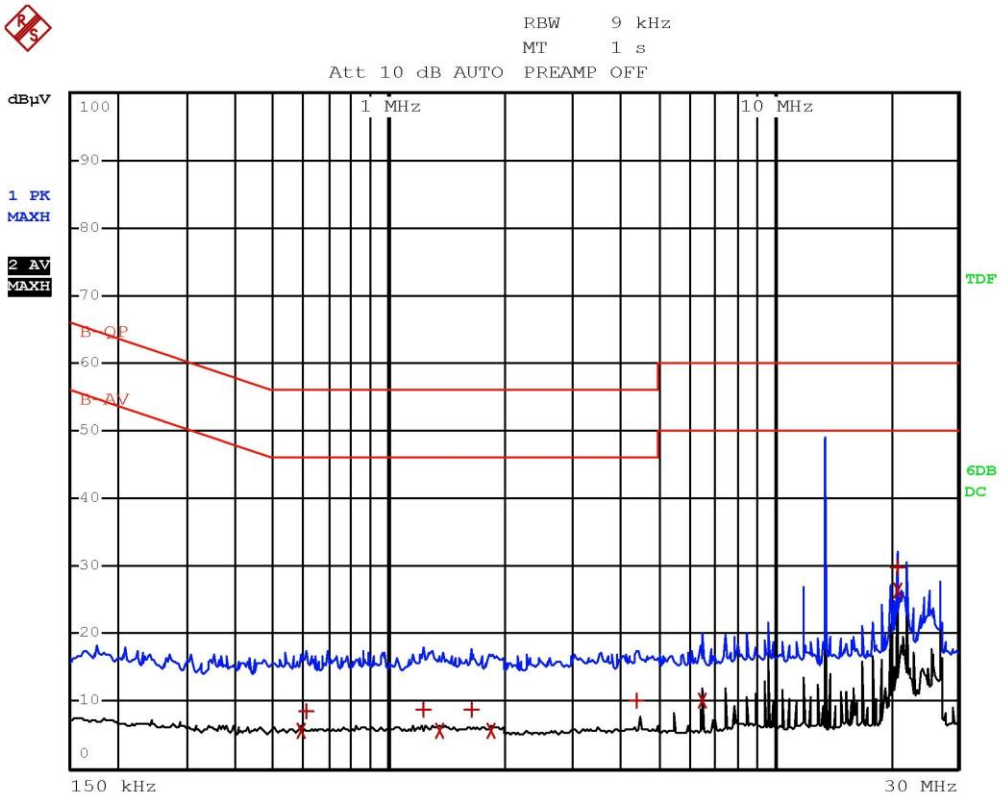
Bertezzolo 19190501



Bertezzolo 19190502

EDIT PEAK LIST (Final Measurement Results)			
Trace1:	B-QP		
Trace2:	B-AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Quasi Peak	170 kHz	12.04	-52.91
2 Average	558 kHz	5.53	-40.46
1 Quasi Peak	670 kHz	8.40	-47.59
2 Average	1.33 MHz	5.51	-40.48
1 Quasi Peak	1.398 MHz	8.49	-47.50
1 Quasi Peak	1.562 MHz	8.40	-47.59
2 Average	1.926 MHz	5.63	-40.36
1 Quasi Peak	4.25 MHz	9.80	-46.20
2 Average	4.406 MHz	5.20	-40.80
2 Average	19.554 MHz	12.31	-37.68
1 Quasi Peak	21.662 MHz	28.21	-31.78

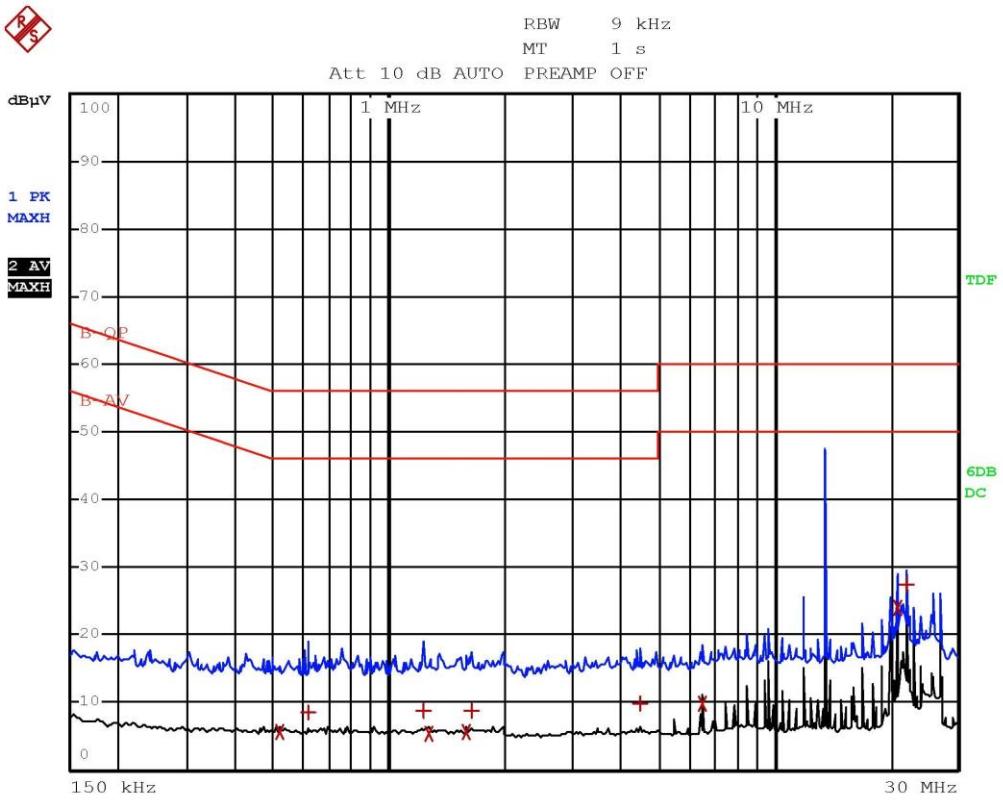
Bertezzolo 19190502



Bertezzolo 19190503

EDIT PEAK LIST (Final Measurement Results)			
Trace1:	B-QP		
Trace2:	B-AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	590 kHz	5.61	-40.38
1 Quasi Peak	610 kHz	8.49	-47.50
1 Quasi Peak	1.226 MHz	8.66	-47.33
2 Average	1.358 MHz	5.51	-40.48
1 Quasi Peak	1.642 MHz	8.66	-47.33
2 Average	1.842 MHz	5.60	-40.39
1 Quasi Peak	4.422 MHz	9.98	-46.01
2 Average	6.486 MHz	10.20	-39.79
1 Quasi Peak	20.954 MHz	29.72	-30.27
2 Average	20.954 MHz	26.46	-23.53

Bertezzolo 19190503



Bertezzolo 19190504

EDIT PEAK LIST (Final Measurement Results)			
Trace1:	B-QP		
Trace2:	B-AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	518 kHz	5.61	-40.38
1 Quasi Peak	614 kHz	8.58	-47.41
1 Quasi Peak	1.23 MHz	8.66	-47.33
2 Average	1.27 MHz	5.51	-40.48
2 Average	1.594 MHz	5.56	-40.43
1 Quasi Peak	1.642 MHz	8.66	-47.33
1 Quasi Peak	4.474 MHz	9.82	-46.17
2 Average	6.486 MHz	9.96	-40.03
2 Average	20.954 MHz	23.92	-26.08
1 Quasi Peak	21.95 MHz	27.50	-32.49

Bertezzolo 19190504

9.3 Radiated emissions

Tested by ..... :	A. Bertezzolo	
Test date ..... :	27.01.2020	
Test location (stand) ..... :	Semi-anechoic chamber (CMC A070)	
Reference standards ..... :	FCC Rules and Regulation; Titles 47 Part. 15.209 ANSI C63.10 cl. 6.3, 6.4, 6.5 and 6.6	
Test set-up description ..... :	☒	Table top equipment set-up (80 cm above the reference ground plane)
	☐	Floor standing equipment set-up (insulating material up to 12 mm thick)
	☐	False floor installation equipment set-up (insulating material up to 34 cm above the reference ground plane)
Supplementary test set-up description ..... :	--	
Test method applied ..... :	☒	SAC with measurement distance [m]: 10
Supplementary information..... :	According to KDB 414788 D01 chapter 2, emissions at frequencies below 30 MHz have been evaluated on 10 m SAC test site. As demonstrated on document “Test site correlation” date 28.03.2019, results of tests on SAC10 are slightly higher than the results of tests on OATS test site. The evaluation has been performed at both 10 and 3 m distance and at both 125 kHz and 13,56 MHz frequency	

Acceptance limits

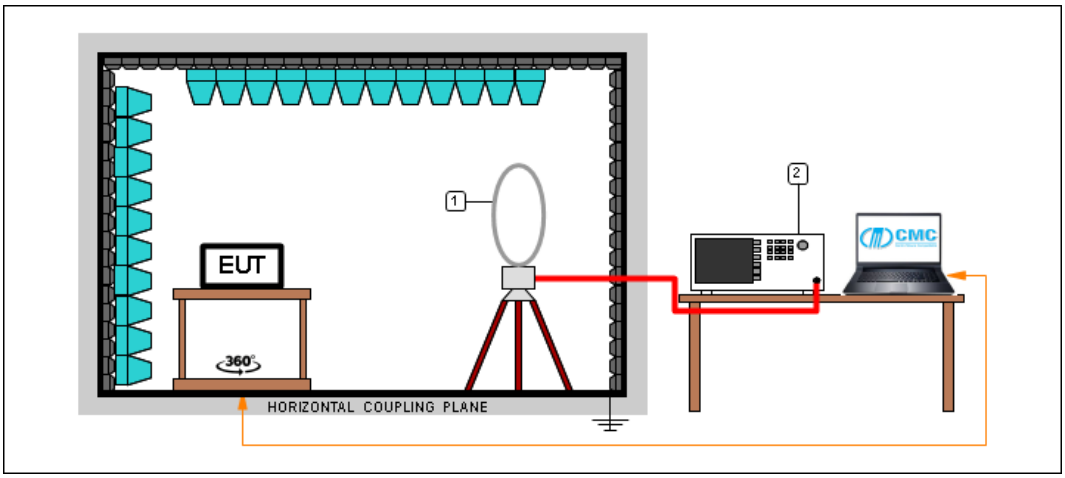
Frequency range (MHz)	*Test distance (m)*	*Limits [dB(µV/m)]*
0,009 to 0,490	300	48,5 to 13,8
0,490 to 1,705	30	33,8 to 22,9
1,705 to 30	30	29,5
30 to 88	3	40
88 to 216	3	43,5
216 to 960	3	46,0
960 to 1000	3	54

Remarks: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz and 110–490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector. The results have been extrapolated to the specified distance using an extrapolation factor

Frequency (MHz)	*Test distance (m)*	*AV limits [dB(µV/m)]*	*Peak limits [dB(µV/m)]*
> 1000	3	54	74

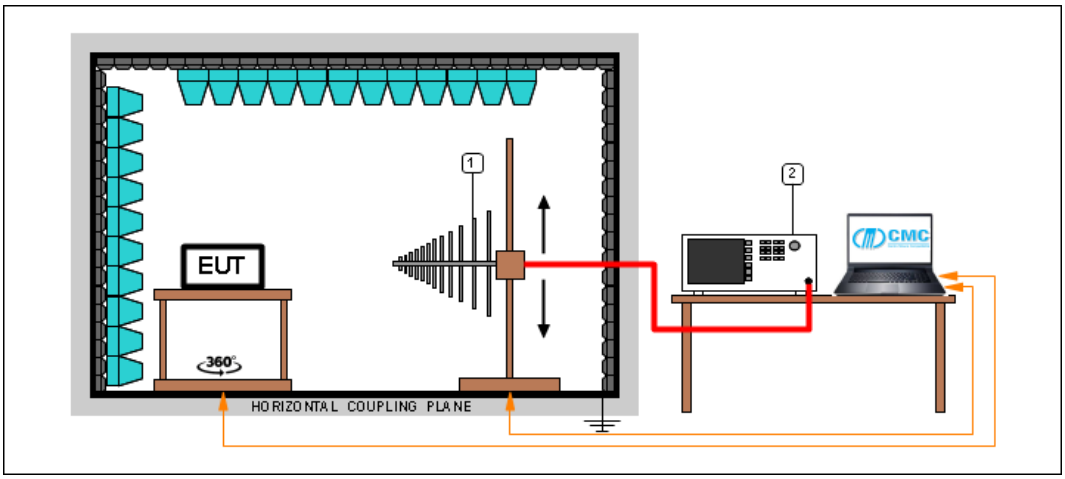
Test setup

Frequency ≤ 30 MHz



Test setup PE004_01				
Nr.	*Id. Number*	*Manufacturer*	*Model*	*Description*
2	CMC S164	Rohde & Schwarz	ESU26	Receiver 20 Hz - 26.5 GHz
1	CMC S127	Schaffner	HLA6120	Loop Antenna 9kHz - 30MHz

Frequency ≤ 1 GHz



Test setup PE004_02				
Nr.	*Id. Number*	*Manufacturer*	*Model*	*Description*
2	CMC S164	Rohde & Schwarz	ESU26	Receiver 20 Hz - 26.5 GHz
1	CMC S271	Schwarzbeck	BBA 9106 + VHBB 9124	Broadband Antenna

Test setup PE004_03				
Nr.	*Id. Number*	*Manufacturer*	*Model*	*Description*
2	CMC S164	Rohde & Schwarz	ESU26	Receiver 20 Hz - 26.5 GHz
1	CMC S287	Schwarzbeck	VUSLP 9111B	Broadband Antenna

Result

Polarization	*Frequency Range (MHz)*	*Graphs*	*Remarks*	*Result*
V	30 – 300	G19190505	--	P
H	30 – 300	G19190506	--	P
H	300 – 1000	G19190507	--	P
V	300 – 1000	G19190508	--	P
Loop	0,009 – 30	G19190509	--	P

Remarks: EUT was tested in 3 orthogonal planes, graphs are related to the highest detected levels.
Measurements at frequencies lower than 30 MHz have been performed with an EUT – antenna distance of 10 m. Measured values have been corrected with conversion factor 40log(test distance/10) based on the measuring distance provided by the standard.
Measurements at frequencies higher than 30 MHz and lower than 1000 MHz have been performed with an EUT – antenna distance of 10 m. Measured values have been corrected with conversion factor 20log(test distance/10) based on the measuring distance provided by the standard.
Peaks above the limits are caused by the nominal transmitting frequencies.

Graphs Legend
PK: Peak; QP [1s] (quasi-peak at 1 second) values are marked with a +
AV: Average; AV [1s] (average at 1 second) values are marked with a X