CMC Centro Misure Compatibilità S.r.l.
Via della Fisica, 20
36016 Thiene (VI) – ITALY
Tel./Fax +39 0445 367702
www.cmclab.it - info@cmclab.it

LAB N° 0168

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

TEST REPORT
Nr. R19239301

Federal Communication Commission (FCC)

Report Reference No. .....:	R19239301
Date of issue: .....:	20.02.2020
Total number pages: .....:	48
Applicant´s name .....:	Elettronica GF S.r.l.
Address .....:	Via Ca' Bianca, 10 – 48018 Faenza (RA) – 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 .....:	NFC (Gymkit) 5V RS232 board
Trademark .....:	Elettronica GF
Manufacturer .....:	Elettronica GF S.r.l.
Model / Type reference .....:	0615C
FCC ID .....:	2ARDN0615C
Rating(s) .....:	5 Vdc

Report

Tested by (name + signature).....:	G. Gandini	.....
Approved by (name + signature) .....:	R. Beghetto	.....

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1 Summary

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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	

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Testing and sampling:	
Date of receipt of test item	29.10.2019
Testing start date	28.01.2020
Testing end date	19.02.2020
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 P191275
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.	

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6 General description of test item(s)

Description .....:	NFC (Gymkit) 5V RS232 board						
Model Number .....:	0615C						
FCC ID .....:	2ARDN0615C						
Serial Number .....:	--						
Brand name .....:	Elettronica GF						
Nominal frequency .....:	13,56 MHz						
Rated power supply .....:		Voltage and Frequency	Reference poles				
			N	L1	L2	L3	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 5 V					☐
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					
	2	TX dummy mode, continuous transmission at 13,56 MHz with 50 Ω termination					

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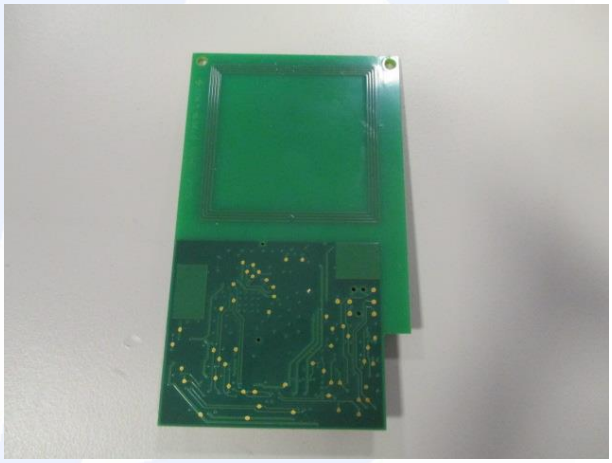
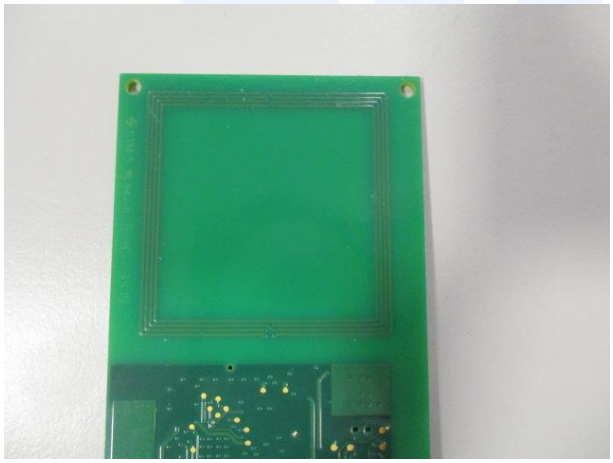
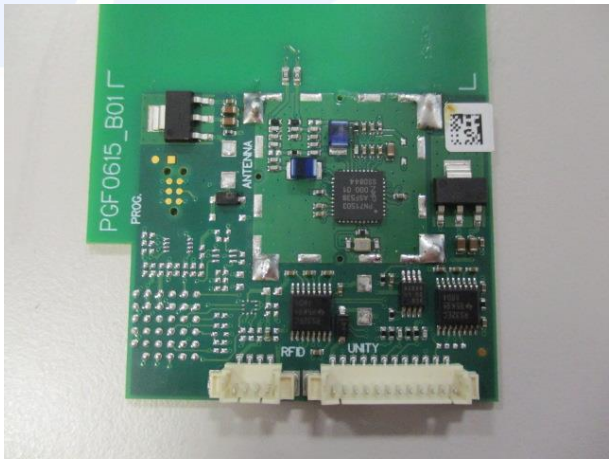
6.1 Photos of the test item







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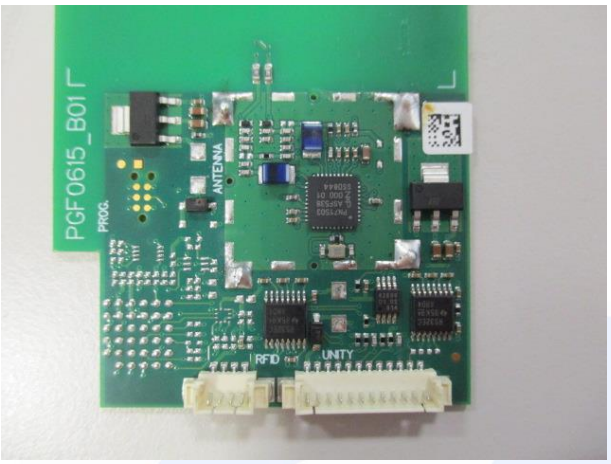

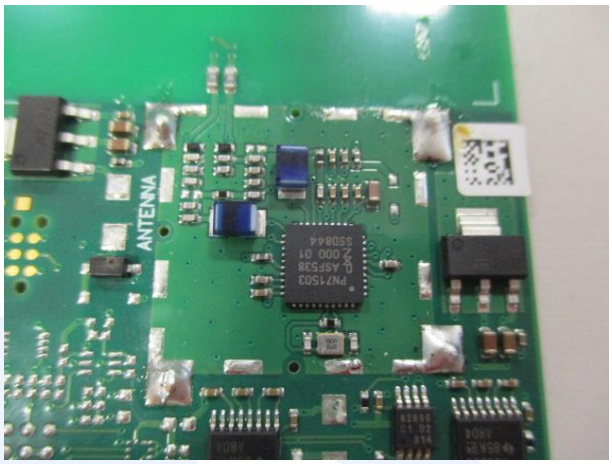

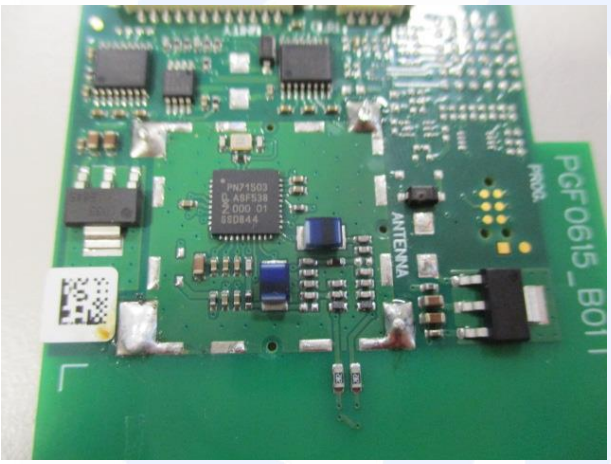

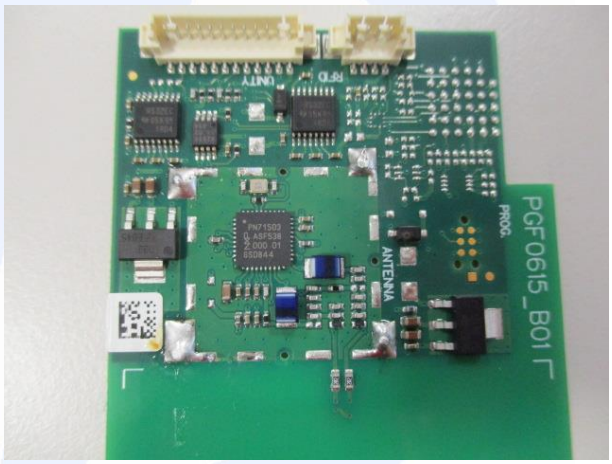

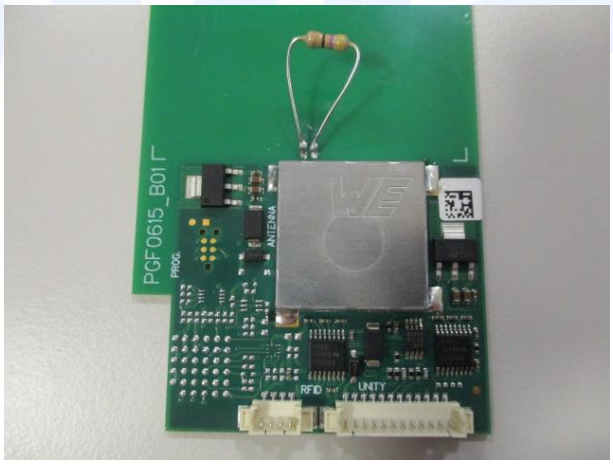

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7 Verdict summary section

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**

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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

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8 Test conditions

8.1 General

<table>
<tr><td rowspan="4">Environmental reference conditions.....:</td><td colspan="3">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:</td></tr>
<tr><td>Temperature</td><td>Humidity</td><td>Atmospheric pressure</td></tr>
<tr><td>15 °C – 35 °C</td><td>30 % - 60 %</td><td>800 hPa – 1060 hPa</td></tr>
<tr><td colspan="3">If explicitly required in the basic standard or applied product standard the climatic values are recorded and documented separately in this test report.</td></tr>
<tr><td>Measurement uncertainties .....:</td><td colspan="3">Attachment 1</td></tr>
</table>

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9 Test results

9.1 Antenna requirements

Tested by ..... :	G. Gandini	
Test date ..... :	28.01.2020	
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	

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9.2 Conducted emission

Tested by ..... :	G. Gandini	
Test date ..... :	13.02.2020	
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

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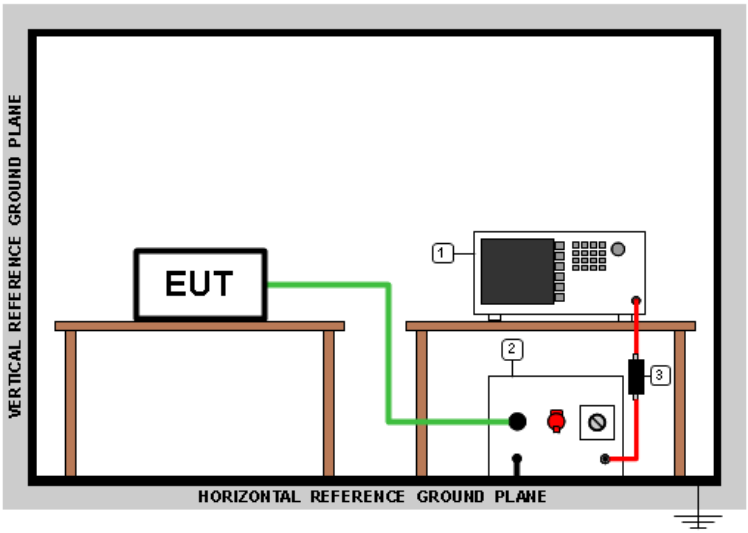
Test setup

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	G19239511	TX mode	P
L1	0,15 – 30	G19239512	TX mode	P
L1	0,15 – 30	G19239515	TX mode with 50 Ω termination	P
N	0,15 – 30	G19239516	TX mode with 50 Ω termination	P

Remarks: tests performed on 120 Vac side of AC/DC power unit

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

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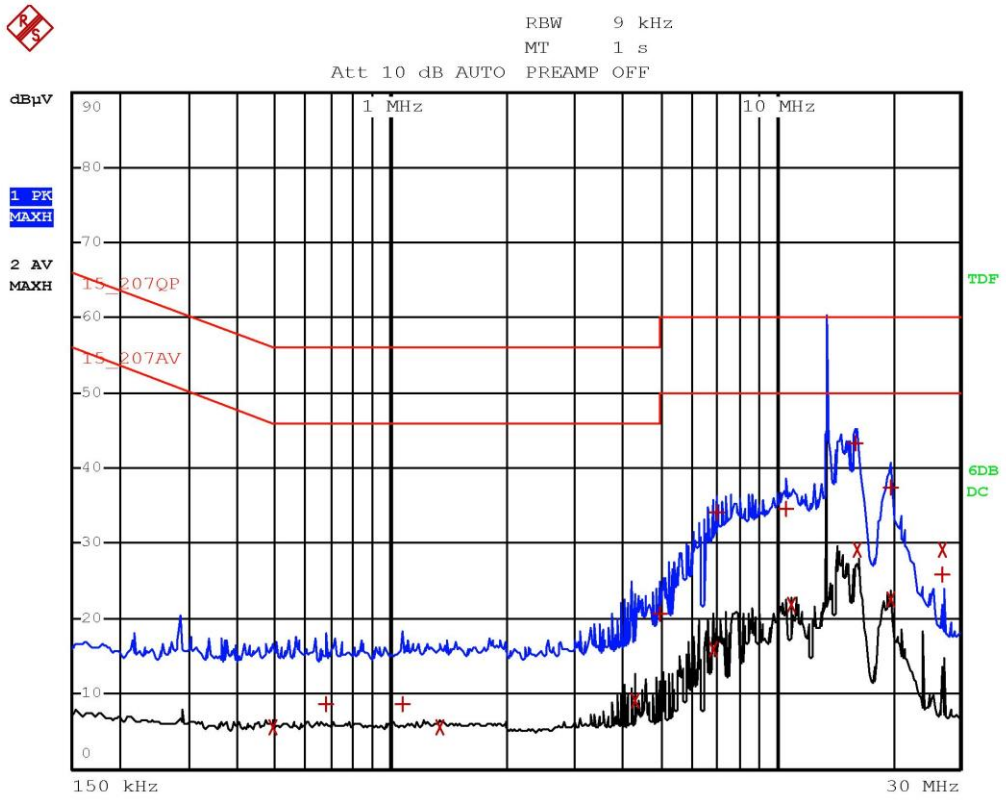
Graphs



Gandini 19239311-Line N-TxRx

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EDIT PEAK LIST (Final Measurement Results)

Trace1:	15_207QP
Trace2:	15_207AV
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	494 kHz	5.64	-40.46
1 Quasi Peak	682 kHz	8.66	-47.33
1 Quasi Peak	1.074 MHz	8.66	-47.33
2 Average	1.342 MHz	5.50	-40.49
2 Average	4.33 MHz	9.16	-36.83
1 Quasi Peak	4.99 MHz	20.63	-35.36
2 Average	6.874 MHz	15.95	-34.04
1 Quasi Peak	7.058 MHz	34.18	-25.81
1 Quasi Peak	10.634 MHz	34.51	-25.48
2 Average	10.918 MHz	21.82	-28.17
1 Quasi Peak	15.998 MHz	43.41	-16.58
2 Average	16.19 MHz	29.09	-20.90
1 Quasi Peak	19.762 MHz	37.41	-22.58
2 Average	19.766 MHz	22.52	-27.47
1 Quasi Peak	27.12 MHz	25.87	-34.12
2 Average	27.12 MHz	29.10	-20.89

Gandini 19239311-Line N-TxRx

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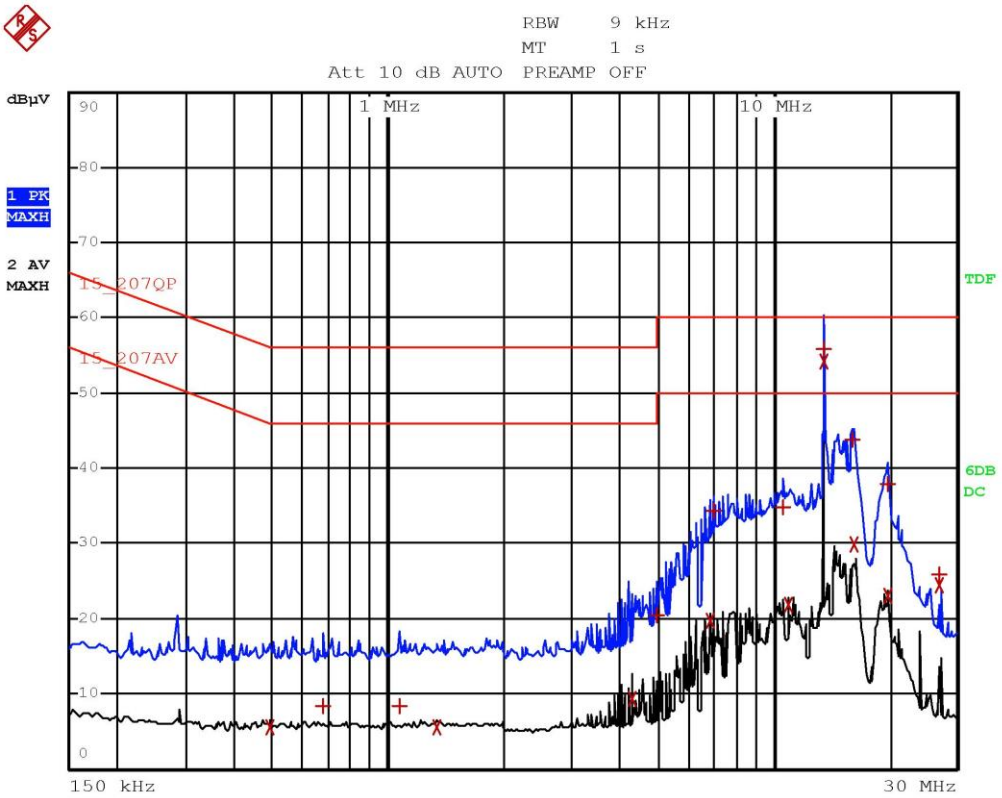

Gandini 19239312-Line L-TxRx

CMC Centro Misure Compatibilità S.r.l.

EDIT PEAK LIST (Final Measurement Results)

Trace1:	15_207QP
Trace2:	15_207AV
Trace3:	---

TRACE		FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2	Average	494 kHz	5.62	-40.47
1	Quasi Peak	682 kHz	8.40	-47.59
1	Quasi Peak	1.074 MHz	8.40	-47.59
2	Average	1.342 MHz	5.44	-40.55
2	Average	4.33 MHz	9.22	-36.77
1	Quasi Peak	4.99 MHz	20.46	-35.53
2	Average	6.874 MHz	19.71	-30.28
1	Quasi Peak	7.058 MHz	34.27	-25.72
1	Quasi Peak	10.634 MHz	34.79	-25.20
2	Average	10.918 MHz	21.85	-28.14
2	Average	13.562 MHz	54.18	4.18
1	Quasi Peak	13.562 MHz	55.79	-4.20
1	Quasi Peak	15.998 MHz	43.80	-16.19
2	Average	16.19 MHz	29.85	-20.14
1	Quasi Peak	19.762 MHz	37.82	-22.17
2	Average	19.766 MHz	23.04	-26.95
1	Quasi Peak	27.12 MHz	25.96	-34.03
2	Average	27.12 MHz	24.52	-25.48

Gandini 19239312-Line L-TxRx

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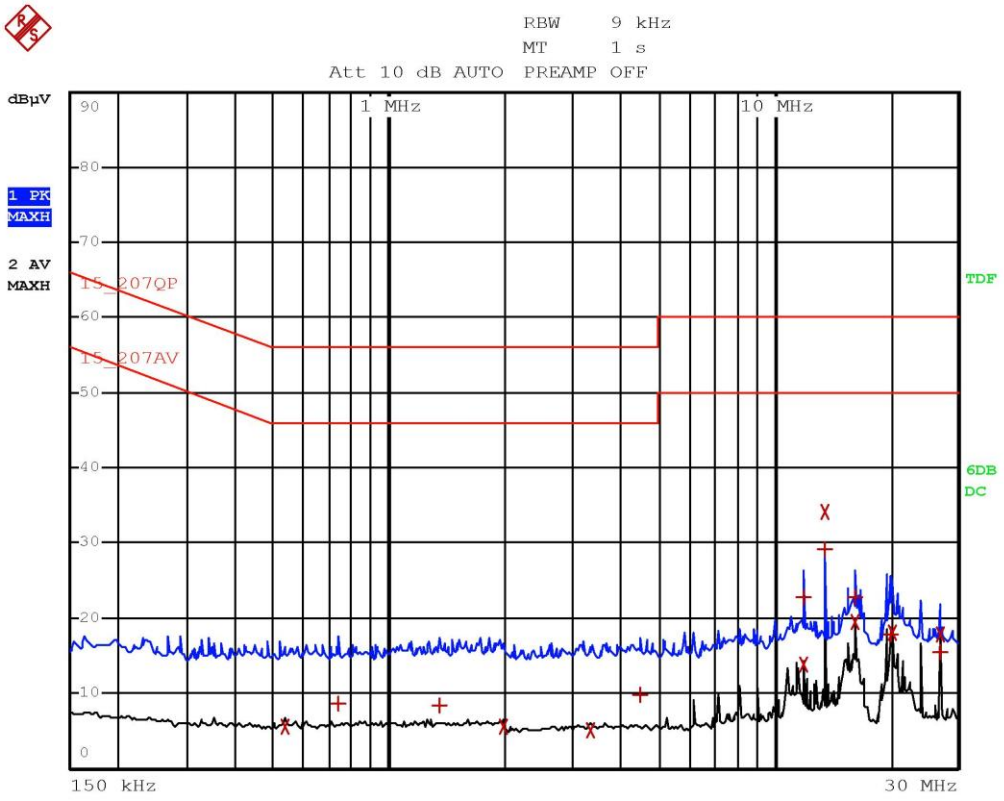

Gandini 19239315-Line L-TxRx

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EDIT PEAK LIST (Final Measurement Results)

Trace1:	15_207QP
Trace2:	15_207AV
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	538 kHz	5.53	-40.46
1 Quasi Peak	738 kHz	8.66	-47.33
1 Quasi Peak	1.354 MHz	8.49	-47.50
2 Average	1.99 MHz	5.60	-40.39
2 Average	3.342 MHz	4.98	-41.01
1 Quasi Peak	4.474 MHz	9.75	-46.24
1 Quasi Peak	11.946 MHz	22.84	-37.15
2 Average	11.946 MHz	13.90	-36.09
1 Quasi Peak	13.56 MHz	29.23	-30.76
2 Average	13.56 MHz	34.24	-15.75
2 Average	16.23 MHz	19.41	-30.58
1 Quasi Peak	16.23 MHz	22.73	-37.26
1 Quasi Peak	20.038 MHz	17.72	-42.27
2 Average	20.258 MHz	18.01	-31.98
2 Average	27.12 MHz	17.93	-32.06
1 Quasi Peak	27.12 MHz	15.51	-44.48

Gandini 19239315-Line L-TxRx

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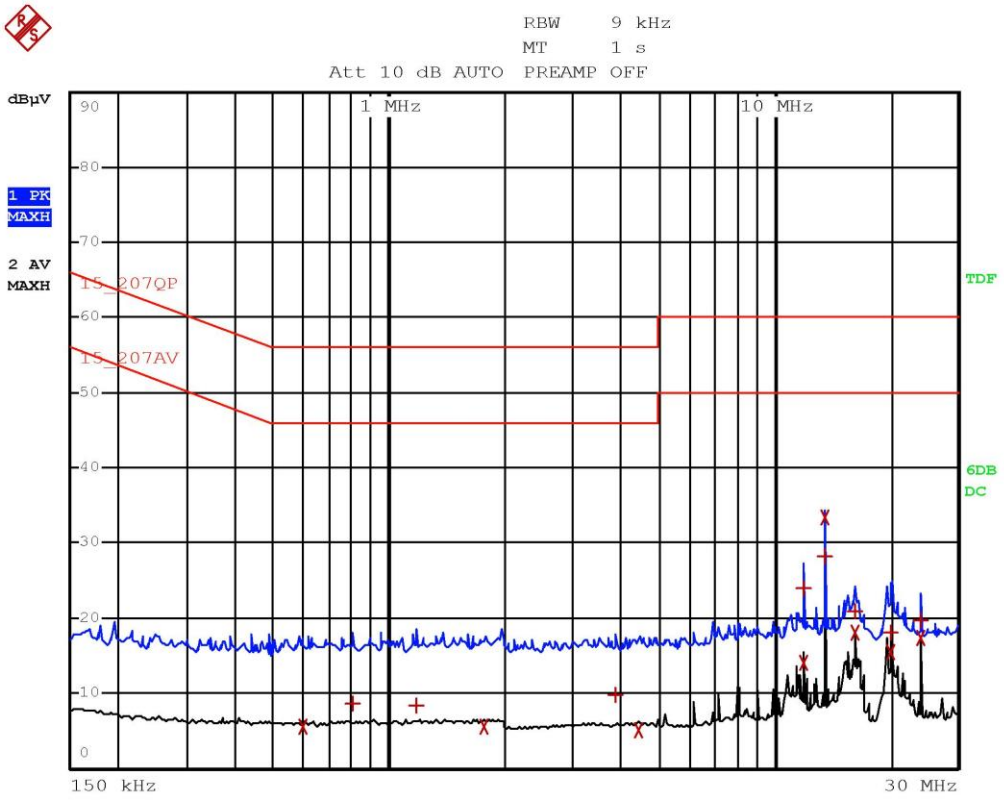

Gandini 19239316-Line N-TxRx

CMC Centro Misure Compatibilità S.r.l.

EDIT PEAK LIST (Final Measurement Results)

Trace1:	15_207QP
Trace2:	15_207AV
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	594 kHz	5.62	-40.37
1 Quasi Peak	806 kHz	8.58	-47.41
1 Quasi Peak	1.186 MHz	8.31	-47.68
2 Average	1.766 MHz	5.62	-40.37
1 Quasi Peak	3.87 MHz	9.72	-46.27
2 Average	4.454 MHz	5.18	-40.81
1 Quasi Peak	11.95 MHz	23.87	-36.13
2 Average	11.95 MHz	14.08	-35.91
1 Quasi Peak	13.56 MHz	28.18	-31.81
2 Average	13.56 MHz	33.31	-16.69
2 Average	16.23 MHz	18.06	-31.93
1 Quasi Peak	16.23 MHz	21.00	-38.99
2 Average	19.994 MHz	15.36	-34.63
1 Quasi Peak	20.014 MHz	18.14	-41.85
2 Average	23.894 MHz	17.40	-32.59
1 Quasi Peak	23.898 MHz	19.80	-40.20

Gandini 19239316-Line N-TxRx

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9.3 Radiated emissions

Tested by ..... :	G. Gandini	
Test date ..... :	28.01.2020	
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..... :	--	

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

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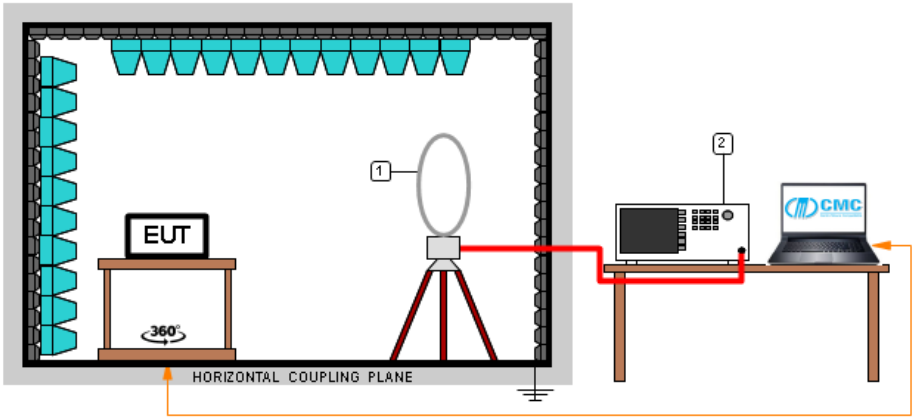
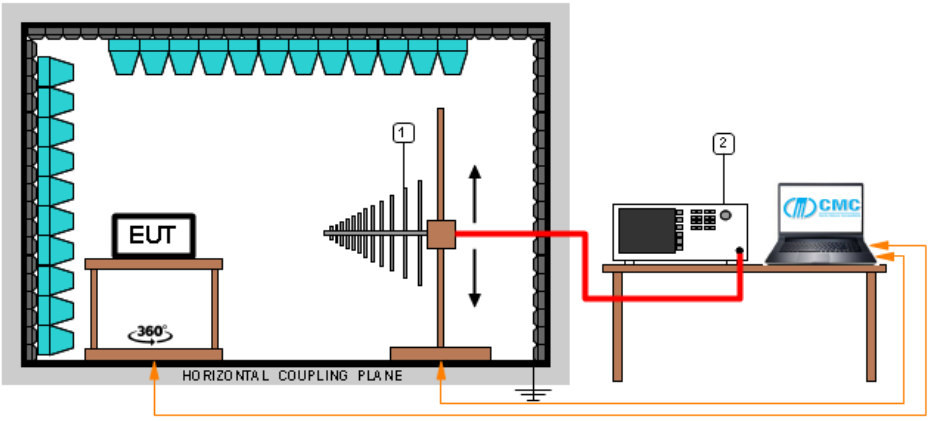
Test setup

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

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Result

Polarization	*Frequency Range (MHz)*	*Graphs*	*Remarks*	*Result*
Loop	0,009 – 30	G19239302	--	P
V	30 – 300	G19239307	--	P
H	30 – 300	G19239308	--	P
H	300 – 1000	G19239309	--	P
V	300 – 1000	G19239310	--	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

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