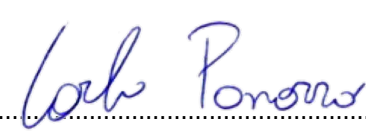
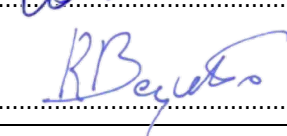


TEST REPORT

Nr. R21232401

Federal Communication Commission (FCC)

Report Reference No.	R21232401
Date of issue:	16.11.2021
Total number pages:	148
Applicant's name	Embit S.r.l.
Address	Via Emilia Est, 911 – 41122 Modena (MO) – Italy
Test specification:	
Standards	FCC Rules & Regulations, Title 47:2020 Part 15 paragraph(s): 203, 204, 205, 207, 209, 215 and 247
Non-standard test method	N/A
Test Report Form No.	15-247_HoppingCMC
Test Report Form(s) Originator ..	CMC Centro Misure Compatibilità S.r.l.
Master TRF	2021-07
General disclaimer:	
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of CMC Centro Misure Compatibilità S.r.l.	
Test item description	EMB-LR1302-mPCIe LoRaWAN Gateway Module
Trademark	Embit
Manufacturer	Embit S.r.l.
Model / Type reference	EMB-LR1302-mPCIe-SPI-915
FCC ID	Z7HEMBLR1302
Rating(s)	120 V ~ 60 Hz single-phase
Report	
Tested by (name + signature)	C. Panozzo 
Approved by (name + signature)	R. Beghetto 

1 Summary

1	Summary.....	2
2	Reference standard	3
3	List of attachments.....	3
4	Deviation(s) from test specification.....	3
5	Testing location.....	3
6	General description of tested item and testing condition(s)	5
6.1	Photos of the test item	6
7	Verdict summary section	8
8	Test conditions	10
8.1	General	10
9	Test results	11
9.1	Antenna requirements	11
9.2	Conducted emission	12
9.3	Emissions in restricted frequency bands and in unrestricted frequency bands	31
9.4	DTS bandwidth	98
9.5	20 dB bandwidth	103
9.6	Channel separation.....	111
9.7	Number of hopping channels.....	114
9.8	Time of occupancy.....	117
9.9	Band edge	121
9.10	Fundamental emission output power.....	129
9.11	Maximum power spectral density level in the fundamental emission.....	137

2 Reference standard	
FCC Rules and Regulation Title 47 part 15:2020	--
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 Misura Compatibilità S.r.l. Via della Fisica, 20 – 36016 Thiene (VI) – Italy Test site facility's FCC registration number: 182474	

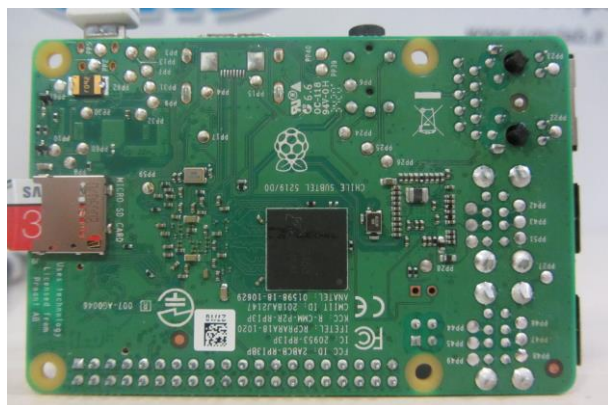
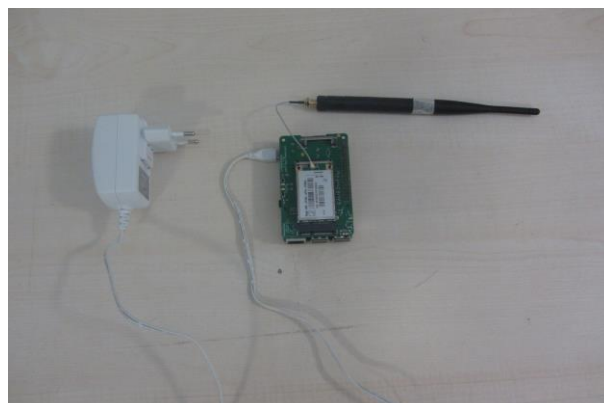
<i>Revision index</i>	<i>Date</i>	<i>Change history</i>
1.0	16.11.2021	--

Testing and sampling:	
Date of receipt of test item	08.10.2021
Testing start date	09.10.2021
Testing end date	12.11.2021
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 P211144
General remarks:	
This report shall not be reproduced, except in full, without the written approval of CMC. The test results presented in this report relate only to the object tested. “(see appended table)”: refers to a table appended to the report. Throughout this report a comma is used as the decimal separator.	
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 tested item and testing condition(s)

Description	EMB-LR1302-mPCIe LoRaWAN Gateway Module						
Model Number	EMB-LR1302-mPCIe-SPI-915						
FCC ID	Z7HEMBLR1302						
Serial Number	--						
Brand name	Embit						
Frequency band	902 – 928 MHz						
Nominal frequencies (LoRa 125 kHz)	F _L : 903,90 MHz	F _M : 904,50 MHz			F _H : 905,30 MHz		
Nominal frequencies (LoRa 500 kHz)	F _L : 923,30 MHz	F _M : 925,00 MHz			F _H : 927,50 MHz		
Test power supply		Voltage and Frequency	Reference poles				
			N	L1	L2	L3	PE
	☒	AC: 120 V, 60 Hz	☒	☒	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☐	DC:					☐
Software version	v2.0.0						
Test configuration	☒	Table top equipment					
	☐	Floor standing equipment					
	☐	Hand-held equipment					
Type of equipment	☒	Transmitter unit					
	☒	Receiver unit					
Type of station	☐	Portable station					
	☒	Mobile station					
Operating modes	No.	Operating mode of test item					
	1	EUT in continuous transmission at maximum power					

6.1 Photos of the test item





7 Verdict summary section

FCC Rules & Regulations, Title 47:2020			
Part 15 paragraph(s): 203, 204, 205, 207, 209, 215 and 247			
Clause	Requirement – Test case	Basic standard	Verdict
Part 15.247 (a) (1)	Pseudo randomly ordered list of hopping frequencies	--	P
Part 15.203	Antenna requirements	ANSI C63.10	P
Part 15.207	Conducted emissions	ANSI C63.10	P
Part 15.209	Emissions in restricted frequency bands and in unrestricted frequency bands	ANSI C63.10	P
Part 15.247 (a) (2)	DTS bandwidth	ANSI C63.10	
Part 15.247	20 dB Bandwidth	ANSI C63.10	P
Part 15.247	Channel Separation	ANSI C63.10	P
Part 15.247	Number of Hopping Channel	ANSI C63.10	P
Part 15.247	Time of occupancy	ANSI C63.10	P
Part 15.247	Band edge	ANSI C63.10	P
Part 15.209 and 15.247	Fundamental emission output power	ANSI C63.10	P
Part 15.209 and 15.247	Maximum power spectral density level in the fundamental emission	ANSI C63.10	P

Normative references	
Reference no.	Description
FCC Rules and Regulation Title 47 part 15:2020	--
KDB 558074 D01 15.247 Meas Guidance v05r02	Guidance for compliance measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices operating under section 15.247 of the FCC rules
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	C. Panozzo	
Test date	09.10.2021	
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.....	2 dBi	
External R.F. power amplifier	Not Present	

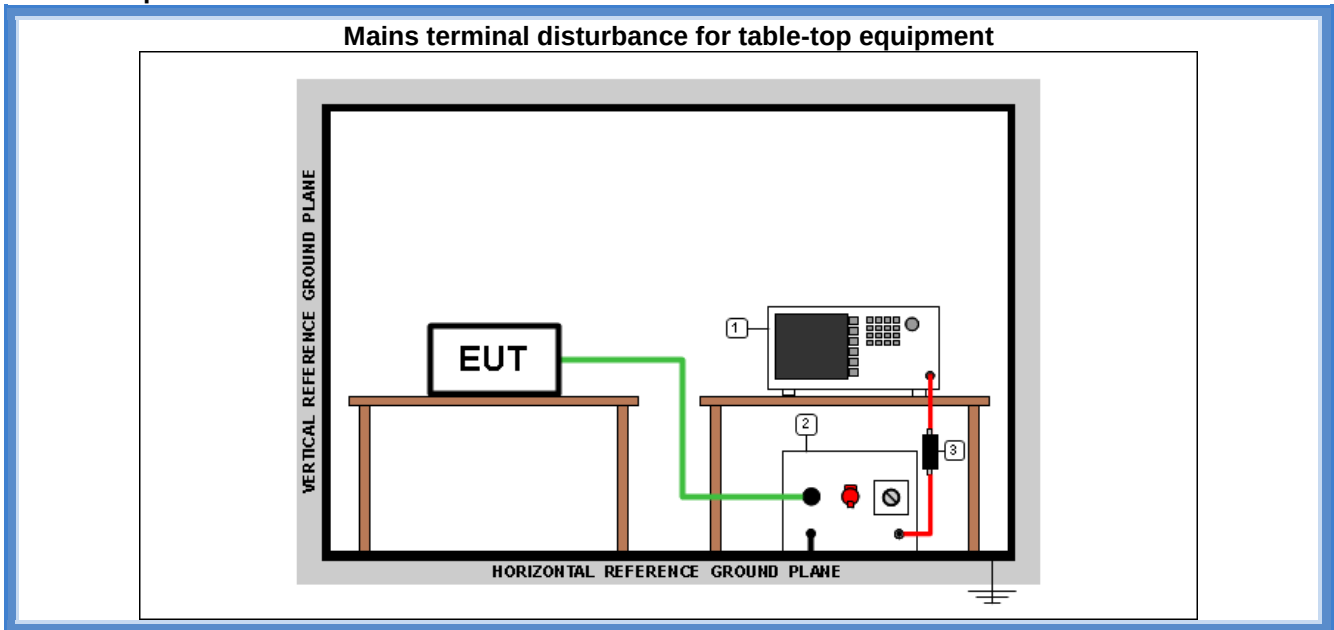
9.2 Conducted emission

Tested by	C. Panozzo	
Test date	03.11.2021	
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 μ H/50 Ω LISN
	☐	Other:

Acceptance limits

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

Test setup



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 – LoRa 125 kHz, spread factor 10

Line	Frequency Range (MHz)	Graphs	Remarks	Result
N	0,15 – 30	G212324A42	--	P
L1	0,15 – 30	G212324A43	--	P

Result – LoRa 125 kHz, spread factor 7

Line	Frequency Range (MHz)	Graphs	Remarks	Result
L1	0,15 – 30	G212324A44	--	P
N	0,15 – 30	G212324A45	--	P

Result – LoRa 500 kHz, spread factor 12

Line	Frequency Range (MHz)	Graphs	Remarks	Result
N	0,15 – 30	G212324A46	--	P
L1	0,15 – 30	G212324A47	--	P

Result – LoRa 500 kHz, spread factor 7

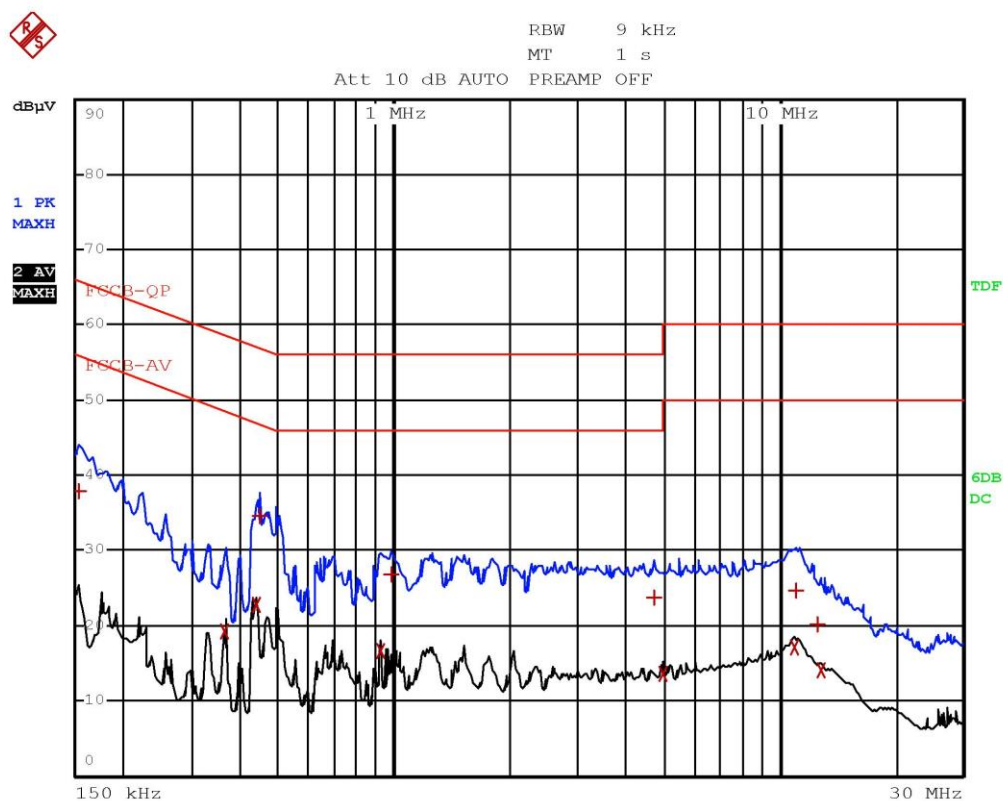
<i>Line</i>	<i>Frequency Range (MHz)</i>	<i>Graphs</i>	<i>Remarks</i>	<i>Result</i>
N	0,15 – 30	G212324A48	--	P
L1	0,15 – 30	G212324A49	--	P

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

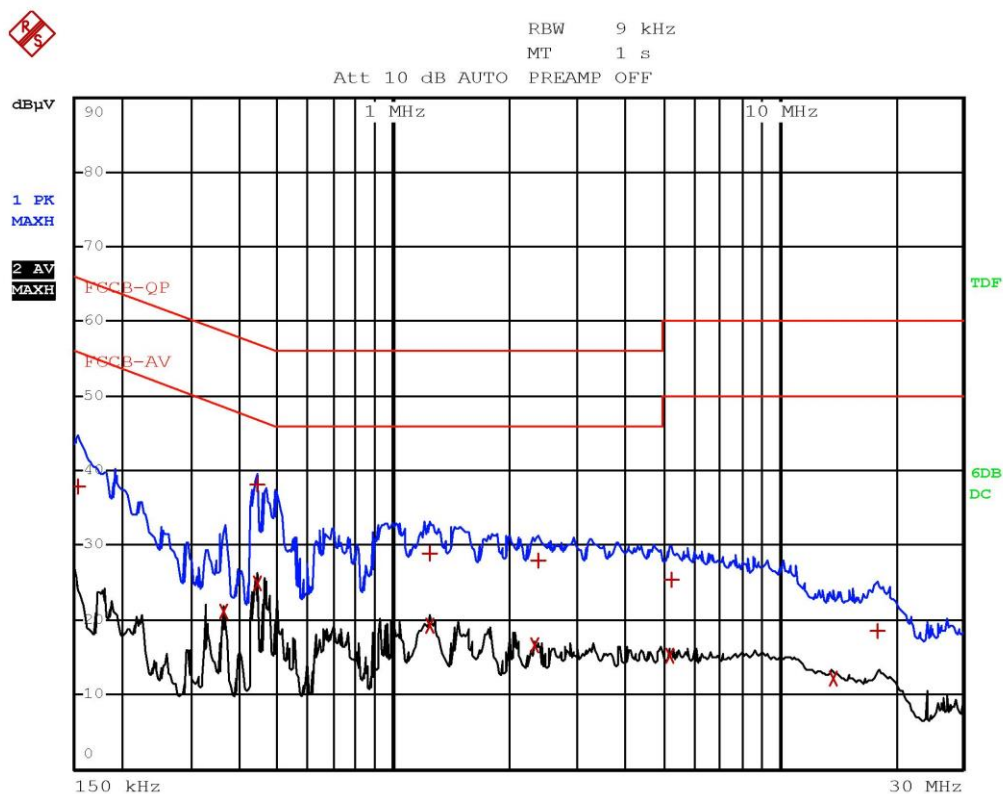
Graphs



Panozzo 212324A42 Line N In Funzione Hybrid SF10

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCCB-QP			
Trace2:	FCCB-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBpV	DELTA LIMIT dB	
1 Quasi Peak	154 kHz	37.83	-27.95	
2 Average	362 kHz	19.28	-29.40	
2 Average	438 kHz	22.90	-24.19	
1 Quasi Peak	446 kHz	34.51	-22.43	
2 Average	922 kHz	16.70	-29.29	
1 Quasi Peak	982 kHz	26.71	-29.28	
1 Quasi Peak	4.75 MHz	23.66	-32.33	
2 Average	4.982 MHz	13.66	-32.33	
2 Average	11.006 MHz	17.18	-32.81	
1 Quasi Peak	11.026 MHz	24.63	-35.36	
1 Quasi Peak	12.594 MHz	20.25	-39.74	
2 Average	12.79 MHz	14.09	-35.90	

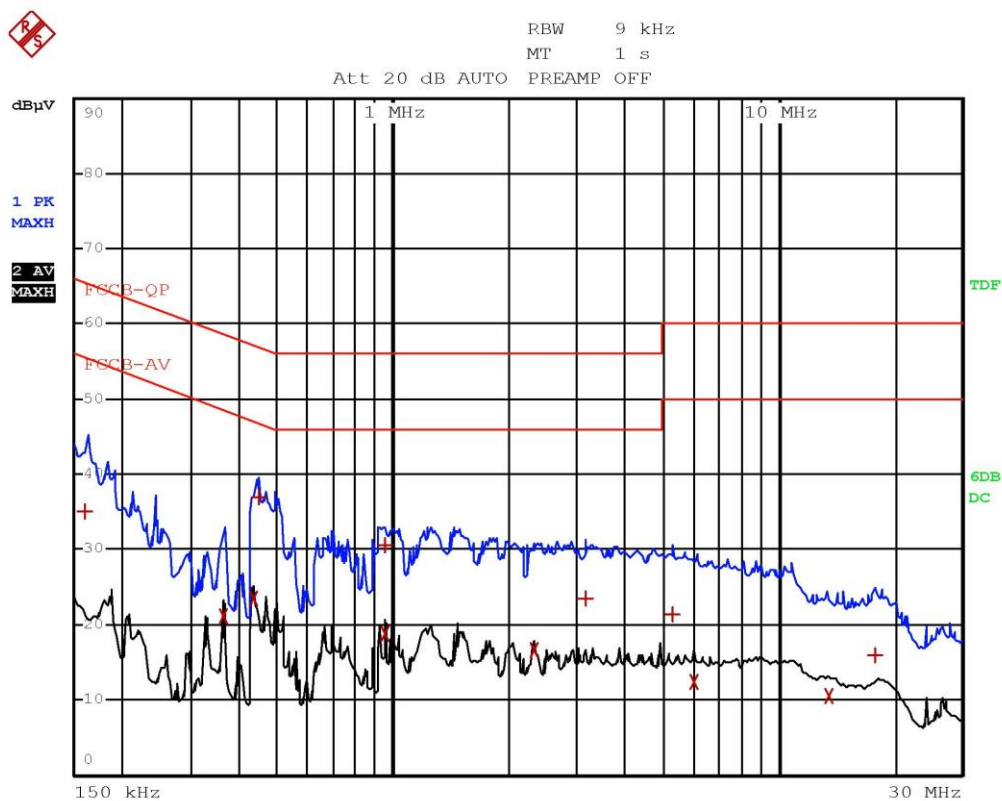
Panozzo 212324A42 Line N In Funzione Hybrid SF10



Panozzo 212324A43 Line L In Funzione Hybrid SF10

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCCB-QP			
Trace2:	FCCB-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB	
1 Quasi Peak	154 kHz	37.90	-27.88	
2 Average	362 kHz	21.24	-27.43	
1 Quasi Peak	442 kHz	38.06	-18.96	
2 Average	442 kHz	24.97	-22.05	
1 Quasi Peak	1.242 MHz	29.05	-26.95	
2 Average	1.242 MHz	19.20	-26.79	
2 Average	2.334 MHz	16.72	-29.27	
1 Quasi Peak	2.37 MHz	27.93	-28.06	
2 Average	5.198 MHz	15.15	-34.84	
1 Quasi Peak	5.274 MHz	25.49	-34.50	
2 Average	13.778 MHz	12.20	-37.79	
1 Quasi Peak	18.038 MHz	18.46	-41.53	

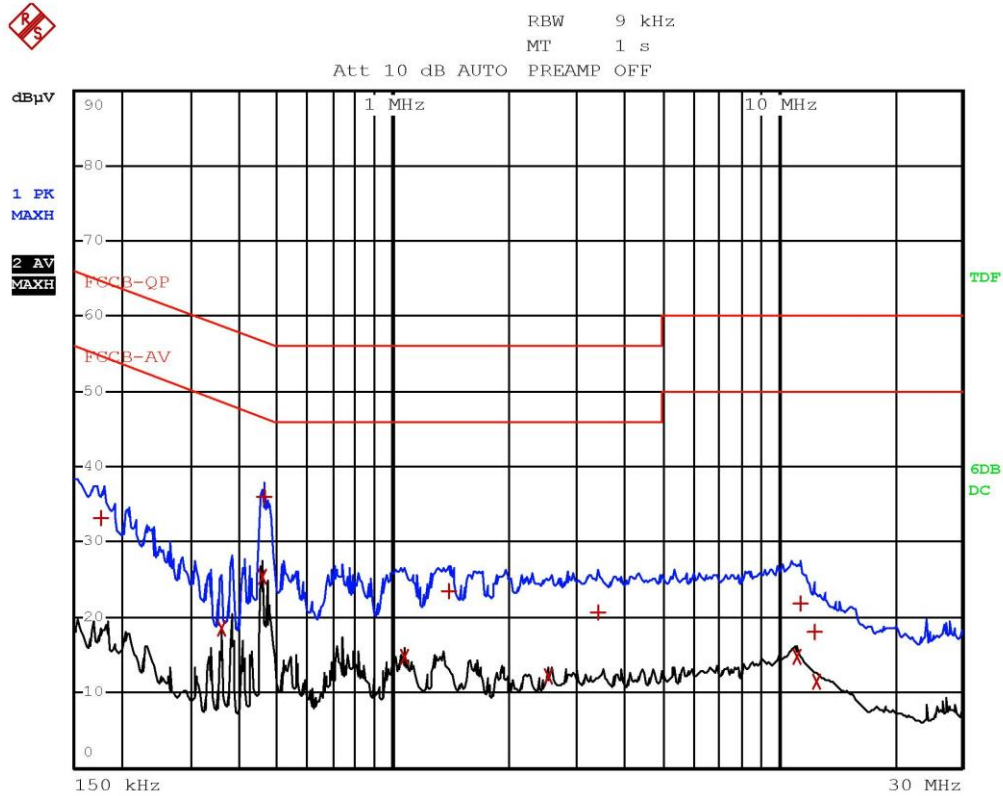
Panozzo 212324A43 Line L In Funzione Hybrid SF10



Panozzo 212324A44 Line L In Funzione Hybrid SF7

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCCB-QP			
Trace2:	FCCB-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB	
1 Quasi Peak	162 kHz	35.01	-30.34	
2 Average	362 kHz	21.19	-27.48	
2 Average	434 kHz	23.54	-23.62	
1 Quasi Peak	446 kHz	36.91	-20.03	
1 Quasi Peak	958 kHz	30.65	-25.34	
2 Average	958 kHz	18.68	-27.31	
2 Average	2.33 MHz	16.55	-29.44	
1 Quasi Peak	3.166 MHz	23.53	-32.46	
1 Quasi Peak	5.318 MHz	21.43	-38.56	
2 Average	6.034 MHz	12.50	-37.49	
2 Average	13.558 MHz	10.44	-39.56	
1 Quasi Peak	17.886 MHz	16.00	-43.99	

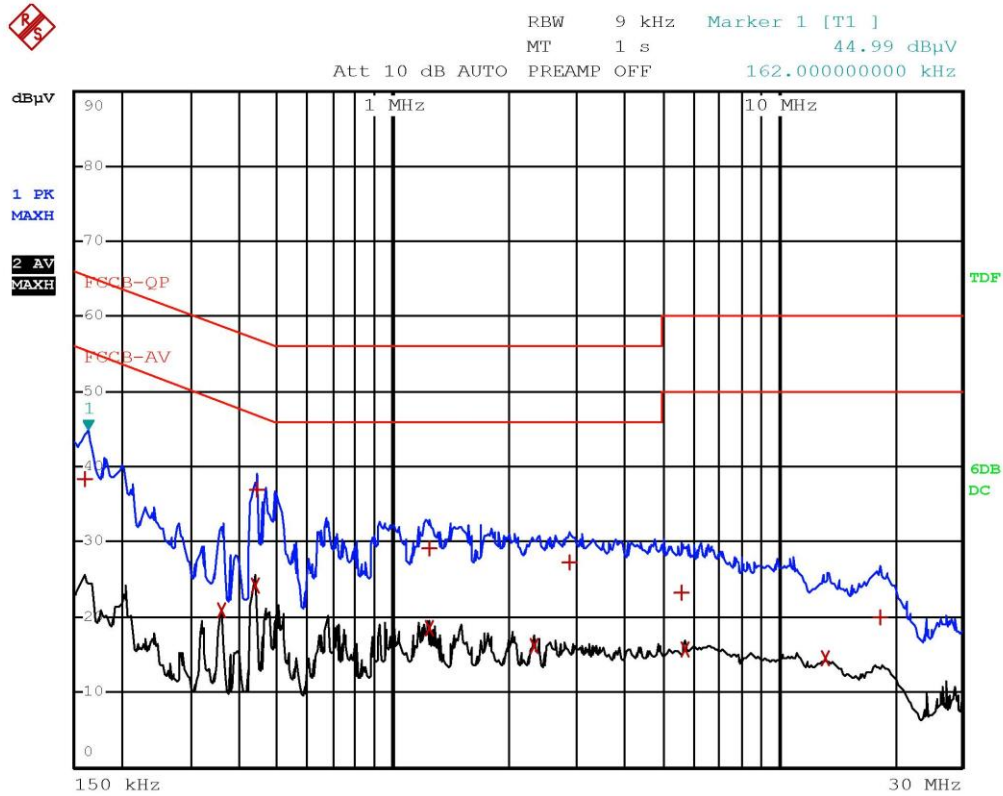
Panozzo 212324A44 Line L In Funzione Hybrid SF7



Panozzo 212324A45 Line N In Funzione Hybrid SF7

EDIT PEAK LIST (Final Measurement Results)			
Trace1:	FCCB-QP		
Trace2:	FCCB-AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1 Quasi Peak	178 kHz	33.21	-31.35
2 Average	358 kHz	18.55	-30.22
2 Average	458 kHz	25.39	-21.33
1 Quasi Peak	462 kHz	36.11	-20.54
2 Average	1.07 MHz	14.79	-31.20
1 Quasi Peak	1.406 MHz	23.56	-32.43
2 Average	2.546 MHz	12.13	-33.86
1 Quasi Peak	3.422 MHz	20.61	-35.38
2 Average	11.182 MHz	14.70	-35.29
1 Quasi Peak	11.422 MHz	21.82	-38.17
1 Quasi Peak	12.486 MHz	18.06	-41.93
2 Average	12.634 MHz	11.45	-38.54

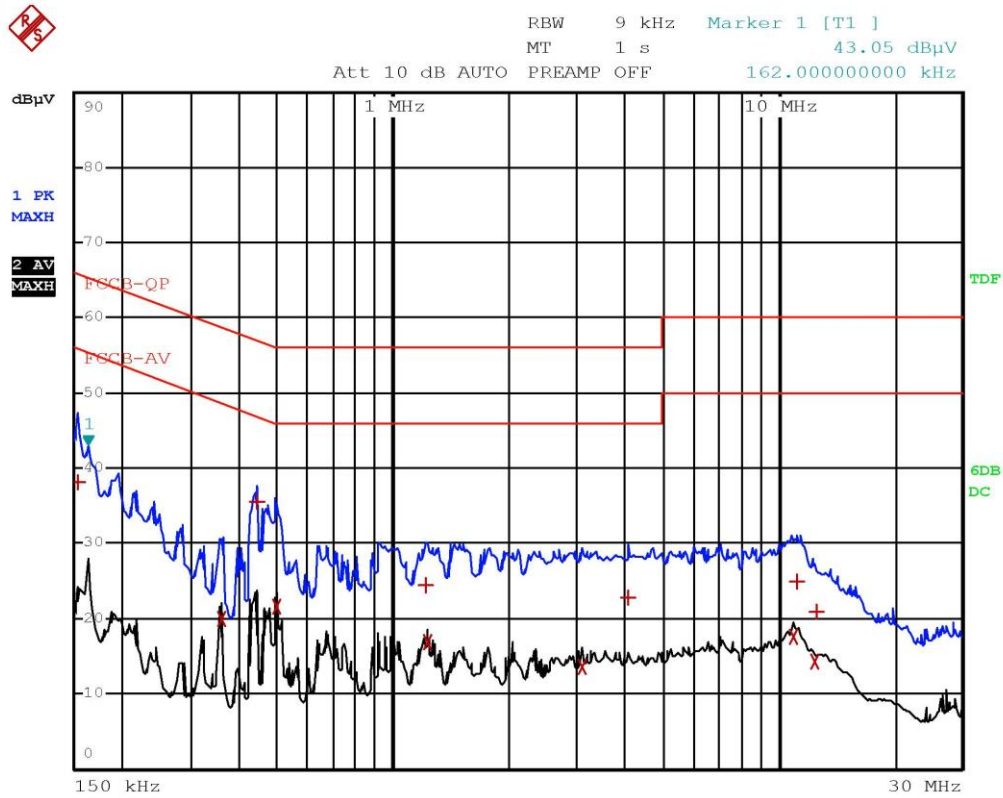
Panozzo 212324A45 Line N In Funzione Hybrid SF7



Panozzo 212324A46 Line N DTS SF12

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCCB-QP			
Trace2:	FCCB-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBpV	DELTA LIMIT dB	
1 Quasi Peak	162 kHz	38.50	-26.85	
2 Average	358 kHz	20.93	-27.84	
2 Average	438 kHz	24.26	-22.83	
1 Quasi Peak	442 kHz	36.90	-20.11	
1 Quasi Peak	1.246 MHz	29.16	-26.83	
2 Average	1.246 MHz	18.54	-27.45	
2 Average	2.33 MHz	16.17	-29.82	
1 Quasi Peak	2.89 MHz	27.25	-28.74	
1 Quasi Peak	5.618 MHz	23.22	-36.78	
2 Average	5.746 MHz	15.74	-34.25	
2 Average	13.238 MHz	14.43	-35.56	
1 Quasi Peak	18.33 MHz	19.93	-40.07	

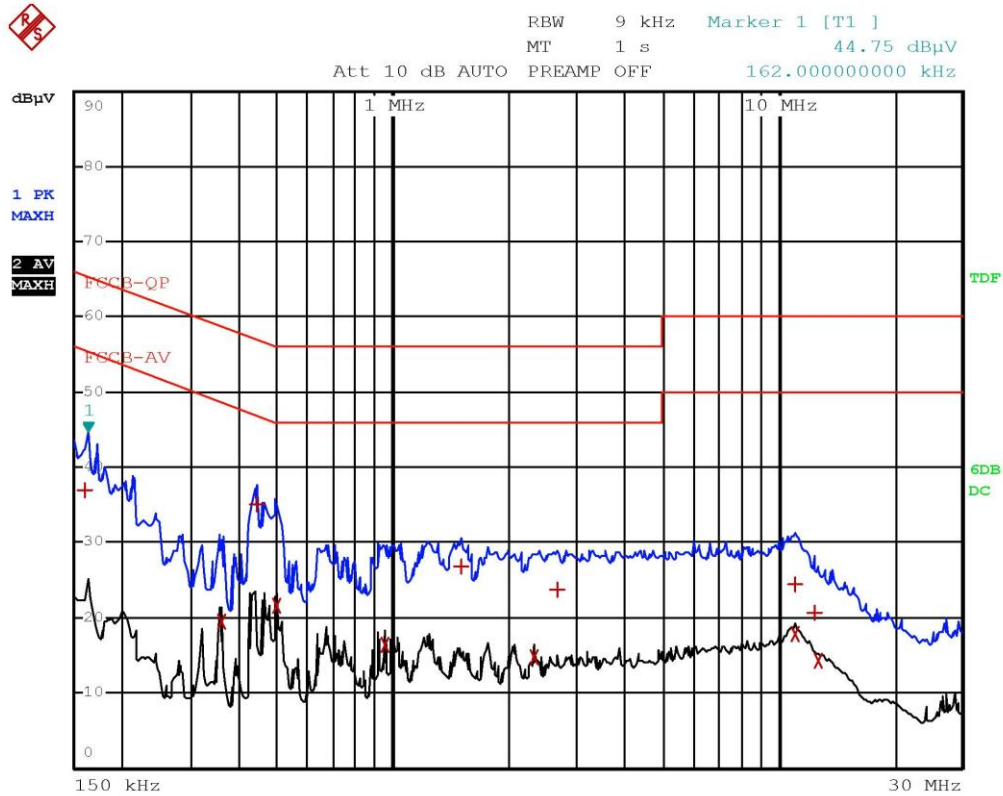
Panozzo 212324A46 Line N DTS SF12



Panozzo 212324A47 Line L DTS SF12

EDIT PEAK LIST (Final Measurement Results)			
Trace1:	FCCB-QP		
Trace2:	FCCB-AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1 Quasi Peak	154 kHz	38.14	-27.63
2 Average	358 kHz	19.91	-28.85
1 Quasi Peak	442 kHz	35.58	-21.44
2 Average	498 kHz	21.63	-24.40
1 Quasi Peak	1.218 MHz	24.50	-31.49
2 Average	1.238 MHz	16.79	-29.20
2 Average	3.11 MHz	13.69	-32.30
1 Quasi Peak	4.07 MHz	22.81	-33.18
2 Average	10.958 MHz	17.51	-32.48
1 Quasi Peak	11.218 MHz	24.88	-35.11
2 Average	12.482 MHz	14.30	-35.69
1 Quasi Peak	12.586 MHz	20.80	-39.19

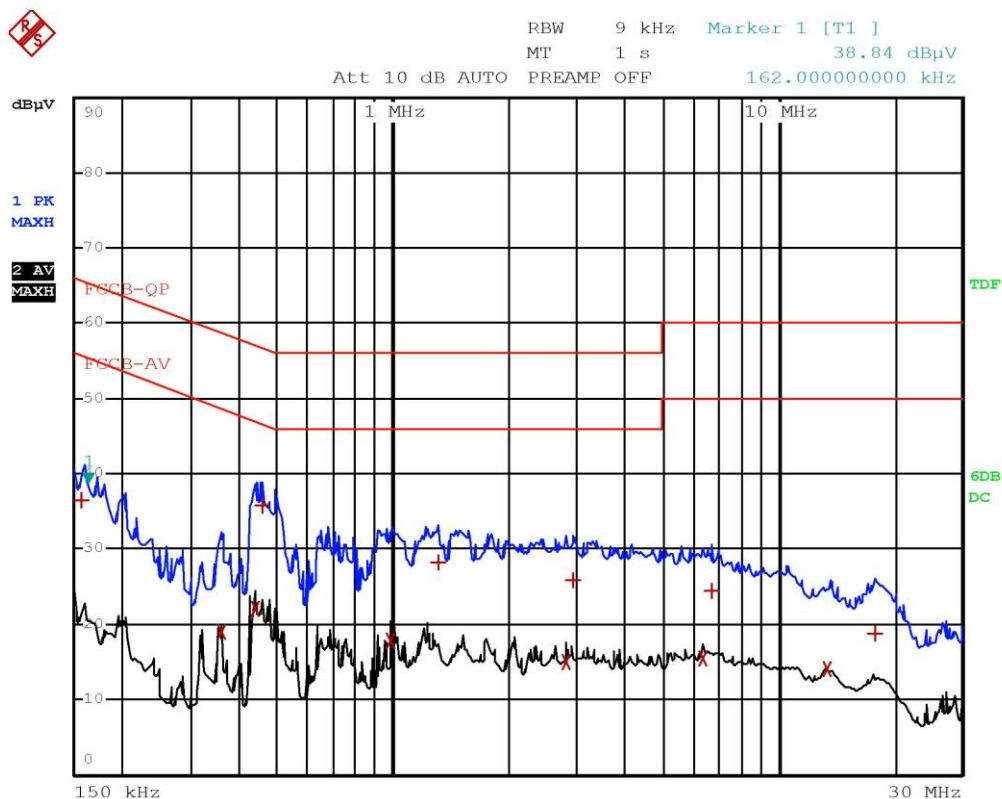
Panozzo 212324A47 Line L DTS SF12



Panozzo 212324A48 Line L DTS SF07

EDIT PEAK LIST (Final Measurement Results)				
Trace1:		FCCB-QP		
Trace2:		FCCB-AV		
Trace3:		---		
TRACE		FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1	Quasi Peak	162 kHz	36.89	-28.46
2	Average	358 kHz	19.44	-29.32
1	Quasi Peak	442 kHz	35.05	-21.97
2	Average	498 kHz	21.57	-24.45
2	Average	958 kHz	16.37	-29.62
1	Quasi Peak	1.506 MHz	26.78	-29.21
2	Average	2.326 MHz	14.72	-31.27
1	Quasi Peak	2.686 MHz	23.74	-32.25
1	Quasi Peak	11.042 MHz	24.48	-35.51
2	Average	11.13 MHz	17.72	-32.27
1	Quasi Peak	12.418 MHz	20.67	-39.32
2	Average	12.71 MHz	14.38	-35.61

Panozzo 212324A48 Line L DTS SF07



Panozzo 212324A49 Line N DTS SF07

EDIT PEAK LIST (Final Measurement Results)				
Trace1:		FCCB-QP		
Trace2:		FCCB-AV		
Trace3:		---		
TRACE		FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1	Quasi Peak	158 kHz	36.57	-28.99
2	Average	358 kHz	19.00	-29.77
2	Average	438 kHz	22.01	-25.08
1	Quasi Peak	458 kHz	35.90	-20.82
2	Average	990 kHz	17.88	-28.11
1	Quasi Peak	1.318 MHz	28.29	-27.70
2	Average	2.826 MHz	15.01	-30.98
1	Quasi Peak	2.942 MHz	25.76	-30.23
2	Average	6.374 MHz	15.57	-34.42
1	Quasi Peak	6.698 MHz	24.46	-35.53
2	Average	13.422 MHz	13.96	-36.03
1	Quasi Peak	17.806 MHz	18.83	-41.16

Panozzo 212324A49 Line N DTS SF07

9.3 Emissions in restricted frequency bands and in unrestricted frequency bands

Tested by	C. Panozzo	
Test date	22.10.2021	
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 m for frequencies below 1 GHz 3 m for frequencies above 1 GHz	
Supplementary information	--	

Acceptance limits

Acceptance limits for emissions in restricted frequency bands ($f < 1000$ MHz)		
Frequency range (MHz)	Test distance (m)	Limits [dB(μ V/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

Acceptance limits for emissions in restricted frequency bands ($f \geq 1000$ MHz)			
Frequency (MHz)	Test distance (m)	AV limits [dB(μ V/m)]	Peak limits [dB(μ V/m)]
> 1000	3	54	74

The restricted frequency bands are listed in the following table

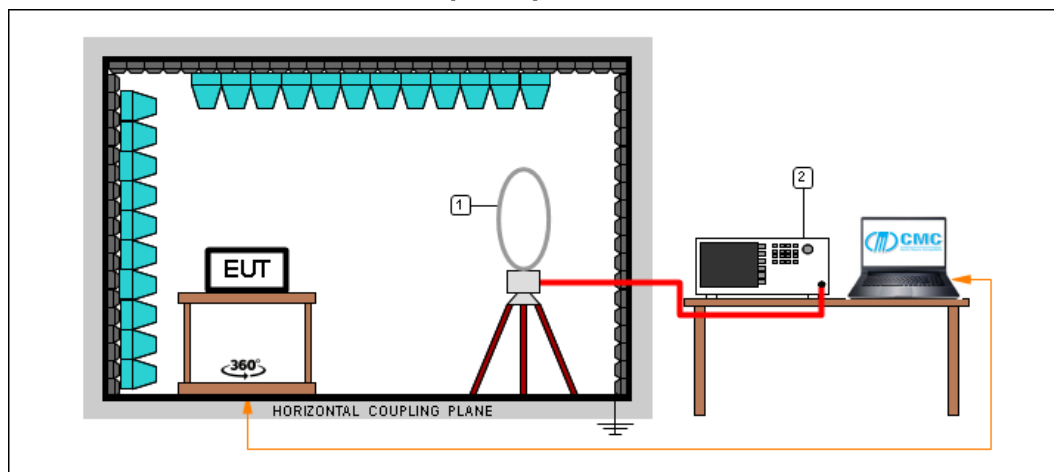
MHz	MHz	MHz	GHz
0,090 – 0,110	16,42 – 16,423	399,9 – 410	4,5 – 5,15
0,495 – 0,505	16,69475 – 16,69525	608 – 614	5,35 – 5,46
2,1735 – 2,1905	16,80425 – 16,80475	960 – 1240	7,25 – 7,75
4,125 – 4,128	25,5 – 25,67	1300 – 1427	8,025 – 8,5
4,17725 – 4,17775	37,5 – 38,25	1435 – 1626,5	9,0 – 9,2
4,20725 – 4,20775	73 – 74,6	1645,5 – 1646,5	9,3 – 9,5
6,215 – 6,218	74,8 – 75,2	1660 – 1710	10,6 – 12,7
6,26775 – 6,26825	108 – 121,94	1718,8 – 1722,2	13,25 – 13,4
6,31175 – 6,31225	123 – 138	2200 – 2300	14,47 – 14,5
8,291 – 8,294	149,9 – 150,05	2310 – 2390	15,35 – 16,2
8,362 – 8,366	156,52475 – 156,52525	2483,5 – 2500	17,7 – 21,4
8,37625 – 8,38675	156,7 – 156,9	2690 – 2900	22,01 – 23,12
8,41425 – 8,41475	162,0125 – 167,17	3260 – 3267	23,6 – 24,0
12,29 – 12,293	167,72 – 173,2	3332 – 3339	31,2 – 31,8
12,51975 – 12,52025	240 – 285	3345,8 – 3358	36,43 – 36,5
12,57675 – 12,57725	322 – 335,4	3600 – 4400	Above 38,6
13,36 – 13,41			

Acceptance limits for emissions in non-restricted frequency bands

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Test setup

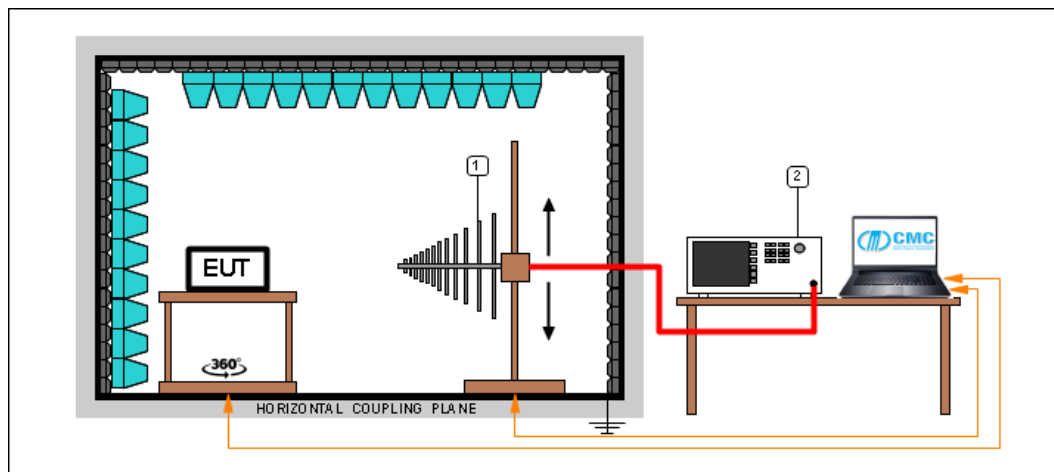
Frequency ≤ 30 MHz



Test setup PE004_01

Nr.	Id. Number	Manufacturer	Model	Description
2	CMC S353	Rohde & Schwarz	ESW26	EMI Test Receiver 1 Hz - 26.5 GHz
1	CMC S127	Schaffner	HLA6120	Loop Antenna 9kHz - 30MHz

Frequency ≤ 1 GHz



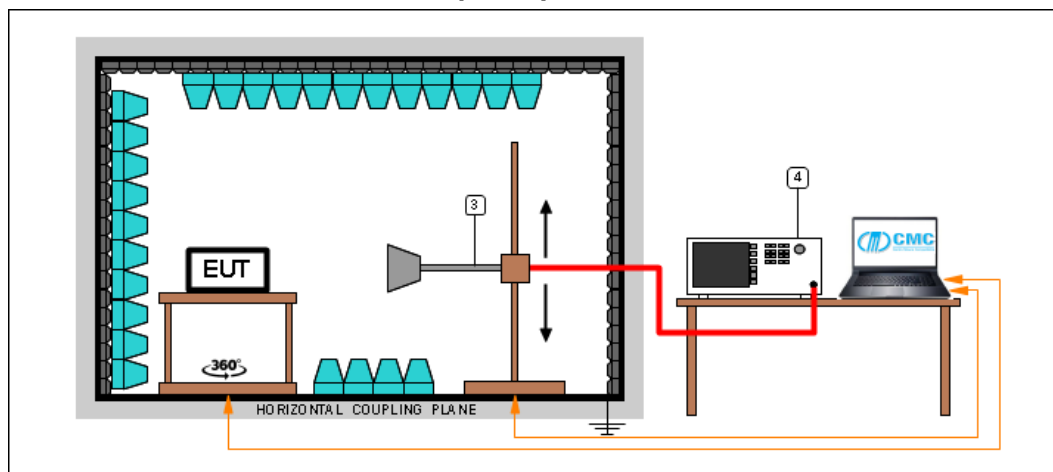
Test setup PE004_02

Nr.	Id. Number	Manufacturer	Model	Description
2	CMC S353	Rohde & Schwarz	ESW26	EMI Test Receiver 1 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 S353	Rohde & Schwarz	ESW26	EMI Test Receiver 1 Hz - 26.5 GHz
1	CMC S287	Schwarzbeck	VUSLP 9111B	Broadband Antenna

Frequency > 1 GHz



Test setup PE004_04

Nr.	Id. Number	Manufacturer	Model	Description
4	CMC S353	Rohde & Schwarz	ESW26	EMI Test Receiver 1 Hz - 26.5 GHz
3	CMC S108	Emco	3115	Waveguide antenna

Test setup PE004_05

Nr.	Id. Number	Manufacturer	Model	Description
4	CMC S353	Rohde & Schwarz	ESW26	EMI Test Receiver 1 Hz - 26.5 GHz
3	CMC S290	Schwarzbeck	BBHA 9170	Horn Antenna (15-40 GHz)

Result – LoRa 125 kHz, spread factor 10

Transmission channel (MHz)	Polarization	Frequency Range (MHz)	Graphs	Result
903,90	V	1000 – 9500	G21232421	P
903,90	H	1000 – 9500	G21232422	P
904,50	H	1000 – 9500	G21232423	P
904,50	V	1000 – 9500	G21232424	P
905,30	V	1000 – 9500	G21232425	P
905,30	H	1000 – 9500	G21232426	P
903,90	H	300 – 1000	G21232445	P
903,90	V	300 – 1000	G21232446	P
904,50	V	300 – 1000	G21232447	P
904,50	H	300 – 1000	G21232448	P
905,30	H	300 – 1000	G21232449	P
905,30	V	300 – 1000	G21232450	P
Worst case	V	30 – 300	G212324A50	P
Worst case	H	30 – 300	G212324A51	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 $40\log(\text{test distance}/10)$ 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 $20\log(\text{test distance}/10)$ based on the measuring distance provided by the standard.

Peaks above the limits are caused by the nominal transmitting frequencies

Result – LoRa 125 kHz, spread factor 7

<i>Transmission channel (MHz)</i>	<i>Polarization</i>	<i>Frequency Range (MHz)</i>	<i>Graphs</i>	<i>Result</i>
903,90	V	1000 – 9500	G21232415	P
903,90	H	1000 – 9500	G21232416	P
904,50	H	1000 – 9500	G21232417	P
904,50	V	1000 – 9500	G21232418	P
905,30	V	1000 – 9500	G21232419	P
905,30	H	1000 – 9500	G21232420	P
903,90	V	300 – 1000	G21232439	P
903,90	H	300 – 1000	G21232440	P
904,50	H	300 – 1000	G21232441	P
904,50	V	300 – 1000	G21232442	P
905,30	V	300 – 1000	G21232443	P
905,30	H	300 – 1000	G21232444	P
Worst case	H	30 – 300	G212324A52	P
Worst case	V	30 – 300	G212324A53	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 $40\log(\text{test distance}/10)$ 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 $20\log(\text{test distance}/10)$ based on the measuring distance provided by the standard.

Peaks above the limits are caused by the nominal transmitting frequencies

Result – LoRa 500 kHz, spread factor 12

<i>Transmission channel (MHz)</i>	<i>Polarization</i>	<i>Frequency Range (MHz)</i>	<i>Graphs</i>	<i>Result</i>
923,30	V	1000 – 10000	G21232409	P
923,30	H	1000 – 10000	G21232410	P
925,00	H	1000 – 10000	G21232411	P
925,00	V	1000 – 10000	G21232412	P
927,50	V	1000 – 10000	G21232413	P
927,50	H	1000 – 10000	G21232414	P
923,30	H	300 – 1000	G21232433	P
923,30	V	300 – 1000	G21232434	P
925,00	V	300 – 1000	G21232435	P
925,00	H	300 – 1000	G21232436	P
927,50	H	300 – 1000	G21232437	P
927,50	V	300 – 1000	G21232438	P
Worst case	H	30 – 300	G212324A56	P
Worst case	V	30 – 300	G212324A57	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 $40\log(\text{test distance}/10)$ 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 $20\log(\text{test distance}/10)$ based on the measuring distance provided by the standard.

Peaks above the limits are caused by the nominal transmitting frequencies

Result – LoRa 500 kHz, spread factor 7

<i>Transmission channel (MHz)</i>	<i>Polarization</i>	<i>Frequency Range (MHz)</i>	<i>Graphs</i>	<i>Result</i>
923,30	H	1000 – 10000	G21232403	P
923,30	V	1000 – 10000	G21232404	P
925,00	V	1000 – 10000	G21232405	P
925,00	H	1000 – 10000	G21232406	P
927,50	H	1000 – 10000	G21232407	P
927,50	V	1000 – 10000	G21232408	P
923,30	V	300 – 1000	G21232427	P
923,30	H	300 – 1000	G21232428	P
925,00	H	300 – 1000	G21232429	P
925,00	V	300 – 1000	G21232430	P
927,50	V	300 – 1000	G21232431	P
927,50	H	300 – 1000	G21232432	P
Worst case	V	30 – 300	G212324A54	P
Worst case	H	30 – 300	G212324A55	P

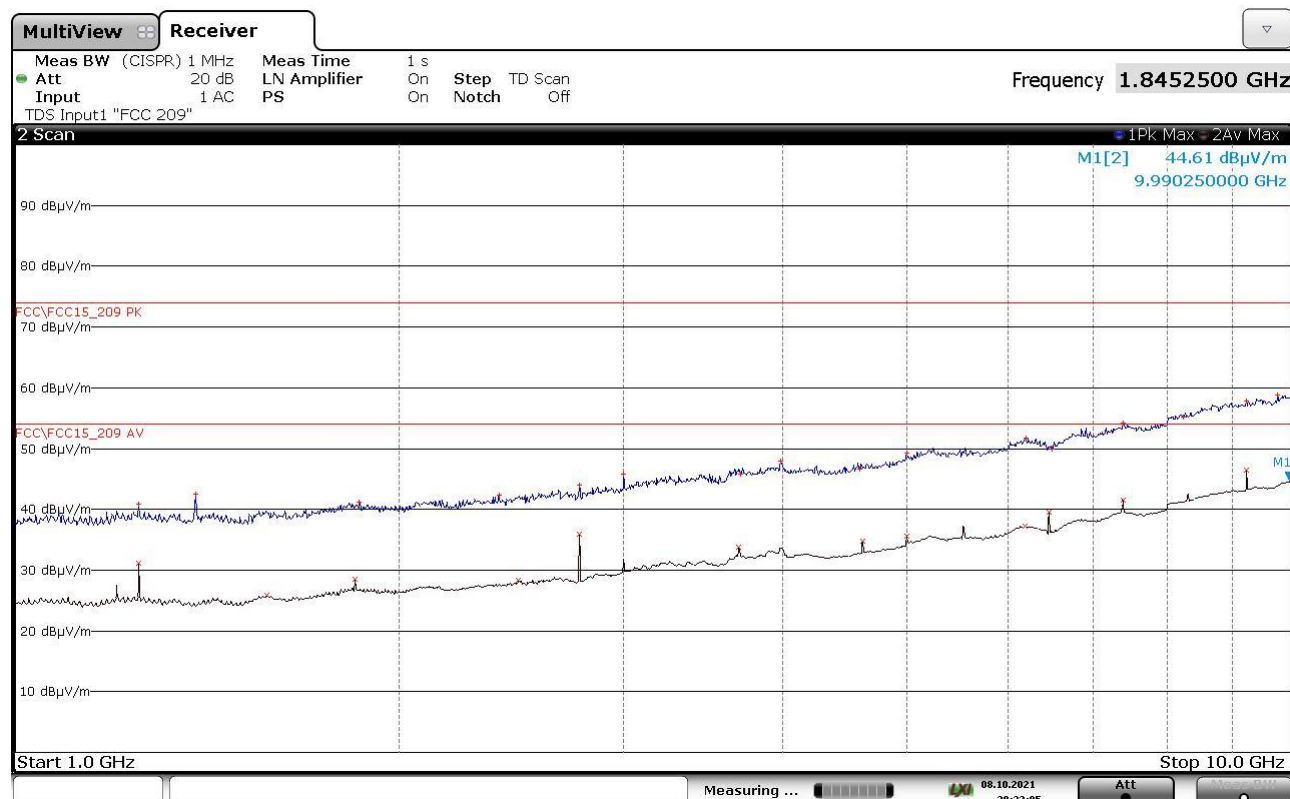
Remarks: EUT was tested in 3 orthogonal planes, graphs are related to the highest detected levels. Measurements at frequencies lower than 30 MHz have been performed with an EUT – antenna distance of 10 m. Measured values have been corrected with conversion factor $40\log(\text{test distance}/10)$ based 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 $20\log(\text{test distance}/10)$ 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

Graphs

Panozzo 21232403 Ant Horiz EUT Vert In Funzione Fmin


FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
1250000000	+40,86	-33,12	1250000000	+31,16	-22,82
1384250000	+42,54	-31,44	1574500000	+25,86	-28,12
1861000000	+41,19	-32,79	1846500000	+28,42	-25,56
2393750000	+42,36	-31,62	2481500000	+28,26	-25,72
2770000000	+43,94	-30,04	2770000000	+35,84	-18,14
2998500000	+45,77	-28,21	3693250000	+33,72	-20,26
3706000000	+45,84	-28,14			
3981000000	+47,89	-26,09			

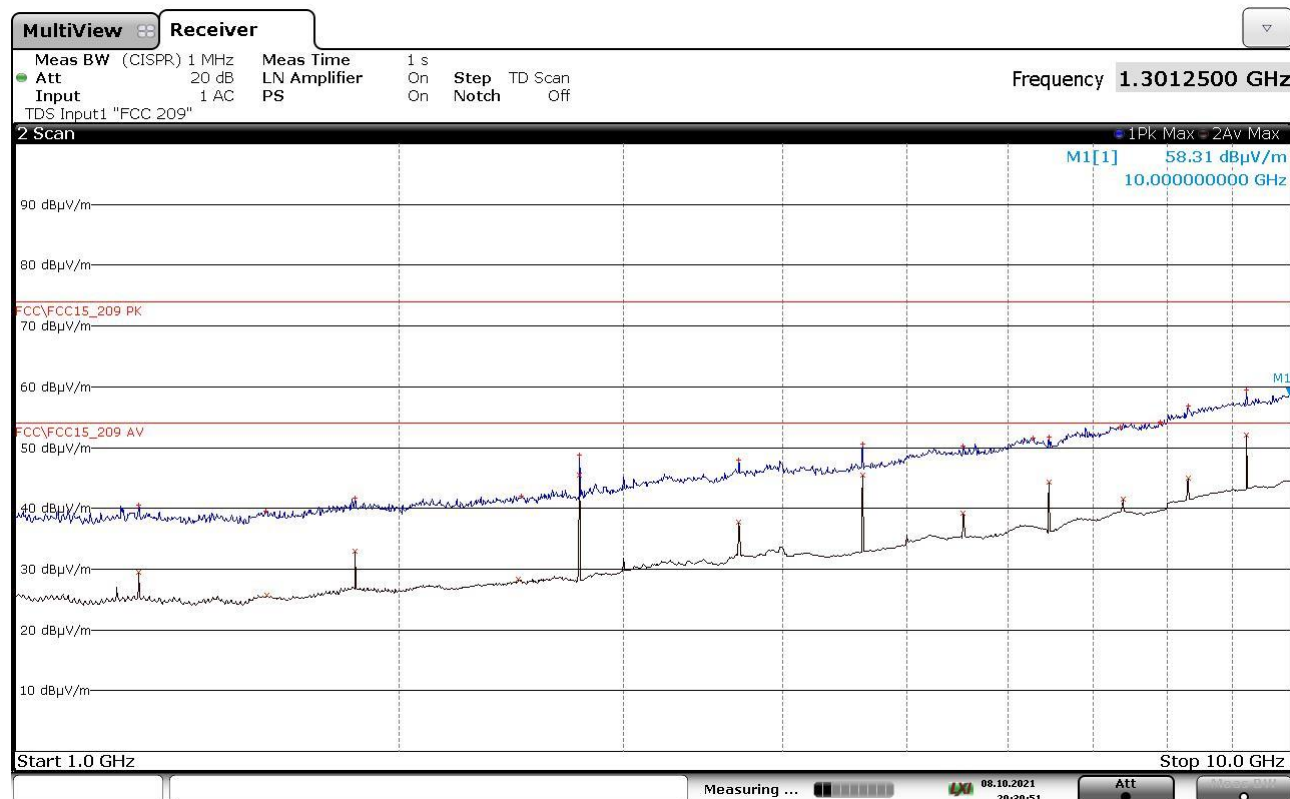
21232403_2

FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
4591500000	+46,69	-27,29	4616500000	+34,82	-19,16
4998500000	+49,27	-24,71	4999750000	+35,57	-18,41
6199500000	+51,67	-22,31	6187250000	+37,25	-16,73
6505000000	+49,94	-24,04	6463000000	+39,56	-14,42
7394000000	+54,15	-19,83	7386500000	+41,48	-12,50
8233750000	+55,23	-18,75	9233000000	+46,53	-7,45
9233000000	+57,82	-16,16			
9771750000	+58,76	-15,22			

21232403_2

Panozzo 21232404 Ant Vert EUT Vert In Funzione Emin

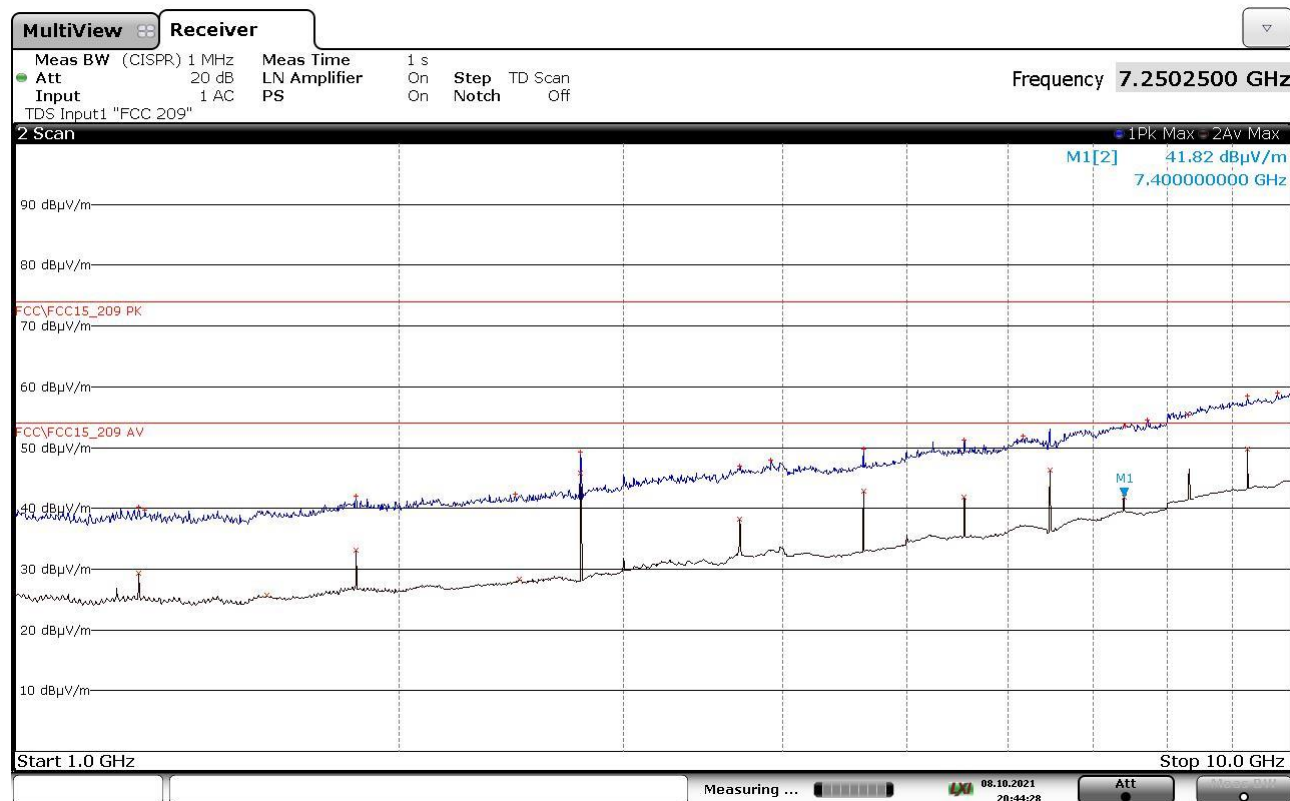


FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
1250250000	+40,55	-33,43	1250000000	+29,45	-24,53
1570500000	+39,50	-34,48	1575000000	+25,70	-28,28
1846750000	+41,68	-32,30	1846500000	+32,96	-21,02
2493250000	+42,01	-31,97	2481500000	+28,26	-25,72
2770000000	+48,79	-25,19	2770000000	+45,49	-8,49
3693500000	+47,89	-26,09	3693250000	+37,78	-16,20
4616500000	+50,65	-23,33	4616500000	+45,44	-8,54
5539500000	+50,18	-23,80	5539750000	+39,24	-14,74
6287250000	+51,64	-22,34	6463000000	+44,32	-9,66
6463250000	+51,78	-22,20	7386500000	+41,50	-12,48
7355250000	+53,31	-20,67	8309750000	+45,02	-8,96
7901000000	+54,17	-19,81	9233000000	+52,11	-1,87
8309750000	+56,78	-17,20			
9233000000	+59,54	-14,44			

21232404_2

Panozzo 21232405 Ant Vert EUT Vert In Funzione Fmed

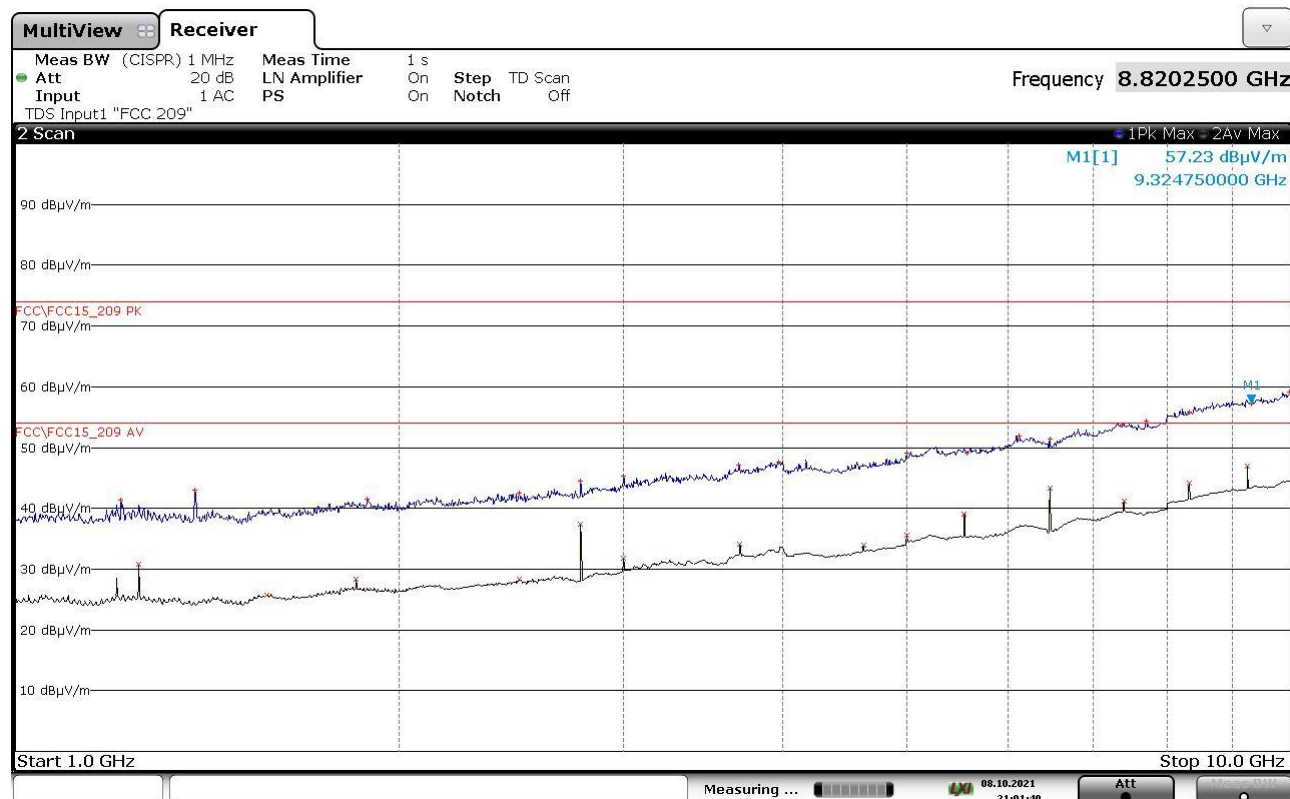


FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
1250000000	+40,24	-33,74	1250000000	+29,36	-24,62
1263000000	+39,78	-34,20	1574250000	+25,68	-28,30
1850000000	+42,05	-31,93	1850000000	+33,15	-20,83
2465750000	+42,34	-31,64	2482000000	+28,27	-25,71
2775000000	+49,28	-24,70	2775000000	+45,74	-8,24
3700000000	+46,95	-27,03	3700000000	+38,27	-15,71
3914250000	+48,01	-25,97	4625000000	+42,86	-11,12
4625000000	+49,68	-24,30	5550000000	+41,77	-12,21
5550000000	+51,18	-22,80	6475000000	+46,30	-7,68
6166000000	+51,85	-22,13	7400000000	+41,82	-12,16
7420000000	+53,53	-20,45	9250000000	+49,69	-4,29
7726000000	+54,49	-19,49			
8311750000	+55,29	-18,69			
9250000000	+58,51	-15,47			
9771750000	+58,95	-15,03			

21232405_2

Panozzo 21232406 Ant Horiz EUT Vert In Funzione Fmed



FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
1209750000	+41,41	-32,57	1250000000	+30,73	-23,25
1383000000	+43,05	-30,93	1575500000	+25,78	-28,20
1887750000	+41,44	-32,54	1850000000	+28,41	-25,57
2483250000	+42,46	-31,52	2481750000	+28,28	-25,70
2775000000	+44,42	-29,56	2775000000	+37,36	-16,62
2999500000	+45,36	-28,62	2998250000	+31,83	-22,15
3694000000	+47,17	-26,81	3700000000	+34,05	-19,93
3966000000	+47,61	-26,37			

21232406_2

FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
4999250000	+49,02	-24,96	4625000000	+33,98	-20,00
5579500000	+49,07	-24,91	4999750000	+35,58	-18,40
6126250000	+51,92	-22,06	5550000000	+39,11	-14,87
6475000000	+51,36	-22,62	6475000000	+43,28	-10,70
7381750000	+53,74	-20,24	7400000000	+41,25	-12,73
7705250000	+54,33	-19,65	8325000000	+44,23	-9,75
8325000000	+55,87	-18,11	9250000000	+46,95	-7,03
9324750000	+57,23	-16,75			

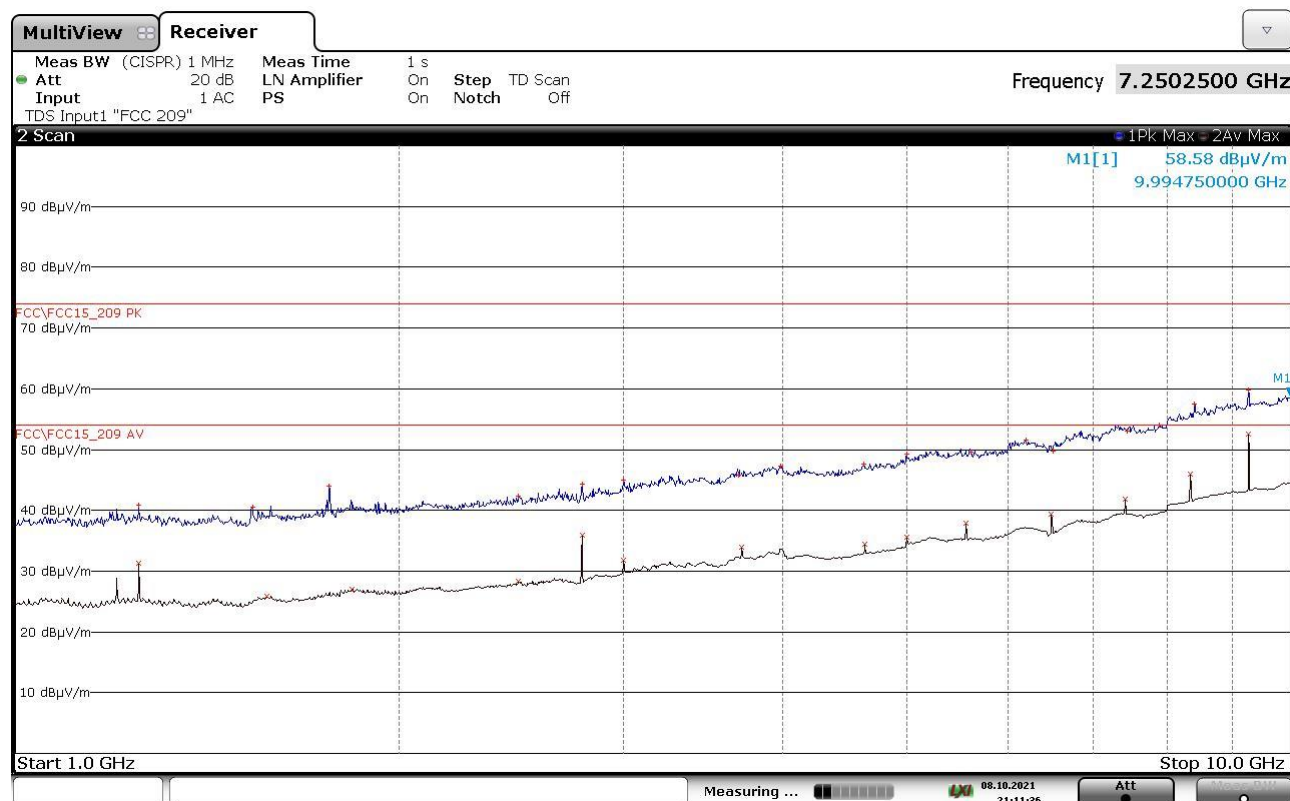
21232406_2

FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
9988250000	+59,11	-14,87			

21232406_2

Panozzo 21232407 Ant Horiz EUT Vert In Funzione Fmax



FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
1249750000	+40,88	-33,10	1250000000	+31,22	-22,76
1534250000	+40,50	-33,48	1574750000	+25,85	-28,13
1763000000	+44,00	-29,98	1837750000	+27,05	-26,93
2480000000	+42,32	-31,66	2481500000	+28,26	-25,72
2782500000	+44,38	-29,60	2782500000	+35,94	-18,04
2999250000	+44,93	-29,05	2998250000	+31,81	-22,17
3692250000	+45,78	-28,20	3710000000	+33,88	-20,10
3979500000	+47,34	-26,64			

21232407_2