

TEST REPORT

Nr. R22233901

Federal Communication Commission (FCC)

Report Reference No.	R22233901
Date of issue:	10.01.2023
Total number pages:	51
Customer name	Xylem Service Italia S.r.l.
Address	Via Lombardi, 14 – 36075 Montecchio Maggiore (VI) – Italy
Test specification:	
Standards	FCC Rules & Regulations, Title 47:2021 Part 15 paragraph(s): 203, 204, 205, 207, 209, 215 and 247 Tests details at page 7
Non-standard test method	N/A
Test Report Form No.	15-247_DTS_DEKRA
Test Report Form(s) Originator ...	DEKRA Testing and Certification S.r.l.
Master TRF	2022-12
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 DEKRA Testing and Certification S.r.l.	
(*) Test item description	Variable speed control with Bluetooth® wireless technology for electric motors (on-board installation) HVX+ – size D
(*) Trademark	Xylem
(*) Manufacturer	Xylem Service Italia S.r.l.
(*) Model / Type reference	10534398
(*) FCC ID	2AYCGXSI03
(*) Rating(s)	208 V ~ 60 Hz three-phase + earth
Report	
Tested by (name + signature)	M. Segalla
Approved by (name + signature)	F. Marenda

(*) information provided by the customer

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	7
8	Test conditions.....	9
8.1	General.....	9
9	Test results	10
9.1	Antenna requirements	10
9.2	Emissions in restricted frequency bands and in unrestricted frequency bands	11
9.3	Band edge	39

2 Reference standard	
FCC Rules and Regulation Title 47 part 15:2021	--
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	
DEKRA Testing and Certification 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	10.01.2023	--

Testing and sampling:	
Date of receipt of test item	16.11.2022
Testing start date	05.12.2022
Testing end date	05.12.2022
Sampling procedure	Sample used for testing chosen by the customer; DEKRA Testing and Certification S.r.l. cannot be considered responsible for the selection of the sample
Internal identification	Adhesive label with the product number P221158
General remarks:	
This report shall not be reproduced, except in full, without the written approval of DEKRA Testing and Certification S.r.l. 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	Variable speed control with Bluetooth® wireless technology for electric motors (on-board installation) HVX+ – size D						
Model Number	10534398						
FCC ID	2AYCGXS103						
Serial Number	--						
Brand name	Xylem						
Frequency band	2400 – 2483,5 MHz						
Nominal frequencies	F _L : 2402 MHz		F _M : 2440 MHz		F _H : 2480 MHz		
Test power supply	Voltage and Frequency		Reference poles				
			N	L1	L2	L3	PE
	☒	AC: 208 V, 60 Hz	☐	☒	☒	☒	☒
	☐	AC:	☐	☐	☐	☐	☐
	☐	DC:					☐
Type of equipment	☒ Transmitter unit ☒ Receiver unit						
Type of station	☐ Portable station ☒ Mobile station						
Test arrangements of EUT	<i>Intended operational arrangement(s) of EUT</i>			<i>Test arrangement (see basic standard)</i>			
	☐ Table-top only			Table-top			
	☒ Floor-standing only			Floor-standing			
	☐ Can be floor-standing or table-top			Table-top			
	☐ Rack mounted			In rack or table-top			
	☐ Other, for example wall mounted, ceiling mounted, handheld, body worn			Table-top			
Operating modes	No.	Operating mode of test item					
	1	Running mode at idle, 3100 rpm, radio transmission at maximum output power					
Declination of responsibility	Information relating to the description of the sample, components list and software/hardware version (if reported) are provided by the customer. DEKRA Testing and Certification S.r.l. cannot be considered responsible for these information, for any other document sent by the customer and for any difference between the software version present in the tested sample and that present in the object intended for final sale. In some cases, the software in the tested sample is in a version dedicated exclusively to the test, and therefore does not represent the software installed in the final version of the product.						

6.1 Photos of the test item



7 Verdict summary section

FCC Rules & Regulations, Title 47:2021			
Part 15 paragraph(s): 203, 204, 205, 207, 209, 215 and 247			
Clause	Requirement – Test case	Basic standard	Verdict
Part 15.203	Antenna requirements	--	P
Part 15.207	Conducted emissions	ANSI C63.10	N/E
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	N/E
Part 15.215 (c)	20 dB bandwidth	ANSI C63.10	N/E
Part 15.247 (d)	Band edge	ANSI C63.10	P
Part 15.209 and 15.247	Fundamental emission output power	ANSI C63.10	N/E
Part 15.209 and 15.247	Maximum power spectral density level in the fundamental emission	ANSI C63.10	N/E

Normative references	
Reference no.	Description
FCC Rules and Regulation Title 47 part 15:2021	--
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	M. Segalla	
Test date	05.12.2022	
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	-1,80 dBi	
External R.F. power amplifier.....	Not Present	

9.2 Emissions in restricted frequency bands and in unrestricted frequency bands

Tested by	M. Segalla
Test date	05.12.2022
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	OATS or 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

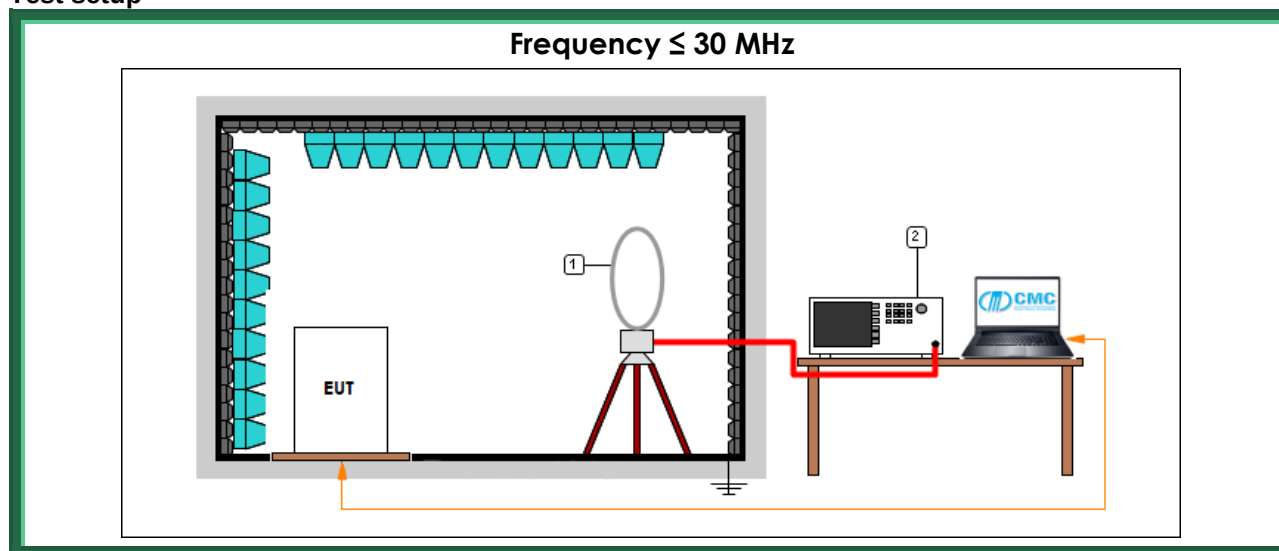
MHz	MHz	MHz	GHz
0,090 – 0,110	16,42 – 16,423	399,9 – 410	4,5 – 5,15
0,495 – 0,505	16,69475 – 16,69525	608 – 614	5,35 – 5,46
2,1735 – 2,1905	16,80425 – 16,80475	960 – 1240	7,25 – 7,75
4,125 – 4,128	25,5 – 25,67	1300 – 1427	8,025 – 8,5
4,17725 – 4,17775	37,5 – 38,25	1435 – 1626,5	9,0 – 9,2
4,20725 – 4,20775	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 (according to ANSI C63.10 cl. 11.11.1)

The DTS rules specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

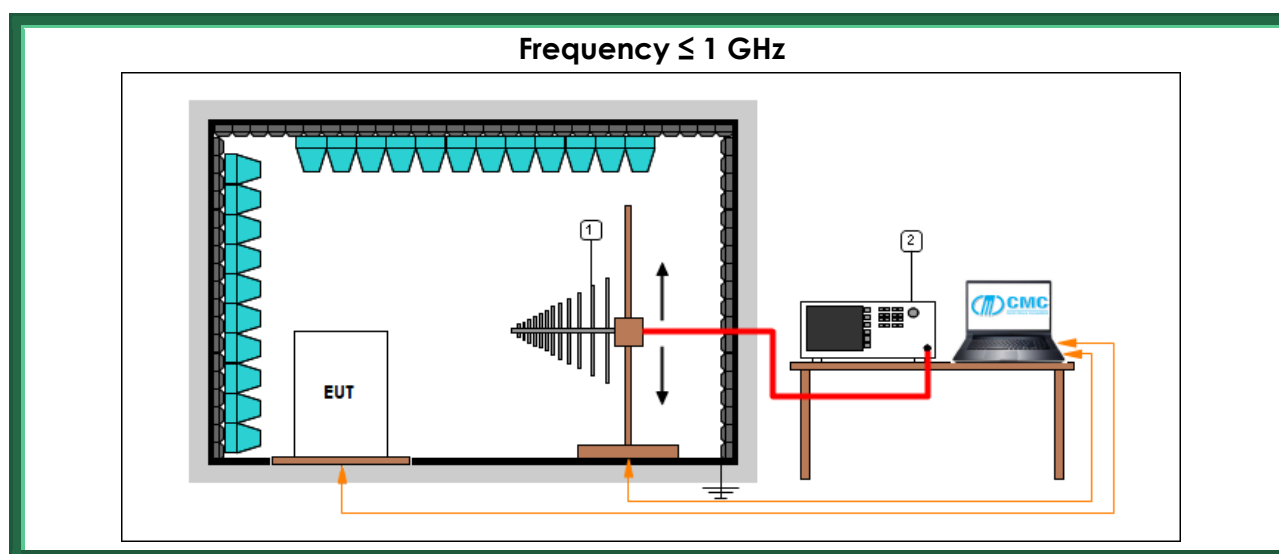
- If the maximum peak conducted output power procedure was used to demonstrate compliance as described in 9.1, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz
- If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz.
- In either case, attenuation to levels below the 15.209 general radiated emissions limits is not required

Test setup



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

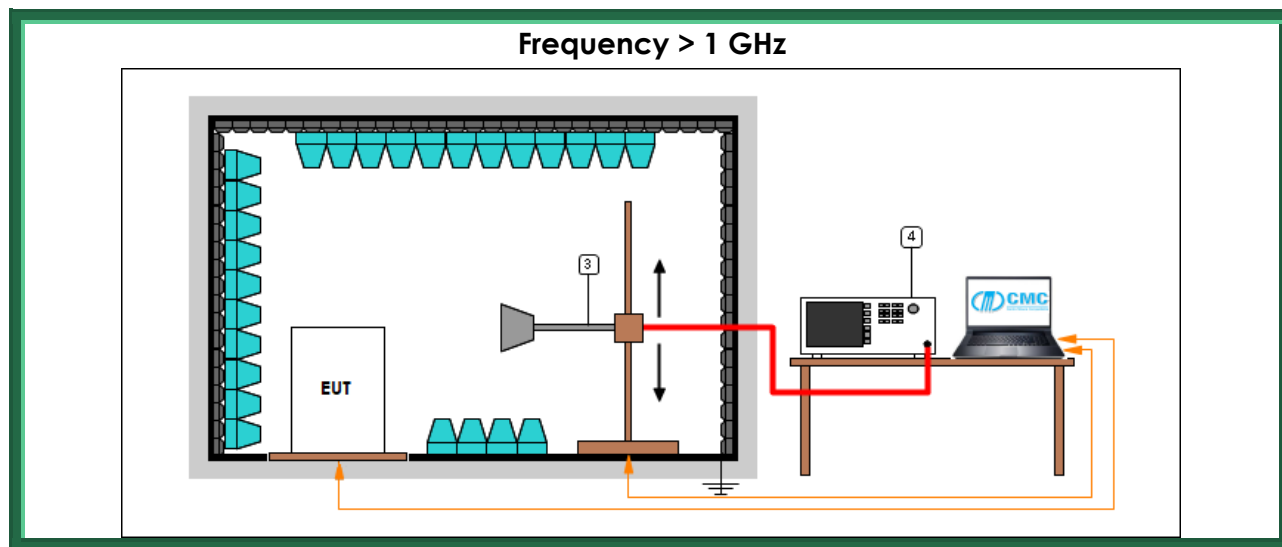


Test setup PE004_02

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



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

Transmission channel	Polarization	Frequency Range (MHz)	Graphs	Verdict
2402 MHz	V	1000 – 3000	G22233901	P
2402 MHz	H	1000 – 3000	G22233902	P
2440 MHz	H	1000 – 3000	G22233903	P
2440 MHz	V	1000 – 3000	G22233904	P
2480 MHz	V	1000 – 3000	G22233905	P
2480 MHz	H	1000 – 3000	G22233906	P
2402 MHz	H	3000 – 18000	G22233911	P
2402 MHz	V	3000 – 18000	G22233912	P
2440 MHz	V	3000 – 18000	G22233913	P
2440 MHz	H	3000 – 18000	G22233914	P
2480 MHz	H	3000 – 18000	G22233915	P
2480 MHz	V	3000 – 18000	G22233916	P
2480 MHz	V	18000 – 26000	G22233917	P
2480 MHz	H	18000 – 26000	G22233918	P
2440 MHz	H	18000 – 26000	G22233919	P
2440 MHz	V	18000 – 26000	G22233920	P
2402 MHz	V	18000 – 26000	G22233921	P
2402 MHz	H	18000 – 26000	G22233922	P
Worst case	V	30 – 300	G22233923	P
Worst case	H	30 – 300	G22233924	P
Worst case	H	300 – 1000	G22233925	P
Worst case	V	300 – 1000	G22233926	P
Worst case	Loop	0,009 – 30	G22233927	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

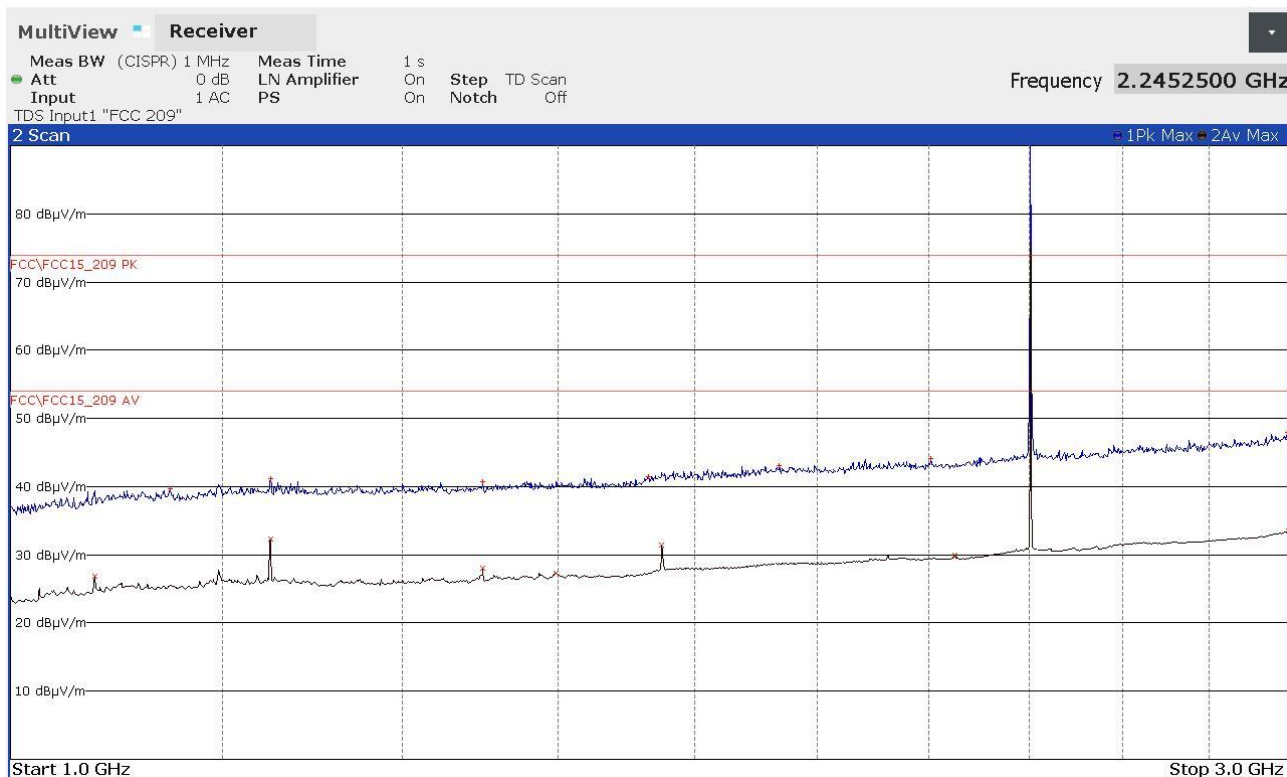
Graphs Legend

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

Segalla 22233901

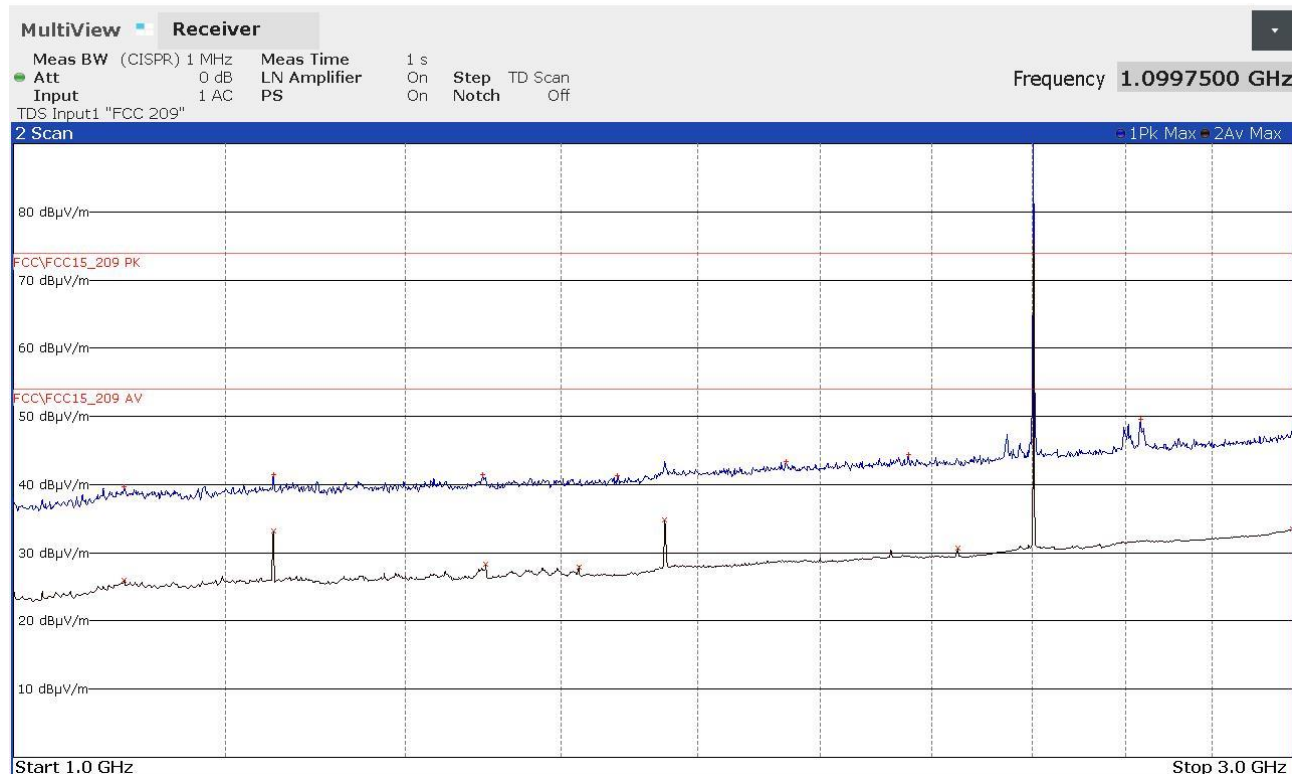


FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
1146750000	+39,67	-14,31	1075000000	+26,88	-47,10
1250000000	+41,13	-12,85	1250000000	+32,28	-41,70
1500000000	+40,75	-13,23	1500000000	+28,09	-45,89
1729750000	+41,49	-12,49	1597250000	+27,36	-46,62
1935500000	+43,02	-10,96	1750000000	+31,45	-42,53
2204750000	+44,12	-9,86	2250000000	+29,99	-43,99
2995750000	+47,89	-6,09	2998250000	+33,43	-40,55

22233901_2

Segalla 22233902

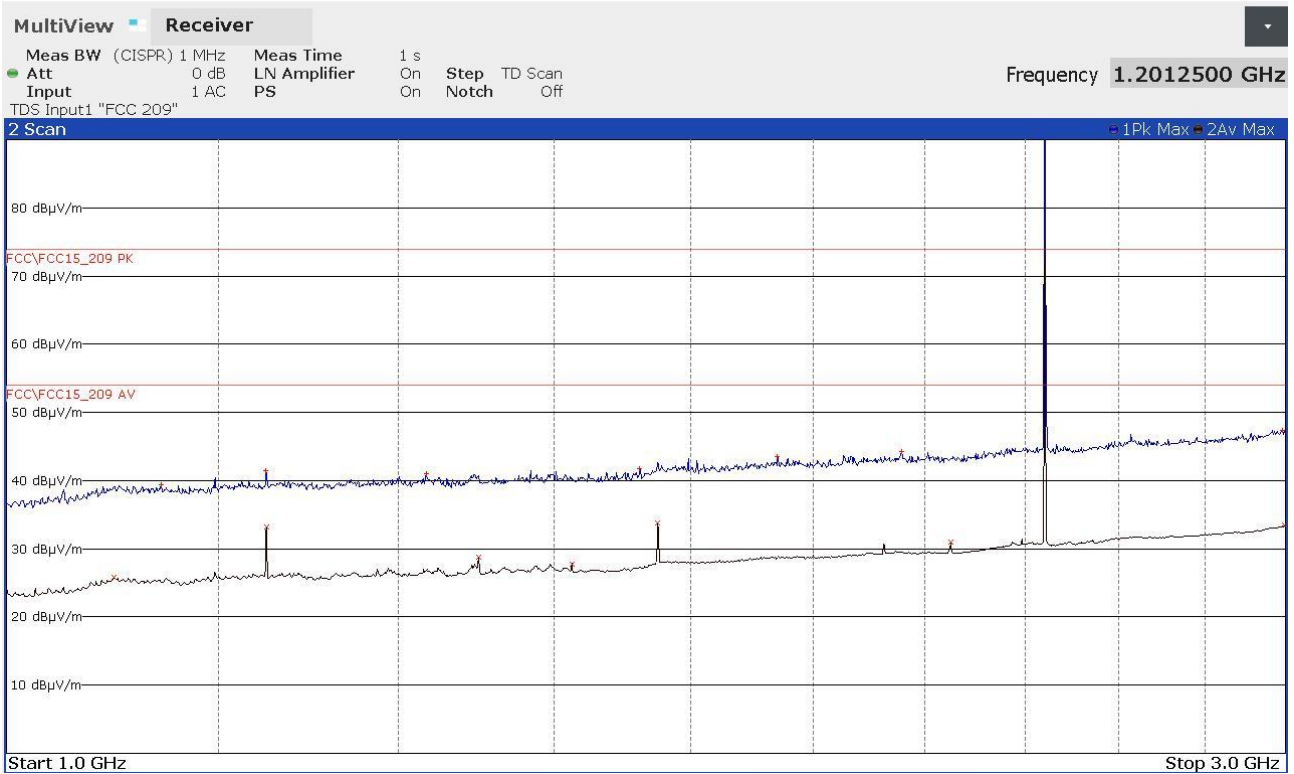


FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
1099750000	+39,67	-14,31	1100000000	+25,97	-48,01
1250000000	+41,49	-12,49	1250000000	+33,17	-40,81
1496500000	+41,41	-12,57	1500000000	+28,34	-45,64
1680500000	+41,30	-12,68	1625000000	+27,88	-46,10
1941500000	+43,43	-10,55	1750000000	+34,82	-39,16
2156750000	+44,36	-9,62	2250000000	+30,71	-43,27
2633000000	+49,62	-4,36	2998750000	+33,42	-40,56

22233902_2

Segalla 22233903

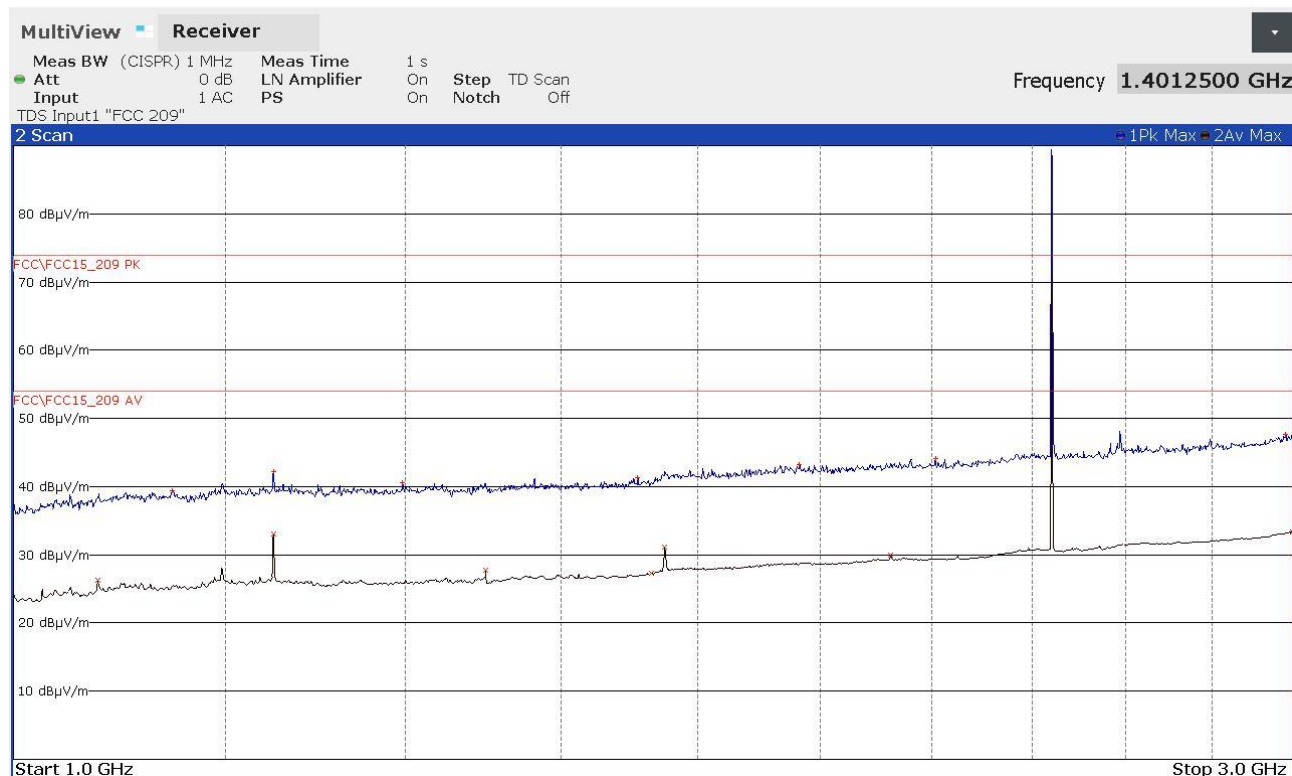


FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
1142000000	+39,38	-14,60	1097000000	+25,76	-48,22
1249750000	+41,43	-12,55	1250000000	+33,26	-40,72
1434000000	+40,96	-13,02	1500000000	+28,71	-45,27
1723000000	+41,71	-12,27	1625000000	+27,81	-46,17
1939250000	+43,51	-10,47	1750000000	+33,74	-40,24
2157750000	+44,30	-9,68	2250000000	+30,99	-42,99
2991250000	+47,41	-6,57	2998500000	+33,42	-40,56

22233903_2

Segalla 22233904

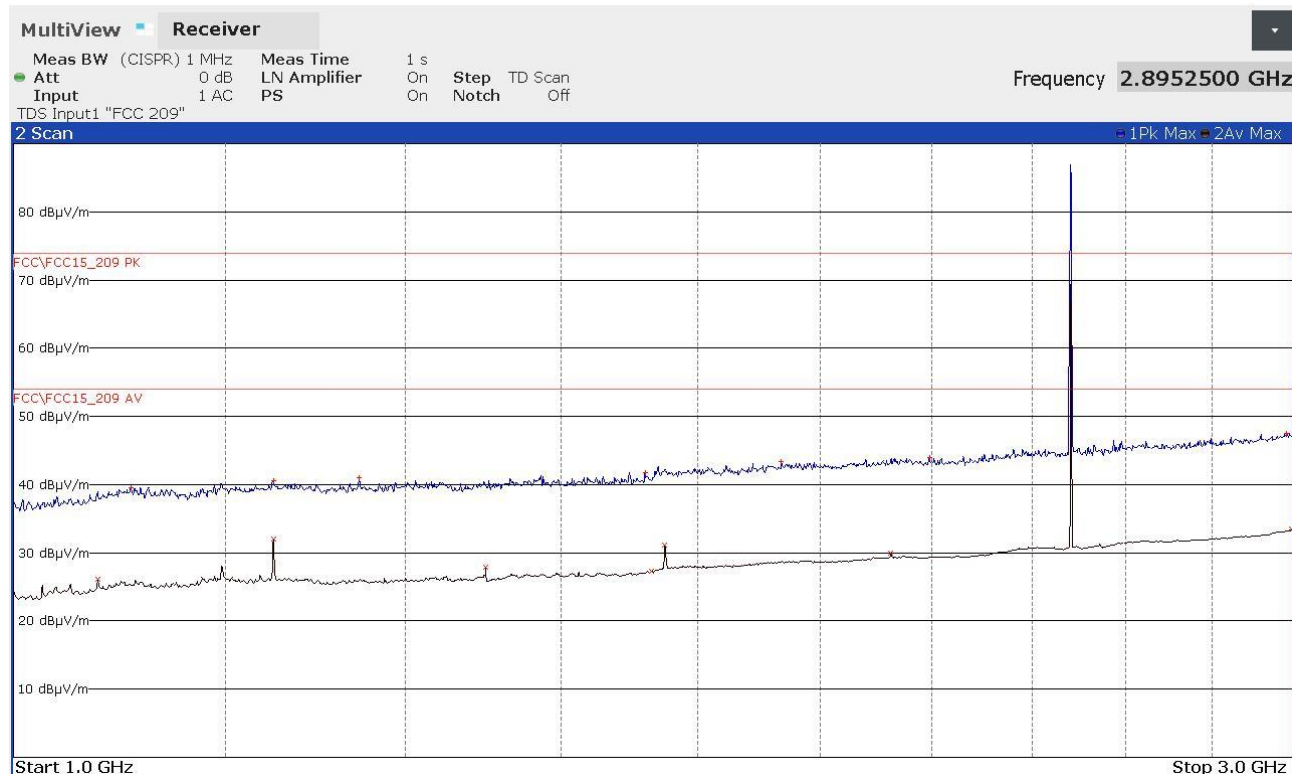


FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
1146000000	+39,32	-14,66	1075000000	+26,27	-47,71
1250000000	+42,13	-11,85	1250000000	+33,04	-40,94
1396750000	+40,53	-13,45	1500000000	+27,81	-46,17
1709750000	+41,28	-12,70	1729750000	+27,33	-46,65
1964500000	+43,24	-10,74	1750000000	+31,07	-42,91
2207500000	+44,05	-9,93	2125000000	+29,97	-44,01
2983000000	+47,68	-6,30	2998750000	+33,41	-40,57

22233904_2

Segalla 22233905

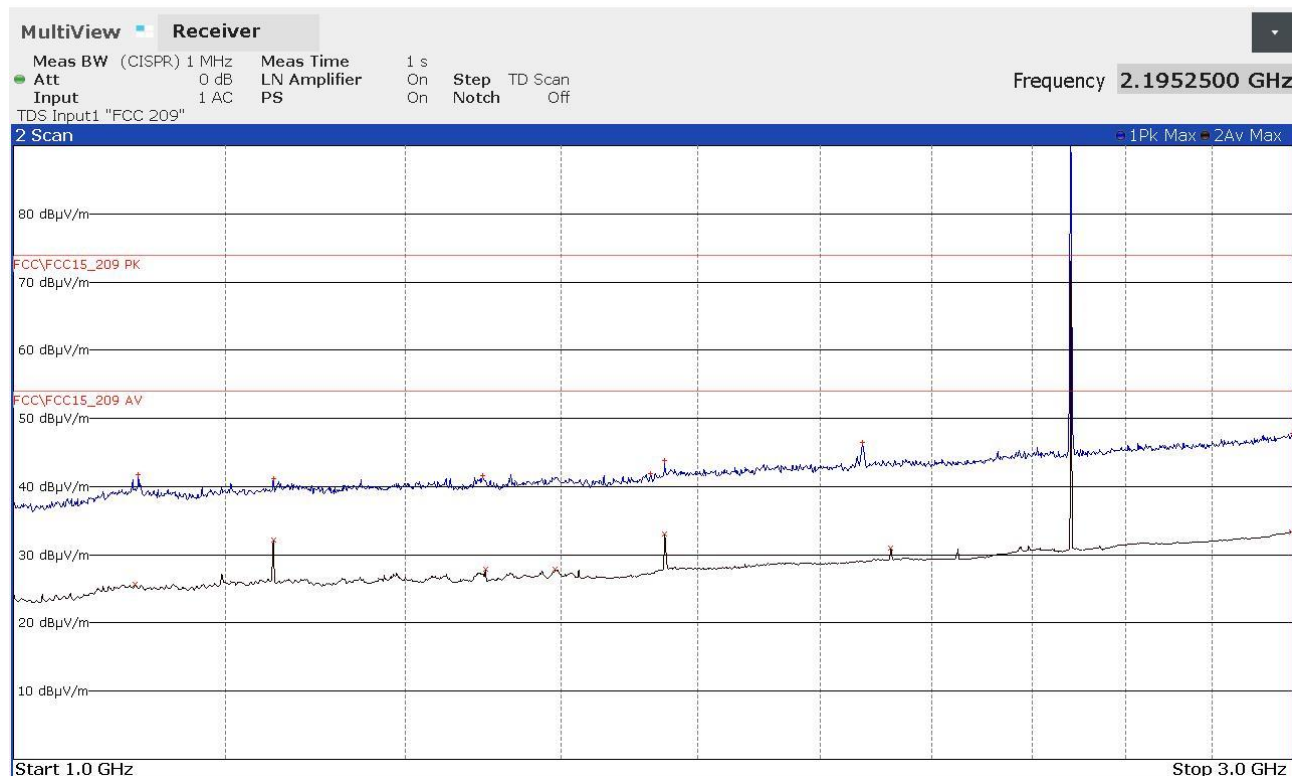


FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
1106000000	+39,59	-14,39	1075000000	+26,14	-47,84
1250250000	+40,52	-13,46	1250000000	+31,96	-42,02
1345750000	+40,98	-13,00	1500000000	+27,88	-46,10
1720250000	+41,79	-12,19	1730000000	+27,30	-46,68
1933500000	+43,32	-10,66	1750000000	+31,19	-42,79
2196000000	+43,99	-9,99	2125000000	+29,97	-44,01
2985000000	+47,49	-6,49	2998250000	+33,42	-40,56

22233905_2

Segalla 22233906

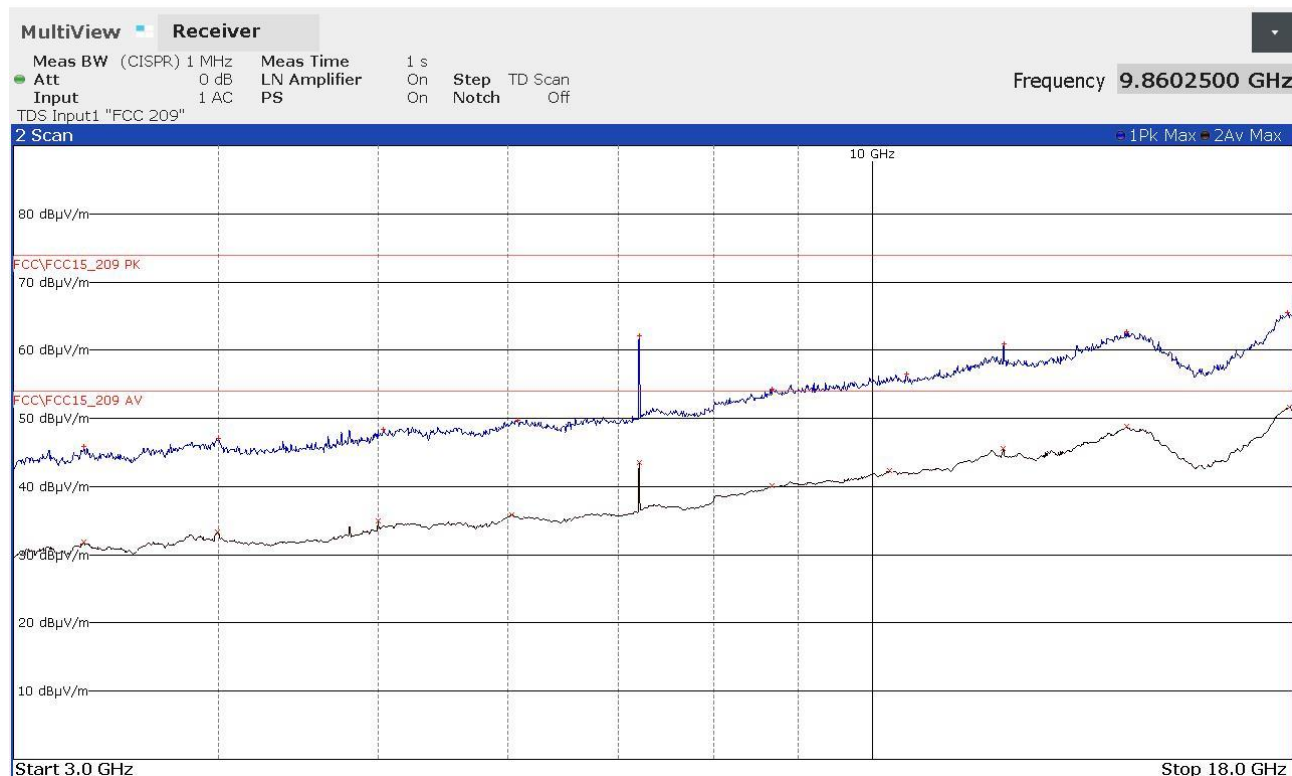


FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
1113250000	+41,77	-12,21	1110000000	+25,73	-48,25
1250000000	+41,15	-12,83	1250000000	+32,15	-41,83
1496250000	+41,66	-12,32	1500000000	+27,86	-46,12
1728500000	+41,86	-12,12	1592750000	+27,88	-46,10
1749750000	+43,85	-10,13	1750000000	+32,99	-40,99
2073750000	+46,46	-7,52	2125000000	+30,97	-43,01
2999500000	+47,75	-6,23	2998250000	+33,40	-40,58

22233906_2

Segalla 22233911

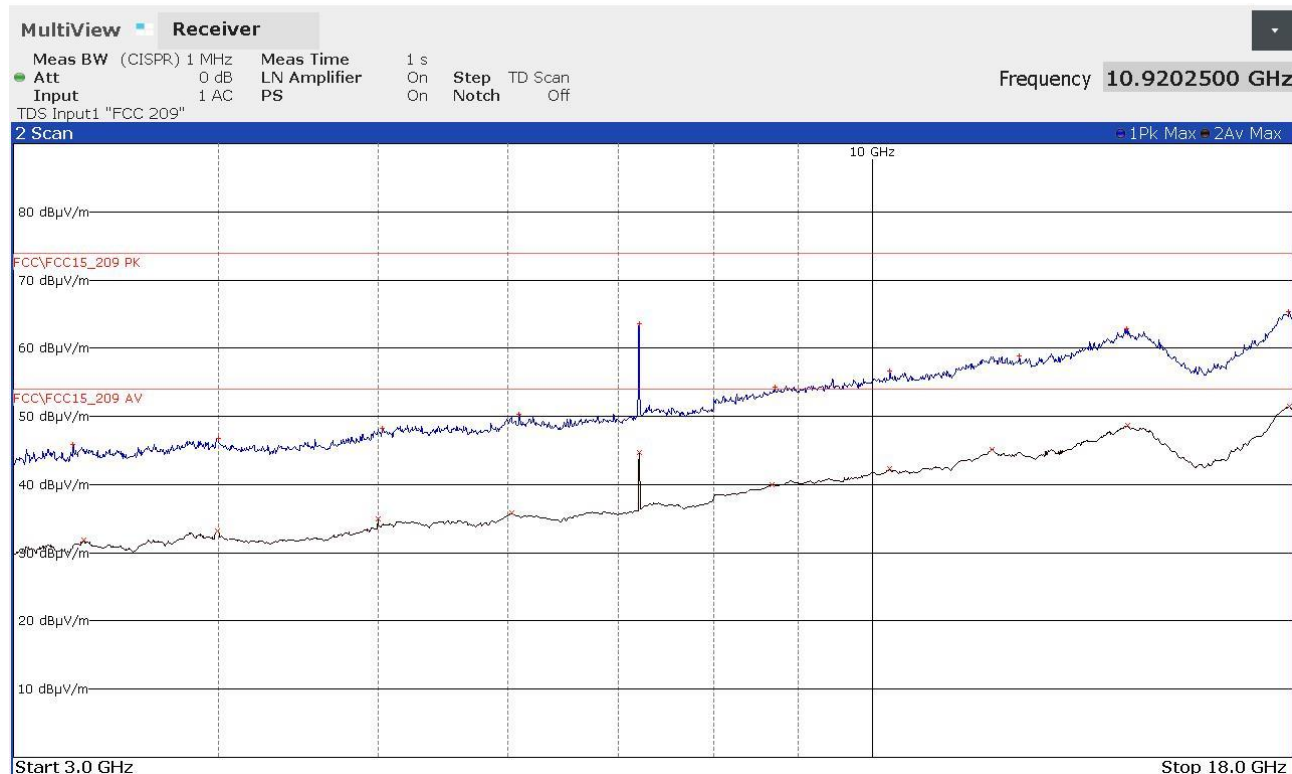


FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
3311750000	+45,93	-28,05	3312000000	+31,93	-22,05
3998500000	+47,12	-26,86	3990750000	+33,29	-20,69
5038000000	+48,46	-25,52	4999750000	+35,00	-18,98
6083000000	+49,65	-24,33	6029000000	+35,85	-18,13
7205250000	+62,14	-11,84	7205500000	+43,50	-10,48
8686250000	+54,36	-19,62	8680000000	+40,10	-13,88
10478500000	+56,52	-17,46	10240000000	+42,39	-11,59
12010000000	+60,90	-13,08	12009000000	+45,55	-8,43
14278750000	+62,64	-11,34	14279000000	+48,79	-5,19
17878250000	+65,52	-8,46	17920000000	+51,69	-2,29

22233911_2

Segalla 22233912

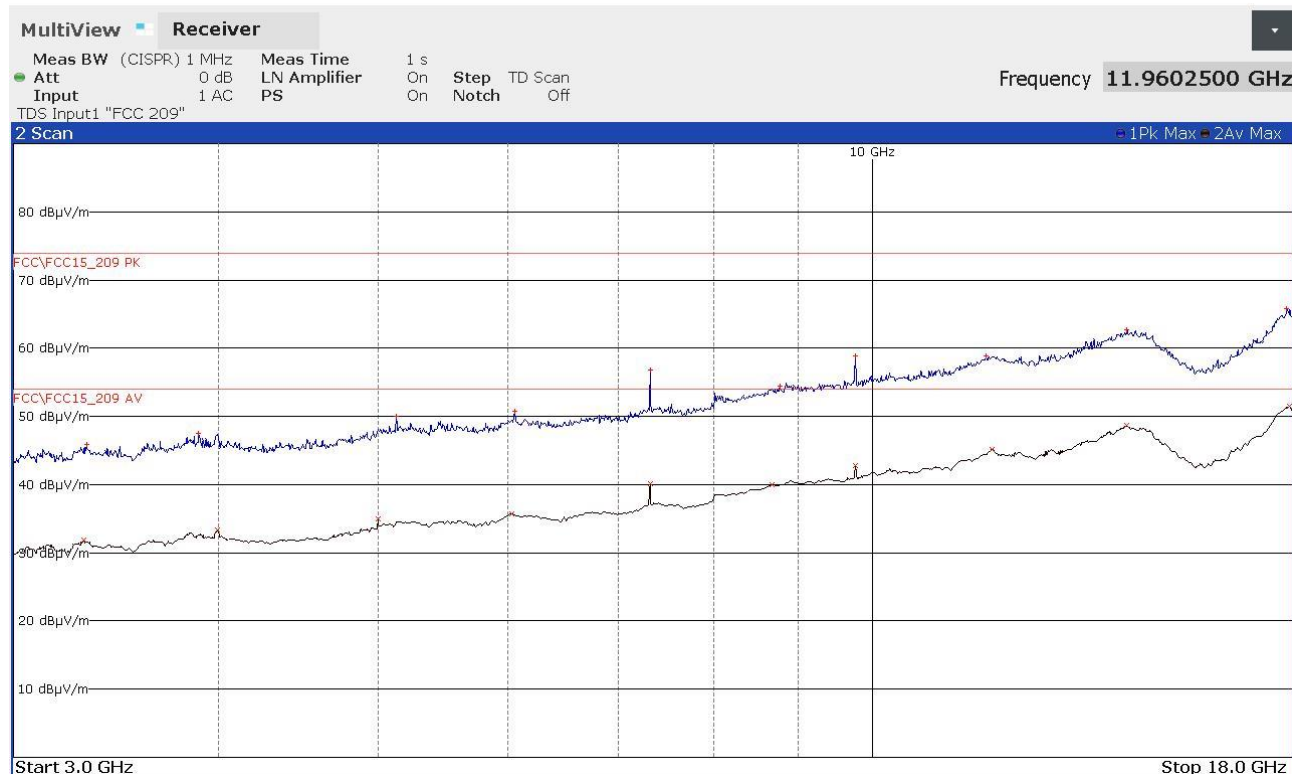


FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
3262000000	+45,94	-28,04	3311500000	+31,92	-22,06
3996250000	+46,78	-27,20	3991000000	+33,27	-20,71
5032000000	+48,24	-25,74	4999750000	+34,96	-19,02
6093500000	+50,35	-23,63	6028750000	+35,78	-18,20
7205250000	+63,60	-10,38	7205500000	+44,67	-9,31
8715500000	+54,26	-19,72	8680000000	+40,01	-13,97
10240000000	+56,65	-17,33	10240000000	+42,29	-11,69
12277750000	+58,84	-15,14	11820000000	+45,20	-8,78
14279250000	+62,90	-11,08	14280000000	+48,68	-5,30
17910000000	+65,34	-8,64	17920000000	+51,47	-2,51

22233912_2

Segalla 22233913

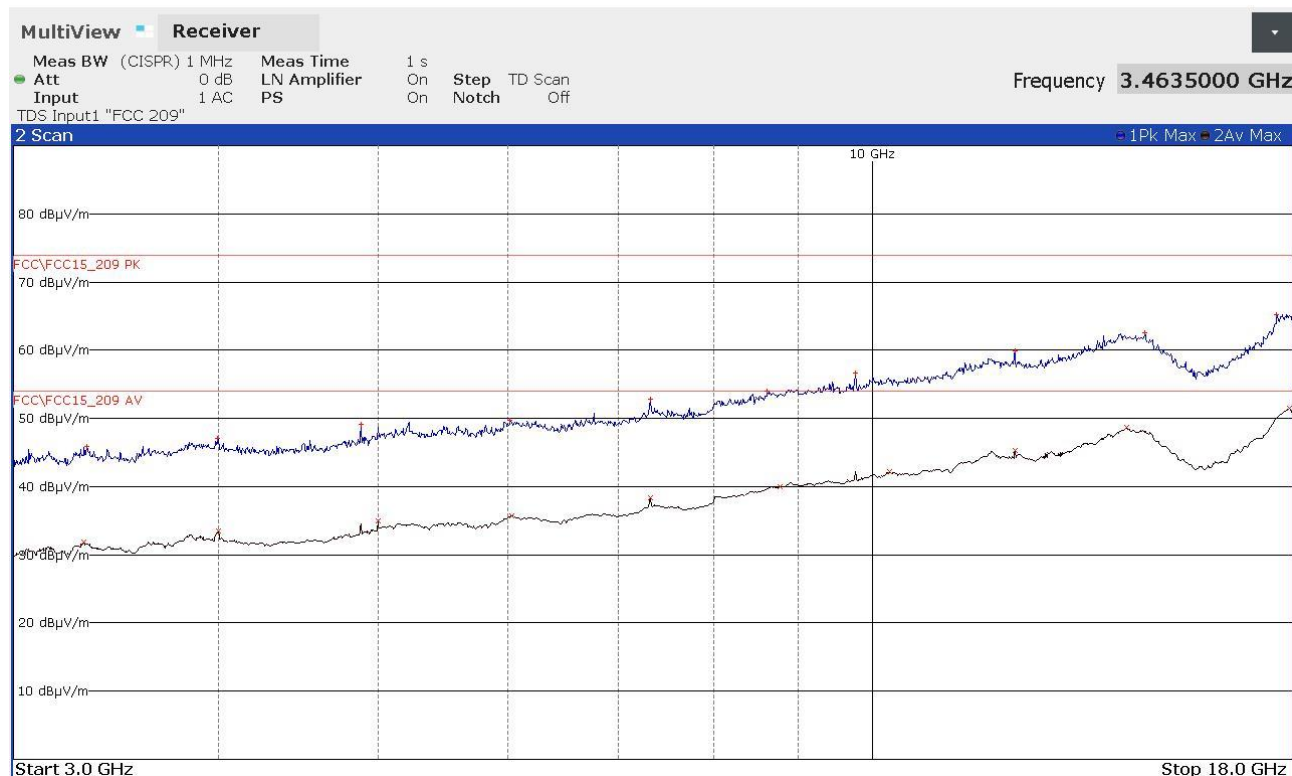


FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
3324250000	+45,90	-28,08	3311500000	+31,93	-22,05
3887500000	+47,55	-26,43	3991250000	+33,31	-20,67
5130000000	+50,09	-23,89	4999750000	+34,98	-19,00
6053750000	+50,72	-23,26	6028750000	+35,77	-18,21
7319500000	+56,83	-17,15	7319500000	+40,20	-13,78
8778000000	+54,48	-19,50	8680000000	+40,00	-13,98
9759000000	+58,83	-15,15	9759250000	+42,82	-11,16
11719250000	+58,84	-15,14	11820000000	+45,19	-8,79
14278750000	+62,68	-11,30	14279250000	+48,69	-5,29
17857500000	+65,81	-8,17	17920000000	+51,47	-2,51

22233913_2

Segalla 22233914



FINAL RESULT TABLE

MAX PEAK			AVERAGE		
Freq Hz	Lev dBuV/m	Margin dB	Freq Hz	Lev dBuV/m	Margin dB
3325750000	+45,89	-28,09	3311250000	+31,94	-22,04
3993000000	+47,11	-26,87	3999750000	+33,42	-20,56
4880000000	+49,09	-24,89	4999750000	+34,96	-19,02
6015250000	+49,73	-24,25	6028250000	+35,74	-18,24
7320750000	+52,76	-21,22	7319500000	+38,32	-15,66
8620500000	+53,95	-20,03	8779750000	+39,97	-14,01
9759000000	+56,61	-17,37	10240000000	+42,25	-11,73
12199000000	+59,92	-14,06	12199000000	+45,35	-8,63
14639500000	+62,56	-11,42	14278250000	+48,67	-5,31
17609750000	+65,19	-8,79	17920000000	+51,43	-2,55

22233914_2