FCC TEST REPORT

For

Amplimax

Model Number: EPRL16, EPRL20

FCC ID: 2AZC5-01

Report Number : WT218000493

Test Laboratory	:	Shenzhen Academy of Metrology and Quality Inspection
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TEST REPORT DECLARATION

Applicant	:	ELSYS EQUIPAMENTOS ELETRONICOS LTDA
Address	:	RUA DOUTOR ALCIDES GOMES MIRANDA, 251 Valinhos SP 13277-220 Brazil
Manufacturer	:	ELSYS EQUIPAMENTOS ELETRONICOS LTDA
Address	:	RUA DOUTOR ALCIDES GOMES MIRANDA, 251 Valinhos SP 13277-220 Brazil
EUT Description	:	Amplimax
Model No.	:	EPRL16, EPRL20
Trade mark	:	ELSYS
Serial Number	:	/
FCC ID	:	2AZC5-01

Test Standards:

FCC Part 15 Subpart B (2019)

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Project Engineer:	周芳媛 (Zhou Fangai 周芳媛)	Date:	Apr.12,2021
Checked by:	施昌达 (Shi Changda 施昌达)	Date:	Apr.12,2021
Approved by:	林奕翔 (Lin Yixiang 林奕翔)	Date:	Apr.12,2021

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1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	FCC Rules	Test Results
Conducted Emission	15.107	Pass
Radiation Emission	15.109	Pass

Remark: “N/A” means “Not applicable.”

2. GENERAL INFORMATION

2.1. Report information

This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.

The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

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The lab will not be liable for any loss or damage resulting for false, inaccurate, inappropriate or incomplete product information provided by the applicant/manufacturer.

2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at NETC Building, No.4 Tongfa Rd., Xili, Nanshan, Shenzhen, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is Accredited Testing Laboratory of FCC with Designation number CN1165 and Site registration number 582918.

The Laboratory is registered to perform emission tests with Innovation, Science and Economic Development (ISED), and the registration number is 11177A.

The Laboratory is registered to perform emission tests with VCCI, and the registration number are C-20048, G20076, R-20077, R-20078 and T-20047.

The Laboratory is Accredited Testing Laboratory of American Association for Laboratory Accreditation (A2LA) and certificate number is 3292.01.

2.3. Measurement Uncertainty

Conducted Emission
9 kHz~150 kHz 3.7dB
150 kHz~30MHz 3.3dB

Radiated Emission
30MHz~1000MHz 4.3dB
1GHz~6GHz 4.6 dB
6GHz~18GHz 5.1dB

3. PRODUCT DESCRIPTION

NOTE: The extreme test conditions for temperature and antenna gain were declared by the manufacturer.

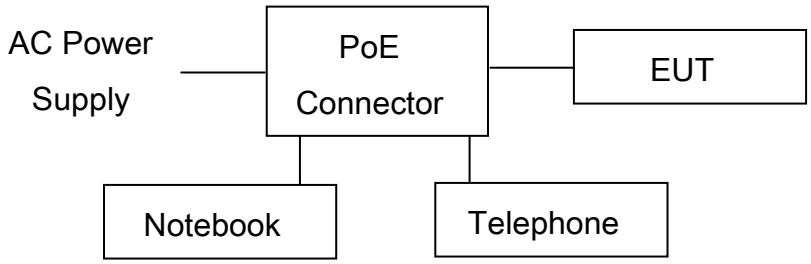
3.1. EUT Description

Description	:	Amplimax
Manufacturer	:	ELSYS EQUIPAMENTOS ELETRONICOS LTDA
Model Number	:	EPRL16, EPRL20
Operating voltage	:	DC11.4V (Low)/DC12~24V (Nominal)/ DC25.2V (Max)
Test voltage	:	AC 120V/60Hz
Software Version	:	1.7.1.1
Hardware Version	:	02
Frequency	:	WCDMA 850: TX 824MHz~849MHz RX 869MHz~894MHz WCDMA 1700: TX: 1710MHz~1755MHz RX 2110MHz~2155MHz WCDMA 1900: TX 1850MHz~1910MHz RX 1930MHz~1990MHz LTE Band 2: TX 1850MHz~1910MHz RX 1930MHz~1990MHz LTE Band 4: TX: 1710MHz~1755MHz RX 2110MHz~2155MHz LTE Band 5: TX 824MHz~849MHz RX 869MHz~894MHz LTE Band 12: TX 699MHz ~ 716MHz RX 729 ~ 746MHz LTE Band 13: TX 777MHz ~ 787MHz RX 746~ 756MHz LTE Band 14: TX 788MHz ~ 798MHz RX 758~ 768MHz LTE Band 66: TX:1710MHz~1780MHz RX 2110MHz~2200MHz LTE Band 71: TX:663MHz~698MHz RX 617MHz~652MHz
Type(s) of Modulation	:	WCDMA:QPSK LTE:QPSK, 16QAM
Antenna Type	:	WCDMA/LTE: Internal antenna 663MHz~698MHz: 4.00 dBi 699MHz~716MHz: 5.62 dBi 777MHz~787MHz: 5.28 dBi 788MHz ~ 798MHz : 5.26 dBi

824MHz~849MHz: 5.66 dBi
1710MHz~1780MHz: 6.65 dBi
1850MHz~1910MHz: 8.67 dBi

Remark: All models are identical except that EPRL 16 does not have the voice feature and components related to the voice feature. Unless otherwise specified, the model EPRL 20 was chosen as representative model to perform all the tests.

3.2. Block Diagram of EUT Configuration



Setup of test

3.3. Operating Condition of EUT

Test mode 1: Adapter+ WCDMA 850 Idle + Connect to LAN port + Connect to TEL port
Test mode 2: Adapter+ LTE band 5 Idle + Connect to LAN port + Connect to TEL port
Test mode 3: Adapter+ LTE band 12 Idle + Connect to LAN port + Connect to TEL port
Test mode 4: Adapter+ LTE band 13 Idle + Connect to LAN port + Connect to TEL port
Test mode 5: Adapter+ LTE band 14 Idle + Connect to LAN port + Connect to TEL port
Test mode 6: Adapter+ LTE band 71 Idle + Connect to LAN port + Connect to TEL port

EUT has more than one typical operation, only the worst test mode will be recorded in this report.

The Radiated emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission (X plane).

3.4. Support Equipment List

Table 2 Support Equipment List

Name	Model No.	S/N	Manufacturer
Adaptor for EUT	SO188BAU2400075	--	--
PoE connector	--	--	ELSYS EQUIPAMENTOS ELETRONICOS LTDA
Notebook	ThinkPad E450	--	Lenovo
Telephone	HCD129P/TDSL 2957E	--	SHENZHEN DAERXUN TECHNOLOGY CO.,LTD.

3.5. Test Conditions

Date of test：Mar.19, 2021- Apr.02, 2021
Date of EUT Receive：Mar.01, 2021
Temperature: 22℃-23℃
Relative Humidity: 45%-50%

3.6. Modifications

No modification was made.

4. TEST EQUIPMENT USED

4.1. Test Equipment Used to Measure Conducted Emission

Table 3 Conducted Emission Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB9058/05	Test Receiver	R&S	ESCI 3	Sep.25,2020	1 Year
SB4357	AMN	R&S	ENN216	Aug.26,2020	1 Year

4.2. Test Equipment Used to Measure Radiated Emission

Table 4 Radiated Emission Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB13956	Test Receiver	R&S	ESR26	Feb.05,2021	1 Year
SB3955	Broadband Antenna	Schwarzbeck	VULB9163	Jan.05,2021	1 Year
SB13958	Horn Antenna	R&S	HF907	Apr.15,2020	1 Year

5. CONDUCTED EMISSION TEST

5.1. Test Standard and Limit

5.1.1. Test Standard

FCC Part 15: Section 15.107

5.1.2. Test Limit

Table 5 Conducted Emission Test Limit (Class A)

Frequency	Power Port limits (dBμV)	
	Quasi-peak	Average
0.15MHz ~ 0.5MHz	79	66
0.5MHz ~ 30 MHz	73	60

5.2. Test Procedure

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI test receiver is used to test the emissions from both sides of AC line. The bandwidth of EMI test receiver is set at 9kHz.

5.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

5.4. Test Data

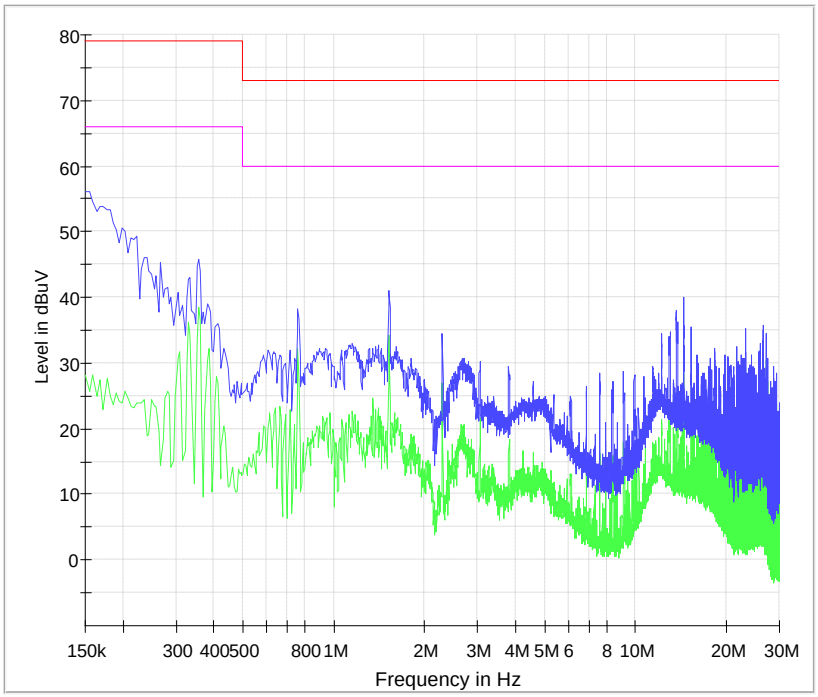
The emissions don't show in below are too low against the limits. Refer to the test curves.

Table 6 Conducted Emission Test Data at mains Port

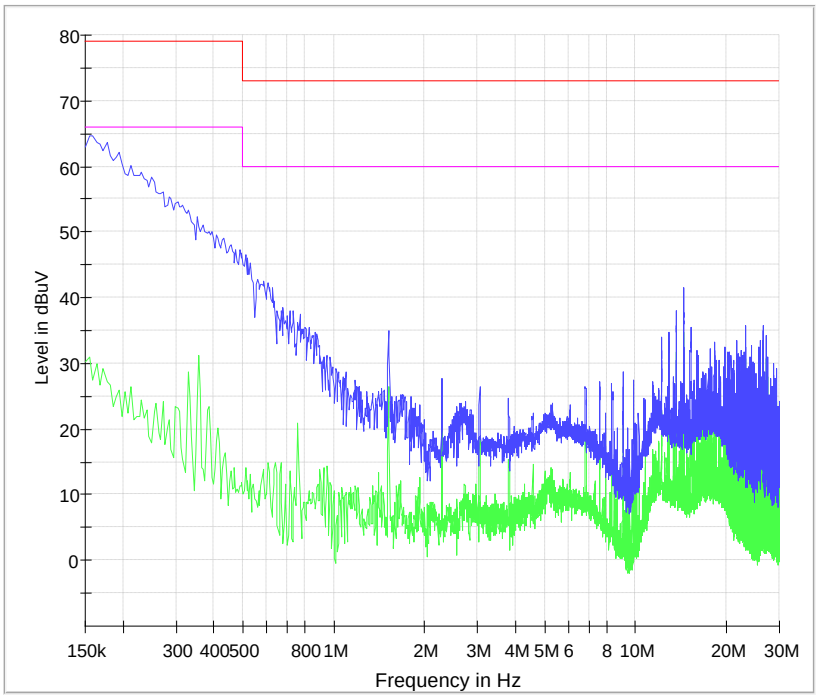
Test mode: 1								
	Frequency (MHz)	Correction Factor (dB)	Quasi-Peak			Average		
			Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)
Line	0.154	9.7	39.1	48.8	79	19.1	28.8	66
	0.222	9.7	39.8	49.5	79	12.2	21.9	66
	0.357	9.7	34.8	44.5	79	29.2	38.9	66
	0.762	9.8	26.8	36.6	73	21.6	31.4	60
	1.522	9.8	29.0	38.8	73	24.2	34.0	60
	14.487	9.9	30.0	39.9	73	22.6	32.5	60
Neutral	0.159	9.7	45.4	55.1	79	17.3	27.0	66
	0.181	9.7	43.5	53.2	79	15.3	25.0	66
	0.249	9.7	39.3	49.0	79	11.6	21.3	66
	0.352	9.7	27.2	36.9	79	17.2	26.9	66
	1.518	9.8	20.6	30.4	73	11.2	21.0	60
	14.455	9.9	23.2	33.1	73	11.3	21.2	60

REMARKS: 1. Emission level (dBuV) =Read Value (dBuV) + Correction Factor (dB)
2. Correction Factor (dB) =LISN Factor (dB) + Cable Factor (dB) +Limiter Factor (dB)
3. The other emission levels were more than 20dB below the limits.

Line



Neutral



6. RADIATION EMISSION TEST

6.1. Test Standard and Limit

6.1.1. Test Standard

FCC Part 15: Section 15.109

6.1.2. Test Limit

Table 7 Radiation Emission Test Limit for FCC (Class A)

Frequency	Test distance	Limit dB(μV/m)		
		Quasi-peak	Average	Peak
30MHz~88MHz	**3m**	49		
88MHz~216MHz	**3m**	53.5		
216MHz~960MHz	**3m**	56.4		
960MHz~1000MHz	**3m**	59.5		
>1000MHz	**3m**		59.5	79.5
Conditional testing procedure for above 1 GHz：				
Highest frequency generated or used in the device or on which the device operates or tunes (MHz)		**Upper frequency of measurement range (MHz)**		
Below 1.705		30		
1.705~108		1000		
108~500		2000		
500~1000		5000		
Above 1000		5th harmonic of the highest frequency or 40 GHz, whichever is lower.		

* The lower limit shall apply at the transition frequency.
* The test distance is 3m.

6.2. Test Procedure

The EUT is placed on a turntable, which is 0.8 meter above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set **3 meters** away from the receiving antenna, which is mounted on an antenna tower. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.
RBW = 100 kHz (less than or equal to 1 GHz); 1 MHz (above 1 GHz)
VBW ≥ 3 x RBW
Detector = Peak & Quasi-Peak (frequency range 30 MHz to 1 GHz);
Peak & Average (frequency range above 1 GHz);
Changing VBW to 10 Hz for average measurement
The use of a higher-than-specified video bandwidth produces a conservative measurement result.

6.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

6.4. Test Data

The emissions don't show in below are too low against the limits. Refer to the test curves.

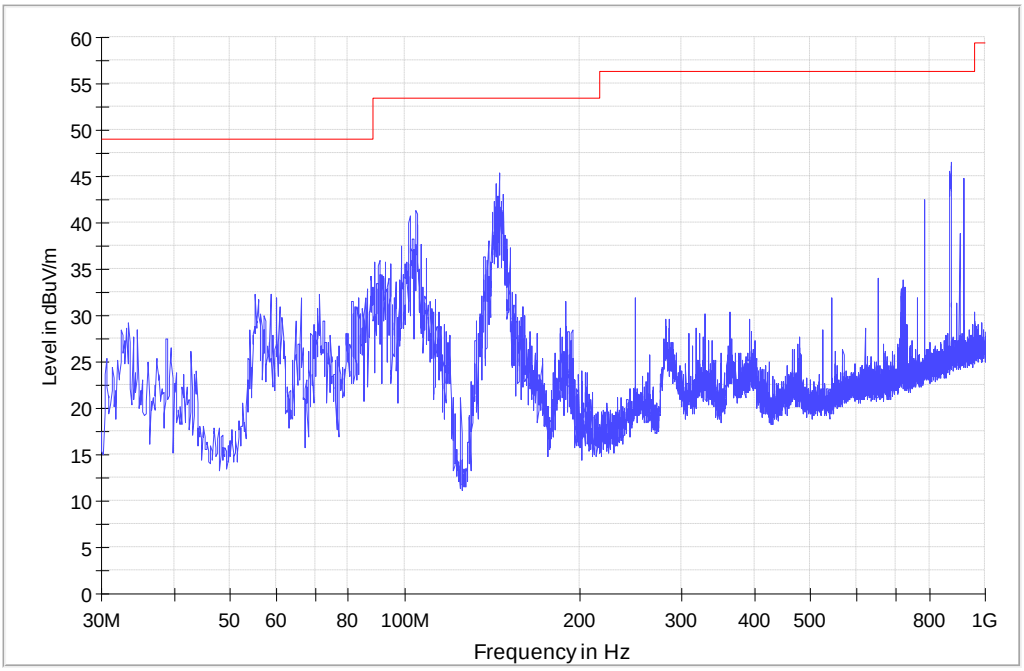
Table 8 Radiated Emission Test Data

Test mode: 1								
Frequency (MHz)	Cable Loss +preamp (dB)	Antenna Factor (dB)	Reading (dBμV/m)	Level (dBμV/m)	Polarity (Horizontal/ Vertical)	Limits (dBμV/m)	Margin (dB)	Note
145.236	1.4	10.5	33.4	45.3	Horizontal	53.5	8.2	QP
143.296	1.3	10.5	34.0	45.8	Horizontal	53.5	7.7	QP
104.690	1.3	13.2	24.9	39.4	Horizontal	53.5	14.1	QP
148.049	1.4	10.5	29.2	41.1	Horizontal	53.5	12.4	QP
871.475	3.7	20.1	19.0	42.8	Horizontal	56.4	13.6	QP
917.550	3.9	21.1	15.6	40.6	Horizontal	56.4	15.8	QP
34.559	0.6	12.3	26.5	39.4	Vertical	49	9.6	QP
38.924	0.7	12.3	28.5	41.5	Vertical	49	7.5	QP
66.278	0.9	10.7	28.6	40.2	Vertical	49	8.8	QP
872.930	3.7	20.1	26.6	50.4	Vertical	56.4	6.0	QP
1656.860	-40.6	26.7	77.0	63.1	Horizontal	79.5	16.4	PK
1699.700	-40.6	26.7	77.8	63.9	Horizontal	79.5	15.6	PK
1755.290	-40.5	26.7	78.3	64.5	Horizontal	79.5	15.0	PK
1781.130	-40.5	26.7	77.3	63.5	Horizontal	79.5	16.0	PK
1771.610	-40.5	26.7	78.5	64.7	Vertical	79.5	14.8	PK
1750.810	-40.5	26.7	78.8	65.0	Vertical	79.5	14.5	PK
1693.410	-40.6	26.7	78.5	64.6	Vertical	79.5	14.9	PK
1799.490	-40.5	26.7	78.6	64.8	Vertical	79.5	14.7	PK
1656.860	-40.6	26.7	63.1	49.2	Horizontal	59.5	10.3	AV
1699.700	-40.6	26.7	63.7	49.8	Horizontal	59.5	9.7	AV
1755.290	-40.5	26.7	64.2	50.4	Horizontal	59.5	9.1	AV
1781.130	-40.5	26.7	63.3	49.5	Horizontal	59.5	10.0	AV
1771.610	-40.5	26.7	63.7	49.9	Vertical	59.5	9.6	AV
1750.810	-40.5	26.7	64.6	50.8	Vertical	59.5	8.7	AV
1693.410	-40.6	26.7	64.4	50.5	Vertical	59.5	9.0	AV
1799.490	-40.5	26.7	64.6	50.8	Vertical	59.5	8.7	AV

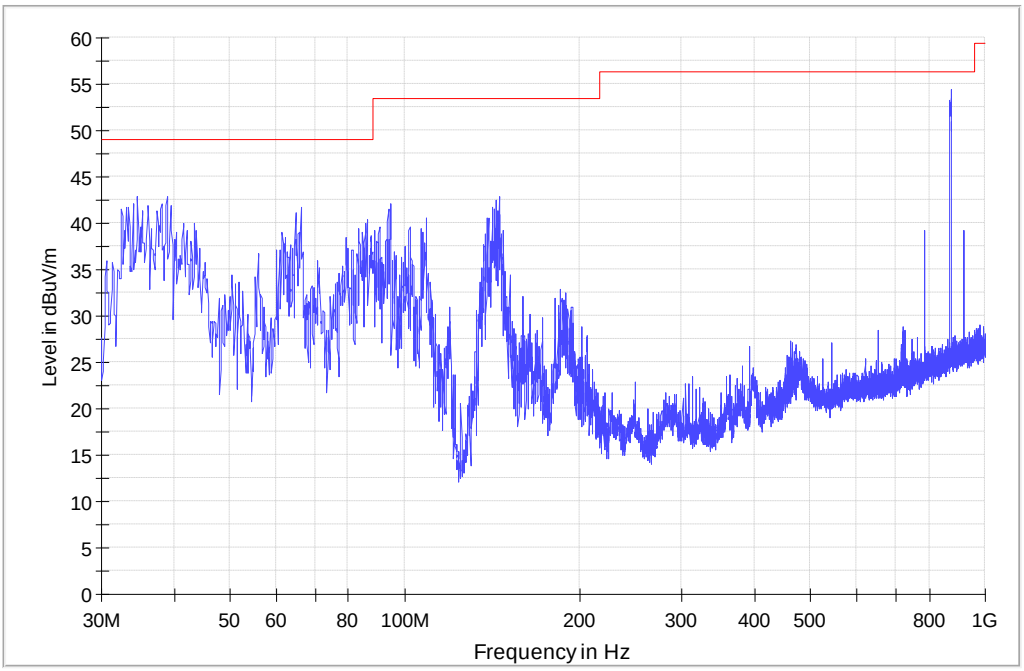
Emission level (dBuV)=Read Value(dBuV/m) + Antenna Factor(dB)+ Cable Loss +preamp(dB)

30MHz-1GHz

Horizontal

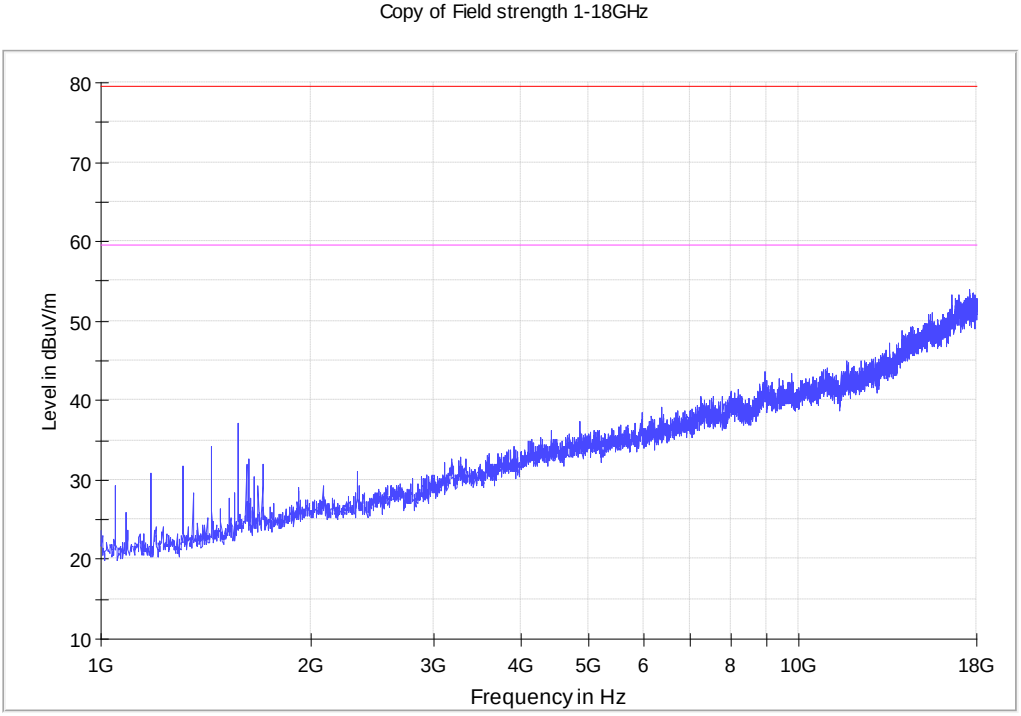


Vertical

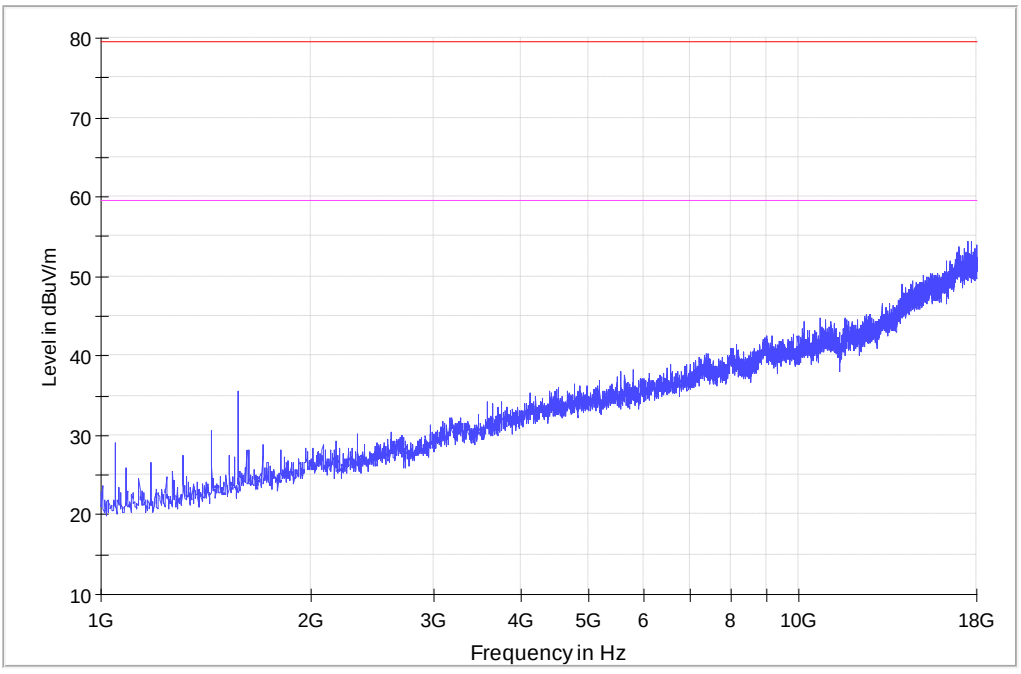


1GHz-18GHz

Horizontal



Vertical



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