

Prüfbericht-Nr.: Test report no.:	60431369 001	Auftrags-Nr.: Order no.:	168292473	Seite 1 von 35 Page 1 of 35
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2020-11-26	
Auftraggeber: Client:	LinHai Zhongtian Electronic Appliance Co., Ltd No.168, Yangqin River Road, Linhai, Zhejiang, China			
Prüfgegenstand: Test item:	Colorful Bluetooth Central Light			
Bezeichnung / Typ-Nr.: Identification / Type no.:	ZT-X-B1			
Auftrags-Inhalt: Order content:	FCC & IC approval			
Prüfgrundlage: Test specification:	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.209			
Wareneingangsdatum: Date of sample receipt:	2020-11-23	Please refer to Photo Document		
Prüfmuster-Nr.: Test sample no:	A002864356-001			
Prüfzeitraum: Testing period:	2020-11-27 – 2020-12-08			
Ort der Prüfung: Place of testing:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:			genehmigt von: authorized by:	
Datum: Date: 2020-12-28	Signed by: Jackson Yang		Ausstellungsdatum: Issue date: 2020-12-28	Signed by: Winnie Hou
Stellung / Position:	Project Engineer		Stellung / Position:	Technical Certifier
Sonstiges / Other:	FCC ID: 2AN8X-ZT-X-B1 Note: The Radiated Spurious Emission above 18GHz and Radiated band edge of BR/BDR function are evaluated in this report. All other tests refer to test report 50426751 001.			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable
5 = mangelhaft N/T = nicht getestet				
5 = poor N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.				

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Test Summary

5.1.1 RADIATED SPURIOUS EMISSION

RESULT: Pass

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1 General Remarks

1.1 Complementary Materials

N/A

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China

FCC Registration No.: 694916

ISED wireless device testing laboratory: 25069

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Unwanted Emission Testing (TS9975)				
Equipment	Manufacturer	Model	Serial No.	Cal. until
EMI Test Receiver	R&S	ESR 7	102021	2021-08-11
Signal Analyzer	R&S	FSV 40	101439	2021-08-10
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	2021-08-10
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2021-08-10
Amplifier	R&S	SCU-18F	180070	2021-08-10
Amplifier	R&S	SCU40A	100475	2021-09-10
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2022-08-08
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	2022-08-08
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2022-08-08
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2022-09-13
Wideband Ridged Horn Antenna (12-18 GHz)	Steatite	QMS-00208	18313	2021-09-02
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2021-07-06

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Parameter	Uncertainty
Radiated Spurious Emissions (up to 1GHz)	± 4.84 dB
Radiated Spurious Emissions (1GHz to 26.5GHz)	± 4.76 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached in this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd. file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at 362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT (equipment under test) is a Colorful Bluetooth Central Light which supports Bluetooth function operated at 2400-2483.5MHz.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	Colorful Bluetooth Central Light
Type Designation	ZT-X-B1
FCC ID	2AN8X-ZT-X-B1
Operating Voltage	DC 3.7V via internal battery
Testing Voltage	Fully charged battery
Technical Specification of V2.1+EDR	
Operating Frequency band	2400 – 2480 MHz
Bluetooth Core Version	V2.1+EDR
Channel Separation	1MHz
Extreme Temperature Range	-20°C ~ 60°C
Modulation	FHSS: GFSK,(Pi/4)DQPSK
Data Rate	EDR: 2 Mbps
Antenna Type	PIFA Antenna
Antenna Gain	3.3 dBi
Channel Number	79 channels

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Bluetooth transmitting mode
 - 1) Low Channel
 - 2) Middle Channel
 - 3) High Channel
- B. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

N/A

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013.

4.3 Special Accessories and Auxiliary Equipment

N/A

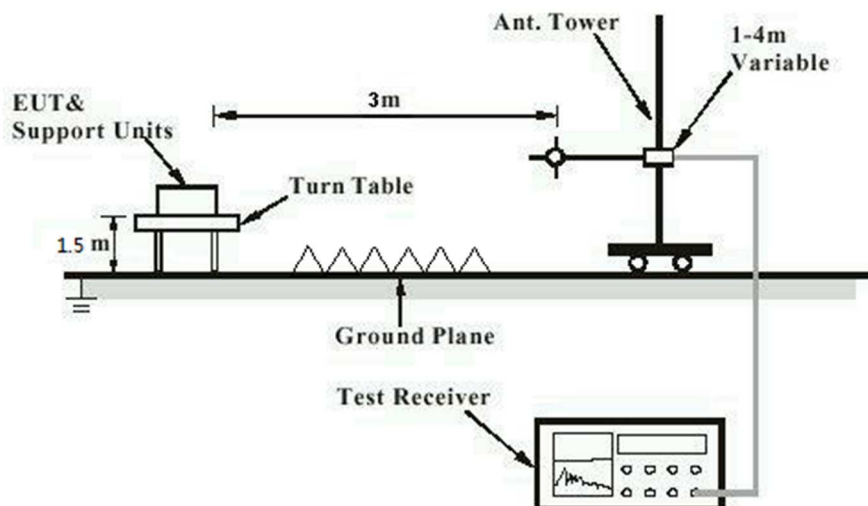
4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Above 1GHz)



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Radiated Spurious Emission

RESULT:

Pass

Test Specification

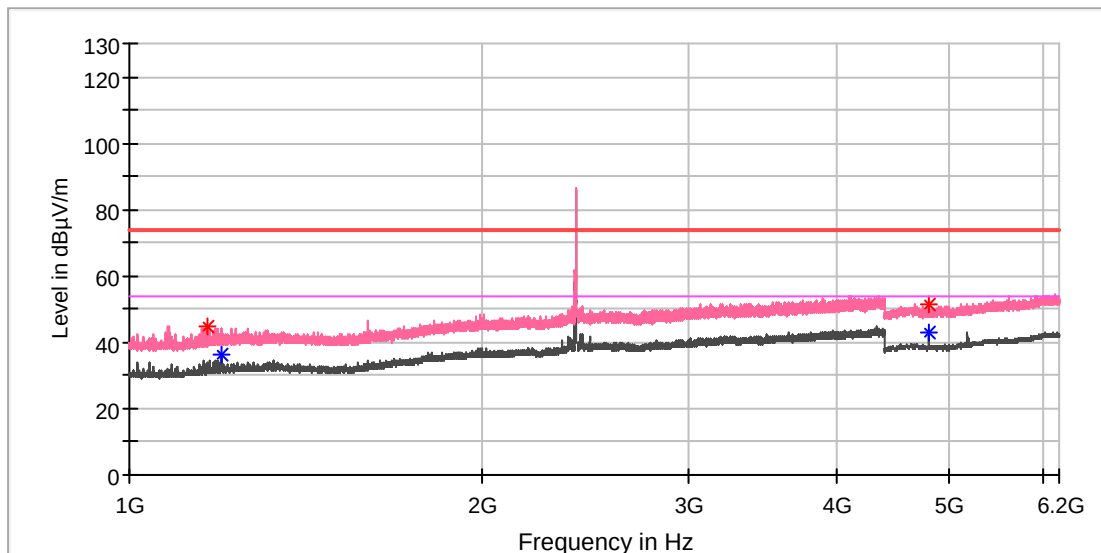
Test standard	: FCC Part 15.247(d) & FCC Part 15.205
Basic standard	: ANSI C63.10: 2013
Limits	: Refer to 15.209(a) of FCC part 15.247(d)
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

Date of testing	: 2020-12-03 ~ 2020-12-07
Input voltage	: Fully charged battery
Operation mode	: A.1, A.2, A.3
Ambient temperature	: 22 °C
Relative humidity	: 50 %
Atmospheric pressure	: 101 kPa

For details refer to following test result, only the worst case was shown.

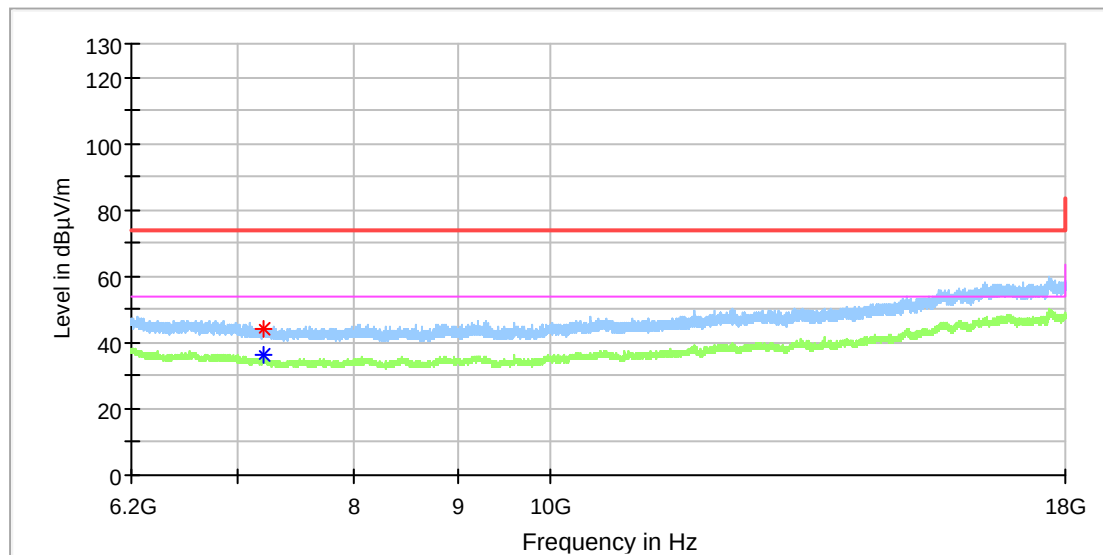
Mode A.1
 Horizontal



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1166.812500	44.98	---	74.00	29.02	100.0	V	193.0	0.9
1196.350000	---	36.44	54.00	17.56	100.0	V	193.0	1.1
4800.000000	---	43.05	54.00	10.95	100.0	V	254.0	11.8
4803.500000	51.44	---	74.00	22.56	100.0	V	282.0	11.8

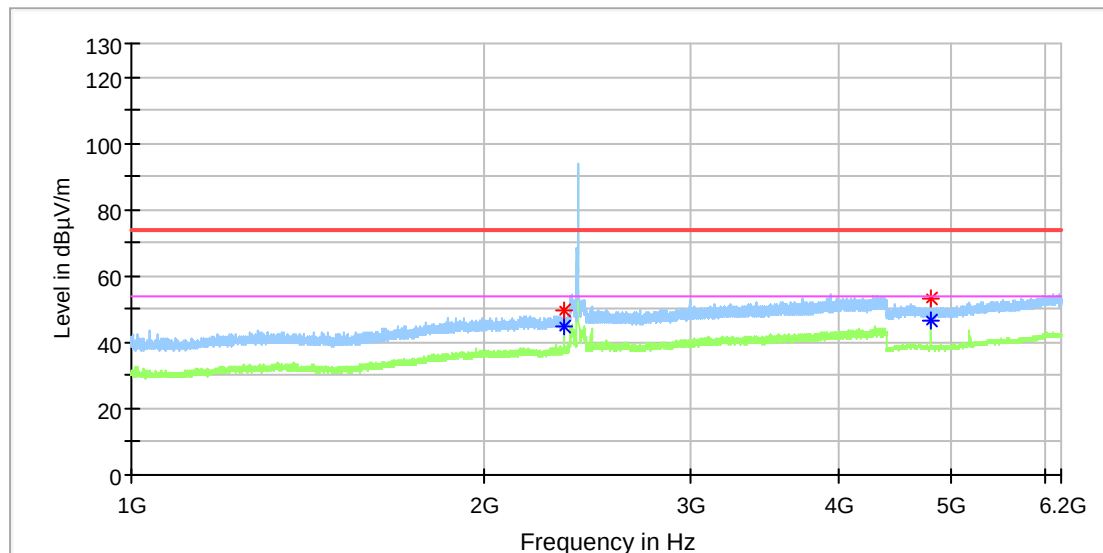
Horizontal



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7206.441667	---	36.18	54.00	17.82	100.0	H	40.0	8.8
7208.900000	44.25	---	74.00	29.75	100.0	H	111.0	8.8

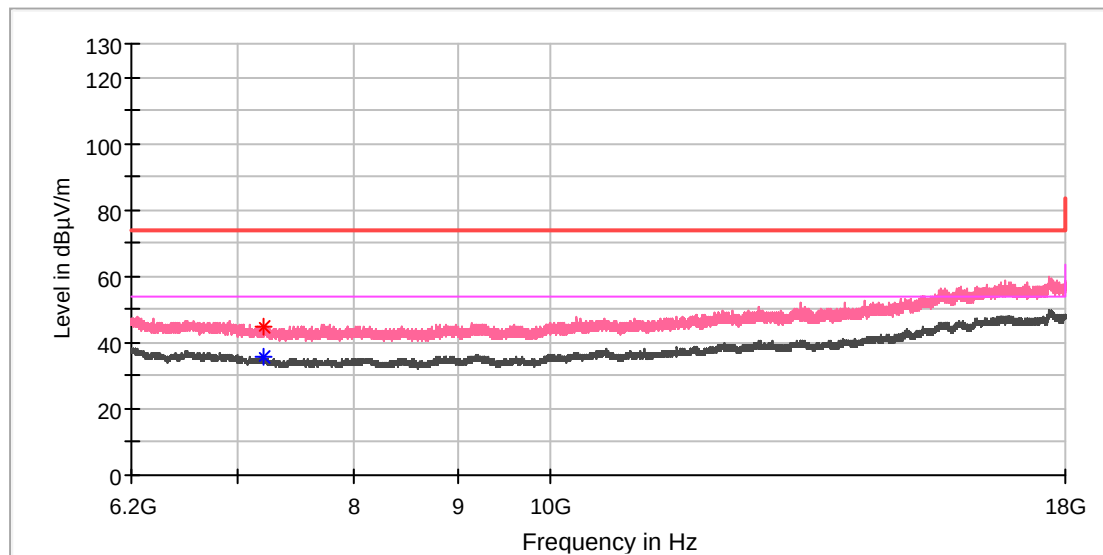
Vertical



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2338.112500	---	44.71	54.00	9.29	100.0	H	0.0	6.8
2338.325000	49.64	---	74.00	24.36	100.0	H	197.0	6.8
4800.000000	52.92	---	74.00	21.08	100.0	H	63.0	11.8
4800.000000	---	46.37	54.00	7.63	100.0	H	63.0	11.8

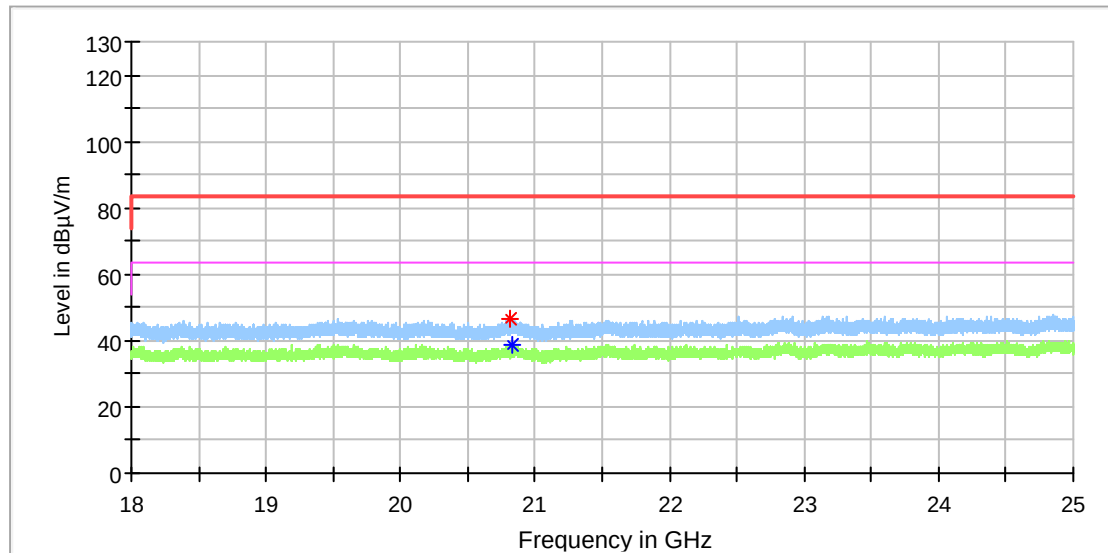
Vertical



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7205.458333	44.48	---	74.00	29.52	100.0	V	22.0	8.8
7205.950000	---	35.55	54.00	18.45	100.0	V	358.0	8.8

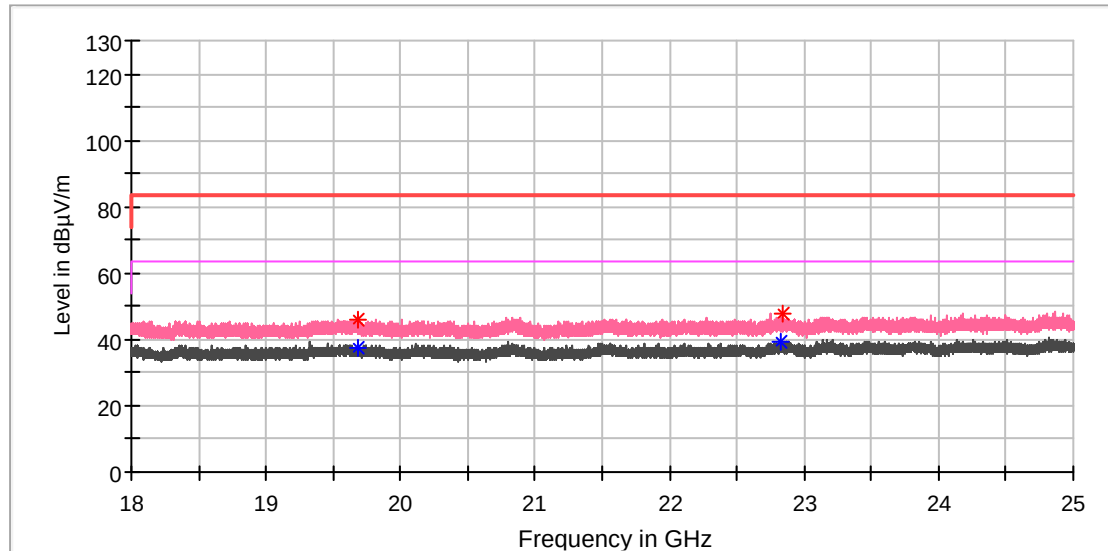
Horizontal



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
20820.781250	46.85	---	83.50	36.65	100.0	H	238.0	-12.3
20831.281250	---	38.80	63.50	24.70	100.0	H	56.0	-12.3

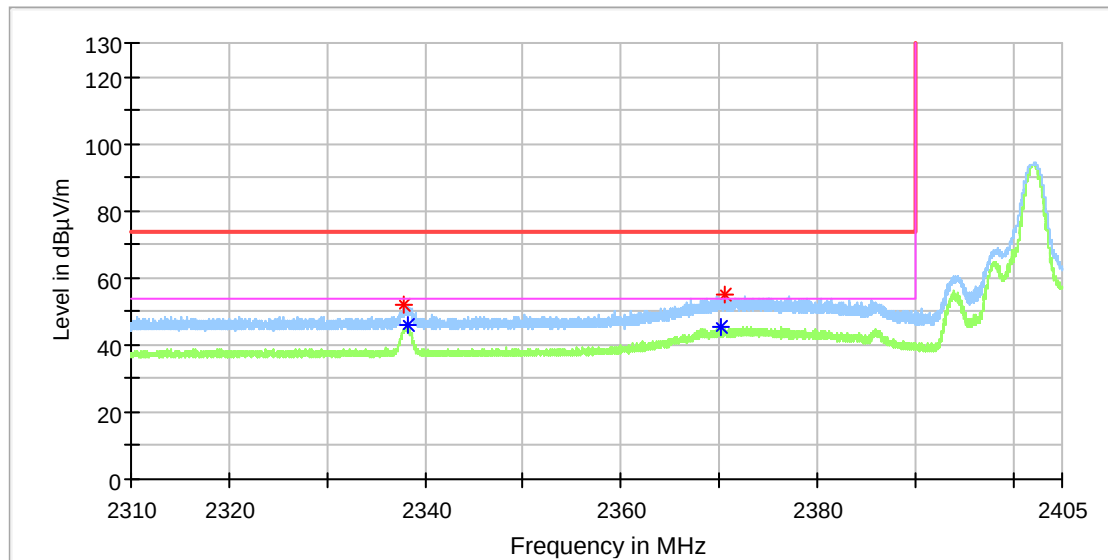
Vertical



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19680.875000	---	37.68	63.50	25.82	100.0	V	275.0	-13.1
19689.187500	46.18	---	83.50	37.32	100.0	V	0.0	-13.1
22827.812500	---	39.04	63.50	24.46	100.0	V	0.0	-10.9
22834.156250	47.79	---	83.50	35.71	100.0	V	4.0	-10.9

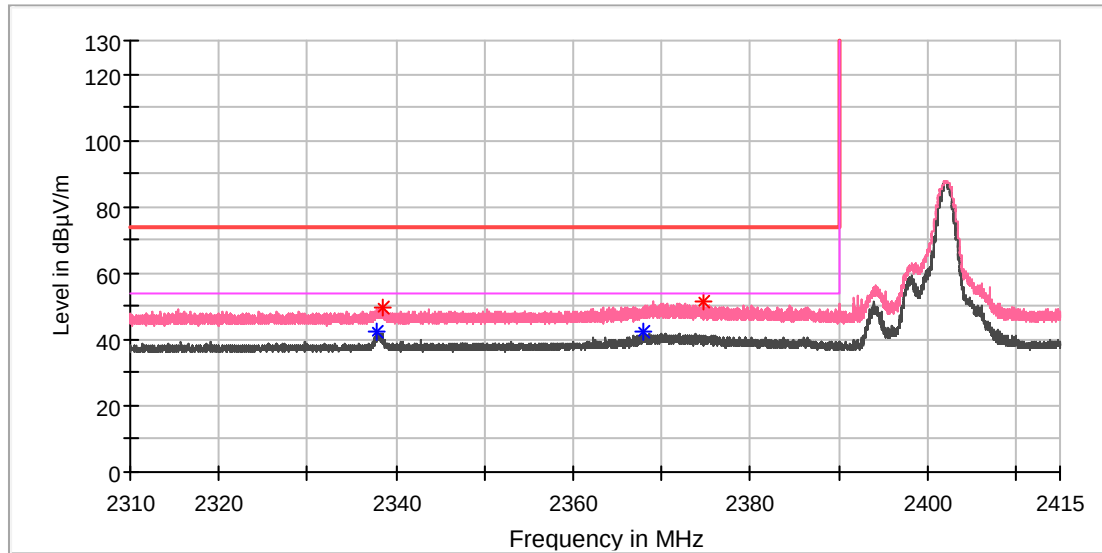
Horizontal



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2337.923438	51.97	---	74.00	22.03	100.0	H	172.0	6.8
2338.225313	---	45.79	54.00	8.21	100.0	H	184.0	6.8
2370.105938	---	45.58	54.00	8.42	100.0	H	356.0	6.9
2370.585000	55.23	---	74.00	18.77	100.0	H	5.0	6.9

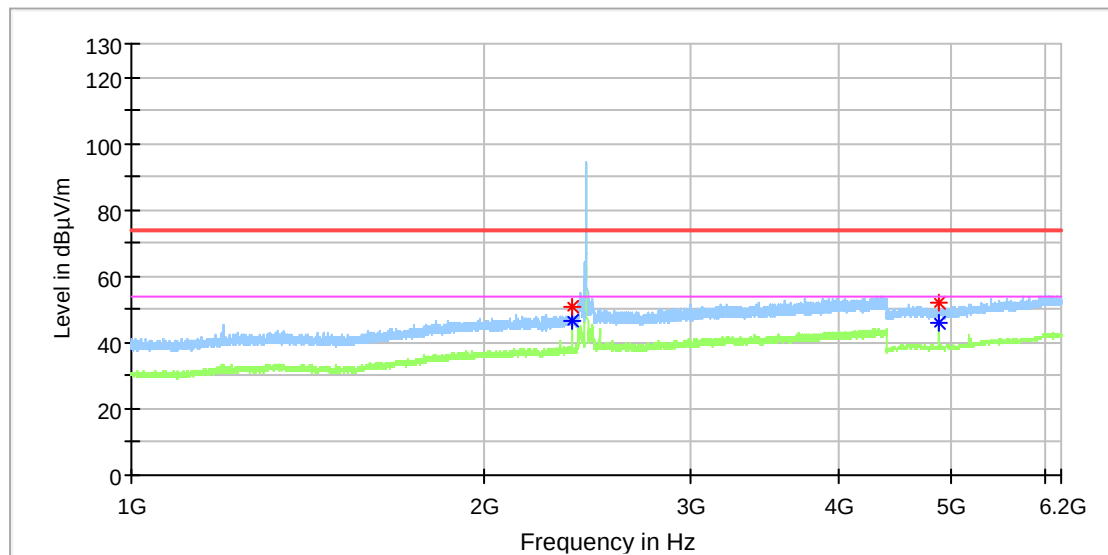
Vertical



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2337.930000	---	42.31	54.00	11.69	100.0	V	73.0	6.8
2338.553438	49.76	---	74.00	24.24	100.0	V	42.0	6.8
2367.900938	---	42.21	54.00	11.79	100.0	V	301.0	6.9
2374.614375	51.42	---	74.00	22.58	100.0	V	301.0	6.9

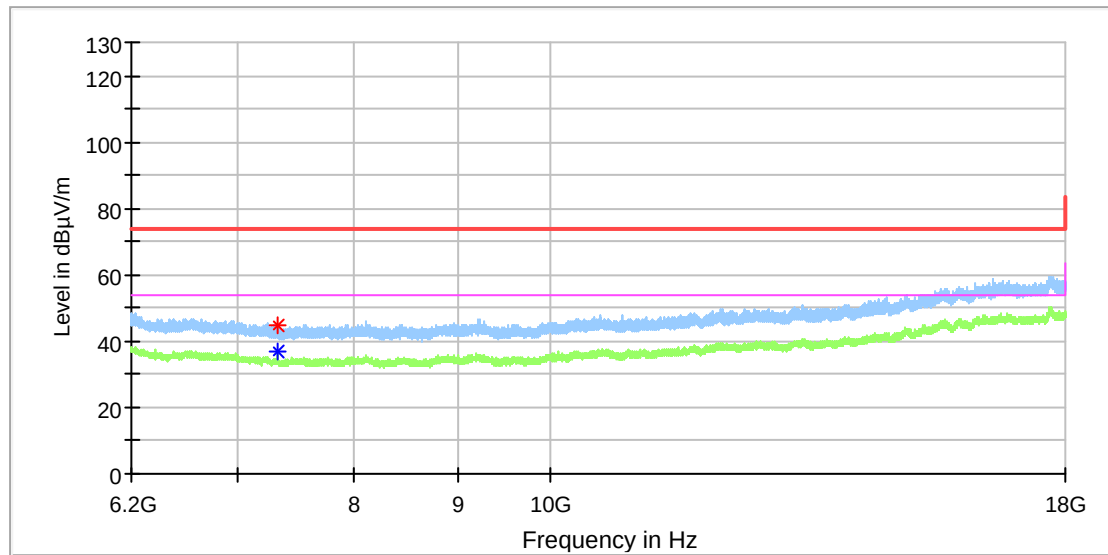
Mode A.2
 Horizontal



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2377.212500	50.61	---	74.00	23.39	100.0	H	358.0	6.9
2377.212500	---	46.39	54.00	7.61	100.0	H	358.0	6.9
4882.000000	---	45.99	54.00	8.01	100.0	H	69.0	11.8
4882.500000	51.75	---	74.00	22.25	100.0	H	69.0	11.8

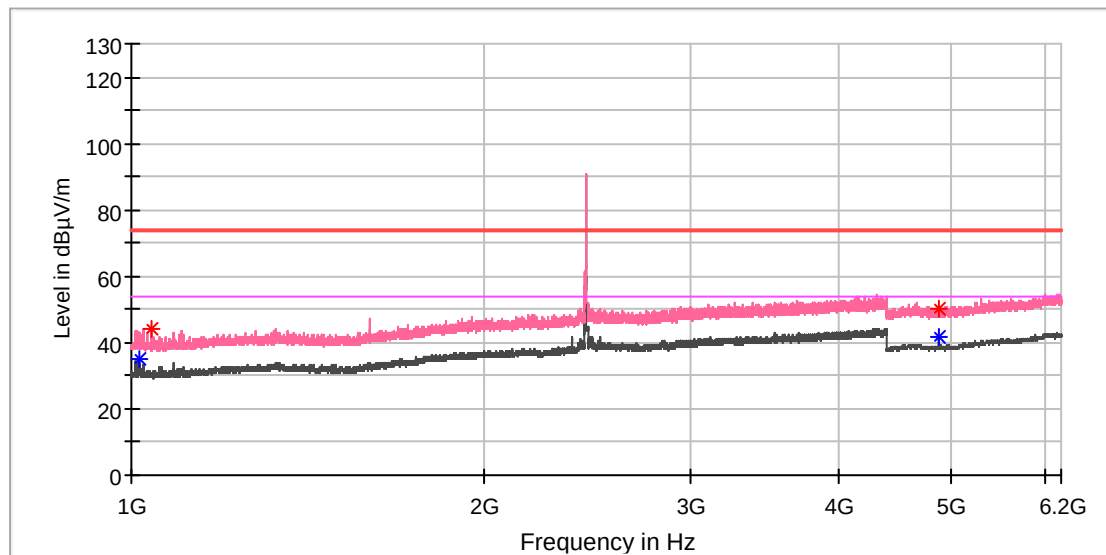
Horizontal



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7322.966667	---	36.61	54.00	17.39	100.0	H	208.0	8.2
7327.391667	44.65	---	74.00	29.35	100.0	H	96.0	8.1

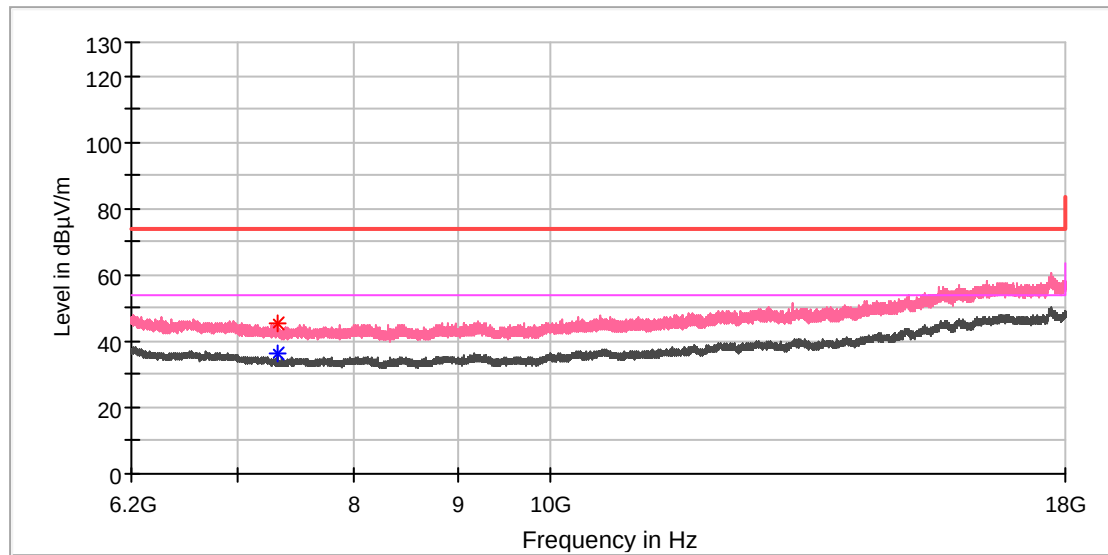
Vertical



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1016.787500	---	35.10	54.00	18.90	100.0	V	212.0	-0.2
1038.675000	44.14	---	74.00	29.86	100.0	V	232.0	-0.2
4882.000000	49.97	---	74.00	24.03	100.0	V	71.0	11.8
4882.000000	---	41.85	54.00	12.15	100.0	V	71.0	11.8

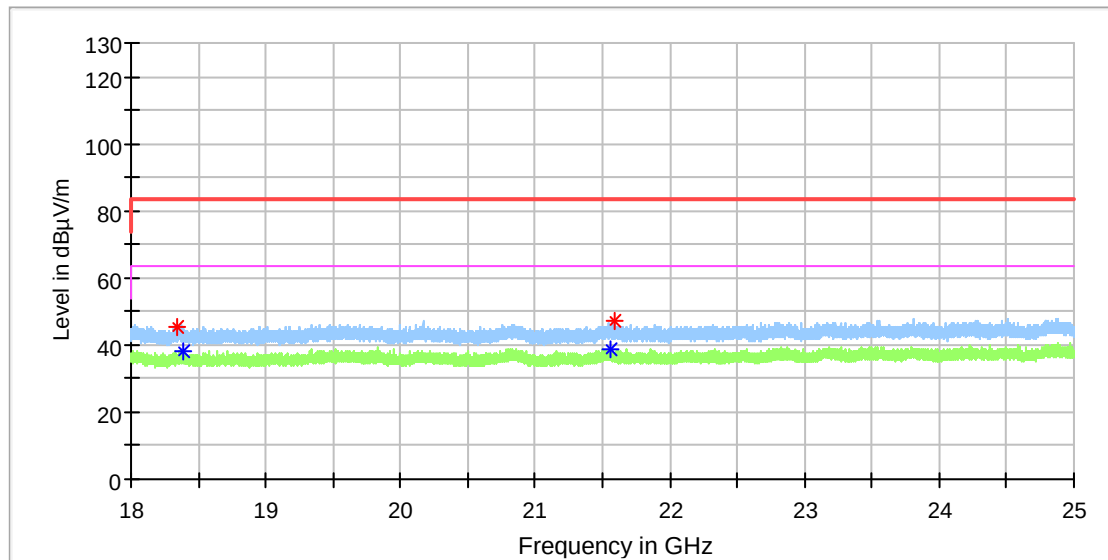
Vertical



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7319.525000	45.06	---	74.00	28.94	100.0	V	125.0	8.2
7322.966667	---	36.19	54.00	17.81	100.0	V	355.0	8.2

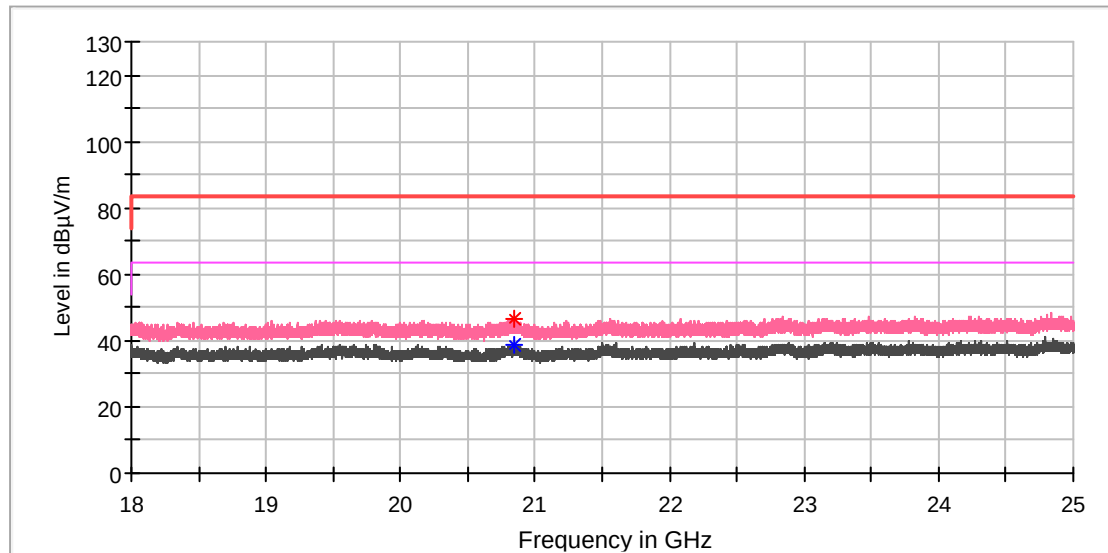
Horizontal



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18348.687500	45.64	---	83.50	37.86	100.0	H	28.0	-13.4
18383.906250	---	38.06	63.50	25.44	100.0	H	304.0	-13.4
21554.031250	---	38.75	63.50	24.75	100.0	H	147.0	-11.7
21596.031250	47.21	---	83.50	36.29	100.0	H	317.0	-11.7

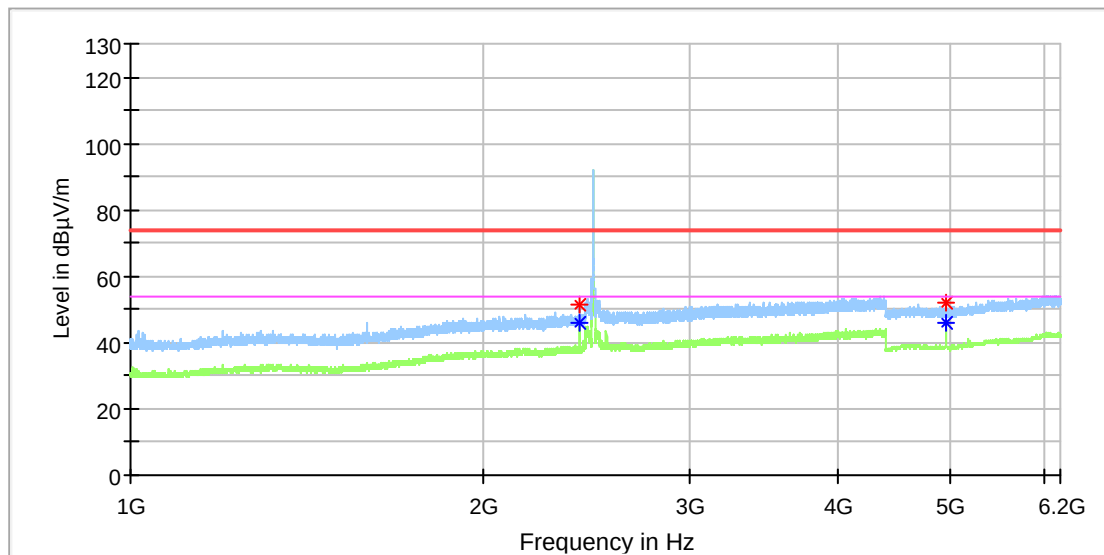
Vertical



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
20837.406250	---	38.59	63.50	24.91	100.0	V	0.0	-12.3
20847.906250	46.39	---	83.50	37.11	100.0	V	129.0	-12.3

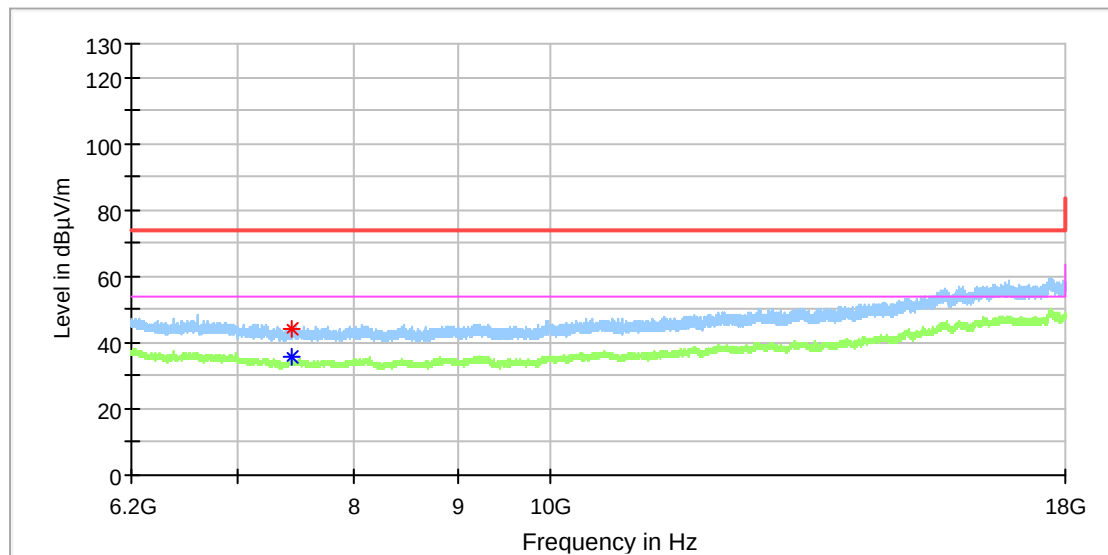
Mode: A3
 Horizontal



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2416.100000	51.35	---	74.00	22.65	100.0	H	180.0	7.1
2416.100000	---	46.00	54.00	8.00	100.0	H	180.0	7.1
4960.000000	---	46.17	54.00	7.83	100.0	H	71.0	11.8
4960.500000	52.30	---	74.00	21.70	100.0	H	71.0	11.8

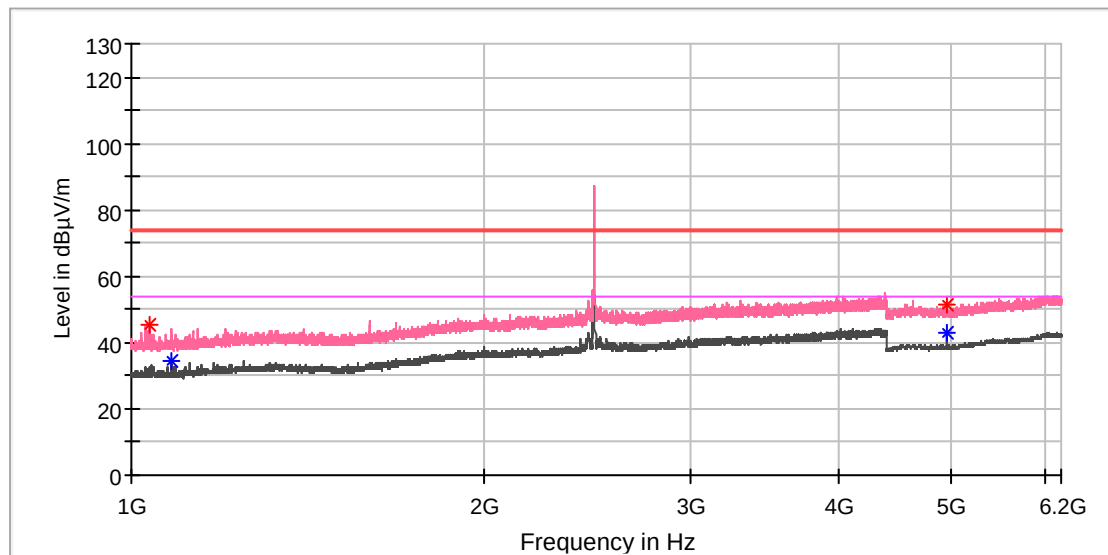
Horizontal



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7439.983333	---	35.71	54.00	18.29	100.0	H	110.0	8.4
7441.950000	44.39	---	74.00	29.61	100.0	H	54.0	8.4

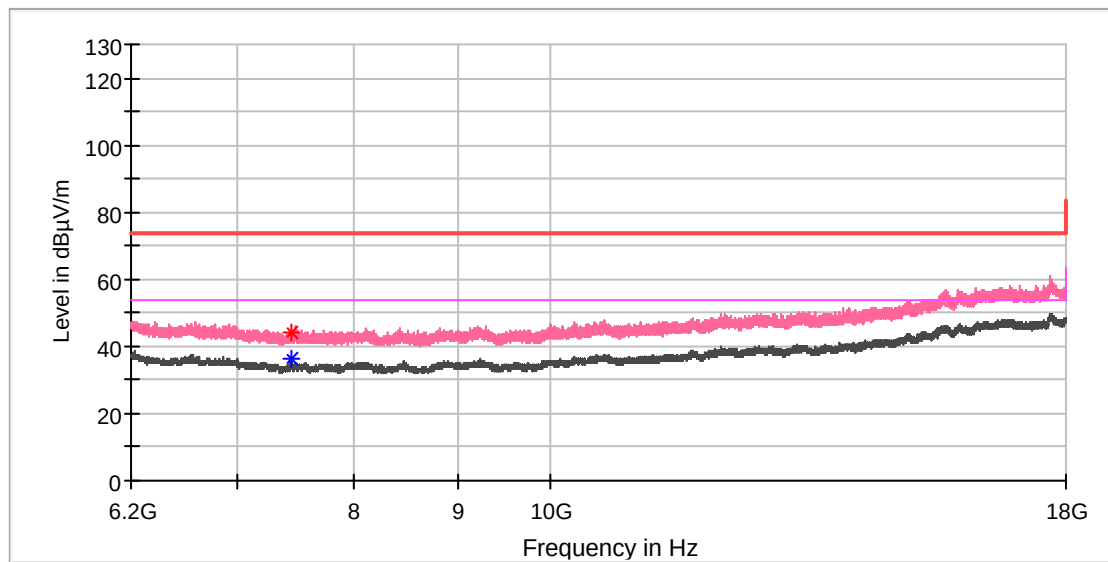
Vertical



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1034.425000	45.16	---	74.00	28.84	100.0	V	214.0	-0.2
1083.300000	---	34.64	54.00	19.36	100.0	V	225.0	-0.2
4956.500000	51.63	---	74.00	22.37	100.0	V	153.0	11.8
4960.000000	---	42.91	54.00	11.09	100.0	V	110.0	11.8

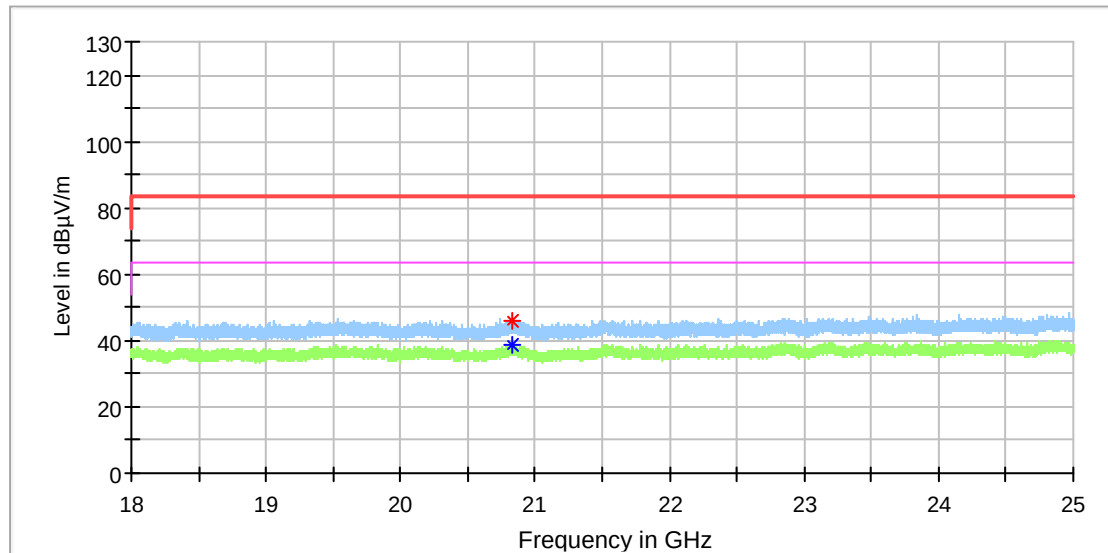
Vertical



Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7440.475000	44.08	---	74.00	29.92	100.0	V	331.0	8.4
7440.475000	---	36.13	54.00	17.87	100.0	V	331.0	8.4

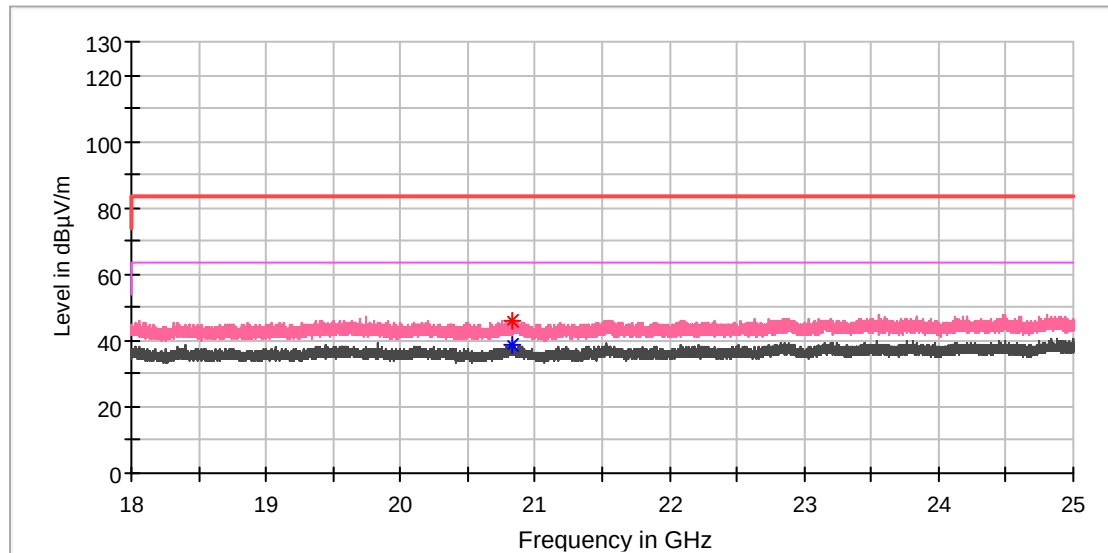
Horizontal



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
20831.937500	46.11	---	83.50	37.39	100.0	H	43.0	-12.3
20834.343750	---	38.51	63.50	24.99	100.0	H	217.0	-12.3

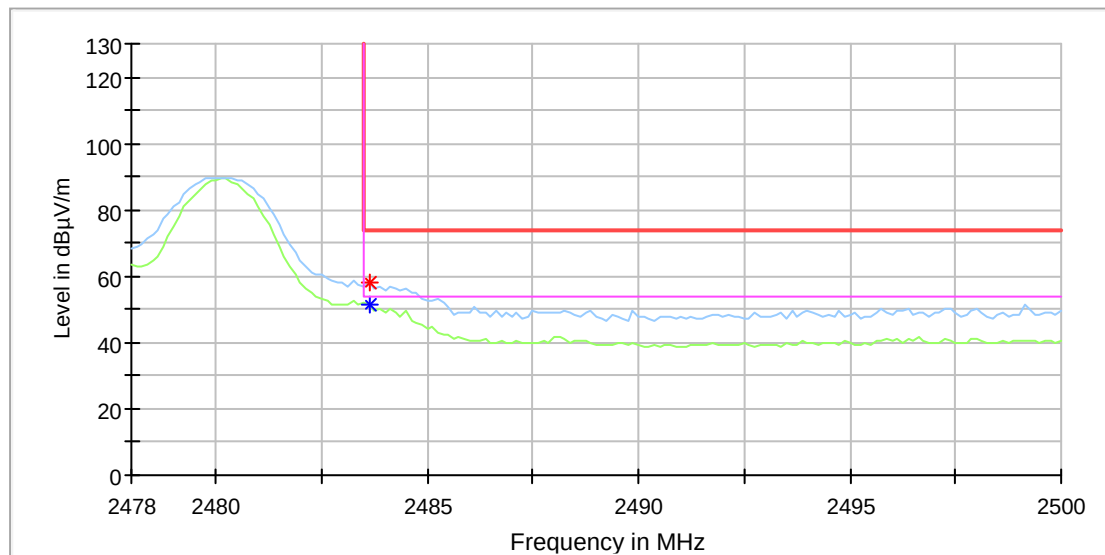
Vertical



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
20827.562500	---	38.95	63.50	24.55	100.0	V	242.0	-12.3
20827.781250	45.70	---	83.50	37.80	100.0	V	25.0	-12.3

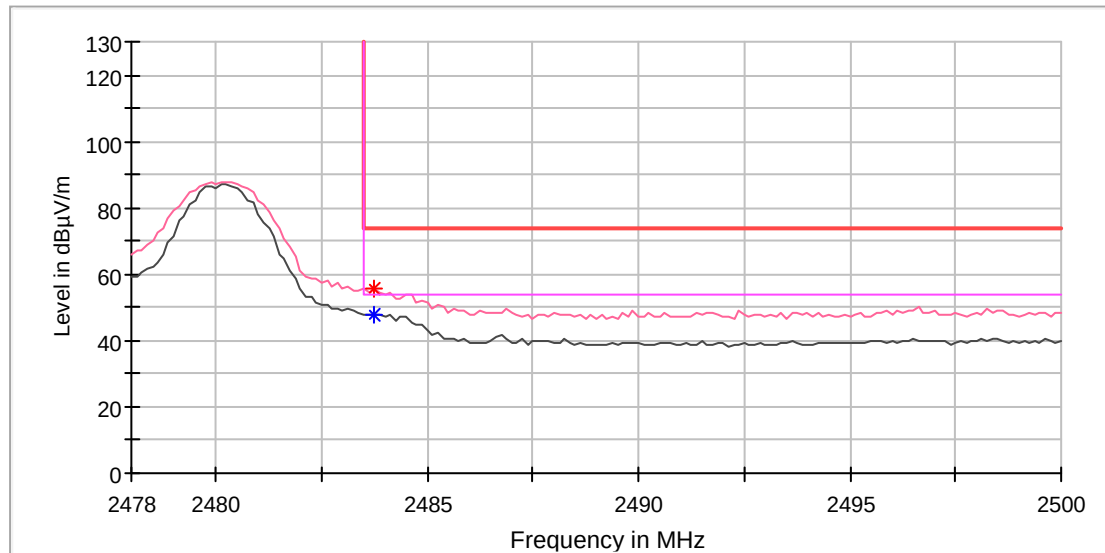
Horizontal



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.625000	---	51.21	54.00	2.79	100.0	H	120.0	7.4
2483.625000	57.93	---	74.00	16.07	100.0	H	120.0	7.4

Vertical



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.750000	55.63	---	74.00	18.37	100.0	V	284.0	7.4
2483.750000	---	47.91	54.00	6.09	100.0	V	284.0	7.4