

TEST REPORT

Applicant: Hera GmbH &Co.KG
Address of Applicant: Dieselstr.9 D-32130,Enger, Nordrhein Westfalen,Germany
Manufacturer: Hera GmbH &Co.KG
Address of Manufacturer: Dieselstr.9 D-32130,Enger, Nordrhein Westfalen,Germany
Factory: Hera GmbH &Co.KG
Address of Factory: Dieselstr.9 D-32130,Enger, Nordrhein Westfalen,Germany

Equipment Under Test (EUT)

Product Name: Radio remote control
Model No.: Hi-Drive Fernbedienung
Trade Mark: Hera
FCC ID: 2BBPR208050021
Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.249
Date of sample receipt: 2024/08/23
Date of Test: 2024/08/26-2024/08/29
Date of report issued: 2024/08/30
Test Result : PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



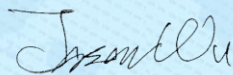
Robinson Luo
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	2024/08/30	Original

Prepared By:

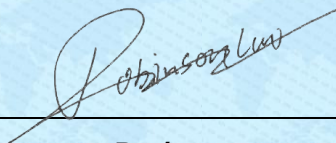


Date:

2024/08/30

Project Engineer

Check By:



Date:

2024/08/30

Reviewer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	N/A
Field strength of the fundamental signal	15.249 (a)	Pass
Spurious emissions	15.249 (a) (d)/15.209	Pass
Band edge	15.249 (d)/15.205	Pass
20dB Occupied Bandwidth	15.215 (c)	Pass

Remarks:

1. Test according to ANSI C63.10:2013.
2. Pass: The EUT complies with the essential requirements in the standard.

4.1 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Duty cycle	$\pm 0.37\%$
3	Occupied Bandwidth	$\pm 3\%$
4	RF conducted power	$\pm 0.75\text{dB}$
5	RF power density	$\pm 3\text{dB}$
6	Conducted Spurious emissions	$\pm 2.58\text{dB}$
7	AC Power Line Conducted Emission	$\pm 3.44\text{dB}$ (0.15MHz ~ 30MHz)
8	Radiated Spurious emission test	$\pm 3.1\text{dB}$ (9kHz-30MHz)
		$\pm 3.8039\text{dB}$ (30MHz-200MHz)
		$\pm 3.9679\text{dB}$ (200MHz-1GHz)
		$\pm 4.29\text{dB}$ (1GHz-18GHz)
		$\pm 3.30\text{dB}$ (18GHz-40GHz)
9	Temperature test	$\pm 1^\circ\text{C}$
10	Humidity test	$\pm 3\%$
11	Time	$\pm 3\%$

5 General Information

5.1 General Description of EUT

Product Name:	Radio remote control
Model No.:	Hi-Drive Fernbedienung
Serial No.:	N/A
Test sample(s) ID:	GTSL2024090004-1
Sample(s) Status	Engineered sample
Operation Frequency:	2440MHz
Modulation Type:	GFSK
Antenna Type:	PCB Antenna
Antenna gain:	2.39dBi
Power supply:	DC 3V or DC 3.3V Lithium Battery

Remark:

1. Antenna gain information provided by the customer
2. The relevant information of the sample is provided by the entrusting company, and the laboratory is not responsible for its authenticity.

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
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Per-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

Axis	X	Y	Z
Field Strength(dBuV/m)	71.35	70.22	69.55

5.3 Description of Support Units

None.

5.4 Deviation from Standards

None.

5.5 Abnormalities from Standard Conditions

None.

5.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC—Registration No.: 381383**

Designation Number: CN5029

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files.

- **ISED—Registration No.: 9079A**

CAB identifier: CN0091

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of ISED for radio equipment testing

- **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

5.7 Test Location

All tests were performed at:
Global United Technology Services Co., Ltd. Address: No. 123- 128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102 Tel: 0755-27798480 Fax: 0755-27798960

5.8 Additional Instructions

Test Software	Special test command provided by manufacturer
Power level setup	Default

6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	June 22, 2024	June 21, 2027
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	April 11, 2024	April 10, 2025
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9168	GTS640	March 19, 2023	March 18, 2025
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	April 17, 2023	April 16, 2025
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	April 11, 2024	April 10, 2025
8	Loop Antenna	ZHINAN	ZN30900A	GTS534	Nov. 13, 2023	Nov.12, 2024
9	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	April 11, 2024	April 10, 2025
10	Amplifier(1GHz-26.5GHz)	HP	8449B	GTS601	April 11, 2024	April 10, 2025
11	Horn Antenna (18-26.5GHz)	/	UG-598A/U	GTS664	Oct. 29, 2023	Oct. 28, 2024
12	Horn Antenna (26.5-40GHz)	A.H Systems	SAS-573	GTS665	Oct. 29, 2023	Oct. 28, 2024
13	FSV·Signal Analyzer (10Hz-40GHz)	Keysight	FSV-40-N	GTS666	March 12, 2024	March 11, 2025
14	Amplifier	/	LNA-1000-30S	GTS650	April 11, 2024	April 10, 2025
15	CDNE M2+M3-16A	HCT	30MHz-300MHz	GTS692	Nov. 08, 2023	Nov.07, 2024
16	Wideband Amplifier	/	WDA-01004000-15P35	GTS602	April 11, 2024	April 10, 2025
17	Thermo meter	JINCHUANG	GSP-8A	GTS643	April 18, 2024	April 17, 2025
18	RE cable 1	GTS	N/A	GTS675	July 02. 2024	July 01. 2025
19	RE cable 2	GTS	N/A	GTS676	July 02. 2024	July 01. 2025
20	RE cable 3	GTS	N/A	GTS677	July 02. 2024	July 01. 2025
21	RE cable 4	GTS	N/A	GTS678	July 02. 2024	July 01. 2025
22	RE cable 5	GTS	N/A	GTS679	July 02. 2024	July 01. 2025
23	RE cable 6	GTS	N/A	GTS680	July 02. 2024	July 01. 2025
24	RE cable 7	GTS	N/A	GTS681	July 05. 2024	July 04. 2025
25	RE cable 8	GTS	N/A	GTS682	July 05. 2024	July 04. 2025

RF Conducted Test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	April 11, 2024	April 10, 2025
2	EMI Test Receiver	R&S	ESCI 7	GTS552	April 11, 2024	April 10, 2025
3	PSA Series Spectrum Analyzer	Agilent	E4440A	GTS536	April 11, 2024	April 10, 2025
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	April 11, 2024	April 10, 2025
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	April 11, 2024	April 10, 2025
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	April 11, 2024	April 10, 2025
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	April 11, 2024	April 10, 2025
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	April 11, 2024	April 10, 2025
9	Thermo meter	JINCHUANG	GSP-8A	GTS641	April 18, 2024	April 17, 2025
10	EXA Signal Analyzer	Keysight	N9010B	MY60241168	Nov. 03, 2023	Nov. 02, 2024

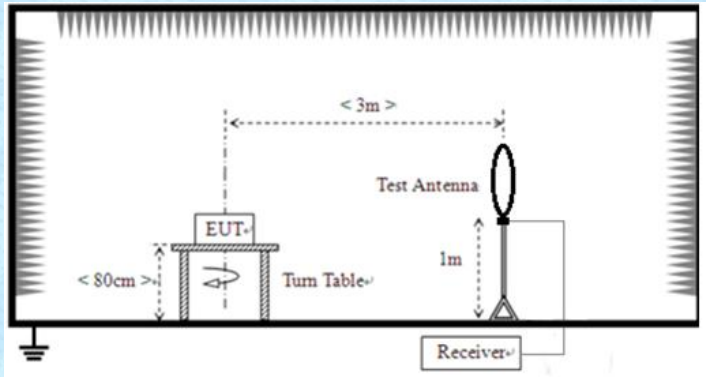
General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	KUMAO	SF132	GTS647	April 18, 2024	April 17, 2025

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: 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, 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. 15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.	
EUT Antenna:	
The antenna is PCB antenna, reference to the appendix II for details.	

7.2 Radiated Emission Method

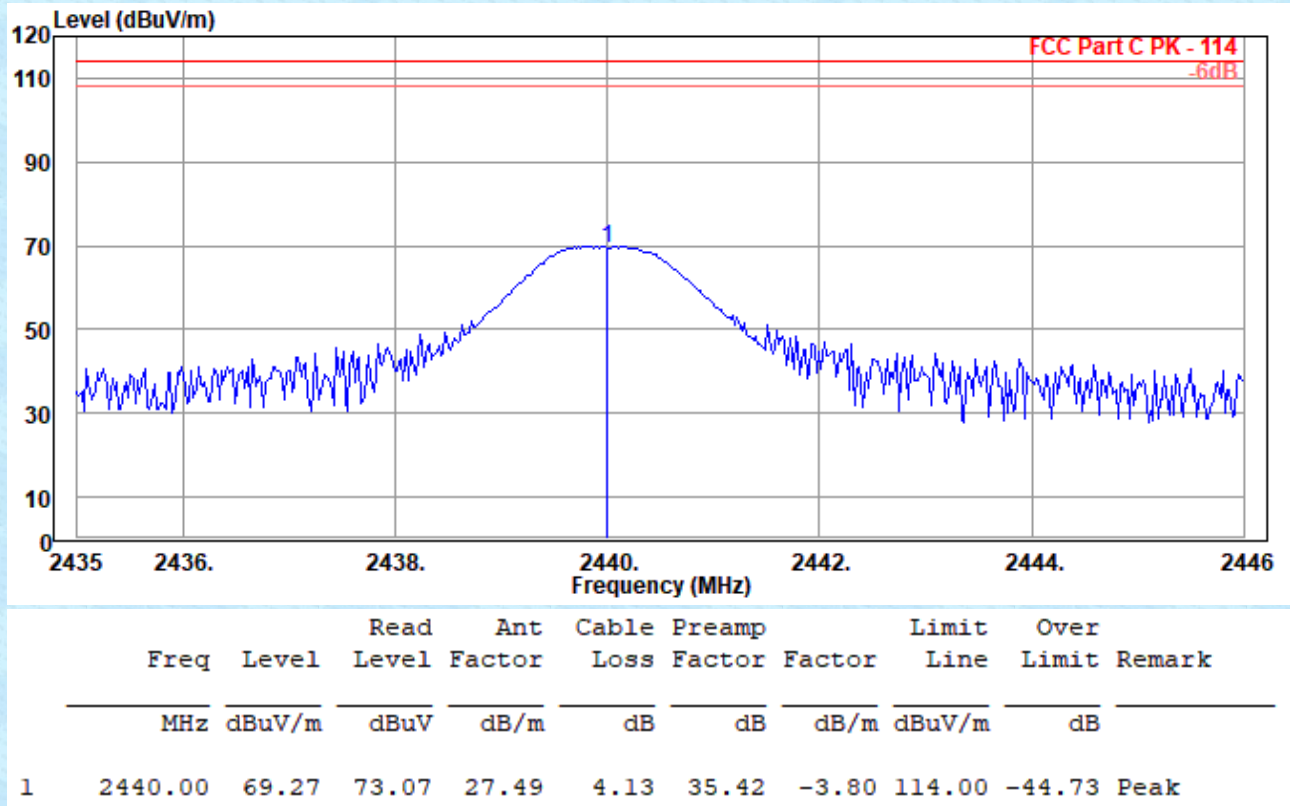
Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	9kHz-150kHz	Quasi-peak	200Hz	300Hz	Quasi-peak Value
	150kHz-30MHz	Quasi-peak	9kHz	10kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	10Hz	Average Value
Limit: (Field strength of the fundamental signal)	Frequency		Limit (dBuV/m @3m)		Remark
	2400MHz-2483.5MHz		94.00		Average Value
			114.00		Peak Value
Limit: (Spurious Emissions)	Frequency		Limit (uV/m)		Remark
	0.009MHz-0.490MHz		2400/F(kHz) @300m		Quasi-peak Value
	0.490MHz-1.705MHz		24000/F(kHz) @30m		Quasi-peak Value
	1.705MHz-30.0MHz		30 @30m		Quasi-peak Value
	30MHz-88MHz		100 @3m		Quasi-peak Value
	88MHz-216MHz		150 @3m		Quasi-peak Value
	216MHz-960MHz		200 @3m		Quasi-peak Value
	960MHz-1GHz		500 @3m		Quasi-peak Value
	Above 1GHz		500 @3m		Average Value
		5000 @3m		Peak Value	
Limit: (band edge)	Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.				
Test setup:	For radiated emissions from 9kHz to 30MHz  For radiated emissions from 30MHz to1GHz				

Measurement data:

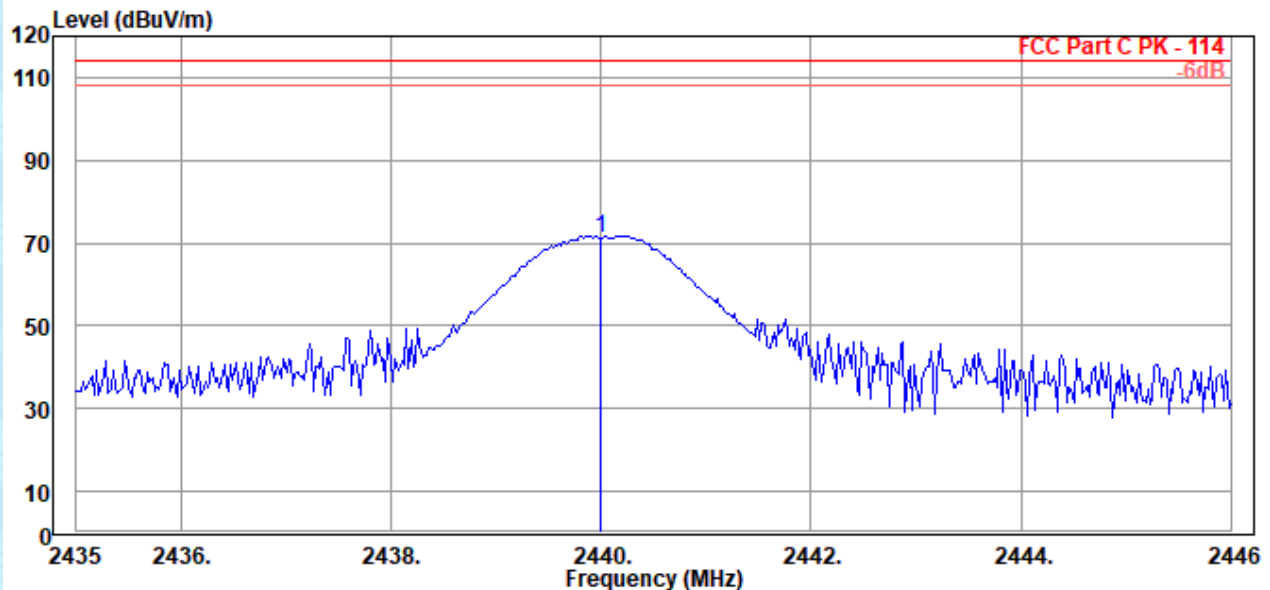
7.2.1 Field Strength of The Fundamental Signal

Peak value:

Horizontal



Vertical



	Freq	Level	Read	Ant	Cable	Preamp	Limit	Over	
	MHz	dBuV/m	Level	Factor	Loss	Factor	Line	Limit	Remark
	MHz	dBuV/m	dBuV	dB/m	dB	dB	dB/m	dBuV/m	dB
1	2440.00	71.35	75.15	27.49	4.13	35.42	-3.80	114.00	-42.65 Peak

Note: For fundamental frequency , RBW>20dB BW, VBW>=RBW, PK detector for PK value, RMS detector for AV value

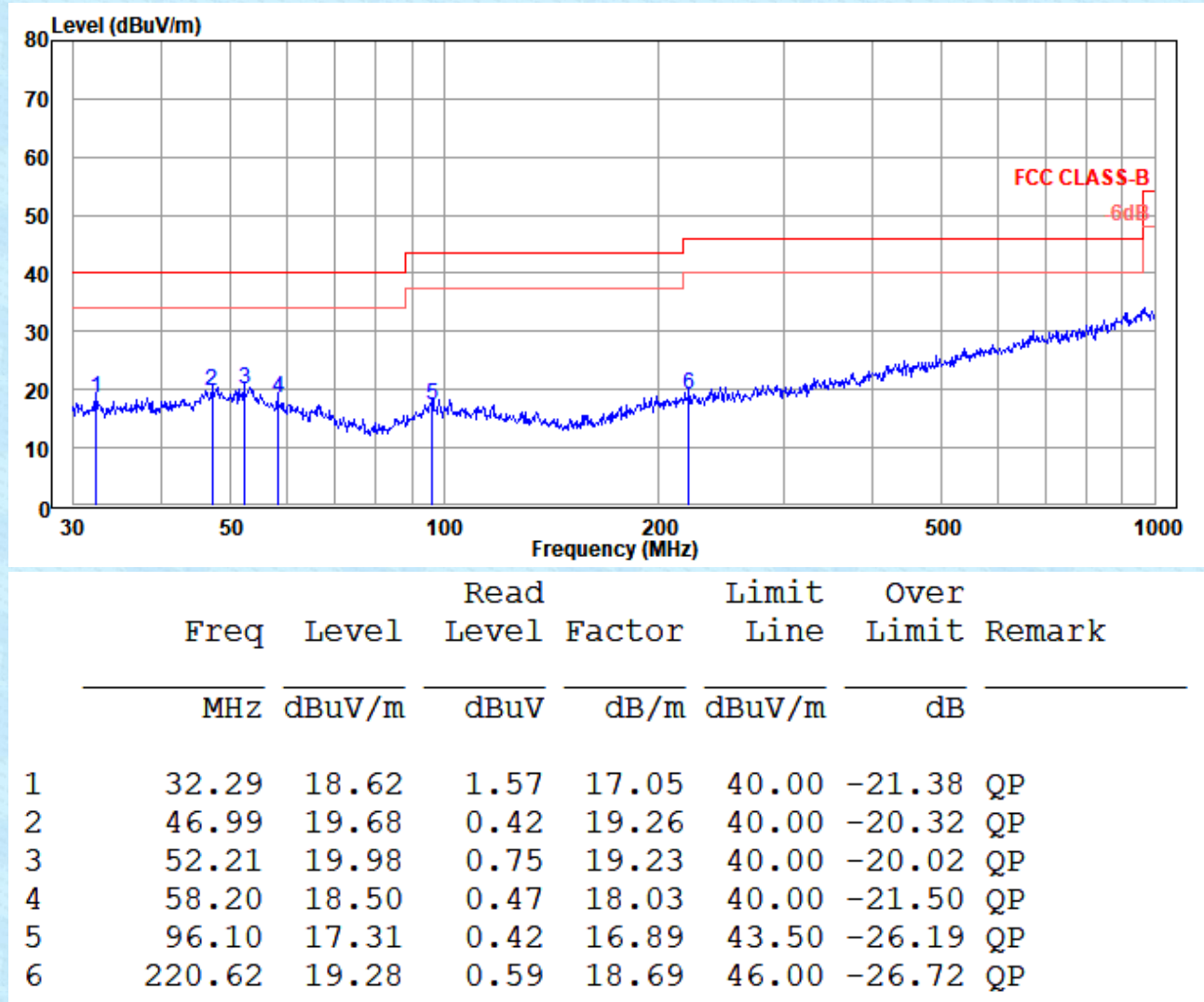
7.2.2 Spurious emissions

■ Below 30MHz

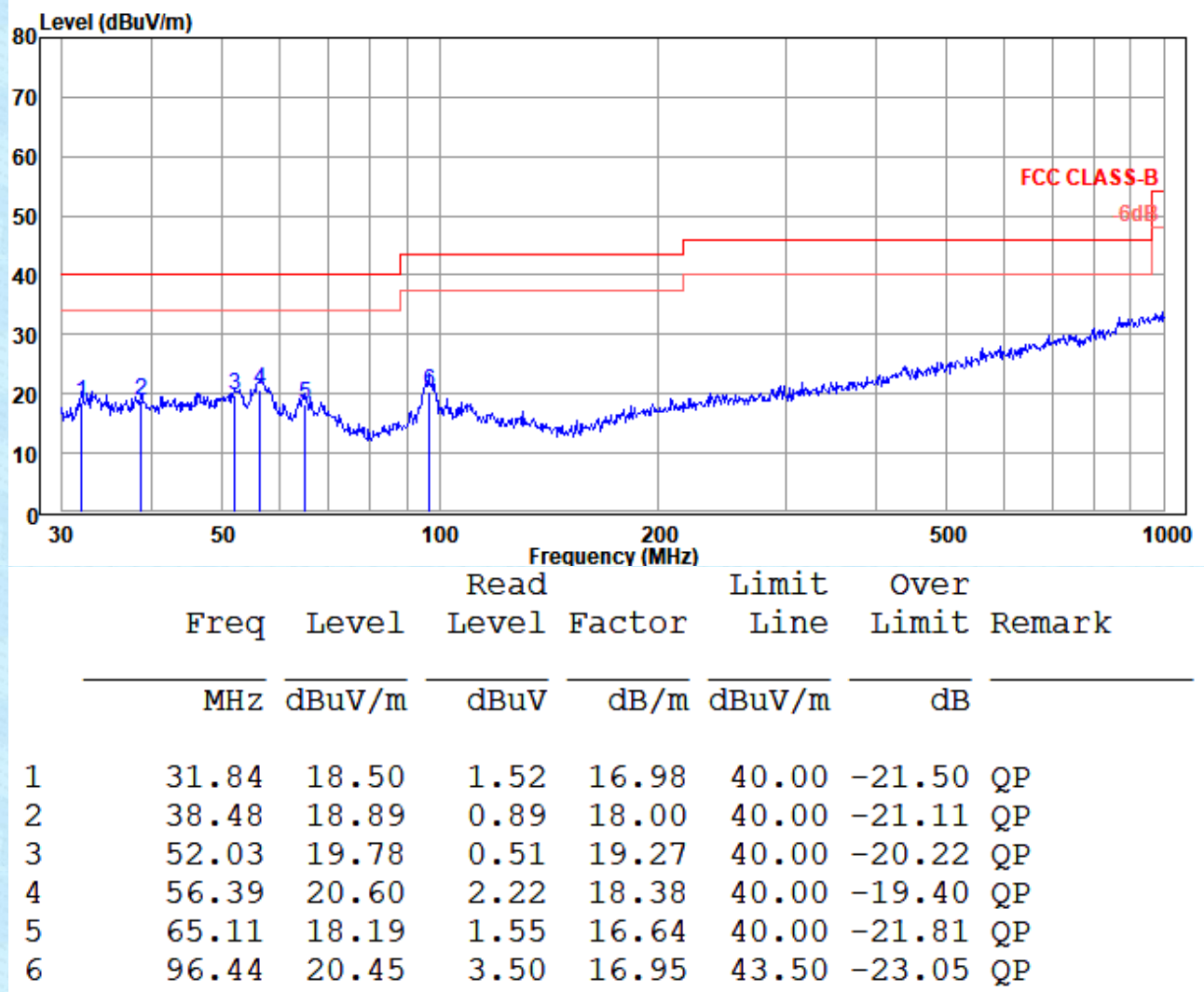
The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o), the test result no need to reported.

■ Below 1GHz

Horizontal



Vertical



■ Above 1GHz

Test channel:	2440MHz	Polarization:	Horizontal
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	Freq	Level	Read Level	Ant Factor	Cable Loss	Preamp Factor		Limit Line	Over Limit	Remark
	MHz	dBuV/m	dBuV	dB/m	dB	dB	dB/m	dBuV/m	dB	
1	2440.00	71.00	74.80	27.49	4.13	35.42	-3.80	114.00	-43.00	Peak
2	4876.00	56.02	54.42	31.35	5.91	35.66	1.60	74.00	-17.98	Peak
3	7324.00	53.81	44.49	35.98	7.17	33.83	9.32	74.00	-20.19	Peak
4	9772.00	50.26	37.55	38.54	8.22	34.05	12.71	74.00	-23.74	Peak

	Freq	Level	Read Level	Ant Factor	Cable Loss	Preamp Factor		Limit Line	Over Limit	Remark
	MHz	dBuV/m	dBuV	dB/m	dB	dB	dB/m	dBuV/m	dB	
1	2440.00	47.18	50.98	27.49	4.13	35.42	-3.80	94.00	-46.82	Average
2	4876.00	35.97	34.37	31.35	5.91	35.66	1.60	54.00	-18.03	Average
3	7324.00	33.52	24.20	35.98	7.17	33.83	9.32	54.00	-20.48	Average
4	9330.00	35.21	22.74	38.56	8.04	34.13	12.47	54.00	-18.79	Average

Test channel:	2440MHz	Polarization:	Vertical
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	Freq	Level	Read Level	Ant Factor	Cable Loss	Preamp Factor	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV/m	dBuV	dB/m	dB	dB	dB/m	dBuV/m	dB	
1	2440.00	70.18	73.98	27.49	4.13	35.42	-3.80	114.00	-43.82	Peak
2	4876.00	42.09	40.49	31.35	5.91	35.66	1.60	74.00	-31.91	Peak
3	7392.00	43.50	34.02	36.14	7.20	33.86	9.48	74.00	-30.50	Peak
4	10214.00	47.32	34.03	38.83	8.42	33.96	13.29	74.00	-26.68	Peak

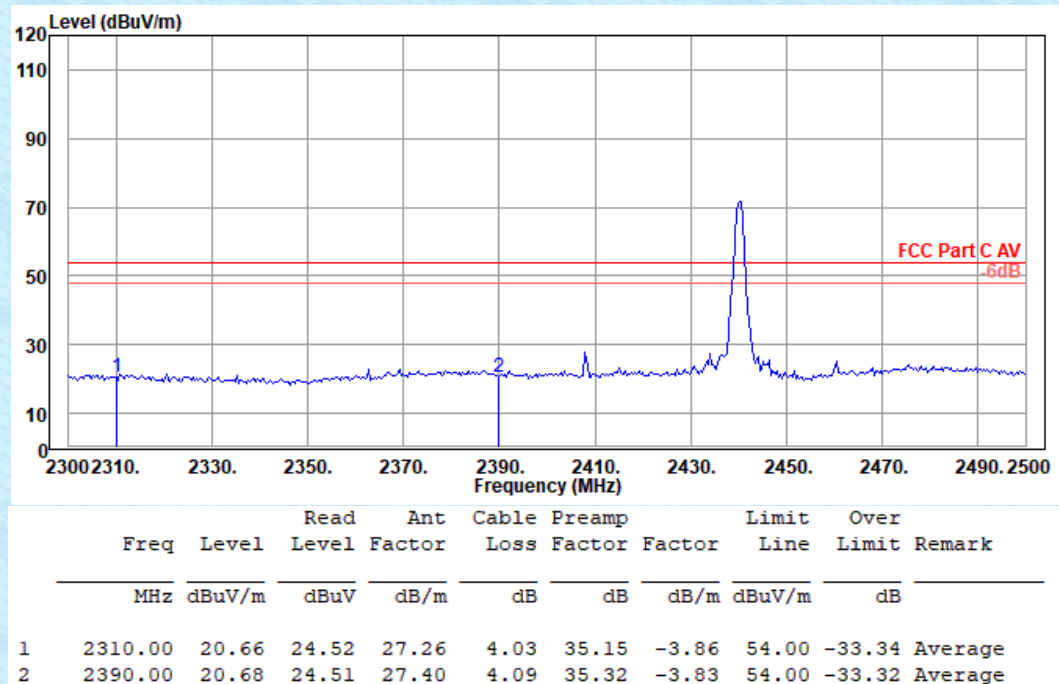
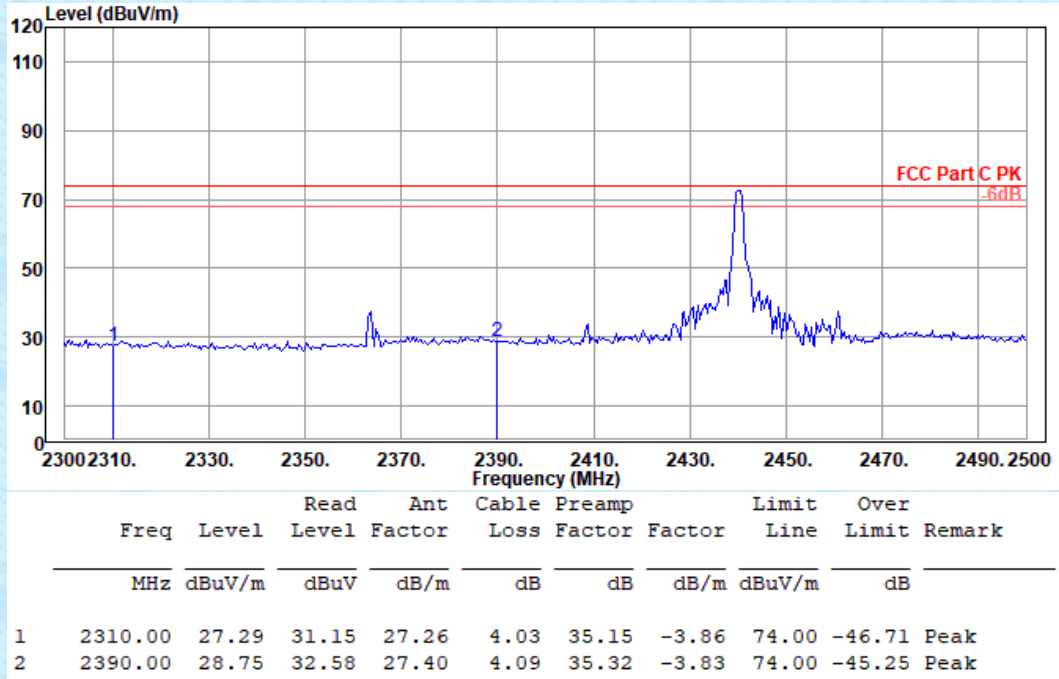
	Freq	Level	Read Level	Ant Factor	Cable Loss	Preamp Factor	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV/m	dBuV	dB/m	dB	dB	dB/m	dBuV/m	dB	
1	2440.00	45.94	49.74	27.49	4.13	35.42	-3.80	94.00	-48.06	Average
2	4876.00	30.46	28.86	31.35	5.91	35.66	1.60	54.00	-23.54	Average
3	7324.00	31.14	21.82	35.98	7.17	33.83	9.32	54.00	-22.86	Average
4	9772.00	39.43	26.72	38.54	8.22	34.05	12.71	54.00	-14.57	Average

Remarks:

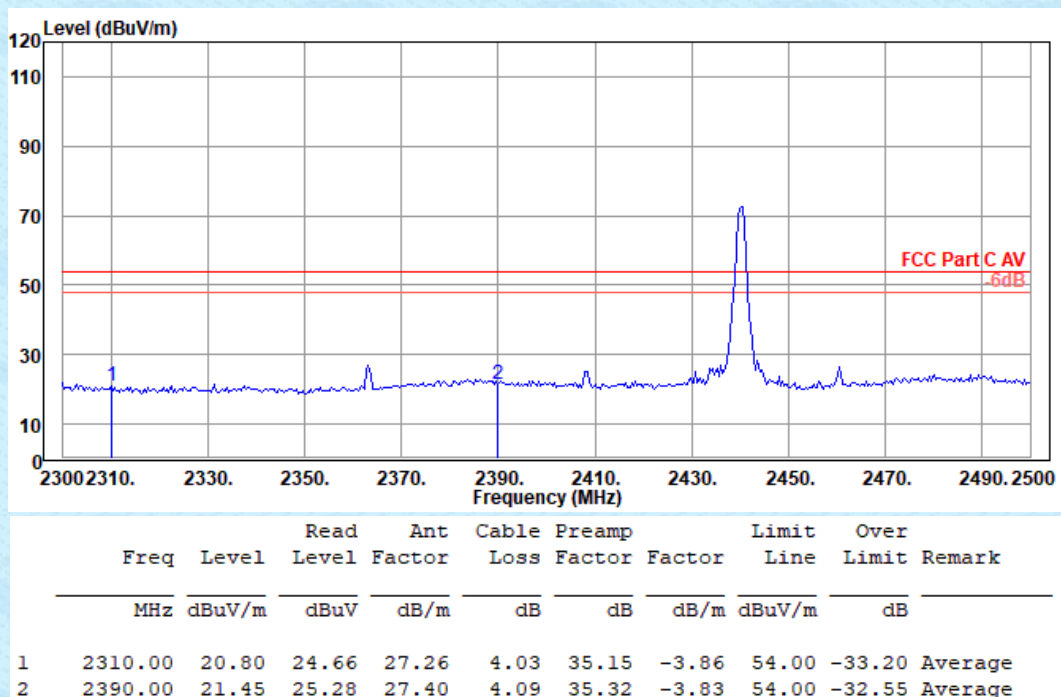
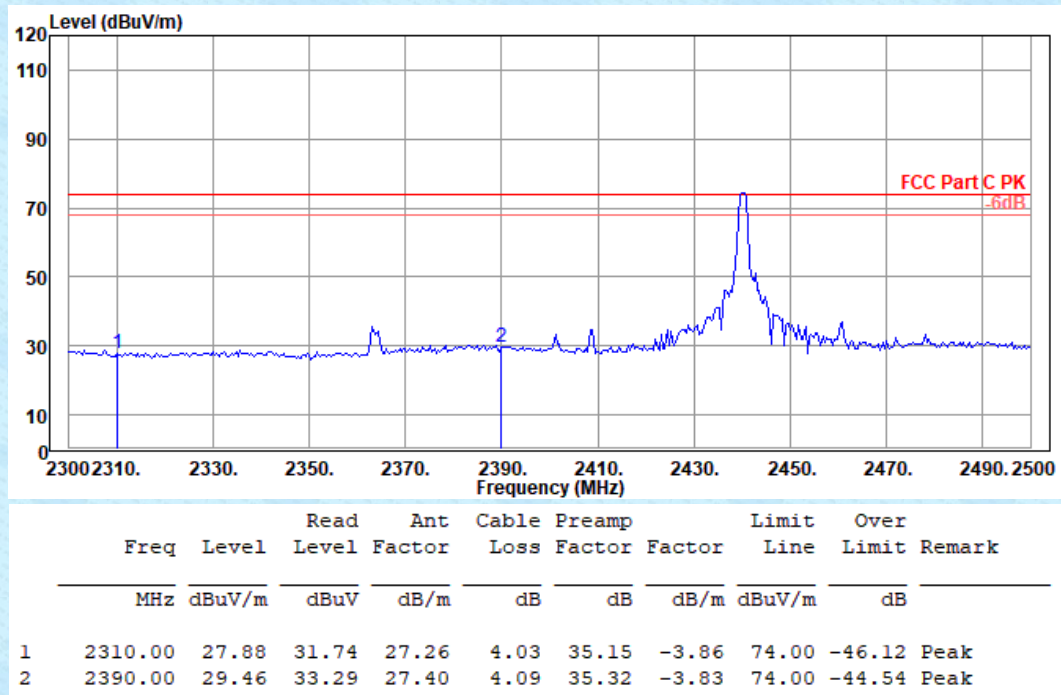
1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. For above 18GHz, no emission found.
4. If the average limit is met when using a Peak detector, the EUT shall be deemed to meet both peak and average limits. And measurement with the average detector is unnecessary.

7.2.3 Bandedge emissions

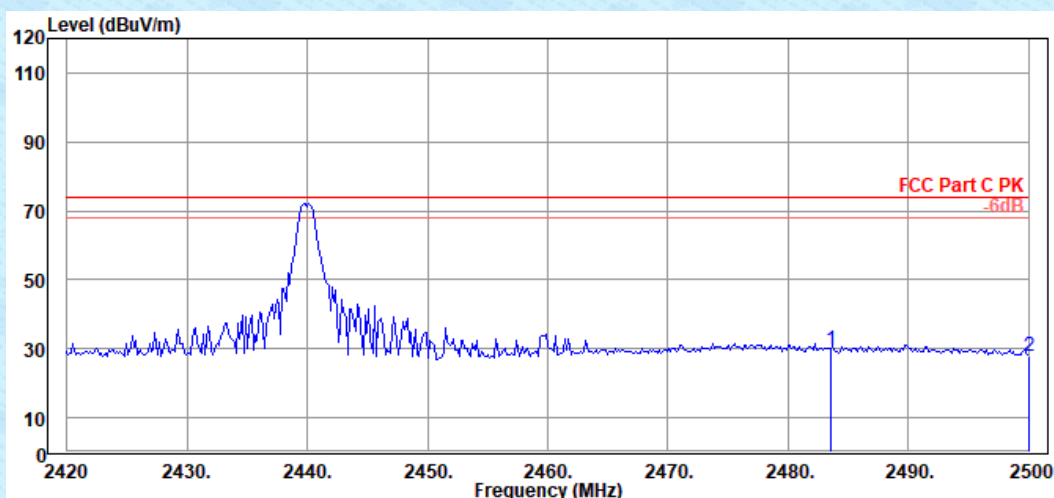
Test channel:	Lowest	Polarization:	Horizontal
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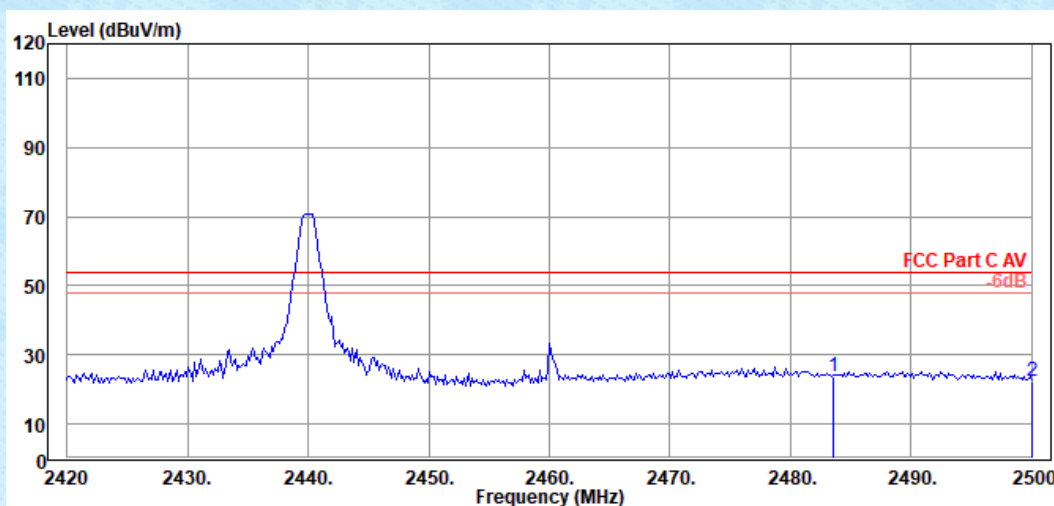
Test channel:	Lowest	Polarization:	Vertical
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Test channel:	Highest	Polarization:	Horizontal
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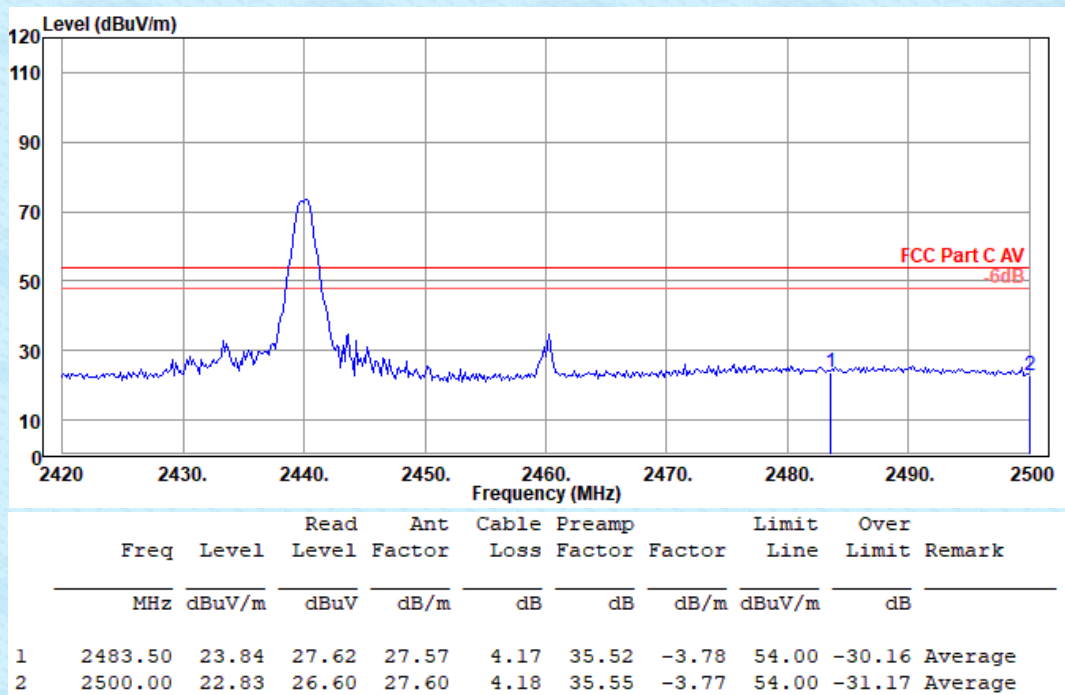
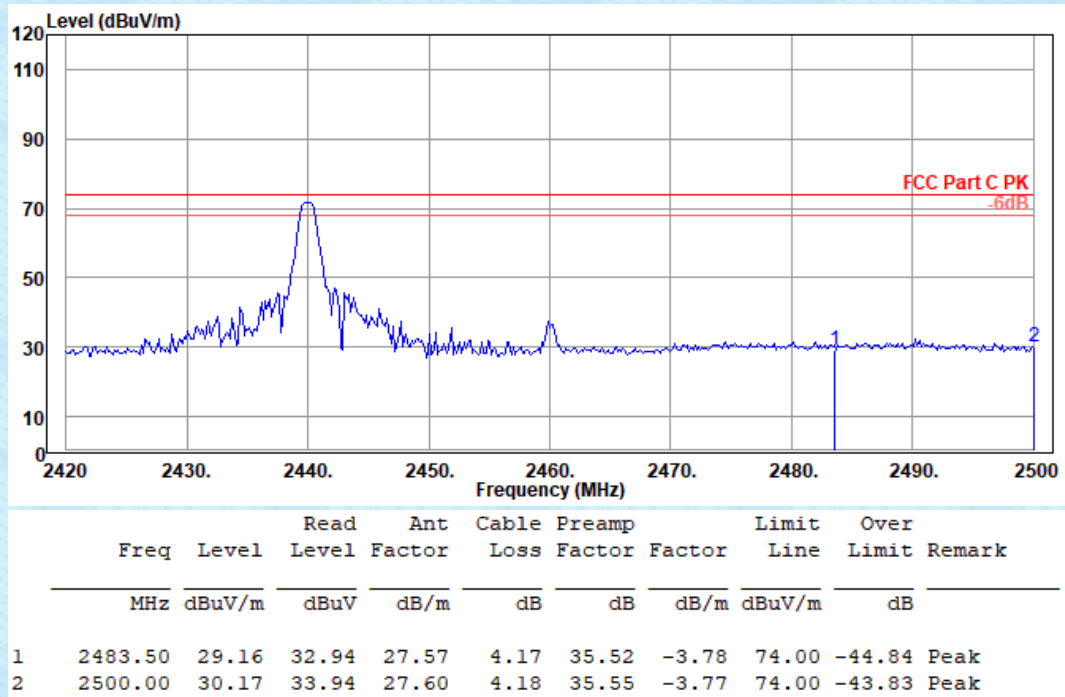


	Freq	Level	Read Level	Ant Factor	Cable Loss	Preamp Factor	Limit Line	Over Limit	Remark
	MHz	dBuV/m	dBuV	dB/m	dB	dB	dBuV/m	dB	
1	2483.50	29.59	33.37	27.57	4.17	35.52	-3.78	74.00	-44.41 Peak
2	2500.00	27.93	31.70	27.60	4.18	35.55	-3.77	74.00	-46.07 Peak



	Freq	Level	Read Level	Ant Factor	Cable Loss	Preamp Factor	Limit Line	Over Limit	Remark
	MHz	dBuV/m	dBuV	dB/m	dB	dB	dBuV/m	dB	
1	2483.50	23.79	27.57	27.57	4.17	35.52	-3.78	54.00	-30.21 Average
2	2500.00	22.30	26.07	27.60	4.18	35.55	-3.77	54.00	-31.70 Average

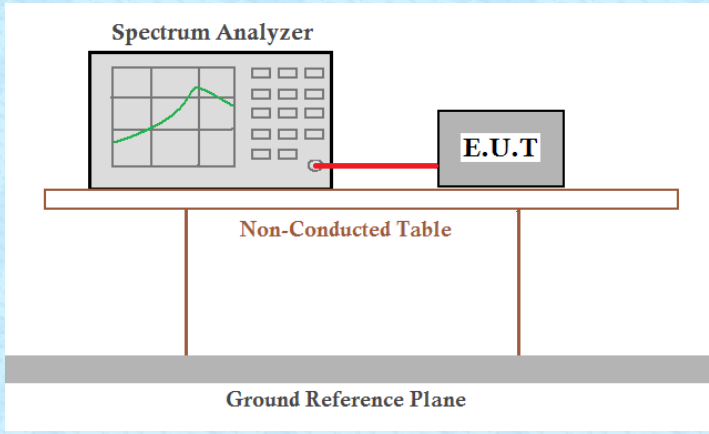
Test channel:	Highest	Polarization:	Vertical
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Remark:

- Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
- For above 18GHz, no emission found

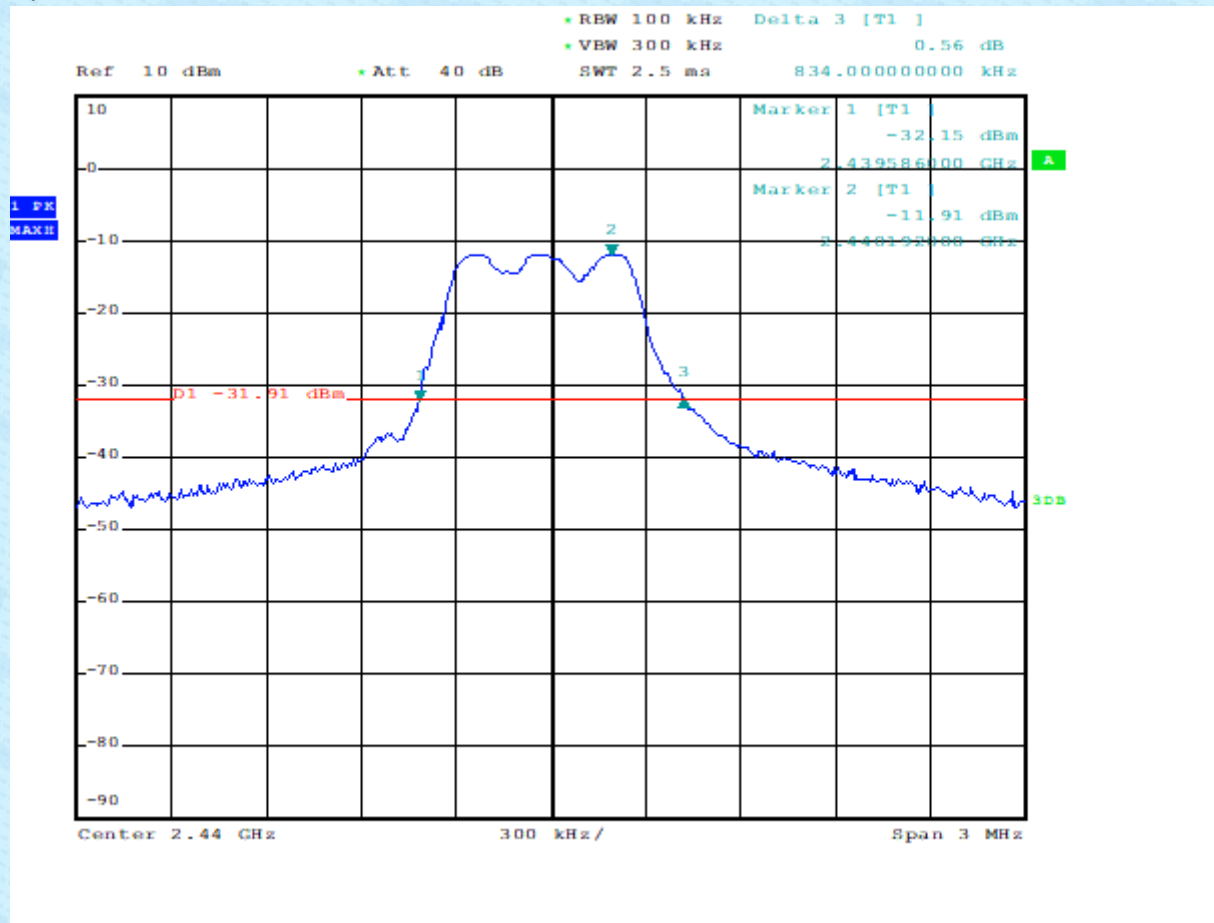
7.3 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.249/15.215
Test Method:	ANSI C63.10:2013
Limit:	Operation Frequency range 2440MHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Test Frequency	20dB bandwidth(kHz)	Result
2440MHz	834	Pass

Test plot as follows:



8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

-----End-----