



Shenzhen Huaxin Information Technology Service Co., Ltd

101, R & D Building, No.3 guansheng 4th Road, Luhua Community, Guanhu Street, Longhua District, Shenzhen, Guangdong, China

Tel: +86-755-21018313 Http: //www.tecovo.net

TEST REPORT

Report No.: **HX260608R001**

IC.....: **20208-B004E**

FCC ID.....: **2AD99B004E**

Applicant.....: **Bird Home Automation GmbH**

IC Address.....: Uhlandstraße 165 Berlin IP 10719 Germany (Federal Republic Of)

FCC Address.....: Uhlandstr. 165, 10719 Berlin, Germany

Manufacturer.....: Bird Home Automation GmbH

IC Address.....: Uhlandstraße 165 Berlin IP 10719 Germany (Federal Republic Of)

FCC Address.....: Uhlandstr. 165, 10719 Berlin, Germany

Product Name.....: **IP Video Door Station**

Trade Mark.....: DoorBird

Model/Type reference.....: D22x

Listed Model(s): /

Standard.....: **RSS-247 Issue 4**
FCC Rules Part 15.247

Date of receipt of test sample...: May. 27, 2026

Date of testing.....: May. 28, 2026 ~ June. 13, 2026

Date of issue.....: June. 13, 2026

Result.....: **PASS**

Compiled by:

(Printed name + signature)

Terry Su



Approved by:

(Printed name + signature)

Amy Zhai

Testing Laboratory Name.....: **Shenzhen Huaxin Information Technology Service Co., Ltd**

Address.....: 101, R & D Building, No.3 guansheng 4th Road, Luhua Community,
Guanhu Street, Longhua District, Shenzhen, Guangdong, China

This test report shall not be copied in any form except with the written approval of our laboratory. The customer shall not claim that the product has been endorsed by Shenzhen Huaxin Information Technology Service Co., Ltd. based on this report, The test results in the report are only applicable to the samples tested. Without the signatures of the compiled engineer and the approver, the test report will be invalid. Any objection shall be submitted to Shenzhen Huaxin Information Technology Service Co., Ltd. within 15 days from the date of receiving the report. After this period, it will not be considered. The test report only corresponds to the test sample.



Table of Contents

Page

1. TEST SUMMARY	3
1.1. TEST STANDARDS	3
1.2. REPORT VERSION	3
1.3. TEST DESCRIPTION	4
1.4. TEST FACILITY	5
1.5. MEASUREMENT UNCERTAINTY	5
1.6. ENVIRONMENTAL CONDITIONS	6
2. GENERAL INFORMATION	7
2.1. CLIENT INFORMATION	7
2.2. GENERAL DESCRIPTION OF EUT	7
2.3. ACCESSORY EQUIPMENT INFORMATION	8
2.4. OPERATION STATE	9
2.5. MEASUREMENT INSTRUMENTS LIST	10
3. TEST ITEM AND RESULTS	12
3.1. CONDUCTED EMISSION	12
3.2. RADIATED EMISSION	15
3.3. RADIATED EMISSIONS RESTRICTED BAND	31
3.4. BAND EDGE AND SPURIOUS EMISSIONS (CONDUCTED)	36
3.5. DTS BANDWIDTH	41
3.6. PEAK OUTPUT POWER	44
3.7. POWER SPECTRAL DENSITY	46
3.8. DUTY CYCLE	48
3.9. ANTENNA REQUIREMENT	50



1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Operation within the bands of 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.

[RSS-247 Issue 4](#): Standard Specifications for Frequency Hopping Systems (FHSs) and Digital Transmission Systems (DTSS) Operating in the Bands 902-928MHz, 2400-2483.5MHz and 5725-5850MHz.

[ANSI C63.10-2020+Cor 1-2023+C63.10a-2024 + Errata to C63.10a-2024](#): American National Standard for Testing Unlicensed Wireless Devices.

[RSS-Gen Issue 5](#): General Requirements for Compliance of Radio Apparatus.

1.2. Report version

Revised No.	Date of issue	Description
01	June. 13, 2026	Original



1.3. Test Description

FCC Part 15 Subpart C (15.247) / RSS-247 Issue 4				
Test Item	Standard Section		Result	Test Engineer
	FCC	IC		
Antenna Requirement	15.203 & 15.247(b)(4)	RSS-Gen 6.8	Pass	Sain Liao
Conducted Emission	15.207	RSS-Gen 8.8	Pass	Ann Lu
Conducted Band Edge and Spurious Emissions	15.247(d)	RSS-247 6.6 & RSS-Gen 8.10	Pass	Sain Liao
Radiated Emissions Restricted Band and Radiated Spurious Emissions	15.205&15.209 & 15.247(d)	RSS-Gen 8.9 & RSS-Gen 8.10	Pass	Sain Liao
6dB Bandwidth	15.247(a)(2)	RSS-247 6.3.1 (a)	Pass	Sain Liao
Occupied Bandwidth	/	RSS-Gen 6.7	Pass	Sain Liao
Peak Output Power	15.247(b)(3)	RSS-247 6.3.2	Pass	Sain Liao
Power Spectral Density	15.247(e)	RSS-247 6.3.1 (b)	Pass	Sain Liao
Transmitter Radiated Spurious	15.209&15.247(d)	RSS-247 6.6 & RSS-Gen 8.10	Pass	Sain Liao

Note: "N/A" is not applicable.

The measurement uncertainty is not included in the test result.



1.4. Test Facility

Shenzhen Huaxin Information Technology Service Co., Ltd

Add: 101, R & D Building, No.3 guansheng 4th Road, Luhuhu Community, Guanhu Street, Longhua District, Shenzhen, Guangdong, China

Laboratory accreditation

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

A2LA-Lab Cert. No.: 6855.01

Shenzhen Huaxin Information Technology Service Co., Ltd EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

Industry Canada (Company Number: 31786, CAB Identifier: CN0147)

Shenzhen Huaxin Information Technology Service Co., Ltd EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 31786.

FCC (Registration No.: 932271, Designation Number CN1344)

Shenzhen Huaxin Information Technology Service Co., Ltd 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 our files. Registration NO.: 932271.

1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Shenzhen Huaxin Information Technology Service Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Below is the best measurement capability for Shenzhen Huaxin Information Technology Service Co., Ltd



Test Items	Measurement Uncertainty	Notes
DTS Bandwidth	$\pm 3.70\%$	(1)
Maximum Conducted Output Power	$\pm 0.60\text{dB}$	(1)
Maximum Power Spectral Density Level	$\pm 0.46\text{dB}$	(1)
Band-edge Compliance	$\pm 4.40\text{dB}$	(1)
Conducted Spurious Emissions	$\pm 1.40\text{dB}$	(1)
Conducted Emissions 9kHz~30MHz	$\pm 3.10\text{dB}$	(1)
Radiated Emissions 9kHz~30MHz	$\pm 3.62\text{dB}$	(1)
Radiated Emissions 30~1000MHz	$\pm 4.63\text{dB}$	(1)
Radiated Emissions 1~18GHz	$\pm 4.40\text{dB}$	(1)
Radiated Emissions 18~40GHz	$\pm 4.40\text{dB}$	(1)

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

1.6. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	21°C ~ 27°C
Relative Humidity:	40% ~ 60%
Air Pressure:	101kPa



2. GENERAL INFORMATION

2.1. Client Information

Applicant:	Bird Home Automation GmbH
IC Address:	Uhlandstraße 165 Berlin IP 10719 Germany (Federal Republic Of)
FCC Address:	Uhlandstr. 165, 10719 Berlin, Germany
Manufacturer:	Bird Home Automation GmbH
IC Address:	Uhlandstraße 165 Berlin IP 10719 Germany (Federal Republic Of)
FCC Address:	Uhlandstr. 165, 10719 Berlin, Germany

2.2. General Description of EUT

Product Name:	IP Video Door Station
Trade Mark:	DoorBird
Model/Type reference:	D22x
Listed Model(s):	/
Power supply:	48Vdc from POE
Hardware version:	/
Software version:	/
Samples No.:	YP260528-E003-1
RF Specification	
Modulation:	GFSK
Data rate:	1Mbps
Operation frequency:	2402MHz~2480MHz
Channel number:	40
Channel separation:	2MHz
Antenna type:	PCB Antenna
Antenna gain:	3.57dBi



2.3. Accessory Equipment information

Equipment Information			
Name	Model	S/N	Manufacturer
Notebook	MCLG-16	2NZBB24117801340	HUAWEI
AC/DC Adapter	TEKA-UCA20US	---	TEKA
Cable Information			
Name	Shielded Type	Ferrite Core	Length
USB Cable	Without	Without	100cm
Test Software Information			
Name	Versions	/	/
SecreCRT	V7.1.1	/	/



2.4. Operation state

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. BT BLE, 40 channels are provided to the EUT. Channels 00/19/39 were selected for testing.

Operation Frequency List:

Channel	Frequency (MHz)
00	2402
01	2404
:	:
18	2438
19	2440
20	2442
:	:
38	2478
39	2480

Note: The display in grey were the channel selected for testing.

Test mode

For RF test items:
The engineering test program was provided and enabled to make EUT continuous transmit.
For AC power line conducted emissions:
The EUT was set to connect with the Bluetooth instrument under large package sizes transmission.
For Radiated spurious emissions test item:
The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.



2.5. Measurement Instruments List

RF Test System - SRD					
Item	Test Equipment	Manufacturer	Model No.	Versions/ Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY51280803	Apr. 08, 2027
2	Wideband Radio Communication Tester	R&S	CMW500	157763	Apr. 08, 2027
3	MXG Vector Signal Generator	Agilent	N5182A	101795	Apr. 08, 2027
4	EXG Analog Signal Generator	Agilent	N5181A	MY47421151	Apr. 08, 2027
5	RF Sensor Unit	Techy	TR1029-2	20220428P009	Apr. 08, 2027
6	High and low temperature test chamber	Asprey	LX-225L	2020091401	Apr. 08, 2027
7	SRD Test Software	TACHOY	RTS	V1.0.0	/
8	2G/3G/4G Test Software	TST	TST-PASS	V2.0	/
9	RF cable 1#	Yunyi	0.2M	/	Apr. 08, 2027

Radiated emission					
Item	Test Equipment	Manufacturer	Model No.	Versions/ Serial No.	Calibrated until
1	EMI spectrum receiver	R&S	ESR7	102543	Apr. 09, 2027
2	9*6*6 anechoic chamber	Mao Rui	9*6*6	/	Apr. 09, 2028
3	Spectrum analyzer	R&S	FSV40-N	101795	Apr. 09, 2027
4	Preamplifier	Agilent	8449B	3008A00551	Apr. 08, 2027
5	Preamplifier	HP	8447D	1616A02061	Apr. 09, 2027
6	Preamplifier	SKET	LNPA1840G-50	SK2019040302	Apr. 09, 2027
7	Horn Antenna	SCHWARZBECK	BBHA9170	00369	Apr. 10, 2028
8	Horn Antenna	A. H. System, Inc	SAS-571	915	Apr. 10, 2028
9	Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	01318	Apr. 10, 2028
10	Loop Antenna	SCHWARZBECK	FMZB1519B	00128	Apr. 08, 2027
11	6dB Fixed Attenuator	SKET	AP_DC01G-2W-N-6dB	SK2021012803	Apr. 08, 2027
12	RF Cable 0.009~1000MHz	Langjingkeji	N/J-NJ-RG58(1G) 9m	/	Apr. 09, 2027
13	RF Cable 1000~18000MHz	Langjingkeji	N/J-SMAAJ-406(18G) 9m	/	Apr. 09, 2027
14	RF Cable	Langjingkeji	2.92/M-2.92/M-0.5M	/	Apr. 12, 2027
15	RF Cable 18000~40000MHz	Langjingkeji	2.92/M-2.92/M-3M	/	Apr. 12, 2027
16	Test Software	SKET	EMC-I	V1.4.0.1	/
17	Test Software	FARA	EZ-EMC	FA-03A3	/

Conducted emission					
Item	Test Equipment	Manufacturer	Model No.	Versions/ Serial No.	Calibrated until
1	LISN	R&S	ENV216	101291	Apr. 09, 2027
2	LISN	R&S	ESH3-Z5	894981/024	Apr. 09, 2027
3	EMI Test Receiver	R&S	ESR7	102543	Apr. 09, 2027



5	RF Cable	Langjingkeji	N/J-NJ-RG58(1G) 10m	/	Apr. 09, 2027
6	Test Software	SKET	EMC-I	V1.4.0.1	/

Note: 1. The Cal. Interval was one year.

2. The cable loss has calculated in test result which connection between each test instruments.

3. TEST ITEM AND RESULTS

3.1. Conducted Emission

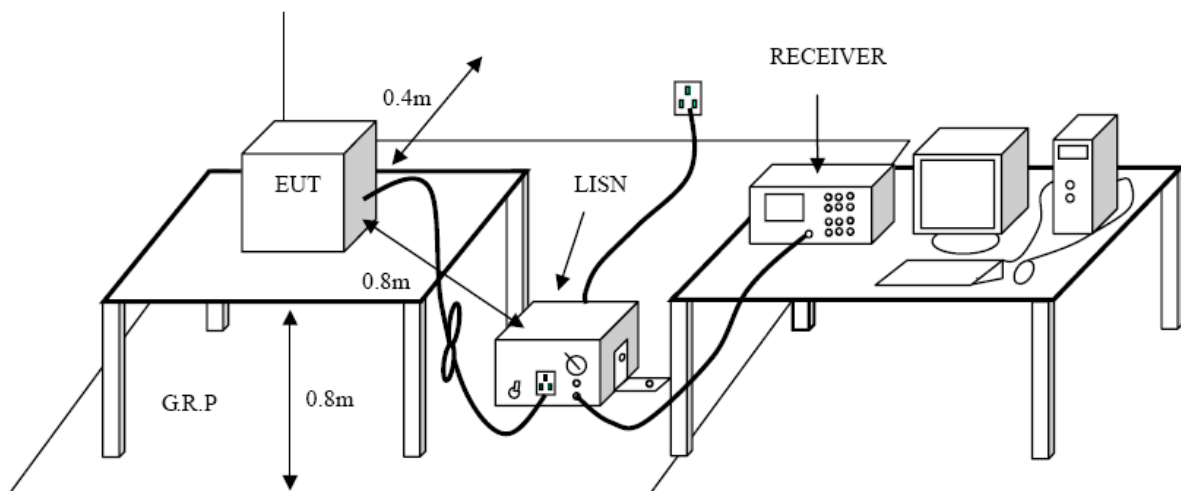
Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.207/ RSS-Gen 8.8

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test Configuration

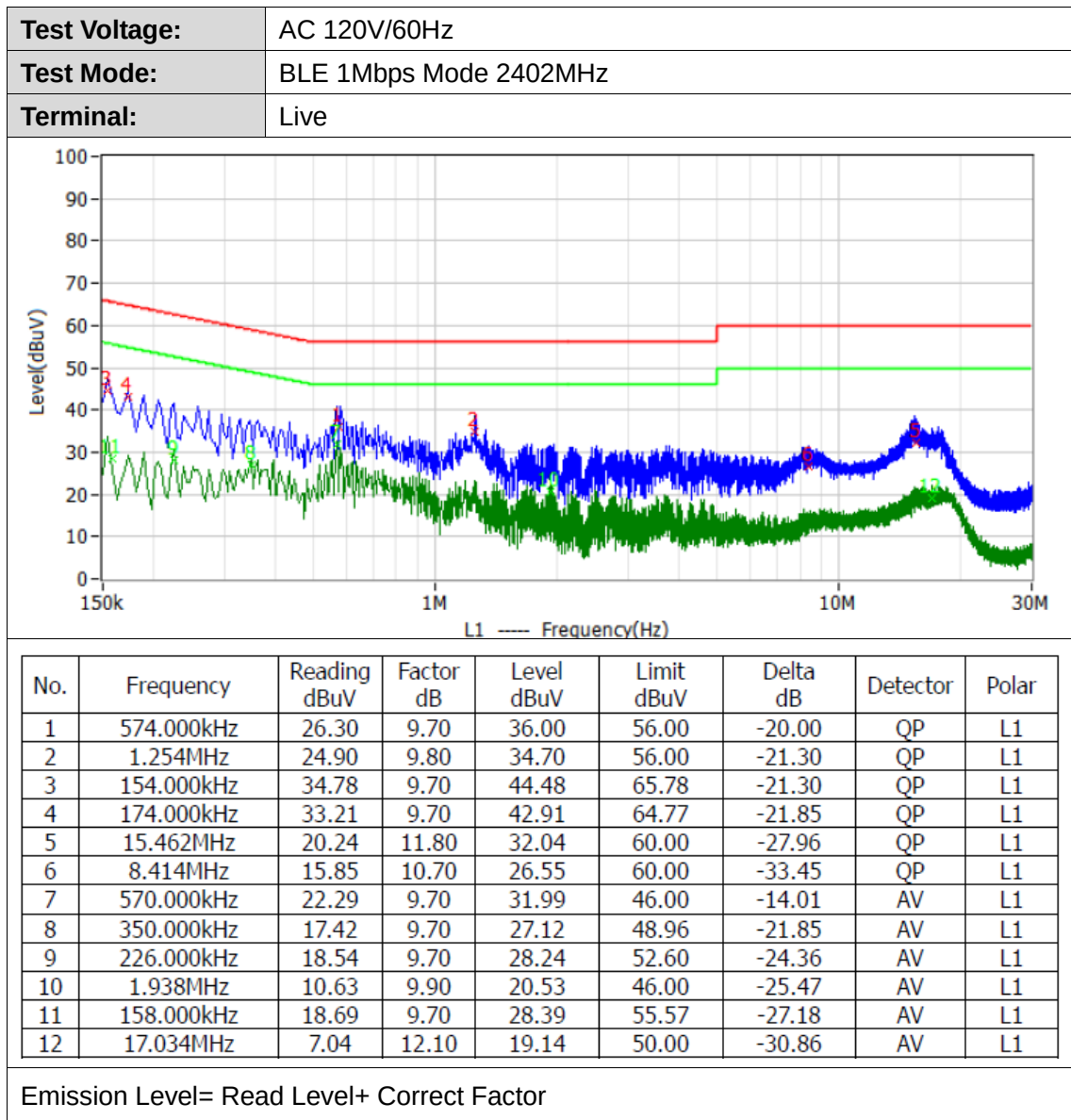


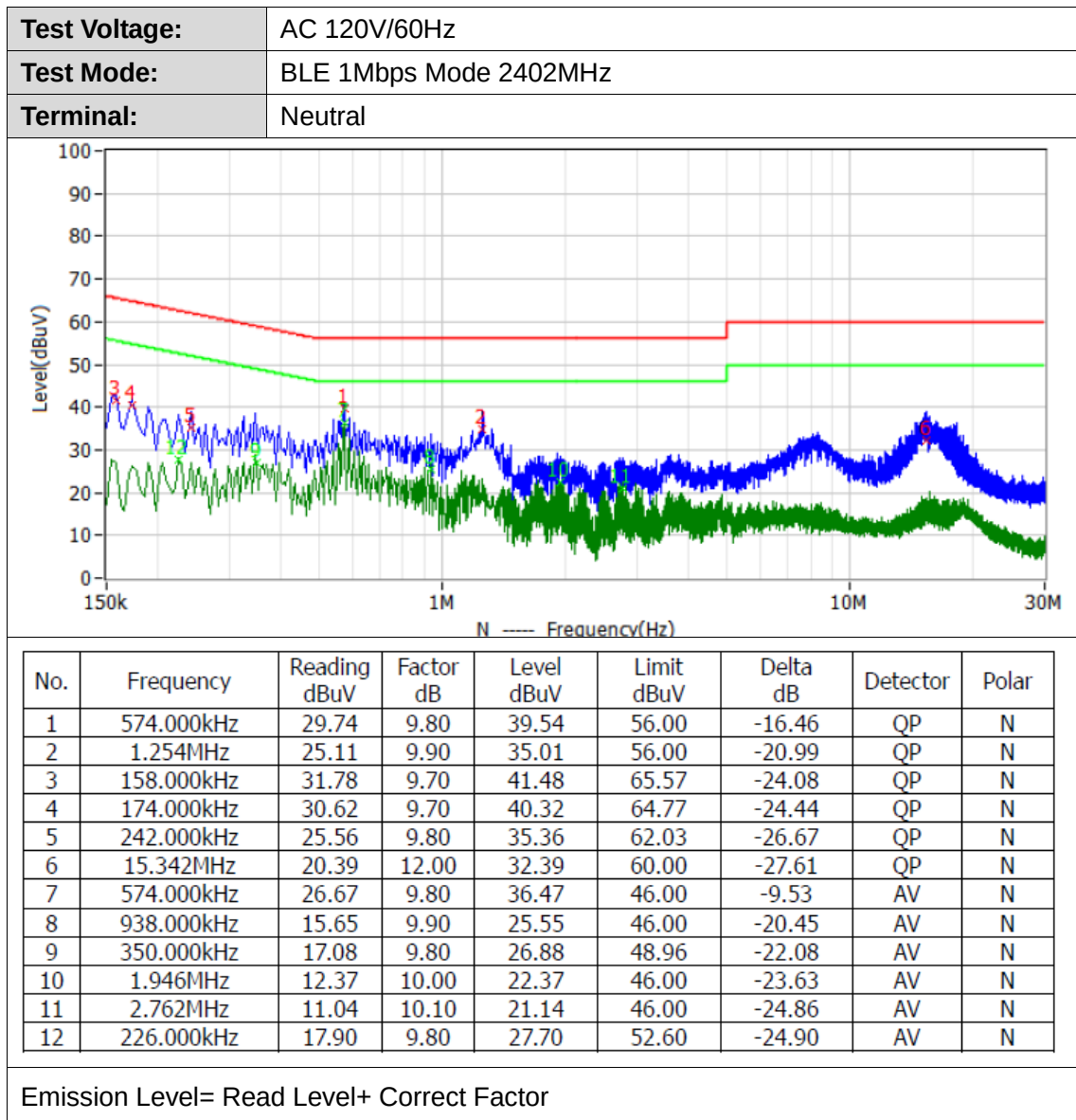
Test Procedure

1. The EUT was setup according to ANSI C63.10-2020+Cor 1-2023+C63.10a-2024 + Errata to C63.10a-2024 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, Raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
7. During the above scans, the emissions were maximized by cable manipulation.

**Test Mode:**

Please refer to the clause 2.4.

Test Results





3.2. Radiated Emission

Limit

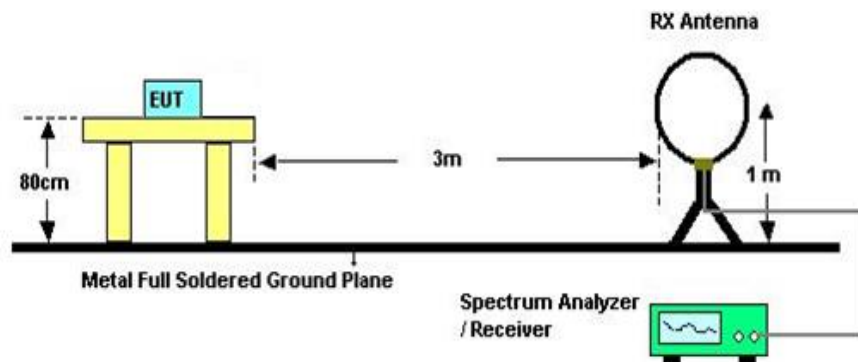
FCC CFR Title 47 Part 15 Subpart C Section 15.209/ RSS-Gen 8.9

Frequency	Limit (dBuV/m @3m)	Value
30 MHz ~ 88 MHz	40.00	Quasi-peak
88 MHz ~ 216 MHz	43.50	Quasi-peak
216 MHz ~ 960 MHz	46.00	Quasi-peak
960 MHz ~ 1 GHz	54.00	Quasi-peak
Above 1 GHz	54.00	Average
	74.00	Peak

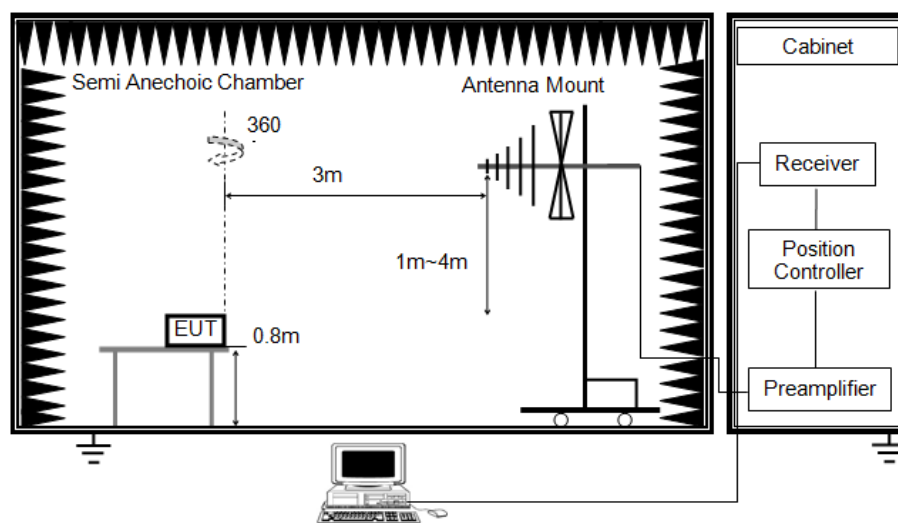
Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBuV/m)=20log Emission Level (uV/m).

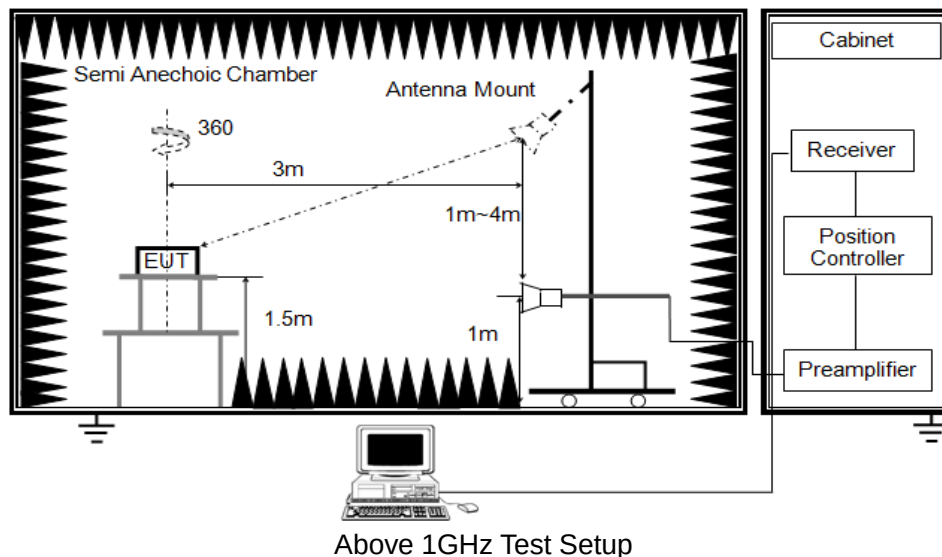
Test Configuration



Below 30MHz Test Setup



30MHz ~ 1000MHz Test Setup



Test Procedure

1. The EUT was setup and tested according to ANSI C63.10-2020+Cor 1-2023+C63.10a-2024 + Errata to C63.10a-2024
 2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
 5. Set to the maximum power setting and enable the EUT transmit continuously.
 6. Use the following spectrum analyzer settings
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Below 30 MHz:
9kHz – 150kHz, RBW=200Hz, VBW $\geq$ RBW, Sweep=auto, Detector function=peak, Trace=max hold;
150kHz – 30MHz, RBW=9kHz, VBW $\geq$ RBW, Sweep=auto, Detector function=peak, Trace=max hold; If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
 - (3) 30 MHz - 1 GHz:
RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
 - (3) From 1 GHz to 10th harmonic:
RBW=1MHz, VBW=3MHz Peak detector for Peak value.
RBW=1MHz, VBW $\geq$ 1/T Peak detector for Average value.
- Note 1: For the 1/T& Duty Cycle please refer to clause 3.8 Duty Cycle.

Test Mode

Please refer to the clause 2.4.

Test Result

9 KHz~30 MHz

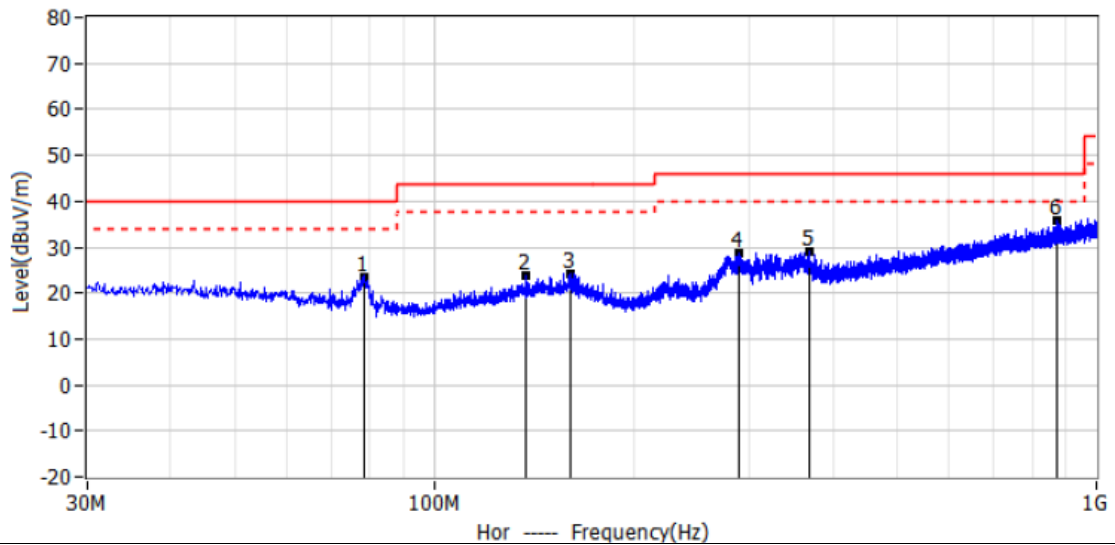
From 9 KHz to 30 MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



30MHz-1GHz

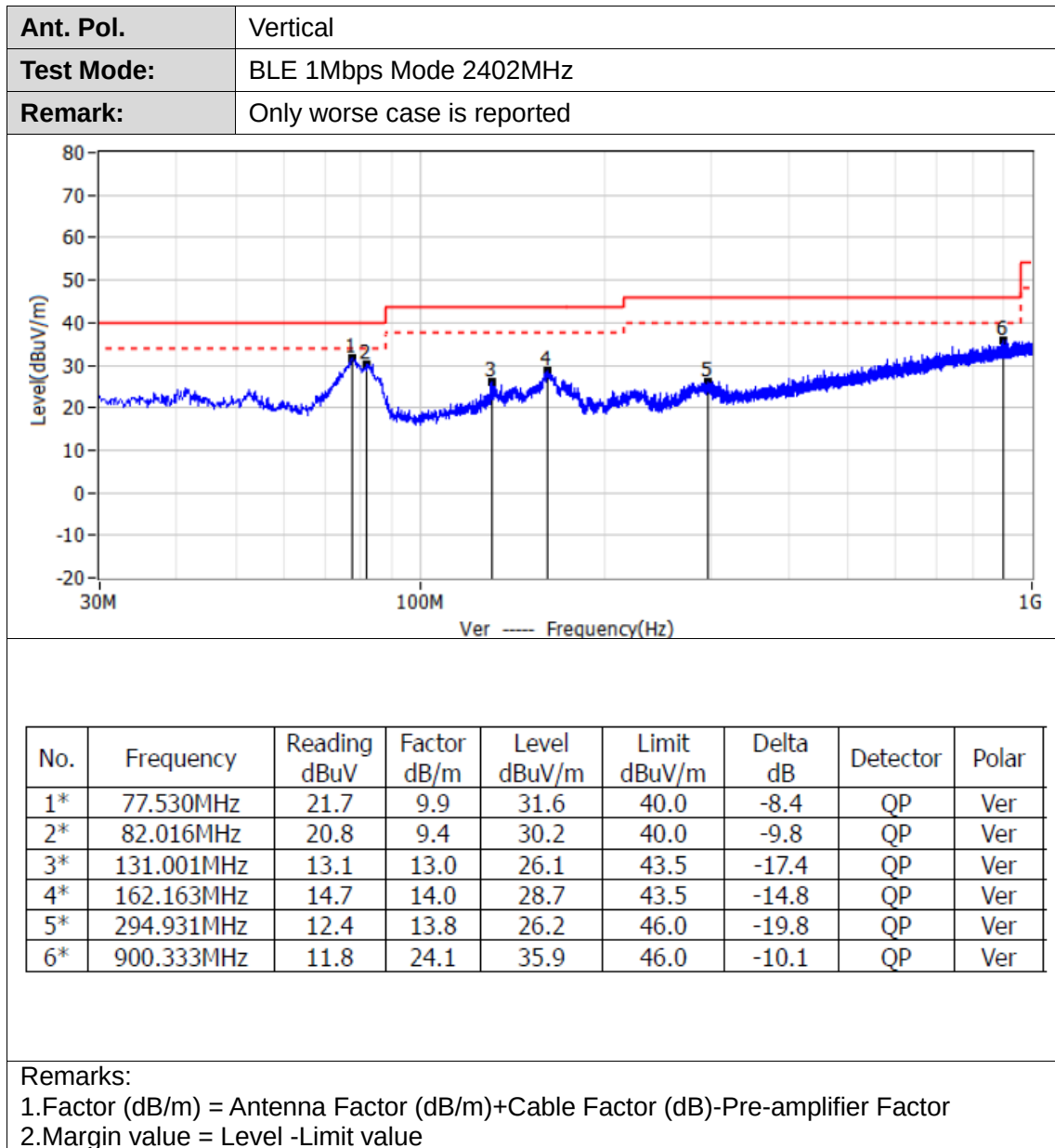
Ant. Pol.	Horizontal
Test Mode:	BLE 1Mbps Mode 2402MHz
Remark:	Only worse case is reported



No.	Frequency	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Delta dB	Detector	Polar
1*	78.500MHz	13.9	9.7	23.6	40.0	-16.4	QP	Hor
2*	137.913MHz	10.4	13.5	23.9	43.5	-19.6	QP	Hor
3*	160.829MHz	10.2	14.1	24.3	43.5	-19.2	QP	Hor
4*	288.384MHz	15.0	13.6	28.6	46.0	-17.4	QP	Hor
5*	367.924MHz	13.5	15.5	29.0	46.0	-17.0	QP	Hor
6*	871.718MHz	12.0	23.7	35.7	46.0	-10.3	QP	Hor

Remarks:

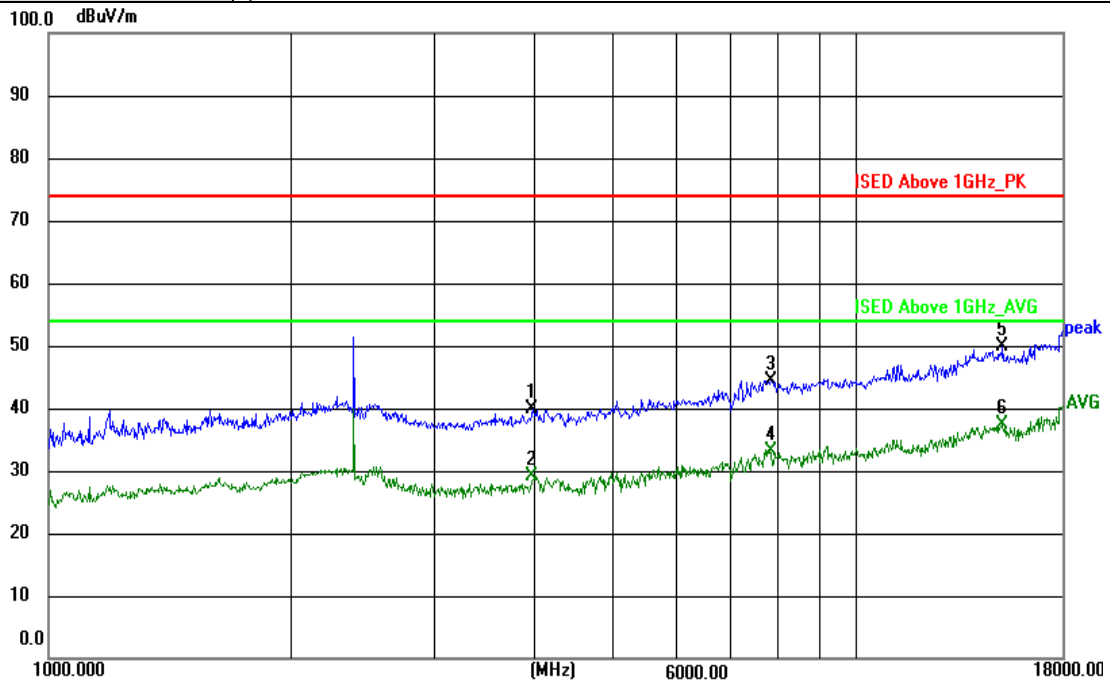
1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
2. Margin value = Level - Limit value





1GHz-18GHz

Ant. Pol.	Horizontal
Test Mode:	BLE 1Mbps Mode 2402MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.



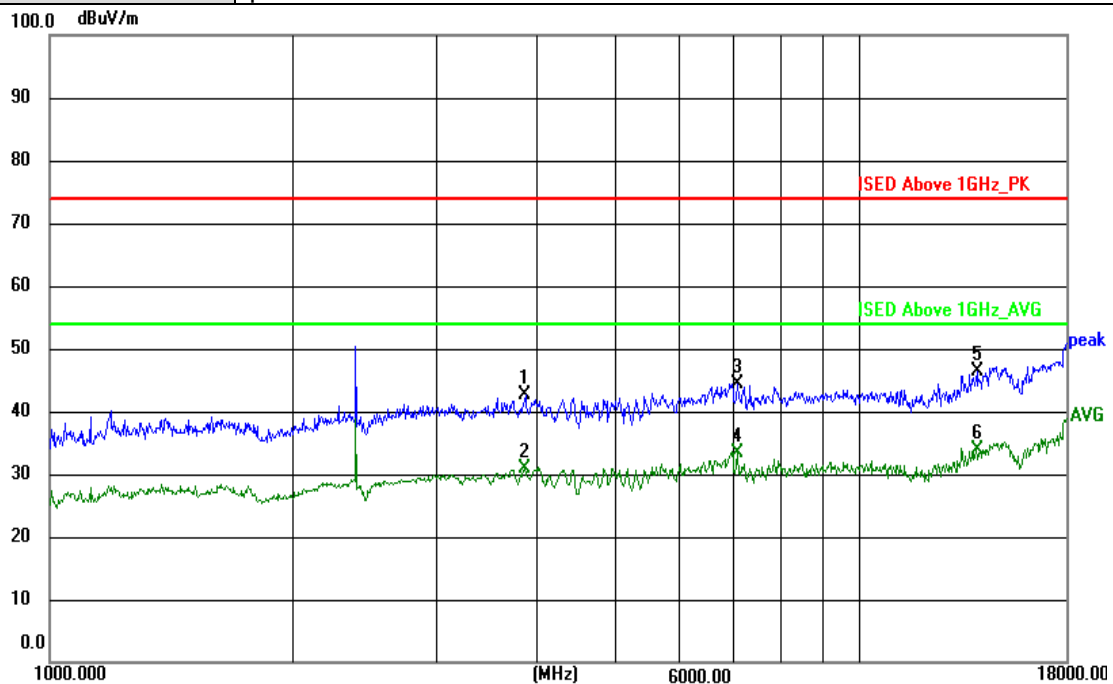
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3981.257	59.30	-19.46	39.84	74.00	-34.16	peak
2	3981.257	48.49	-19.46	29.03	54.00	-24.97	AVG
3	7852.524	52.63	-8.13	44.50	74.00	-29.50	peak
4	7852.524	41.20	-8.13	33.07	54.00	-20.93	AVG
5	15177.891	52.43	-2.67	49.76	74.00	-24.24	peak
6 *	15177.891	39.97	-2.67	37.30	54.00	-16.70	AVG

Remarks:

- 1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
- 2.Margin value = Level -Limit value
- 3.All modes have been tested,only show the worst case.



Ant. Pol.	Vertical
Test Mode:	BLE 1Mbps Mode 2402MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.



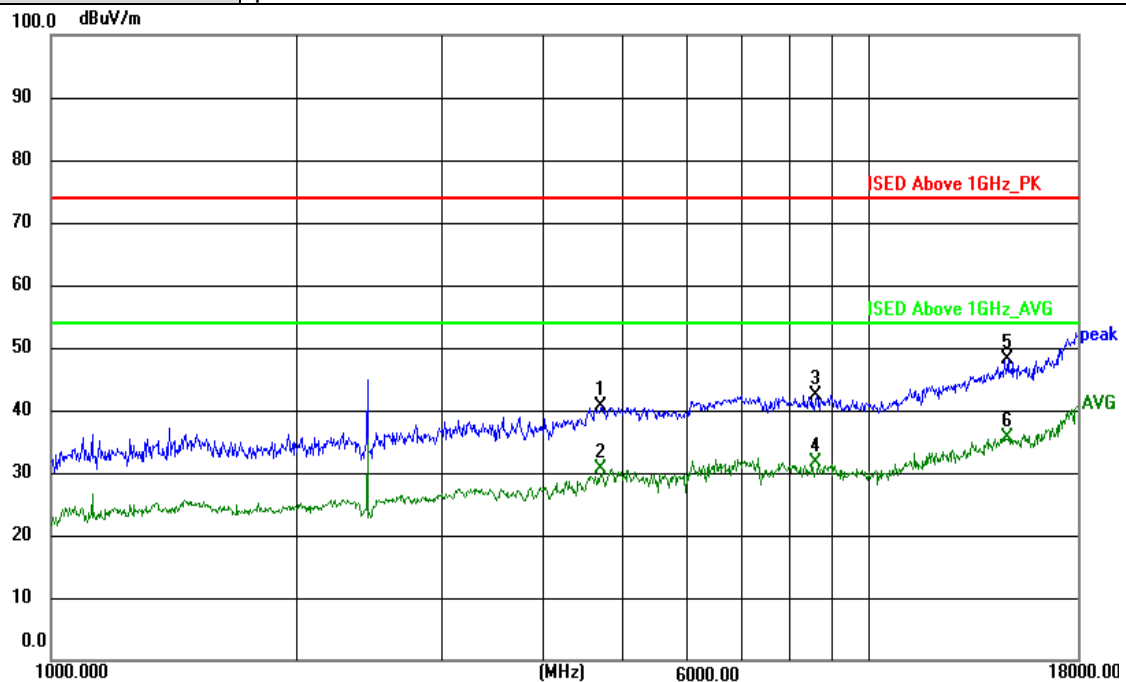
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3867.831	62.52	-19.85	42.67	74.00	-31.33	peak
2	3867.831	50.84	-19.85	30.99	54.00	-23.01	AVG
3	7056.092	54.89	-10.44	44.45	74.00	-29.55	peak
4	7056.092	43.83	-10.44	33.39	54.00	-20.61	AVG
5	13957.529	49.64	-3.25	46.39	74.00	-27.61	peak
6 *	13957.529	37.18	-3.25	33.93	54.00	-20.07	AVG

Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
2. Margin value = Level - Limit value
3. All modes have been tested, only show the worst case.



Ant. Pol.	Horizontal
Test Mode:	BLE 1Mbps Mode 2440MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.



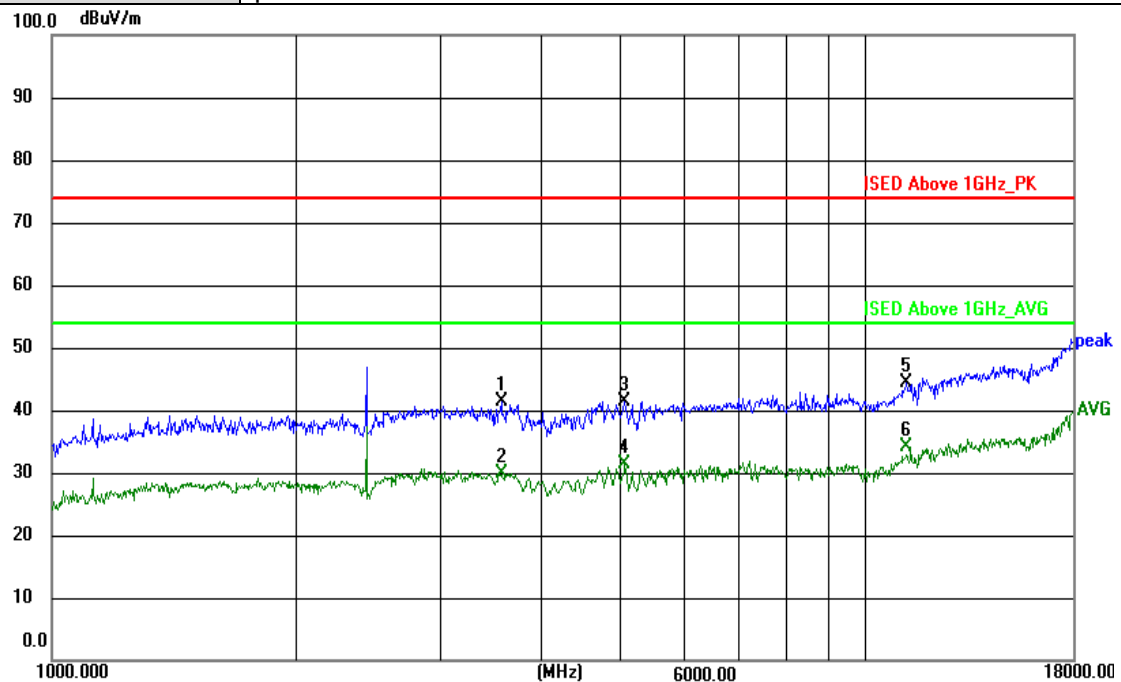
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4707.887	57.60	-16.99	40.61	74.00	-33.39	peak
2	4707.887	47.59	-16.99	30.60	54.00	-23.40	AVG
3	8638.399	49.96	-7.57	42.39	74.00	-31.61	peak
4	8638.399	39.18	-7.57	31.61	54.00	-22.39	AVG
5	14788.154	50.38	-2.33	48.05	74.00	-25.95	peak
6 *	14788.154	38.05	-2.33	35.72	54.00	-18.28	AVG

Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
2. Margin value = Level - Limit value
3. All modes have been tested, only show the worst case.



Ant. Pol.	Vertical
Test Mode:	BLE 1Mbps Mode 2440MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.



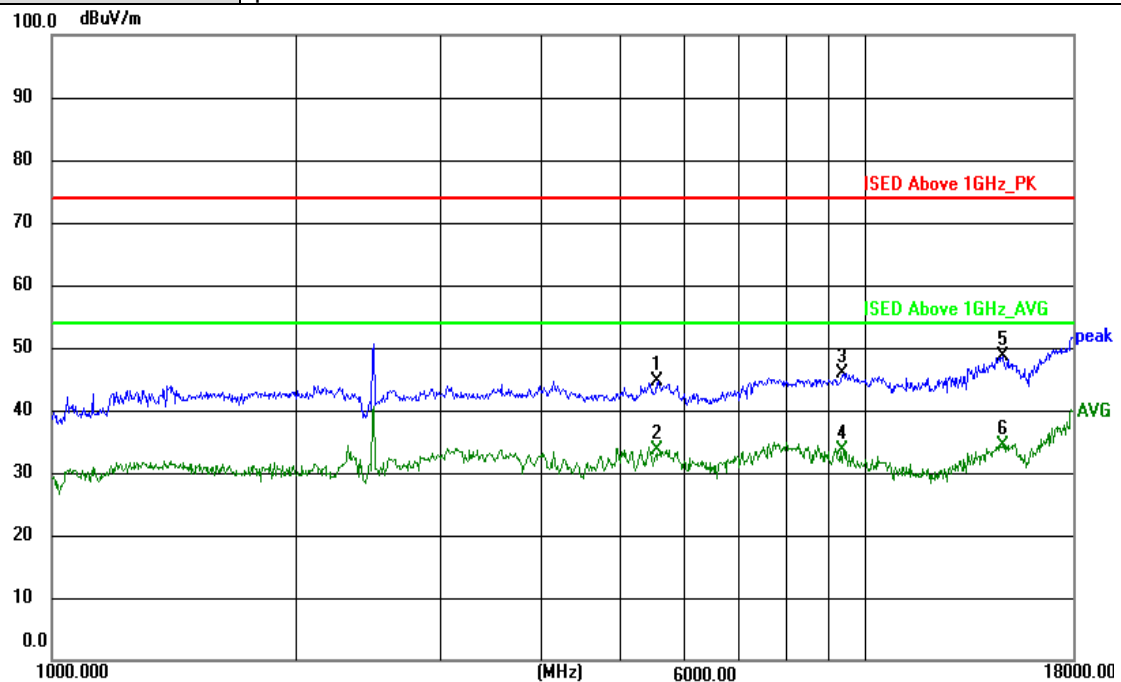
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3567.138	62.16	-20.87	41.29	74.00	-32.71	peak
2	3567.138	50.67	-20.87	29.80	54.00	-24.20	AVG
3	5060.668	57.35	-15.88	41.47	74.00	-32.53	peak
4	5060.668	47.21	-15.88	31.33	54.00	-22.67	AVG
5	11237.329	49.75	-5.31	44.44	74.00	-29.56	peak
6 *	11237.329	39.55	-5.31	34.24	54.00	-19.76	AVG

Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
2. Margin value = Level - Limit value
3. All modes have been tested, only show the worst case.



Ant. Pol.	Horizontal
Test Mode:	BLE 1Mbps Mode 2480MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.



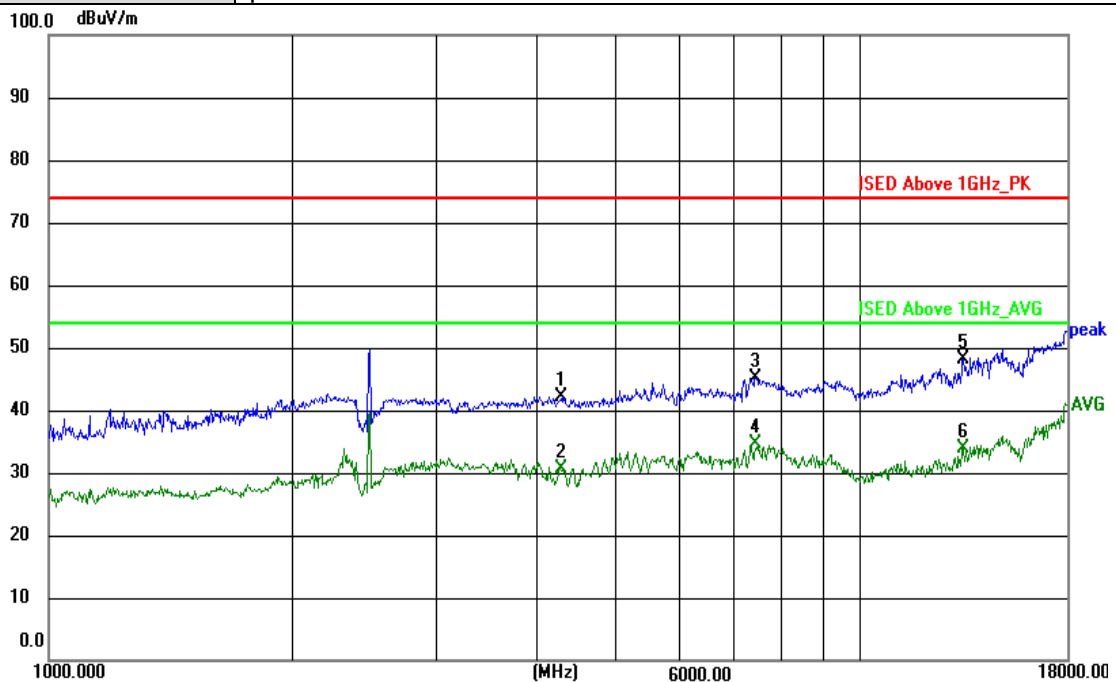
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	5567.136	59.60	-14.92	44.68	74.00	-29.32	peak
2	5567.136	48.56	-14.92	33.64	54.00	-20.36	AVG
3	9393.689	53.23	-7.42	45.81	74.00	-28.19	peak
4	9393.689	41.03	-7.42	33.61	54.00	-20.39	AVG
5	14745.473	50.89	-2.38	48.51	74.00	-25.49	peak
6 *	14745.473	36.88	-2.38	34.50	54.00	-19.50	AVG

Remarks:

- 1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
- 2.Margin value = Level -Limit value
- 3.All modes have been tested,only show the worst case.



Ant. Pol.	Vertical
Test Mode:	BLE 1Mbps Mode 2480MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4291.976	60.55	-18.41	42.14	74.00	-31.86	peak
2	4291.976	49.02	-18.41	30.61	54.00	-23.39	AVG
3	7432.914	54.50	-9.34	45.16	74.00	-28.84	peak
4 *	7432.914	43.98	-9.34	34.64	54.00	-19.36	AVG
5	13404.009	52.08	-3.92	48.16	74.00	-25.84	peak
6	13404.009	37.92	-3.92	34.00	54.00	-20.00	AVG

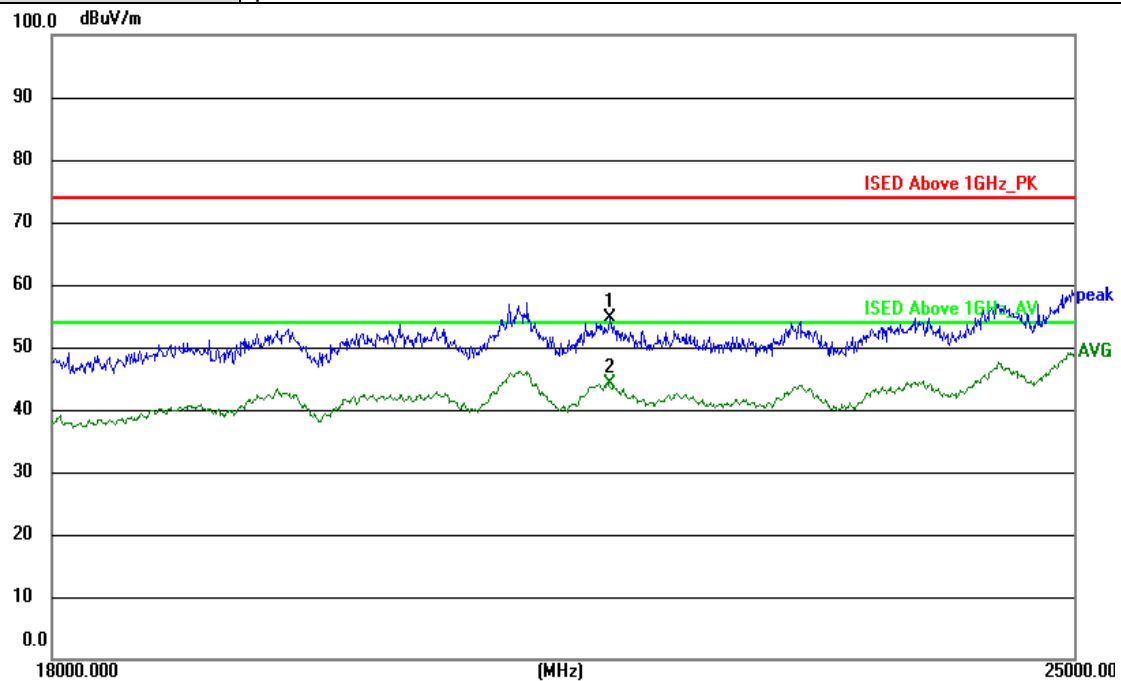
Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
2. Margin value = Level - Limit value
3. All modes have been tested, only show the worst case.



18GHz-25GHz

Ant. Pol.	Horizontal
Test Mode:	BLE 1Mbps Mode 2402MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.



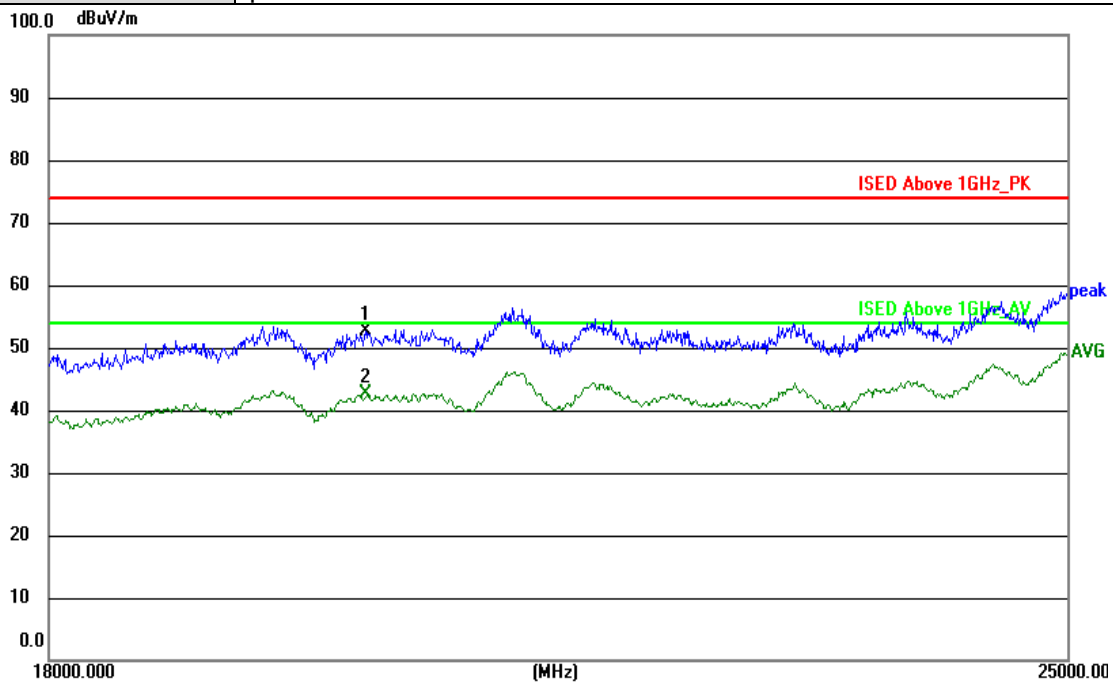
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	21542.000	59.18	-4.52	54.66	74.00	-19.34	peak
2 *	21542.000	48.73	-4.52	44.21	54.00	-9.79	AVG

Remarks:

- Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
- Margin value = Level -Limit value
- All modes have been tested,only show the worst case.



Ant. Pol.	Vertical
Test Mode:	BLE 1Mbps Mode 2402MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.



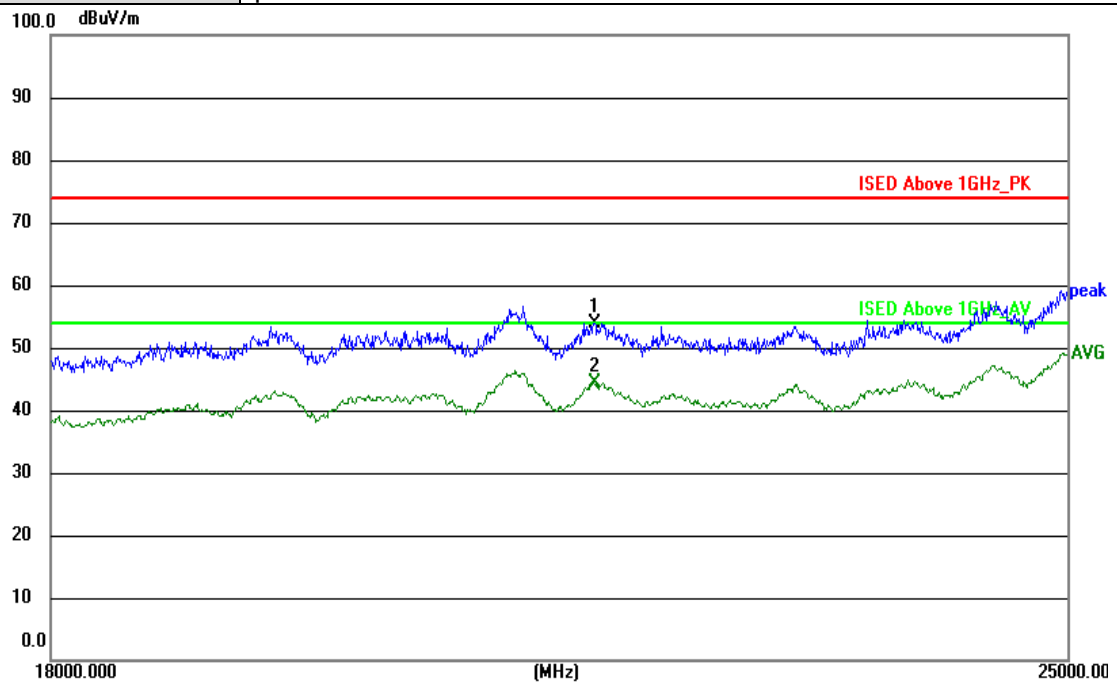
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	19939.000	58.29	-5.59	52.70	74.00	-21.30	peak
2 *	19939.000	48.21	-5.59	42.62	54.00	-11.38	AVG

Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
2. Margin value = Level - Limit value
3. All modes have been tested, only show the worst case.



Ant. Pol.	Horizontal
Test Mode:	BLE 1Mbps Mode 2440MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.



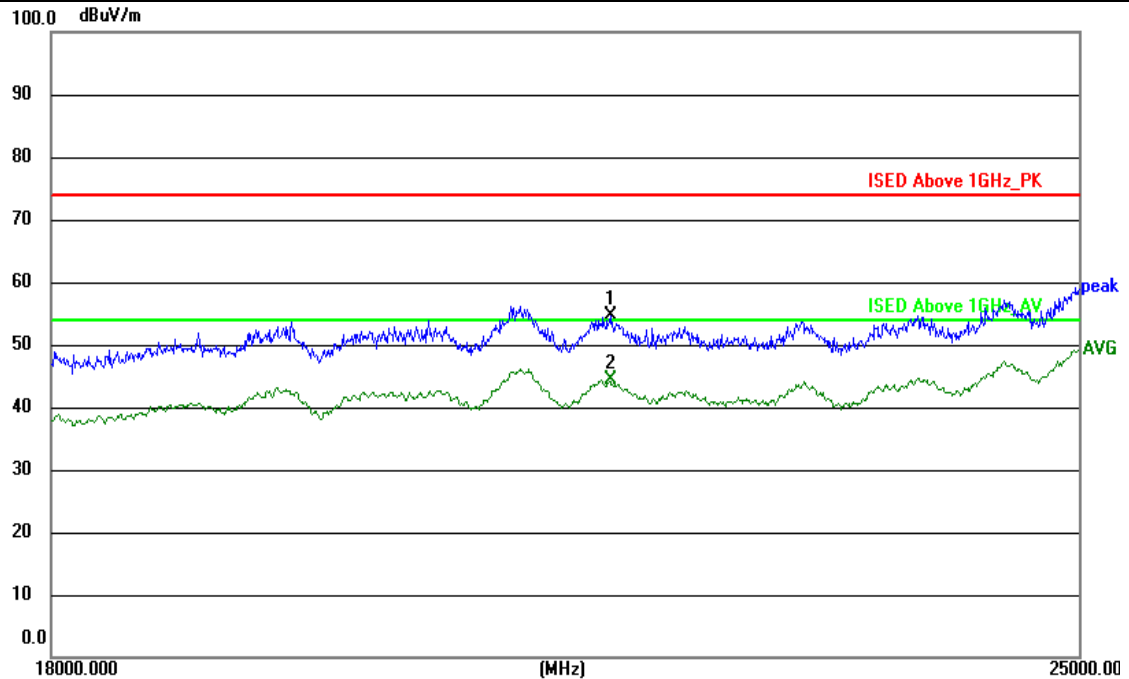
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	21465.000	58.40	-4.46	53.94	74.00	-20.06	peak
2 *	21465.000	48.94	-4.46	44.48	54.00	-9.52	AVG

Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
2. Margin value = Level - Limit value
3. All modes have been tested, only show the worst case.



Ant. Pol.	Vertical
Test Mode:	BLE 1Mbps Mode 2440MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.



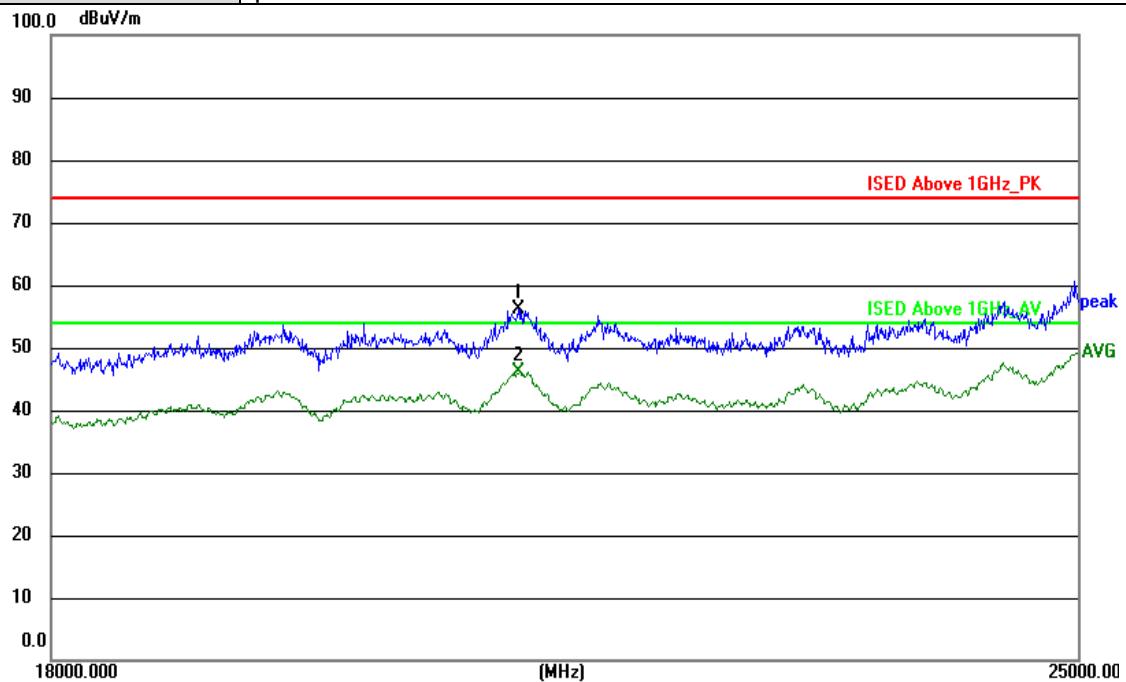
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	21528.000	59.05	-4.51	54.54	74.00	-19.46	peak
2 *	21528.000	48.88	-4.51	44.37	54.00	-9.63	AVG

Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
2. Margin value = Level - Limit value
3. All modes have been tested, only show the worst case.



Ant. Pol.	Horizontal
Test Mode:	BLE 1Mbps Mode 2480MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.



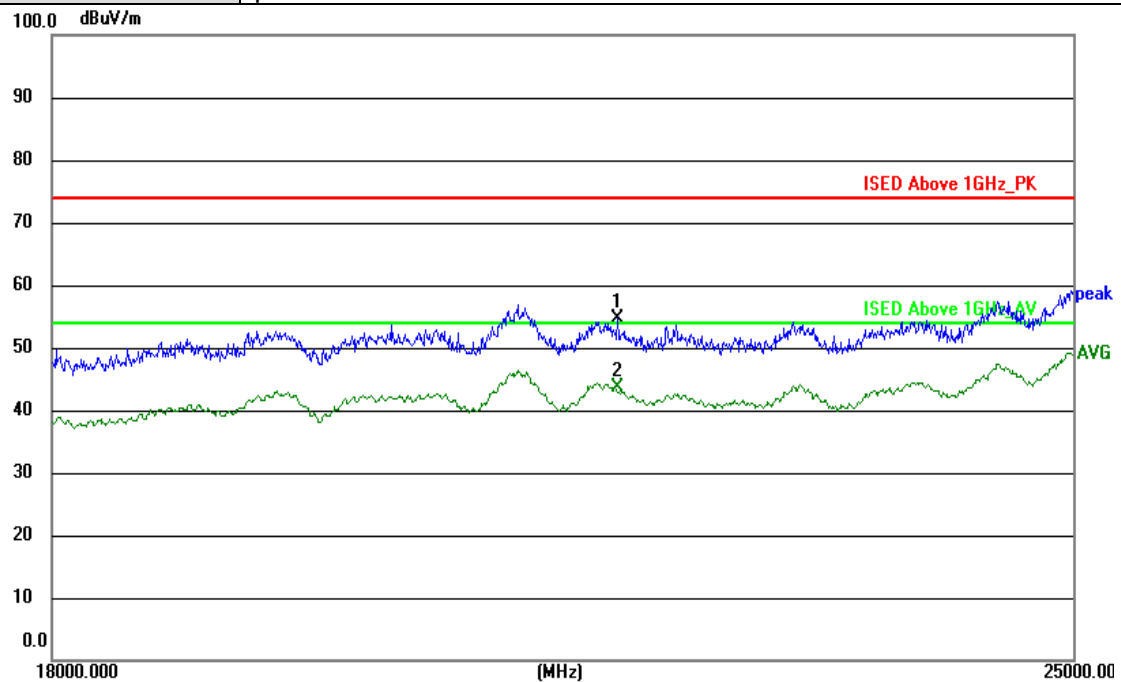
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	20905.000	60.48	-4.24	56.24	74.00	-17.76	peak
2 *	20905.000	50.32	-4.24	46.08	54.00	-7.92	AVG

Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
2. Margin value = Level - Limit value
3. All modes have been tested, only show the worst case.



Ant. Pol.	Vertical
Test Mode:	BLE 1Mbps Mode 2480MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	21598.000	59.09	-4.56	54.53	74.00	-19.47	peak
2 *	21598.000	48.28	-4.56	43.72	54.00	-10.28	AVG

Remarks:

- Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
- Margin value = Level -Limit value
- All modes have been tested,only show the worst case.

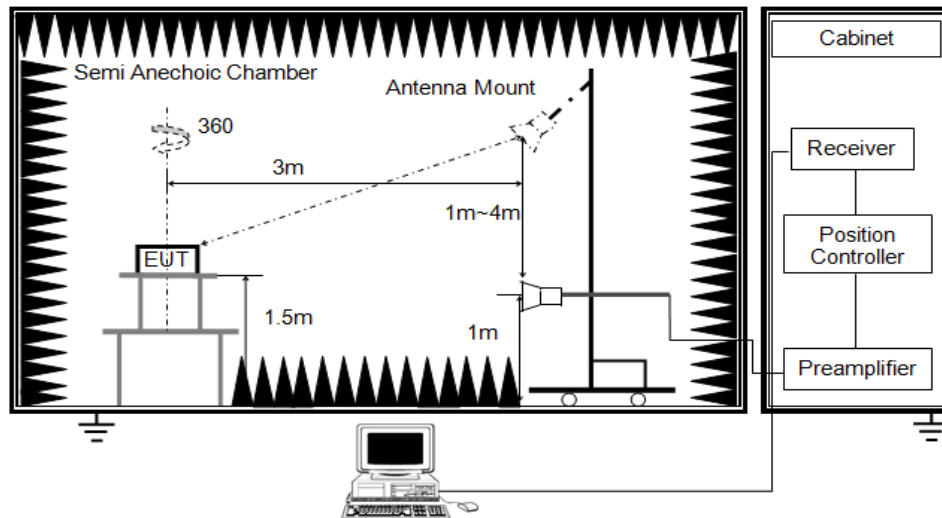
3.3. Radiated Emissions Restricted Band

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d)/ RSS-Gen 8.10

Restricted Frequency Band (MHz)	(dBuV/m)(at 3m)	
	Peak	Average
2310 ~ 2390	74	54
2483.5 ~ 2500	74	54

Test Configuration



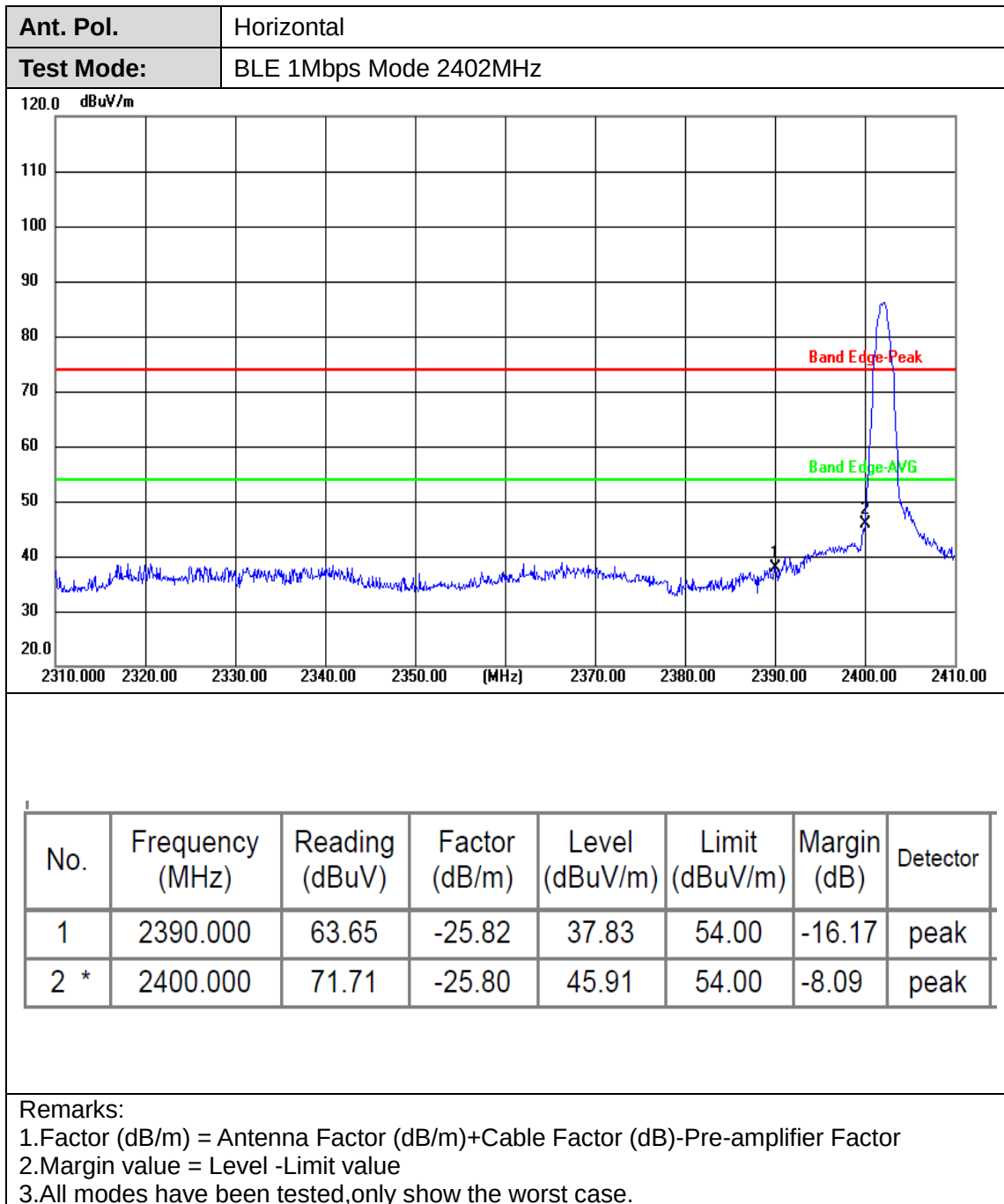
Test Procedure

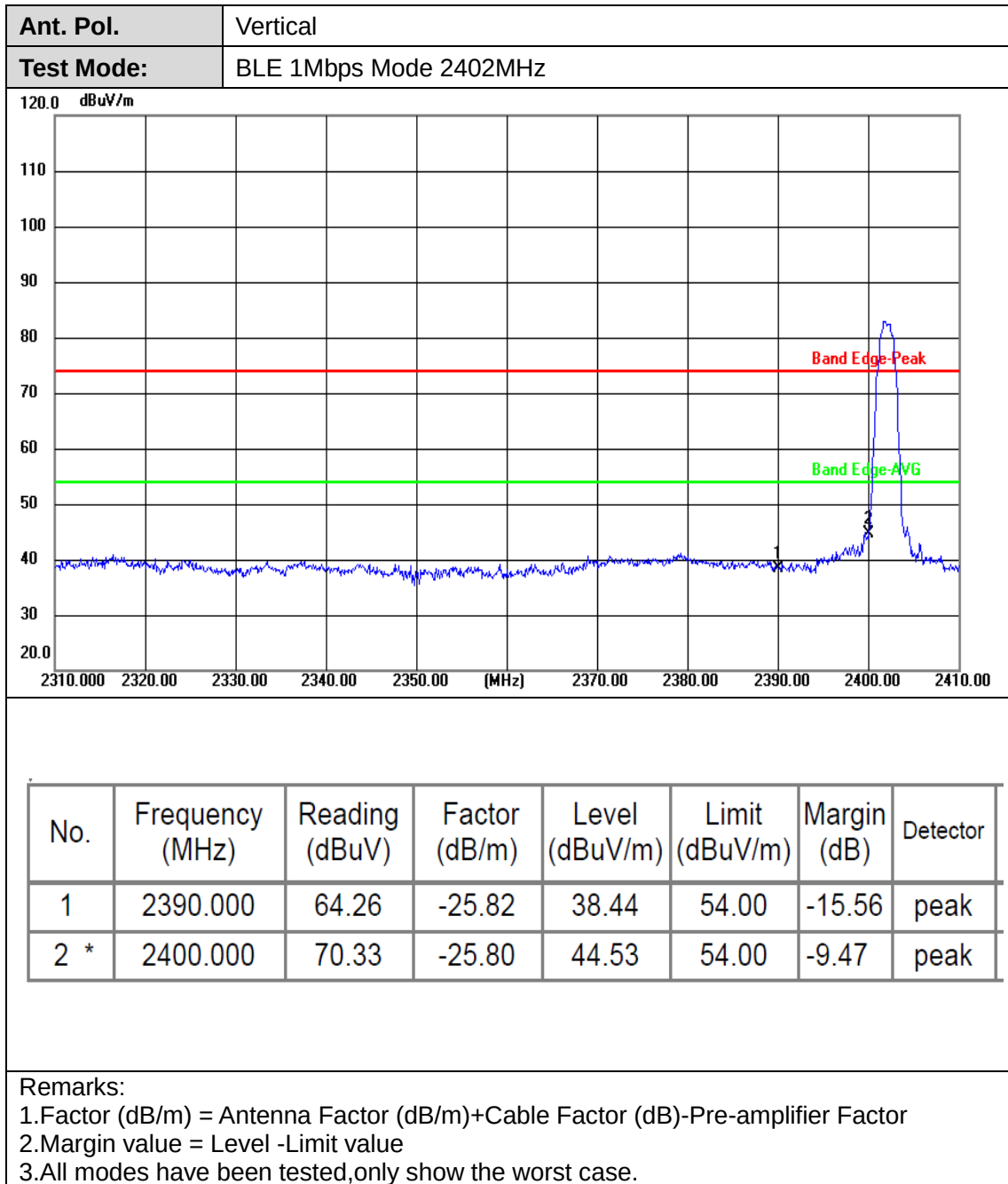
- The EUT was setup and tested according to ANSI C63.10-2020+Cor 1-2023+C63.10a-2024 + Errata to C63.10a-2024 requirements.
- The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
- The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2020+Cor 1-2023+C63.10a-2024 + Errata to C63.10a-2024 on radiated measurement.
- The receiver set as follow:
RBW=1MHz, VBW=3MHz Peak detector for Peak value.
RBW=1MHz, VBW see note 1 with Peak Detector for Average Value.

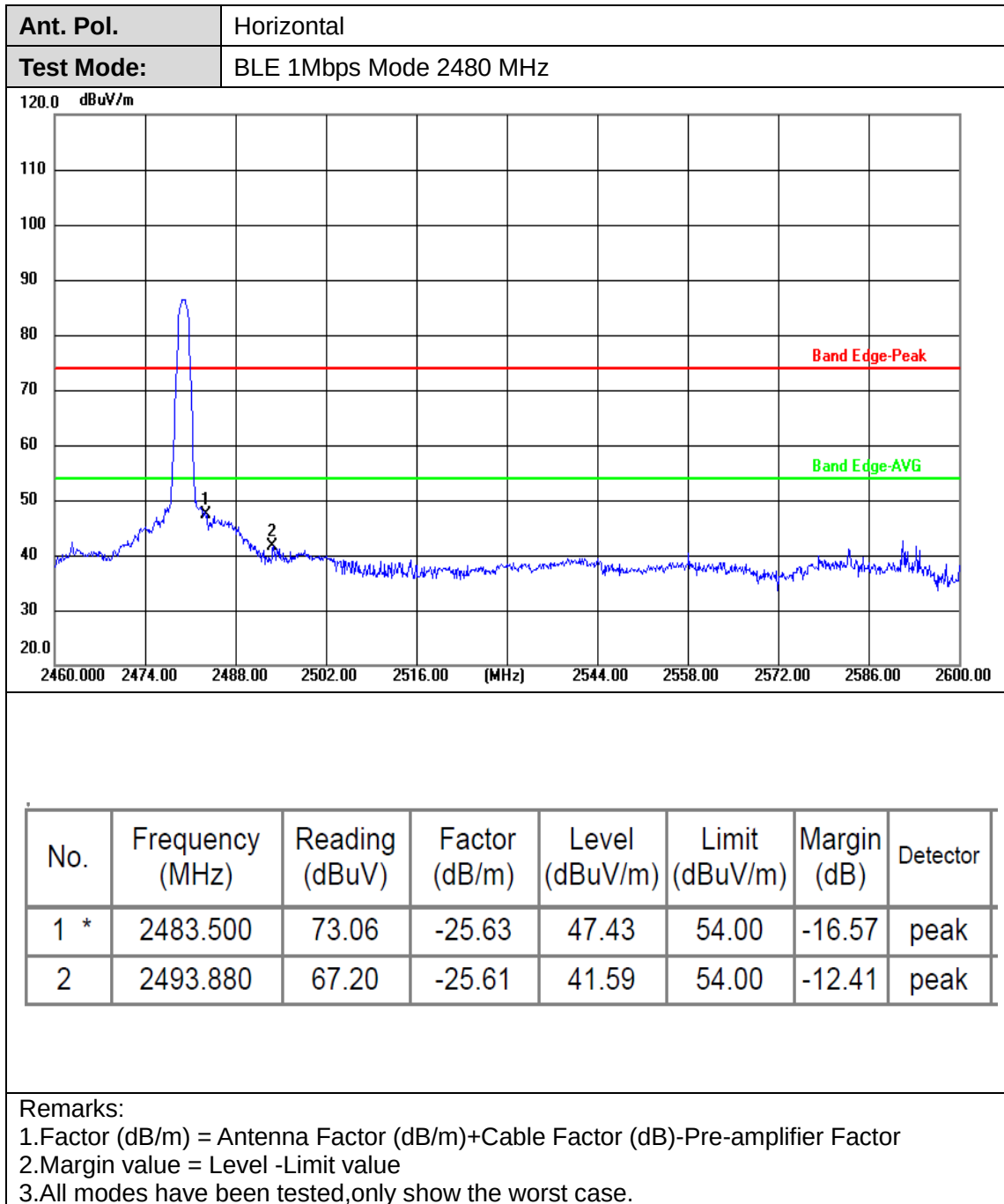
Note 1: For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 3.8 Duty Cycle.

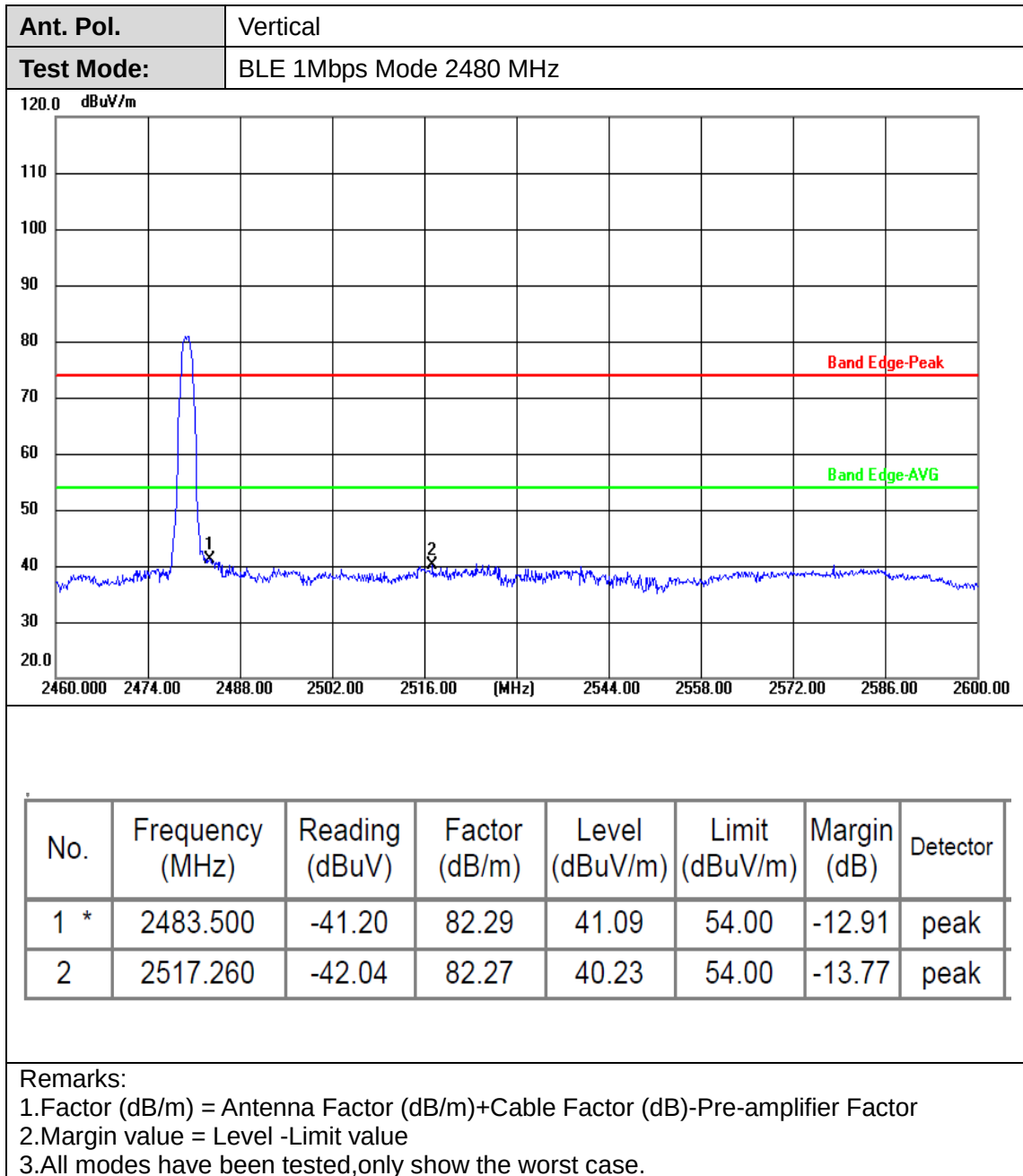
Test Mode

Please refer to the clause 2.4.

**Test Results**







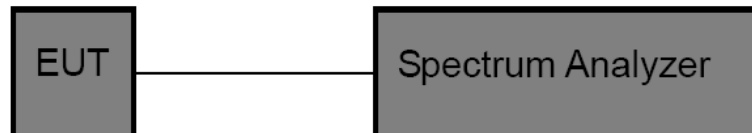


3.4. Band edge and Spurious Emissions (Conducted)

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d)/ RSS-247 Section 6.6: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

Test Configuration



Test Procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
RBW = 100 kHz, VBW ≥ RBW, scan up through 10th harmonic.
Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

Test Mode

Please refer to the clause 2.4.

Test Results

(1) Band edge Conducted Test

Test Mode	Frequency[MHz]	Ref Level[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE 1Mbps	2402	2.045	-49.986	-17.955	PASS
	2480	1.976	-57.906	-18.024	PASS



BLE_1Mbps_Low_2402



BLE_1Mbps_High_2480

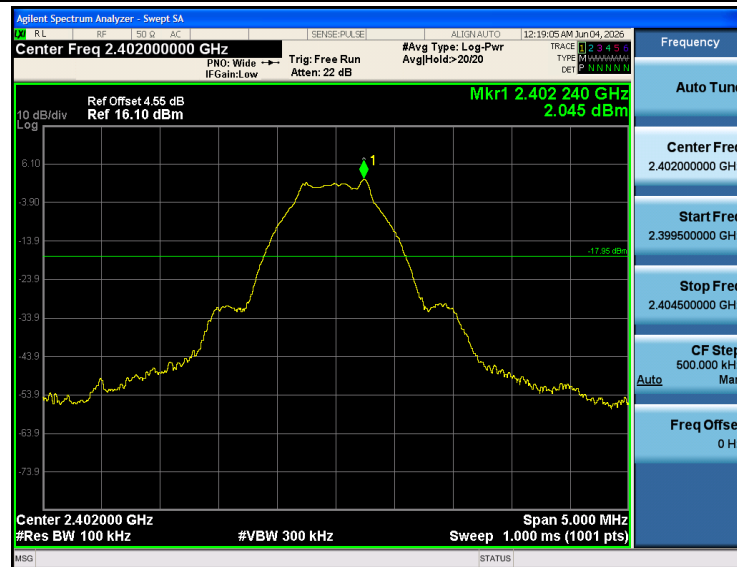


**(2) Conducted Spurious Emissions Test**

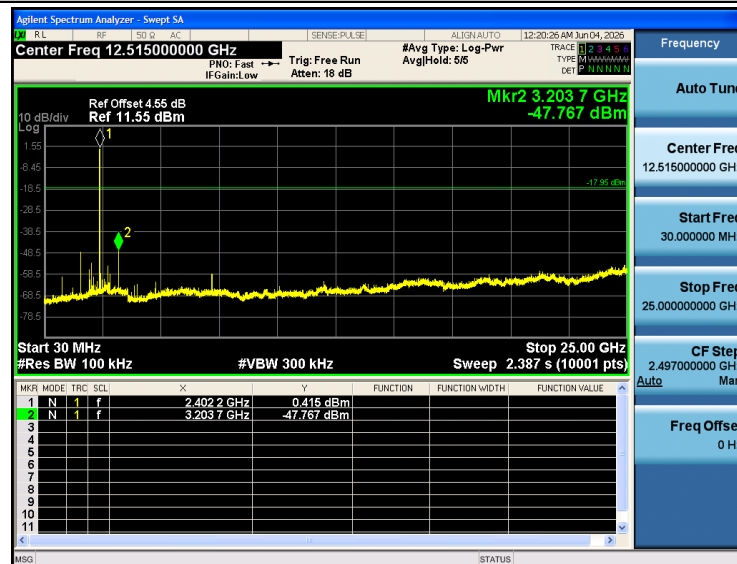
Test Mode	Frequency [MHz]	Ref Level [dBm]	Spurious level[dBm]	Limit[dBm]	Verdict
BLE 1Mbps	2402	2.045	-47.767	-17.955	PASS
	2440	1.877	-47.688	-18.123	PASS
	2480	1.976	-46.718	-18.024	PASS



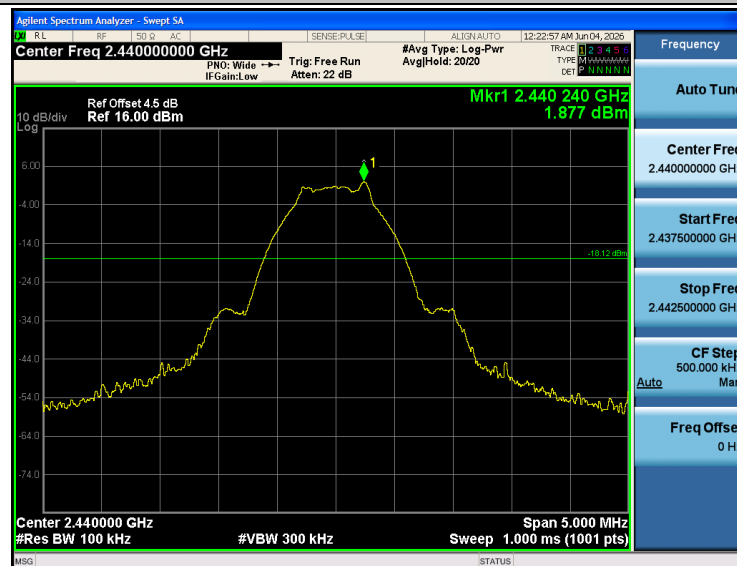
BLE_1Mbps_2402_Reference



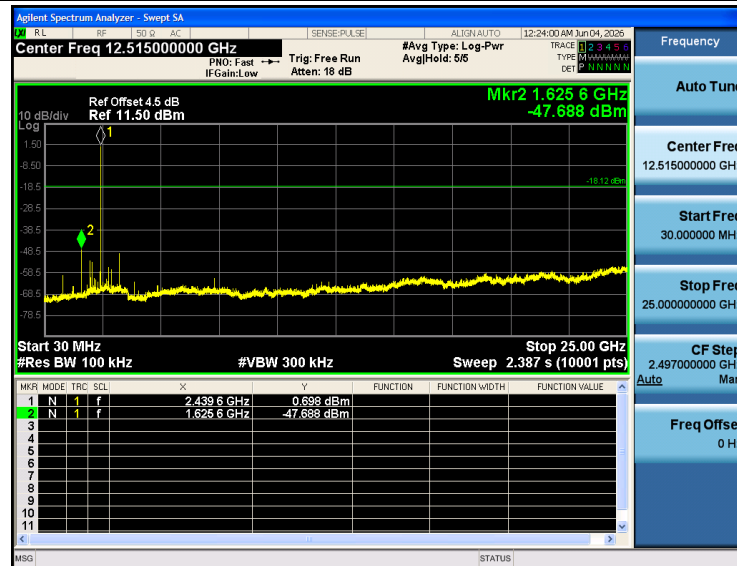
BLE_1Mbps_2402_30~25000



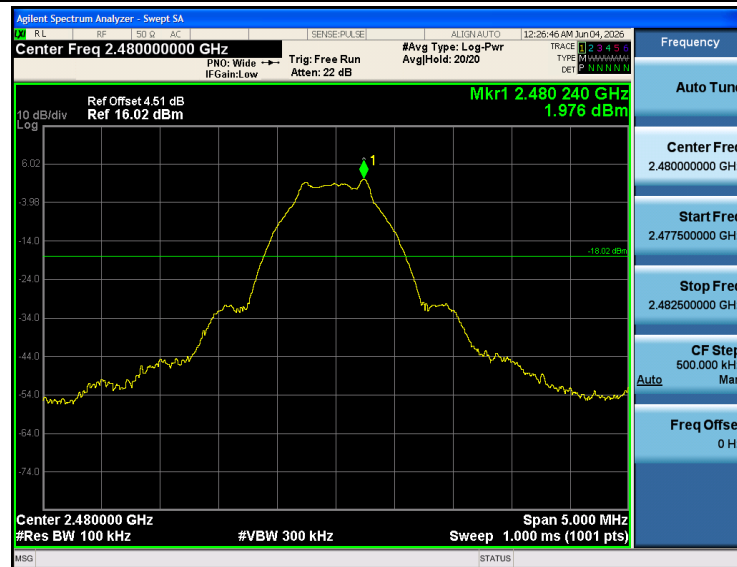
BLE_1Mbps_2440_Reference



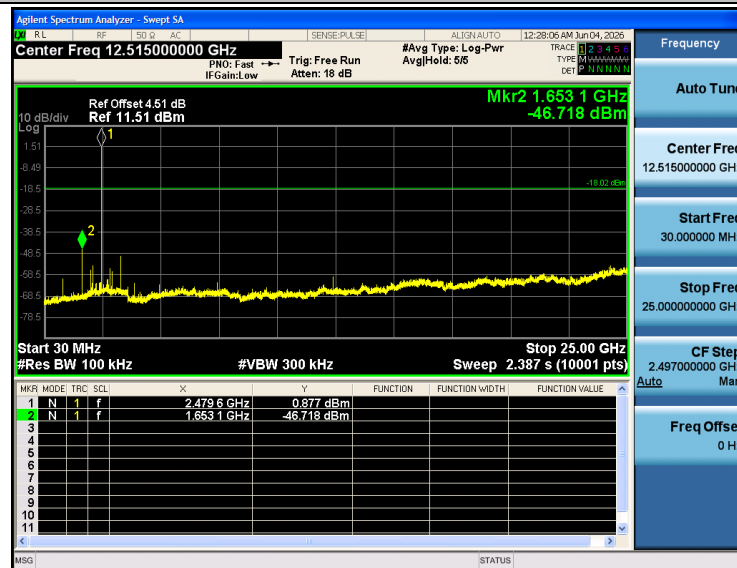
BLE_1Mbps_2440_30~25000



BLE_1Mbps_2480_0-Reference



BLE_1Mbps_2480_30-25000





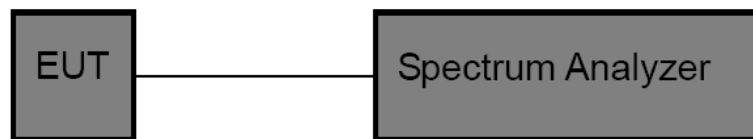
3.5. DTS Bandwidth

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(2)/ RSS-247 6.3.1 a:

Test Item	Limit	Frequency Range(MHz)
DTS Bandwidth	≥ 500 KHz (6dB bandwidth)	2400~2483.5

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. DTS Spectrum Setting:
 - (1) Set RBW = 100 kHz.
 - (2) Set the video bandwidth (VBW) ≥ 3 RBW.
 - (3) Detector = Peak.
 - (4) Trace mode = Max hold.
 - (5) Sweep = Auto couple.OCB Spectrum Setting:
 - (1) Set RBW = 1% ~ 5% occupied bandwidth.
 - (2) Set the video bandwidth (VBW) ≥ 3 RBW.
 - (3) Detector = Peak.
 - (4) Trace mode = Max hold.
 - (5) Sweep = Auto couple.

Test Mode

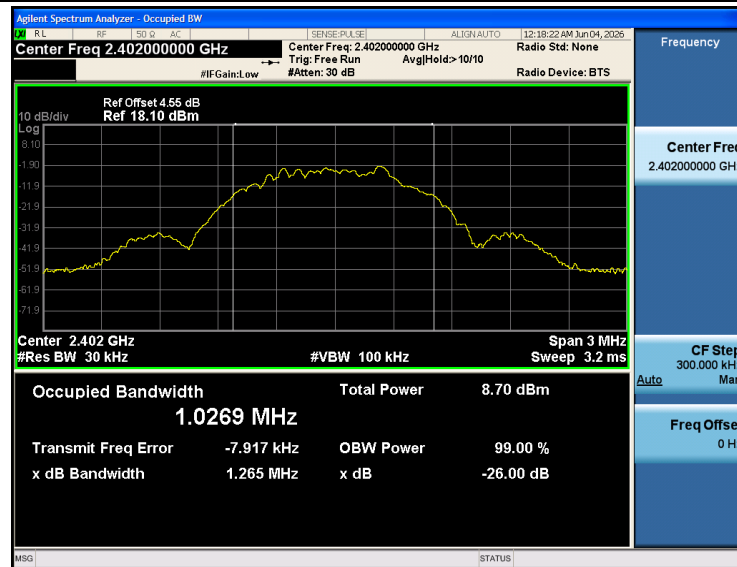
Please refer to the clause 2.4.

Test Results

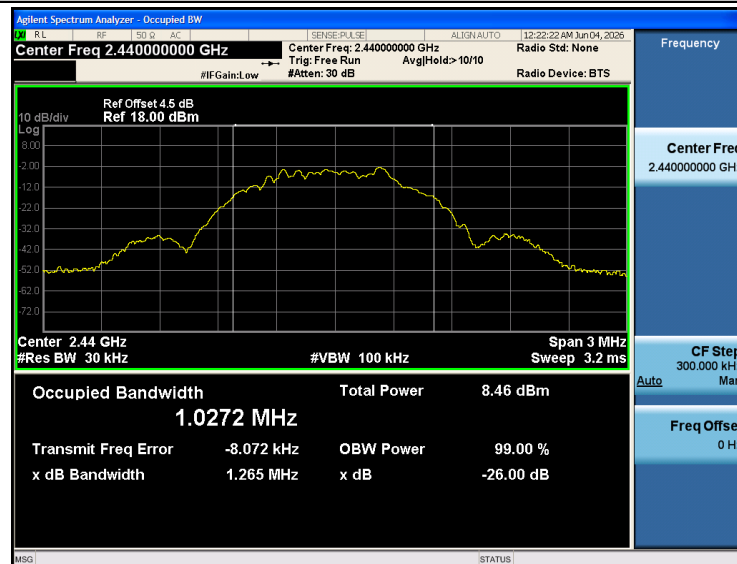
Test Mode	Frequency[MHz]	99% OBW[MHz]	DTS BW[kHz]	Limit[kHz]	Verdict
BLE 1Mbps	2402	1.027	668.53	>500	PASS
	2440	1.027	667.69	>500	PASS
	2480	1.028	666.88	>500	PASS



BLE_1Mbps_OBW_2402



BLE_1Mbps_OBW_2440

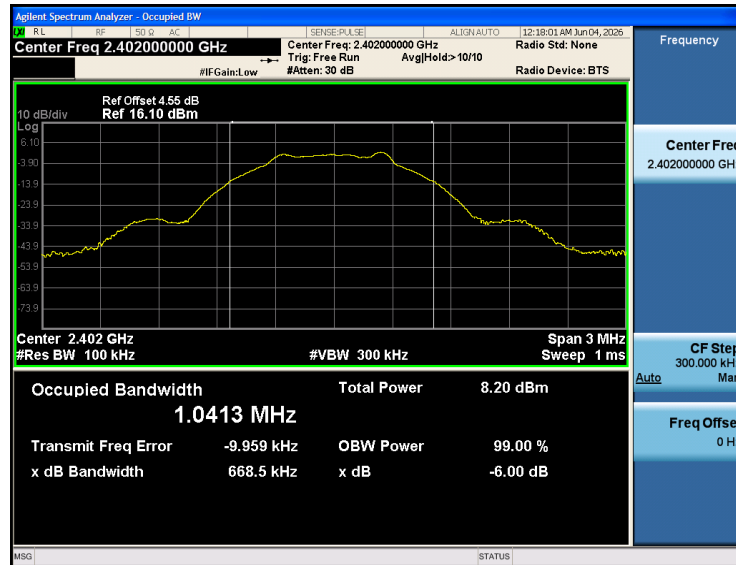


BLE_1Mbps_OBW_2480





BLE_1Mbps_DTS_2402



BLE_1Mbps_DTS_2440



BLE_1Mbps_DTS_2480





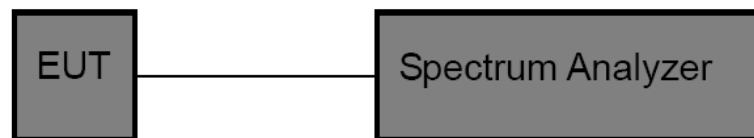
3.6. Peak Output Power

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(3)/ RSS-247 6.3.2:

Section	Test Item	Limit	Frequency Range(MHz)
CFR 47 FCC 15.247(b)(3)	Maximum conducted output power	1 Watt or 30dBm	2400~2483.5
ISED RSS-247 6.3.2	Maximum conducted output power	1 Watt or 30dBm	2400~2483.5
ISED RSS-247 6.3.2	EIRP	4 Watt or 36dBm	2400~2483.5

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
Peak Detector: RBW $\geq$ DTS Bandwidth, VBW $\geq$ 3*RBW.
Sweep time=Auto.
Detector= Peak.
Trace mode= Maxhold.
Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

Test Mode

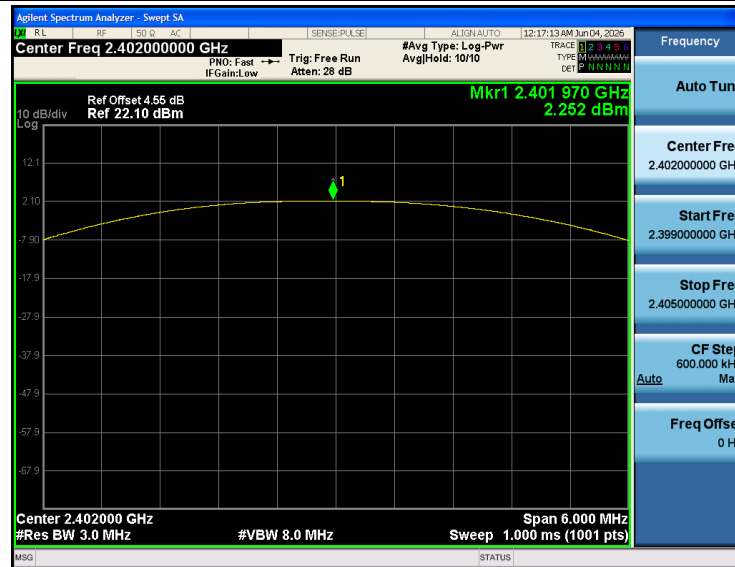
Please refer to the clause 2.4.

Test Result

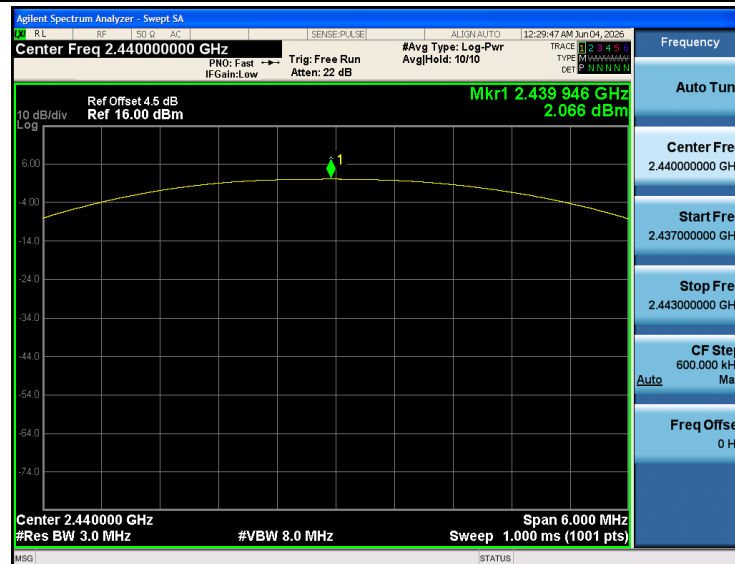
Test Mode	Frequency[MHz]	Result[dBm]	Antenna Gain (dBi)	E.I.R.P Result[dBm]	E.I.R.P Limit[dBm]	Verdict
BLE 1Mbps	2402	2.25	3.57	5.82	≤ 36	PASS
	2440	2.07	3.57	5.64	≤ 36	PASS
	2480	2.21	3.57	5.78	≤ 36	PASS



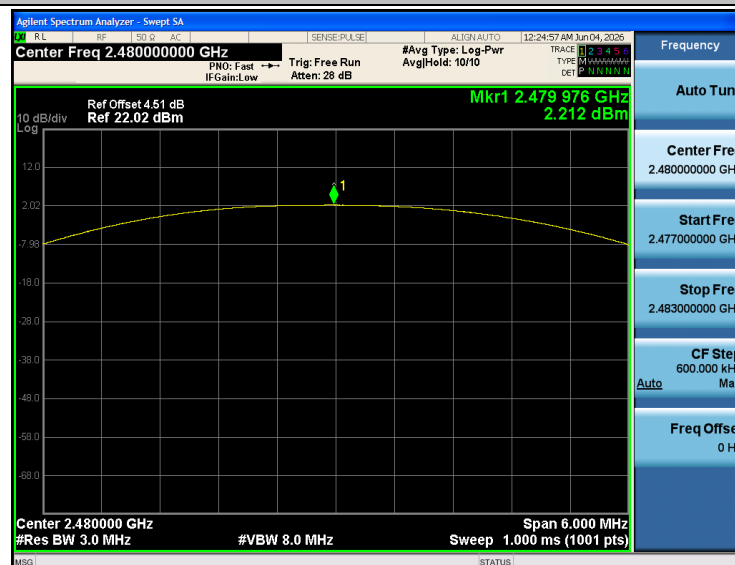
BLE_1Mbps_2402



BLE_1Mbps_2440



BLE_1Mbps_2480





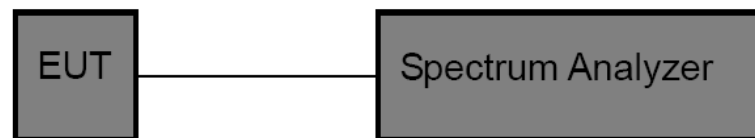
3.7. Power Spectral Density

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (e)/ RSS-247 6.3.1 b:

Test Item	Limit	Frequency Range(MHz)
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v05r02.
3. Spectrum Setting:
Set analyzer center frequency to DTS channel center frequency.
Set the span to 1.5 times the DTS bandwidth.
Set the RBW to: 3 kHz
Set the VBW to: 10 kHz
Detector: peak
Sweep time: auto
Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

Test Mode

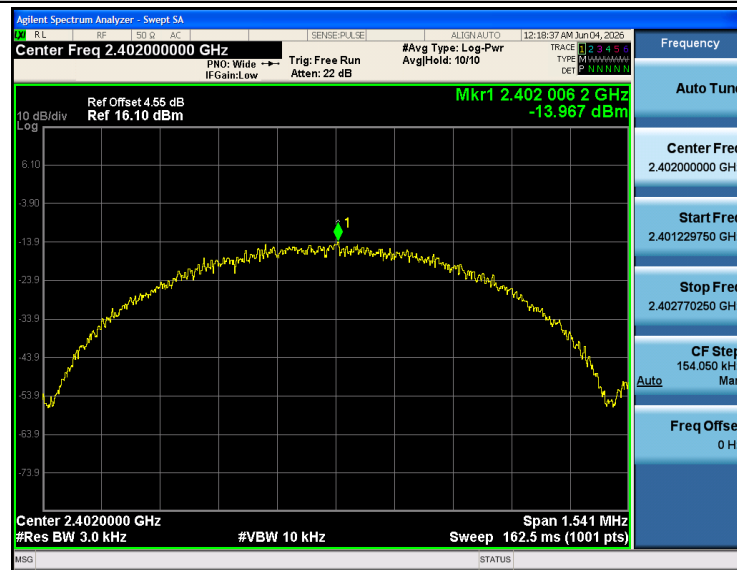
Please refer to the clause 2.4.

Test Result

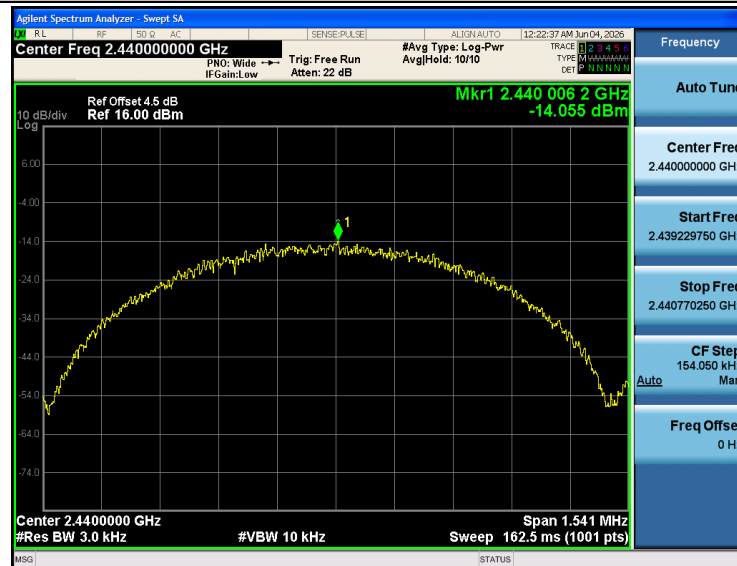
Test Mode	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE 1Mbps	2402	-13.97	<=8	PASS
	2440	-14.05	<=8	PASS
	2480	-14.06	<=8	PASS



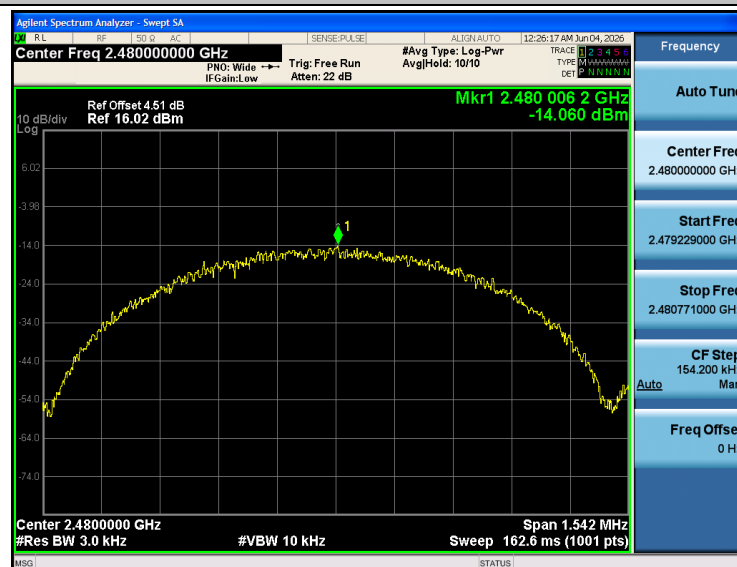
BLE_1Mbps_2402



BLE_1Mbps_2440



BLE_1Mbps_2480



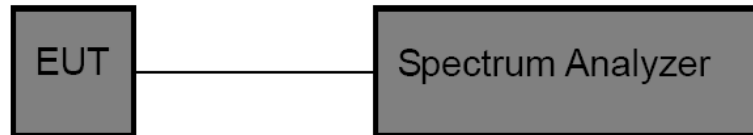


3.8. Duty Cycle

Limit

None, for report purposes only.

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v05r02.
3. Spectrum Setting:
Set analyzer center frequency to test channel center frequency.
Set the span to 0Hz
Set the RBW to 8MHz
Set the VBW to 8MHz
Detector: Peak
Sweep time: Auto
Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

Test Mode

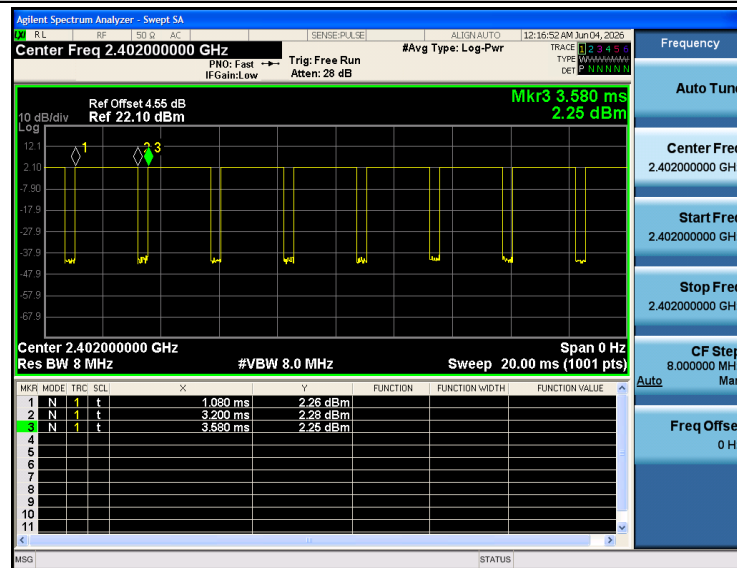
Please refer to the clause 2.4.

Test Result

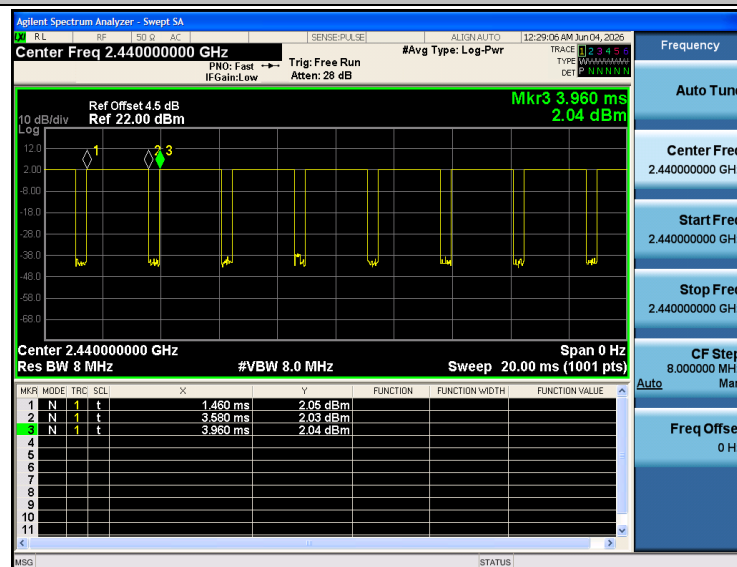
Test Mode	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
BLE 1Mbps	2402	2.12	2.50	84.80	0.47	1
	2440	2.12	2.50	84.80	0.47	1
	2480	2.12	2.50	84.80	0.47	1



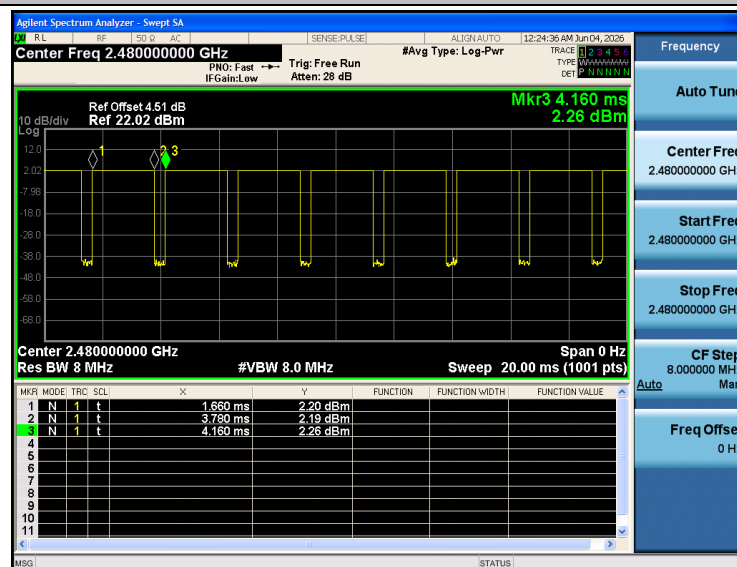
BLE_1Mbps_2402



BLE_1Mbps_2440



BLE_1Mbps_2480





3.9. Antenna requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

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 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.

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(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.

According to RSS-GEN Issue 5, section 6.8, The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropic ally radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer. The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

Test Result

The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.

*****THE END*****