

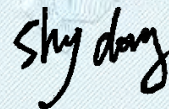
# TEST REPORT

Report No..... : KS2210S4651E01  
FCC ID..... : 2ABFG-IES-D320W-D0  
Applicant..... : iRevo - ASSA ABLOY Korea  
Address..... : 10f of JEI PLATZ Bldg., 186, Gasandigital 1-ro, Geumcheon-gu, Seoul South Korea  
Manufacturer..... : Wuhan Yixin Technology Co., Ltd  
Address..... : Room 02, 4/F, building 10, Sun city, Gezhouba, No.40, Gaoxin 4th Road, East Lake New Technology Development Zone, Wuhan City, Hubei Province, China.  
Product Name..... : Yale Door Position Sensor  
Trademark..... : Yale  
Model/Type reference..... : M2  
Standard..... : 47 CFR Part 15.247  
Date of Receipt..... : November 3, 2022  
Date of Test Date..... : November 3, 2022 to November 9, 2022  
Date of issue..... : November 10, 2022  
**Test result..... : Pass**

Prepared by: Pai Zheng  
( Printed name + Signature)



Approved by: Sky Dong  
( Printed name + Signature)



**Testing Laboratory Name...: KSIGN(Guangdong) Testing Co., Ltd.**

Address..... : West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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## 1. TEST SUMMARY

### 1.1. Test Standards

The tests were performed according to following standards:

**47 CFR Part 15.247:** Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

### 1.2. Report Version

Revised No.	Date of issue	Description
01	November 10, 2022	Original

### 1.3. Test Description

Test Item	Standard	Requirement	Result
Antenna requirement	47 CFR Part 15.247	Part 15.203	Pass
Occupied Bandwidth	47 CFR Part 15.247	47 CFR 15.247(a)(2)	Pass
Maximum Conducted Output Power	47 CFR Part 15.247	47 CFR 15.247(b)(3)	Pass
Power Spectral Density	47 CFR Part 15.247	47 CFR 15.247(e)	Pass
Emissions in non-restricted frequency bands	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
Emissions around the fundamental	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
Emissions in restricted frequency bands (below 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
Emissions in restricted frequency bands (above 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d)	Pass

## 1.4. Test Facility

### **KSIGN(Guangdong) Testing Co., Ltd.**

West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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

#### **CNAS-Lab Code: L13261**

KSIGN(Guangdong) Testing Co., Ltd. has been assessed and proved to be in Compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### **A2LA-Lab Cert. No.: 5457.01**

KSIGN(Guangdong) Testing 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

#### **ISED#: 25693 CAB identifier.: CN0096**

KSIGN(Guangdong) Testing Co., Ltd. has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

#### **FCC-Registration No.: 294912 Designation Number: CN1328**

KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

## 1.5. Measurement Uncertainty

Test Items	Measurement Uncertainty
Output Power, Conducted	± 1.4dB
PSD, Conducted	± 1.0dB
Spurious Emissions, Conducted	± 3.3dB
RSE (1-18GHz)	± 4.68dB
RSE (30-1000MHz)	± 5.7dB
RSE (18-40GHz)	± 5.18dB

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

## 2. GENERAL INFORMATION

### 2.1. General Description Of EUT

Product Name:	Yale Door Position Sensor
Trademark:	Yale
Model / Type reference:	M2
Power Supply:	Battery powered DC 3V
Operation Frequency:	2402MHz to 2480MHz
Number of Channels:	40
Modulation Type:	GFSK
Antenna Type:	Internal Antenna
Antenna Gain:	2.46dBi

### 2.2. Accessory Equipment Information

The EUT was tested as an independent device.

### 2.3. Description of Test Modes

No.	Title	Description of Mode
Test Mode1	TX mode	Keep the EUT works in continuously transmitting mode with GFSK modulation.



## 2.4. Measurement Instruments List

Occupied Bandwidth				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Wideband Radio Communication Tester	R&S	CMU200	115297	2023-03-04
Audio Analyzer	R&S	UPL16	100001	2023-03-04
Shielding box	Gxiong	GX-5915A	2201113	2023-04-23
High Pass Filter	COM-MW Technology Co., Ltd	ZHPF-M1.2-9G-187	09203403	2023-03-04
Band Stop Filter	COM-MW Technology Co., Ltd	ZBSF6-C820-920-188	09203401	2023-03-04
Splitter	COM-MW Technology Co., Ltd	ZPD-M1-8-2103	09203407	2023-03-04
Coaxial Cable	BEBES	A40-2.92M2.92 F-4.5M	1907021	2023-03-04
Hygrothermograph	Anymetre	JB913	/	2023-03-07
Climate Chamber	Angul	AGNH80L	1903042120	2023-03-04
Spectrum Analyzer	HP	8593E	3831U02087	2023-03-04
Dual Output DC Power Supply	Agilent	E3646A	MY40009992	2023-03-04
RF Control Unit	Tonscend	JS0806-2	/	2023-03-04
Analog Signal Generator	HP	83752A	3344A00337	2023-03-04
Vector Signal Generator	Agilent	N5182A	MY50142520	2023-03-04
Wideband Radio Communication Tester	R&S	CMW500	157282	2023-03-04
Spectrum Analyzer	R&S	FSV40-N	101798	2023-03-04

Maximum Conducted Output Power				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Wideband Radio Communication Tester	R&S	CMU200	115297	2023-03-04
Audio Analyzer	R&S	UPL16	100001	2023-03-04
Shielding box	Gxiong	GX-5915A	2201113	2023-04-23
High Pass Filter	COM-MW Technology Co., Ltd	ZHPF-M1.2-9G-187	09203403	2023-03-04
Band Stop Filter	COM-MW Technology Co., Ltd	ZBSF6-C820-920-188	09203401	2023-03-04
Splitter	COM-MW Technology Co., Ltd	ZPD-M1-8-2103	09203407	2023-03-04
Coaxial Cable	BEBES	A40-2.92M2.92 F-4.5M	1907021	2023-03-04
Hygrothermograph	Anymetre	JB913	/	2023-03-07
Climate Chamber	Angul	AGNH80L	1903042120	2023-03-04

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Spectrum Analyzer	HP	8593E	3831U02087	2023-03-04
Dual Output DC Power Supply	Agilent	E3646A	MY40009992	2023-03-04
RF Control Unit	Tonscend	JS0806-2	/	2023-03-04
Analog Signal Generator	HP	83752A	3344A00337	2023-03-04
Vector Signal Generator	Agilent	N5182A	MY50142520	2023-03-04
Wideband Radio Communication Tester	R&S	CMW500	157282	2023-03-04
Spectrum Analyzer	R&S	FSV40-N	101798	2023-03-04

Power Spectral Density				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Wideband Radio Communication Tester	R&S	CMU200	115297	2023-03-04
Audio Analyzer	R&S	UPL16	100001	2023-03-04
Shielding box	Gxiong	GX-5915A	2201113	2023-04-23
High Pass Filter	COM-MW Technology Co., Ltd	ZHPF-M1.2-9G-187	09203403	2023-03-04
Band Stop Filter	COM-MW Technology Co., Ltd	ZBSF6-C820-920-188	09203401	2023-03-04
Splitter	COM-MW Technology Co., Ltd	ZPD-M1-8-2103	09203407	2023-03-04
Coaxial Cable	BEBES	A40-2.92M2.92 F-4.5M	1907021	2023-03-04
Hygrothermograph	Anymetre	JB913	/	2023-03-07
Climate Chamber	Angul	AGNH80L	1903042120	2023-03-04
Spectrum Analyzer	HP	8593E	3831U02087	2023-03-04
Dual Output DC Power Supply	Agilent	E3646A	MY40009992	2023-03-04
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Wideband Radio Communication Tester	R&S	CMW500	157282	2023-03-04
Spectrum Analyzer	R&S	FSV40-N	101798	2023-03-04

Emissions in non-restricted frequency bands				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Wideband Radio Communication Tester	R&S	CMU200	115297	2023-03-04
Audio Analyzer	R&S	UPL16	100001	2023-03-04
Shielding box	Gxiong	GX-5915A	2201113	2023-04-23
High Pass Filter	COM-MW Technology Co., Ltd	ZHPF-M1.2-9G-187	09203403	2023-03-04

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	Ltd			
Band Stop Filter	COM-MW Technology Co., Ltd	ZBSF6-C820-92 0-188	09203401	2023-03-04
Splitter	COM-MW Technology Co., Ltd	ZPD-M1-8-2103	09203407	2023-03-04
Coaxial Cable	BEBES	A40-2.92M2.92 F-4.5M	1907021	2023-03-04
Hygrothermograph	Anymetre	JB913	/	2023-03-07
Climate Chamber	Angul	AGNH80L	1903042120	2023-03-04
Spectrum Analyzer	HP	8593E	3831U02087	2023-03-04
Dual Output DC Power Supply	Agilent	E3646A	MY40009992	2023-03-04
RF Control Unit	Tonscend	JS0806-2	/	2023-03-04
Analog Signal Generator	HP	83752A	3344A00337	2023-03-04
Vector Signal Generator	Agilent	N5182A	MY50142520	2023-03-04
Wideband Radio Communication Tester	R&S	CMW500	157282	2023-03-04
Spectrum Analyzer	R&S	FSV40-N	101798	2023-03-04

Emissions around the fundamental				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	1230	2023-04-12
Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	2023-03-04
Color Signal Generator	Philips	PM5418	672926	2023-03-04
Broadcast Television Signal Generator	R&S	SFE100	141038	2023-03-04
Analog Signal Generator	Agilent	8648A	3847M00445	2023-03-04
EMI Test Receiver	R&S	ESR	102525	2023-03-04
Horn Antenna	Schwarzbeck	BBHA 9120 D	2023	2023-03-29
Pre-Amplifier	EMCI	EMC051835SE	980662	2023-03-04
Spectrum Analyzer	Keysight	N9020A	MY46471971	2023-03-04
Loop Antenna	Beijin ZHINAN	ZN30900C	18050	2023-03-05

Emissions in restricted frequency bands (below 1GHz)				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	1230	2023-04-12
Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	2023-03-04
Color Signal Generator	Philips	PM5418	672926	2023-03-04
Broadcast Television Signal Generator	R&S	SFE100	141038	2023-03-04

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Analog Signal Generator	Agilent	8648A	3847M00445	2023-03-04
EMI Test Receiver	R&S	ESR	102525	2023-03-04
Horn Antenna	Schwarzbeck	BBHA 9120 D	2023	2023-03-29
Pre-Amplifier	EMCI	EMC051835SE	980662	2023-03-04
Spectrum Analyzer	Keysight	N9020A	MY46471971	2023-03-04
Loop Antenna	Beijin ZHINAN	ZN30900C	18050	2023-03-05

Emissions in restricted frequency bands (above 1GHz)				
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	1230	2023-04-12
Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	2023-03-04
Color Signal Generator	Philips	PM5418	672926	2023-03-04
Broadcast Television Signal Generator	R&S	SFE100	141038	2023-03-04
Analog Signal Generator	Agilent	8648A	3847M00445	2023-03-04
EMI Test Receiver	R&S	ESR	102525	2023-03-04
Horn Antenna	Schwarzbeck	BBHA 9120 D	2023	2023-03-29
Pre-Amplifier	EMCI	EMC051835SE	980662	2023-03-04
Spectrum Analyzer	Keysight	N9020A	MY46471971	2023-03-04
Loop Antenna	Beijin ZHINAN	ZN30900C	18050	2023-03-05

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### 3. Evaluation Results (Evaluation)

#### 3.1. Antenna requirement

Test 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 shall be considered sufficient to comply with the provisions of this section.
-------------------	--

##### 3.1.1. E.U.T. Operation:

Operating Environment:	
Temperature:	25.7 °C
Humidity:	44.4 %
Atmospheric Pressure:	101 kPa
Final test mode:	TM1

##### 3.1.2. Test Data:

The antenna gain is 2.46dBi, the directional gain of the antenna less than 6dBi. It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used. Antenna structure please refer to the EUT internal photographs antenna photo.
--

## 4. Radio Spectrum Matter Test Results (RF)

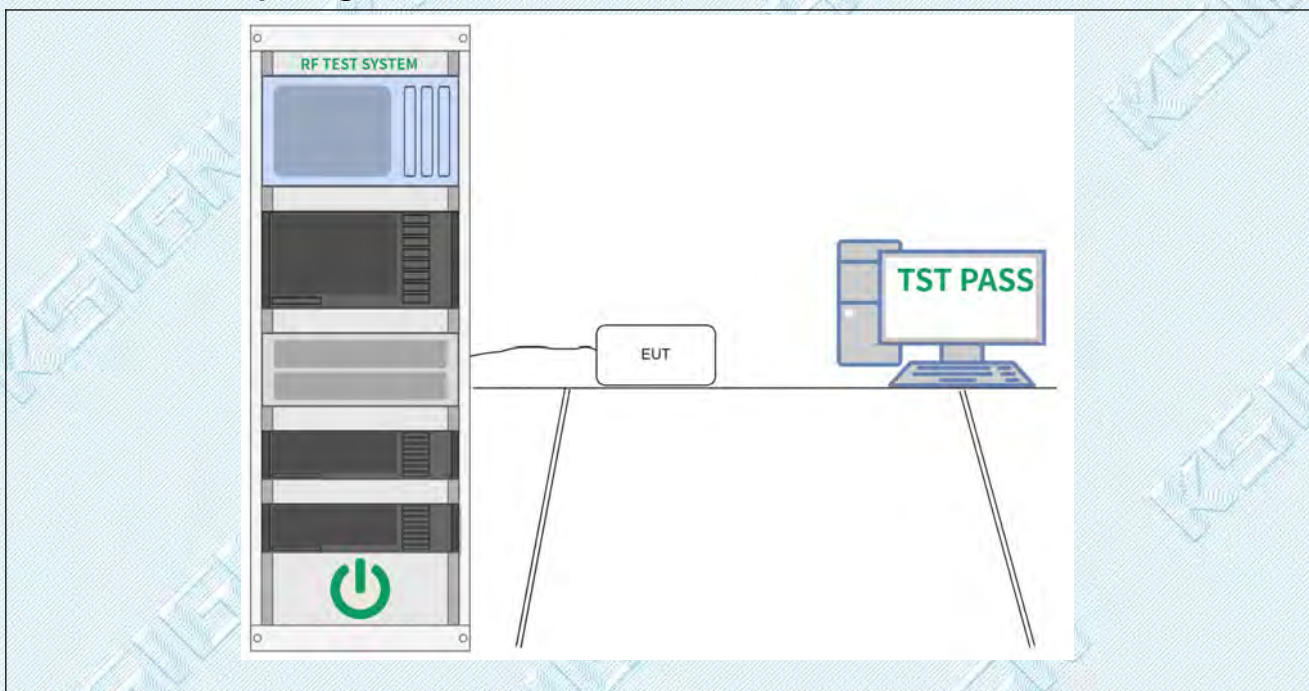
### 4.1. Occupied Bandwidth

Test Requirement:	Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Test Limit:	Section (a)(2), Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Test Method:	DTS bandwidth
Procedure:	<ul style="list-style-type: none"> <li>a) Set RBW = 100 kHz.</li> <li>b) Set the VBW &gt;= [3 × RBW].</li> <li>c) Detector = peak.</li> <li>d) Trace mode = max hold.</li> <li>e) Sweep = auto couple.</li> <li>f) Allow the trace to stabilize.</li> <li>g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.</li> </ul>

#### 4.1.1. E.U.T. Operation:

Operating Environment:	
Temperature:	25.7 °C
Humidity:	44.9 %
Atmospheric Pressure:	102 kPa
Final test mode:	Test Mode 1

#### 4.1.2. Test Setup Diagram:



#### 4.1.3. Test Data:

Please Refer to Appendix for Details.

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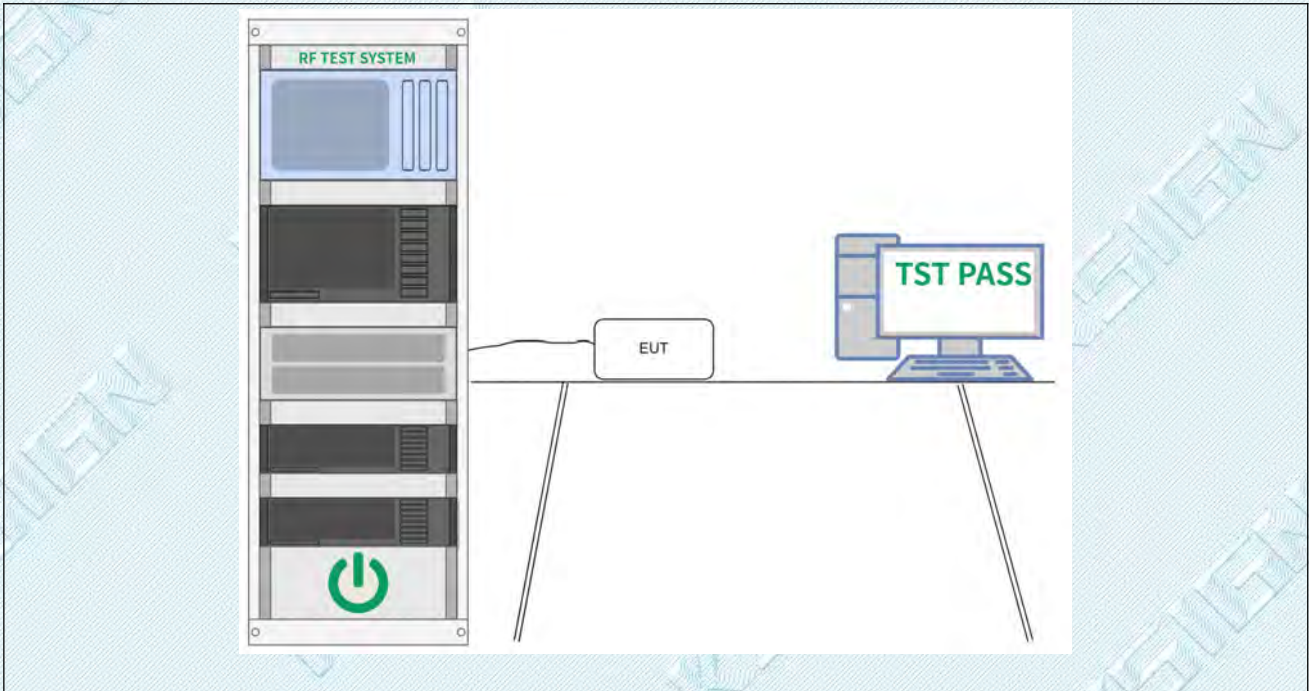
## 4.2. Maximum Conducted Output Power

Test Requirement:	For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
Test Limit:	For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
Test Method:	Maximum peak conducted output power
Procedure:	ANSI C63.10-2013, section 11.9.1 Maximum peak conducted output power

### 4.2.1. E.U.T. Operation:

Operating Environment:	
Temperature:	25.7 °C
Humidity:	44.9 %
Atmospheric Pressure:	102 kPa
Final test mode:	Test Mode 1

#### 4.2.2. Test Setup Diagram:



#### 4.2.3. Test Data:

Please Refer to Appendix for Details.



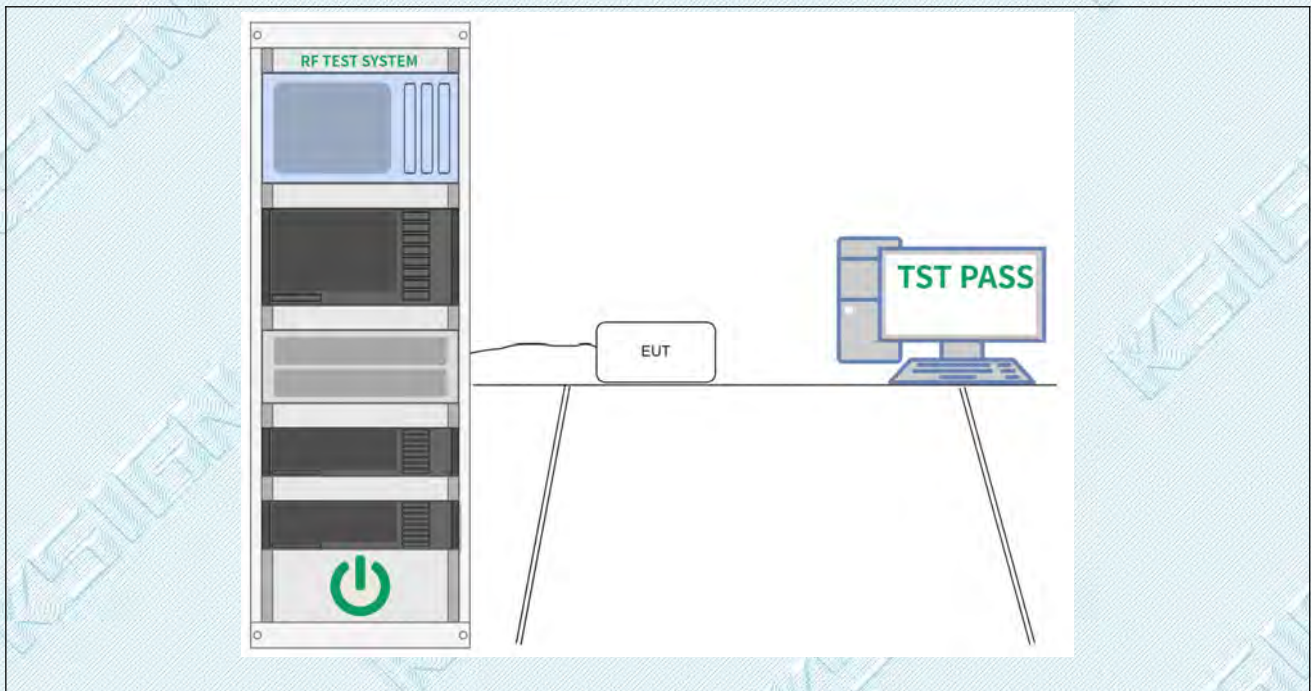
### 4.3. Power Spectral Density

Test Requirement:	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
Test Limit:	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
Test Method:	Maximum power spectral density level in the fundamental emission

#### 4.3.1. E.U.T. Operation:

Operating Environment:	
Temperature:	25.7 °C
Humidity:	44.9 %
Atmospheric Pressure:	102 kPa
Final test mode:	Test Mode1

#### 4.3.2. Test Setup Diagram:



#### 4.3.3. Test Data:

Please Refer to Appendix for Details.

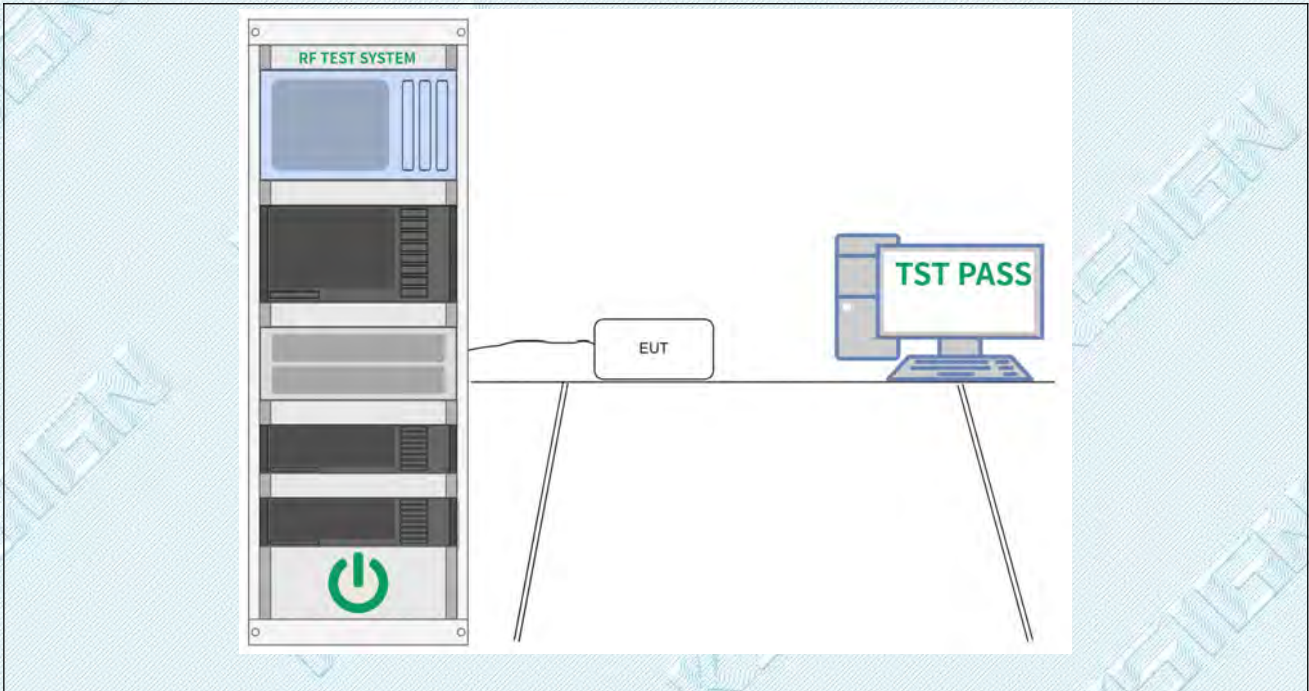
#### 4.4. Emissions in non-restricted frequency bands

Test Requirement:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Test Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Test Method:	Emissions in nonrestricted frequency bands
Procedure:	ANSI C63.10-2013 Section 11.11.1, Section 11.11.2, Section 11.11.3

##### 4.4.1. E.U.T. Operation:

Operating Environment:	
Temperature:	25.7 °C
Humidity:	44.9 %
Atmospheric Pressure:	102 kPa
Final test mode:	Test Mode1

#### 4.4.2. Test Setup Diagram:



#### 4.4.3. Test Data:

Please Refer to Appendix for Details.

#### 4.5. Emissions around the fundamental

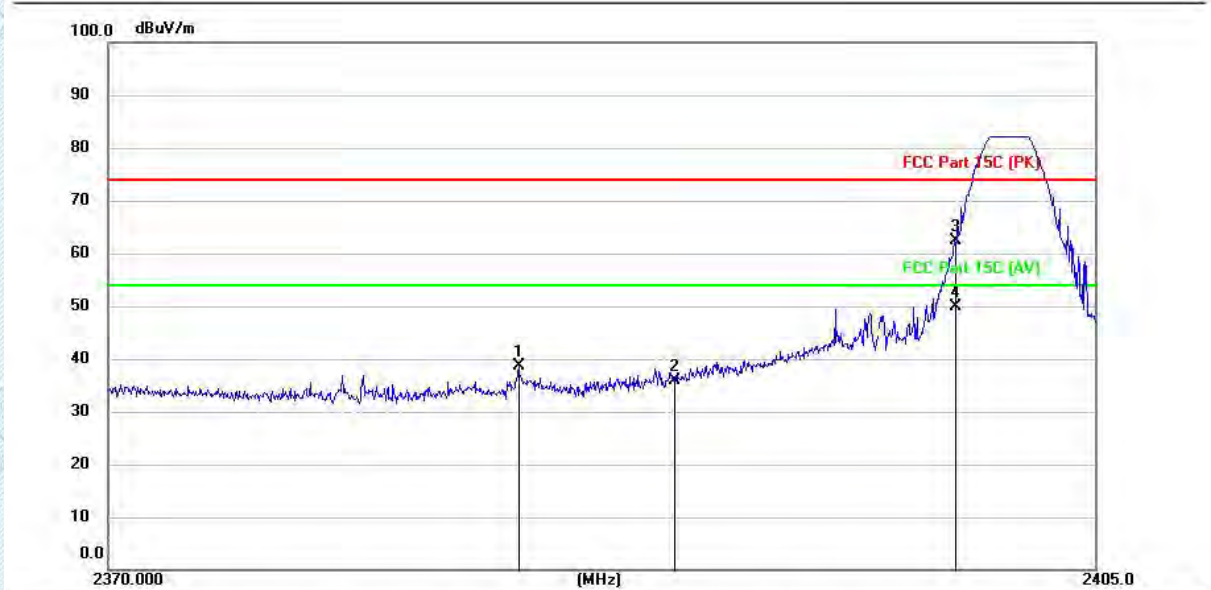
Test Requirement:	In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`		
Test Limit:	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
	30-88	100 **	3
	88-216	150 **	3
	216-960	200 **	3
	Above 960	500	3
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.			
Test Method:	Radiated emissions tests		
Procedure:	ANSI C63.10-2013 section 6.6.4		

##### 4.5.1. E.U.T. Operation:

Operating Environment:	
Temperature:	24.2 °C
Humidity:	42.6 %
Atmospheric Pressure:	102 kPa
Final test mode:	Test Mode 1

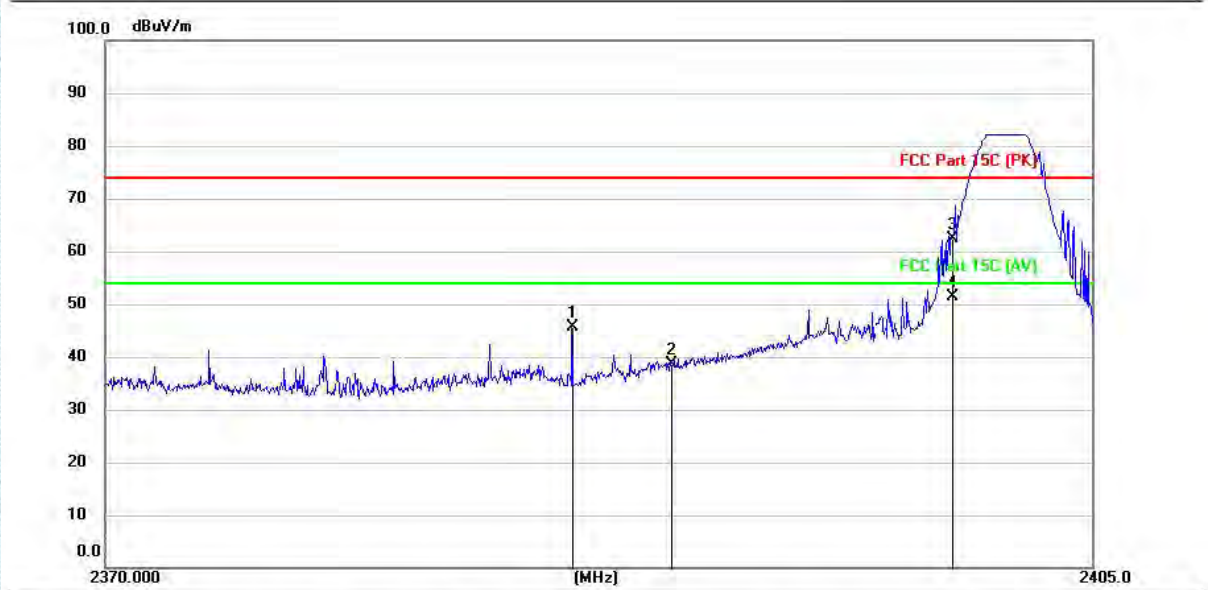
4.5.2. Test Data:

Test Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: L



No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		2384.518	49.61	-10.92	38.69	74.00	-35.31	peak
2		2390.000	46.70	-10.92	35.78	74.00	-38.22	peak
3		2400.000	73.37	-10.92	62.45	74.00	-11.55	peak
4	*	2400.000	60.76	-10.92	49.84	54.00	-4.16	AVG

Test Mode1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: L



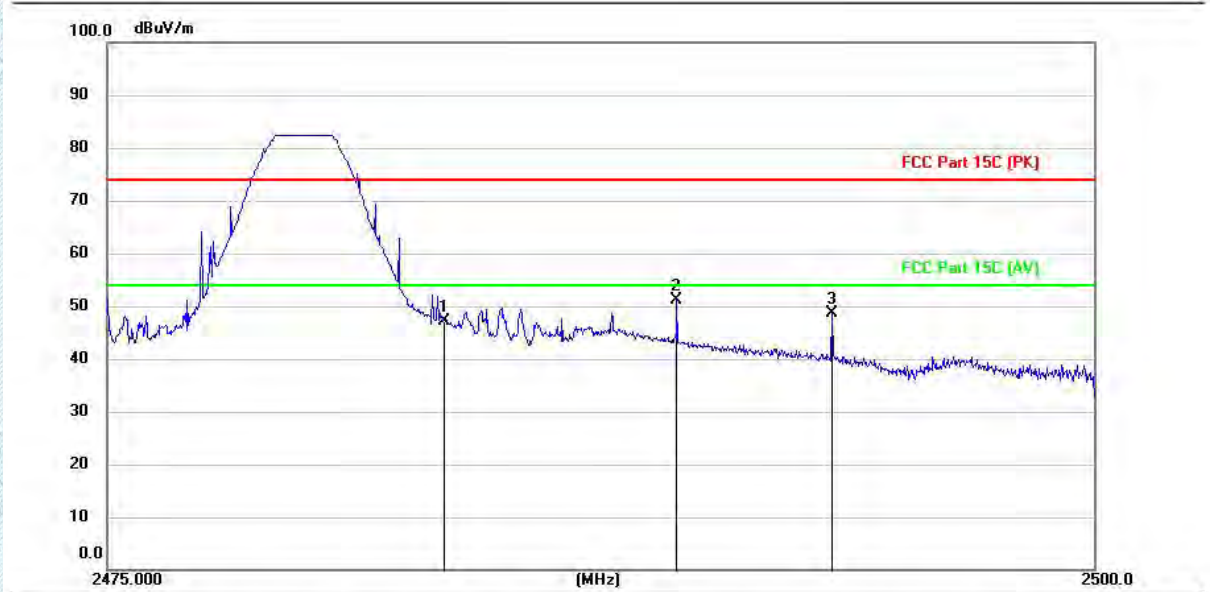
No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		2386.513	56.61	-10.92	45.69	74.00	-28.31	peak
2		2390.000	49.48	-10.92	38.56	74.00	-35.44	peak
3		2400.000	73.20	-10.92	62.28	74.00	-11.72	peak
4	*	2400.000	62.20	-10.92	51.28	54.00	-2.72	AVG

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**Test Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: H**



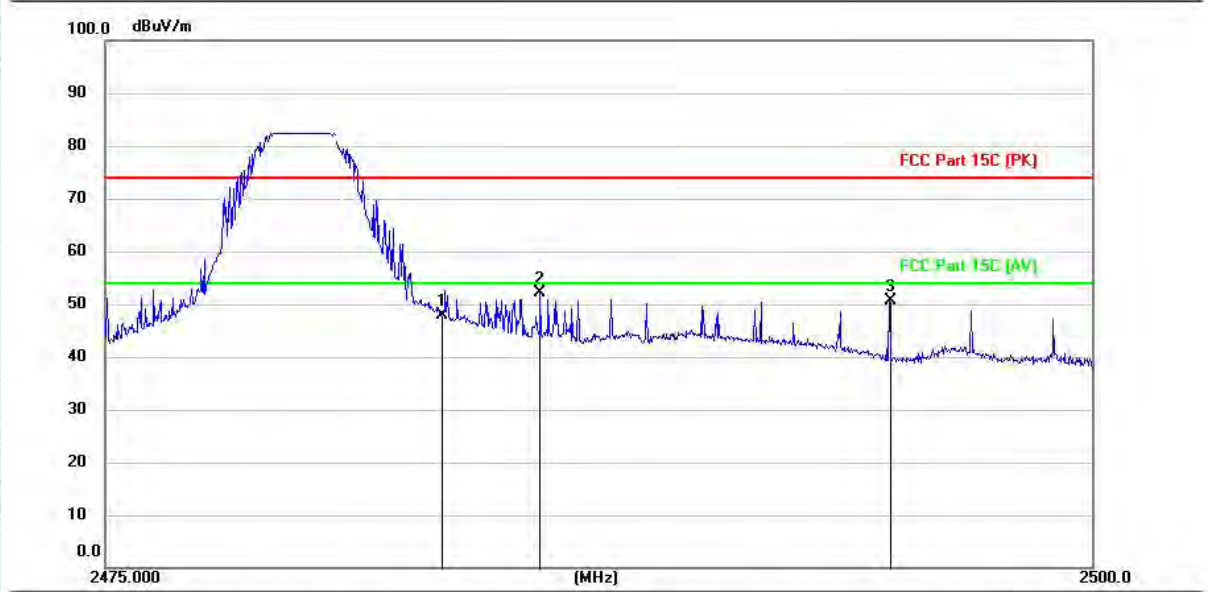
No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		2483.500	57.91	-10.88	47.03	74.00	-26.97	peak
2	*	2489.394	62.13	-10.89	51.24	74.00	-22.76	peak
3		2493.325	59.59	-10.89	48.70	74.00	-25.30	peak

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Test Mode1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: H



No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		2483.500	58.78	-10.88	47.90	74.00	-26.10	peak
2	*	2485.964	63.00	-10.88	52.12	74.00	-21.88	peak
3		2494.875	61.45	-10.87	50.58	74.00	-23.42	peak

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#### 4.6. Emissions in restricted frequency bands (below 1GHz)

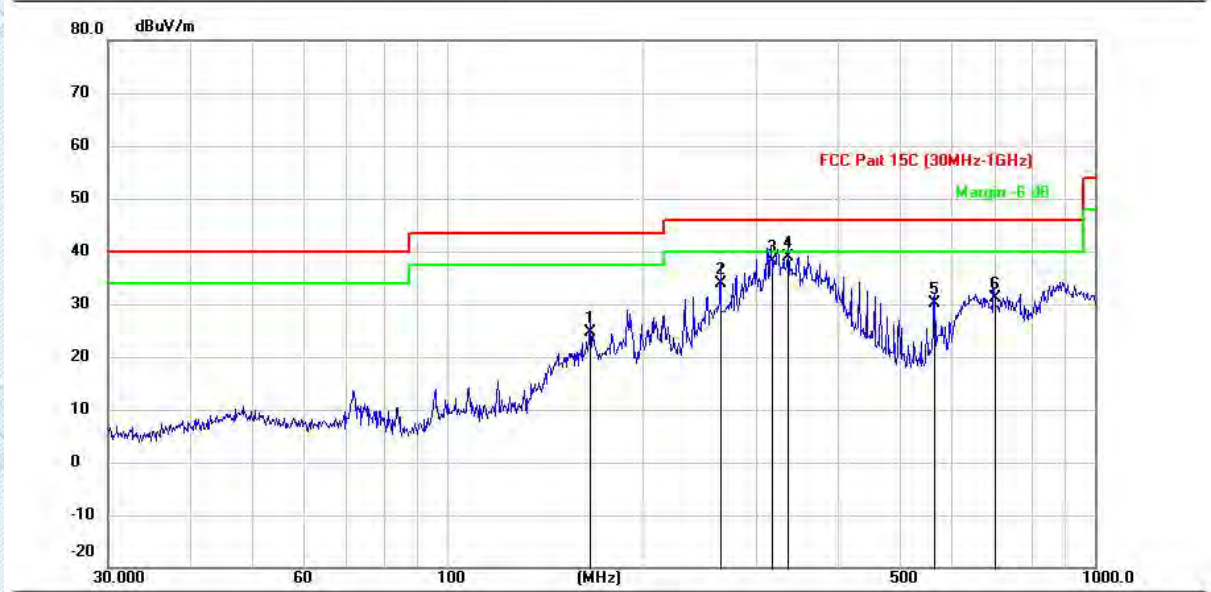
Test Requirement:	In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`		
Test Limit:	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
	30-88	100 **	3
	88-216	150 **	3
	216-960	200 **	3
	Above 960	500	3
	** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.		
Test Method:	Radiated emissions tests		
Procedure:	ANSI C63.10-2013 section 6.6.4		

##### 4.6.1. E.U.T. Operation:

Operating Environment:	
Temperature:	24.2 °C
Humidity:	42.6 %
Atmospheric Pressure:	102 kPa
Final test mode:	Test Mode 1

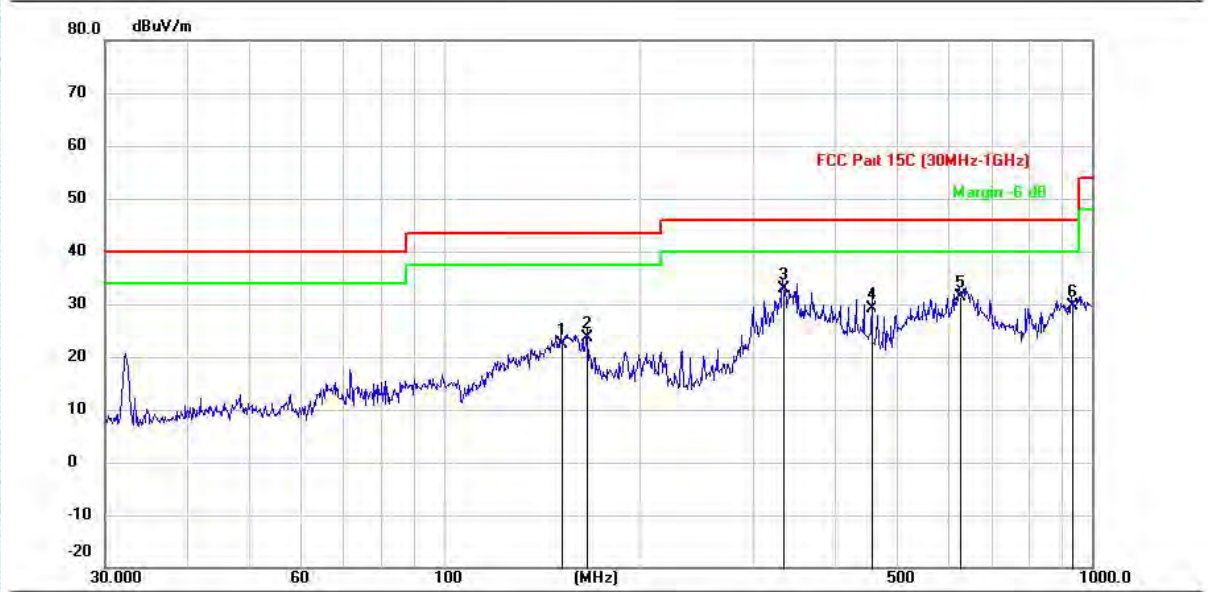
4.6.2. Test Data:

Test Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: L



No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		166.5927	45.54	-20.85	24.69	43.50	-18.81	QP
2		264.0040	49.48	-15.48	34.00	46.00	-12.00	QP
3		315.7019	52.13	-13.99	38.14	46.00	-7.86	QP
4	*	336.0350	51.91	-13.13	38.78	46.00	-7.22	QP
5		566.6221	38.55	-8.49	30.06	46.00	-15.94	QP
6		700.0406	38.32	-7.15	31.17	46.00	-14.83	QP

Test Mode1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: L



No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		151.9696	43.63	-21.35	22.28	43.50	-21.22	QP
2		166.5927	44.54	-20.85	23.69	43.50	-19.81	QP
3	*	332.6351	46.13	-13.27	32.86	46.00	-13.14	QP
4		456.0656	39.31	-10.27	29.04	46.00	-16.96	QP
5		626.3943	38.92	-7.50	31.42	46.00	-14.58	QP
6		930.9647	33.48	-3.94	29.54	46.00	-16.46	QP

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#### 4.7. Emissions in restricted frequency bands (above 1GHz)

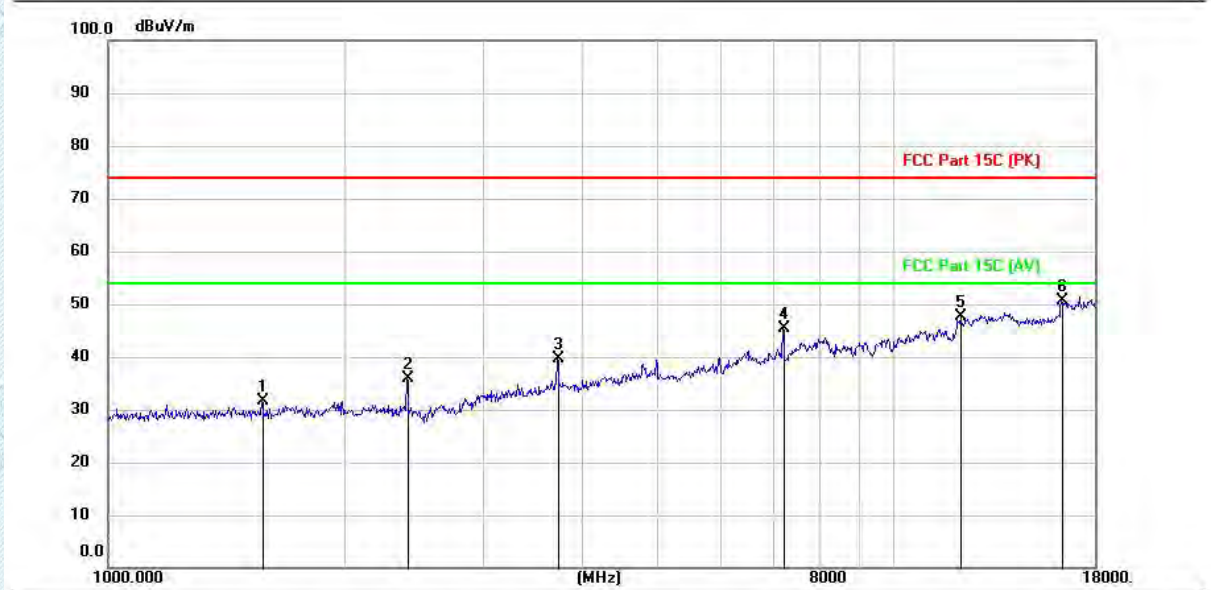
Test Requirement:	In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`		
Test Limit:	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
	30-88	100 **	3
	88-216	150 **	3
	216-960	200 **	3
	Above 960	500	3
	** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.		
Test Method:	Radiated emissions tests		
Procedure:	ANSI C63.10-2013 section 6.6.4		

#### 4.7.1. E.U.T. Operation:

Operating Environment:	
Temperature:	24.2 °C
Humidity:	42.6 %
Atmospheric Pressure:	102 kPa
Final test mode:	Test Mode 1

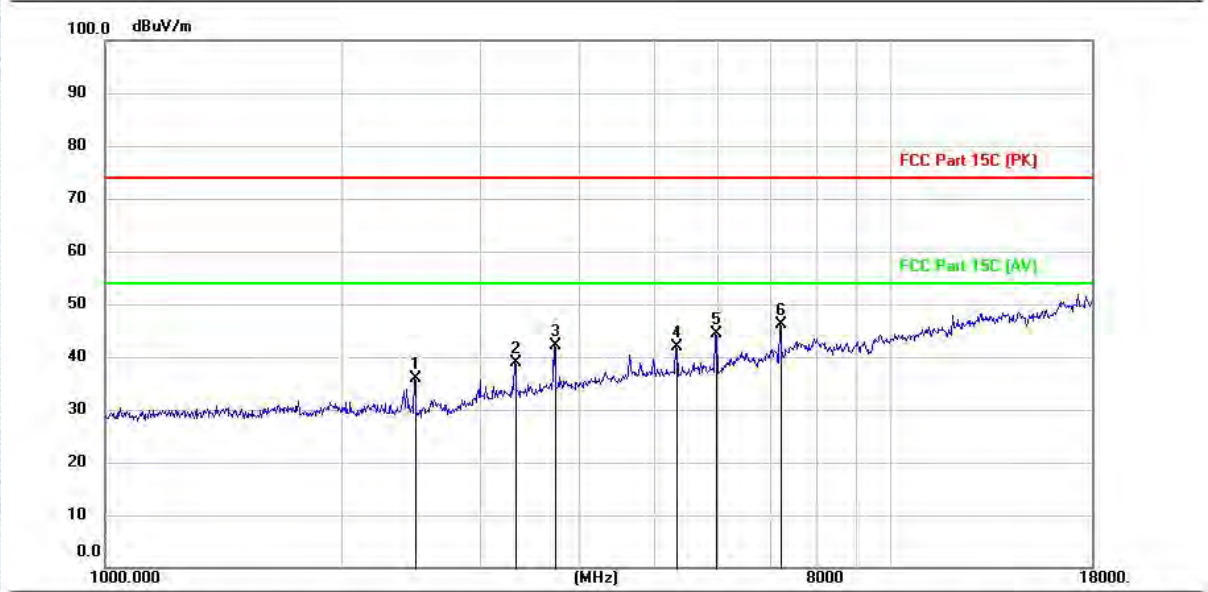
4.7.2. Test Data:

Test Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: L



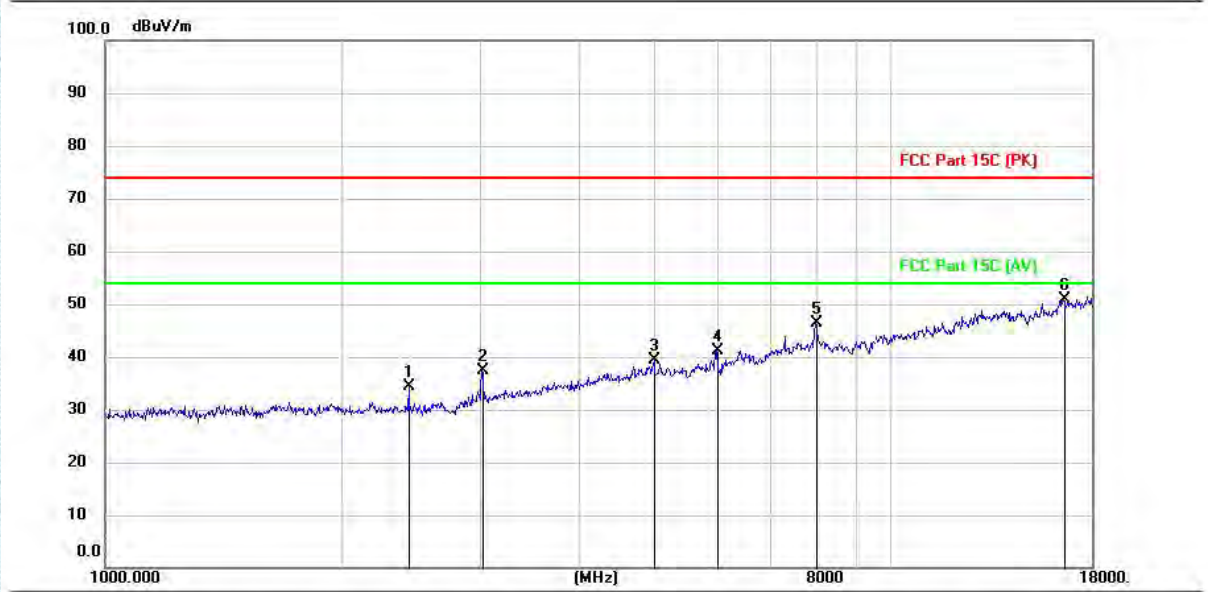
No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		1566.100	43.29	-11.65	31.64	74.00	-42.36	peak
2		2402.500	46.88	-10.91	35.97	74.00	-38.03	peak
3		3730.200	48.76	-9.10	39.66	74.00	-34.34	peak
4		7206.700	45.38	-0.07	45.31	74.00	-28.69	peak
5		12152.000	39.34	8.22	47.56	74.00	-26.44	peak
6	*	16318.700	37.14	13.37	50.51	74.00	-23.49	peak

Test Mode1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: L



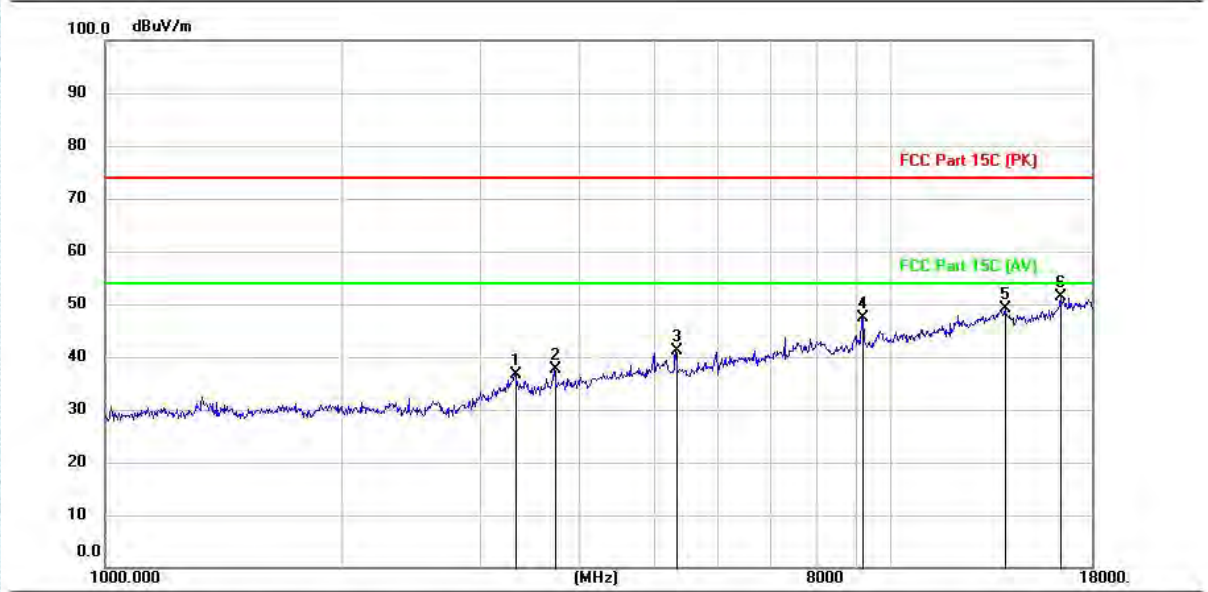
No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		2480.700	46.83	-10.89	35.94	74.00	-38.06	peak
2		3322.200	48.85	-10.01	38.84	74.00	-35.16	peak
3		3731.900	51.22	-9.09	42.13	74.00	-31.87	peak
4		5329.900	47.02	-5.08	41.94	74.00	-32.06	peak
5		5981.000	48.20	-3.84	44.36	74.00	-29.64	peak
6	*	7206.700	46.32	-0.07	46.25	74.00	-27.75	peak

Test Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: M



No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		2439.900	45.35	-10.90	34.45	74.00	-39.55	peak
2		3024.700	47.92	-10.55	37.37	74.00	-36.63	peak
3		4989.900	44.91	-5.42	39.49	74.00	-34.51	peak
4		5994.600	44.98	-3.81	41.17	74.00	-32.83	peak
5		8009.100	44.37	2.07	46.44	74.00	-27.56	peak
6	*	16582.200	37.31	13.68	50.99	74.00	-23.01	peak

Test Mode1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: M



No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		3330.700	46.72	-9.98	36.74	74.00	-37.26	peak
2		3728.500	46.87	-9.12	37.75	74.00	-36.25	peak
3		5321.400	46.11	-5.09	41.02	74.00	-32.98	peak
4		9154.900	45.31	2.18	47.49	74.00	-26.51	peak
5		13965.900	37.84	11.18	49.02	74.00	-24.98	peak
6	*	16456.400	37.75	13.71	51.46	74.00	-22.54	peak

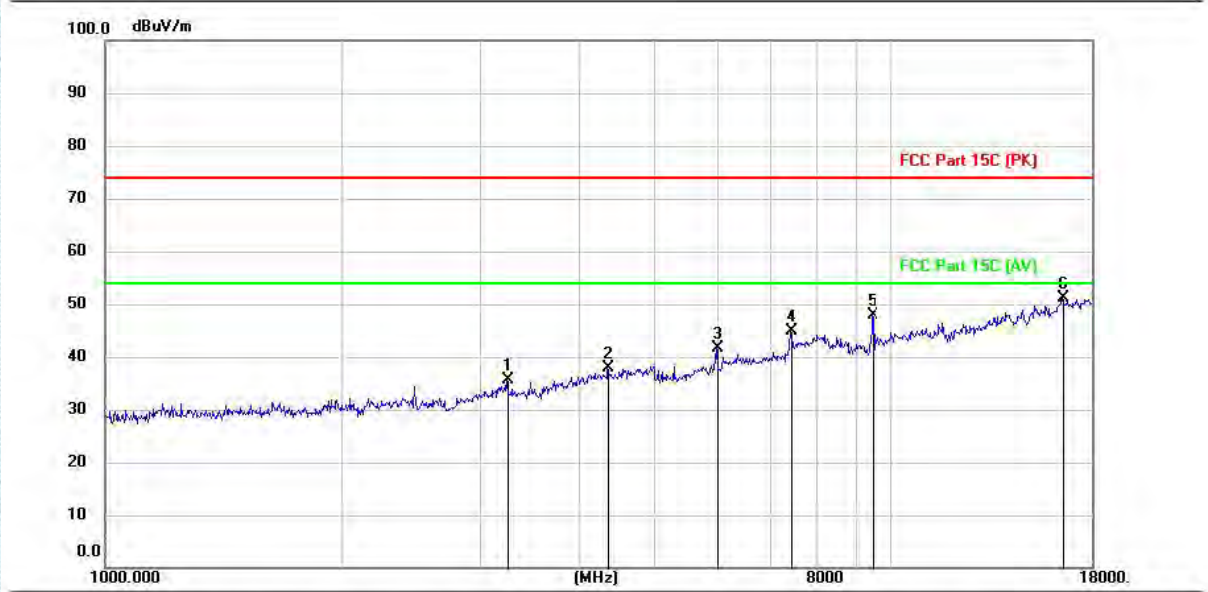
TRF EMC\_R1

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Test Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: H



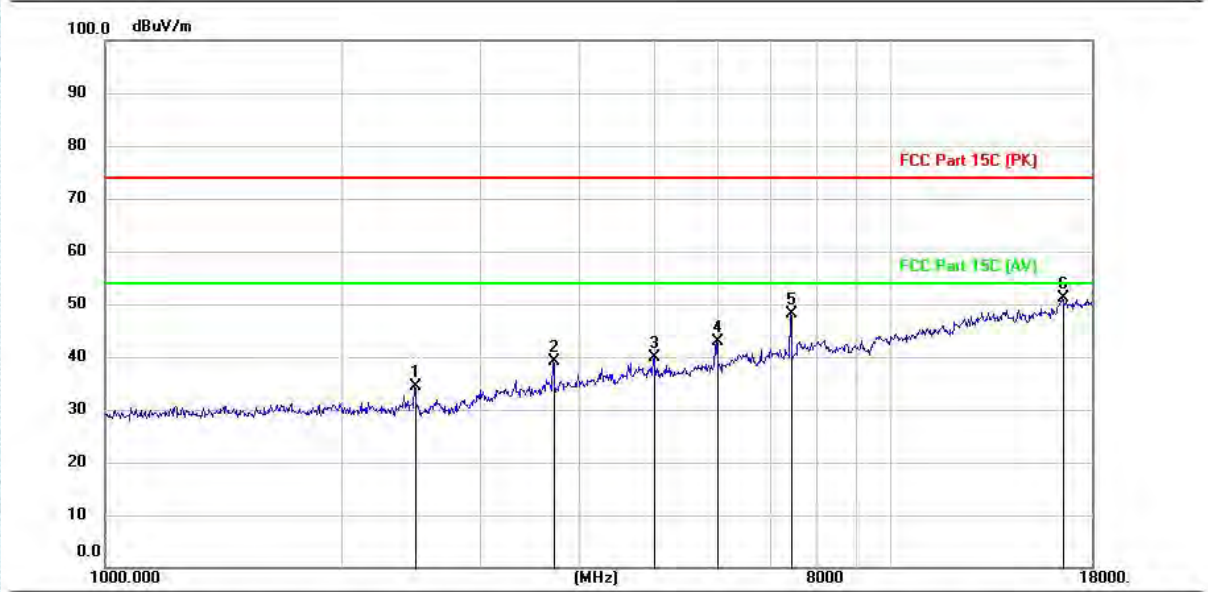
No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		3245.700	45.77	-10.14	35.63	74.00	-38.37	peak
2		4360.900	45.22	-7.22	38.00	74.00	-36.00	peak
3		5987.800	45.42	-3.83	41.59	74.00	-32.41	peak
4		7437.900	44.33	0.63	44.96	74.00	-29.04	peak
5		9472.800	44.94	2.90	47.84	74.00	-26.16	peak
6	*	16522.700	37.40	13.77	51.17	74.00	-22.83	peak

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Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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Test Mode1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: H



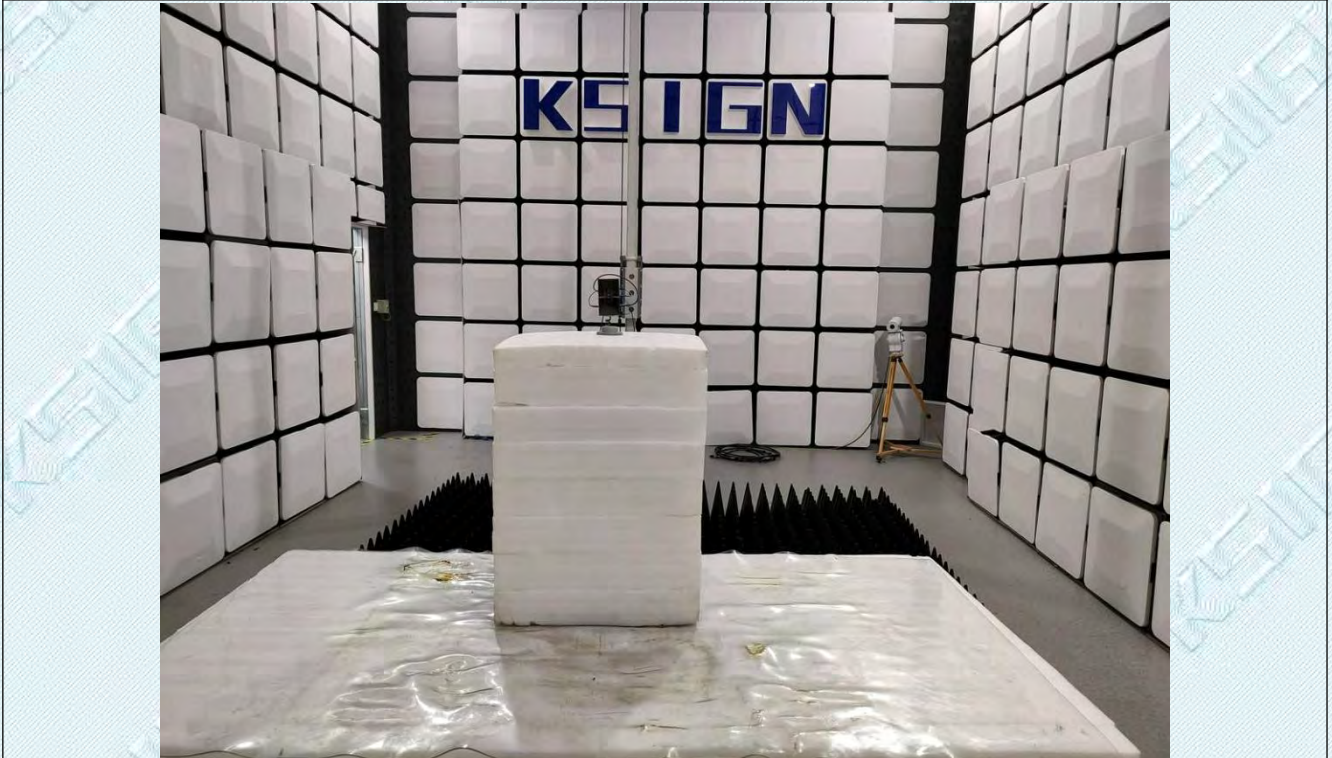
No. Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1	2480.700	45.25	-10.89	34.36	74.00	-39.64	peak
2	3720.000	48.32	-9.13	39.19	74.00	-34.81	peak
3	4988.200	45.22	-5.43	39.79	74.00	-34.21	peak
4	5992.900	46.65	-3.81	42.84	74.00	-31.16	peak
5	7437.900	47.48	0.63	48.11	74.00	-25.89	peak
6 *	16546.500	37.30	13.74	51.04	74.00	-22.96	peak

## 5. EUT TEST PHOTOS

Emissions in restricted frequency bands (below 1GHz)

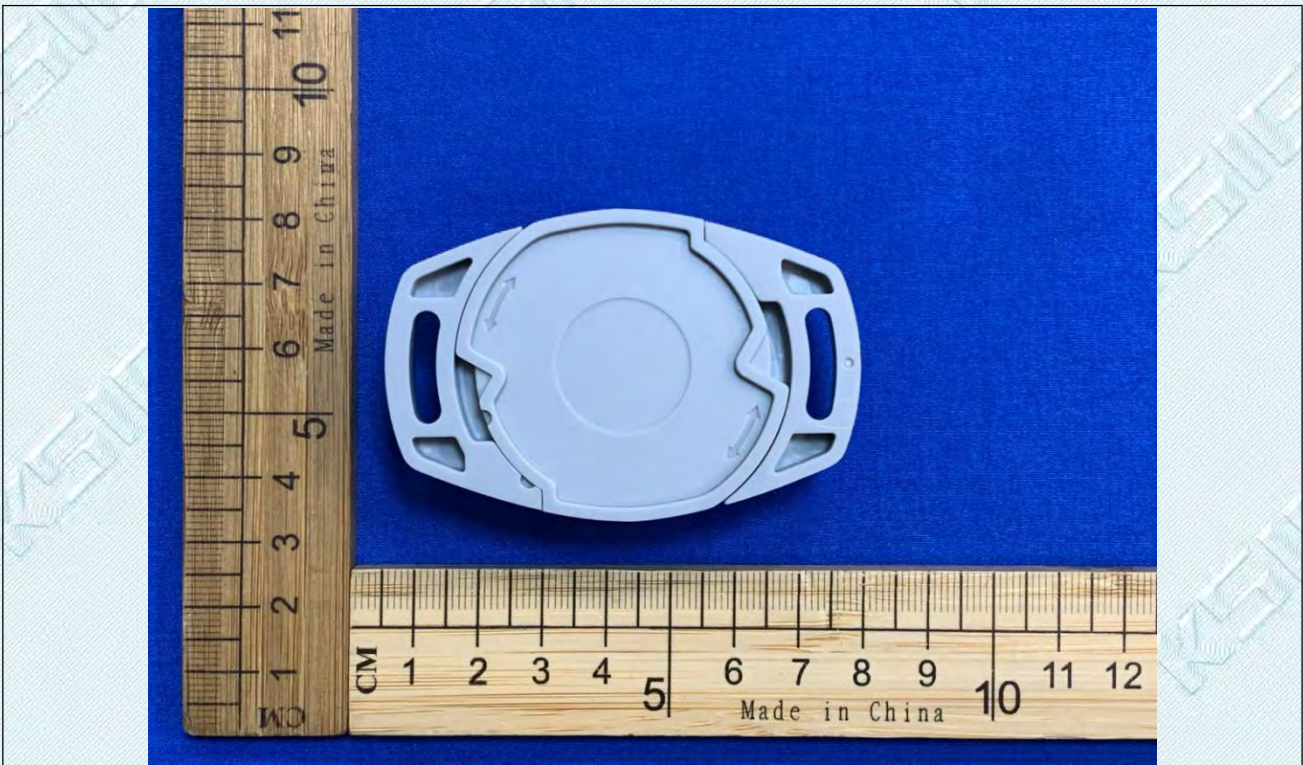


Emissions in restricted frequency bands (above 1GHz)

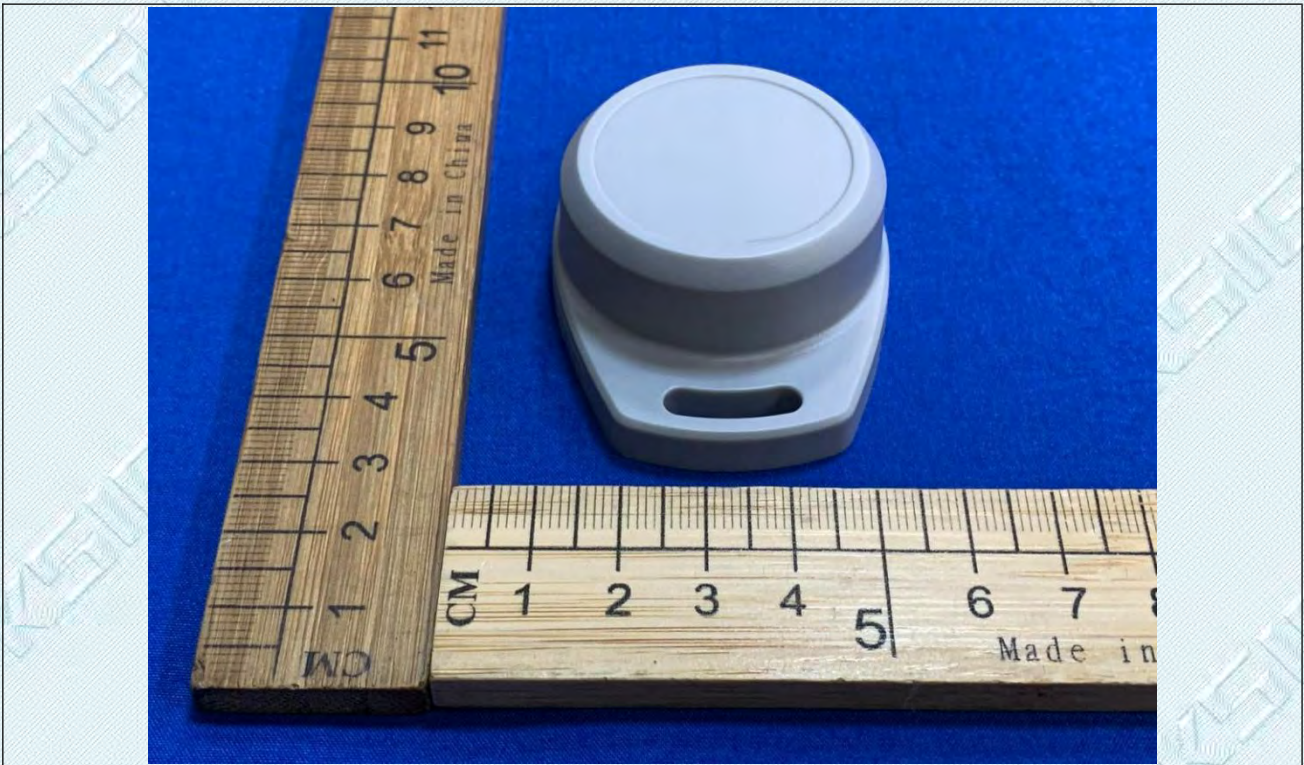


## 6. PHOTOGRAPHS OF EUT CONSTRUCTIONAL

External

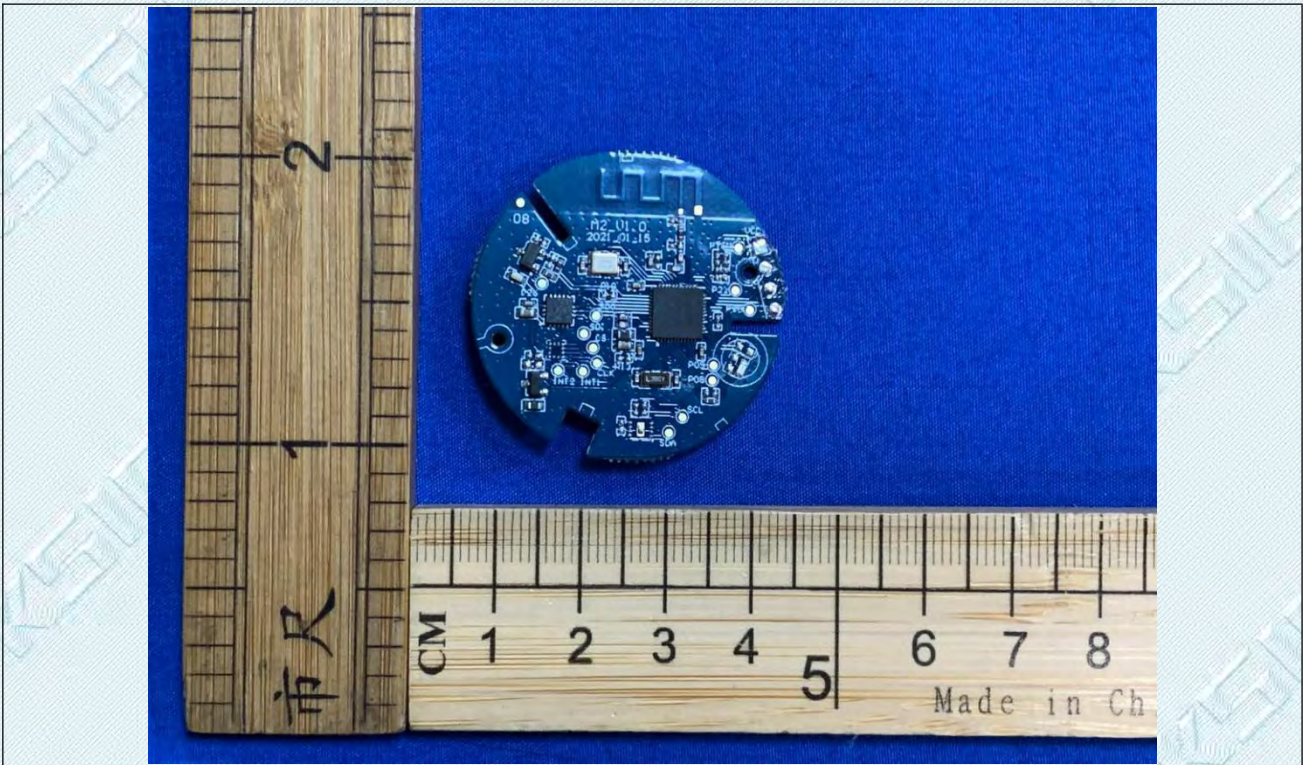
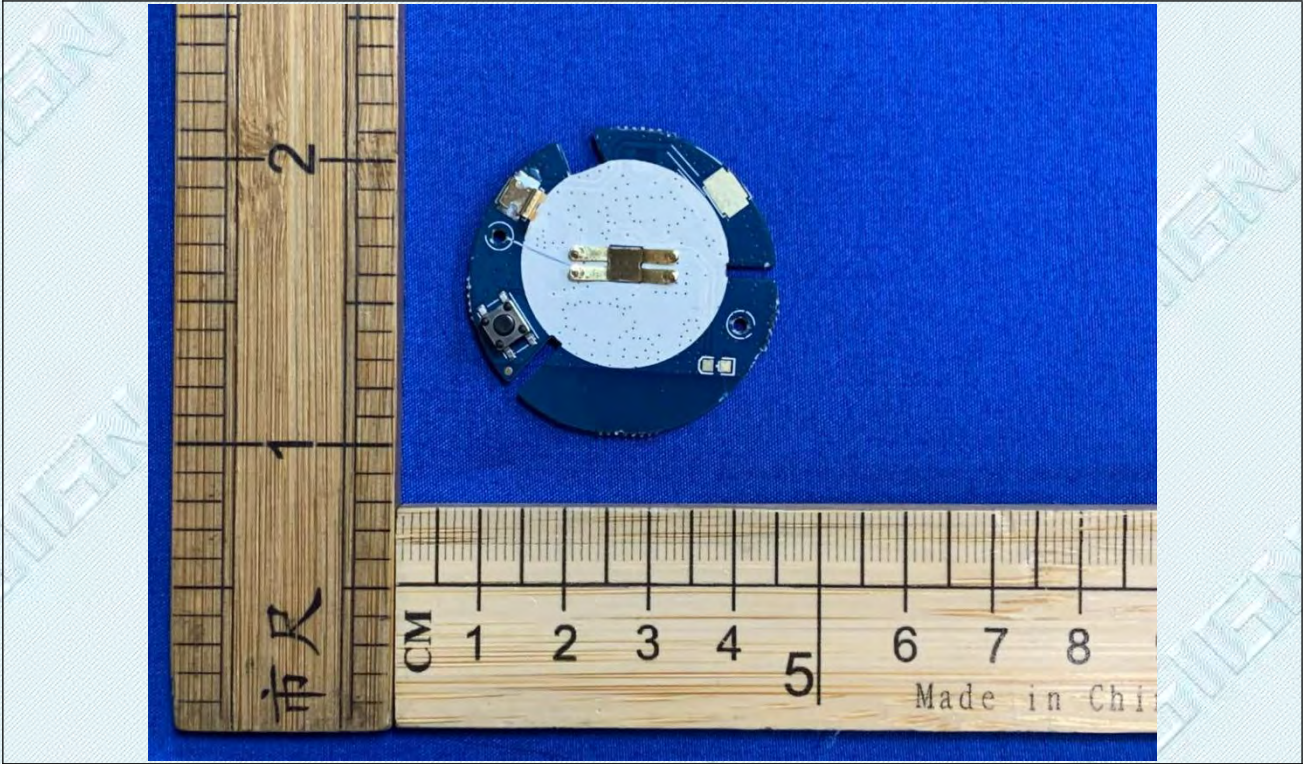




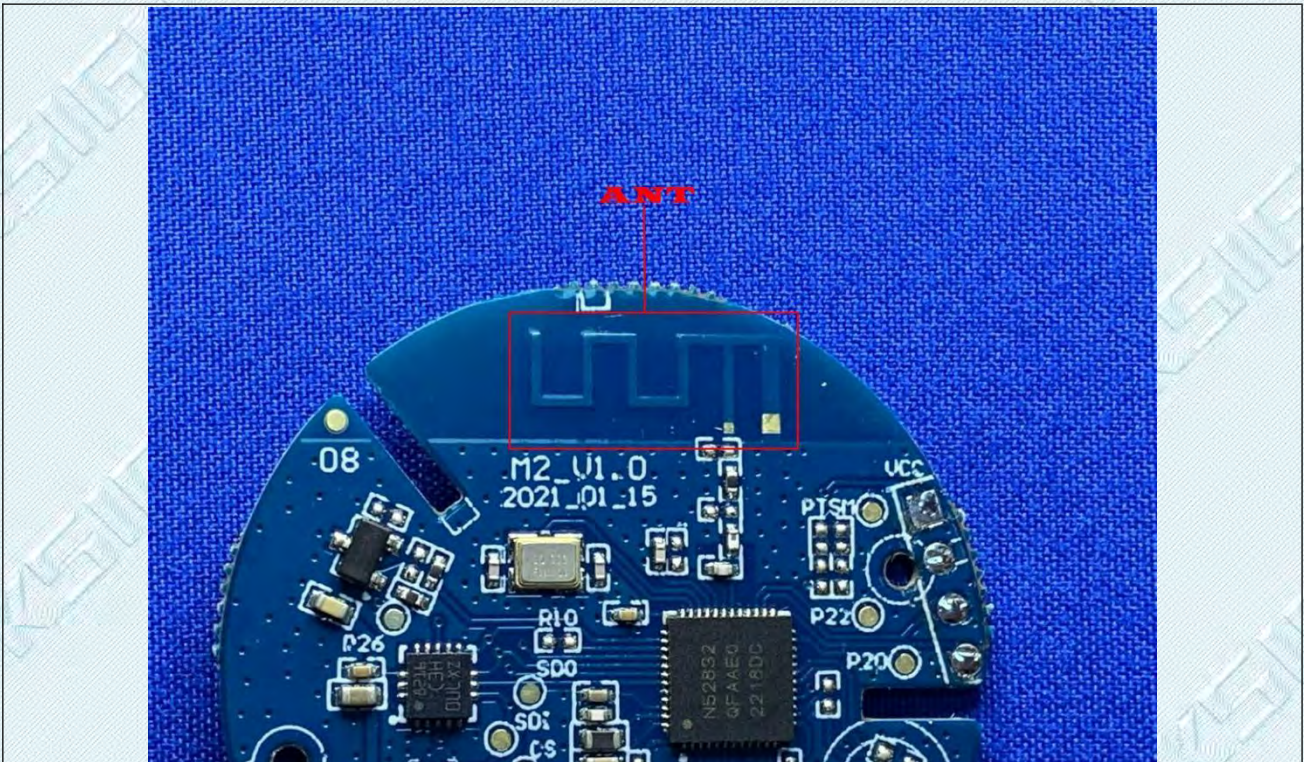
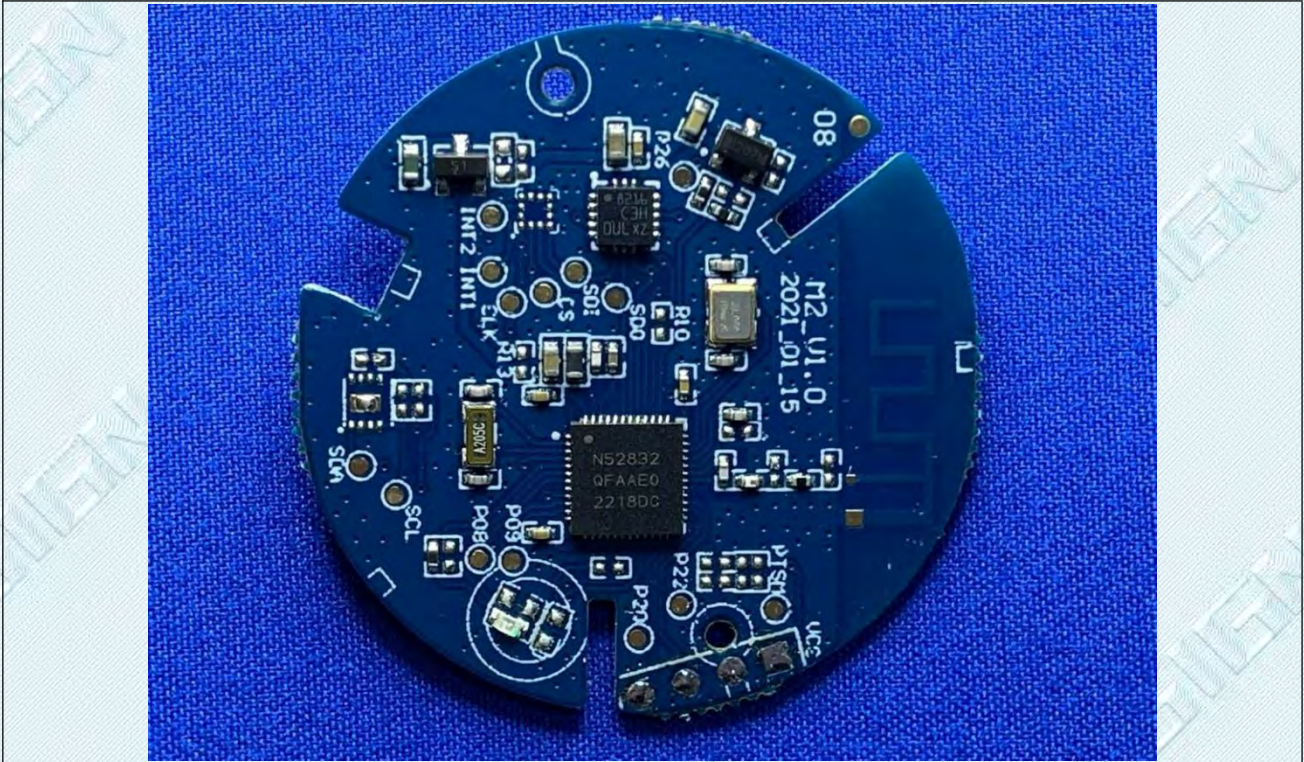


**Internal**









# Appendix

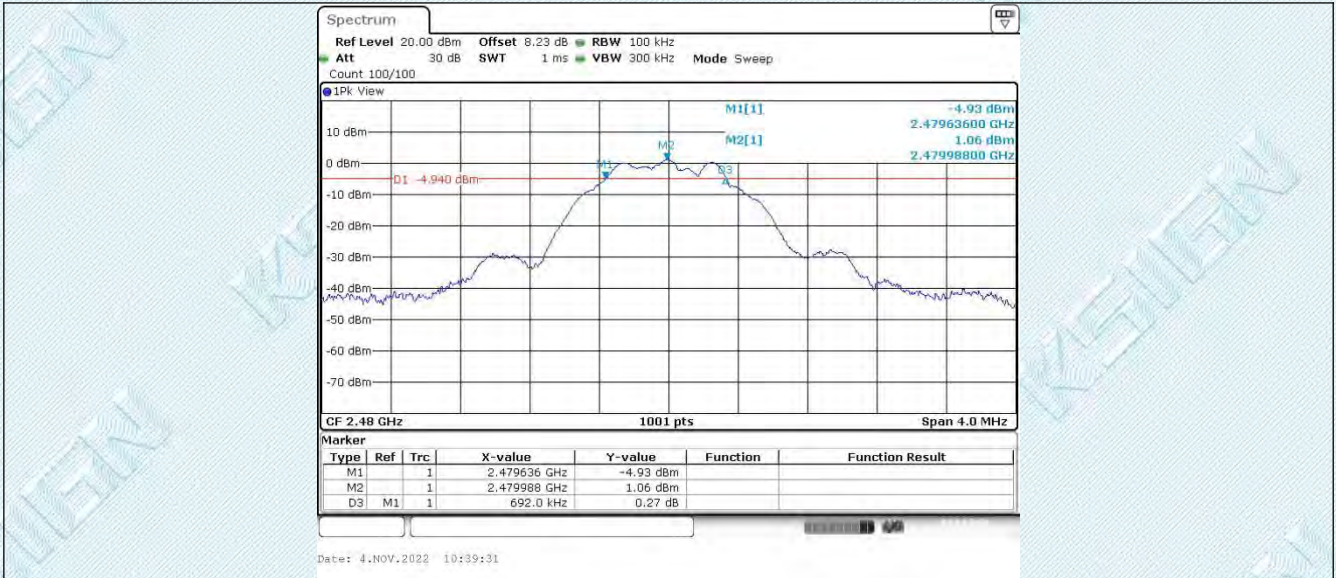
## 6.1. Appendix A: DTS Bandwidth

### 6.1.1. Test Result

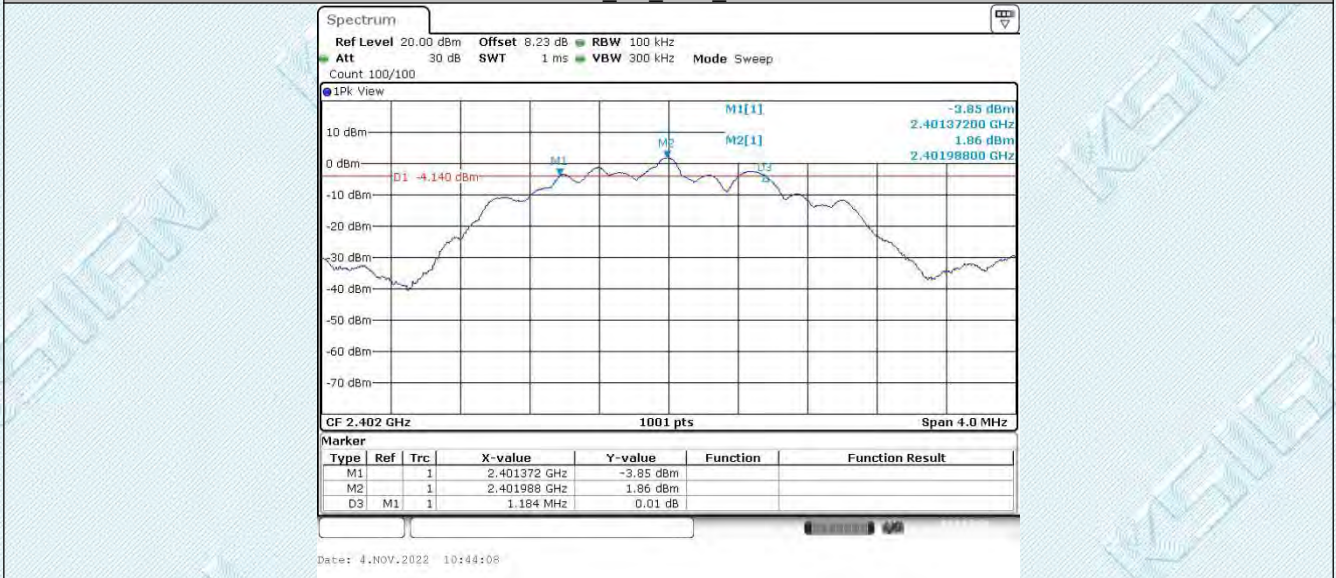
TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.70	2401.63	2402.33	0.5	PASS
		2440	0.69	2439.64	2440.33	0.5	PASS
		2480	0.69	2479.64	2480.33	0.5	PASS
BLE_2M	Ant1	2402	1.18	2401.37	2402.56	0.5	PASS
		2440	1.19	2439.37	2440.56	0.5	PASS
		2480	1.18	2479.37	2480.55	0.5	PASS

### 6.1.2. Test Graphs

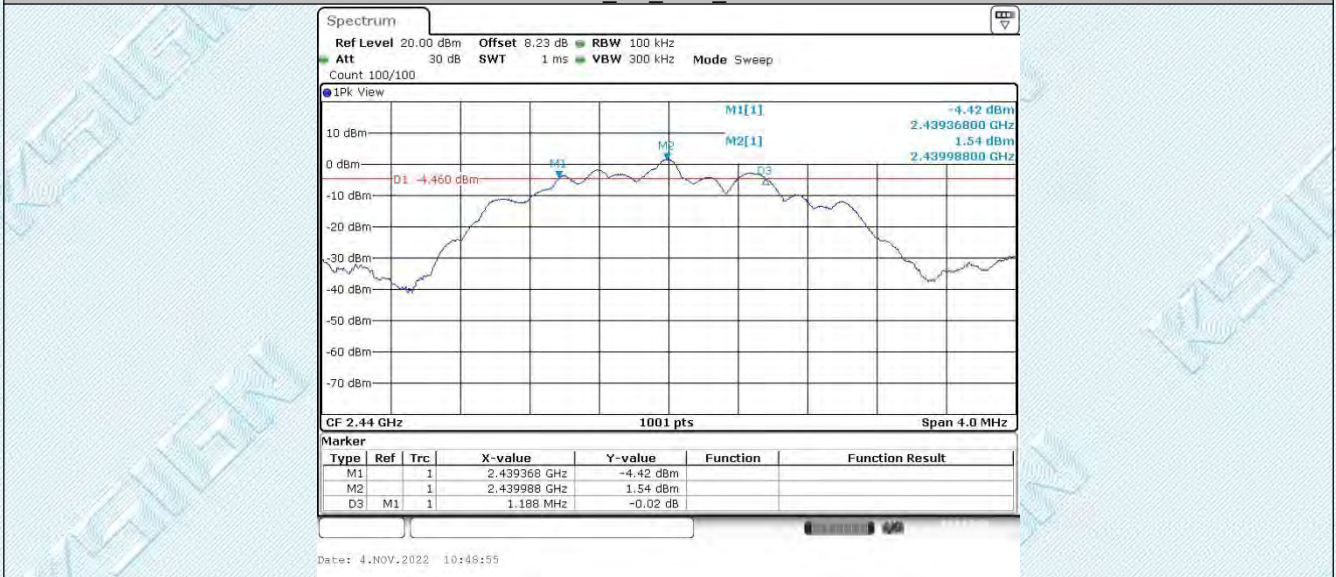




BLE\_2M\_Ant1\_2402



BLE\_2M\_Ant1\_2440

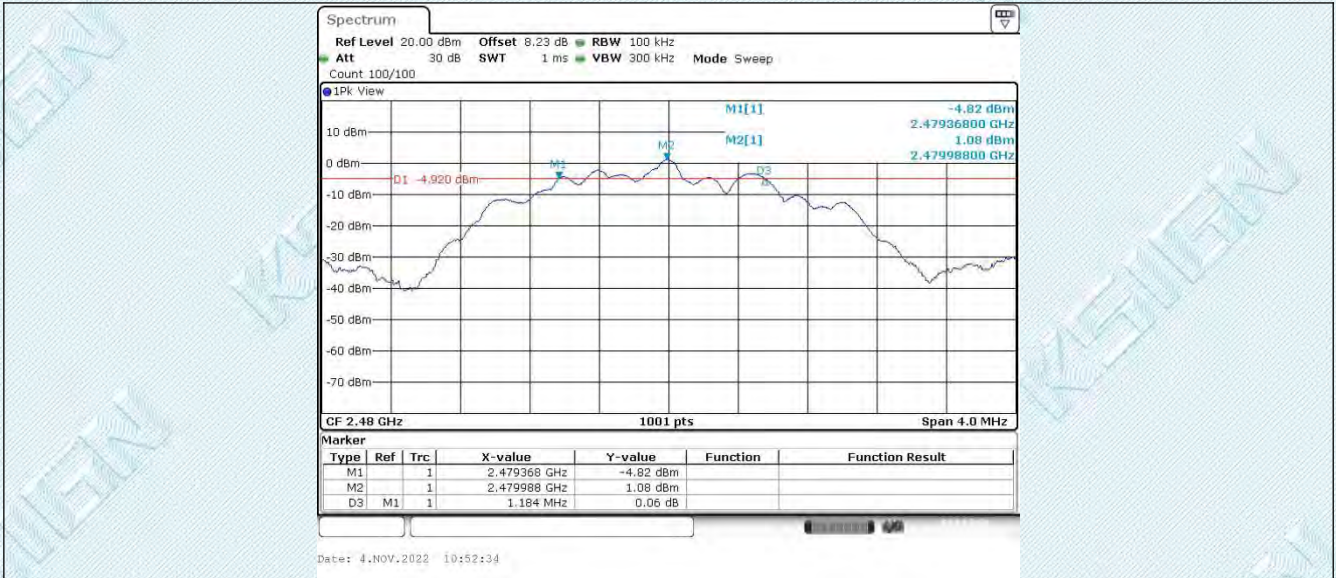


BLE\_2M\_Ant1\_2480

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## 6.2. Appendix B: Occupied Channel Bandwidth

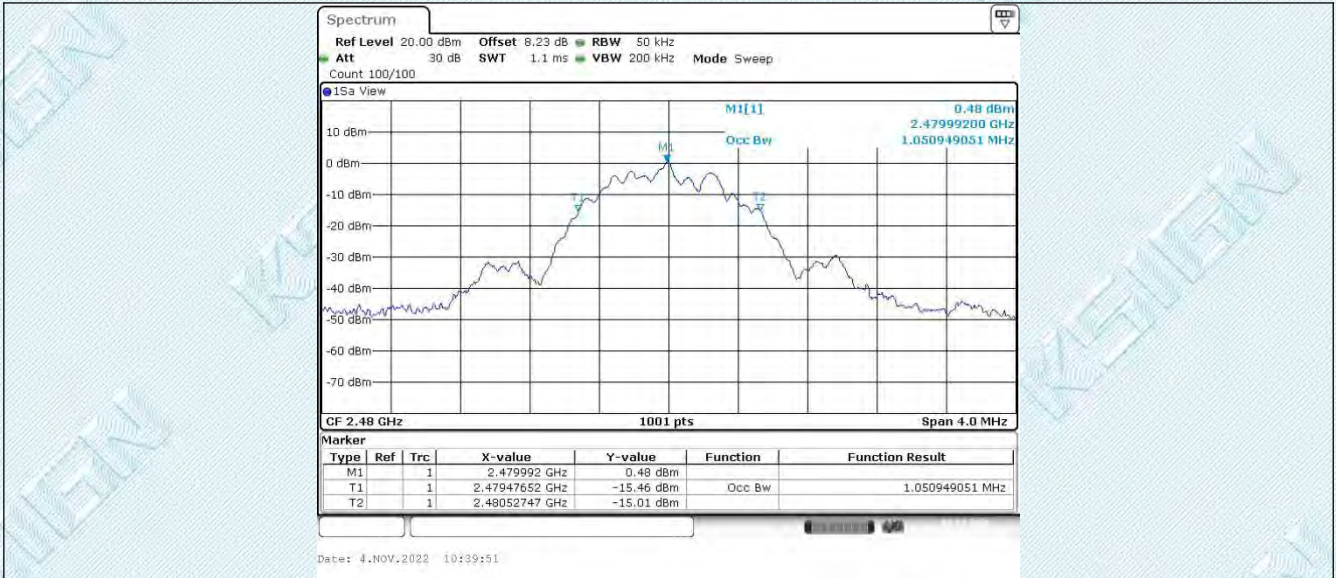
### 6.2.1. Test Result

TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.047	2401.477	2402.523	---	PASS
		2440	1.051	2439.477	2440.527	---	PASS
		2480	1.051	2479.477	2480.527	---	PASS
BLE_2M	Ant1	2402	2.058	2400.977	2403.035	---	PASS
		2440	2.058	2438.977	2441.035	---	PASS
		2480	2.062	2478.973	2481.035	---	PASS

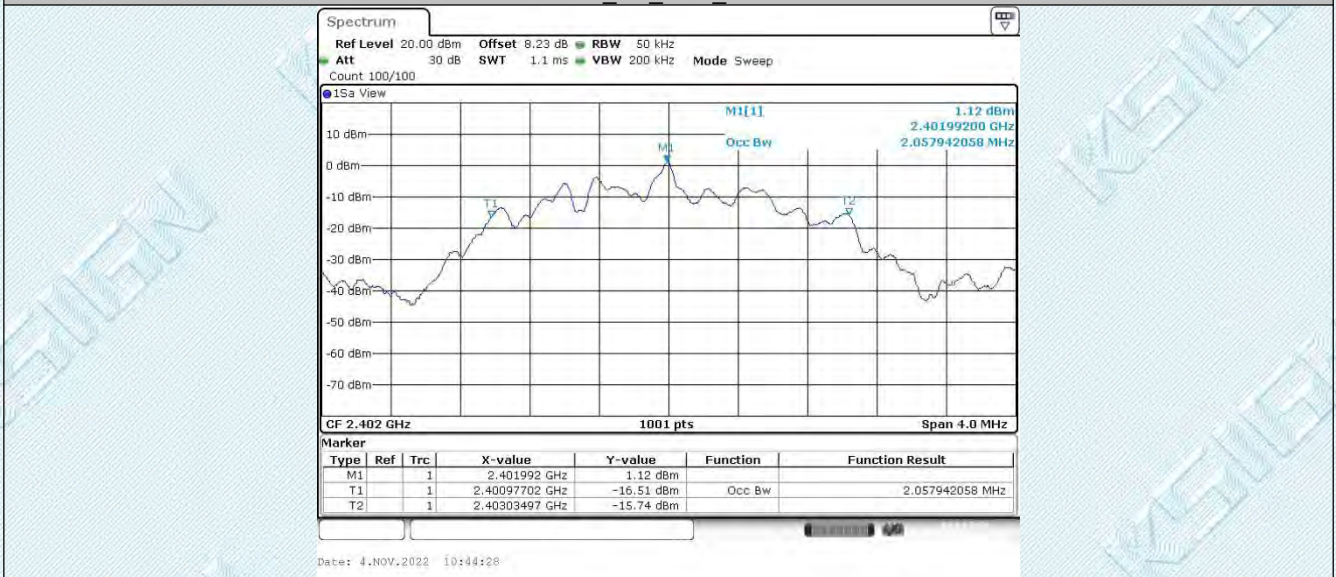
### 6.2.2. Test Graphs



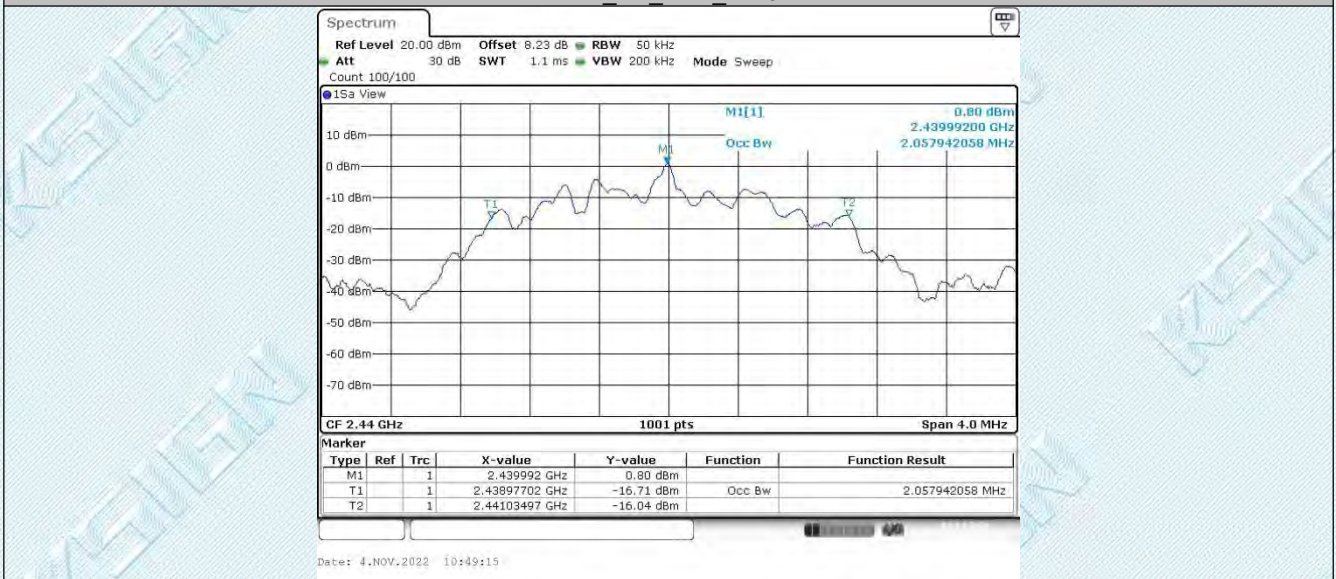




BLE\_2M\_Ant1\_2402



BLE\_2M\_Ant1\_2440

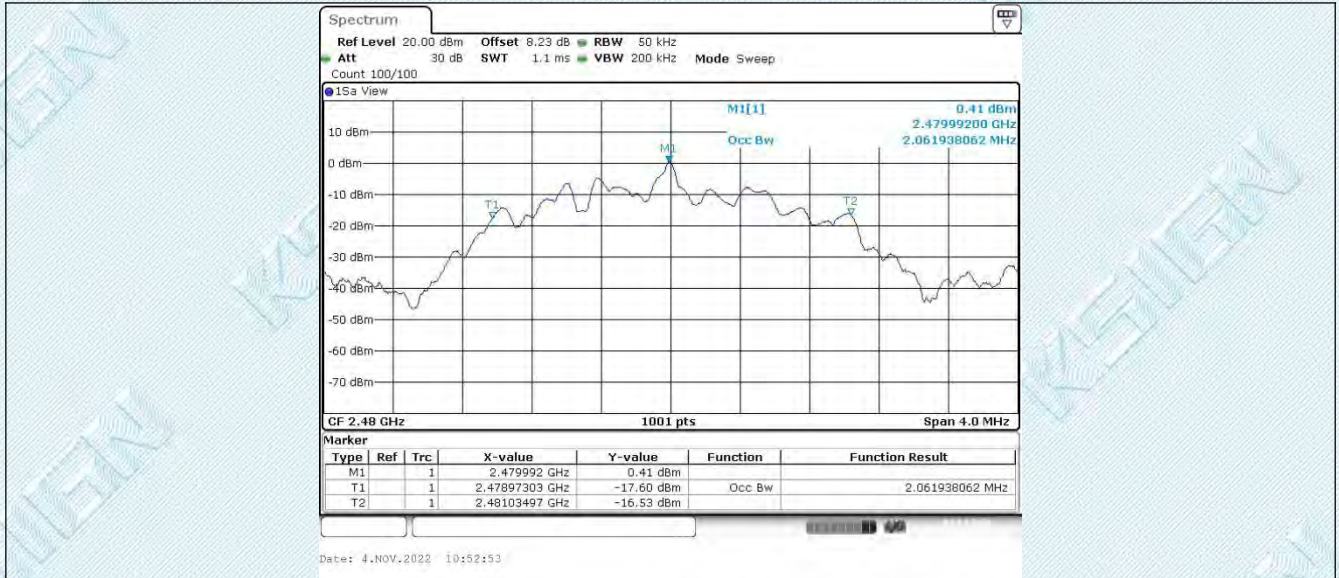


BLE\_2M\_Ant1\_2480

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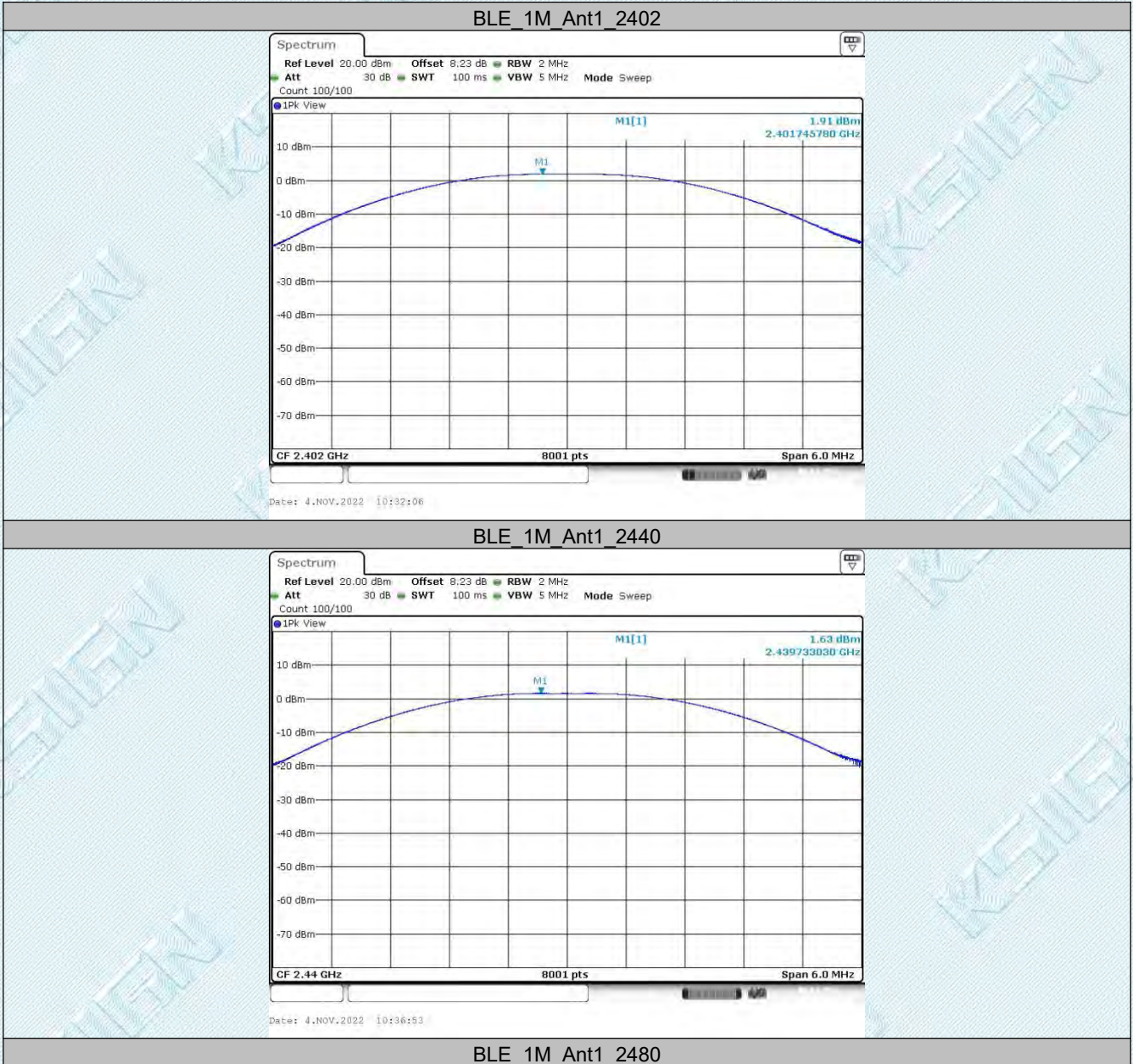


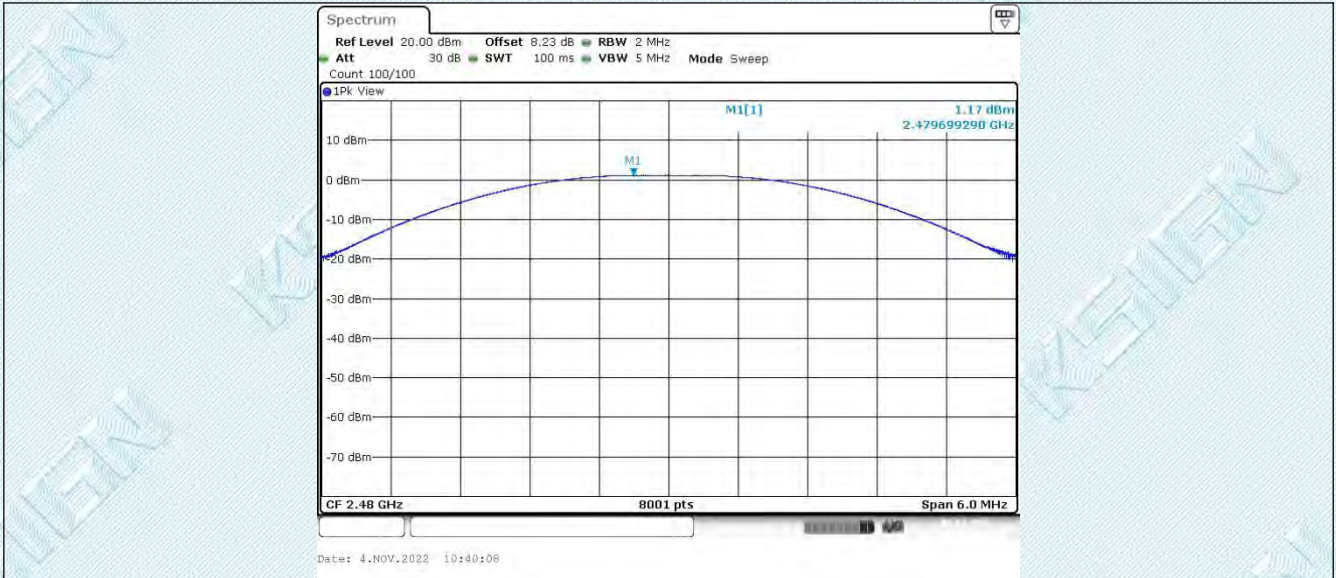
### 6.3. Appendix C: Maximum conducted output power

#### 6.3.1. Test Result Peak

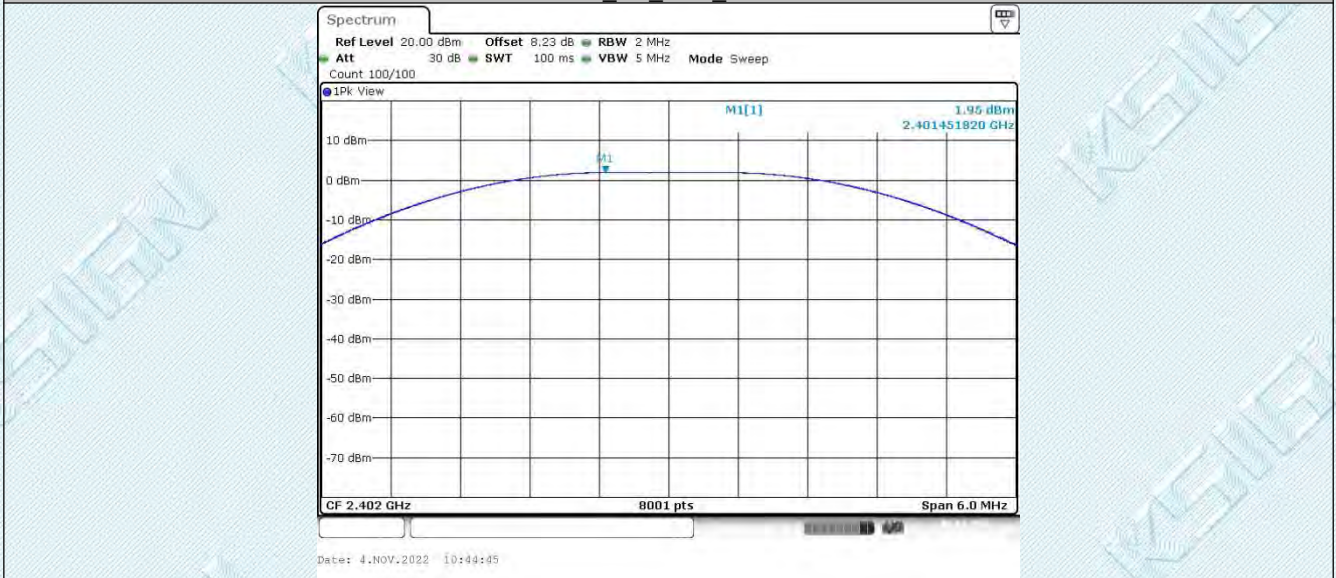
TestMode	Antenna	Freq(MHz)	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant1	2402	1.91	≤30	PASS
		2440	1.63	≤30	PASS
		2480	1.17	≤30	PASS
BLE_2M	Ant1	2402	1.95	≤30	PASS
		2440	1.62	≤30	PASS
		2480	1.18	≤30	PASS

### 6.3.2. Test Graphs Peak

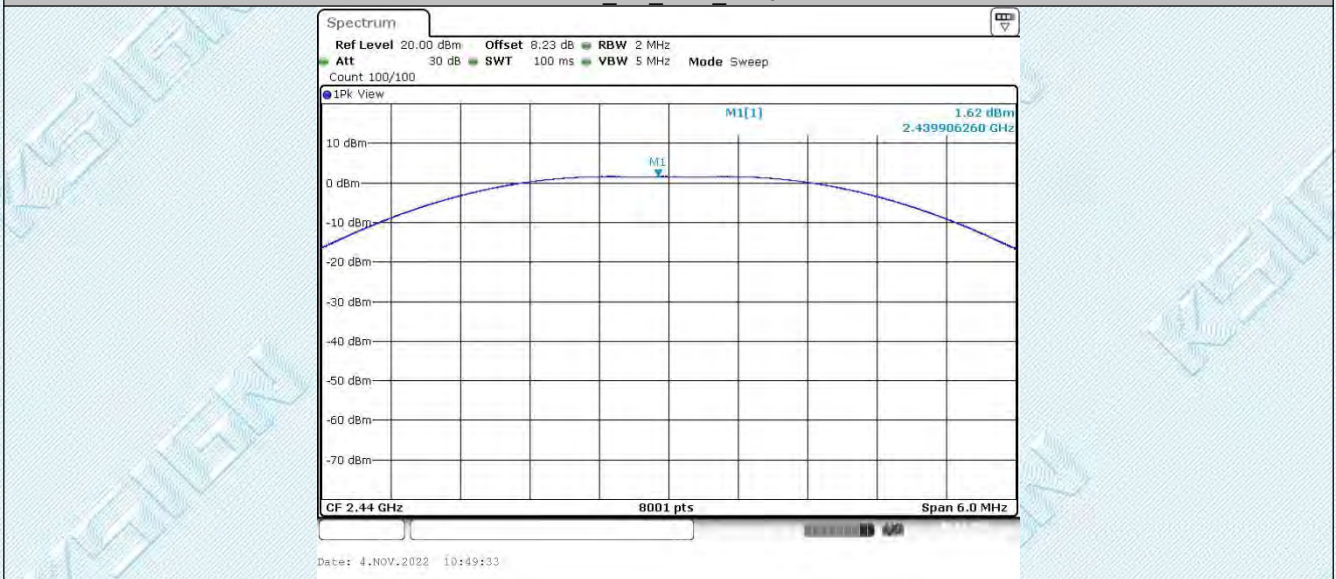




BLE\_2M\_Ant1\_2402



BLE\_2M\_Ant1\_2440

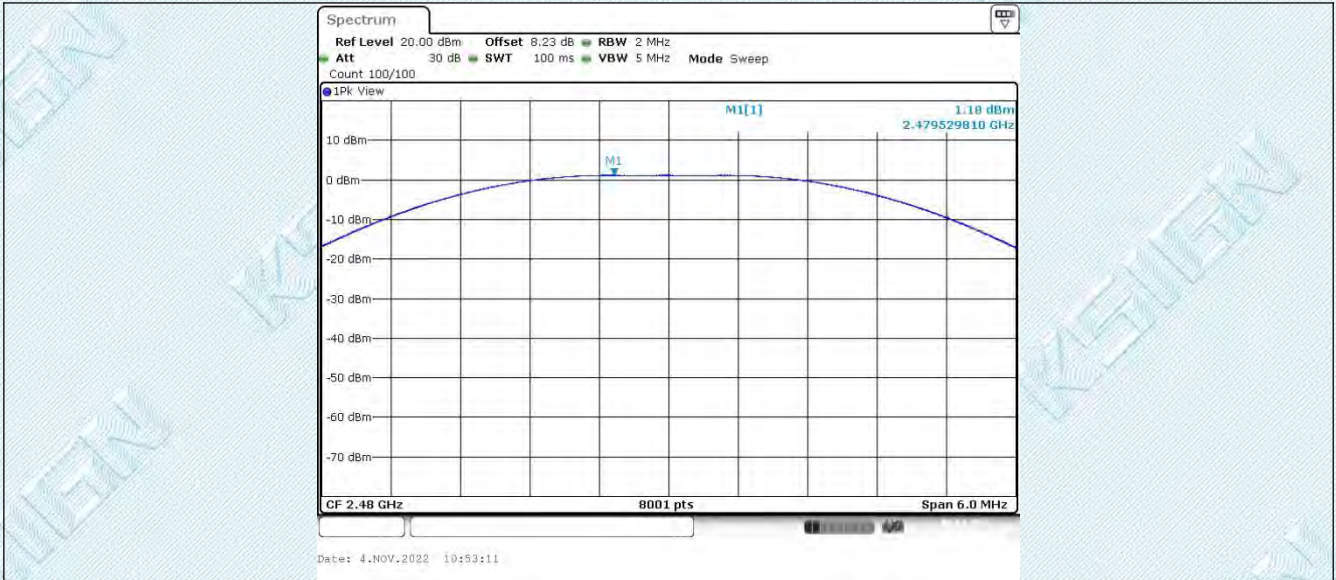


BLE\_2M\_Ant1\_2480

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## 6.4. Appendix D: Maximum power spectral density

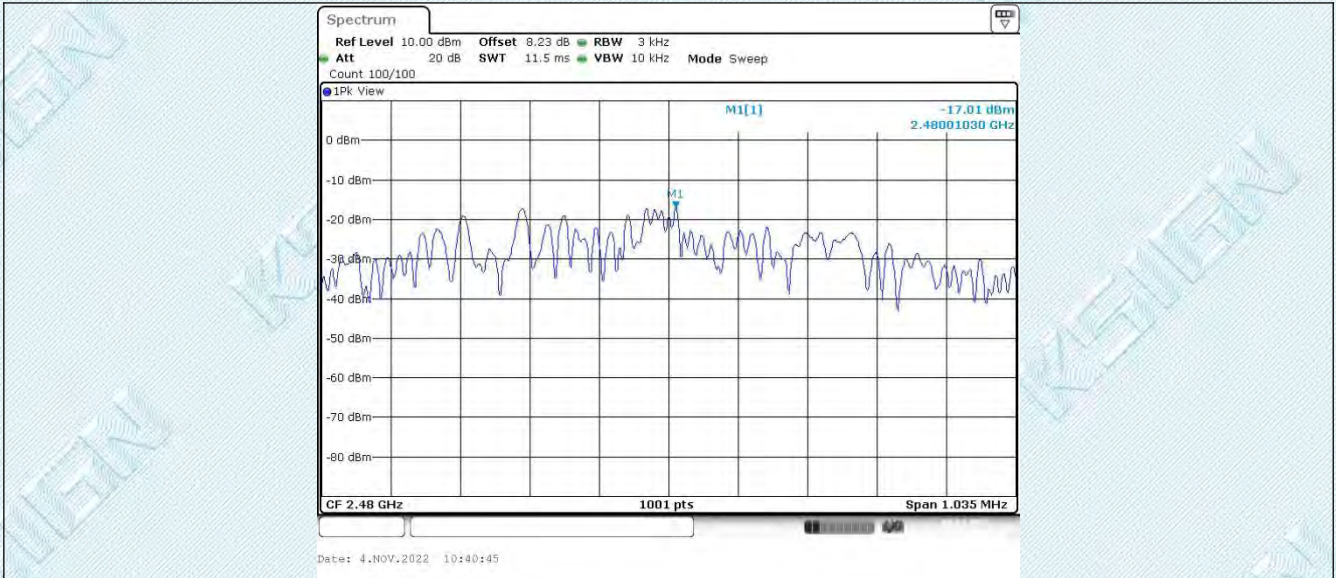
### 6.4.1. Test Result

TestMode	Antenna	Freq(MHz)	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-16.13	≤8.00	PASS
		2440	-16.62	≤8.00	PASS
		2480	-17.01	≤8.00	PASS
BLE_2M	Ant1	2402	-17.86	≤8.00	PASS
		2440	-18.04	≤8.00	PASS
		2480	-18.43	≤8.00	PASS

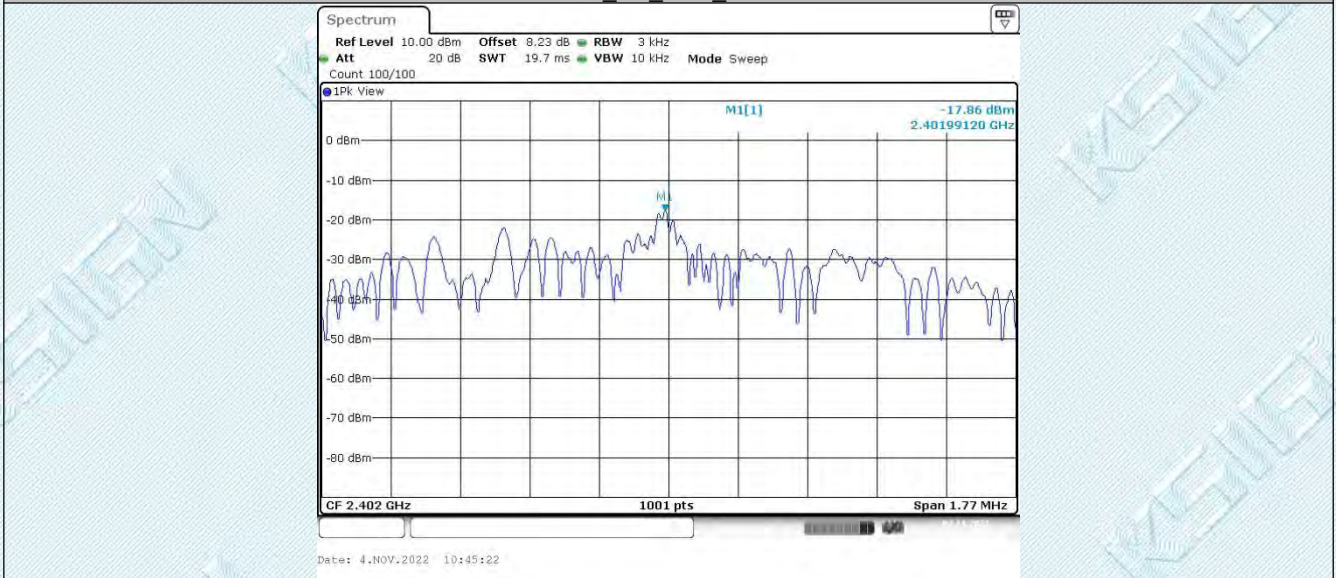
### 6.4.2. Test Graphs



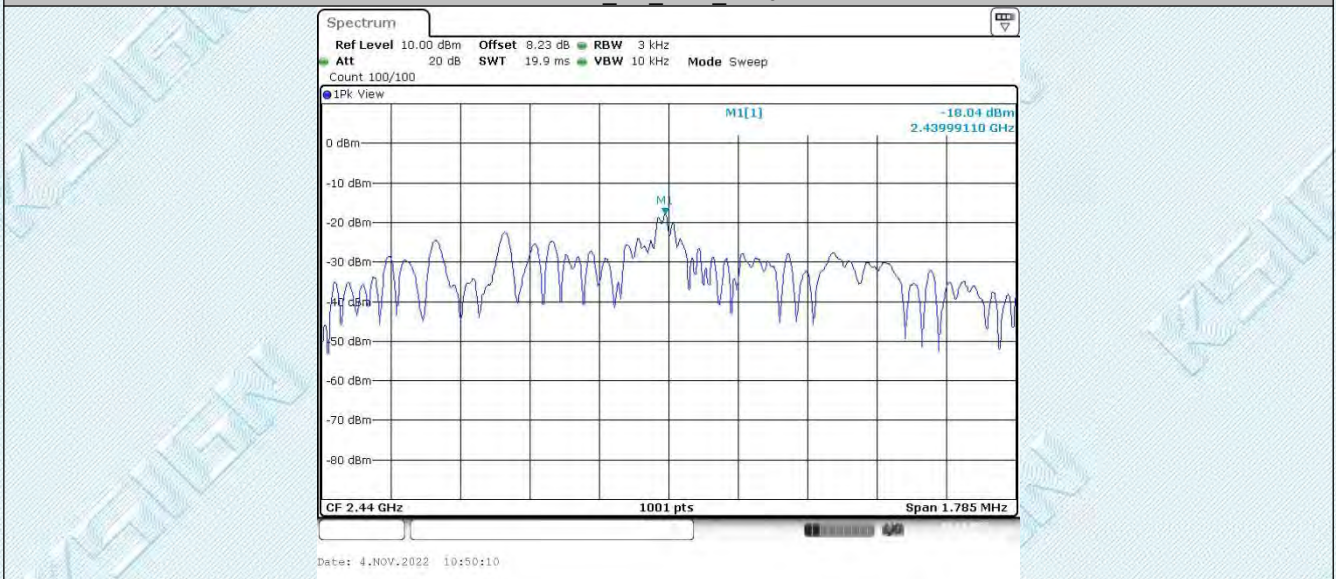




BLE\_2M\_Ant1\_2402



BLE\_2M\_Ant1\_2440

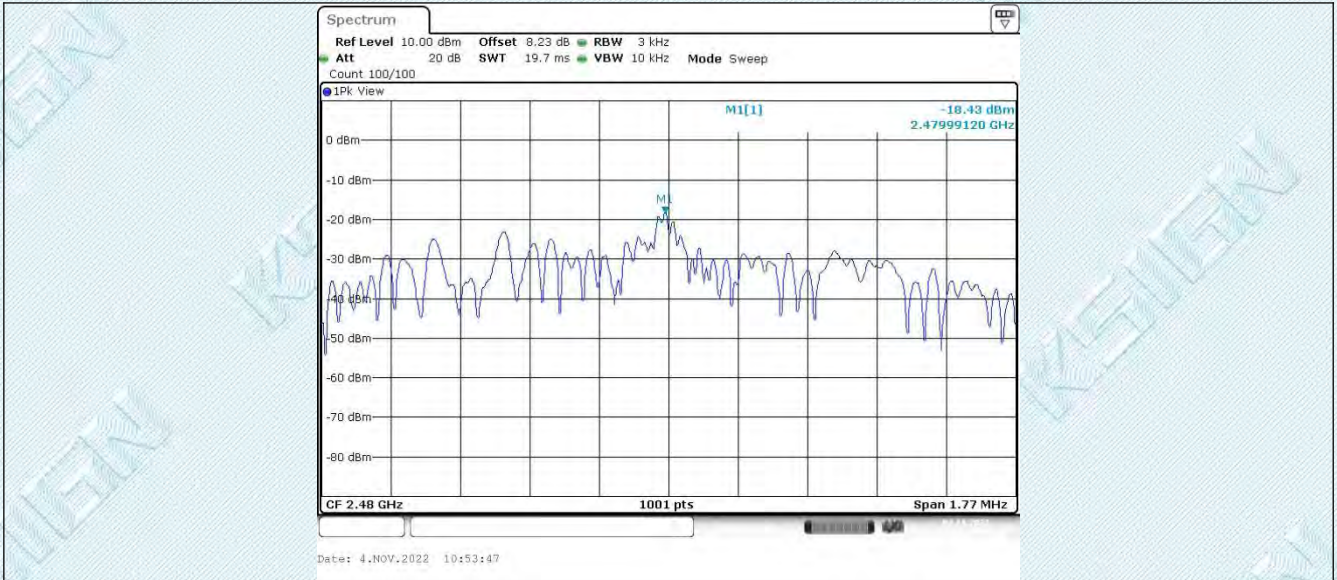


BLE\_2M\_Ant1\_2480

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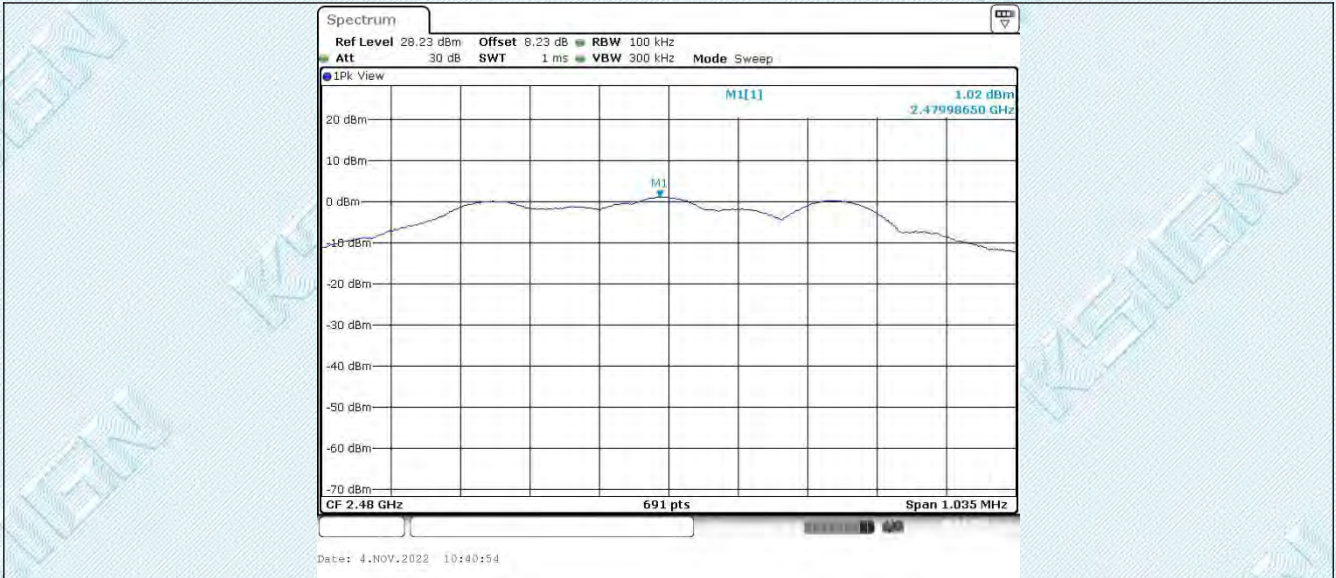
## 6.5. ppendix E: Reference level measurement

### 6.5.1. Test Result

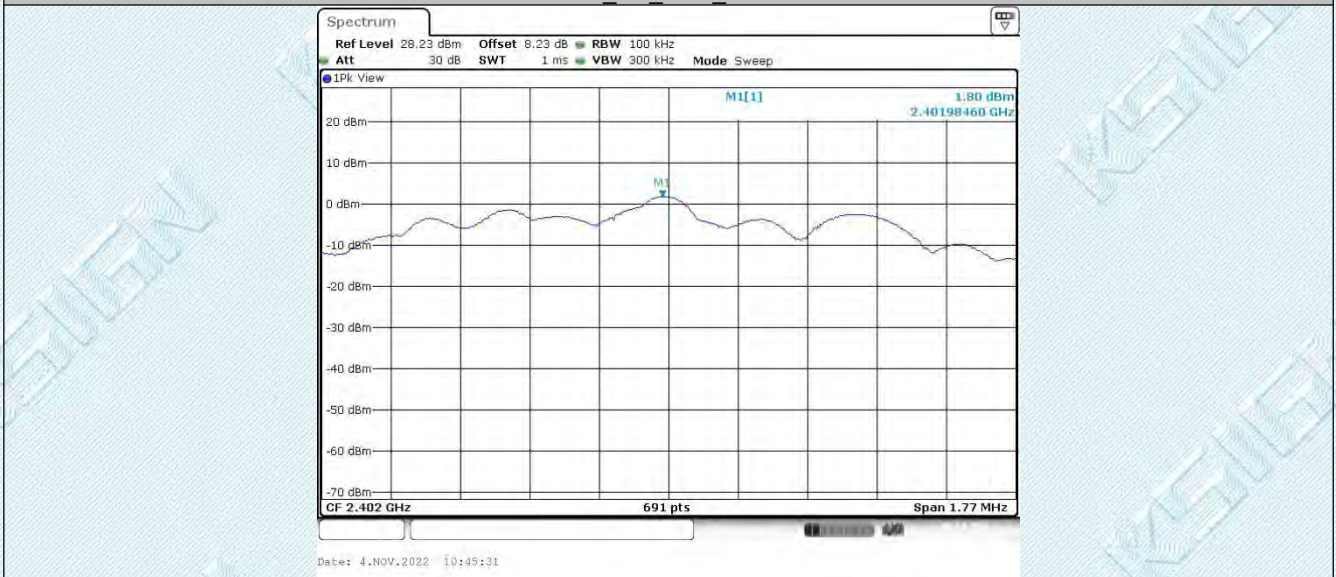
TestMode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm]
BLE_1M	Ant1	2402	2401.98	1.76
		2440	2439.99	1.48
		2480	2479.99	1.02
BLE_2M	Ant1	2402	2401.98	1.80
		2440	2439.99	1.48
		2480	2479.99	1.03

### 6.5.2. Test Graphs

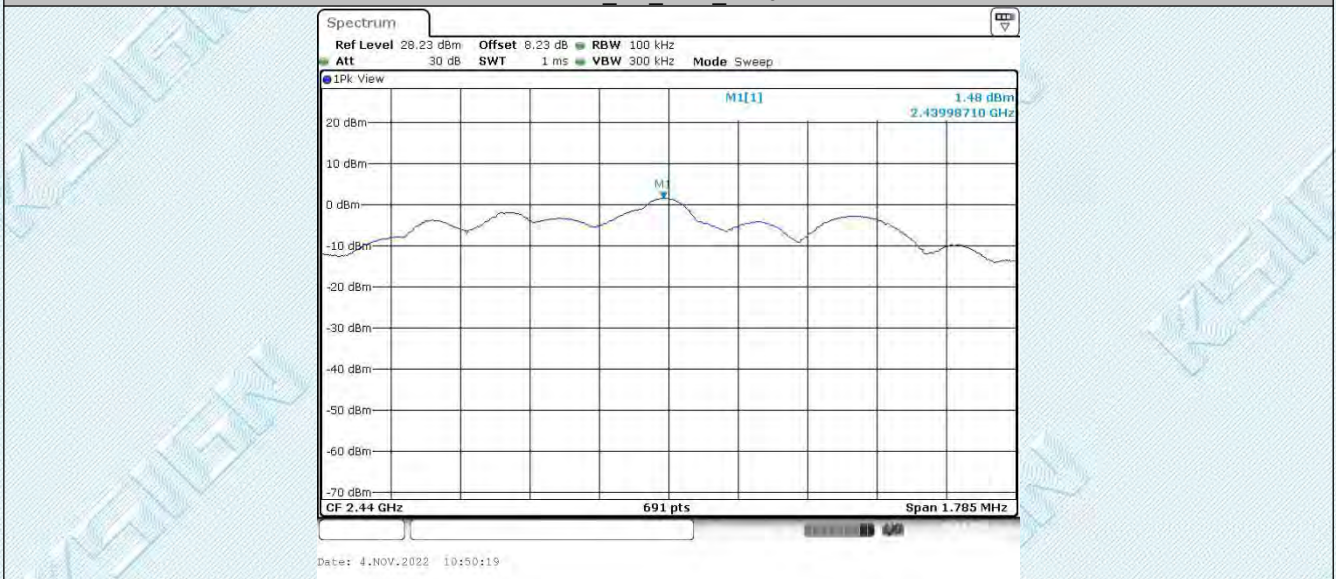




BLE\_2M\_Ant1\_2402



BLE\_2M\_Ant1\_2440

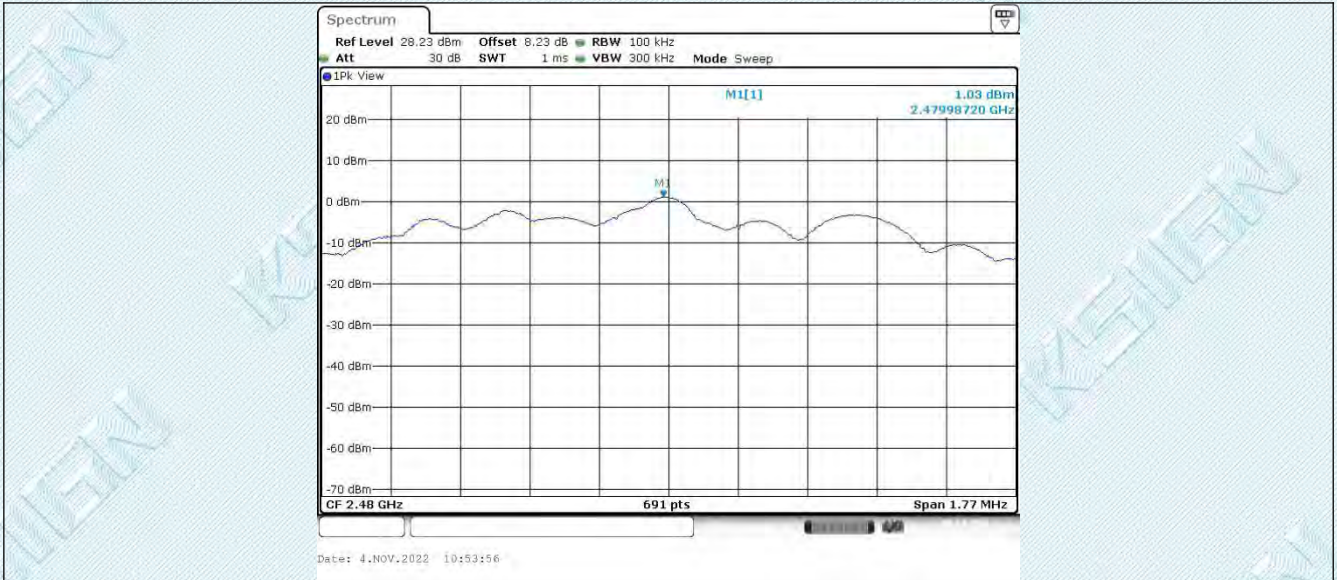


BLE\_2M\_Ant1\_2480

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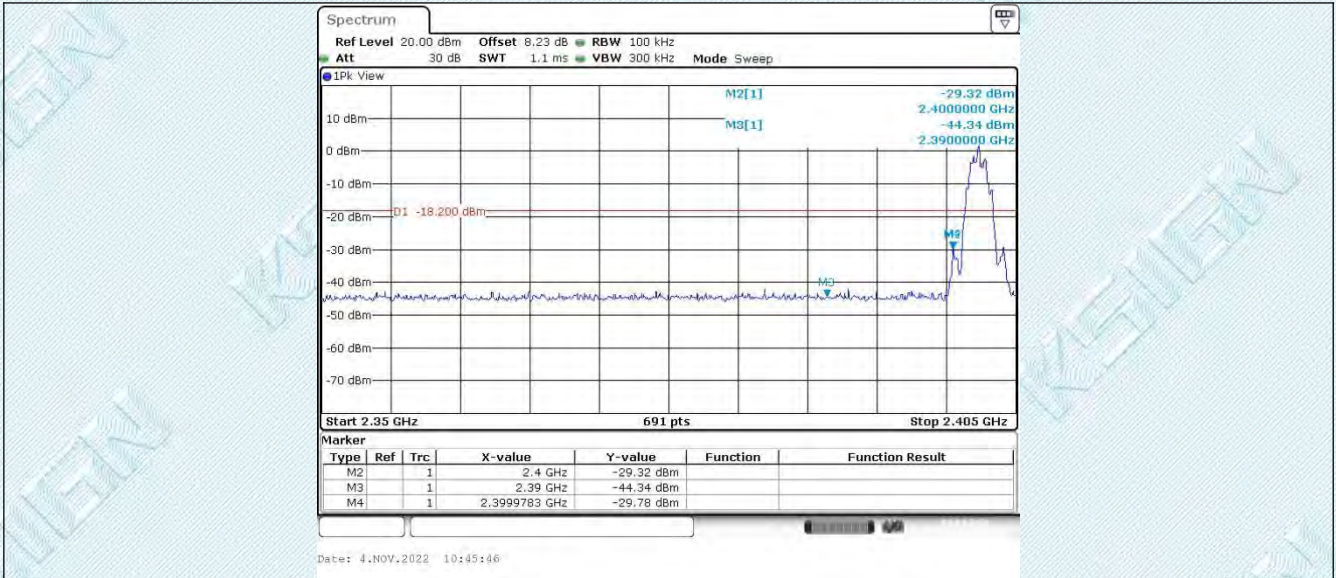
## 6.6. Appendix F: Band edge measurements

### 6.6.1. Test Result

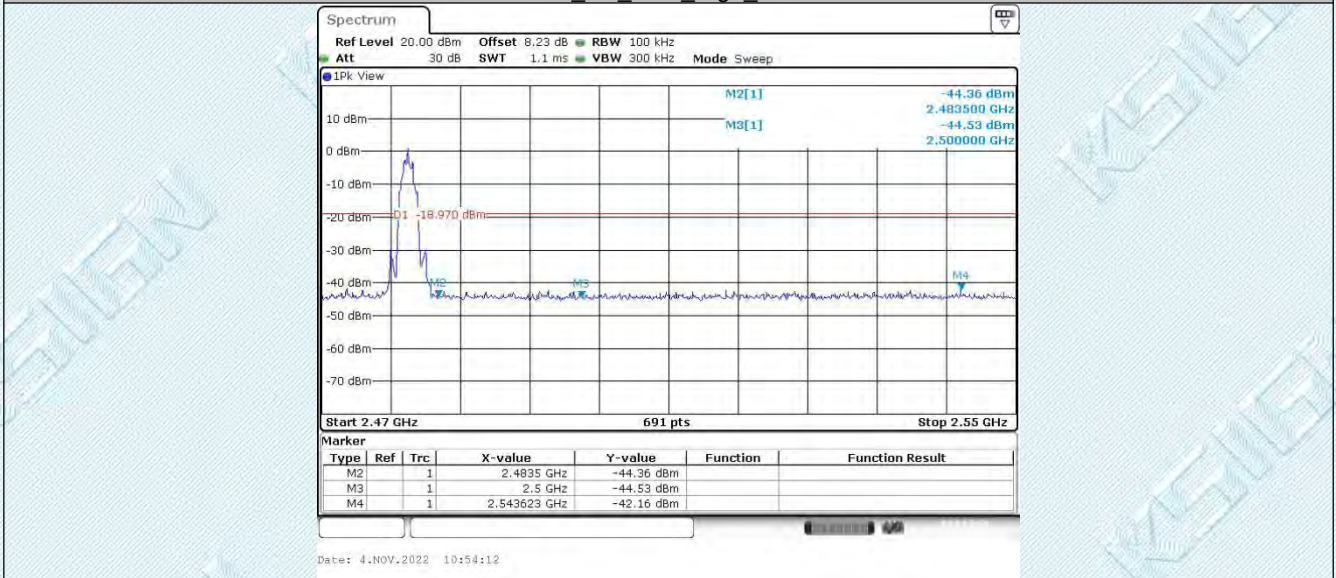
TestMode	Antenna	ChName	Freq(MHz)	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	1.76	-42.06	≤-18.24	PASS
		High	2480	1.02	-41.7	≤-18.98	PASS
BLE_2M	Ant1	Low	2402	1.80	-29.78	≤-18.2	PASS
		High	2480	1.03	-42.16	≤-18.97	PASS

### 6.6.2. Test Graphs





BLE\_2M Ant1 High 2480



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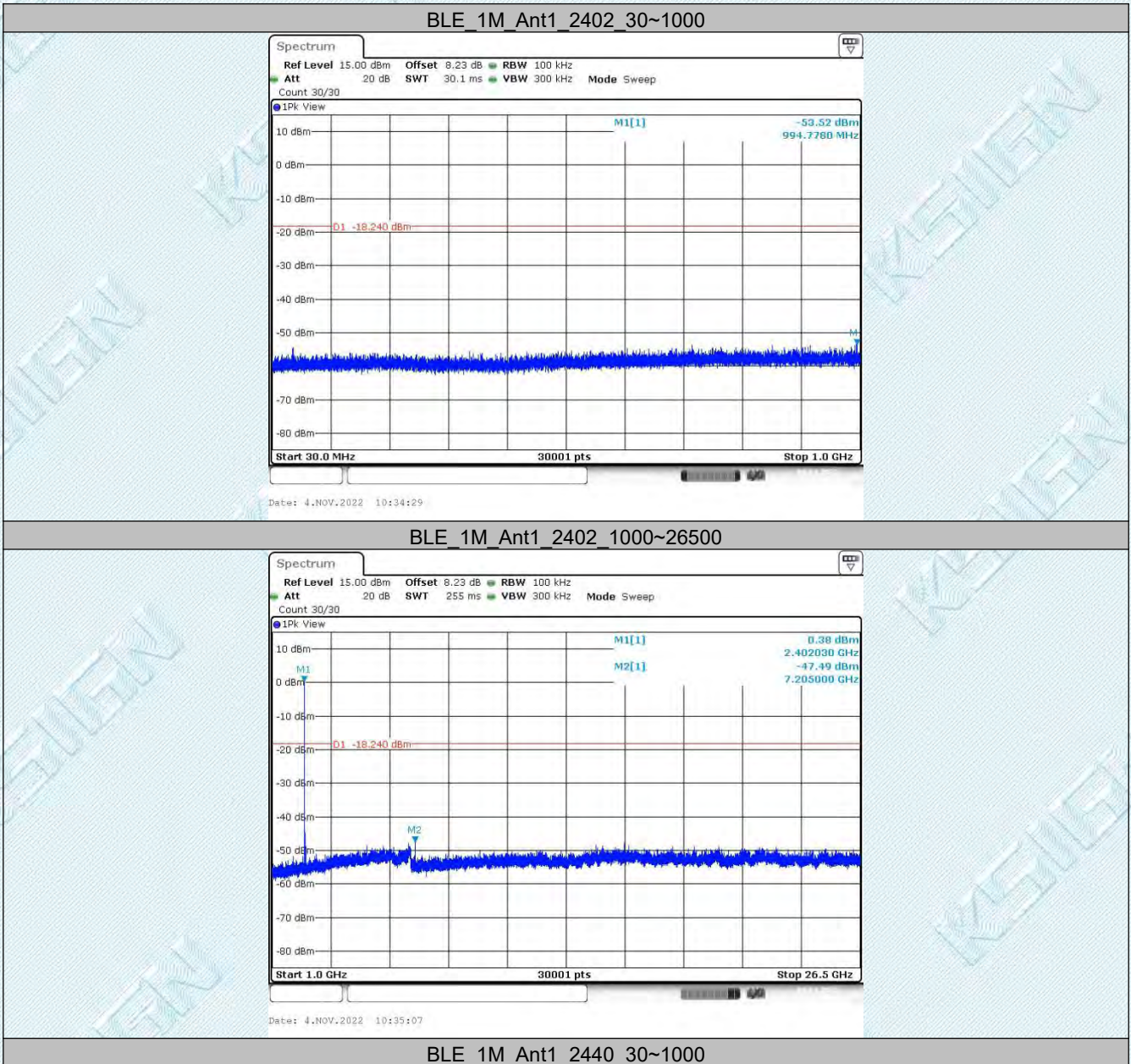


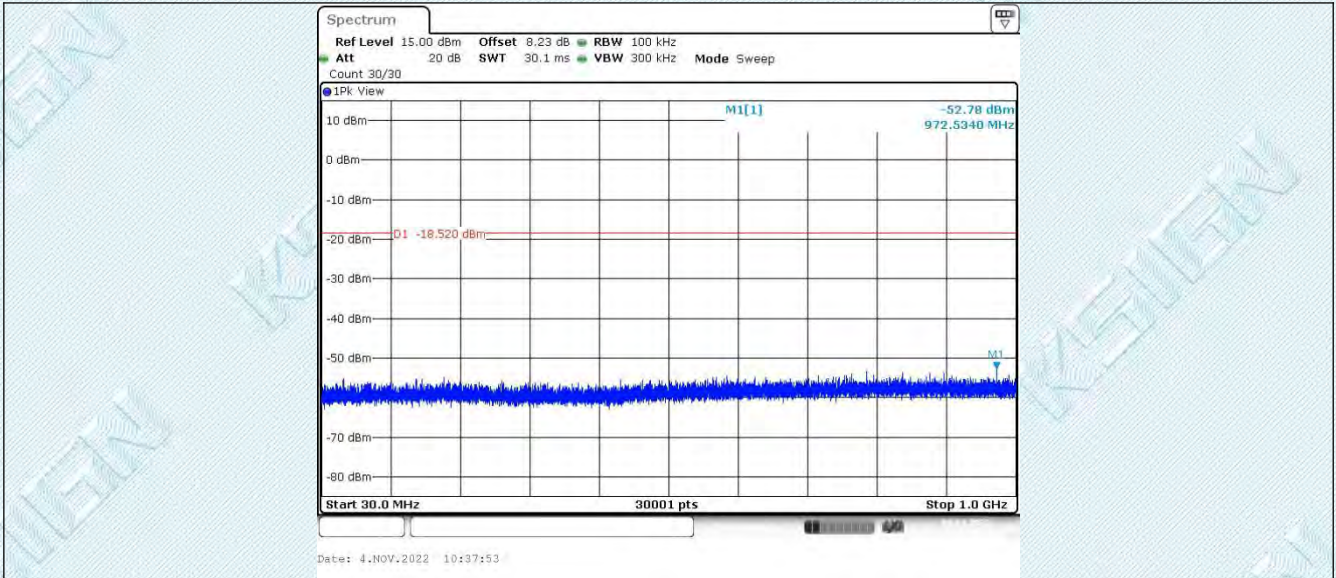
## 6.7. Appendix G: Conducted Spurious Emission

### 6.7.1. Test Result

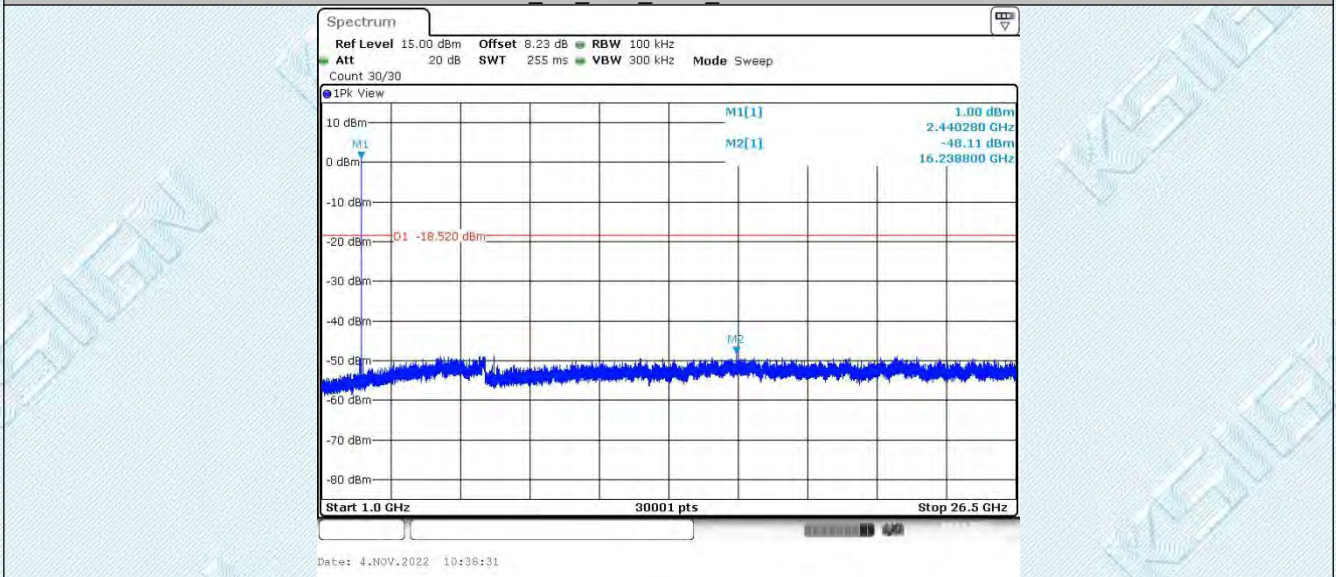
TestMode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	30~1000	1.76	-53.52	≤-18.24	PASS
			1000~26500	1.76	-47.49	≤-18.24	PASS
		2440	30~1000	1.48	-52.78	≤-18.52	PASS
			1000~26500	1.48	-48.11	≤-18.52	PASS
		2480	30~1000	1.02	-53.11	≤-18.98	PASS
			1000~26500	1.02	-47.72	≤-18.98	PASS
BLE_2M	Ant1	2402	30~1000	1.80	-53.53	≤-18.2	PASS
			1000~26500	1.80	-45.69	≤-18.2	PASS
		2440	30~1000	1.48	-53.53	≤-18.52	PASS
			1000~26500	1.48	-48.16	≤-18.52	PASS
		2480	30~1000	1.03	-53.47	≤-18.97	PASS
			1000~26500	1.03	-47.63	≤-18.97	PASS

### 6.7.2. Test Graphs

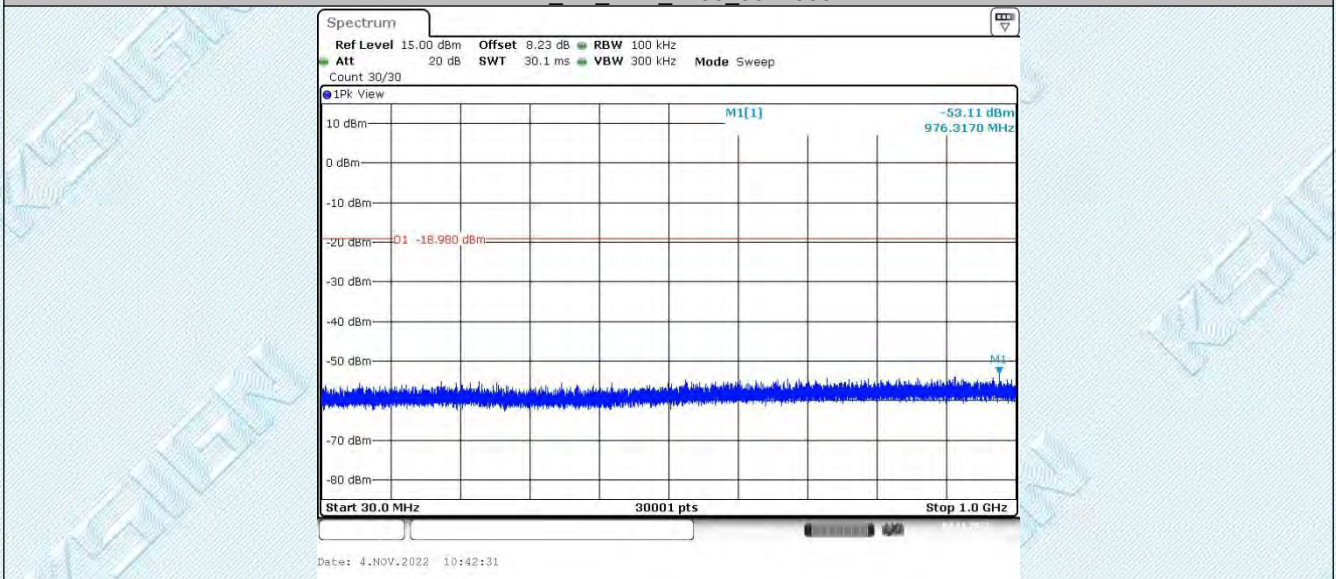




BLE\_1M\_Ant1\_2440\_1000~26500



BLE\_1M\_Ant1\_2480\_30~1000

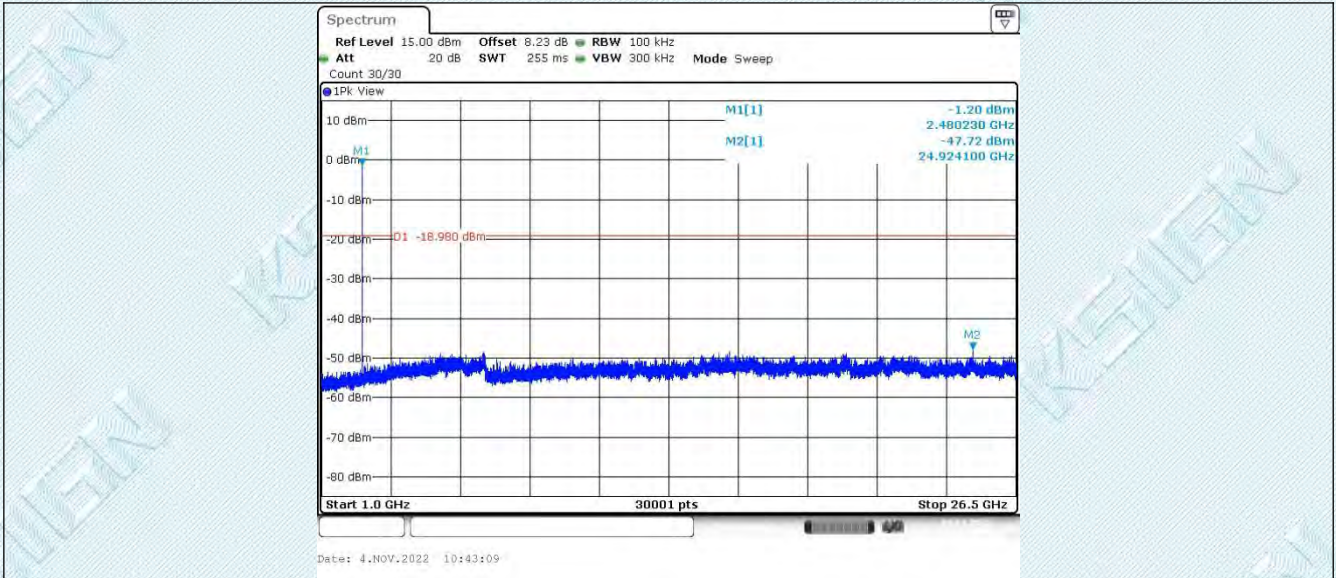


BLE\_1M\_Ant1\_2480\_1000~26500

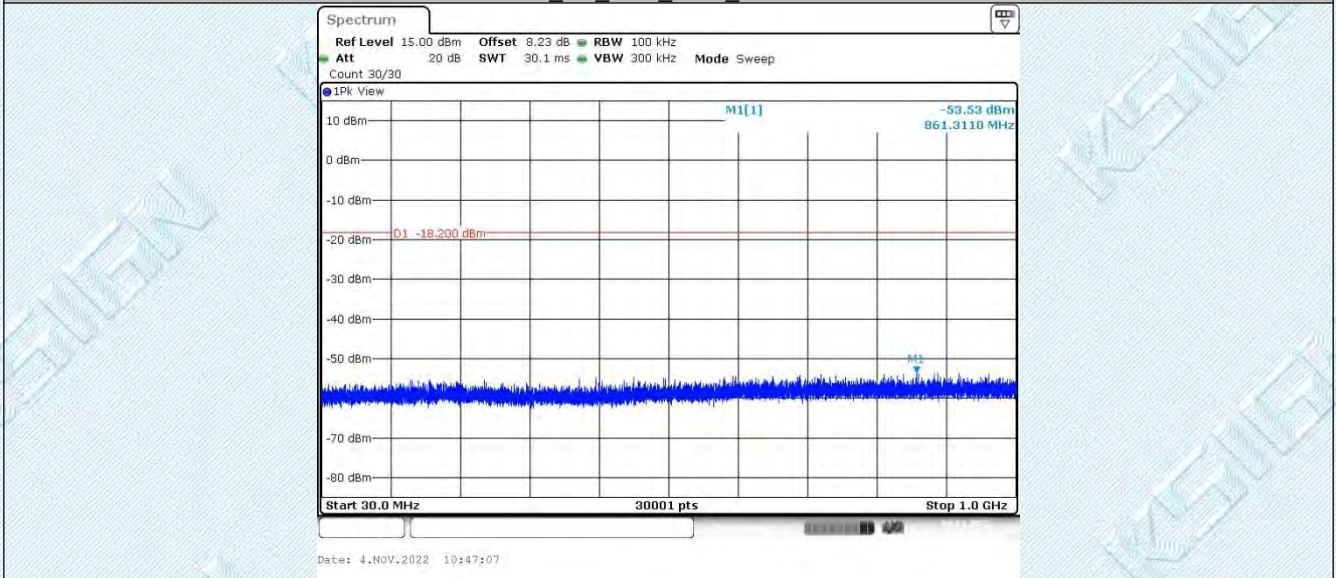
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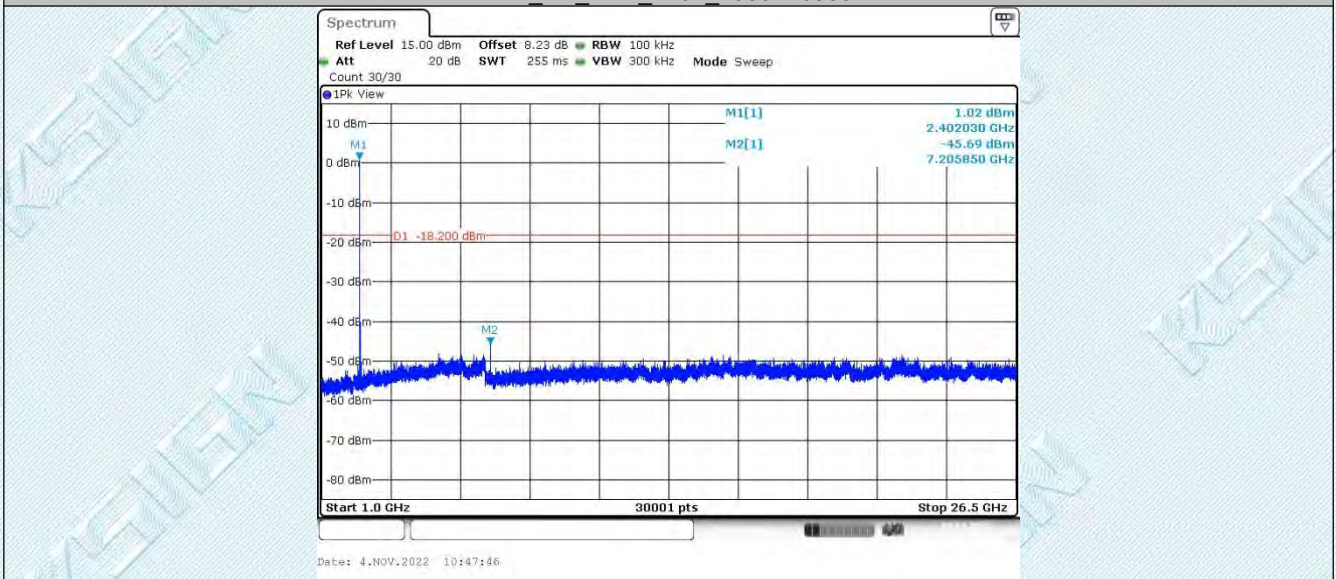
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BLE 2M Ant1\_2402\_30~1000



BLE 2M Ant1\_2402\_1000~26500

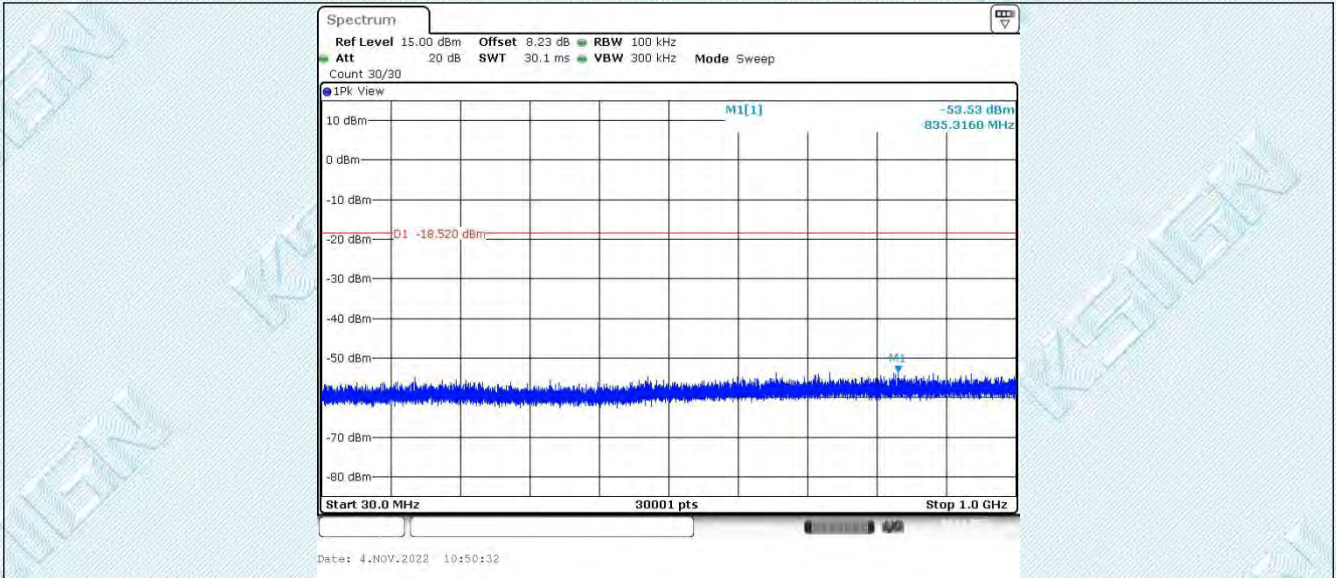


BLE 2M Ant1\_2440\_30~1000

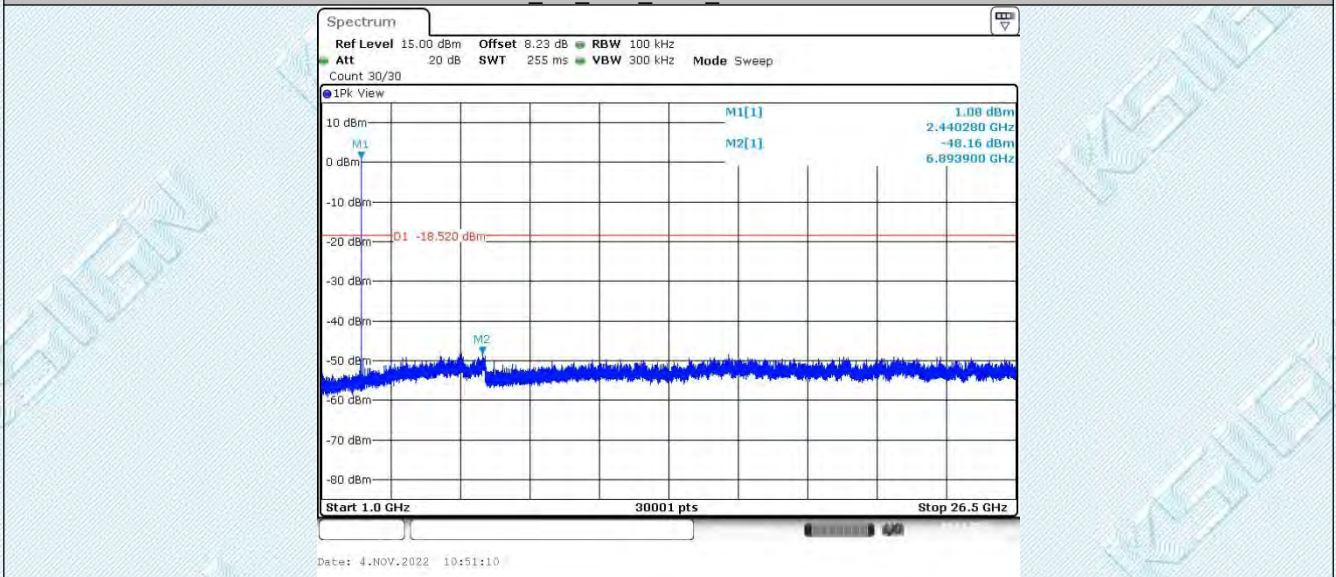
TRF EMC\_R1

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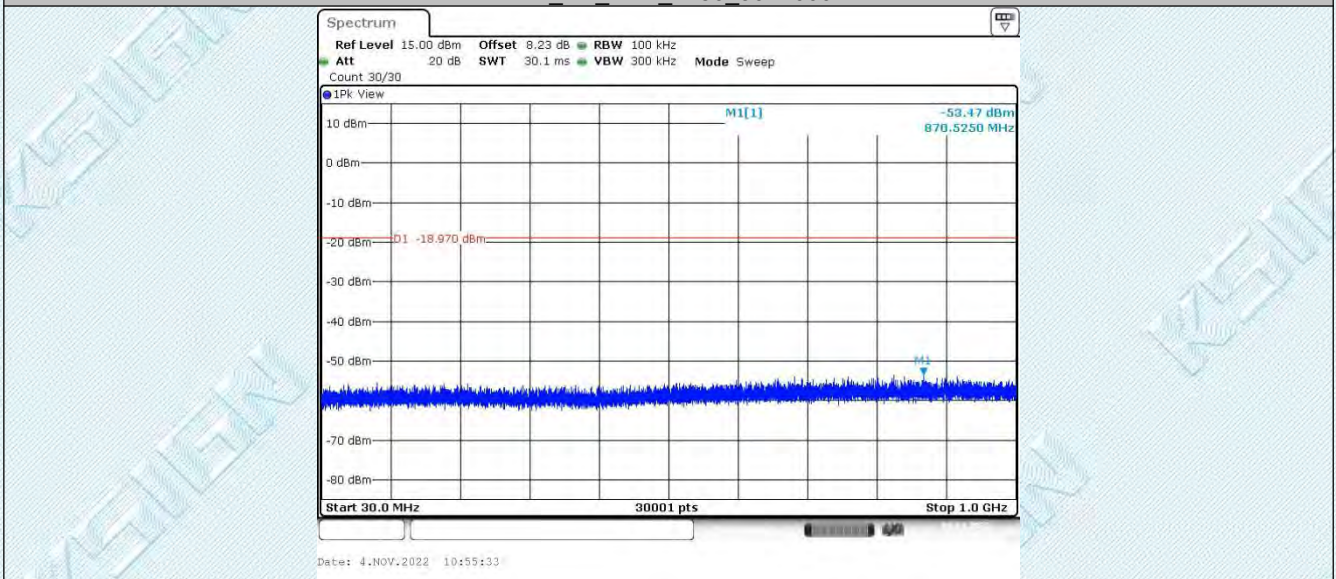
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BLE\_2M\_Ant1\_2440\_1000~26500



BLE\_2M\_Ant1\_2480\_30~1000

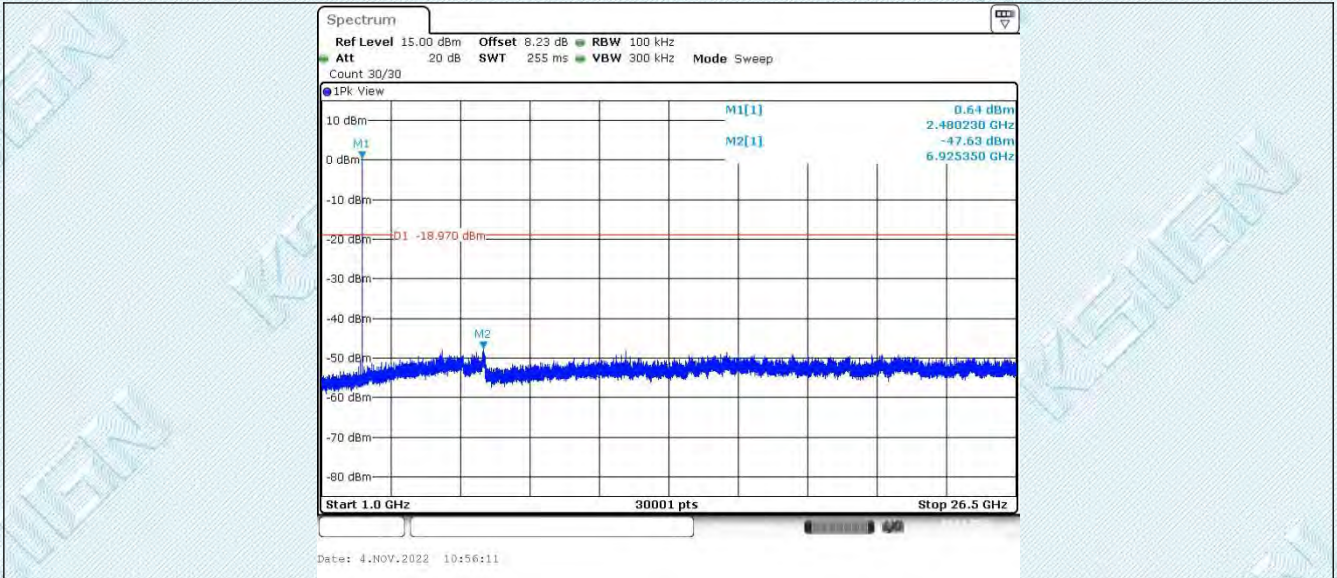


BLE\_2M\_Ant1\_2480\_1000~26500

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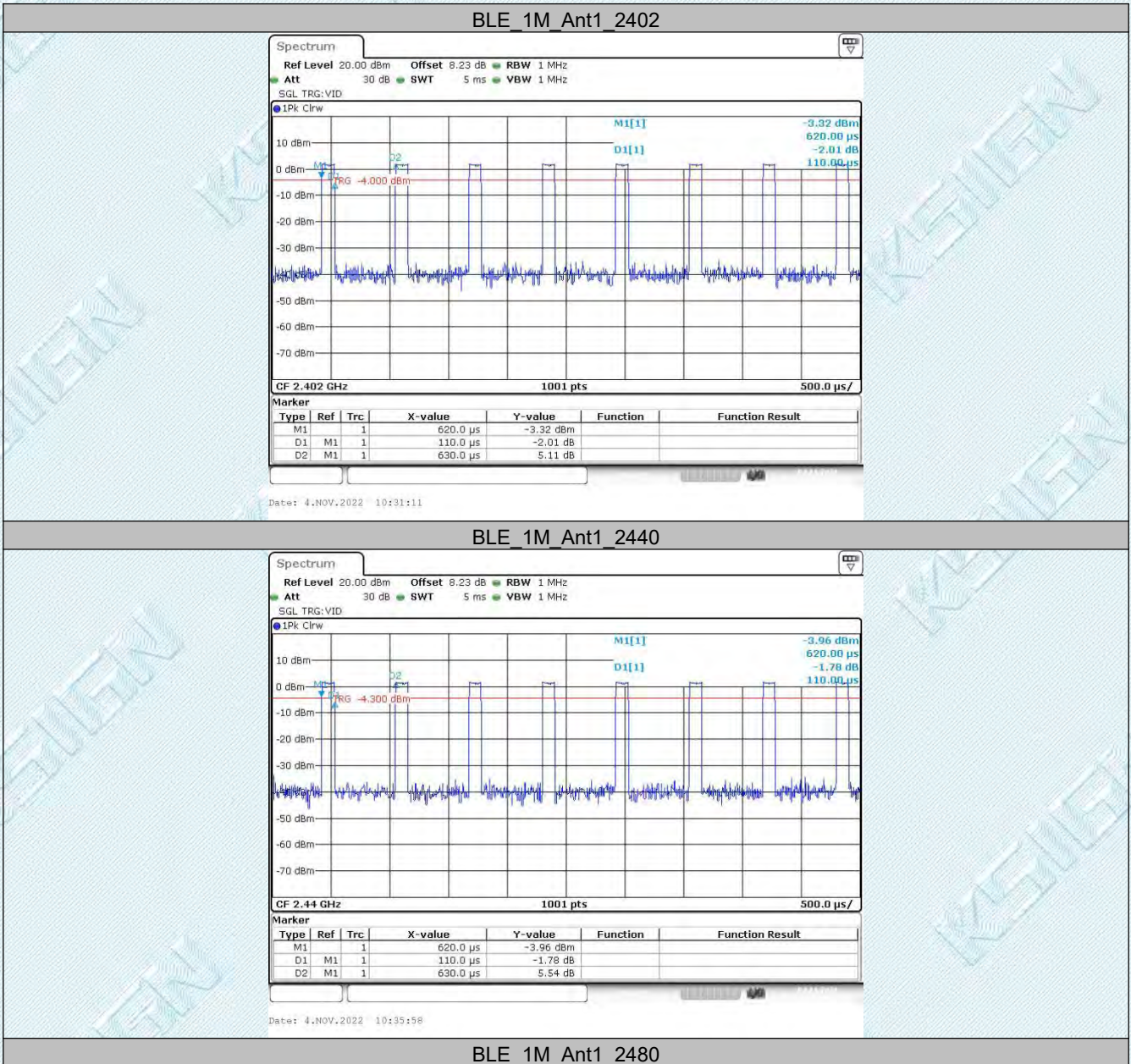


## 6.8. Appendix H: Duty Cycle

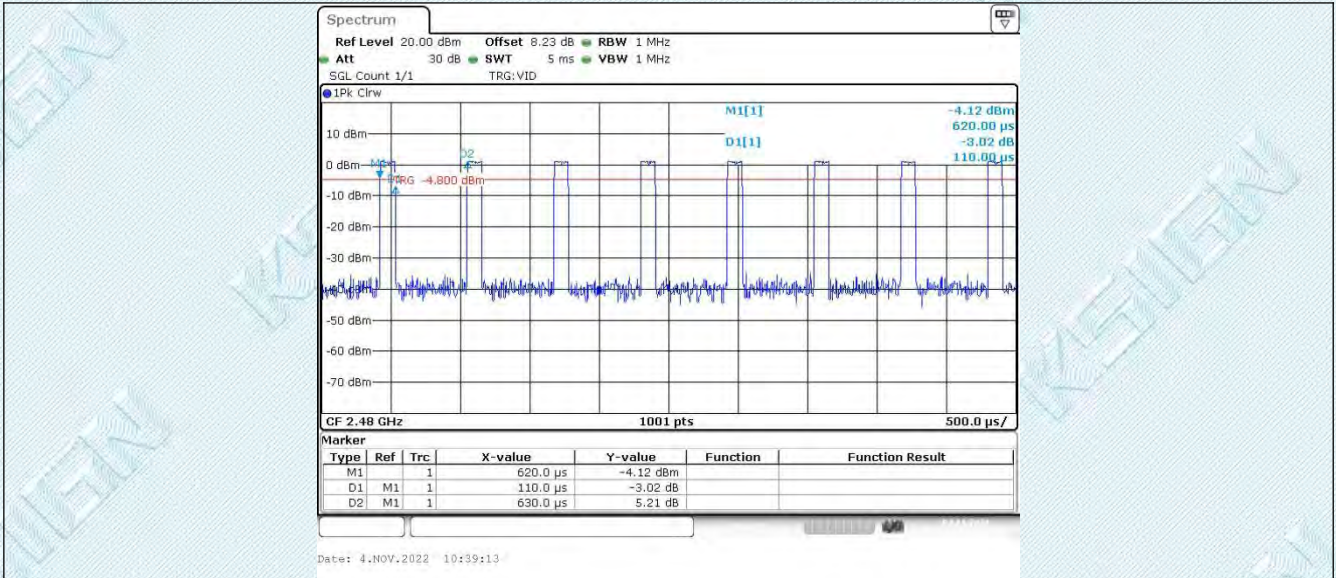
### 6.8.1. Test Result

TestMode	Antenna	Freq(MHz)	ON Time [ms]	Period [ms]	DC [%]	Factor	Limit	Verdict
BLE_1M	Ant1	2402	0.11	0.63	17.46	7.58	---	Pass
		2440	0.11	0.63	17.46	7.58	---	Pass
		2480	0.11	0.63	17.46	7.58	---	Pass
BLE_2M	Ant1	2402	0.06	0.62	9.68	10.14	---	Pass
		2440	0.06	0.62	9.68	10.14	---	Pass
		2480	0.06	0.62	9.68	10.14	---	Pass

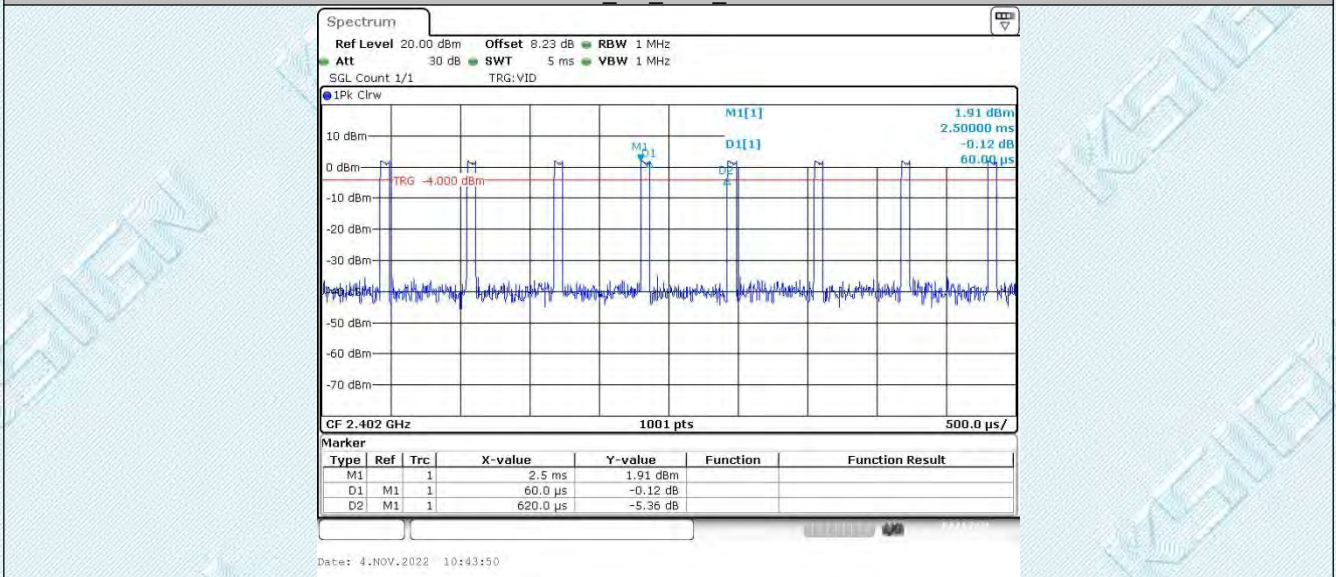
### 6.8.2. Test Graphs



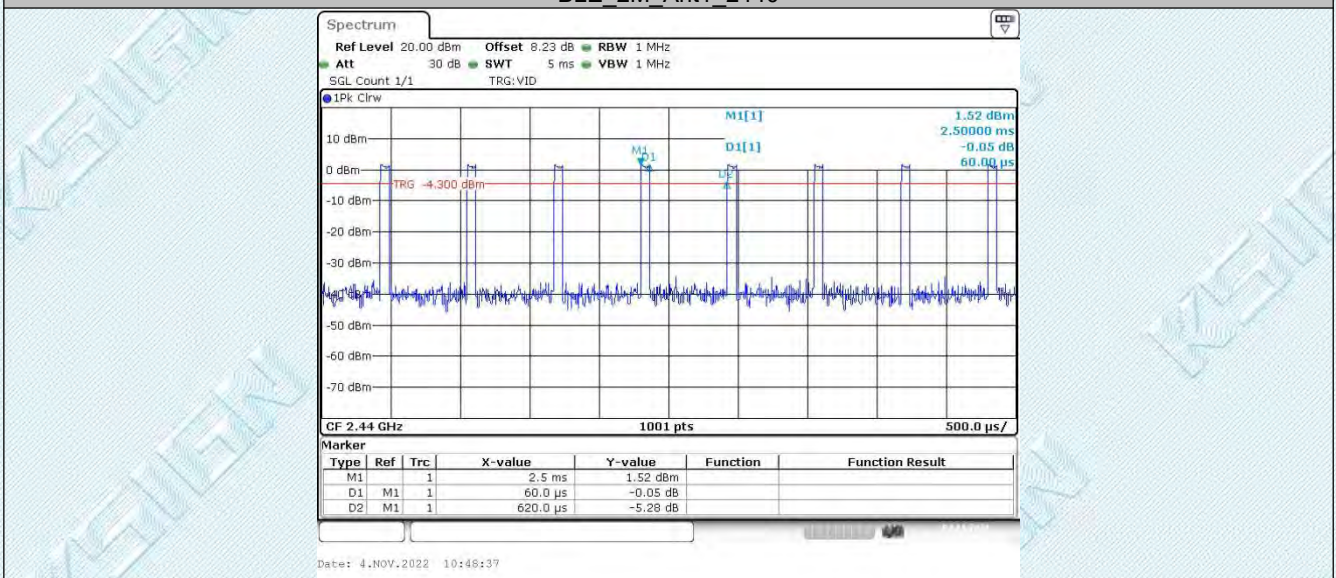




BLE\_2M\_Ant1\_2402



BLE\_2M\_Ant1\_2440

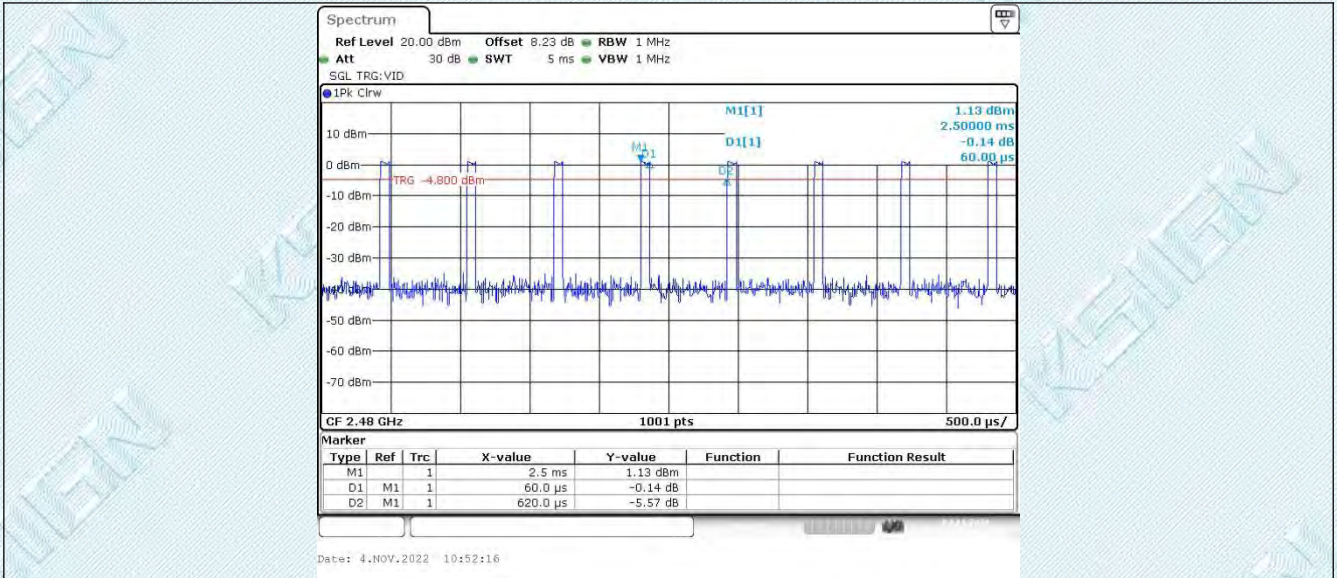


BLE\_2M\_Ant1\_2480

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--THE END--