

Report No.: SUZR/2021/9002603

Rev.: 01

Page: 1 of 62

# TEST REPORT

**Application No.:** ZR/2021/90026  
**Applicant:** Great Talent Technology Limited  
**Address of Applicant:** 35F,HBC HuiLong Center Building-II Minzhi Street,Longhua, Shenzhen, P.R. China  
**Manufacturer:** Great Talent Technology Limited  
**Address of Manufacturer:** 35F,HBC HuiLong Center Building-II Minzhi Street,Longhua, Shenzhen, P.R. China  
**EUT Description:** Smart Phone  
**Model No.:** SP502  
**Trade Mark:** SeNse  
**FCC ID:** 2ALZM-SP502  
**Standards:** 47 CFR FCC Part 2, Subpart J  
 47 CFR Part 15, Subpart C  
**Date of Receipt:** 2021/11/9  
**Date of Test:** 2021/11/10 to 2022/2/15  
**Date of Issue:** 2022/2/16

<b>Test Result :</b>	<b>PASS *</b>
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\* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

Pantu Sun  
Wireless Laboratory Manager

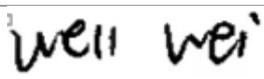


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# 1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2022/2/16		Original

<b>Prepared By</b>		 <hr/> <b>(Weller Liu) / Engineer</b>
<b>Checked By</b>		 <hr/> <b>(Well Wei) / Reviewer</b>



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## 2 Test Summary

Test Item	Test Requirement	Test Method	Test Result	Result
Antenna Requirement	15.203/247(b)	--	Clause 4.1	PASS
AC Power Line Conducted Emission	15.207	ANSI C63.10 2013	Clause 4.2	PASS
Conducted Output Power	15.247 (b)(3)	ANSI C63.10 2013	Clause 4.3	PASS
DTS (6 dB) Bandwidth & 99% Occupied Bandwidth	15.247 (a)(2)	ANSI C63.10 2013	Clause 4.4	PASS
Power Spectral Density	15.247 (e)	ANSI C63.10 2013	Clause 4.5	PASS
Band-edge for RF Conducted Emissions	15.247(d)	ANSI C63.10 2013	Clause 4.6	PASS
RF Conducted Spurious Emissions	15.247(d)	ANSI C63.10 2013	Clause 4.7	PASS
Radiated Spurious Emissions	15.205/15.209	ANSI C63.10 2013	Clause 4.8	PASS
Restricted bands around fundamental frequency (Radiated Emission)	15.205/15.209	ANSI C63.10 2013	Clause 4.9	PASS



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## Contents

1	Version .....	2
2	Test Summary .....	3
3	General Information .....	5
3.1	Details of Client .....	5
3.2	Test Location .....	5
3.3	Test Facility .....	5
3.4	General Description of EUT .....	6
3.5	Test Environment .....	8
3.6	Description of Support Units .....	8
4	Test results and Measurement Data .....	9
4.1	Antenna Requirement .....	9
4.2	AC Power Line Conducted Emissions .....	10
4.3	Duty Cycle .....	14
4.4	Conducted Output Power .....	15
4.5	DTS (6 dB) Bandwidth & 99% Occupied Bandwidth .....	16
4.6	Power Spectral Density .....	17
4.7	Band-edge for RF Conducted Emissions .....	18
4.8	RF Conducted Spurious Emissions .....	19
4.9	Radiated Spurious Emissions .....	20
4.10	Restricted bands around fundamental frequency .....	23
5	Measurement Uncertainty (95% confidence levels, k=2) .....	25
6	Equipment List .....	26
7	Photographs - EUT Constructional Details .....	28



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### 3 General Information

#### 3.1 Details of Client

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Address of Applicant:	35F,HBC HuiLong Center Building-II Minzhi Street,Longhua, Shenzhen, P.R. China
Manufacturer:	Great Talent Technology Limited
Address of Manufacturer:	35F,HBC HuiLong Center Building-II Minzhi Street,Longhua, Shenzhen, P.R. China

#### 3.2 Test Location

Company:	SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd
Address:	South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone
Post code:	215000
Test engineer:	Weller Liu, King-p Li, Nature Shen, Tizzy Song

#### 3.3 Test Facility

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

<ul style="list-style-type: none"> <li> <b>A2LA (Certificate No. 6336.01)</b>            SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.         </li> <li> <b>Innovation, Science and Economic Development Canada</b>            SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.            CAB identifier: CN0120.            IC#: 27594.         </li> <li> <b>FCC –Designation Number: CN1312</b>            SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.            Designation Number: CN1312.            Test Firm Registration Number: 717327         </li> </ul>
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### 3.4 General Description of EUT

EUT Description:	Smart Phone
Model No.:	SP502
Trade Mark:	SeNse
Hardware Version:	Q6003_V1.0
Software Version:	SP502_01.01.04
Operation Frequency:	2400MHz~2483.5MHz fc = 2402 MHz + N * 2 MHz, where: -fc = "Operating Frequency" in MHz, -N = "Channel Number" with the range from 0 to 39.
Bluetooth version:	Bluetooth V4.1
Modulation Type:	GFSK
Number of Channel:	40
Rates Type*:	<input checked="" type="checkbox"/> Provided by client
	1M PHY
Sample Type:	<input checked="" type="checkbox"/> Portable Device, <input type="checkbox"/> Module
Antenna Type:	<input type="checkbox"/> External, <input checked="" type="checkbox"/> Integrated
Antenna Gain*:	<input checked="" type="checkbox"/> Provided by client
	2.96dBi;
RF Cable*:	<input checked="" type="checkbox"/> Provided by client
	1dB
Remark:	*Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information , SGS is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.



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Operation Frequency of each channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	10	2422MHz	20	2442MHz	30	2462MHz
1	2404MHz	11	2424MHz	21	2444MHz	31	2464MHz
2	2406MHz	12	2426MHz	22	2446MHz	32	2466MHz
3	2408MHz	13	2428MHz	23	2448MHz	33	2468MHz
4	2410MHz	14	2430MHz	24	2450MHz	34	2470MHz
5	2412MHz	15	2432MHz	25	2452MHz	35	2472MHz
6	2414MHz	16	2434MHz	26	2454MHz	36	2474MHz
7	2416MHz	17	2436MHz	27	2456MHz	37	2476MHz
8	2418MHz	18	2438MHz	28	2458MHz	38	2478MHz
9	2420MHz	19	2440MHz	29	2460MHz	39	2480MHz

**Remark:**

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The Lowest channel(CH0)	2402MHz
The Middle channel(CH19)	2440MHz
The Highest channel(CH39)	2480MHz



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### 3.5 Test Environment

Environment Parameter	101.0 kPa Selected Values During Tests	
Relative Humidity	44-46 % RH Ambient	
Value	Temperature(°C)	Voltage(V)
NTNV	22~23	3.8
LTNV	-20	3.8
HTNV	50	3.8

Remark:  
 NV: Normal Voltage  
 NT: Normal Temperature  
 LT: Low Extreme Test Temperature  
 HT: High Extreme Test Temperature

### 3.6 Description of Support Units

The EUT has been tested independent unit.



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## 4 Test results and Measurement Data

### 4.1 Antenna Requirement

<b>Standard requirement:</b>	47 CFR Part 15C Section 15.203 /247(c)
<p>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.</p> <p>15.247(b) (4) requirement:          The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p>	
The antenna is integrated and no consideration of replacement. The best case gain of the antenna is 2.96dBi.	



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### 4.2 AC Power Line Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150kHz to 30MHz		
Limit:	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 Procedure:	<ol style="list-style-type: none"> <li>1) The mains terminal disturbance voltage test was conducted in a shielded room.</li> <li>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.</li> <li>3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.</li> <li>4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.</li> <li>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</li> </ol>		



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<p>Test Setup:</p>	
<p>Test Mode:</p>	<p>Transmitting with GFSK modulation. Charge + Transmitting mode.</p>
<p>Instruments Used:</p>	<p>Refer to section 6 for details.</p>
<p>Test Results:</p>	<p>Pass</p>



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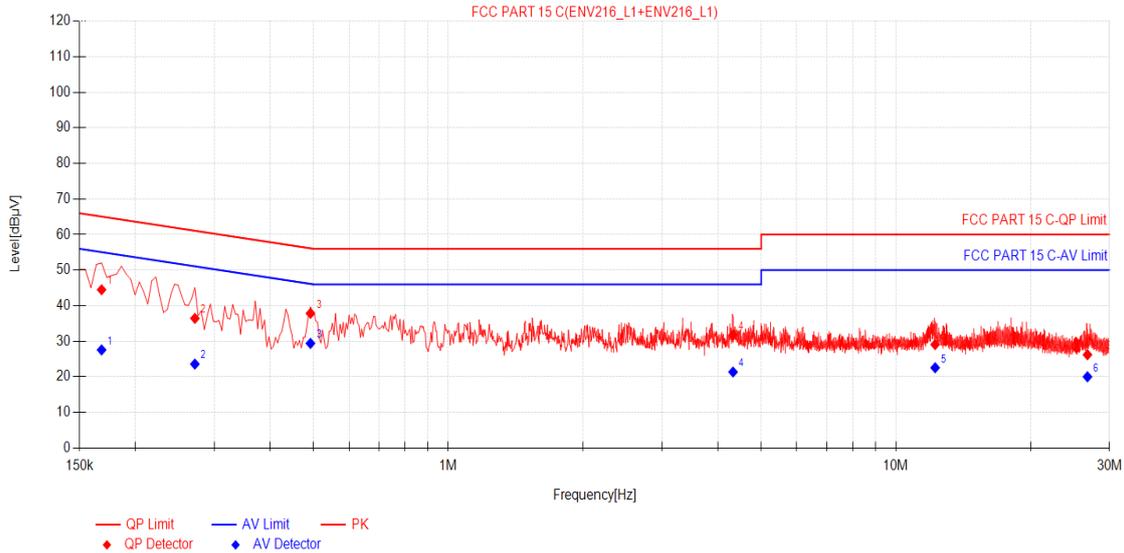
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**Measurement Data**

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

**Live Line:**



Final Data List									
NO.	Frequency [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.1680	10.71	44.48	65.06	20.58	27.57	55.06	27.49	PASS
2	0.2715	10.73	36.44	61.07	24.63	23.59	51.07	27.48	PASS
3	0.4920	10.61	37.85	56.13	18.28	29.41	46.13	16.72	PASS
4	4.3260	10.70	31.76	56.00	24.24	21.36	46.00	24.64	PASS
5	12.2370	10.58	29.08	60.00	30.92	22.56	50.00	27.44	PASS
6	26.7900	10.30	26.22	60.00	33.78	20.01	50.00	29.99	PASS

**Remark:**

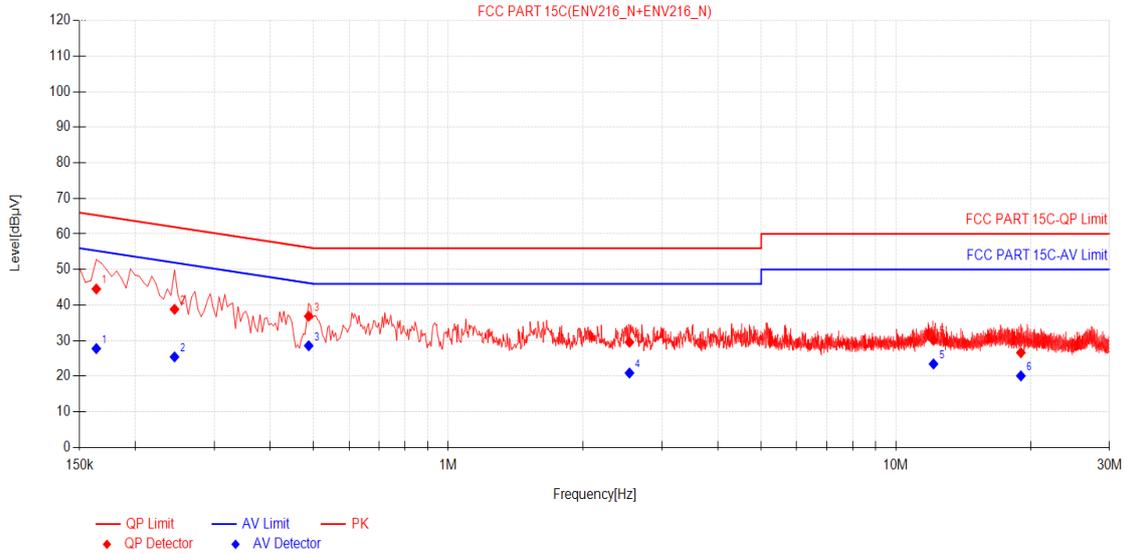
1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.



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Neutral Line:



Final Data List									
NO.	Frequency [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.1635	10.72	44.54	65.28	20.74	27.78	55.28	27.50	PASS
2	0.2445	10.72	38.84	61.94	23.10	25.45	51.94	26.49	PASS
3	0.4875	10.81	36.86	56.21	19.35	28.58	46.21	17.63	PASS
4	2.5395	10.76	29.57	56.00	26.43	20.92	46.00	25.08	PASS
5	12.1335	10.65	30.14	60.00	29.86	23.47	50.00	26.53	PASS
6	19.0230	10.43	26.62	60.00	33.38	20.11	50.00	29.89	PASS

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.



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Report No.: SUZR/2021/9002603

Rev.: 01

Page: 14 of 62

### 4.3 Duty Cycle

The detailed test data see: **Appendix**



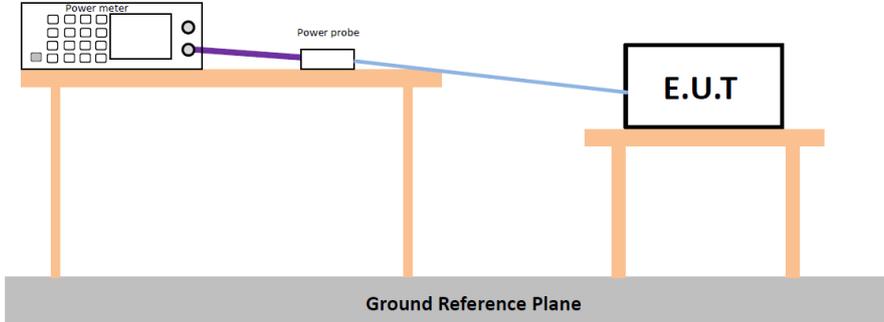
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### 4.4 Conducted Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3)
Test Method:	ANSI C63.10 :2013 Section 11.9.1.1
Test Setup:	 <p>* Test with power meter (Detector function: Peak)</p>
Test Instruments:	Refer to section 6 for details
Test Mode:	Transmitting with GFSK modulation.
Limit:	30dBm
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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### 4.5 DTS (6 dB) Bandwidth & 99% Occupied Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2)
Test Method:	ANSI C63.10: 2013 Section 11.8 Option 2
Test Setup:	
Instruments Used:	Refer to section 6 for details
Test Mode:	Transmitting with GFSK modulation.
Limit:	≥ 500 kHz
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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### 4.6 Power Spectral Density

Test Requirement:	47 CFR Part 15C Section 15.247 (e)
Test Method:	ANSI C63.10 :2013 Section 11.10.2
Test Setup:	
Test Instruments:	Refer to section 6 for details
Test Mode:	Transmitting with GFSK modulation.
Limit:	≤8.00dBm/3kHz
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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### 4.7 Band-edge for RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013 Section 11.13
Test Setup:	
Instruments Used:	Refer to section 6 for details
Test Mode:	Transmitting with GFSK modulation.
Limit:	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 Results:	Pass
The detailed test data see: <b>Appendix</b>	



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### 4.8 RF Conducted Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013 Section 11.11
Test Setup:	
Instruments Used:	Refer to section 6 for details
Test Mode:	Transmitting with GFSK modulation.
Limit:	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 Results:	Pass
The detailed test data see: <b>Appendix</b>	



### 4.9 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205				
Test Method:	ANSI C63.10 :2013 Section 11.12				
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
Remark: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.					

Test Setup:

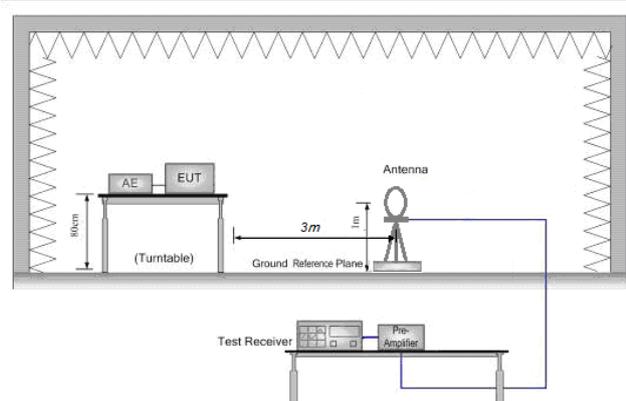


Figure 1. Below 30MHz

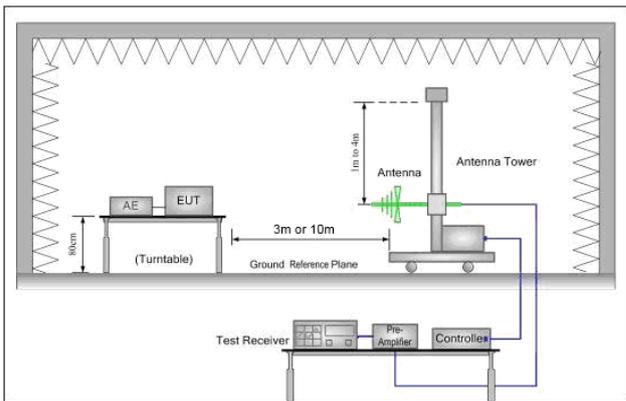


Figure 2. 30MHz to 1GHz



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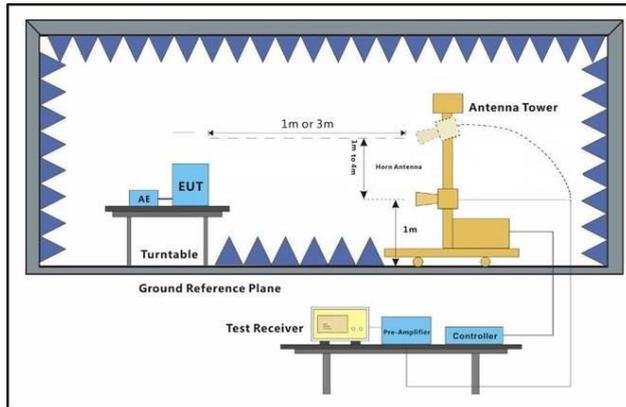


Figure 3. Above 1 GHz

<p>Test Procedure:</p>	<ol style="list-style-type: none"> <li>For below 1GHz(9KHz start), the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>For above 1GHz(10th harmonic), the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation</li> <li>The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters(for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> <li>Test the EUT in the lowest channel, the middle channel ,the Highest channel.</li> <li>The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.</li> <li>Repeat above procedures until all frequencies measured was complete.</li> </ol>
<p>Test Configuration:</p>	<p>Measurements Below 1000MHz</p> <ul style="list-style-type: none"> <li>• RBW = 120 kHz</li> <li>• VBW = 300 kHz</li> <li>• Detector = Peak</li> <li>• Trace mode = max hold</li> </ul> <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW ≥ 3 MHz</li> </ul>



	<ul style="list-style-type: none"> <li>• Detector = Peak</li> <li>• Sweep time = auto</li> <li>• Trace mode = max hold</li> </ul> <p>Average Measurements Above 1000MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW <math>\geq</math> [3 *RBW]</li> <li>• Detector = RMS (power averaging), if span / (# of points in sweep) <math>\leq</math> (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.</li> <li>• Sweep time = auto</li> <li>• Perform a trace average of at least 100 traces.</li> </ul>
Exploratory Test Mode:	Transmitting with GFSK modulation. Charge + Transmitting mode.
Final Test Mode:	Transmitting with GFSK modulation. Pretest the EUT at Charge + Transmitting mode, For below 1GHz part, through pre-scan, the worst case is the lowest channel. Only the worst case is recorded in the report. The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported The disturbance above 18GHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.
Instruments Used:	Refer to section 6 for details
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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### 4.10 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205		
Test Method:	ANSI C63.10: 2013 Section 11.12		
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)		
Limit:	Frequency	Limit (dBuV/m)	Remark
	30MHz-88MHz	40.0	Quasi-peak
	88MHz-216MHz	43.5	Quasi-peak
	216MHz-960MHz	46.0	Quasi-peak
	960MHz-1GHz	54.0	Quasi-peak
	Above 1GHz	54.0	Average Value
		74.0	Peak Value

Test Setup:

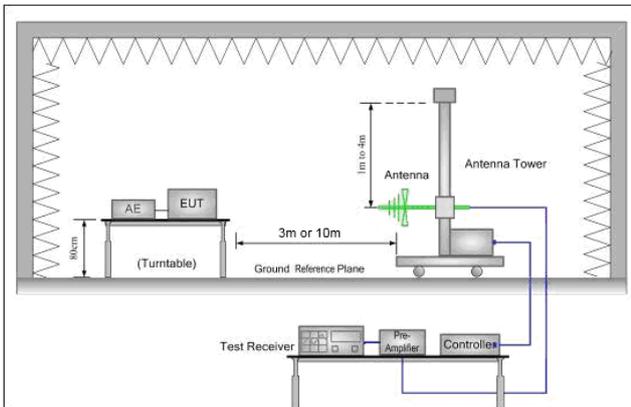


Figure 1. 30MHz to 1GHz

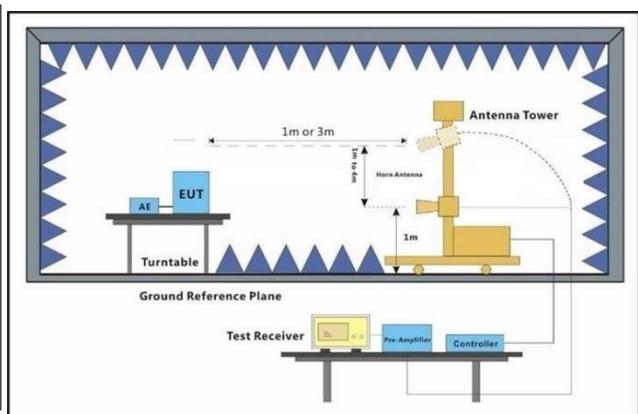


Figure 2. Above 1 GHz

Test Procedure:	<ol style="list-style-type: none"> <li>For below 1GHz the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>Place a marker at the end of the restricted band closest to the transmit</li> </ol>
-----------------	--



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	<p>frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel</p> <p>h. Test the EUT in the lowest channel , the Highest channel</p> <p>i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.</p> <p>j. Repeat above procedures until all frequencies measured was complete.</p>
Test Configuration:	<p>Measurements Below 1000MHz</p> <ul style="list-style-type: none"> <li>• RBW = 120 kHz</li> <li>• VBW = 300 kHz</li> <li>• Detector = Peak</li> <li>• Trace mode = max hold</li> </ul> <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW ≥ 3 MHz</li> <li>• Detector = Peak</li> <li>• Sweep time = auto</li> <li>• Trace mode = max hold</li> </ul> <p>Average Measurements Above 1000MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW ≥ [3 *RBW]</li> <li>• Detector = RMS (power averaging), if span / (# of points in sweep) ≤ (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.</li> <li>• Sweep time = auto</li> <li>• Perform a trace average of at least 100 traces.</li> </ul>
Exploratory Test Mode:	<p>Transmitting with GFSK modulation.</p> <p>Charge + Transmitting mode.</p>
Final Test Mode:	<p>Transmitting with GFSK modulation.</p> <p>Pretest the EUT at Charge + Transmitting mode.</p> <p>Only the worst case is recorded in the report.</p>
Instruments Used:	Refer to section 6 for details
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	



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## 5 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.54dB
2	RF power density, conducted	±1.03dB
3	Spurious emissions, conducted	±0.54dB
4	Radio Frequency	±7.25x 10 <sup>-8</sup>
5	Duty Cycle	±0.37%
6	Occupied Bandwidth	±7.25x 10 <sup>-8</sup>
7	Conduction Emission	± 2.9dB (150kHz to 30MHz)
8	Radiated Emission(966-01)	± 3.13dB (9k -30MHz)
		± 4.8dB (30M -1GHz)
		± 4.8dB (1GHz to 18GHz)
		± 4.8dB (Above 18GHz)



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## 6 Equipment List

Tonscend Test System					
Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal. Due date
				(yyyy-mm-dd)	(yyyy-mm-dd)
Shielding Room	Brilliant-emc	N/A	SUWI-04-01-06	2021/5/8	2024/5/7
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-07	2021/2/20	2022/2/19
Signal Analyzer	ROHDE&SCHWARZ	FSV3030	SUWI-01-02-02	2021/5/28	2022/5/27
DC Power Supply	HYELEC	HY3005B	SUWI-01-18-01	2021/2/20	2022/2/19
Measurement Software	Tonscend	JS1120-3 Test System V 3.5.51	SUWI-02-09-09	NCR	NCR
EPM Series Power Meter	Aglient	E4419B	SUWI-03-22-01	2021/6/11	2022/6/10
E-SERIES AVG POWER SENSOR	Aglient	E9301A	SUWI-03-23-01	2021/6/11	2022/6/10

CE Test Equipment					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Shielding Room	Brilliant-emc	N/A	SUWI-04-03-01	2021/5/8	2024/5/7
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-01	2021/2/20	2022/2/19
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-02	2021/2/20	2022/2/19
Measurement Software	Tonscend	JS32-CE V3.0.0.1	SUWI-02-09-05	NCR	NCR
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-06	2021/2/20	2022/2/19
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2021/2/20	2022/2/19



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RSE Test Equipment 996-01					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Semi-Anechoic Chamber	Brilliant-emc	N/A	SUWI-04-02-01	2021/5/8	2024/5/7
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-05	2021/2/20	2022/2/19
Signal Analyzer	ROHDE&SCHWARZ	FSW43	SUWI-01-02-04	2021/5/28	2022/5/27
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2021/2/20	2022/2/19
DC Power Supply	HYELEC	HY3005B	SUWI-01-18-01	2021/2/20	2022/2/19
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	VULB 9163	SUWI-01-11-01	2021/5/16	2022/5/15
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9120D	SUWI-01-11-02	2021/5/16	2022/5/15
Receiving antenna	SCHWRZBECK MESS-ELEKTRONIK	BBHA 9170	SUWI-01-11-03	2021/5/14	2022/5/13
Amplifier	Tonscend	TAP9K3G40	SUWI-01-14-01	2021/2/20	2022/2/19
Amplifier	Tonscend	TAP01018050	SUWI-01-14-02	2021/2/20	2022/2/19
Amplifier	Tonscend	TAP18040048	SUWI-01-14-03	2021/2/20	2022/2/19
Active Loop Antenna	SCHWRZBECK MESS-ELEKTRONIK	FMZB 1519B	SUWI-01-21-01	2021/6/10	2022/6/9
Measurement Software	Tonscend	JS32-RE V3.0.0.3	SUWI-02-09-04	NCR	NCR
Radio Communication Analyzer	ROHDE&SCHWARZ	CMW500	SUWI-01-27-01	2021/9/28	2022/9/27



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Rev.: 01

Page: 28 of 62

## 7 Photographs - EUT Constructional Details

Refer to Appendix A.2 WLAN Setup Photos.



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# Appendix



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Page: 30 of 62

**DTS Bandwidth  
Test Result**

Test Mode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.68	2401.65	2402.33	0.5	PASS
		2440	0.68	2439.65	2440.33	0.5	PASS
		2480	0.68	2479.65	2480.33	0.5	PASS



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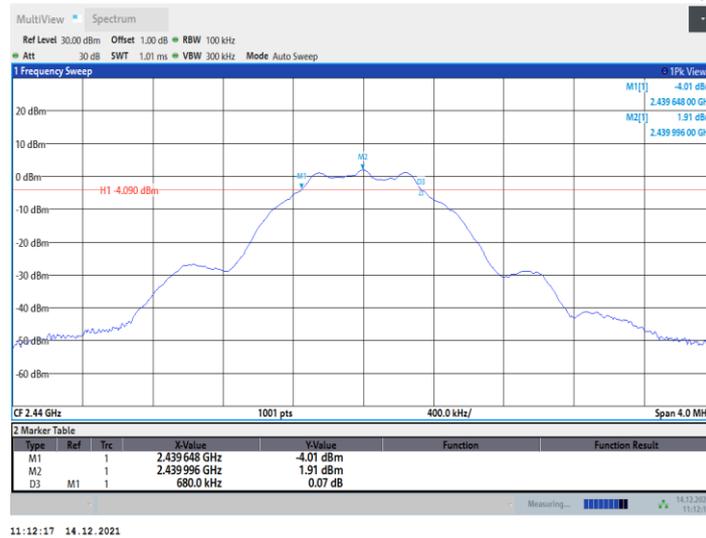
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Test Graphs

BLE\_1M\_Ant1\_2402



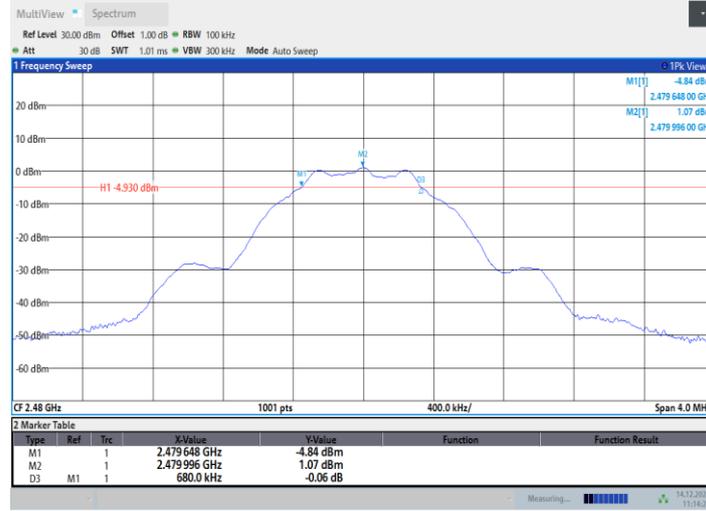
BLE\_1M\_Ant1\_2440



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BLE\_1M\_Ant1\_2480



11:14:29 14.12.2021



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## Occupied Channel Bandwidth Test Result

Test Mode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.066	2401.466	2402.532	---	PASS
		2440	1.067	2439.464	2440.531	---	PASS
		2480	1.066	2479.463	2480.529	---	PASS



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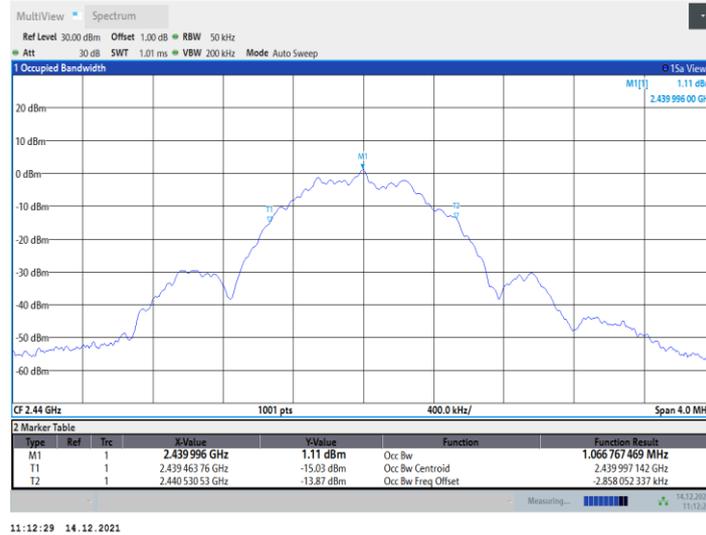
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Test Graphs

BLE\_1M\_Ant1\_2402



BLE\_1M\_Ant1\_2440



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Report No.: SUZR/2021/9002603

Rev.: 01

Page: 36 of 62

## Maximum conducted output power Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	-0.77	≤30	PASS
		2440	0.02	≤30	PASS
		2480	-0.80	≤30	PASS



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## Maximum power spectral density Test Result

Test Mode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-14.06	≤8	PASS
		2440	-13.11	≤8	PASS
		2480	-13.96	≤8	PASS



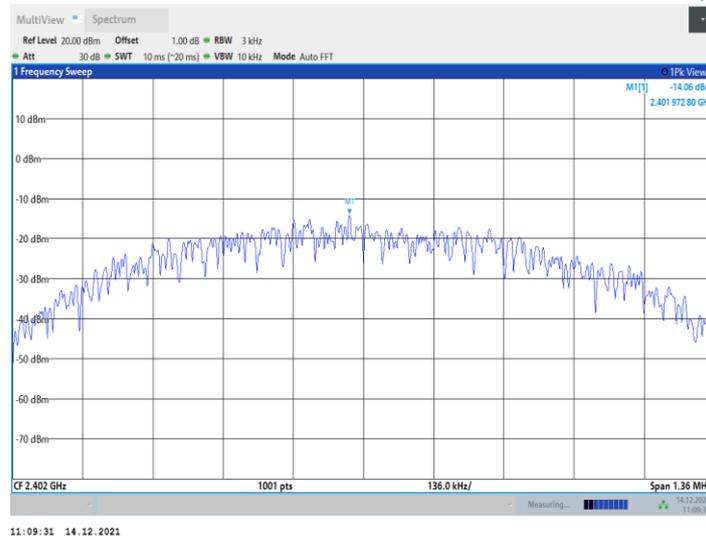
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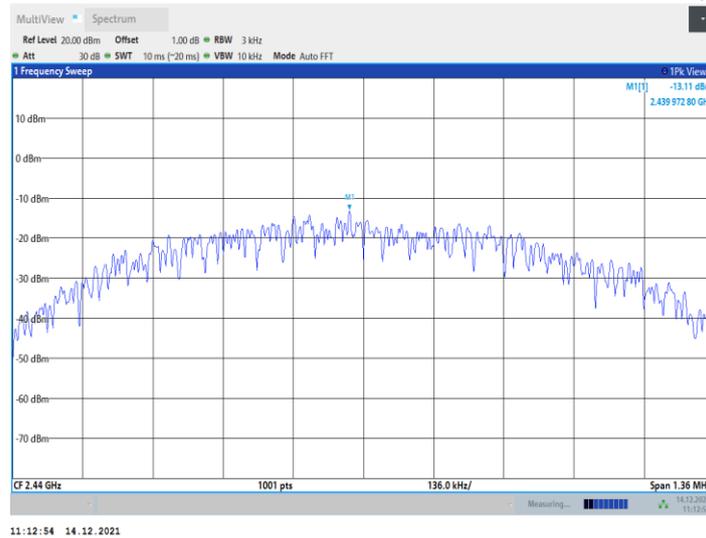
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Test Graphs

BLE\_1M\_Ant1\_2402

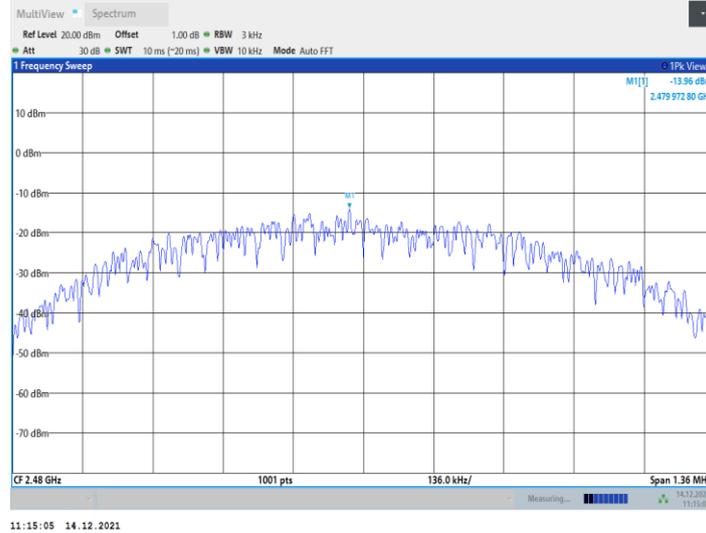


BLE\_1M\_Ant1\_2440



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BLE\_1M\_Ant1\_2480



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Report No.: SUZR/2021/9002603

Rev.: 01

Page: 40 of 62

**Band edge measurements**  
**Test Result**

Test Mode	Antenna	Ch Name	Channel	Ref Level[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	1.18	-53.89	≤-18.82	PASS
		High	2480	1.22	-59.35	≤-18.78	PASS



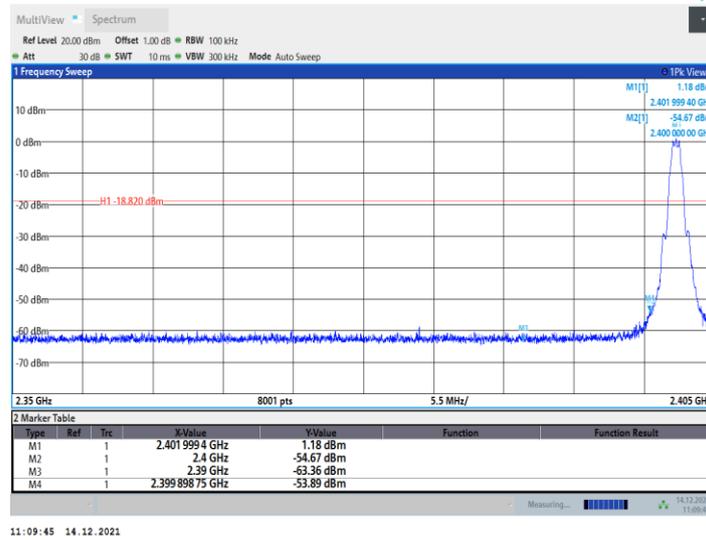
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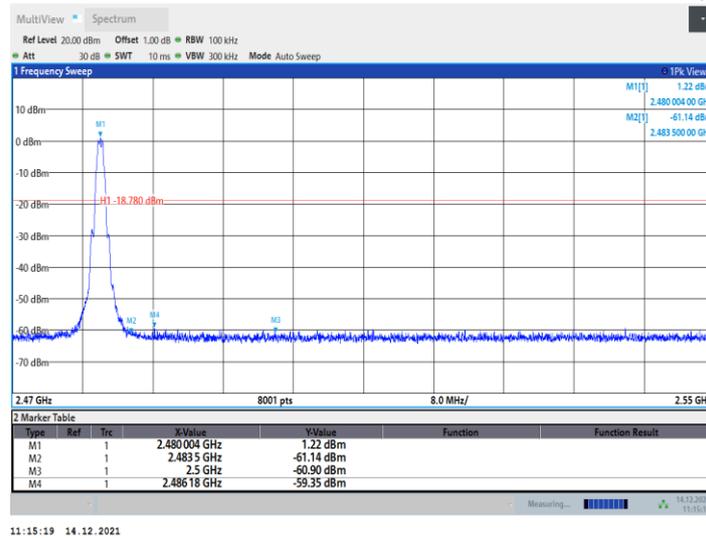
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Test Graphs

BLE\_1M\_Ant1\_Low\_2402



BLE\_1M\_Ant1\_High\_2480



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## Conducted Spurious Emission Test Result

Test Mode	Antenna	Channel	Freq Range [MHz]	Ref Level [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	1.09	1.09	---	PASS
			30~1000	1.09	-62.29	≤-18.91	PASS
			1000~26500	1.09	-47.83	≤-18.91	PASS
		2440	Reference	1.90	1.90	---	PASS
			30~1000	1.90	-61.91	≤-18.1	PASS
			1000~26500	1.90	-55.25	≤-18.1	PASS
		2480	Reference	1.03	1.03	---	PASS
			30~1000	1.03	-62.35	≤-18.97	PASS
			1000~26500	1.03	-57.21	≤-18.97	PASS



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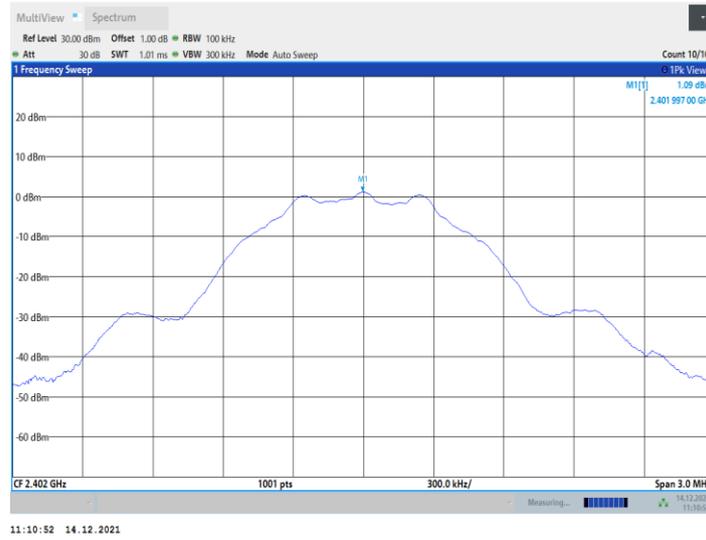
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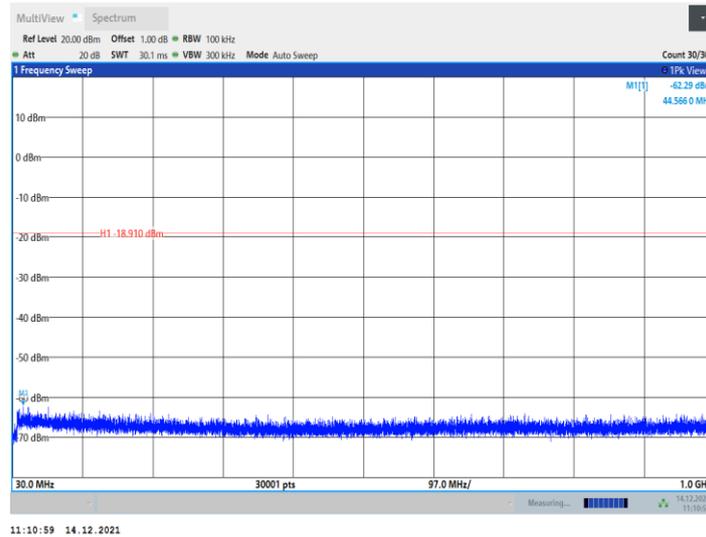
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Test Graphs

BLE\_1M\_Ant1\_2402\_0~Reference



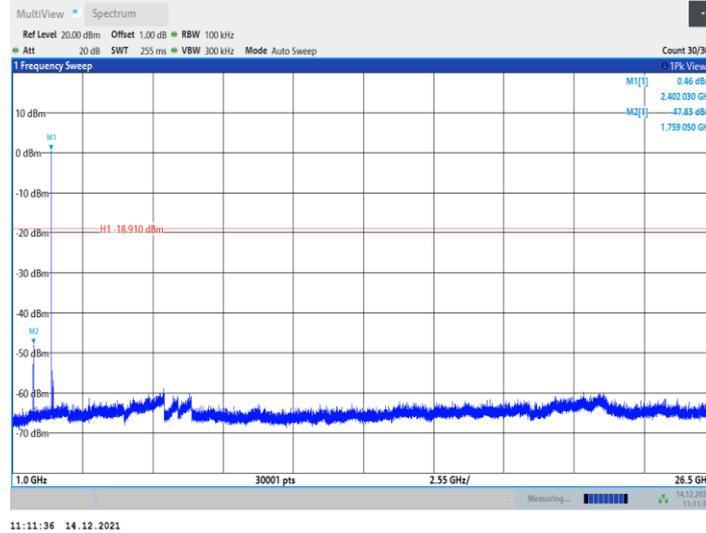
BLE\_1M\_Ant1\_2402\_30~1000



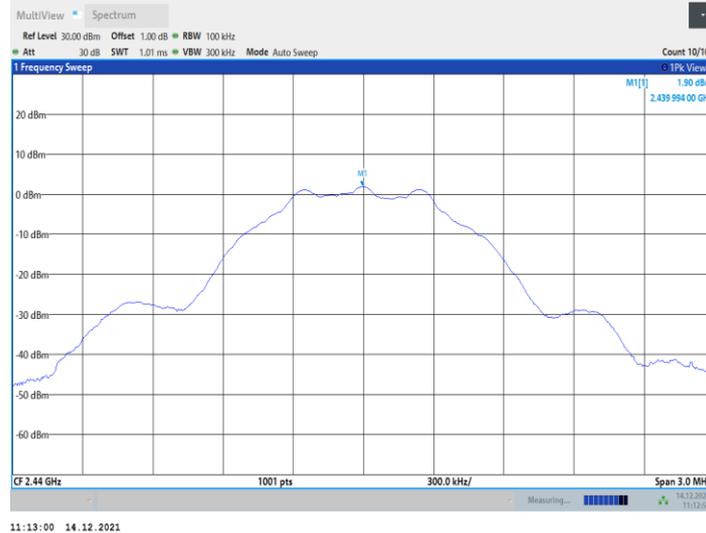
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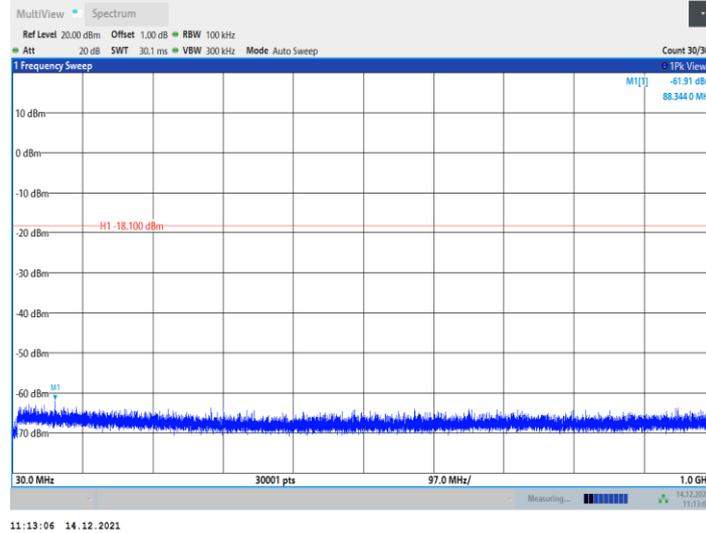
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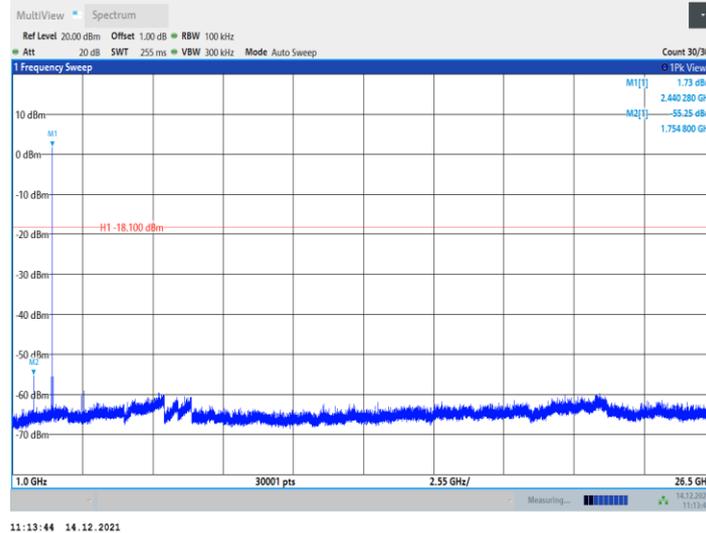
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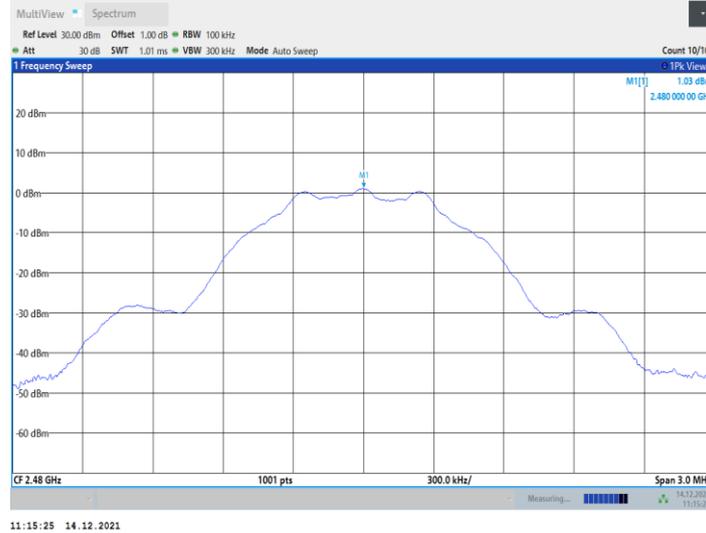


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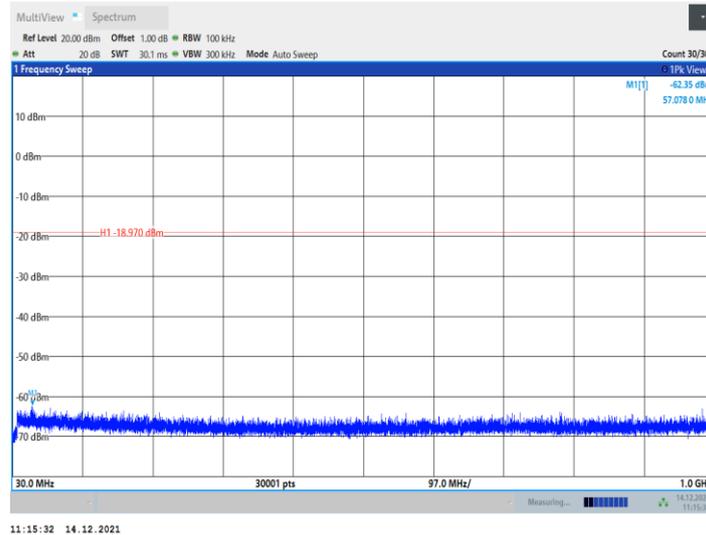
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BLE\_1M\_Ant1\_2480\_30~1000

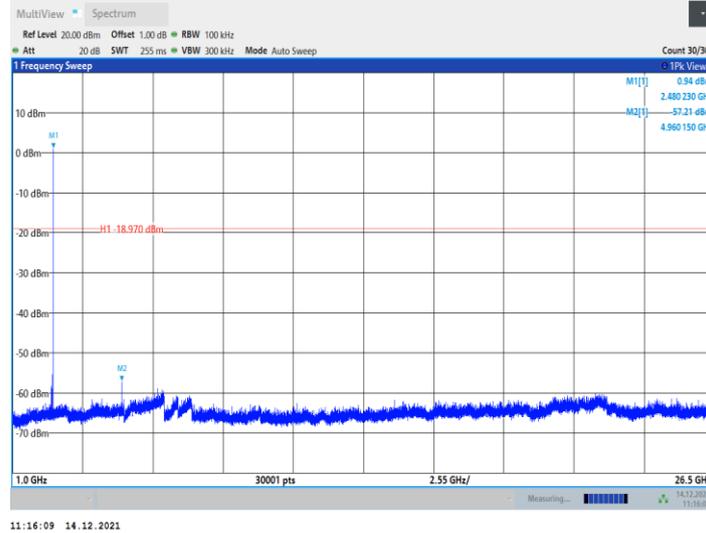


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BLE\_1M\_Ant1\_2480\_1000~26500



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**Duty Cycle  
Test Result**

Test Mode	Antenna	Channel	ON Time [ms]	Period [ms]	X	DC [%]	X Factor	Limit	Verdict
BLE_1M	Ant1	2402	0.39	0.63	0.619	61.90	1.97	---	PASS
		2440	0.39	0.63	0.619	61.90	1.97	---	PASS
		2480	0.39	0.63	0.619	61.90	1.97	---	PASS



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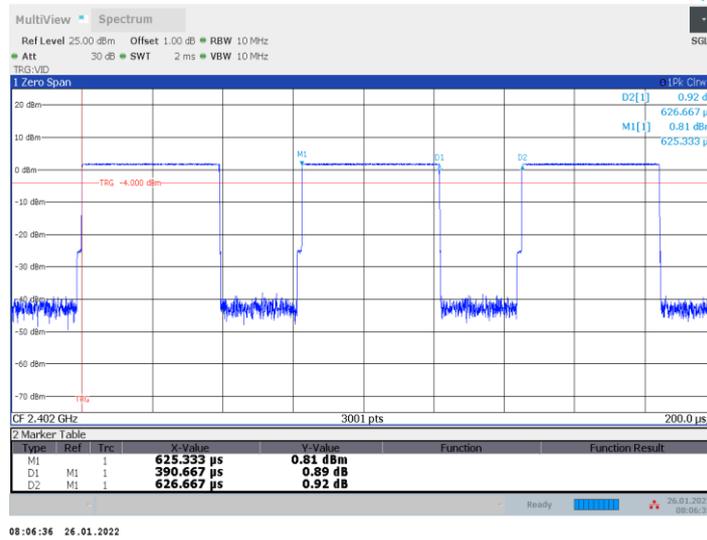
SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd.  
 Wireless Laboratory

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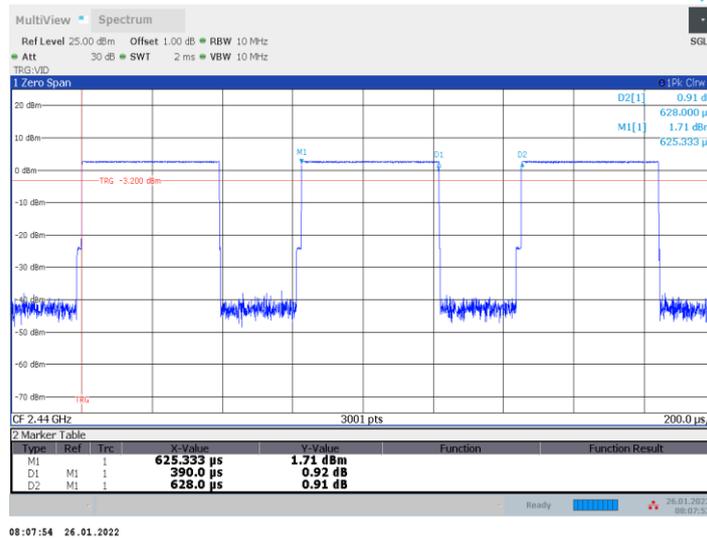
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Test Graphs

BLE\_1M\_Ant1\_2402



BLE\_1M\_Ant1\_2440



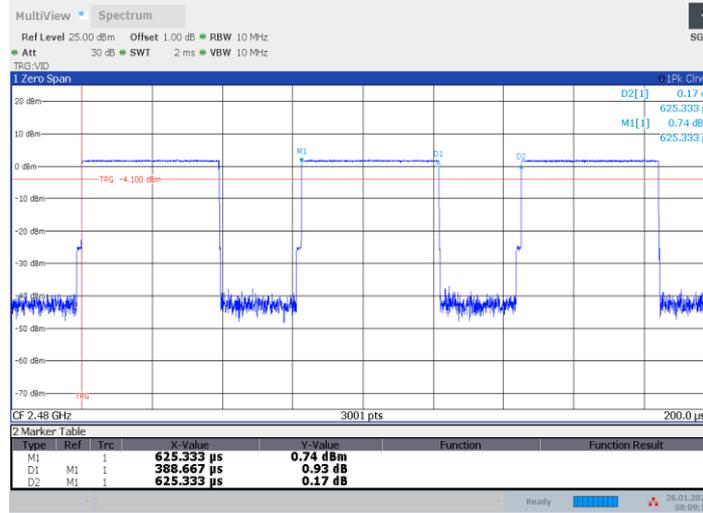
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BLE\_1M\_Ant1\_2480



08:09:11 26.01.2022



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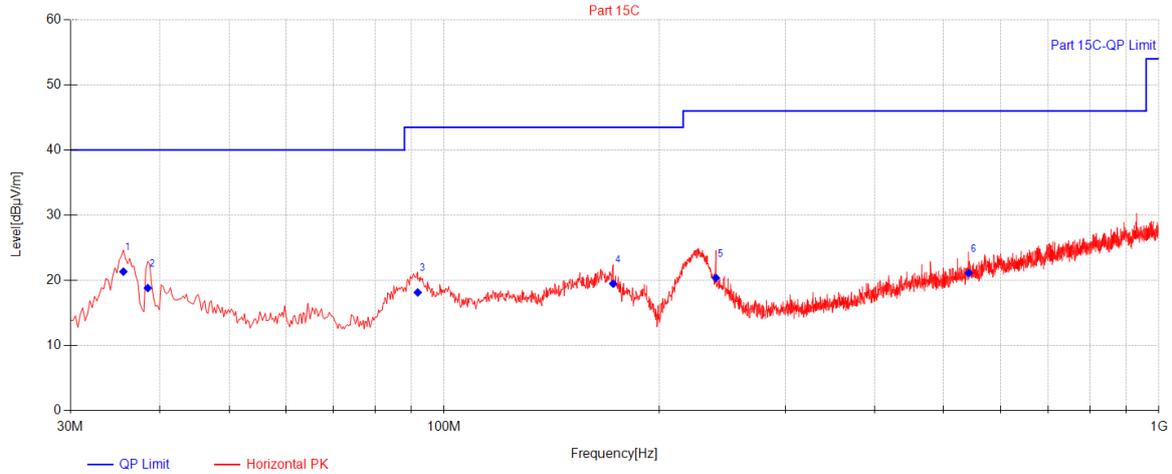
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## Radiated Spurious Emissions

### Radiated emission below 1GHz

#### Worst case Mode: BLE\_Channel 39



Final Data List									
NO.	Frequency [MHz]	Reading [dBµV]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	35.5775	44.33	-22.99	21.34	40.00	18.66	196	132	Horizontal
2	38.4875	41.29	-22.47	18.82	40.00	21.18	235	110	Horizontal
3	91.8375	44.89	-26.74	18.15	43.50	25.35	145	144	Horizontal
4	172.3475	40.18	-20.69	19.49	43.50	24.01	182	205	Horizontal
5	240.005	44.13	-23.76	20.37	46.00	25.63	179	205	Horizontal
6	541.9175	36.58	-15.46	21.12	46.00	24.88	119	49	Horizontal



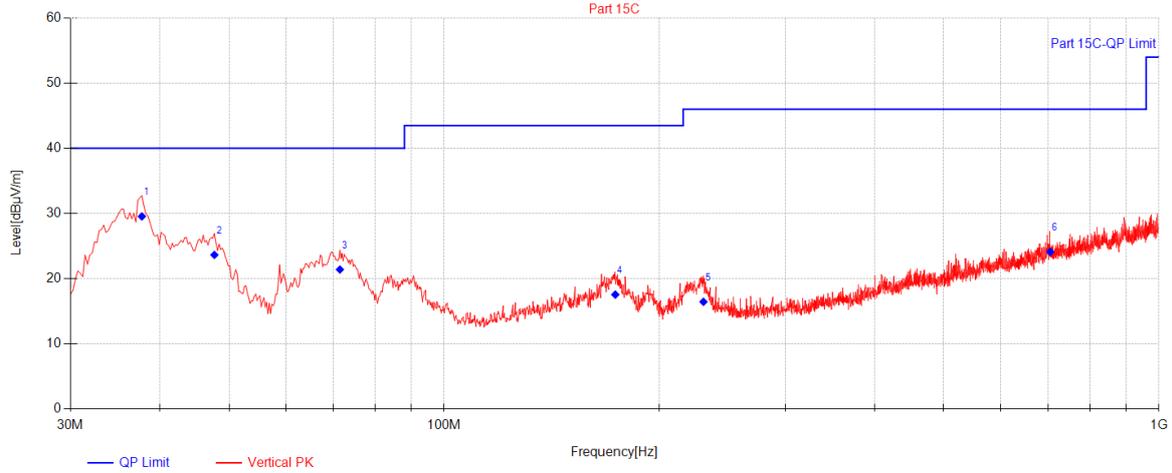
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**Worst case Mode: BLE\_Channel 39**



Final Data List									
NO.	Frequency [MHz]	Reading [dBµV]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	37.76	52.15	-22.60	29.55	40.00	10.45	189	198	Vertical
2	47.7025	46.23	-22.58	23.65	40.00	16.35	126	208	Vertical
3	71.4675	47.19	-25.79	21.40	40.00	18.60	230	186	Vertical
4	173.56	38.22	-20.67	17.55	43.50	25.95	170	218	Vertical
5	230.5475	40.16	-23.71	16.45	46.00	29.55	228	115	Vertical
6	704.635	36.19	-12.07	24.12	46.00	21.88	294	134	Vertical

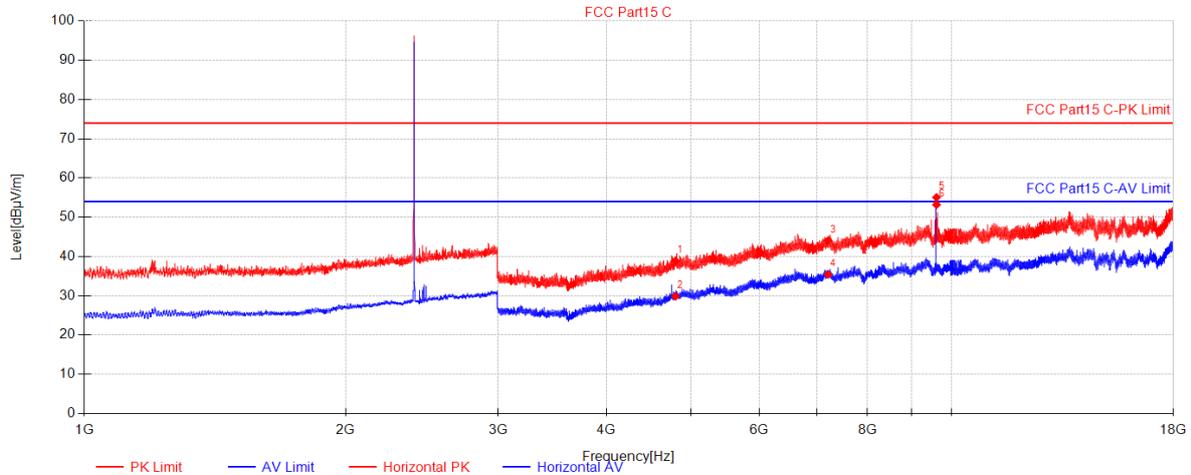


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**Transmitter emission above 1GHz**

**BLE\_Channel 00**



Data List									
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4804	52.06	-13.21	38.85	74.00	35.15	296	151	Horizontal
2	4804	43.05	-13.21	29.84	54.00	24.16	265	3	Horizontal
3	7206	50.91	-6.84	44.07	74.00	29.93	250	178	Horizontal
4	7206	42.26	-6.84	35.42	54.00	18.58	222	178	Horizontal
5	9608	56.29	-1.22	55.07	74.00	18.93	144	27	Horizontal
6	9608.5	54.41	-1.22	53.19	54.00	0.81	315	4	Horizontal

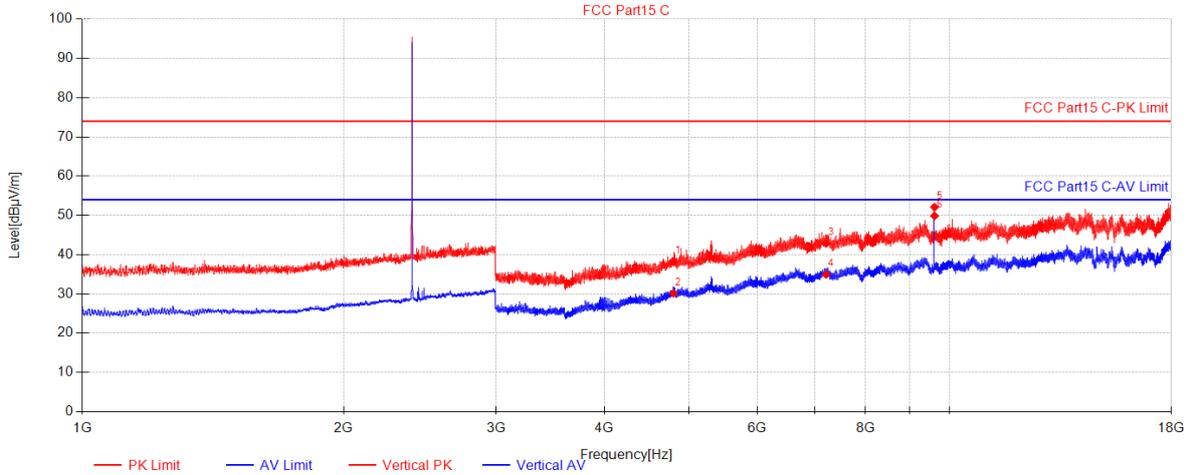


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BLE\_Channel 00



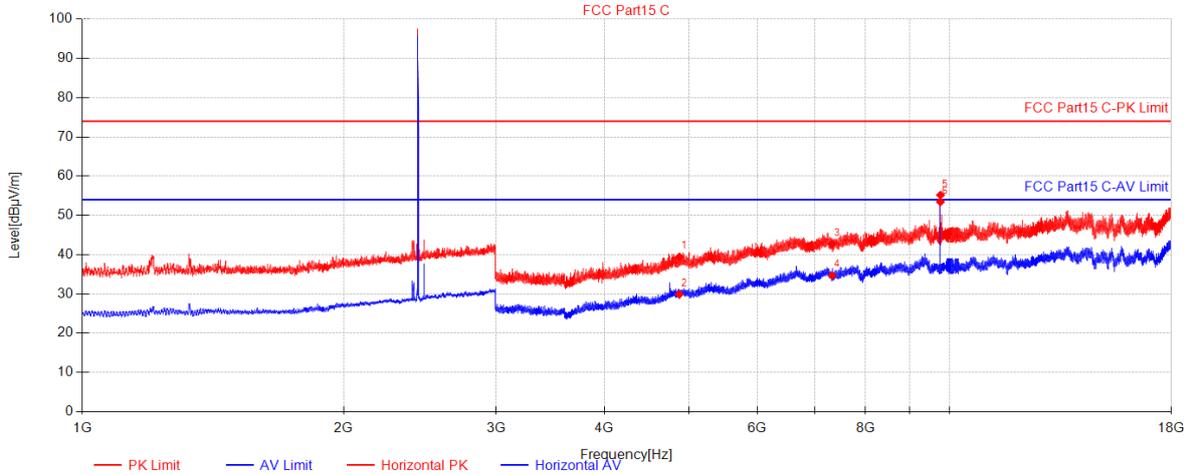
Data List									
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4804	51.39	-13.21	38.18	74.00	35.82	165	302	Vertical
2	4804	43.36	-13.21	30.15	54.00	23.85	336	79	Vertical
3	7206	49.69	-6.84	42.85	74.00	31.15	236	28	Vertical
4	7206	41.79	-6.84	34.95	54.00	19.05	1889	155	Vertical
5	9608	53.33	-1.22	52.11	74.00	21.89	254	54	Vertical
6	9608.5	51.10	-1.22	49.88	54.00	4.12	277	54	Vertical



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BLE\_Channel 19



Data List									
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4880	52.43	-12.99	39.44	74.00	34.56	229	309	Horizontal
2	4880	42.89	-12.99	29.90	54.00	24.10	321	156	Horizontal
3	7320	49.91	-7.15	42.76	54.00	11.24	265	309	Horizontal
4	7320	41.85	-7.15	34.70	54.00	19.30	254	30	Horizontal
5	9760	56.38	-1.20	55.18	74.00	18.82	125	1	Horizontal
6	9760.5	54.63	-1.20	53.43	54.00	0.57	118	9	Horizontal

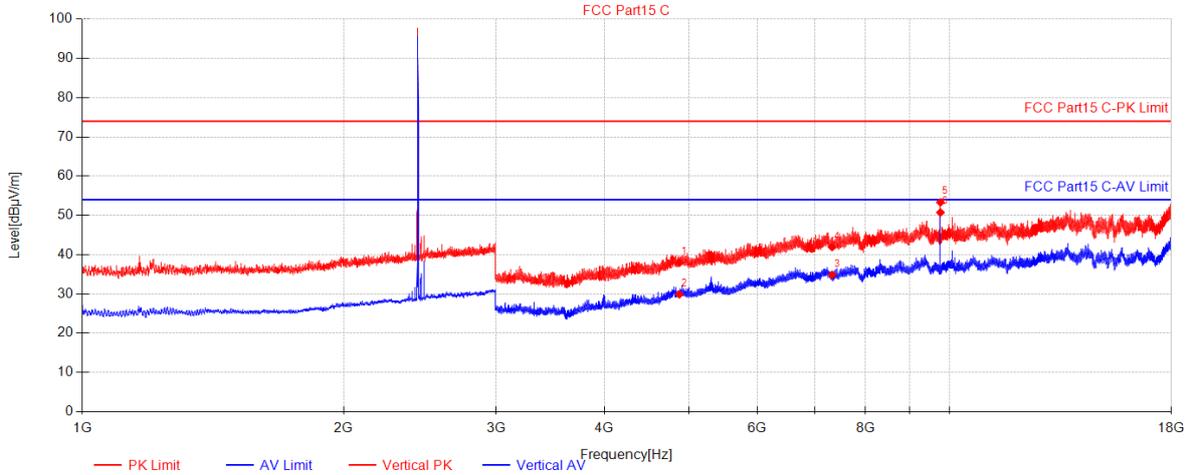


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BLE\_Channel 19



Data List									
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4880	50.92	-12.99	37.93	74.00	36.07	254	357	Vertical
2	4880	42.87	-12.99	29.88	54.00	24.12	265	156	Vertical
3	7320	42.02	-7.15	34.87	54.00	19.13	112	231	Vertical
4	7320	49.08	-7.15	41.93	74.00	32.07	288	1	Vertical
5	9760	54.53	-1.20	53.33	74.00	20.67	165	30	Vertical
6	9760.5	51.95	-1.20	50.75	54.00	3.25	236	30	Vertical

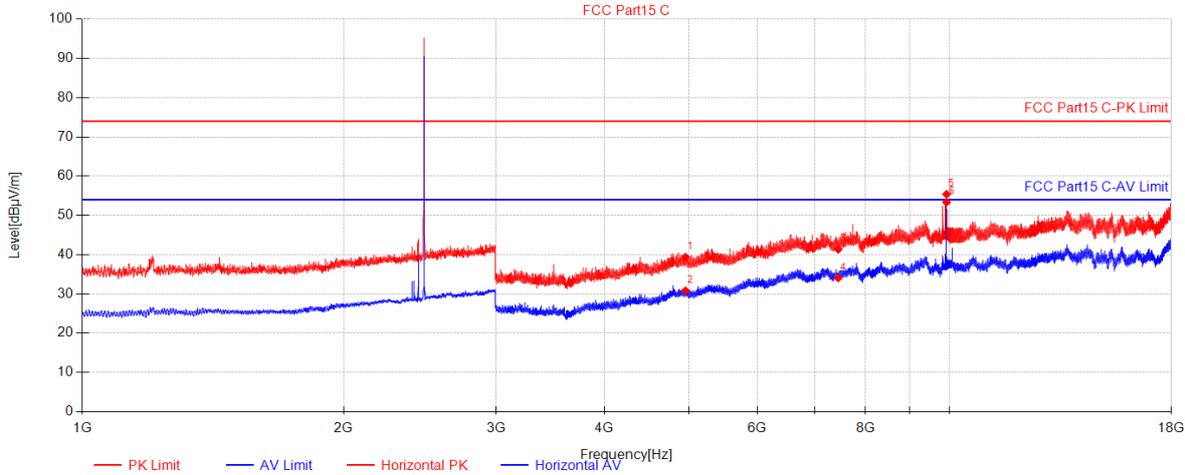


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BLE\_Channel 39



Data List									
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4960	52.20	-12.83	39.37	74.00	34.63	265	352	Horizontal
2	4960	43.62	-12.83	30.79	54.00	23.21	112	360	Horizontal
3	7440	48.18	-6.83	41.35	74.00	32.65	231	129	Horizontal
4	7440	40.88	-6.83	34.05	54.00	19.95	320	53	Horizontal
5	9920	56.32	-0.93	55.39	74.00	18.61	264	28	Horizontal
6	9920.5	54.29	-0.93	53.36	54.00	0.64	110	3	Horizontal

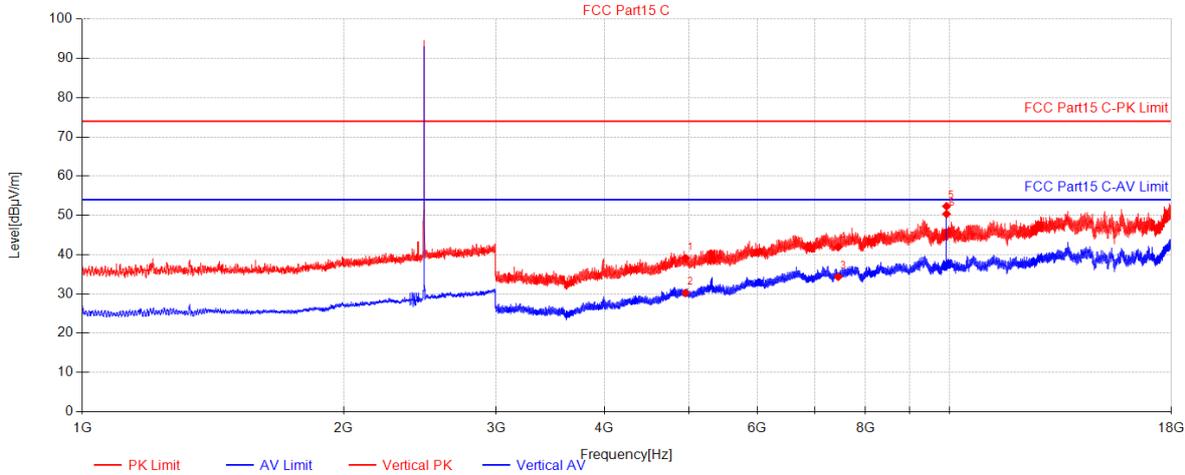


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BLE\_Channel 39



Data List									
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4960	51.91	-12.83	39.08	74.00	34.92	265	127	Vertical
2	4960	43.06	-12.83	30.23	54.00	23.77	249	4	Vertical
3	7440	41.19	-6.83	34.36	54.00	19.64	301	79	Vertical
4	7440	48.74	-6.83	41.91	74.00	32.09	230	155	Vertical
5	9920	53.25	-0.93	52.32	74.00	21.68	185	29	Vertical
6	9920.5	51.28	-0.93	50.35	54.00	3.65	222	29	Vertical



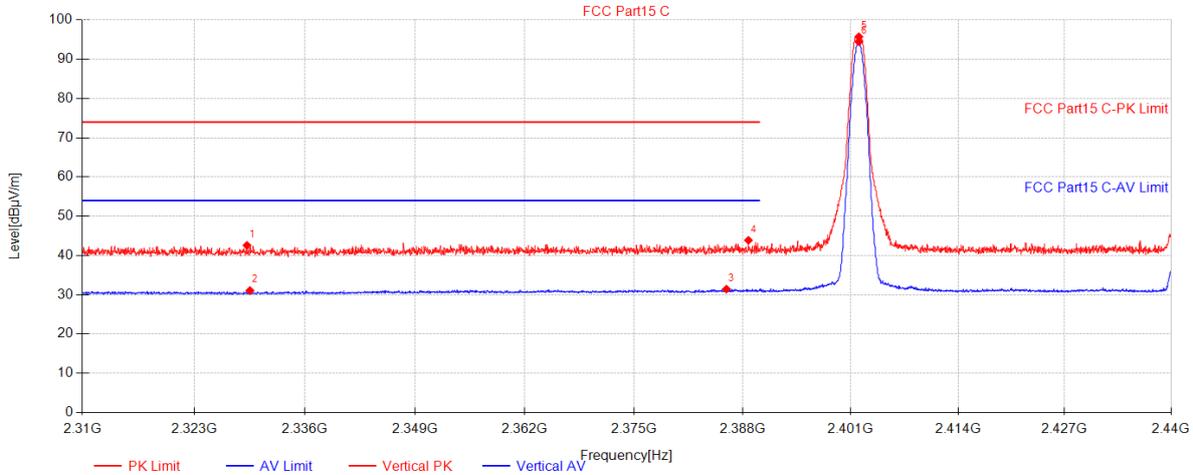
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## Restricted bands around fundamental frequency

### BLE\_Channel 00



Data List									
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2329.1967	39.50	3.09	42.59	74.00	31.41	305	220	Vertical
2	2329.5433	27.98	3.09	31.07	54.00	22.93	305	220	Vertical
3	2386.05	28.36	3.07	31.43	54.00	22.57	305	220	Vertical
4	2388.6933	40.80	3.07	43.87	74.00	30.13	305	220	Vertical
5	2402	92.65	3.08	95.73	-	-	305	220	Vertical
6	2402	91.39	3.08	94.47	-	-	305	220	Vertical

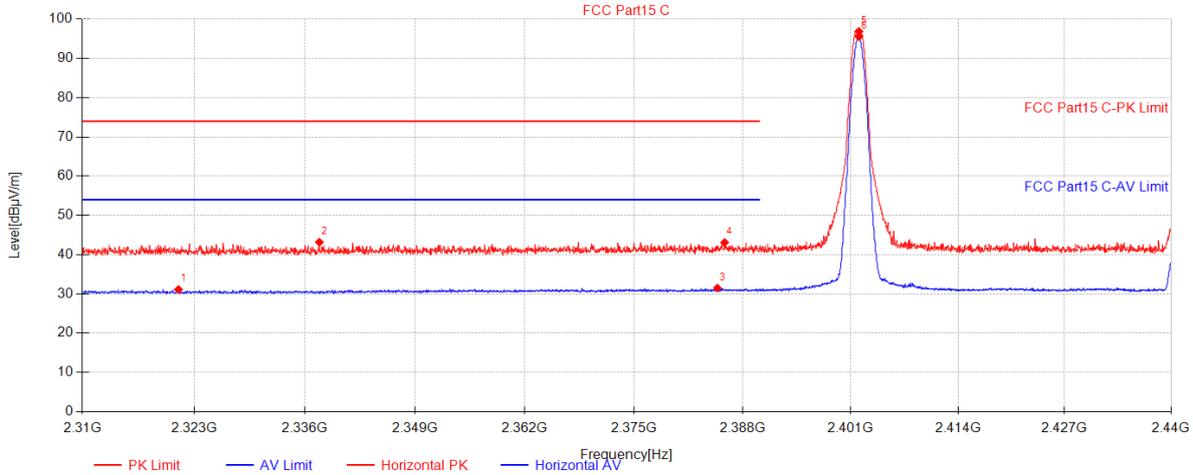


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BLE\_Channel 00

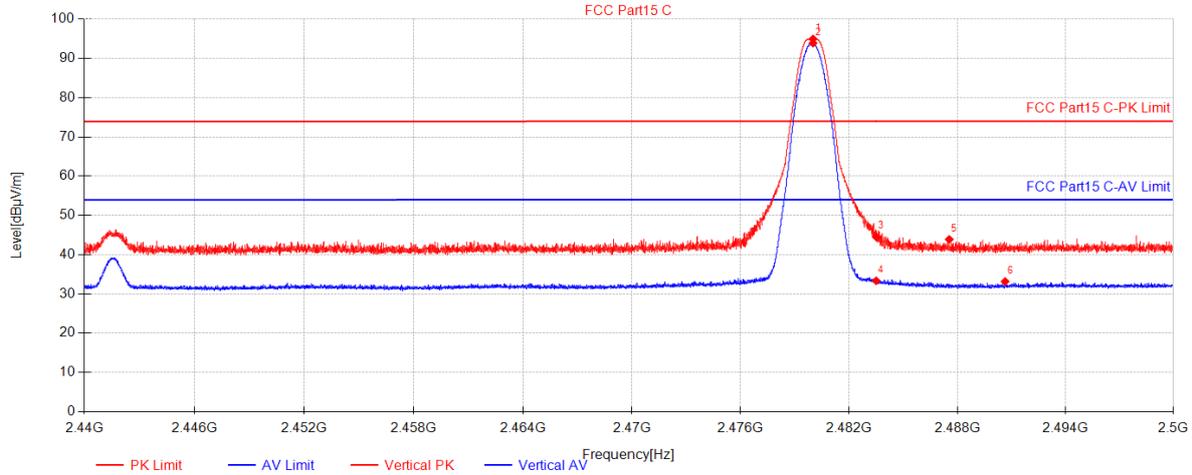


Data List									
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2321.18	28.04	3.09	31.13	54.00	22.87	125	307	Horizontal
2	2337.69	40.08	3.09	43.17	74.00	30.83	125	307	Horizontal
3	2384.9667	28.41	3.07	31.48	54.00	22.52	125	307	Horizontal
4	2385.8333	40.02	3.07	43.09	74.00	30.91	125	307	Horizontal
5	2402	93.79	3.08	96.87	-	-	125	307	Horizontal
6	2402	92.51	3.08	95.59	-	-	125	307	Horizontal



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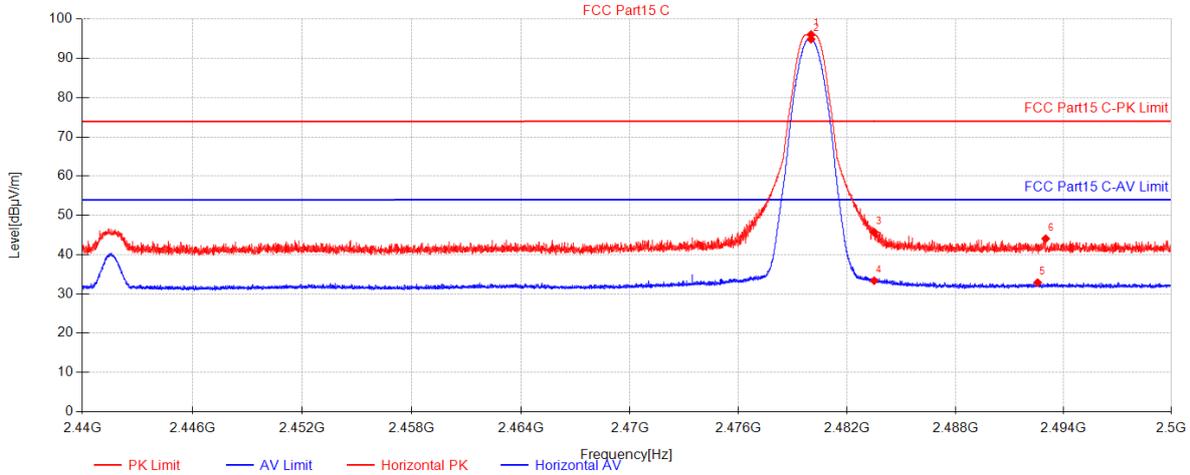


Data List									
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2480	91.39	3.57	94.96	-	-	318	274	Vertical
2	2480	90.32	3.57	93.89	-	-	318	274	Vertical
3	2483.5	40.96	3.60	44.56	74.00	29.44	318	274	Vertical
4	2483.5	29.74	3.60	33.34	54.00	20.66	318	274	Vertical
5	2487.55	40.27	3.62	43.89	74.00	30.11	318	274	Vertical
6	2490.655	29.53	3.64	33.17	54.00	20.83	318	274	Vertical



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Data List									
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2480	92.51	3.57	96.08	-	-	118	305	Horizontal
2	2480	91.31	3.57	94.88	-	-	118	305	Horizontal
3	2483.5	42.13	3.60	45.73	74.00	28.27	118	305	Horizontal
4	2483.5	29.77	3.60	33.37	54.00	20.63	118	305	Horizontal
5	2492.575	29.23	3.65	32.88	54.00	21.12	118	305	Horizontal
6	2493.025	40.42	3.66	44.08	74.00	29.92	118	305	Horizontal

The End



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