

Report No.: SUHR/2021/B001103

Rev.: 01

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# TEST REPORT

<b>Application No.:</b>	HR/2021/B0011
<b>Applicant:</b>	Quectel Wireless Solutions Co., Ltd.
<b>Address of Applicant:</b>	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233
<b>Manufacturer:</b>	Quectel Wireless Solutions Co., Ltd.
<b>Address of Manufacturer:</b>	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233
<b>EUT Description:</b>	LTE Module
<b>Model No.:</b>	SC606T-NAD
<b>Trade Mark:</b>	Quectel
<b>FCC ID:</b>	XMR2021SC606TNAD
<b>Standards:</b>	47 CFR FCC Part 2, Subpart J 47 CFR Part 15, Subpart C
<b>Date of Receipt:</b>	2021/12/19
<b>Date of Test:</b>	2022/1/7 to 2022/1/9
<b>Date of Issue:</b>	2022/1/17

<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:



Panta Sun  
Wireless Laboratory Manager



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## 1 Version

### Revision Record

Version	Chapter	Date	Modifier	Remark
01		2022/1/17		Original

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

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## 2 Test Summary

Test Item	Test Requirement	Test Method	Test Result	Result
Antenna Requirement	15.203/247(b)	--	Refer to HR/2020/A000205	PASS
AC Power Line Conducted Emission	15.207	ANSI C63.10 2013	Refer to HR/2020/A000205	PASS
Conducted Output Power	15.247 (b)(3)	ANSI C63.10 2013	Refer to HR/2020/A000205	PASS
DTS (6 dB) Bandwidth & 99% Occupied Bandwidth	15.247 (a)(2)	ANSI C63.10 2013	Refer to HR/2020/A000205	PASS
Power Spectral Density	15.247 (e)	ANSI C63.10 2013	Refer to HR/2020/A000205	PASS
Band-edge for RF Conducted Emissions	15.247(d)	ANSI C63.10 2013	Refer to HR/2020/A000205	PASS
RF Conducted Spurious Emissions	15.247(d)	ANSI C63.10 2013	Refer to HR/2020/A000205	PASS
Radiated Spurious Emissions	15.205/15.209	ANSI C63.10 2013	Clause 4.1	PASS
Restricted bands around fundamental frequency (Radiated Emission)	15.205/15.209	ANSI C63.10 2013	Clause 4.2	PASS

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Remark:

This test report (Report No.: SUHR/2021/B001103 issued on 2022/1/17) is based on the original FCC ID with ID number XMR2021SC606TNAD issued on 2022/1/16.

Review this report and original report, this report just changing the parts according to the declaration letter from client.

Considering to the difference, pre-scan were performed on the sample in this report to find the items which can be influential to the result in the original test report for fully retest.

Therefore in this report only radiated spurious emissions were performed based on the worst case of the original FCC ID with ID number XMR2021SC606TNAD issued on 2022/1/16 and other test data in this report are based on the previous FCC ID with ID number XMR2021SC606TNAD issued on 2022/1/16.



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## 3 General Information

### 3.1 Details of Client

Applicant:	Quectel Wireless Solutions Co., Ltd.
Address of Applicant:	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233
Manufacturer:	Quectel Wireless Solutions Co., Ltd.
Address of Manufacturer:	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233

### 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:

**• A2LA (Certificate No. 6336.01)**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

**• Innovation, Science and Economic Development Canada**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

**• FCC –Designation Number: CN1312**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number:0031225543

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### 3.4 General Description of EUT

EUT Description:	LTE Module		
Model No.:	SC606T-NAD		
Trade Mark:	Quectel		
Hardware Version:	R1.0		
Software Version:	SC606TNADNAR09A01		
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 V4.2		
Modulation Type:	GFSK		
Number of Channel:	40		
Rates Type:	<input checked="" type="checkbox"/> Provided by applicant 1M PHY		
Sample Type:	<input type="checkbox"/> Portable Device, <input checked="" type="checkbox"/> Module		
Antenna Type:	<input checked="" type="checkbox"/> External, <input type="checkbox"/> Integrated		
Antenna Gain*:	<input checked="" type="checkbox"/> Provided by applicant 5.0dBi		
RF Cable*:	<input checked="" type="checkbox"/> Provided by applicant 0.5dB(0.6~1GHz)      0.8dB(1.4~2GHz)      1.0dB(2.1~2.7GHz) 1.5dB(3~4GHz)      1.8dB(4.4~6GHz)		
Remark:	*Since the above data and/or information is provided by the applicant 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	3.85
LTNV	-35	3.85
HTNV	65	3.85

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 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:

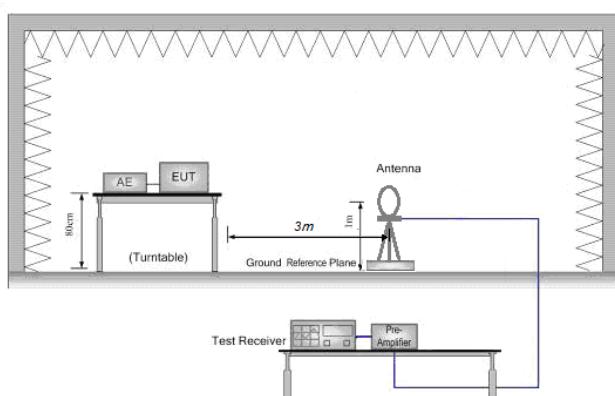


Figure 1. Below 30MHz

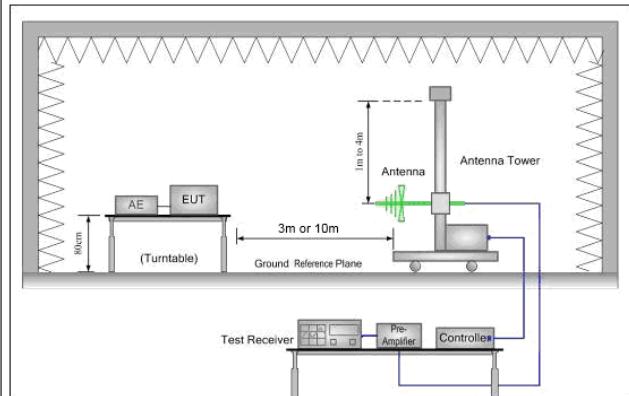


Figure 2. 30MHz to 1GHz

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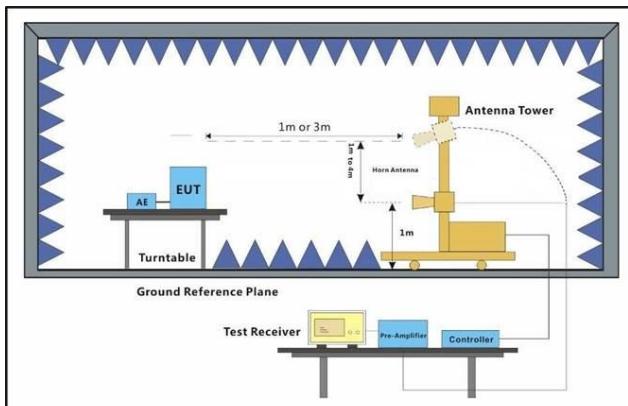


Figure 3. Above 1 GHz

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(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>
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 <math>\geq</math> 3 MHz</li> </ul>

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	<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 = 10 Hz, when duty cycle is no less than 98 percent.</li> <li>VBW <math>\geq 1/T</math>, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.</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.
Instruments Used:	Refer to section 6 for details
Test Results:	Pass
The detailed test data see: <b>Appendix</b>	

Remark: Through pre-scan, The disturbance between 9KHz to 30MHz and below 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. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported .



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## 4.2 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:

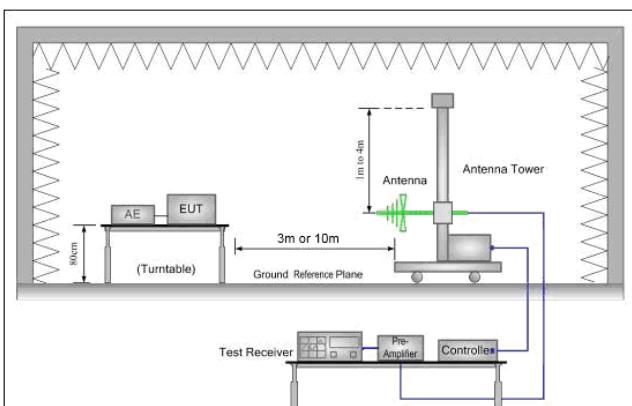


Figure 1. 30MHz to 1GHz

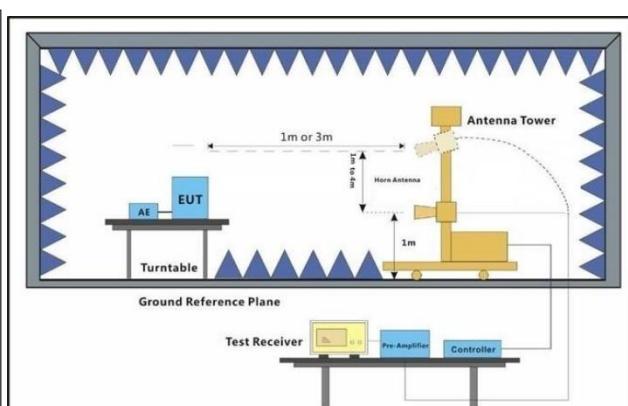


Figure 2. Above 1 GHz

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 <math>\geq</math> 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 = 10 Hz, when duty cycle is no less than 98 percent.</li><li>• VBW <math>\geq</math> 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.</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. Only the worst case is recorded in the report.
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	Radiated Emission	± 3.13dB (9kHz - 30MHz)
		± 4.8dB (30MHz - 1GHz)
		± 4.8dB (1GHz to 18GHz)
		± 4.8dB (Above 18GHz)

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## 6 Equipment List

RSE Test Equipment					
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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## 7 Photographs - EUT Constructional Details

Refer to Appendix A.2 WLAN Setup Photos.



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# Appendix



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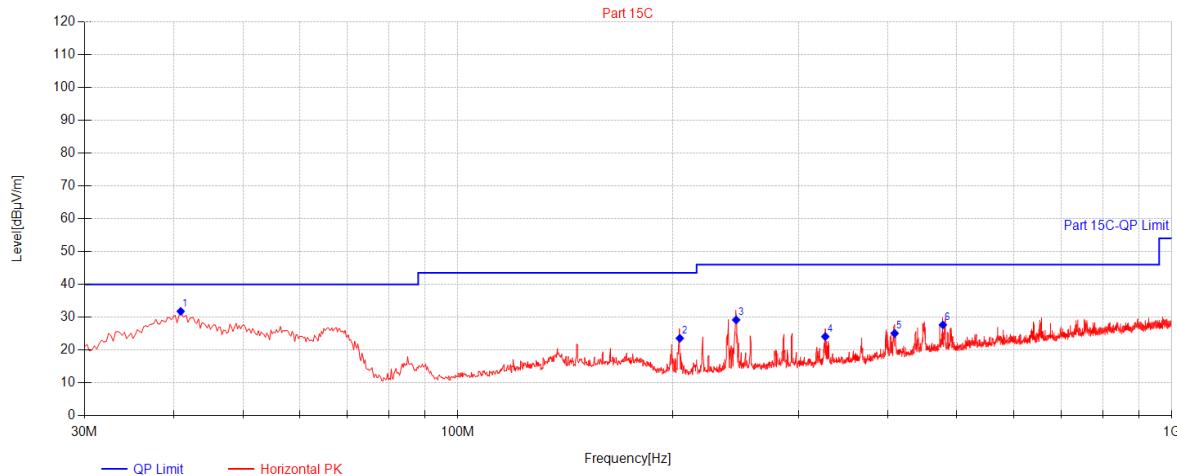
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## Test on the worst case: Radiated Spurious Emissions

### Radiated emission below 1GHz

#### 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	40.9125	54.02	-22.26	31.76	40.00	8.24	104	58	Horizontal
2	204.6	48.59	-25.04	23.55	43.50	19.95	123	74	Horizontal
3	245.34	52.36	-23.20	29.16	46.00	16.84	154	271	Horizontal
4	327.0625	45.11	-21.05	24.06	46.00	21.94	102	109	Horizontal
5	409.0275	43.15	-18.10	25.05	46.00	20.95	178	58	Horizontal
6	477.8975	43.98	-16.34	27.64	46.00	18.36	115	105	Horizontal

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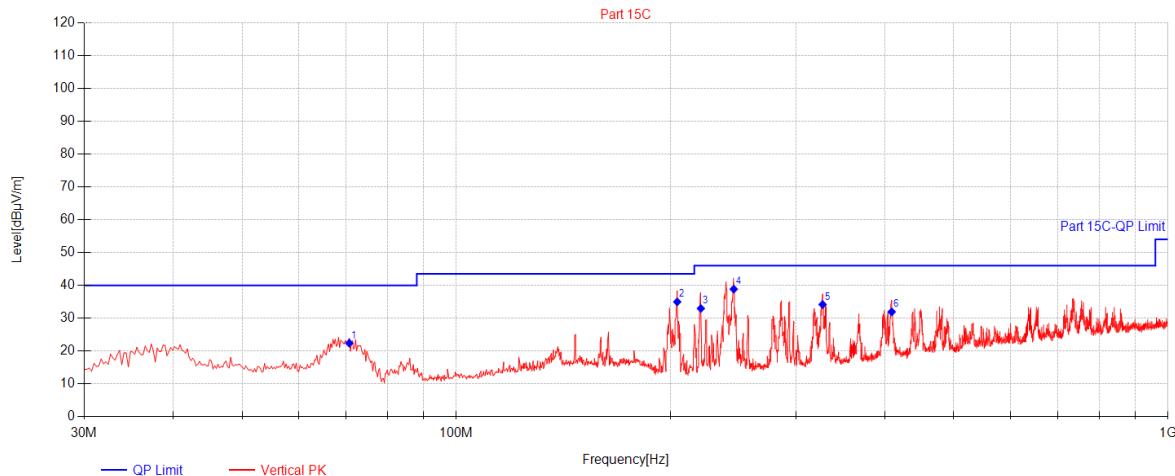


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Final Data List									
NO.	Frequency [MHz]	Reading [dBμV]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	70.74	48.11	-25.75	22.36	40.00	17.64	176	105	Vertical
2	204.3575	60.01	-25.05	34.96	43.50	8.54	192	174	Vertical
3	220.605	57.23	-24.28	32.95	46.00	13.05	104	162	Vertical
4	245.34	62.05	-23.20	38.85	46.00	7.15	131	152	Vertical
5	327.0625	55.21	-21.05	34.16	46.00	11.84	177	0	Vertical
6	409.0275	50.01	-18.10	31.91	46.00	14.09	128	146	Vertical

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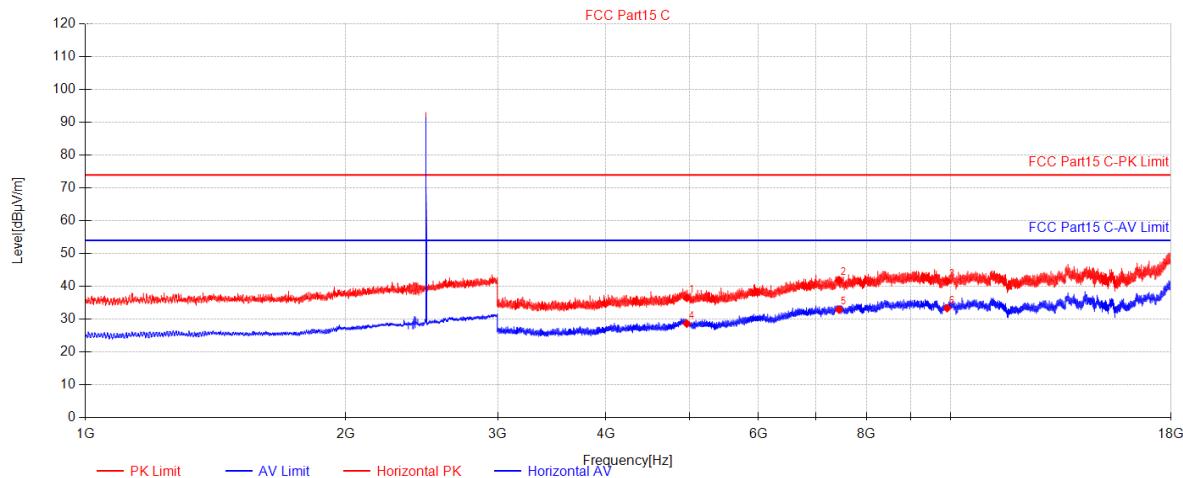


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## Transmitter emission above 1GHz

## BLE\_Channel 39



## Final Data List

Final Data List									
NO.	Frequency [MHz]	Reading [dB $\mu$ V]	Factor [dB]	Level [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	4960	49.34	-12.83	36.51	74.00	37.49	221	277	Horizontal
2	7440	48.70	-6.83	41.87	74.00	32.13	158	177	Horizontal
3	9920	42.44	-0.93	41.51	74.00	32.49	226	277	Horizontal
4	4960	41.46	-12.83	28.63	54.00	25.37	125	358	Horizontal
5	7440	39.74	-6.83	32.91	54.00	21.09	196	360	Horizontal
6	9920	34.29	-0.93	33.36	54.00	20.64	145	304	Horizontal

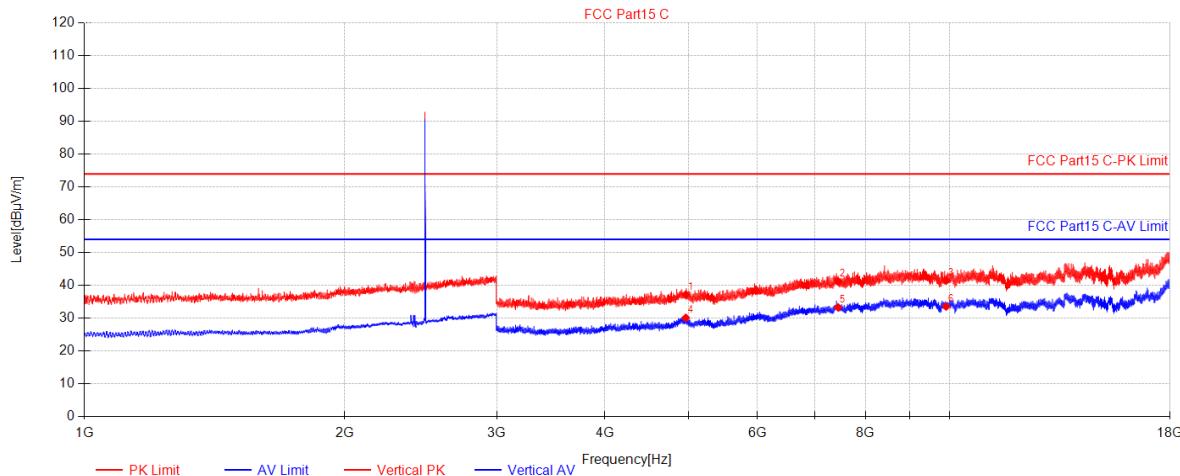
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## BLE\_Channel 39



Final Data List										
NO.	Frequency [MHz]	Reading [dBμV]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	
1	4960	50.02	-12.83	37.19	74.00	36.81	196	52	Vertical	
2	7440	48.02	-6.83	41.19	74.00	32.81	254	279	Vertical	
3	9920	42.46	-0.93	41.53	74.00	32.47	132	360	Vertical	
4	4960	42.92	-12.83	30.09	54.00	23.91	191	254	Vertical	
5	7440	40.10	-6.83	33.27	54.00	20.73	183	153	Vertical	
6	9920	34.48	-0.93	33.55	54.00	20.45	175	358	Vertical	

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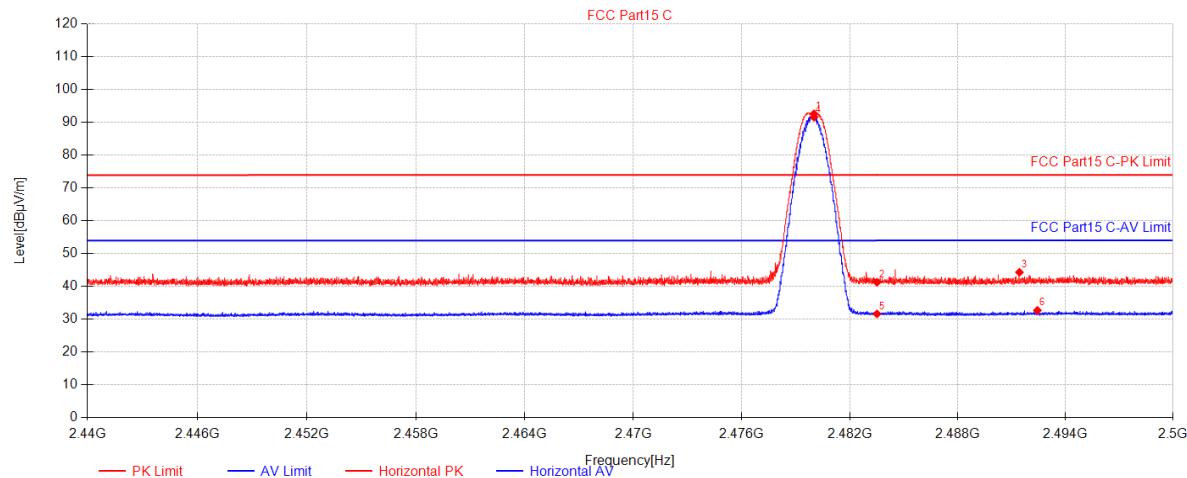


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## Restricted bands around fundamental frequency

### BLE\_Channel 39



Final Data List										
NO.	Frequency [MHz]	Reading [dBμV]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	
1	2480	89.05	3.57	92.62	-	-	115	292	Horizontal	
2	2483.5	37.65	3.60	41.25	74.00	32.75	115	292	Horizontal	
3	2491.4275	40.64	3.65	44.29	74.00	29.71	115	292	Horizontal	
4	2480	88.05	3.57	91.62	-	-	115	292	Horizontal	
5	2483.5	27.99	3.60	31.59	54.00	22.41	115	292	Horizontal	
6	2492.4325	29.02	3.65	32.67	54.00	21.33	115	292	Horizontal	

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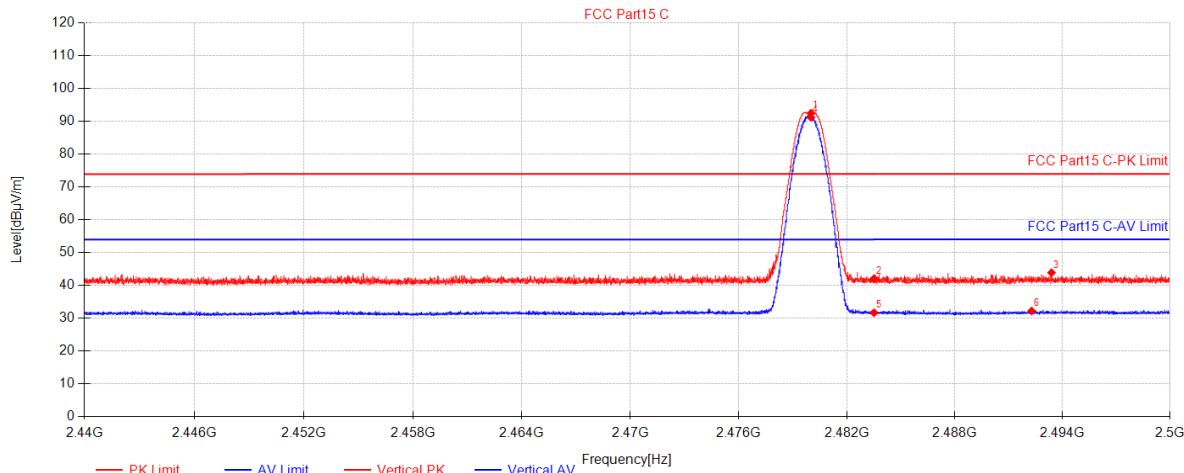
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<b>Final Data List</b>										
NO.	Frequency [MHz]	Reading [dBμV]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	
1	2480	88.92	3.57	92.49	-	-	277	253	Vertical	
2	2483.5	38.47	3.60	42.07	74.00	31.93	277	253	Vertical	
3	2493.385	40.21	3.66	43.87	74.00	30.13	277	253	Vertical	
4	2480	87.64	3.57	91.21	-	-	277	253	Vertical	
5	2483.5	28.04	3.60	31.64	54.00	22.36	277	253	Vertical	
6	2492.275	28.53	3.65	32.18	54.00	21.82	277	253	Vertical	

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The End

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