Report No.: ZR/2021/4001603
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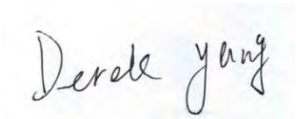
FCC TEST REPORT

Application No.:	ZR/2021/40016
Applicant:	Guangdong OPPO Mobile Telecommunications Corp., Ltd.
Address of Applicant	NO.18 Haibin Road, Wusha Village, Chang'an Town, Dongguan City, Guangdong, China
Manufacturer:	Guangdong OPPO Mobile Telecommunications Corp., Ltd.
Address of Manufacturer	NO.18 Haibin Road, Wusha Village, Chang'an Town, Dongguan City, Guangdong, China
EUT Description:	Mobile Phone
Model No.:	CPH2251
Trade Mark:	OPPO
FCC ID:	R9C-CPH2251
Standards:	47 CFR FCC Part 2, Subpart J 47 CFR Part 15, Subpart C
Date of Receipt:	2021/4/21
Date of Test:	2021/4/21 to 2021/6/4
Date of Issue:	2021/6/10
Test Result :	**PASS ***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:



Derek Yang
Wireless Laboratory Manager

1 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2021-06-10		Original

Authorized for issue by:		
Prepared By		 **(Dee Zheng) / Engineer**
Checked By		 **(Jim Huang) / Reviewer**

2 Test Summary

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

Remark：All test were performed by Lab A and B.
Lab A SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Lab B SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD.

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

Contents

3 General Information

3.1 Details of Client

Applicant:	Guangdong OPPO Mobile Telecommunications Corp., Ltd.
Address of Applicant	NO.18 Haibin Road, Wusha Village, Chang'an Town, Dongguan City, Guangdong, China
Manufacturer:	Guangdong OPPO Mobile Telecommunications Corp., Ltd.
Address of Manufacturer	NO.18 Haibin Road, Wusha Village, Chang'an Town, Dongguan City, Guangdong, China

3.2 Test Location

Lab A:

Company:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Address:	No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
Post code:	518057
Test engineer:	Dee Zheng,Swing Hu,Habit Zeng

Lab B:

Company:	SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD.
Address:	1/F, Unit D, Building 1, Kanghong Orange Technology Park, No.137, Keyuan 3rd Road, Fengdong New City, Xi'an, Shaanxi China
Post code:	710086
Test engineer:	Leah Chen,Ken Liu,Andy Yao

3.3 Test Facility

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

Lab A:

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

Lab B:

A2LA (Certificate No. 4854.01)

SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4854.01.

FCC-Designation Number: CN1271.

3.4 General Description of EUT

EUT Description:	Mobile Phone
Model No.:	CPH2251
Trade Mark:	OPPO
Hardware Version:	11
Software Version:	ColorOS V11.3
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 V5.2
Modulation Type:	GFSK
Number of Channel:	40
Sample Type:	☒ Portable Device, ☐Module
Antenna Type:	☐ External, ☒ Integrated
Antenna Gain:	-3.5dBi

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

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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

3.5 Test Environment

Operating Environment:	
Temperature:	25.0 ˚C
Humidity:	50 % RH
Atmospheric Pressure:	101.30 KPa

3.6 Description of Support Units

The EUT has been tested independent unit.

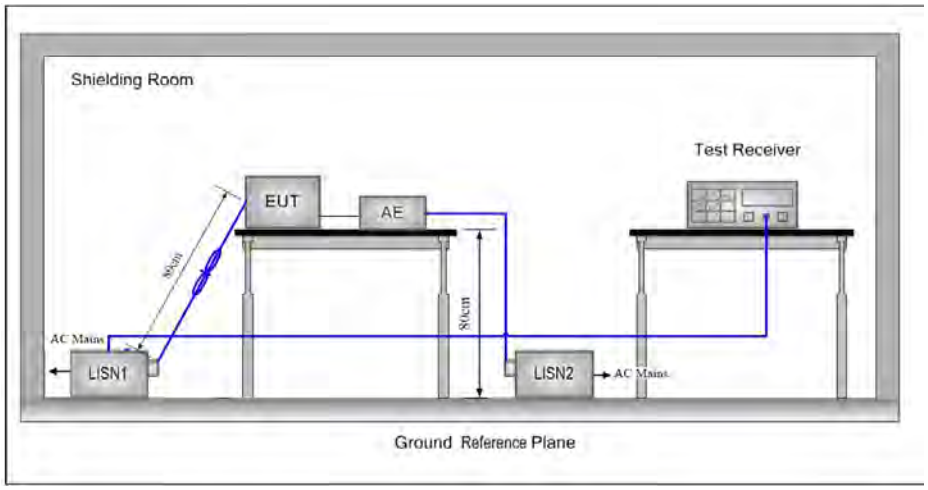
4 Test results and Measurement Data

4.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(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.	
The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -3.5dBi.	

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:	1) The mains terminal disturbance voltage test was conducted in a shielded room. 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. 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. 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. 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.		

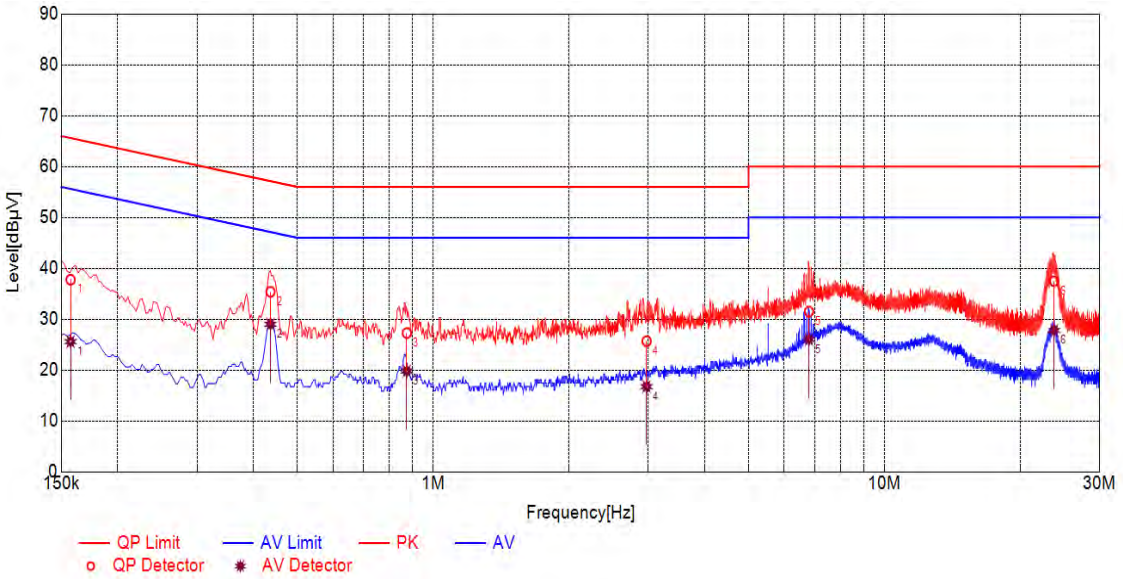
Test Setup:	
Test Mode:	Transmitting with GFSK modulation. Charge +Transmitting mode.
Instruments Used:	Refer to section 6 for details.
Test Results:	Pass

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.

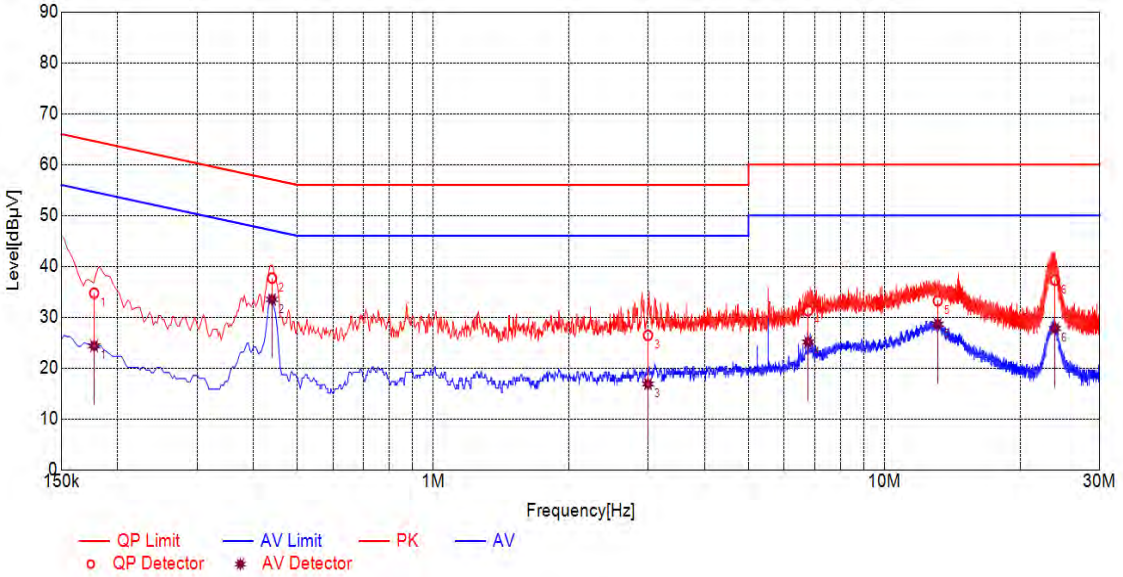
Live Line:



Test Graph

Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.1573	10.10	37.76	65.61	27.85	25.59	55.61	30.02
2	0.4362	10.10	35.39	57.13	21.74	29.02	47.13	18.11
3	0.8744	10.10	27.28	56.00	28.72	19.81	46.00	26.19
4	2.9721	10.10	25.69	56.00	30.31	16.76	46.00	29.24
5	6.8073	10.10	31.49	60.00	28.51	26.00	50.00	24.00
6	23.7822	10.11	37.46	60.00	22.54	27.79	50.00	22.21

Neutral Line:



Test Graph

Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.1774	10.10	34.72	64.61	29.89	24.34	54.61	30.27
2	0.4397	10.10	37.69	57.07	19.38	33.49	47.07	13.58
3	2.9937	10.10	26.44	56.00	29.56	16.87	46.00	29.13
4	6.7776	10.10	31.27	60.00	28.73	25.11	50.00	24.89
5	13.1297	10.11	33.22	60.00	26.78	28.64	50.00	21.36
6	23.9030	10.11	37.29	60.00	22.71	27.79	50.00	22.21

Remark:

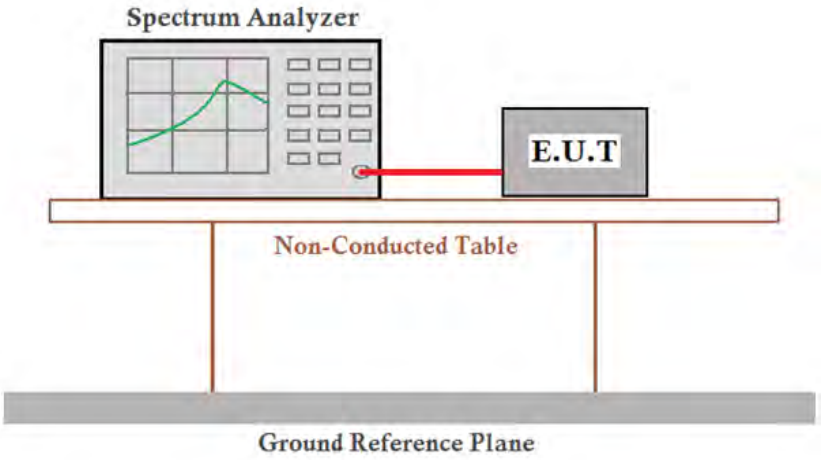
1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

4.3 Duty Cycle

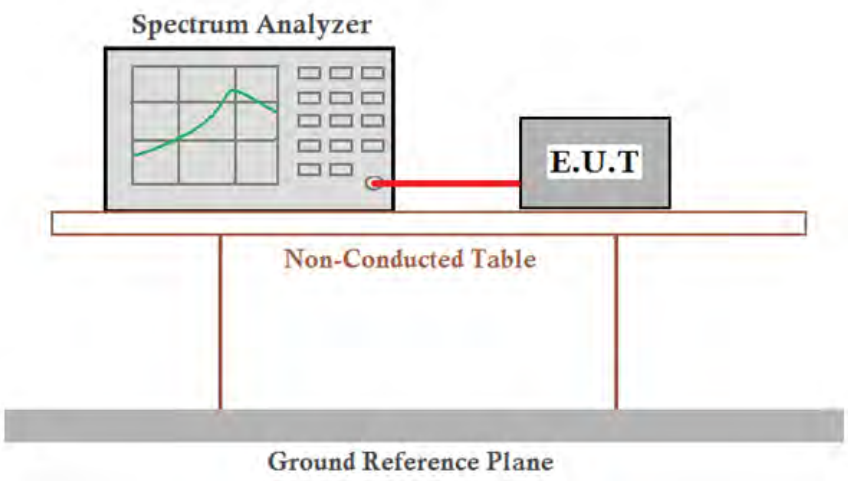
The detailed test data see: **Appendix**

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:	
Test Instruments:	Refer to section 6 for details
Test Mode:	Transmitting with GFSK modulation.
Limit:	30dBm
Test Results:	Pass

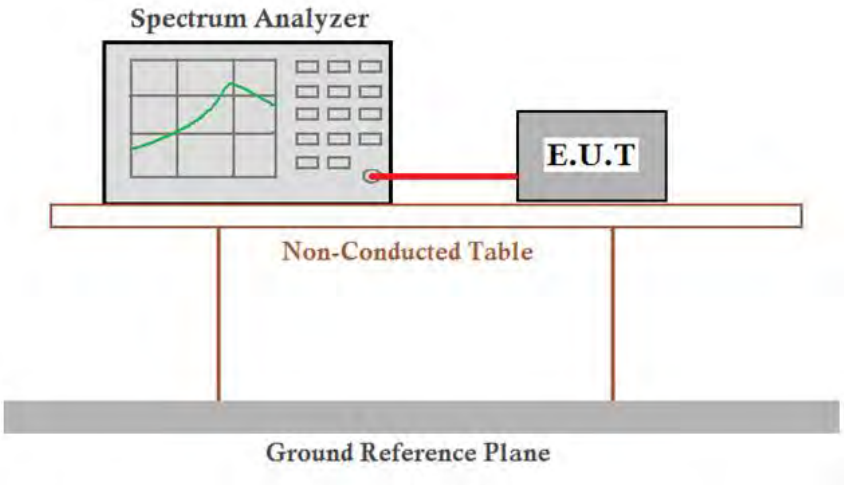
The detailed test data see: **Appendix**

4.5 DTS (6 dB) 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

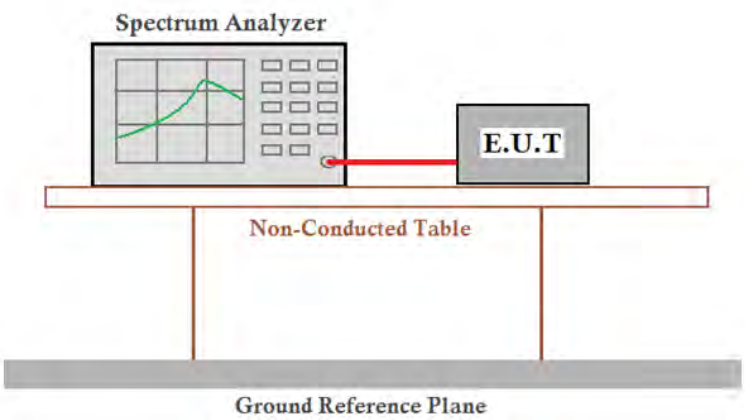
The detailed test data see: **Appendix**

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

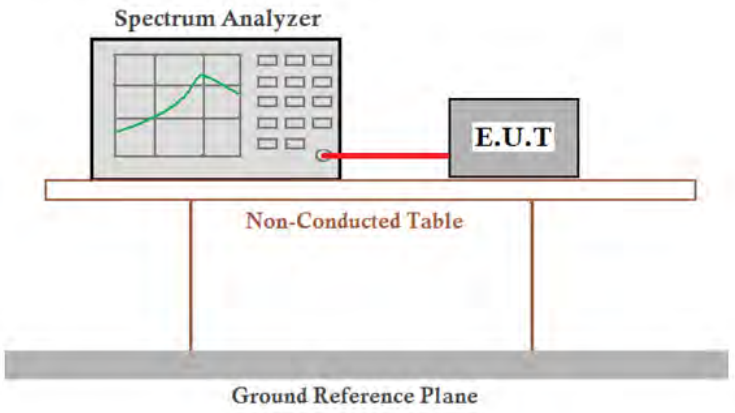
The detailed test data see: **Appendix**

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: **Appendix**

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: **Appendix**

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)				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
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:	

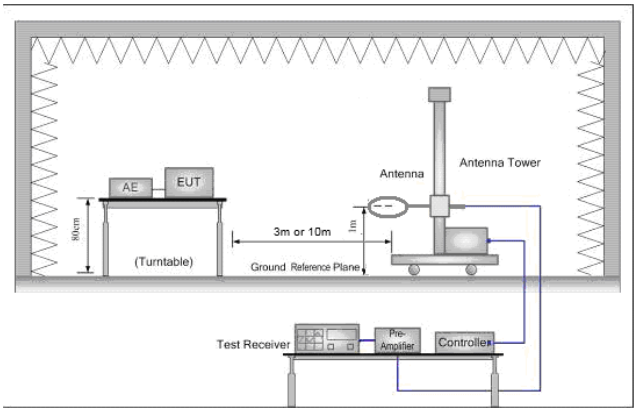


Figure 1. Below 30MHz

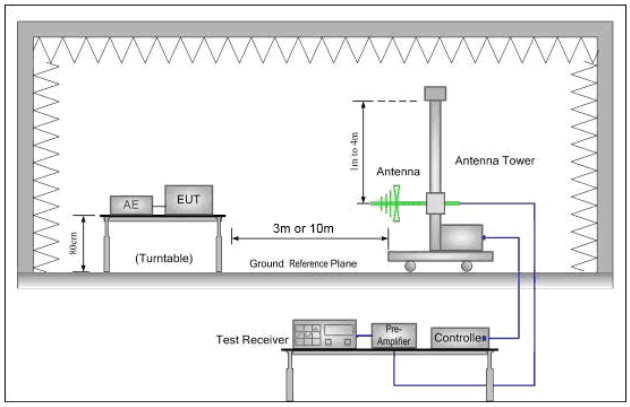


Figure 2. 30MHz to 1GHz

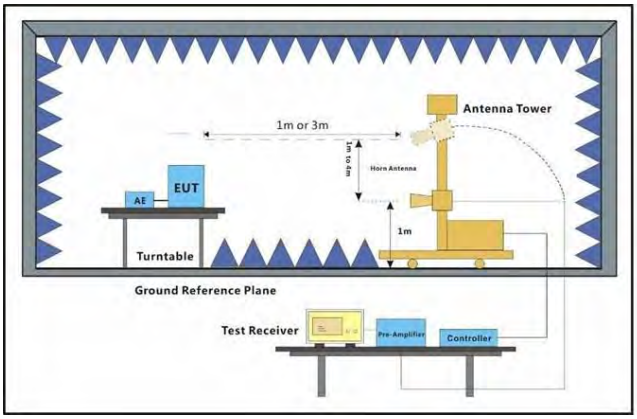


Figure 3. Above 1 GHz

Test Procedure:	a. 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 camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. 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 camber. The table was rotated 360 degrees to determine the position of the highest radiation c. 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. d. 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. e. Use the following spectrum analyzer settings: (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak (3) For average measurement: use duty cycle correction factor method per 15.35(c). Duty cycle = On time/100 milliseconds

	On time = N 1 *L 1 +N 2 *L 2 +...+N n-1 *LN n-1 +N n *L n Where N 1 is number of type 1 pulses, L 1 is length of type 1 pulses, etc. Average Emission Level = Peak Emission Level + 20*log(Duty cycle) f. 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. g. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. h. 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. i. Test the EUT in the lowest channel, the middle channel ,the Highest channel. j. 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. k. Repeat above procedures until all frequencies measured was complete.
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: **Appendix**

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:			

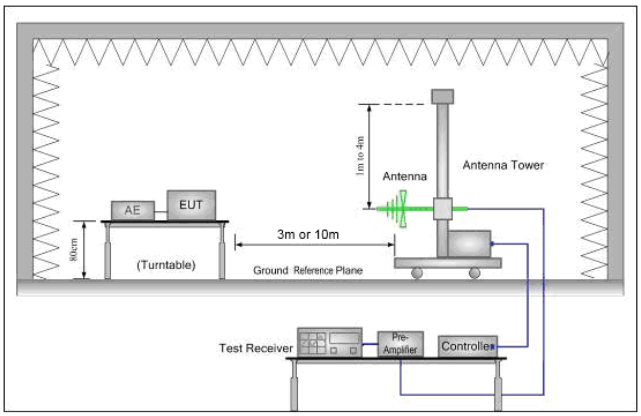


Figure 1. 30MHz to 1GHz

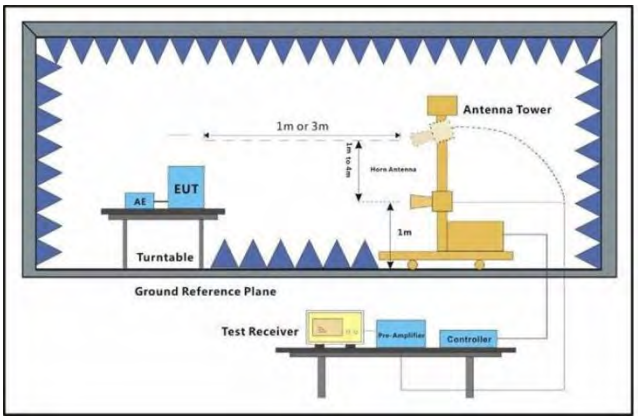


Figure 2. Above 1 GHz

Test Procedure:	a. 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 camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. 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 camber. The table was rotated 360 degrees to determine the position of the highest radiation. c. 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. d. 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. e. 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. f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. g. Place a marker at the end of the restricted band closest to the transmit 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 h. Test the EUT in the lowest channel , the Highest channel 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. j. Repeat above procedures until all frequencies measured was complete.
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: **Appendix**

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

Lab A:

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.41dB
2	RF power density, conducted	±1.96dB
3	Spurious emissions, conducted	±0.41dB
4	Radio Frequency	$\pm 7.10 \times 10^{-8}$
5	Duty Cycle	±0.49%
6	Occupied Bandwidth	±0.2%

Lab B:

No.	Item	Measurement Uncertainty
1	Conduction Emission	± 3.0dB (150kHz to 30MHz)
2	Radiated Emission	± 4.8dB (Below 1GHz)
		± 4.8dB (1GHz to 6GHz)
		± 4.5dB (6GHz to 18GHz)
		± 5.02dB (Above 18GHz)

6 Equipment List

RF conducted					
Test Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (yyyy-mm-dd)**	**Cal. Due date (yyyy-mm-dd)**
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2020/4/16	2021/4/15
				2021/4/14	2022/4/13
DC Power Supply	Rohde & Schwarz	HMP2020	W009-08	2020/7/15	2021/7/15
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2020/7/14	2021/7/13
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	HTC-1	W006-17	2020/4/21	2021/4/20
				2021/4/14	2022/4/13

CE Test System					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Shielding Room	Brilliant-emc	N/A	XAW03-35-01	2019-09-11	2022-09-10
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-01	2020-09-11	2021-09-10
Artificial network	ROHDE&SCHWARZ	ENV216	XAW01-04-01	2020-08-04	2021-08-03
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	2020-11-06	2021-11-05
Measurement Software	Tonscend	TS+ CE V2.5	XAW02-05-02	NCR	NCR

RSE Test System					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Semi-Anechoic Chamber	Brilliant-emc	N/A	XAW03-35-01	2019-09-11	2022-09-10
MXA signal analyzer	Keysight	N9020A	XAW01-06-01	2021-04-01	2022-03-31
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-01	2020-09-11	2021-09-10
Receiving antenna (30MHz-3GHz)	Schwarzbeck	VULB 9163	XAW01-09-01	2019-10-13	2021-10-12
Receiving antenna (1GHz~18GHz)	Schwarzbeck	BBHA 9120D	XAW01-09-02	2019-10-13	2021-10-12
Receiving antenna (15GHz~40GHz)	Schwarzbeck	BBHA 9170	XAW01-09-03	2019-10-13	2021-10-12
Directional antenna rack controller	Max-Full	MF-7802BS	XAW03-03-01	NCR	NCR
High-speed antenna rack controller	Max-Full	MF-7802	XAW03-04-01	NCR	NCR
Filter bank	Tonscend	JS0806-F	XAW03-05-01	NCR	NCR
Filter bank	Tonscend	JS0806s	XAW03-05-02	NCR	NCR
Amplifier	Tonscend	TAP00903040	XAW01-41-01	2020-10-26	2021-10-25
Amplifier	Tonscend	TAP01018048	XAW01-41-02	2020-10-26	2021-10-25
Amplifier	Tonscend	TAP18040048	XAW01-41-03	2020-10-27	2021-10-26
Amplifier	Shanghai Steed	YX28980930	XAW01-41-06	2020-10-26	2021-10-25
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	2020-11-06	2021-11-05
Measurement Software	Tonscend	TS+ RSE V3.0.0.2	XAW02-05-01	NCR	NCR

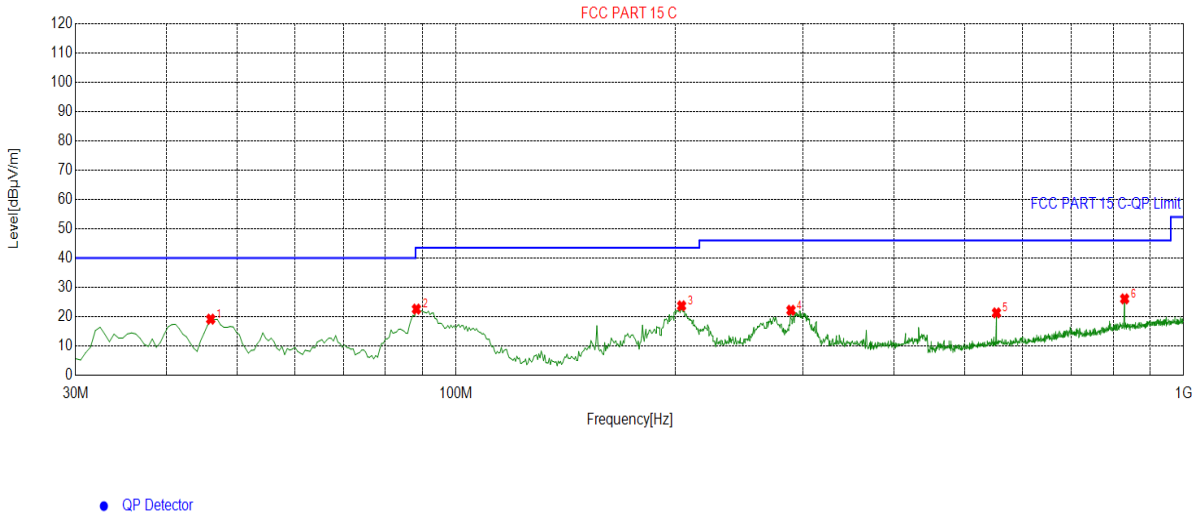
7 Photographs - EUT Constructional Details

Refer to Appendix A Setup Photos.

Appendix

Radiated Spurious Emission

Radiated Emission below 1GHz
Charge + Transmitting BLE 1M
Test Graph

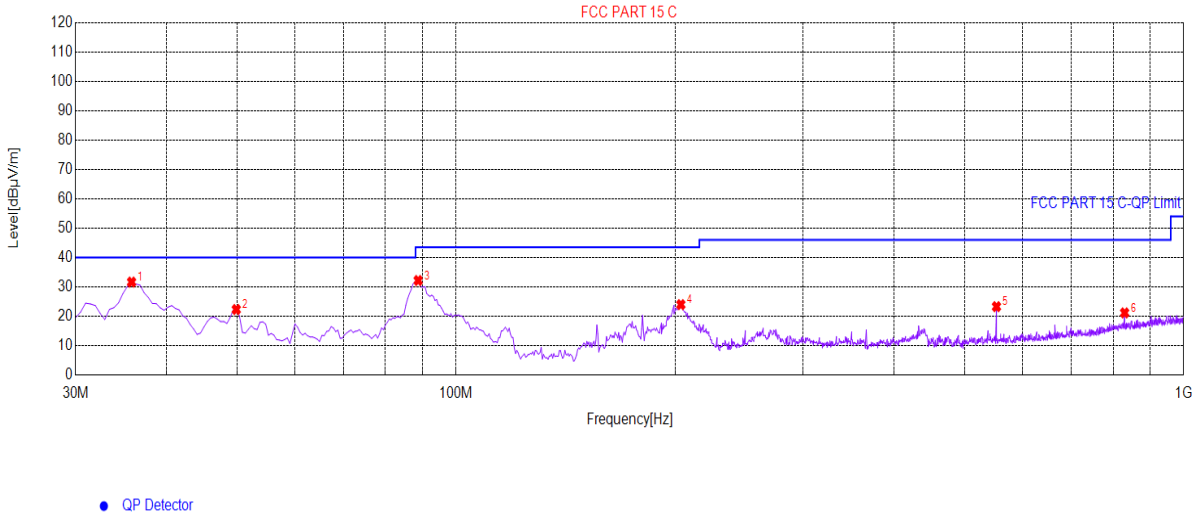


Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	46.0130	19.15	-21.40	40.00	20.85	174	197	Horizontal
2	88.2291	22.57	-24.99	43.50	20.93	165	273	Horizontal
3	204.202	23.69	-22.20	43.50	19.81	184	120	Horizontal
4	288.634	22.17	-19.52	46.00	23.83	169	63	Horizontal
5	553.091	21.28	-13.03	46.00	24.72	188	250	Horizontal
6	829.679	26.07	-8.70	46.00	19.93	196	301	Horizontal

Final Data List

Test Graph



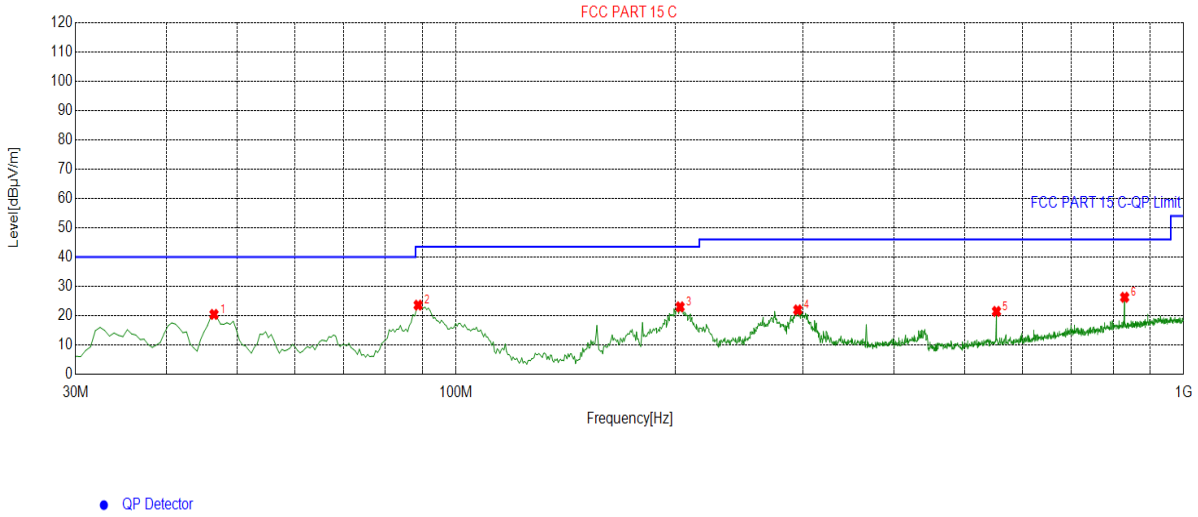
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	35.8229	31.63	-23.68	40.00	8.37	252	2	Vertical
2	49.8949	22.30	-21.36	40.00	17.70	271	340	Vertical
3	88.7144	32.18	-24.85	43.50	11.32	256	75	Vertical
4	203.716	23.97	-22.23	43.50	19.53	248	25	Vertical
5	553.091	23.28	-13.03	46.00	22.72	217	54	Vertical
6	829.679	21.16	-8.70	46.00	24.84	119	4	Vertical

Final Data List

Charge + Transmitting BLE 2M

Test Graph

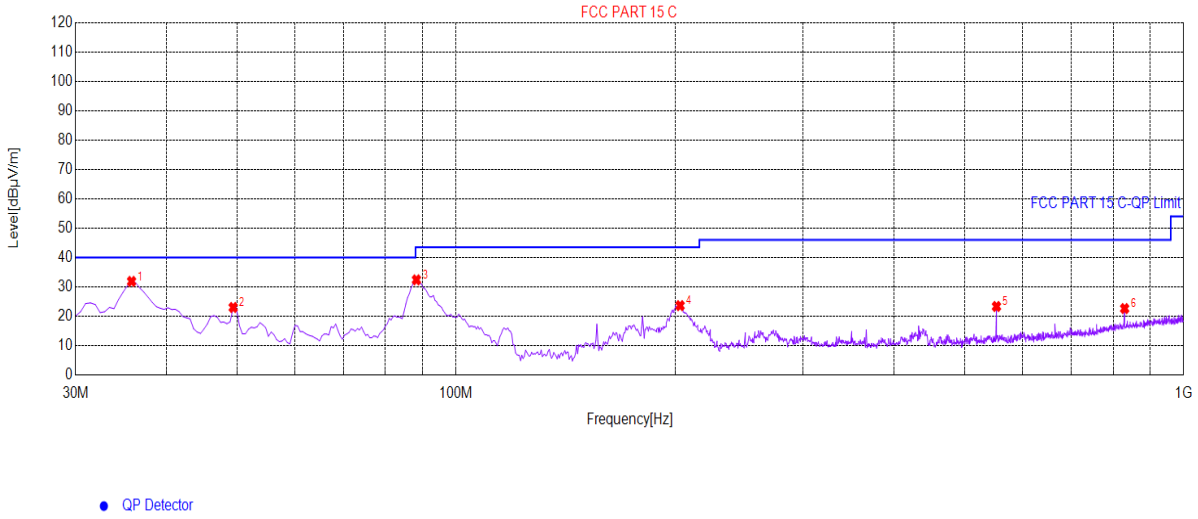


Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	46.4982	20.43	-21.39	40.00	19.57	154	141	Horizontal
2	88.7144	23.58	-24.85	43.50	19.92	174	271	Horizontal
3	203.231	23.00	-22.27	43.50	20.50	165	227	Horizontal
4	294.942	21.95	-19.44	46.00	24.05	184	62	Horizontal
5	553.091	21.45	-13.03	46.00	24.55	184	252	Horizontal
6	829.679	26.26	-8.70	46.00	19.74	176	309	Horizontal

Final Data List

Test Graph



Suspected List

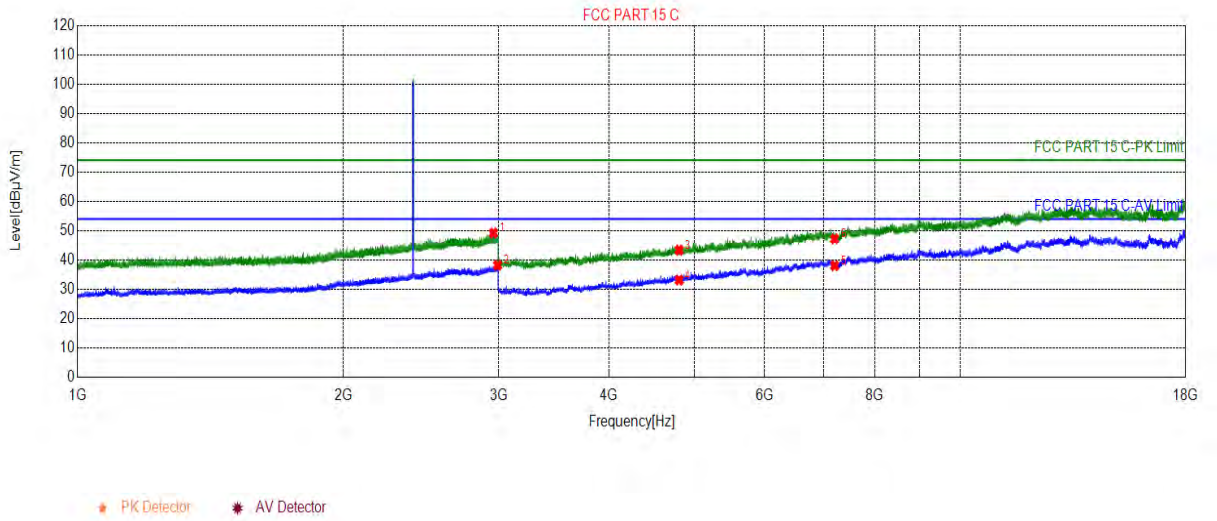
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	35.8229	31.87	-23.68	40.00	8.13	174	2	Vertical
2	49.4097	23.00	-21.37	40.00	17.00	195	311	Vertical
3	88.2291	32.39	-24.99	43.50	11.11	146	91	Vertical
4	203.231	23.62	-22.27	43.50	19.88	185	230	Vertical
5	553.091	23.33	-13.03	46.00	22.67	192	40	Vertical
6	829.679	22.63	-8.70	46.00	23.37	184	356	Vertical

Final Data List

Transmitter Emission above 1GHz

BLE 1M_Channel CH0

Test Graph



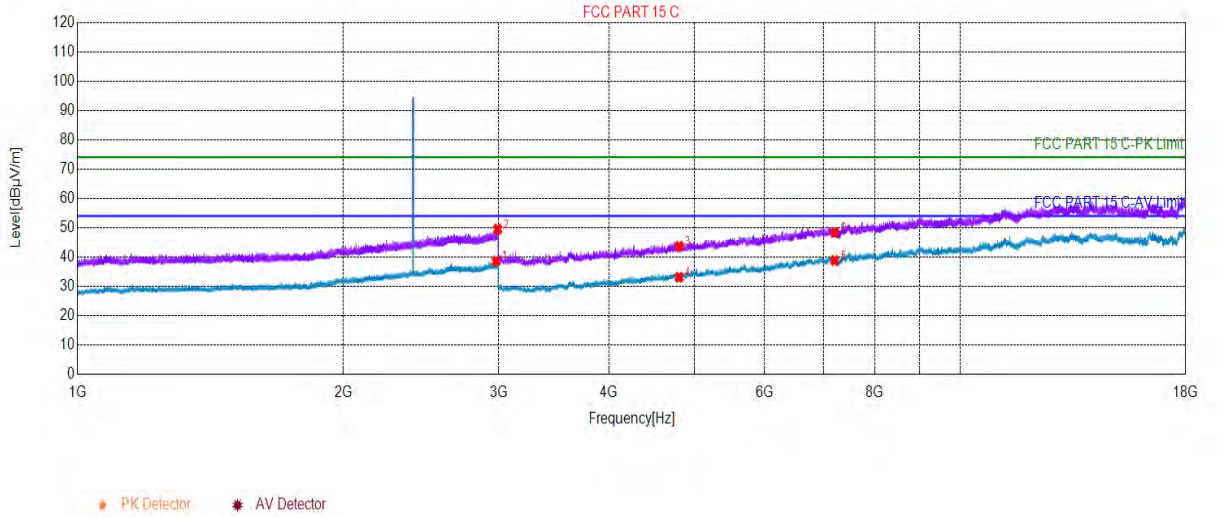
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2958.99	49.22	10.52	74.00	24.78	125	320	Horizontal
2	2991.69	38.20	10.54	54.00	15.80	173	297	Horizontal
3	4804.00	43.39	-15.41	74.00	30.61	155	342	Horizontal
4	4804.00	33.14	-15.41	54.00	20.86	189	45	Horizontal
5	7206.00	38.05	-8.59	54.00	15.95	201	88	Horizontal
6	7206.00	47.22	-8.59	74.00	26.78	236	98	Horizontal

Final Data List

BLE 1M _Channel CH0

Test Graph



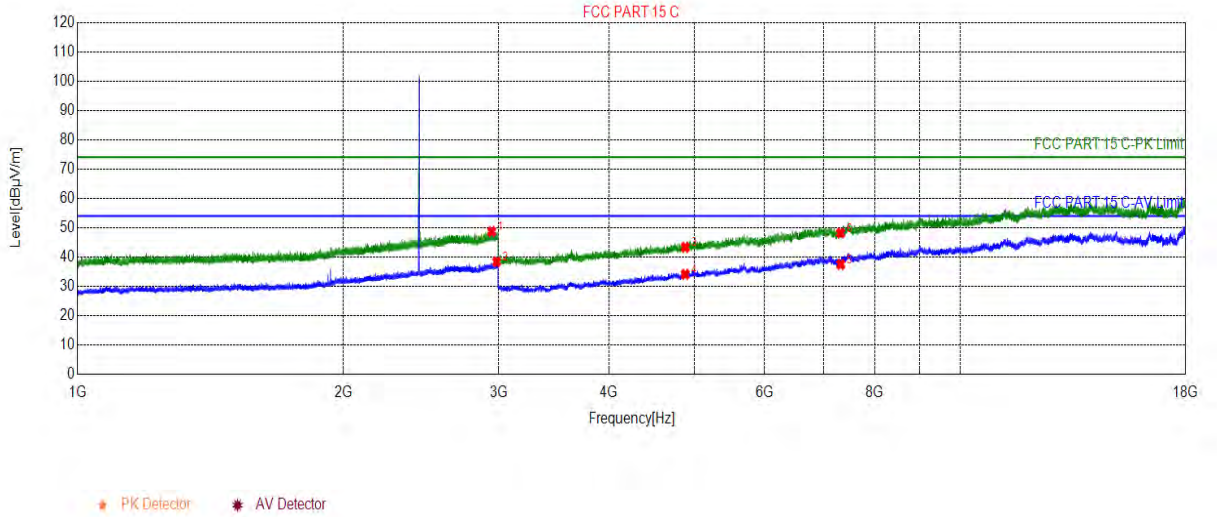
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2979.89	38.54	10.55	54.00	15.46	158	99	Vertical
2	2991.49	49.48	10.54	74.00	24.52	169	266	Vertical
3	4804.00	43.61	-15.41	74.00	30.39	179	165	Vertical
4	4804.00	33.09	-15.41	54.00	20.91	203	298	Vertical
5	7206.00	38.80	-8.59	54.00	15.20	216	148	Vertical
6	7206.00	48.32	-8.59	74.00	25.68	321	70	Vertical

Final Data List

BLE 1M _Channel CH19

Test Graph



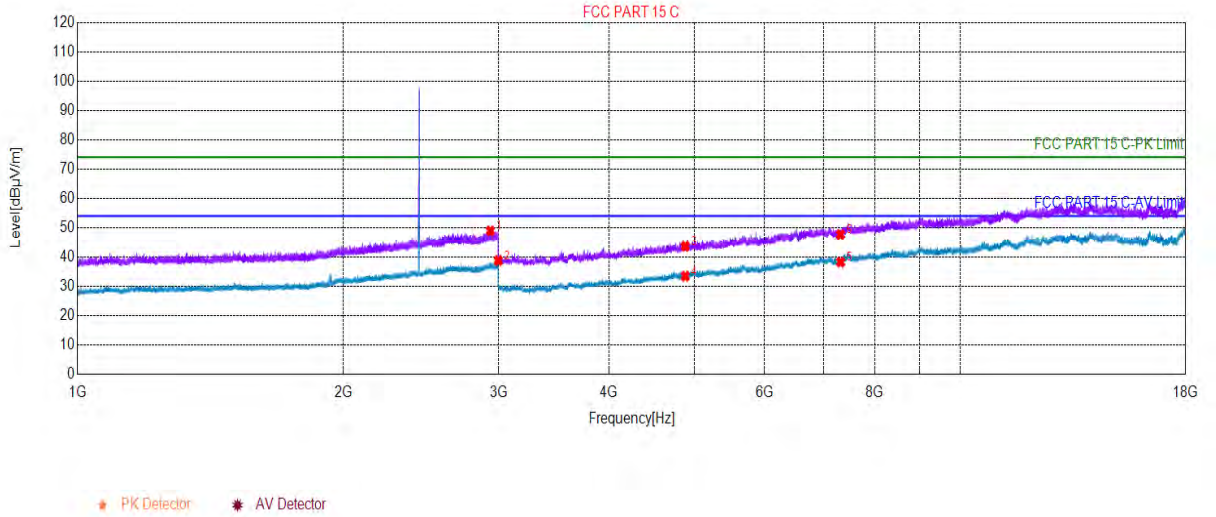
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2945.99	48.70	10.54	74.00	25.30	158	224	Horizontal
2	2984.39	38.38	10.52	54.00	15.62	198	262	Horizontal
3	4880.00	43.32	-15.07	74.00	30.68	173	298	Horizontal
4	4880.00	34.09	-15.07	54.00	19.91	201	52	Horizontal
5	7320.00	37.49	-8.63	54.00	16.51	234	191	Horizontal
6	7320.00	48.16	-8.63	74.00	25.84	258	70	Horizontal

Final Data List

BLE 1M _Channel CH19

Test Graph



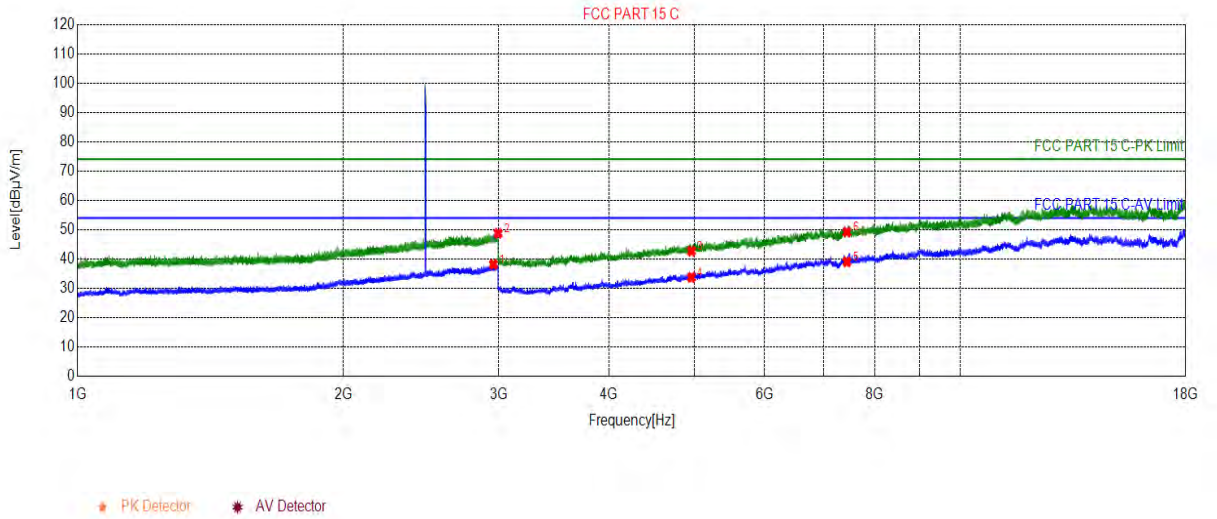
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2935.39	48.93	10.53	74.00	25.07	158	176	Vertical
2	2996.89	38.77	10.71	54.00	15.23	169	31	Vertical
3	4880.00	43.68	-15.07	74.00	30.32	205	10	Vertical
4	4880.00	33.46	-15.07	54.00	20.54	285	254	Vertical
5	7320.00	38.25	-8.63	54.00	15.75	291	185	Vertical
6	7320.00	47.64	-8.63	74.00	26.36	311	254	Vertical

Final Data List

BLE 1M _Channel CH39

Test Graph



Suspected List

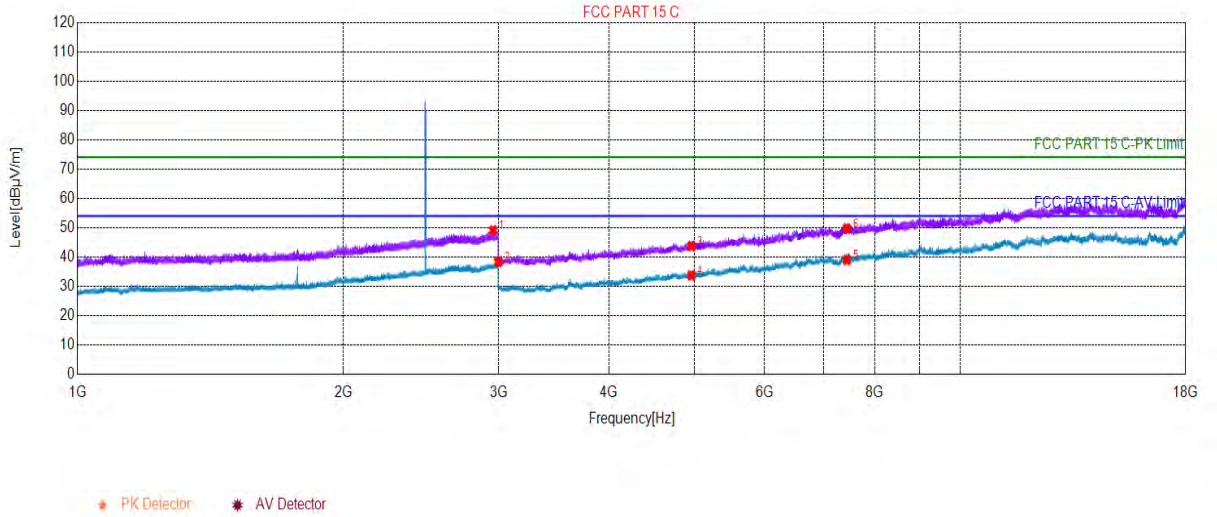
Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2958.89	38.17	10.52	54.00	15.83	158	47	Horizontal
2	2995.19	48.74	10.66	74.00	25.26	219	274	Horizontal
3	4960.00	42.68	-14.40	74.00	31.32	315	53	Horizontal
4	4960.00	33.72	-14.40	54.00	20.28	254	149	Horizontal
5	7440.00	39.02	-7.31	54.00	14.98	125	52	Horizontal
6	7440.00	49.19	-7.31	74.00	24.81	215	333	Horizontal

Final Data List

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

BLE 1M _Channel CH39

Test Graph



Suspected List

Suspected List								
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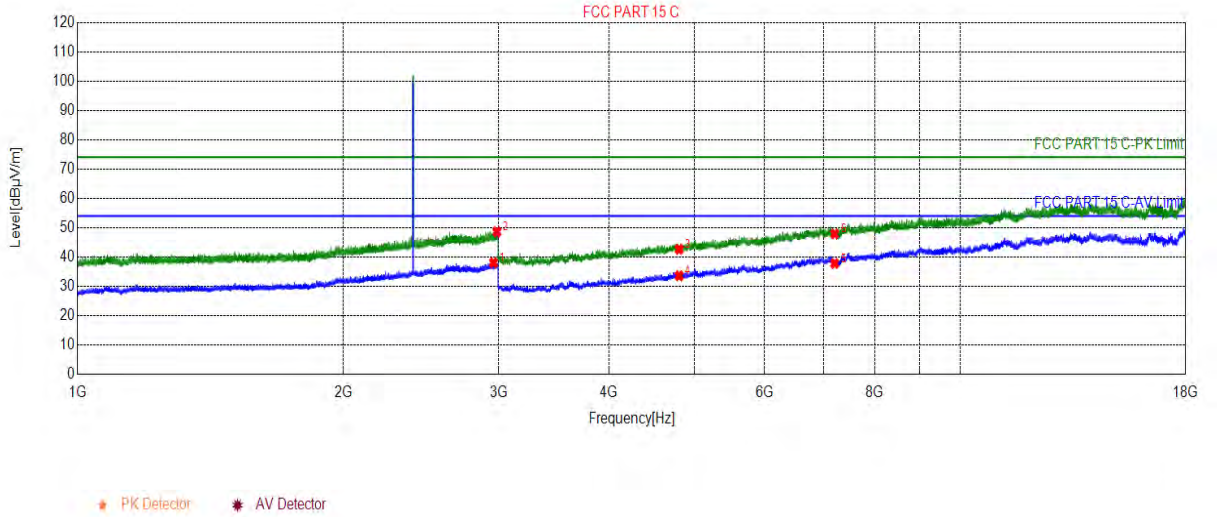
1	2956.39	49.04	10.53	74.00	24.96	198	123	Vertical
2	2996.79	38.29	10.71	54.00	15.71	325	176	Vertical
3	4960.00	43.69	-14.40	74.00	30.31	215	150	Vertical
4	4960.00	33.70	-14.40	54.00	20.30	255	228	Vertical
5	7440.00	39.00	-7.31	54.00	15.00	348	107	Vertical
6	7440.00	49.69	-7.31	74.00	24.31	185	237	Vertical

Final Data List

BLE 2M _Channel CH0

Test Graph



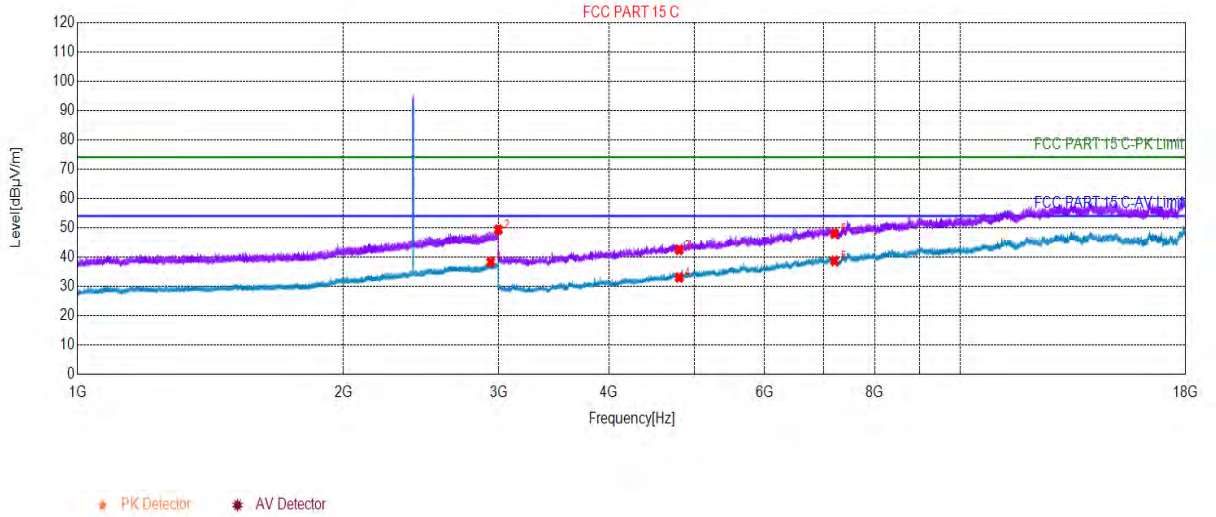
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2959.49	38.03	10.52	54.00	15.97	158	320	Horizontal
2	2985.79	48.60	10.51	74.00	25.40	215	122	Horizontal
3	4804.00	42.62	-15.41	74.00	31.38	258	2	Horizontal
4	4804.00	33.60	-15.41	54.00	20.40	234	342	Horizontal
5	7206.00	37.79	-8.59	54.00	16.21	154	19	Horizontal
6	7206.00	47.88	-8.59	74.00	26.12	385	307	Horizontal

Final Data List

BLE 2M _Channel CH0

Test Graph



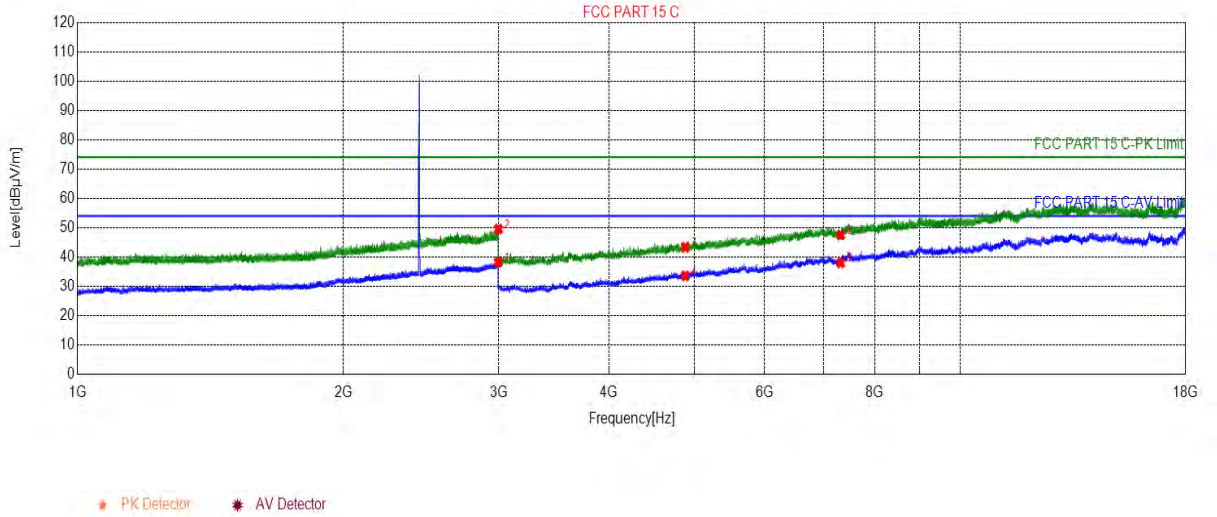
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2938.19	38.28	10.51	54.00	15.72	218	360	Vertical
2	2997.09	49.31	10.72	74.00	24.69	158	281	Vertical
3	4804.00	42.46	-15.41	74.00	31.54	169	0	Vertical
4	4804.00	33.01	-15.41	54.00	20.99	348	71	Vertical
5	7206.00	38.67	-8.59	54.00	15.33	254	80	Vertical
6	7206.00	47.98	-8.59	74.00	26.02	209	89	Vertical

Final Data List

BLE 2M _Channel CH19

Test Graph



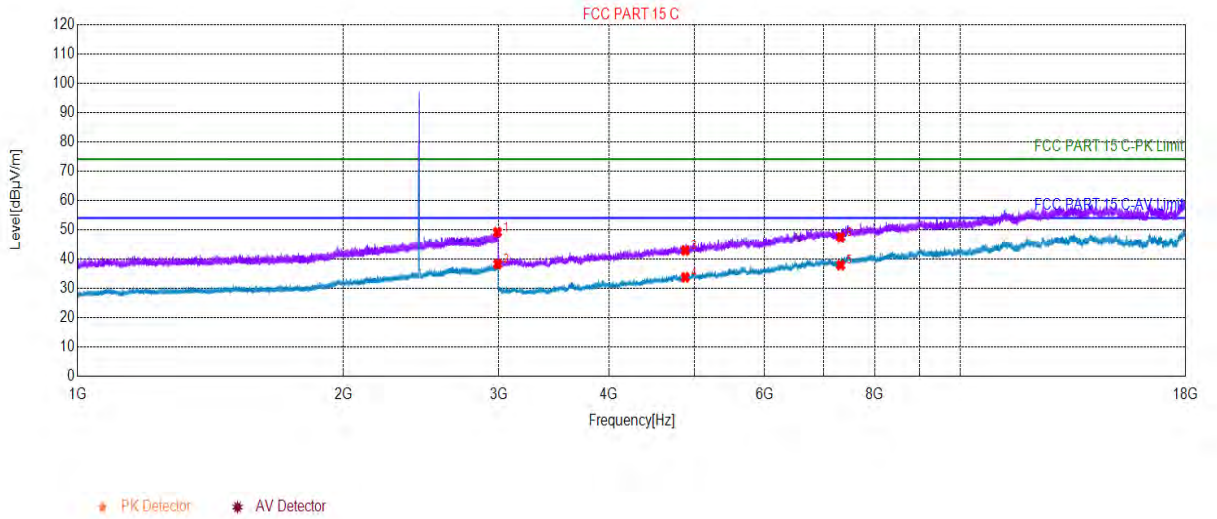
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2996.59	38.18	10.70	54.00	15.82	159	36	Horizontal
2	2997.79	49.50	10.74	74.00	24.50	147	254	Horizontal
3	4880.00	43.32	-15.07	74.00	30.68	168	342	Horizontal
4	4880.00	33.52	-15.07	54.00	20.48	258	209	Horizontal
5	7320.00	38.00	-8.63	54.00	16.00	234	126	Horizontal
6	7320.00	47.41	-8.63	74.00	26.59	269	117	Horizontal

Final Data List

BLE 2M _Channel CH19

Test Graph



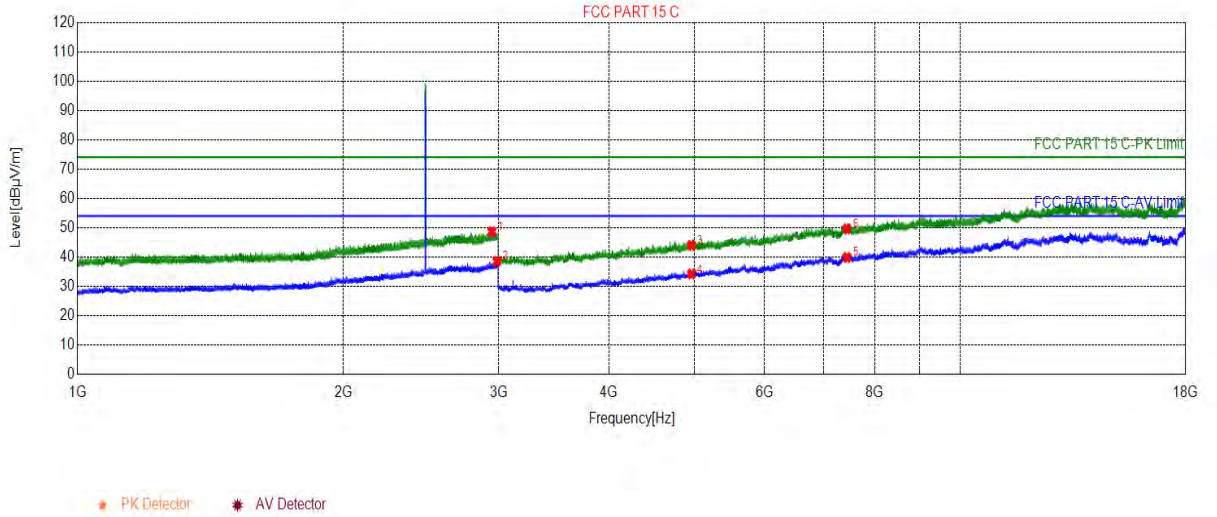
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2990.29	49.14	10.50	74.00	24.86	158	206	Vertical
2	2991.99	38.27	10.55	54.00	15.73	195	259	Vertical
3	4880.00	42.89	-15.07	74.00	31.11	167	158	Vertical
4	4880.00	33.75	-15.07	54.00	20.25	254	150	Vertical
5	7320.00	37.90	-8.63	54.00	16.10	214	194	Vertical
6	7320.00	47.39	-8.63	74.00	26.61	234	307	Vertical

Final Data List

BLE 2M _Channel CH39

Test Graph



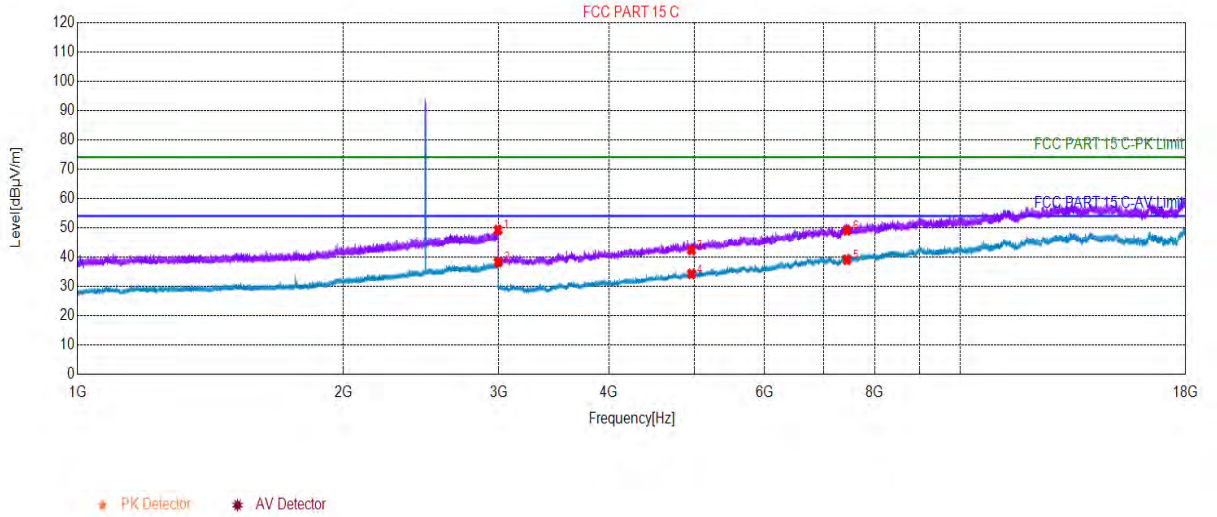
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2947.29	48.62	10.55	74.00	25.38	175	74	Horizontal
2	2987.29	38.56	10.50	54.00	15.44	165	174	Horizontal
3	4960.00	43.99	-14.40	74.00	30.01	189	4	Horizontal
4	4960.00	34.19	-14.40	54.00	19.81	179	197	Horizontal
5	7440.00	39.87	-7.31	54.00	14.13	167	161	Horizontal
6	7440.00	49.57	-7.31	74.00	24.43	145	237	Horizontal

Final Data List

BLE 2M _Channel CH39

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2994.39	49.20	10.63	74.00	24.80	214	296	Vertical
2	2995.69	38.21	10.67	54.00	15.79	198	175	Vertical
3	4960.00	42.37	-14.40	74.00	31.63	175	227	Vertical
4	4960.00	34.18	-14.40	54.00	19.82	234	88	Vertical
5	7440.00	39.02	-7.31	54.00	14.98	208	201	Vertical
6	7440.00	49.07	-7.31	74.00	24.93	227	332	Vertical

Final Data List

Remark:

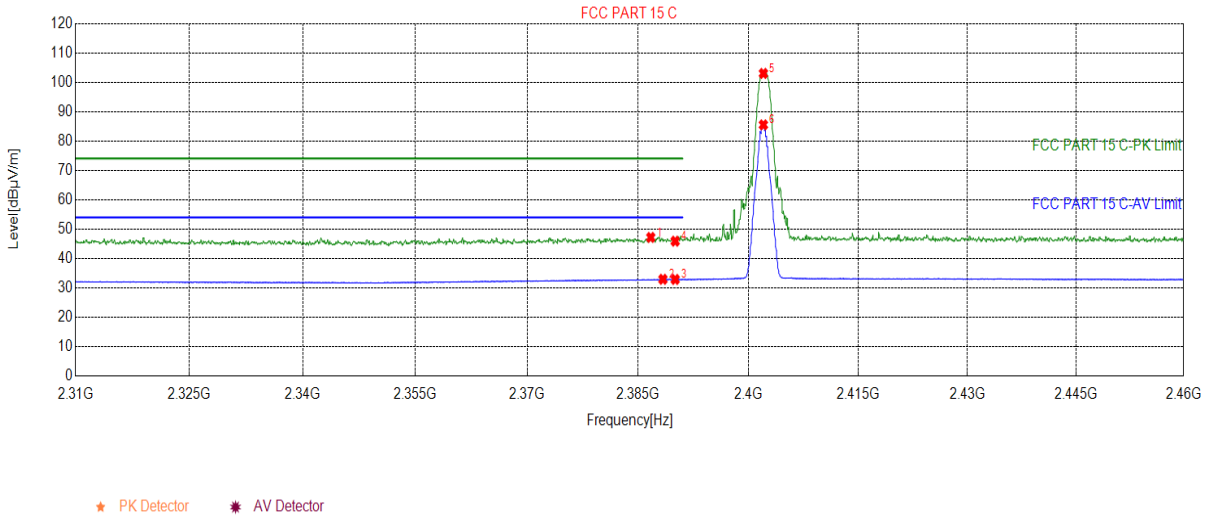
1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
   Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
2) Scan from 9kHz to 25GHz, the disturbance between 9KHz to 30MHz was very low, and the above harmonics were the highest point could be found when testing, The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.
4) All Modes have been tested, but only the worst case data displayed in this report.

Restricted bands around fundamental frequency

Test plots

BLE 1M_Channel 0

Test Graph



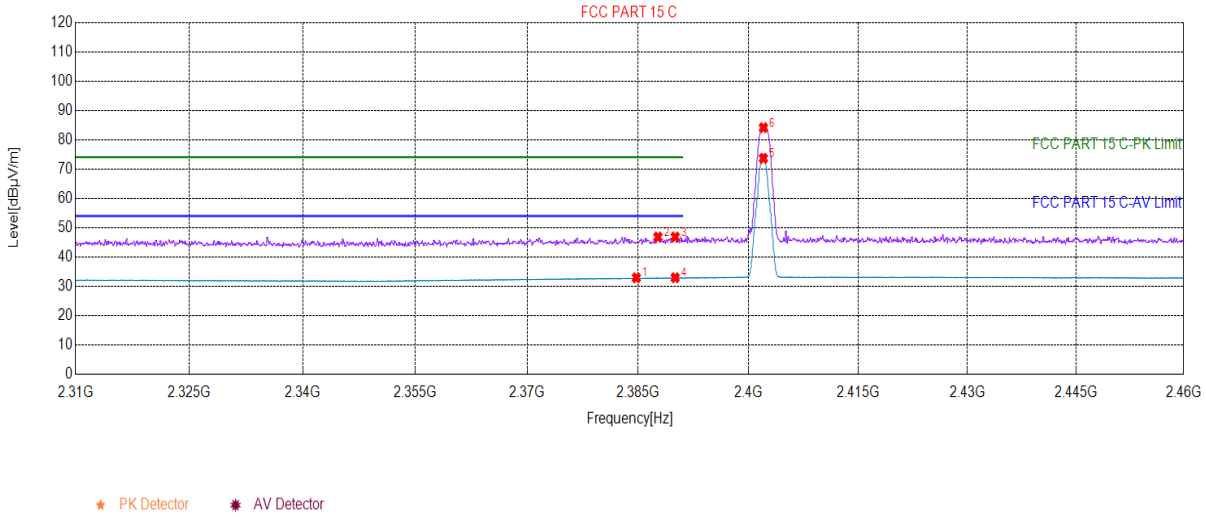
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2386.68	47.18	9.51	74.00	26.82	158	30	Horizontal
2	2388.33	32.92	9.56	54.00	21.08	234	40	Horizontal
3	2390.00	32.88	9.60	54.00	21.12	348	60	Horizontal
4	2390.00	45.89	9.60	74.00	28.11	162	245	Horizontal
5	2402.00	102.99	9.87	0.00	-102.99	176	137	Horizontal
6	2402.00	85.49	9.87	0.00	-85.49	282	351	Horizontal

Final Data List

BLE 1M Channel0

Test Graph



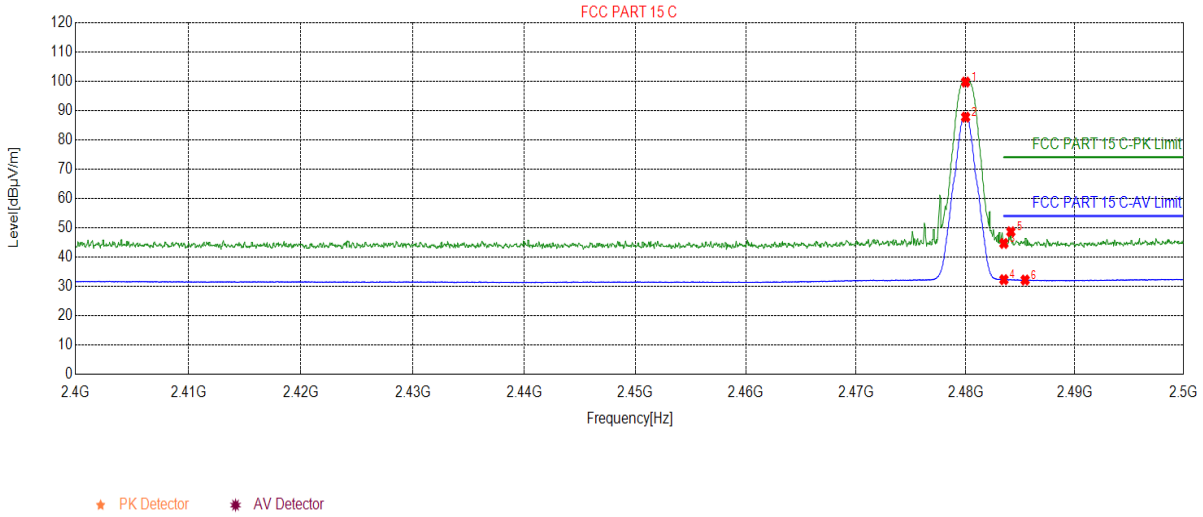
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2384.73	32.89	9.46	54.00	21.11	123	158	Vertical
2	2387.66	46.80	9.54	74.00	27.20	154	167	Vertical
3	2390.00	46.83	9.60	74.00	27.17	167	193	Vertical
4	2390.00	32.93	9.60	54.00	21.07	191	245	Vertical
5	2402.00	73.64	9.87	0.00	-73.64	241	321	Vertical
6	2402.00	84.11	9.87	0.00	-84.11	191	249	Vertical

Final Data List

BLE 1M Channel39

Test Graph



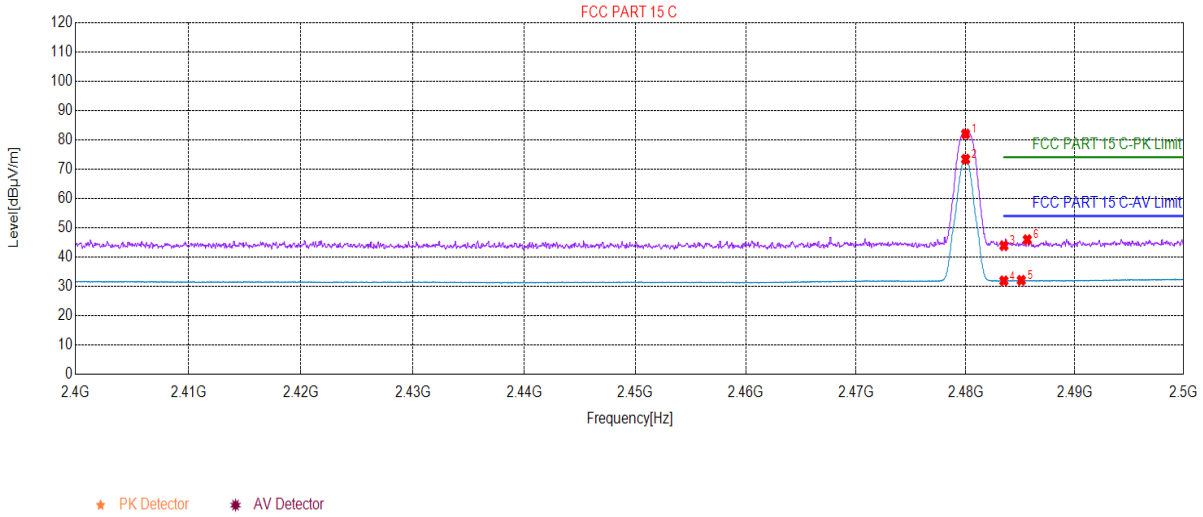
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2480.00	99.66	8.47	0.00	-99.66	125	158	Horizontal
2	2480.00	87.70	8.47	0.00	-87.70	173	137	Horizontal
3	2483.50	44.62	8.48	74.00	29.38	258	64	Horizontal
4	2483.50	32.28	8.48	54.00	21.72	173	60	Horizontal
5	2484.14	48.60	8.49	74.00	25.40	297	118	Horizontal
6	2485.44	32.15	8.49	54.00	21.85	234	333	Horizontal

Final Data List

BLE 1M Channel39

Test Graph



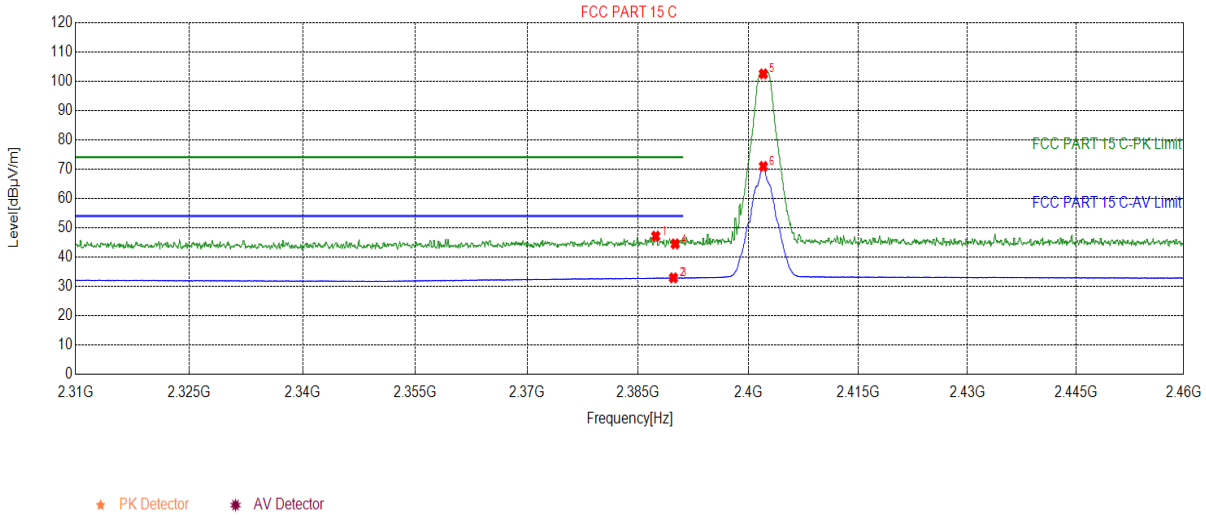
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2480.00	81.95	8.47	0.00	-81.95	134	175	Vertical
2	2480.00	73.36	8.47	0.00	-73.36	256	35	Vertical
3	2483.50	43.86	8.48	74.00	30.14	341	114	Vertical
4	2483.50	31.87	8.48	54.00	22.13	172	39	Vertical
5	2485.09	32.04	8.49	54.00	21.96	183	58	Vertical
6	2485.64	45.91	8.49	74.00	28.09	121	160	Vertical

Final Data List

BLE 2M Channel 0

Test Graph



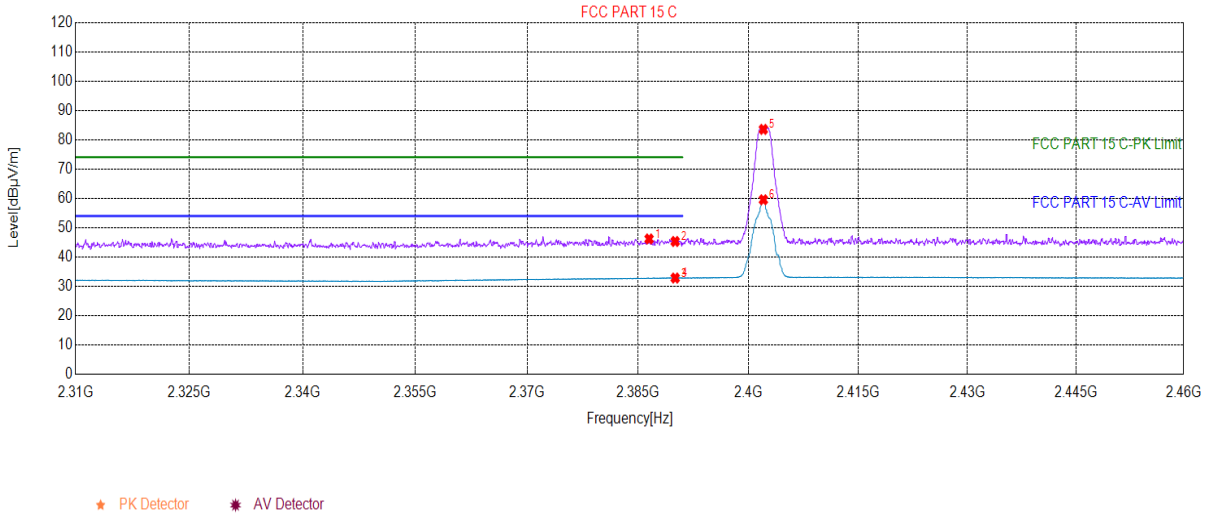
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2387.36	47.10	9.53	74.00	26.90	158	15	Horizontal
2	2389.76	32.89	9.60	54.00	21.11	166	39	Horizontal
3	2390.00	32.88	9.60	54.00	21.12	135	116	Horizontal
4	2390.00	44.47	9.60	74.00	29.53	285	49	Horizontal
5	2402.00	102.45	9.87	0.00	-102.45	167	267	Horizontal
6	2402.00	70.88	9.87	0.00	-70.88	100	60	Horizontal

Final Data List

BLE 2M Channel 0

Test Graph



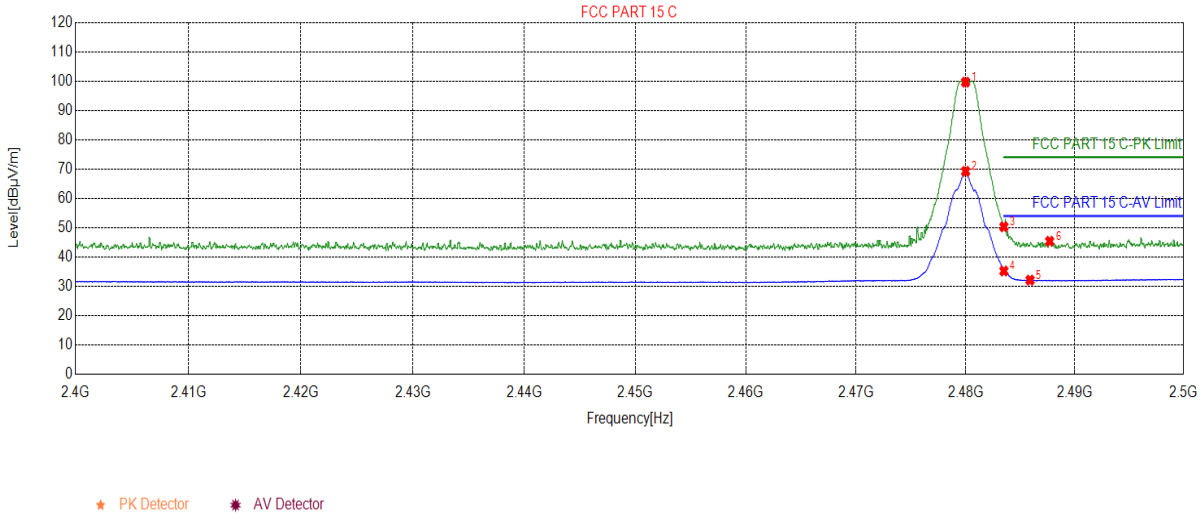
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2386.46	46.16	9.51	74.00	27.84	127	15	Vertical
2	2390.00	45.30	9.60	74.00	28.70	198	49	Vertical
3	2390.00	32.83	9.60	54.00	21.17	155	79	Vertical
4	2390.14	32.95	9.61	54.00	21.05	358	173	Vertical
5	2402.00	83.52	9.87	0.00	-83.52	247	60	Vertical
6	2402.00	59.52	9.87	0.00	-59.52	120	160	Vertical

Final Data List

BLE 2M Channel 39

Test Graph



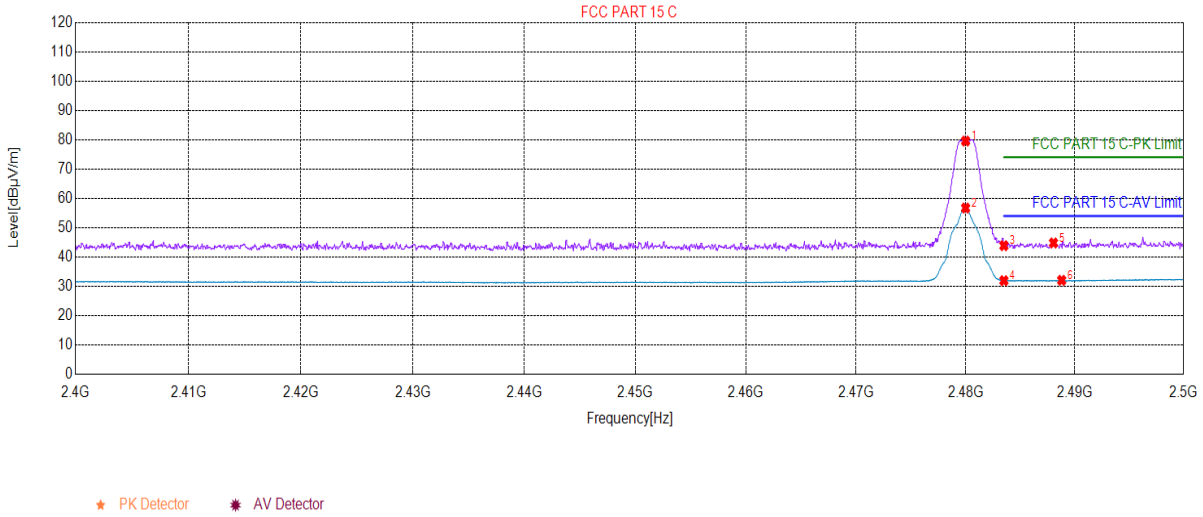
Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2480.00	99.63	8.47	0.00	-99.63	150	25	Horizontal
2	2480.00	69.22	8.47	0.00	-69.22	169	39	Horizontal
3	2483.50	50.30	8.48	74.00	23.70	183	49	Horizontal
4	2483.50	35.22	8.48	54.00	18.78	241	60.0	Horizontal
5	2485.89	32.12	8.49	54.00	21.88	195	148	Horizontal
6	2487.69	45.37	8.50	74.00	28.63	207	170	Horizontal

Final Data List

BLE 2M Channel 39

Test Graph



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2480.00	79.54	8.47	0.00	-79.54	112	58	Vertical
2	2480.00	56.69	8.47	0.00	-56.69	159	69	Vertical
3	2483.50	43.86	8.48	74.00	30.14	173	71	Vertical
4	2483.50	31.94	8.48	54.00	22.06	186	89	Vertical
5	2488.04	44.79	8.50	74.00	29.21	208	112	Vertical
6	2488.79	32.05	8.50	54.00	21.95	226	160.0	Vertical

Final Data List

Remark:
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
All Modes have been tested, but only the worst case data displayed in this report.

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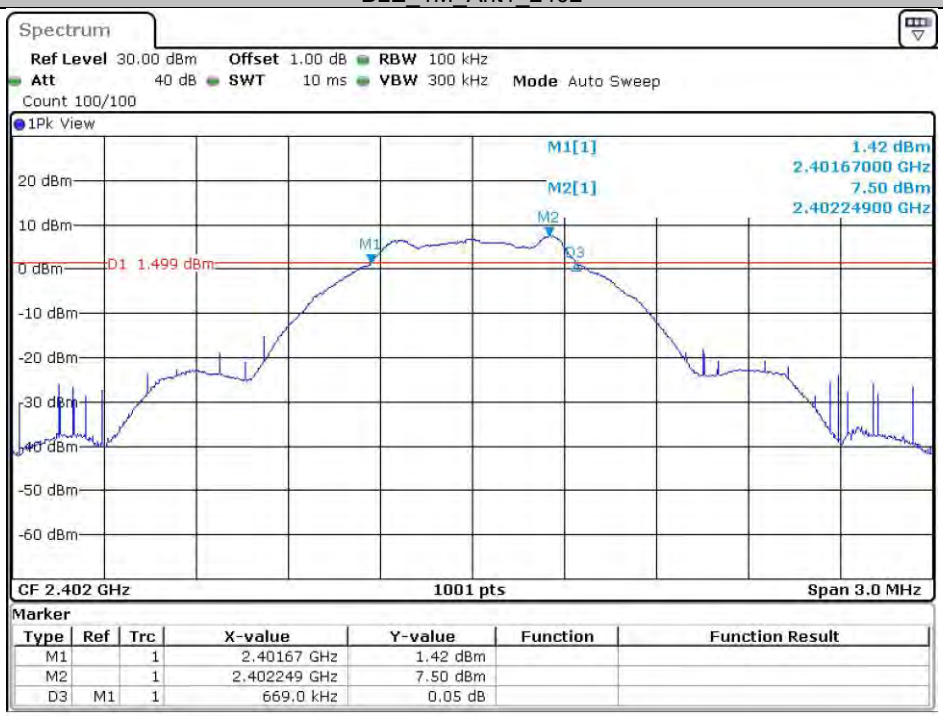
DTS Bandwidth

Test Result

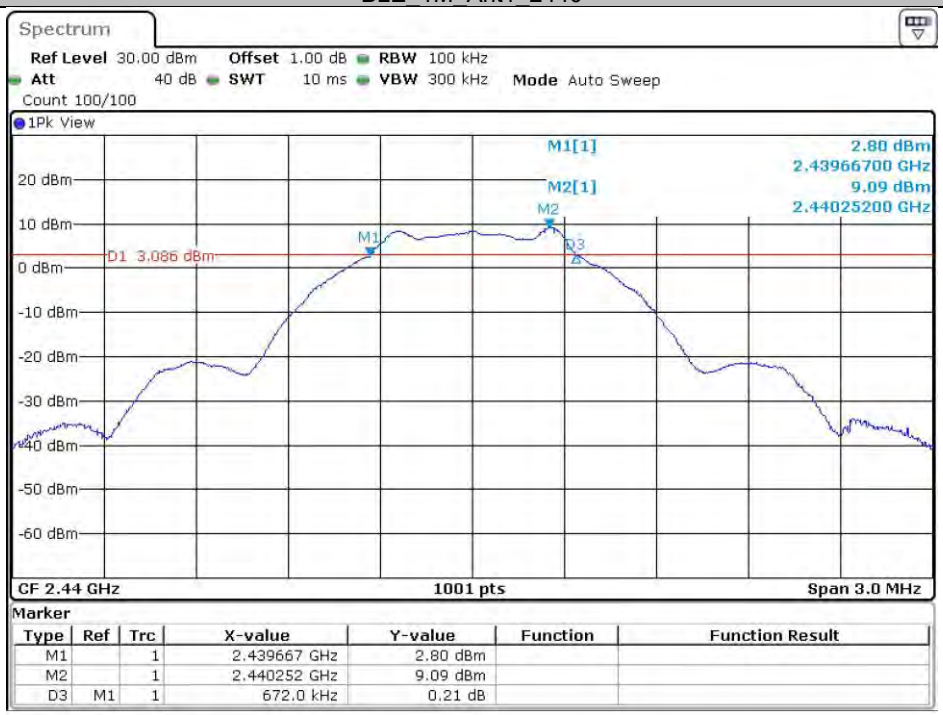
TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.669	2401.670	2402.339	0.5	PASS
		2440	0.672	2439.667	2440.339	0.5	PASS
		2480	0.675	2479.664	2480.339	0.5	PASS
BLE_2M	Ant1	2402	1.185	2401.410	2402.595	0.5	PASS
		2440	1.180	2439.410	2440.590	0.5	PASS
		2480	1.235	2479.355	2480.590	0.5	PASS

Test Graphs

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

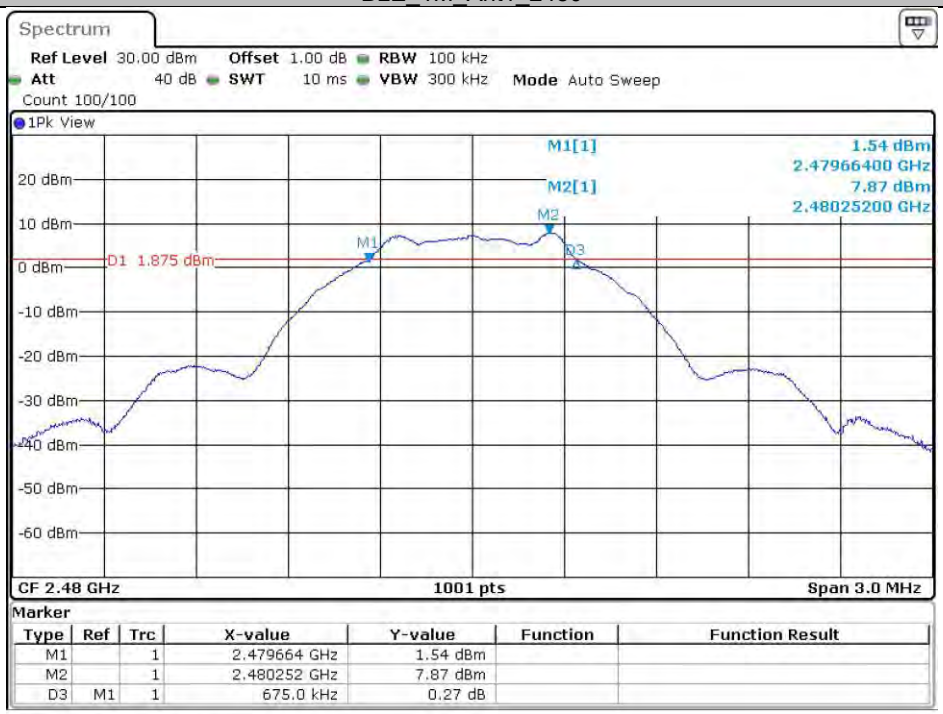


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.439667 GHz	2.80 dBm		
M2		1	2.440252 GHz	9.09 dBm		
D3	M1	1	672.0 kHz	0.21 dB		

Date: 17.MAY.2021 03:48:11

BLE_1M_Ant1_2480

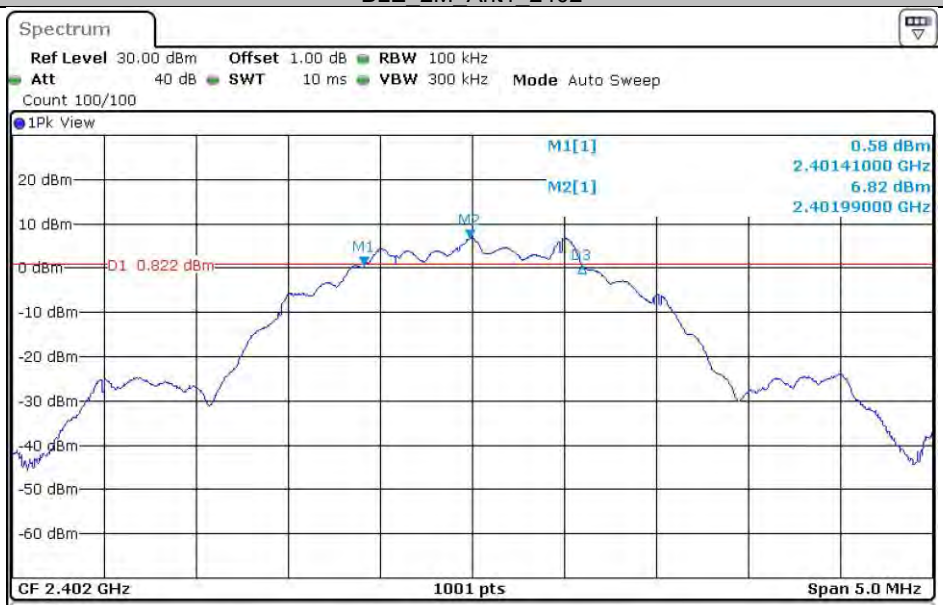


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.479664 GHz	1.54 dBm		
M2		1	2.480252 GHz	7.87 dBm		
D3	M1	1	675.0 kHz	0.27 dB		

Date: 17.MAY.2021 03:50:06

BLE_2M_Ant1_2402

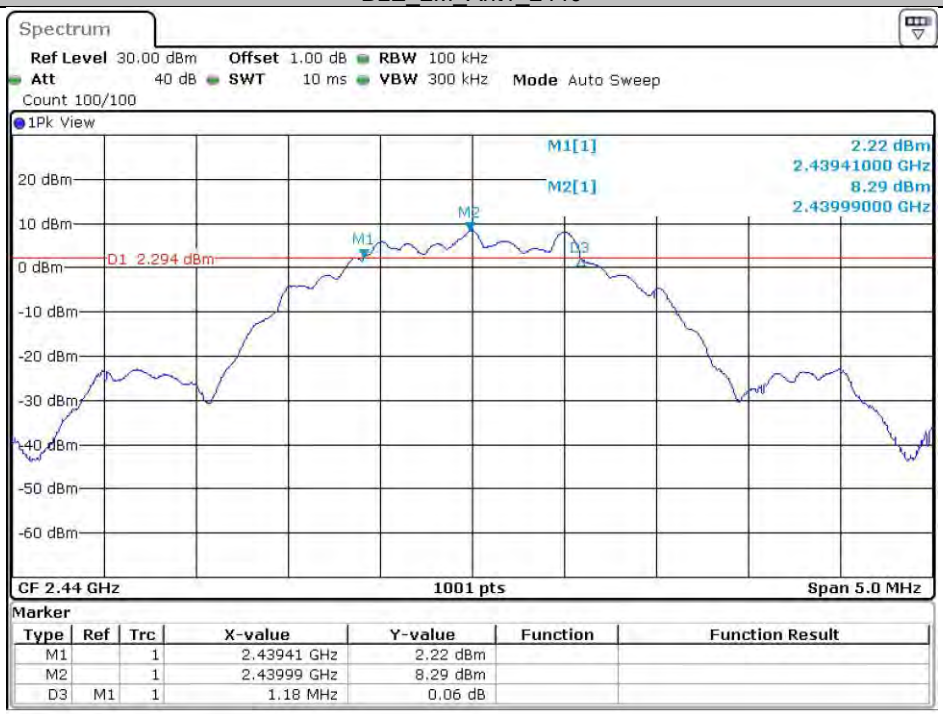


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40141 GHz	0.58 dBm		
M2		1	2.40199 GHz	6.82 dBm		
D3	M1	1	1.185 MHz	0.06 dB		

Date: 17.MAY.2021 03:51:46

BLE_2M_Ant1_2440

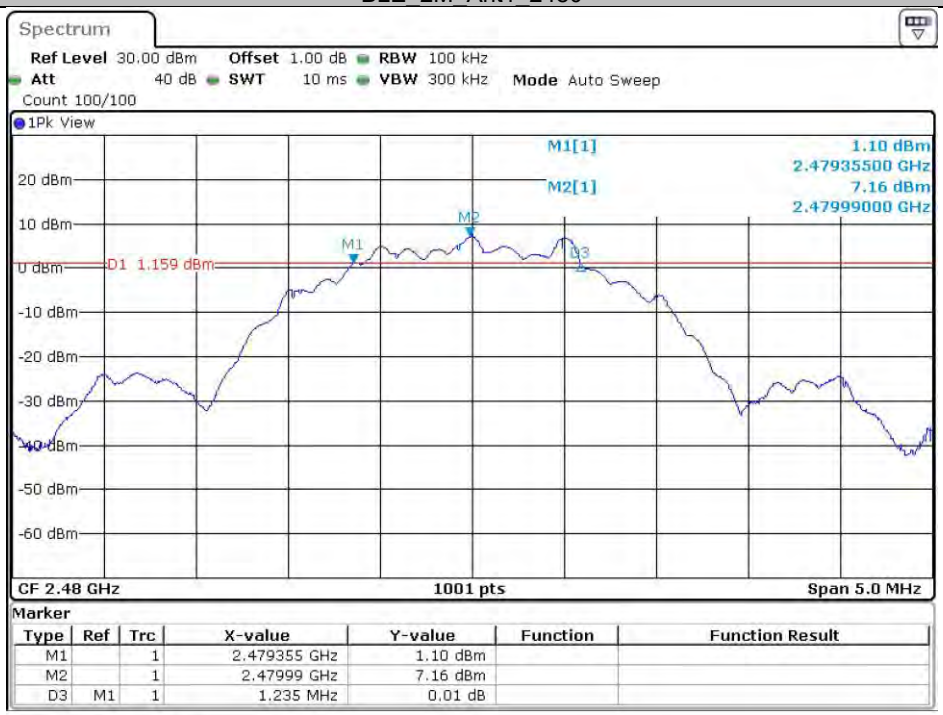


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.43941 GHz	2.22 dBm		
M2		1	2.43999 GHz	8.29 dBm		
D3	M1	1	1.18 MHz	0.06 dB		

Date: 17.MAY.2021 03:53:38

BLE_2M_Ant1_2480



Date: 17.MAY.2021 03:55:49

Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.031	2401.500	2402.530	---	PASS
		2440	1.022	2439.502	2440.524	---	PASS
		2480	1.022	2479.500	2480.521	---	PASS
BLE_2M	Ant1	2402	2.053	2400.986	2403.039	---	PASS
		2440	2.048	2438.986	2441.034	---	PASS
		2480	2.048	2478.981	2481.029	---	PASS

Test Graphs

BLE_1M_Ant1_2402

BLE_1M_Ant1_2440

Date: 17.MAY.2021 03:48:21

BLE_1M_Ant1_2480

Date: 17.MAY.2021 03:50:15

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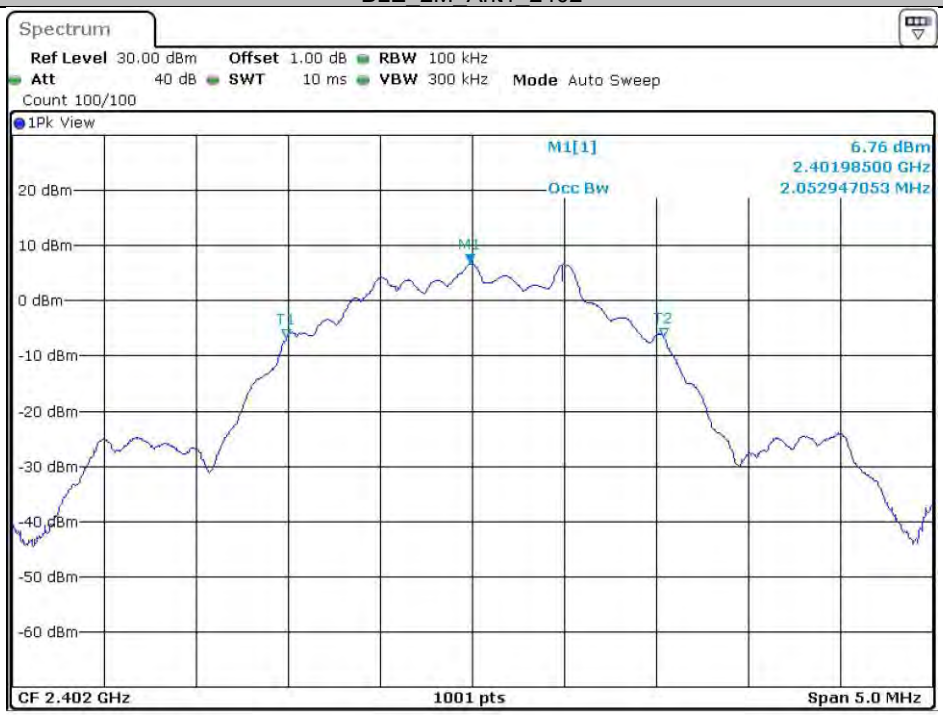
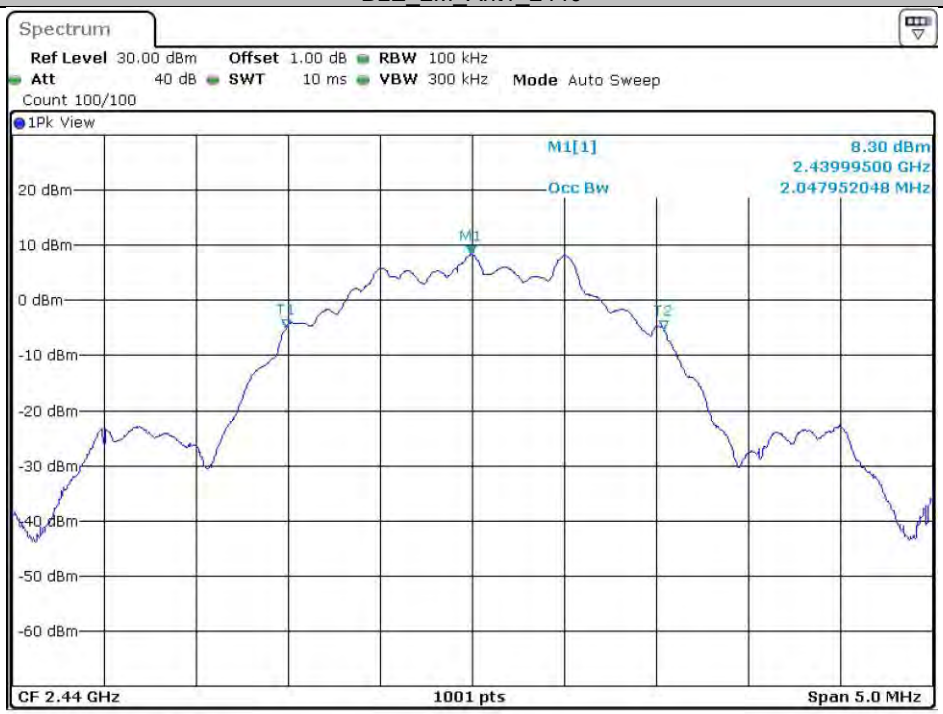
BLE_2M_Ant1_2402



Date: 17.MAY.2021 03:51:56

BLE_2M_Ant1_2440



Date: 17.MAY.2021 03:53:47

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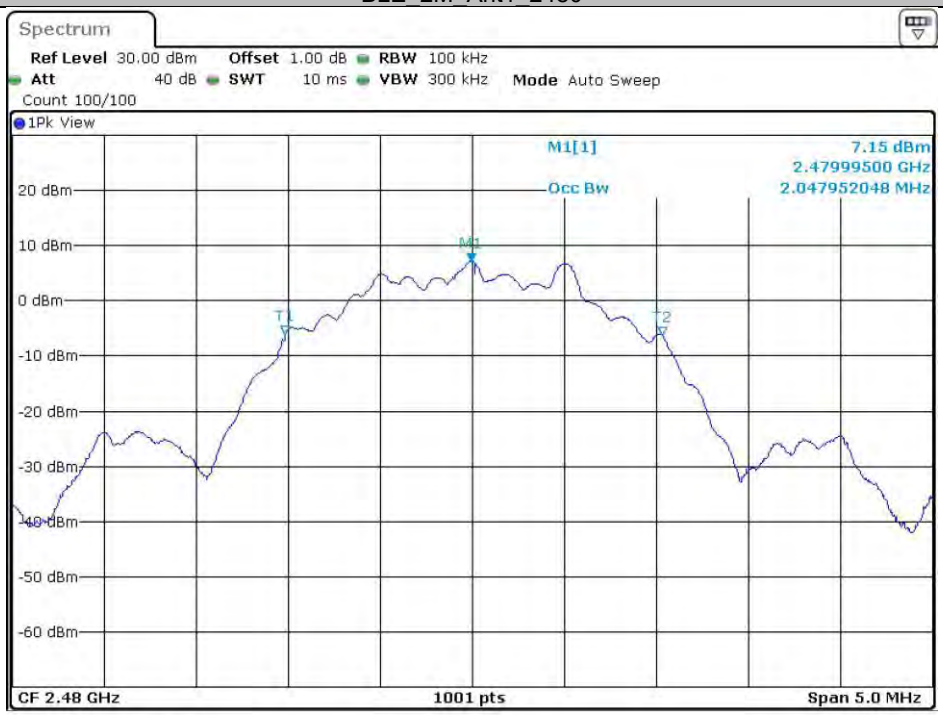
BLE_2M_Ant1_2480



Date: 17.MAY.2021 03:55:58

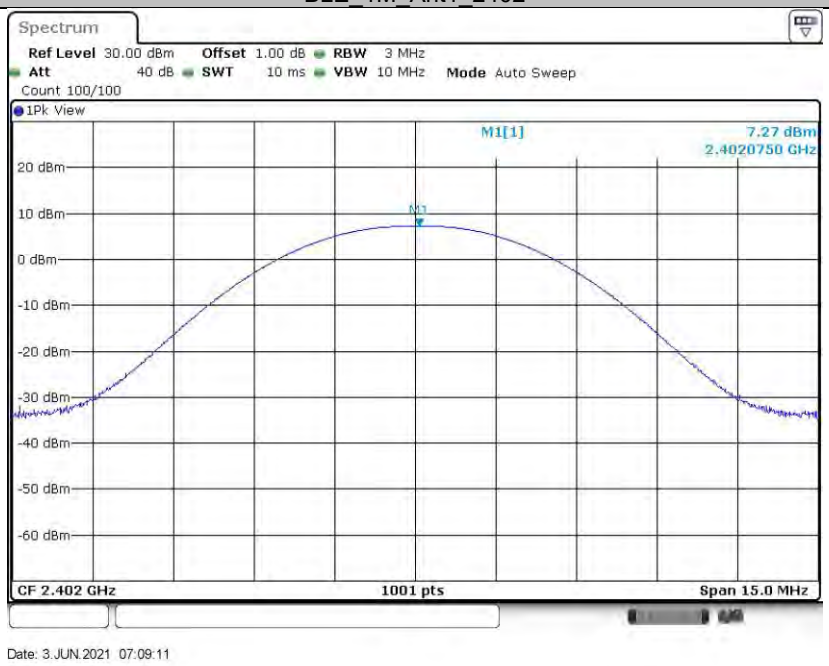
Maximum conducted output power

Test Result

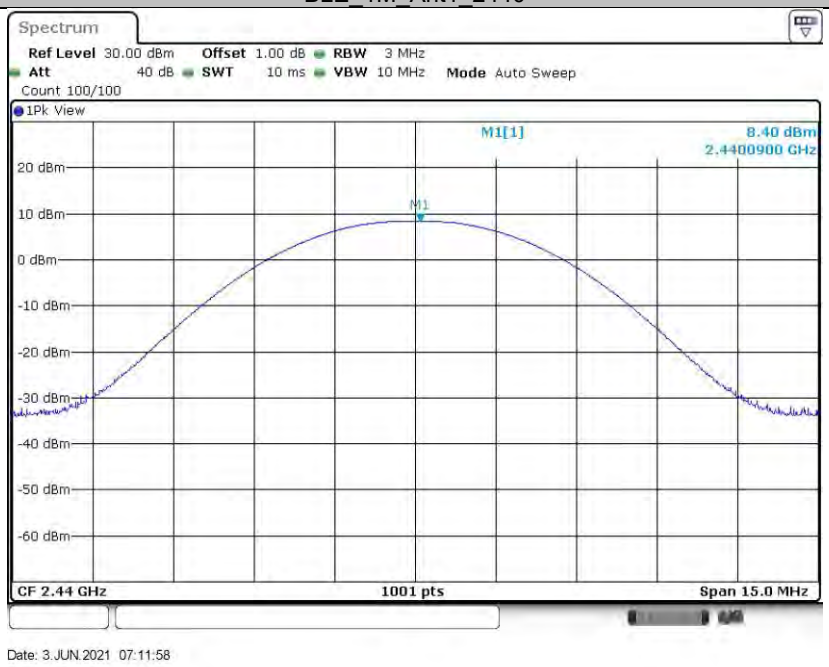
TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	7.27	<=30	PASS
		2440	8.4	<=30	PASS
		2480	7.07	<=30	PASS
BLE_2M	Ant1	2402	7.26	<=30	PASS
		2440	8.49	<=30	PASS
		2480	7.19	<=30	PASS

Test Graphs

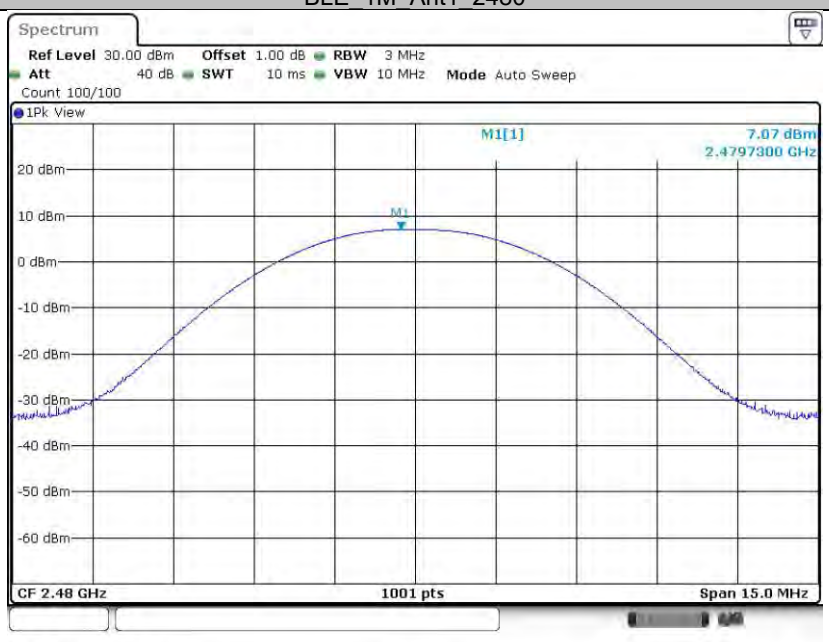
BLE_1M_Ant1_2402



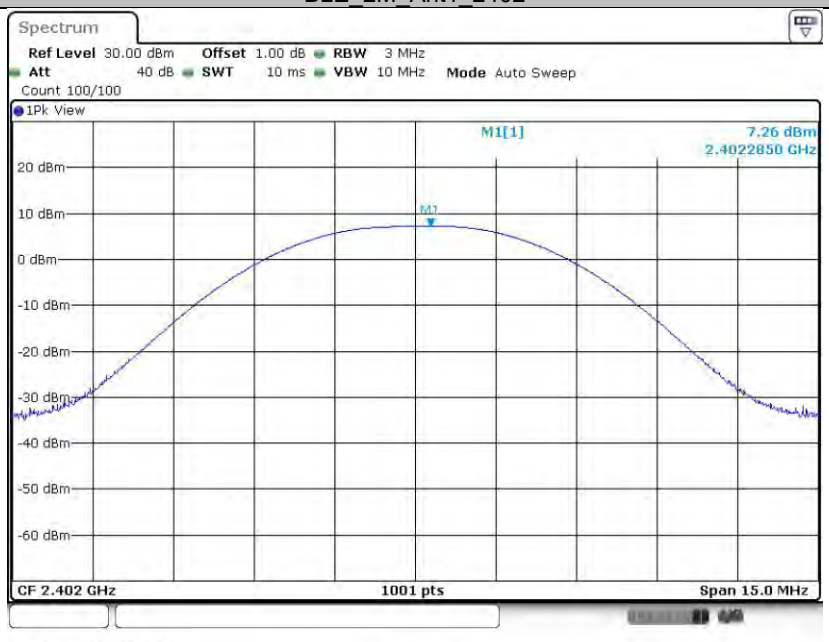
BLE_1M_Ant1_2440



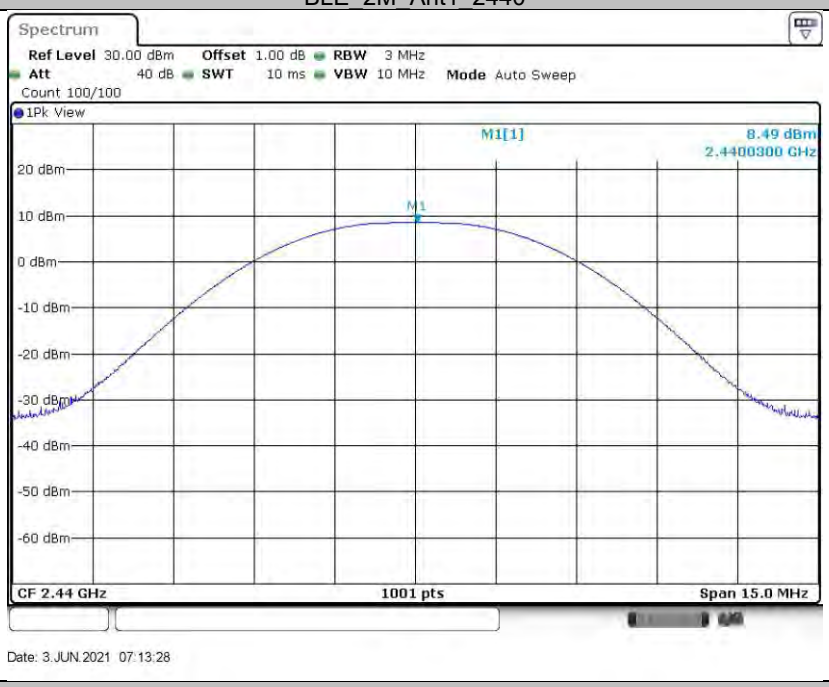
BLE_1M_Ant1_2480



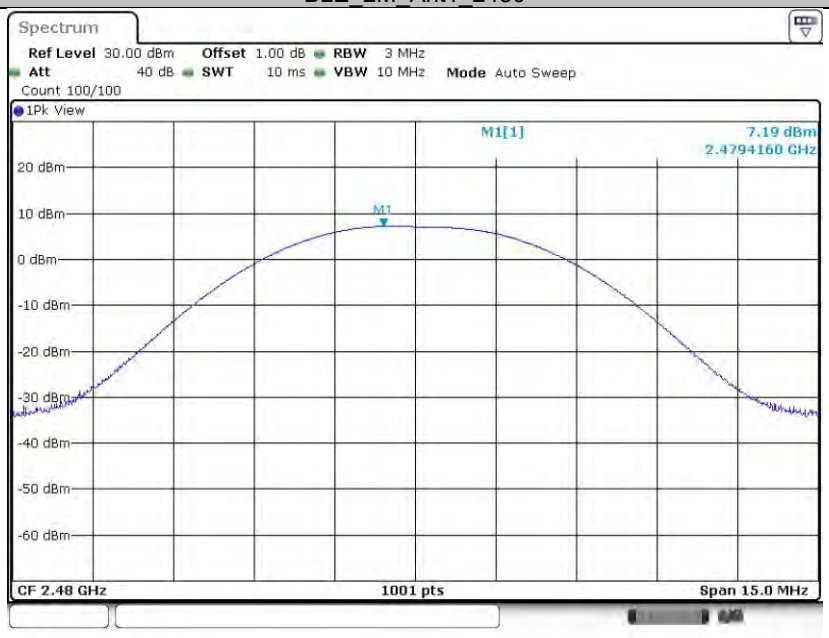
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



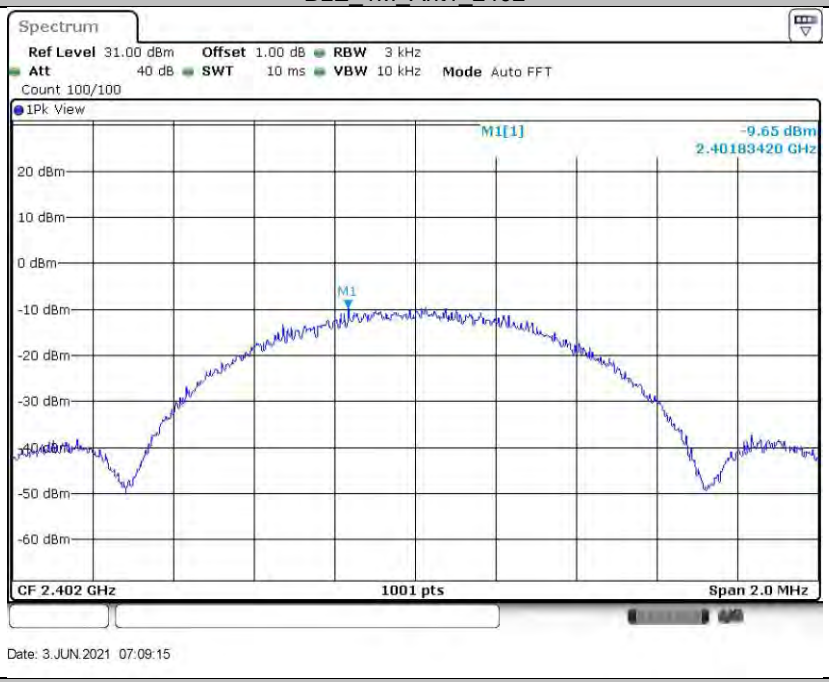
Maximum power spectral density

Test Result

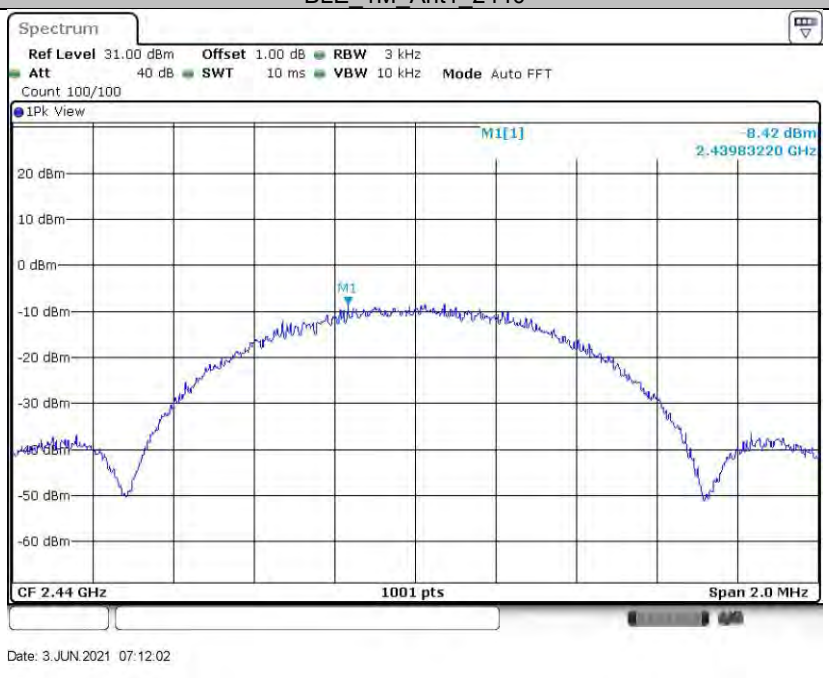
TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-9.65	<=8	PASS
		2440	-8.42	<=8	PASS
		2480	-9.69	<=8	PASS
BLE_2M	Ant1	2402	-11.67	<=8	PASS
		2440	-10.27	<=8	PASS
		2480	-11.66	<=8	PASS

Test Graphs

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



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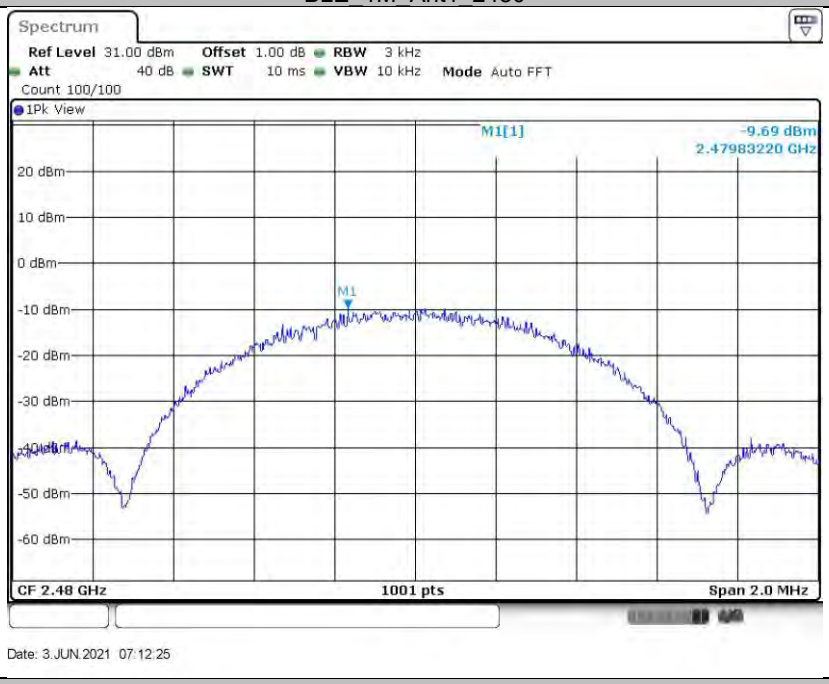
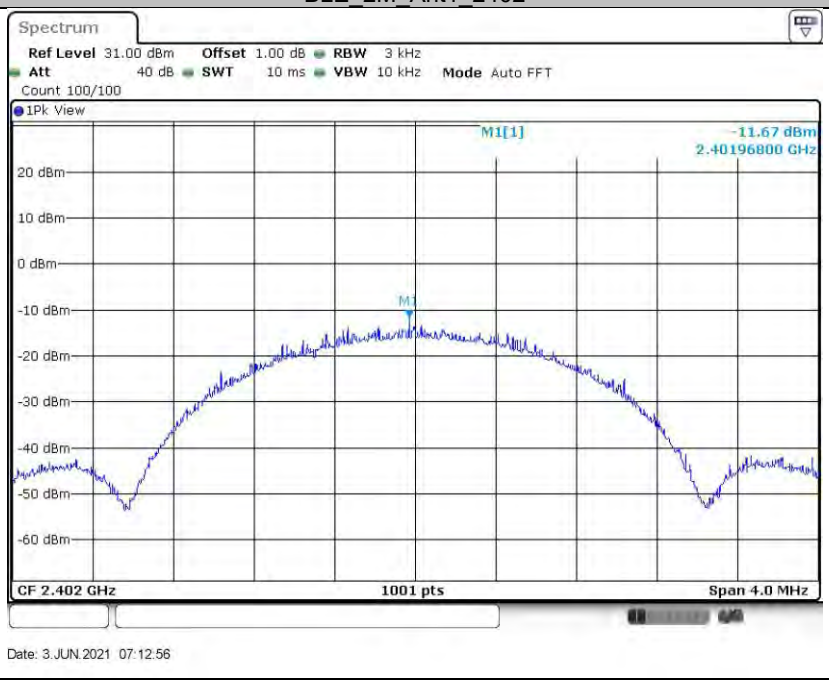
BLE_1M_Ant1_2480



BLE_2M_Ant1_2402



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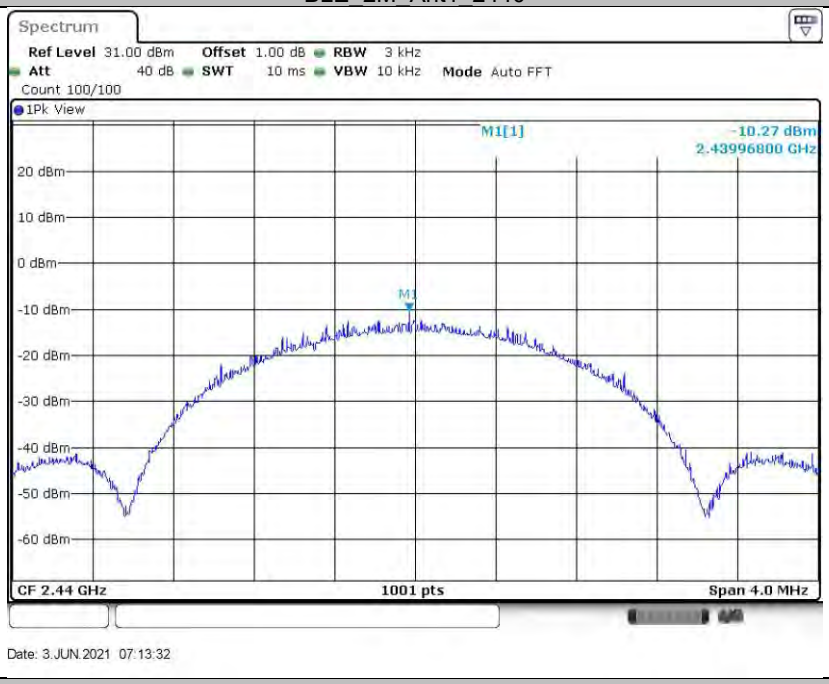
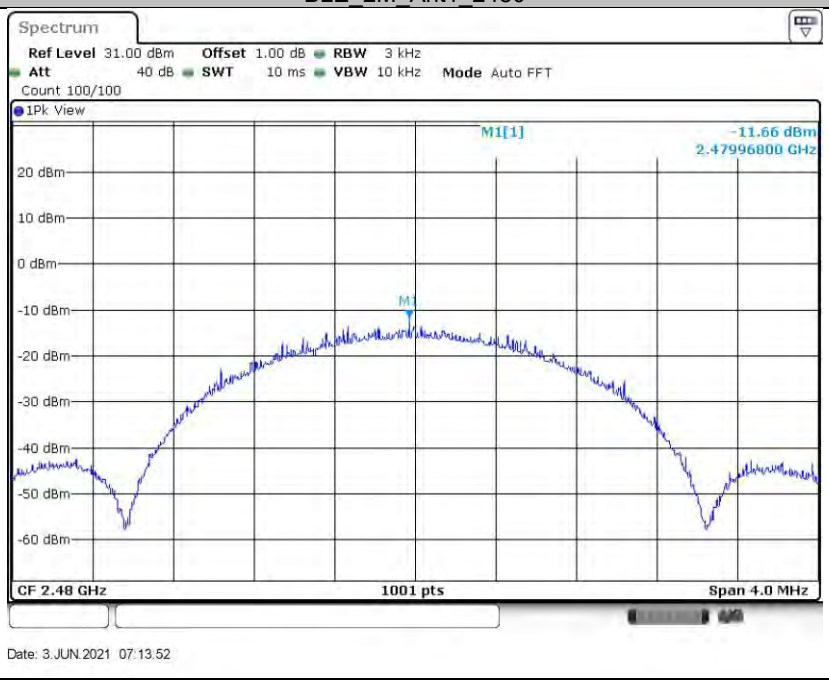
BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



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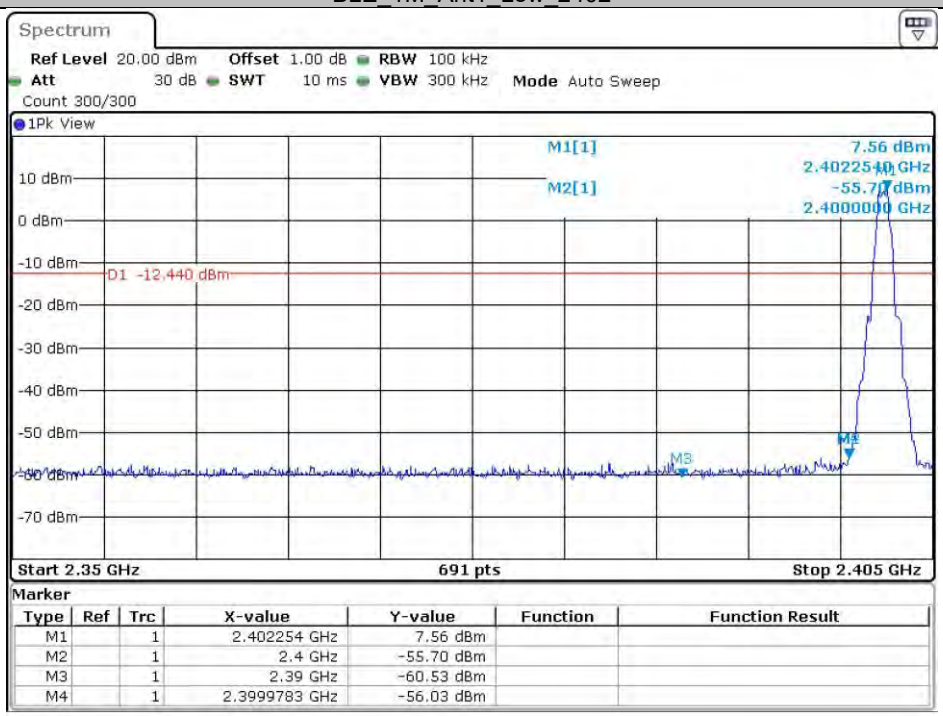
Band edge measurements

Test Result

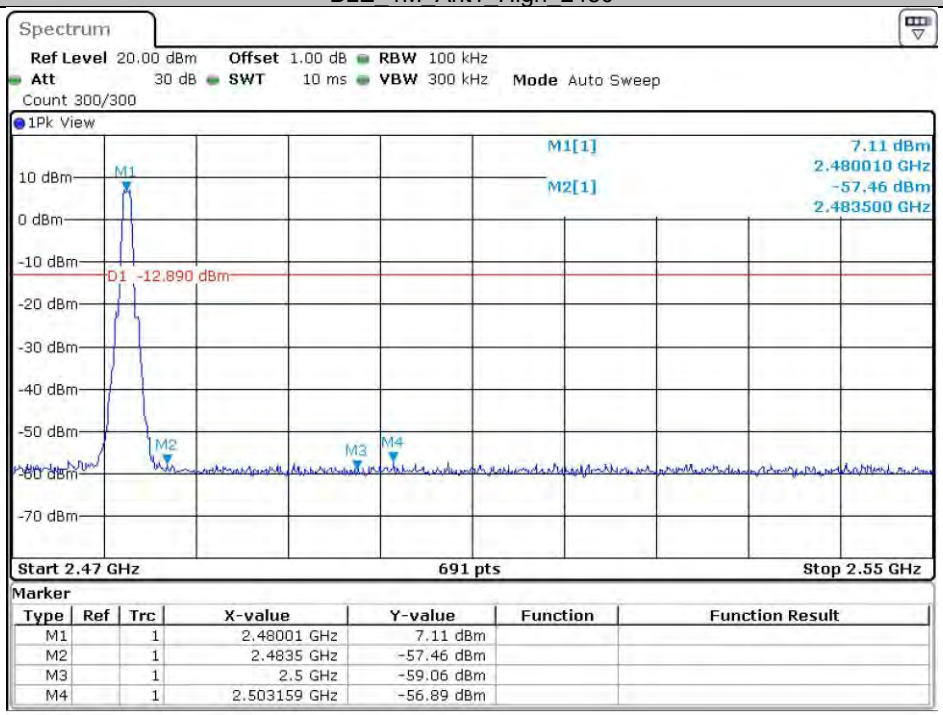
TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	7.56	-56.03	<=-12.44	PASS
		High	2480	7.11	-56.89	<=-12.89	PASS
BLE_2M	Ant1	Low	2402	6.59	-25.47	<=-13.41	PASS
		High	2480	7.25	-52.96	<=-12.75	PASS

Test Graphs

BLE_1M_Ant1_Low_2402



BLE_1M_Ant1_High_2480



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.48001 GHz	7.11 dBm		
M2		1	2.4835 GHz	-57.46 dBm		
M3		1	2.5 GHz	-59.06 dBm		
M4		1	2.503159 GHz	-56.89 dBm		

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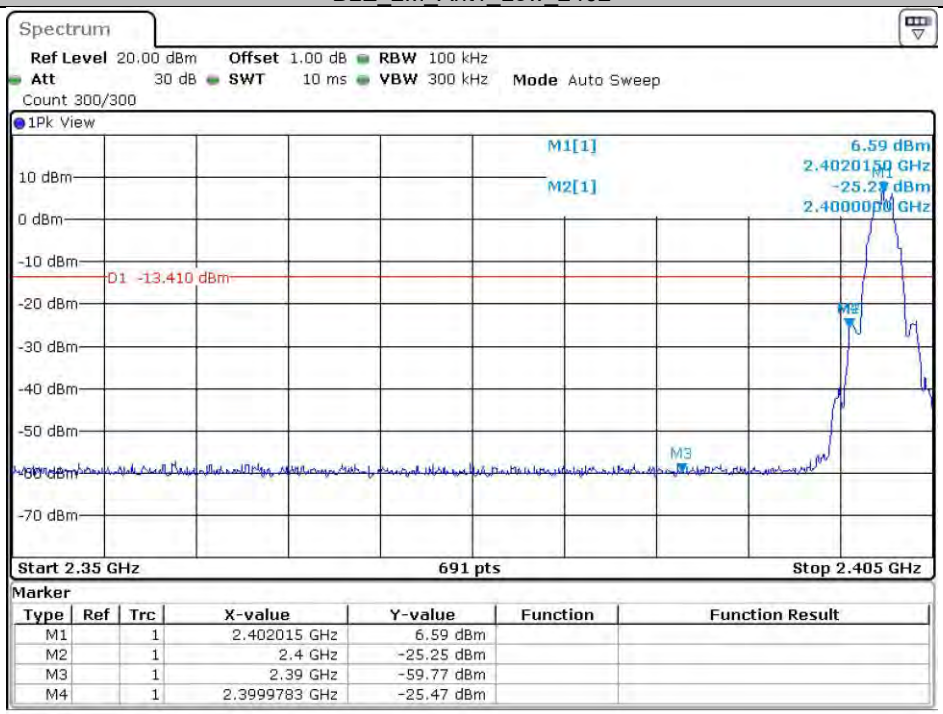
BLE_2M_Ant1_Low_2402



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.402015 GHz	6.59 dBm		
M2		1	2.4 GHz	-25.25 dBm		
M3		1	2.39 GHz	-59.77 dBm		
M4		1	2.3999783 GHz	-25.47 dBm		

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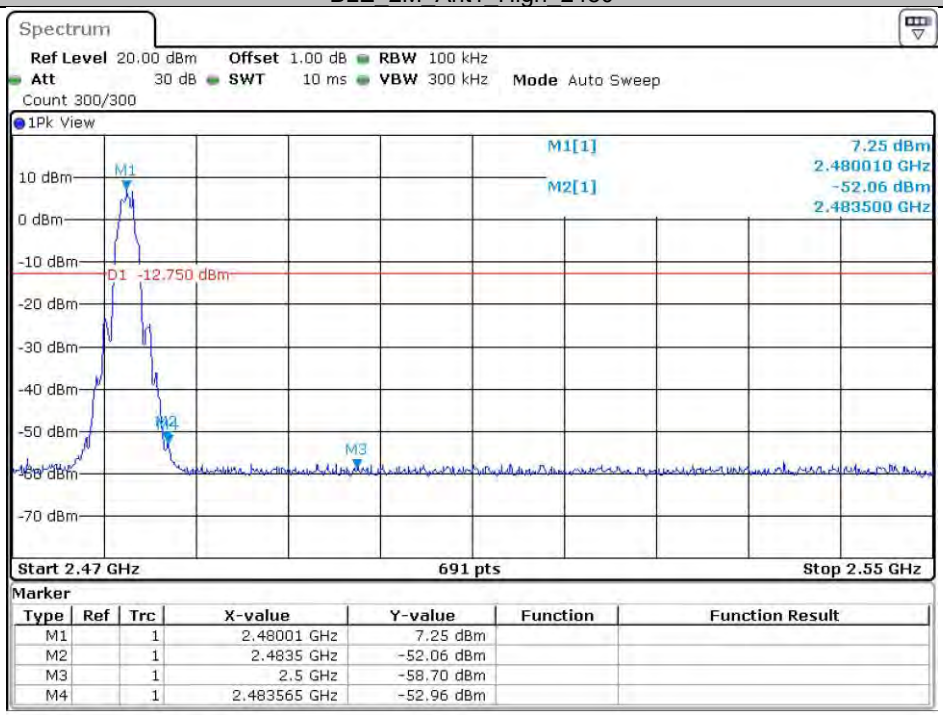
BLE_2M_Ant1_High_2480



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.48001 GHz	7.25 dBm		
M2		1	2.4835 GHz	-52.06 dBm		
M3		1	2.5 GHz	-58.70 dBm		
M4		1	2.483565 GHz	-52.96 dBm		

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Conducted Spurious Emission

Test Result

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	7.69	7.69	---	PASS
			30~1000	7.69	-44.71	<=-12.31	PASS
			1000~26500	7.69	-31.02	<=-12.31	PASS
		2440	Reference	9.14	9.14	---	PASS
			30~1000	9.14	-44.24	<=-10.86	PASS
			1000~26500	9.14	-31.44	<=-10.86	PASS
		2480	Reference	7.94	7.94	---	PASS
			30~1000	7.94	-45.23	<=-12.06	PASS
			1000~26500	7.94	-31.19	<=-12.06	PASS
BLE_2M	Ant1	2402	Reference	6.78	6.78	---	PASS
			30~1000	6.78	-46.04	<=-13.22	PASS
			1000~26500	6.78	-30.73	<=-13.22	PASS
		2440	Reference	8.41	8.41	---	PASS
			30~1000	8.41	-45.56	<=-11.59	PASS
			1000~26500	8.41	-30.3	<=-11.59	PASS
		2480	Reference	7.25	7.25	---	PASS
			30~1000	7.25	-45.5	<=-12.75	PASS
			1000~26500	7.25	-30.96	<=-12.75	PASS

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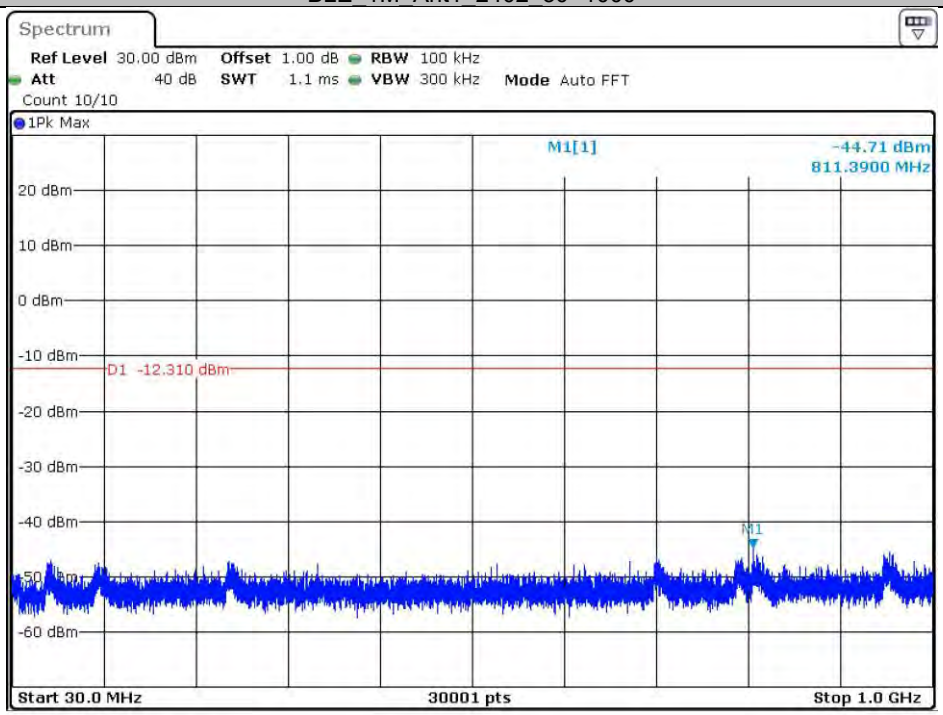
Test Graphs

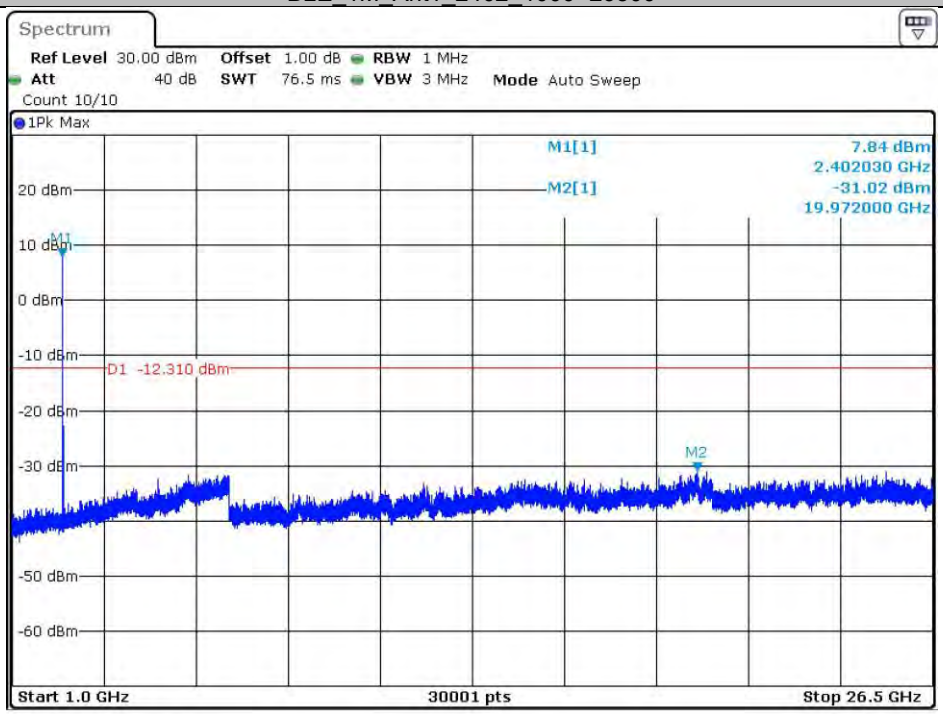
BLE_1M_Ant1_2402_0~Reference

BLE_1M_Ant1_2402_30~1000



Date: 17.MAY.2021 03:47:17

BLE_1M_Ant1_2402_1000~26500



Date: 17.MAY.2021 03:47:39

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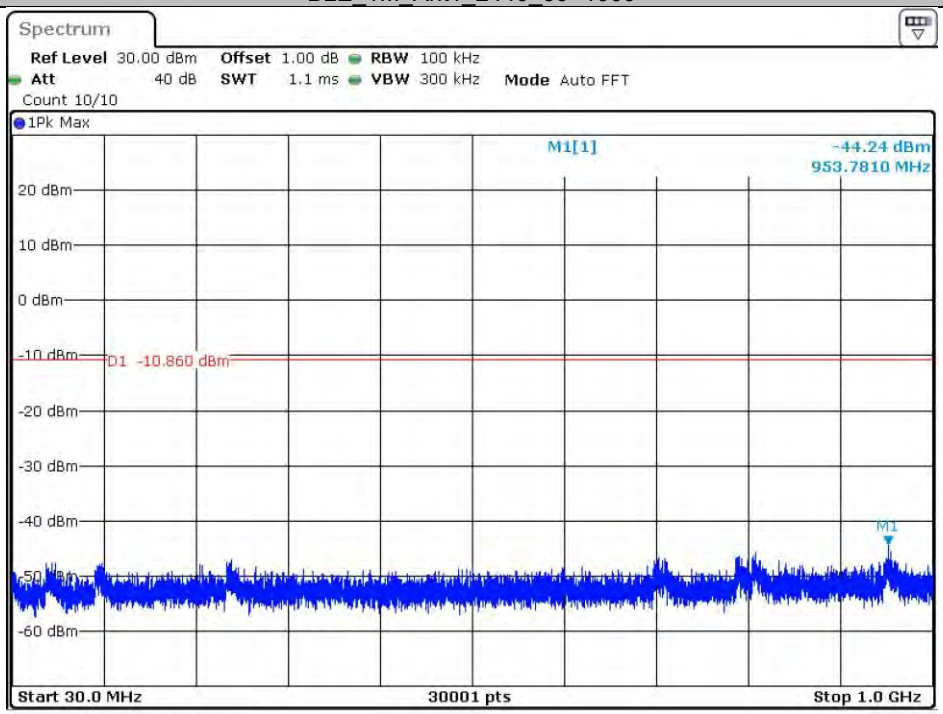
BLE_1M_Ant1_2440_0~Reference

Date: 17.MAY.2021 03:48:36

BLE_1M_Ant1_2440_30~1000



Date: 17.MAY.2021 03:48:40

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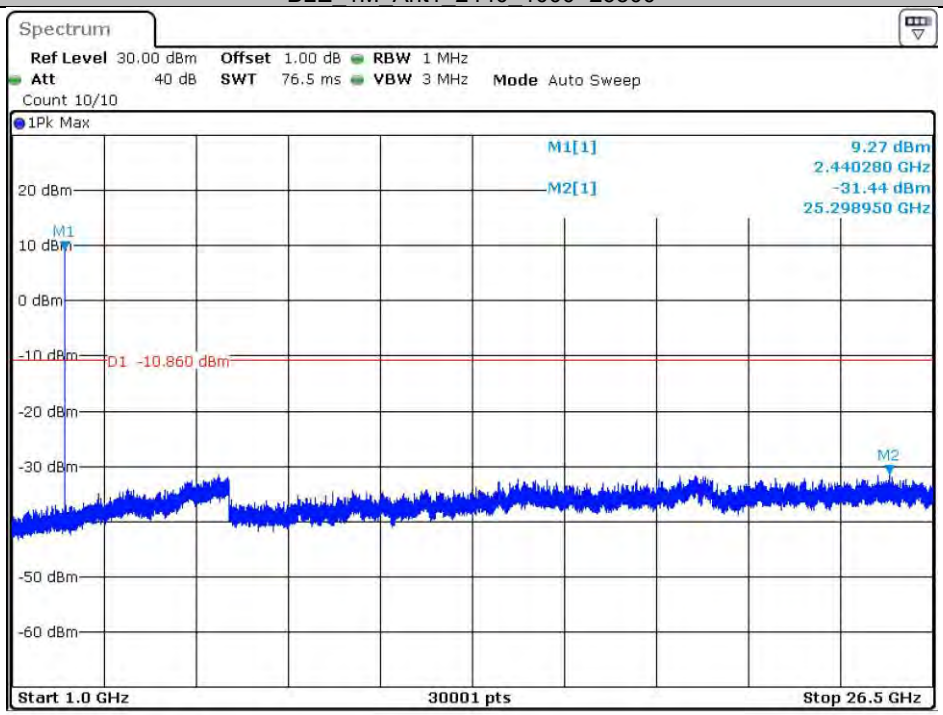
BLE_1M_Ant1_2440_1000~26500



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BLE_1M_Ant1_2480_0~Reference

Date: 17.MAY.2021 03:50:38

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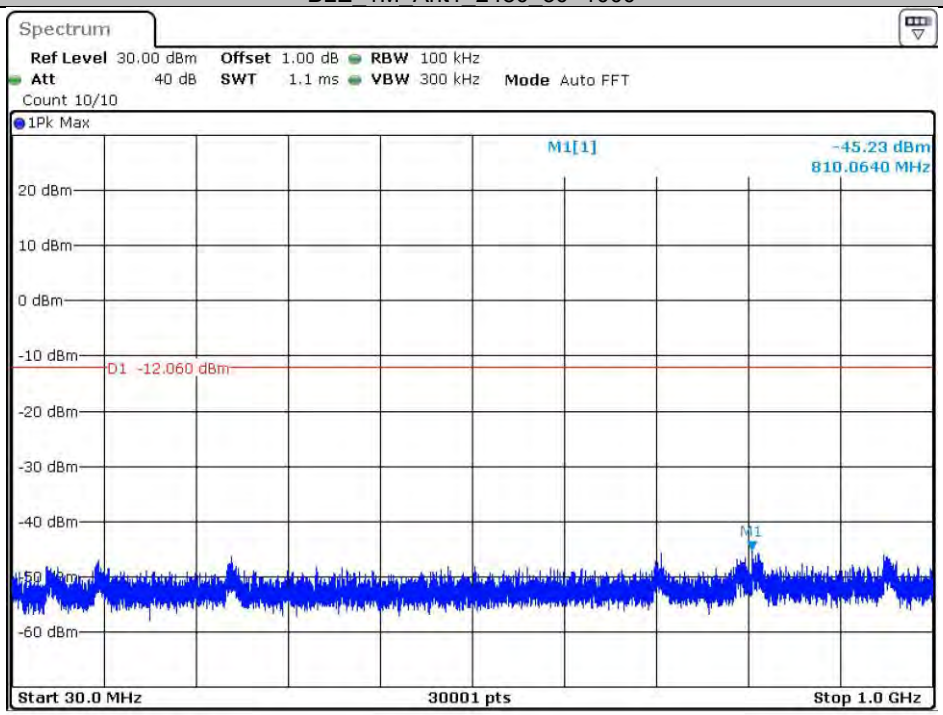
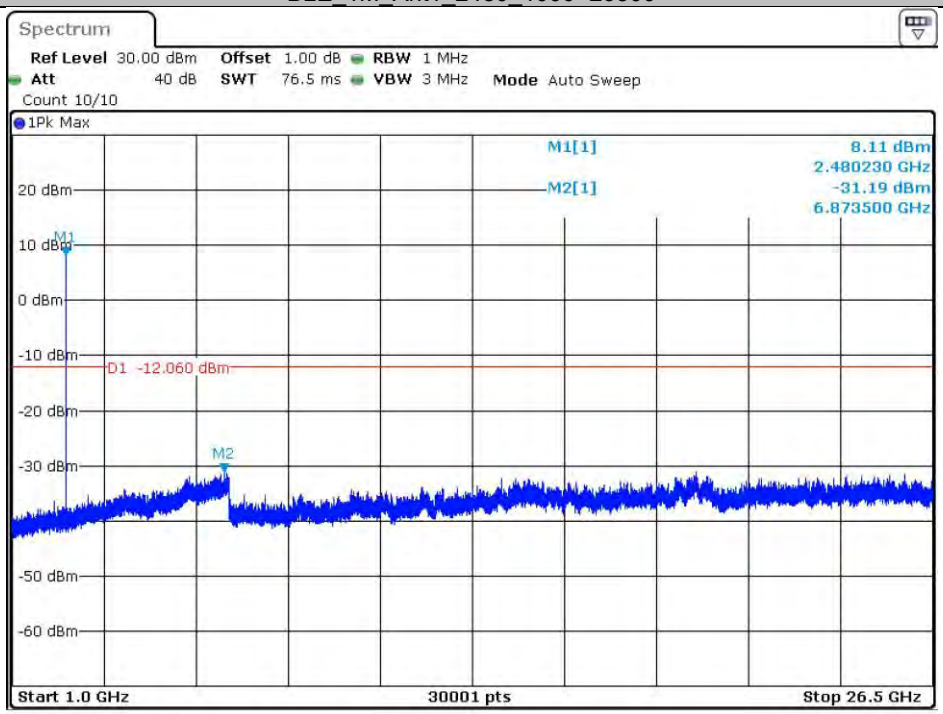
BLE_1M_Ant1_2480_30~1000



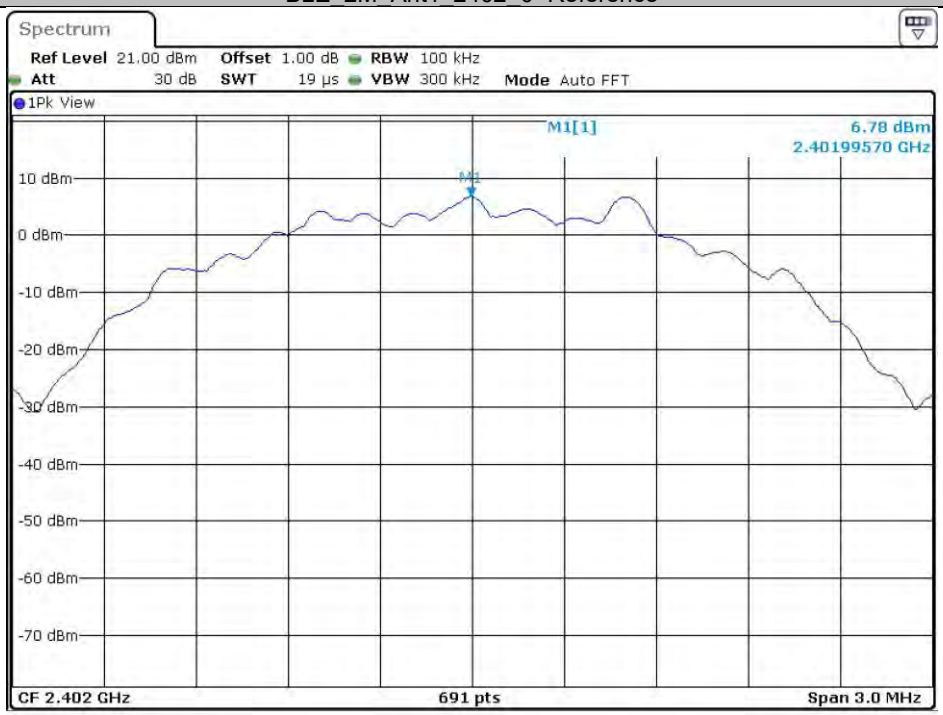
Date: 17.MAY.2021 03:50:42

BLE_1M_Ant1_2480_1000~26500



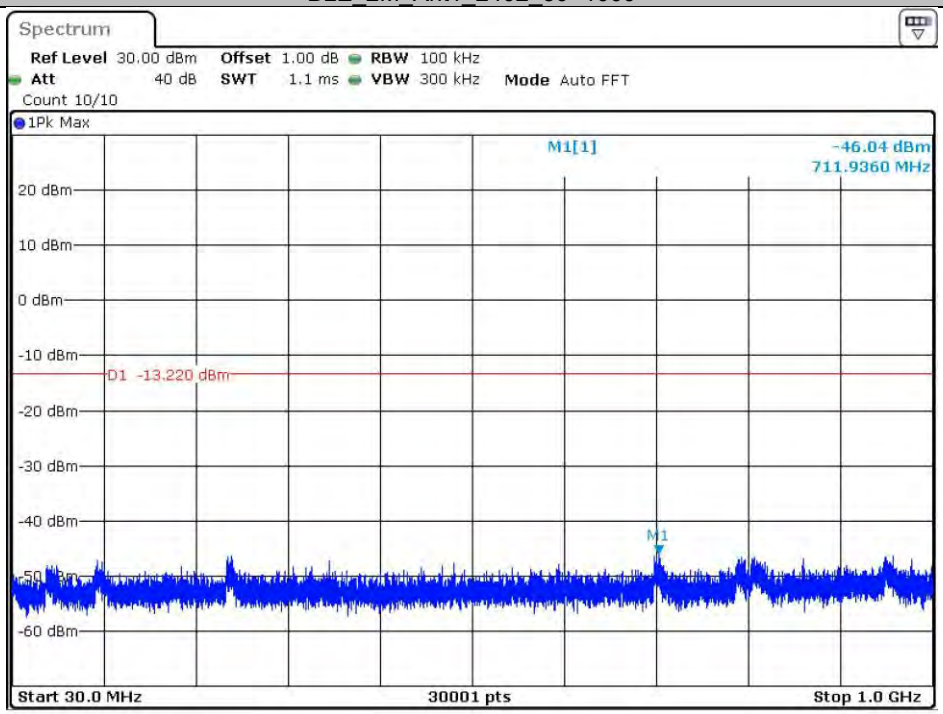
Date: 17.MAY.2021 03:51:04

BLE_2M_Ant1_2402_0~Reference



Date: 17.MAY.2021 03:52:19

BLE_2M_Ant1_2402_30~1000



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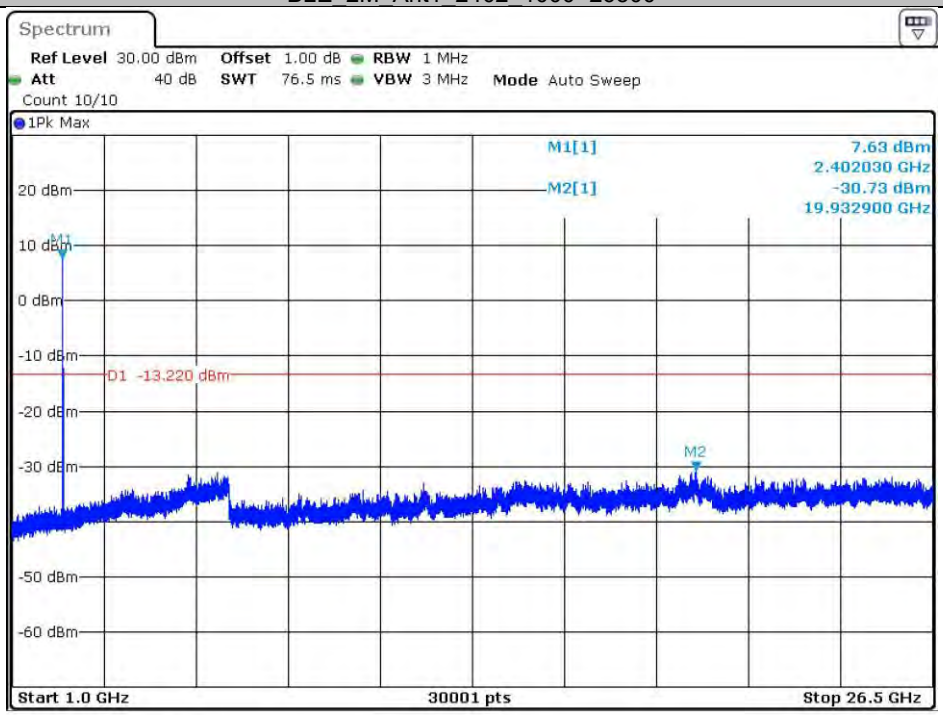
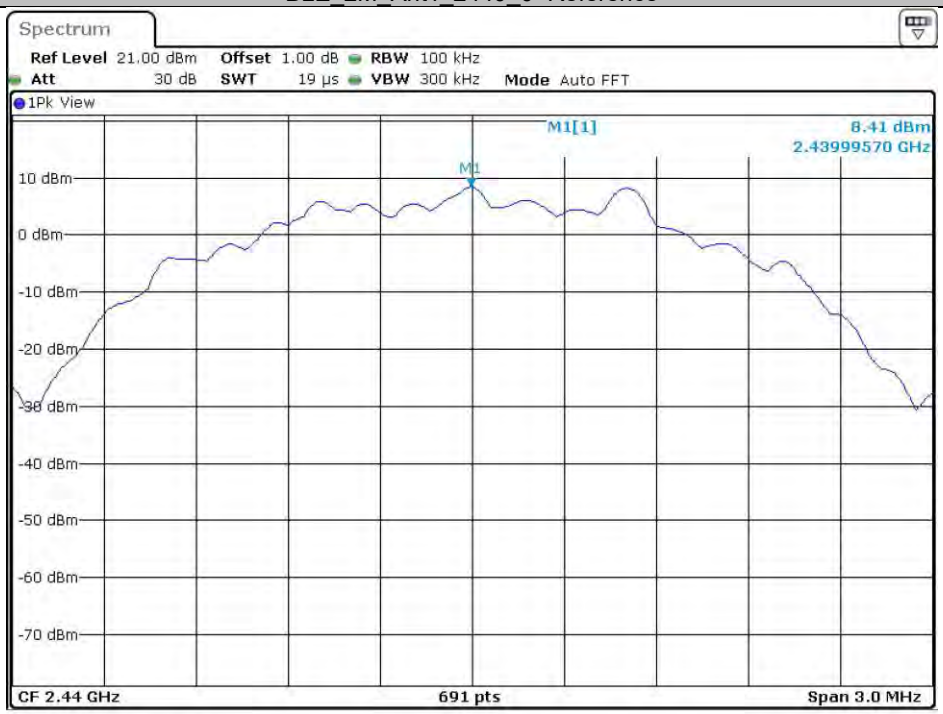
BLE_2M_Ant1_2402_1000~26500



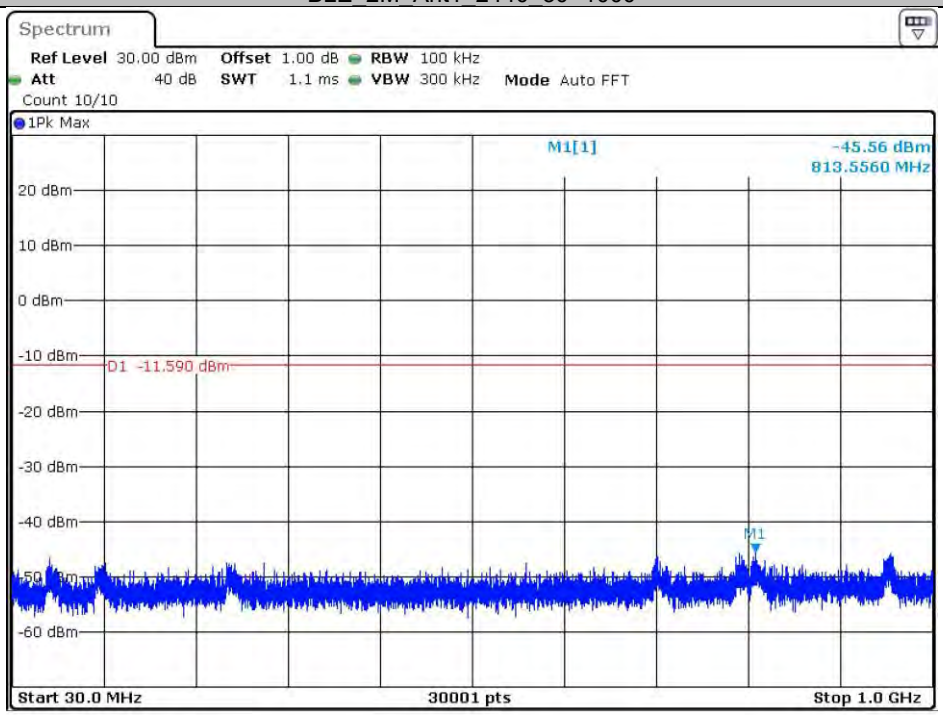
Date: 17.MAY.2021 03:52:45

BLE_2M_Ant1_2440_0~Reference



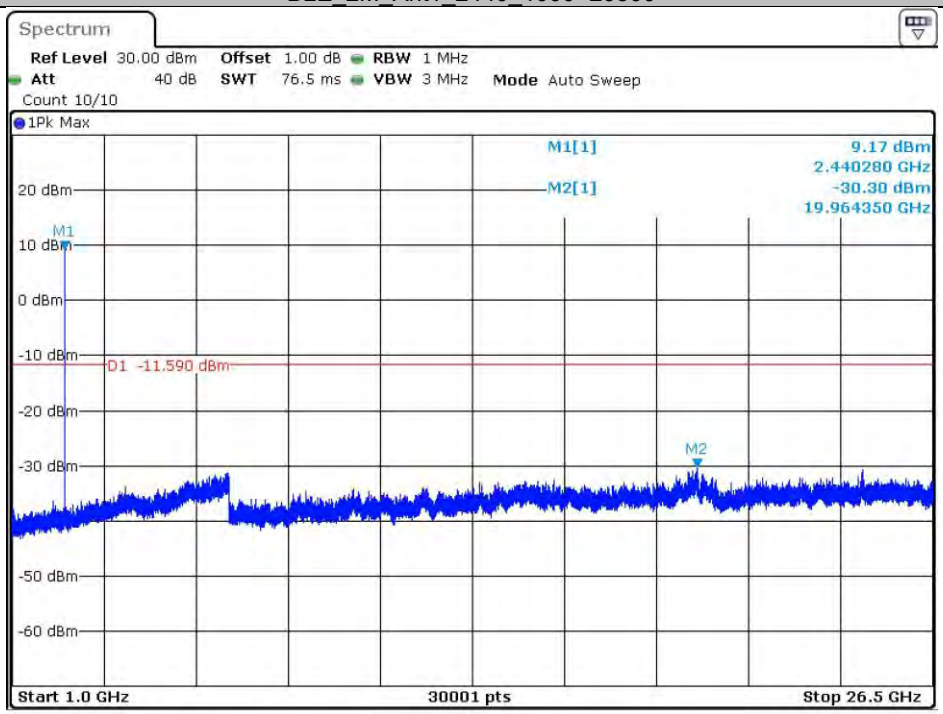
Date: 17.MAY.2021 03:54:02

BLE_2M_Ant1_2440_30~1000



Date: 17.MAY.2021 03:54:06

BLE_2M_Ant1_2440_1000~26500



Date: 17.MAY.2021 03:54:28

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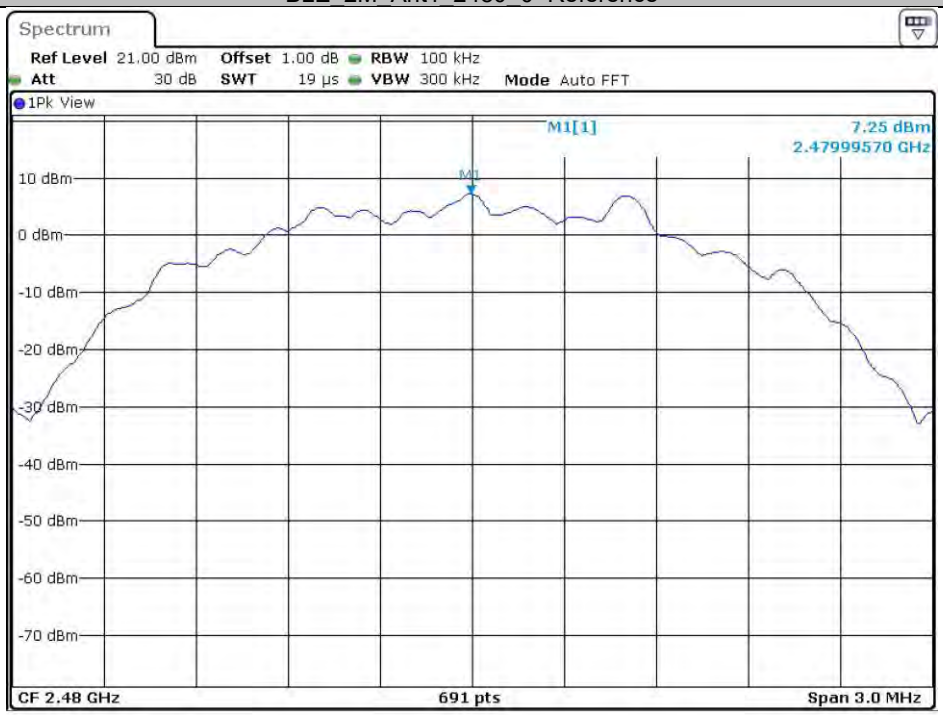
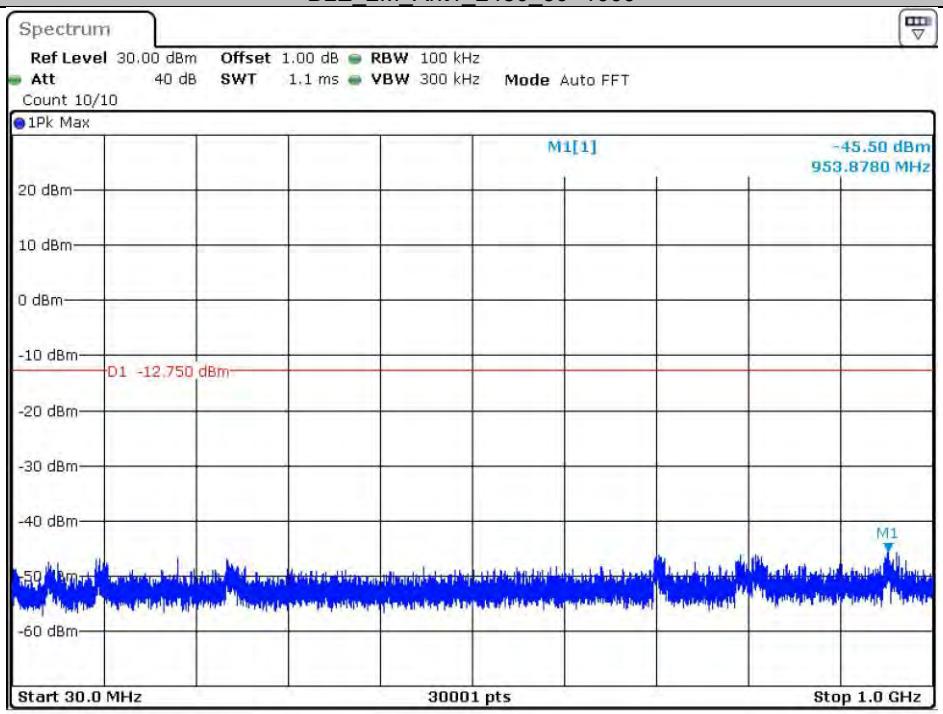
BLE_2M_Ant1_2480_0~Reference



Date: 17.MAY.2021 03:56:21

BLE_2M_Ant1_2480_30~1000



Date: 17.MAY.2021 03:56:26

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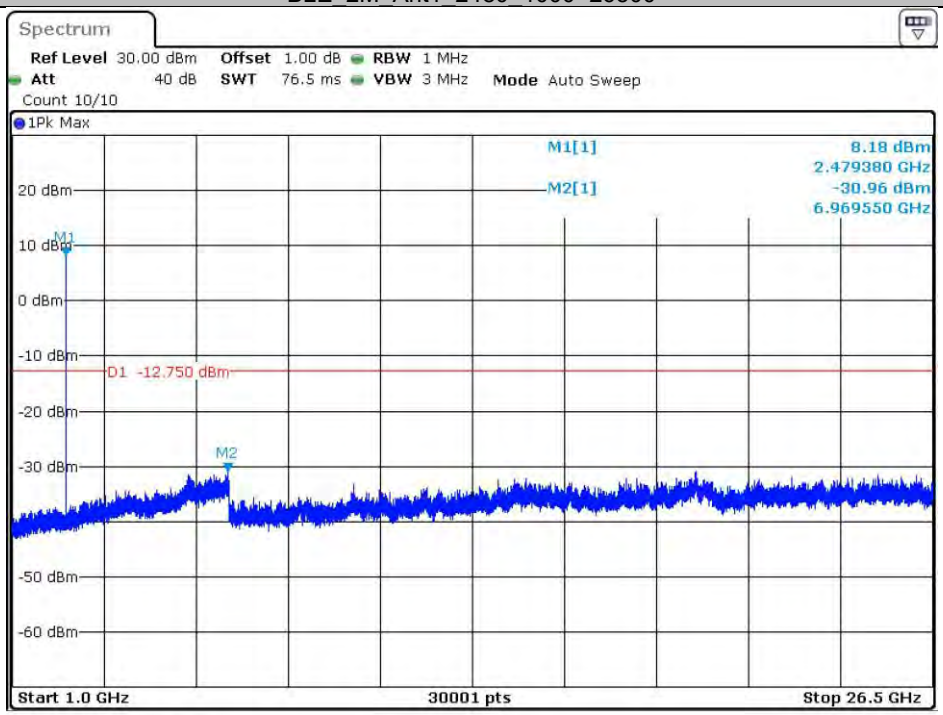
BLE_2M_Ant1_2480_1000~26500



Date: 17.MAY.2021 03:56:47

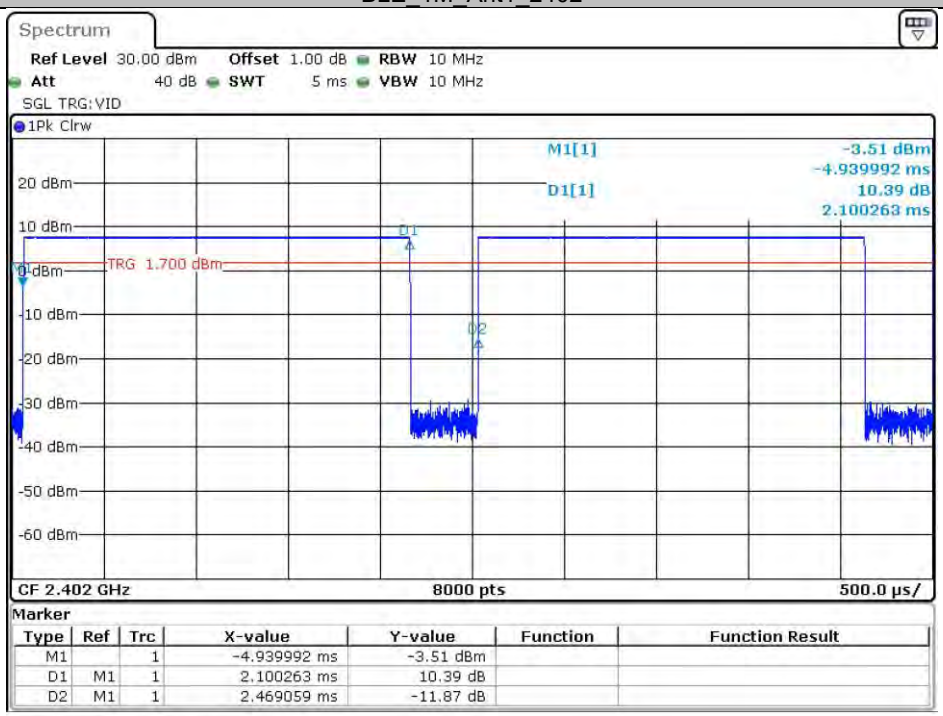
Duty Cycle

Test Result

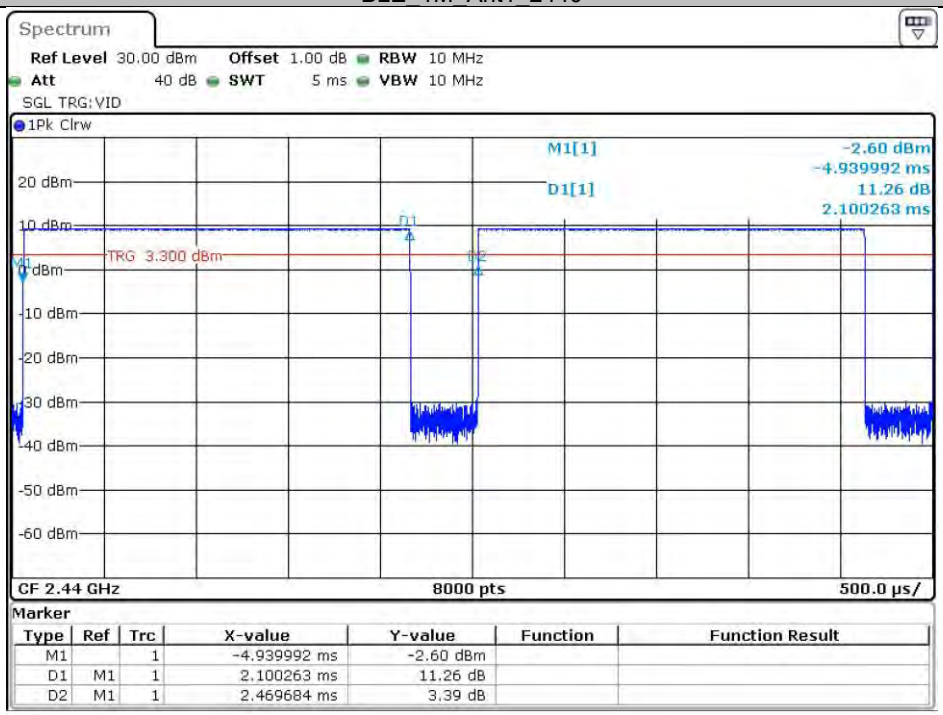
TestMode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Limit	Verdict
BLE_1M	Ant1	2402	2.10	2.47	85.02	---	PASS
		2440	2.10	2.47	85.02	---	PASS
		2480	2.10	2.47	85.02	---	PASS
BLE_2M	Ant1	2402	1.06	1.85	57.30	---	PASS
		2440	1.06	1.85	57.30	---	PASS
		2480	1.06	1.85	57.30	---	PASS

Test Graphs

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

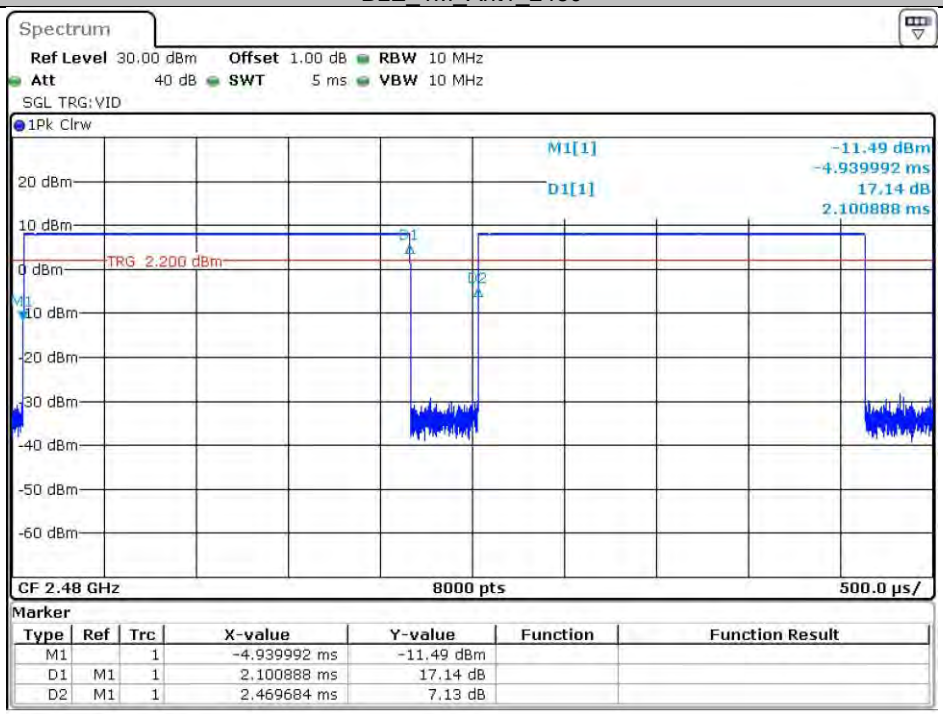


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	-4.939992 ms	-2.60 dBm		
D1	M1	1	2.100263 ms	11.26 dB		
D2	M1	1	2.469684 ms	3.39 dB		

Date: 17.MAY.2021 03:48:03

BLE_1M_Ant1_2480

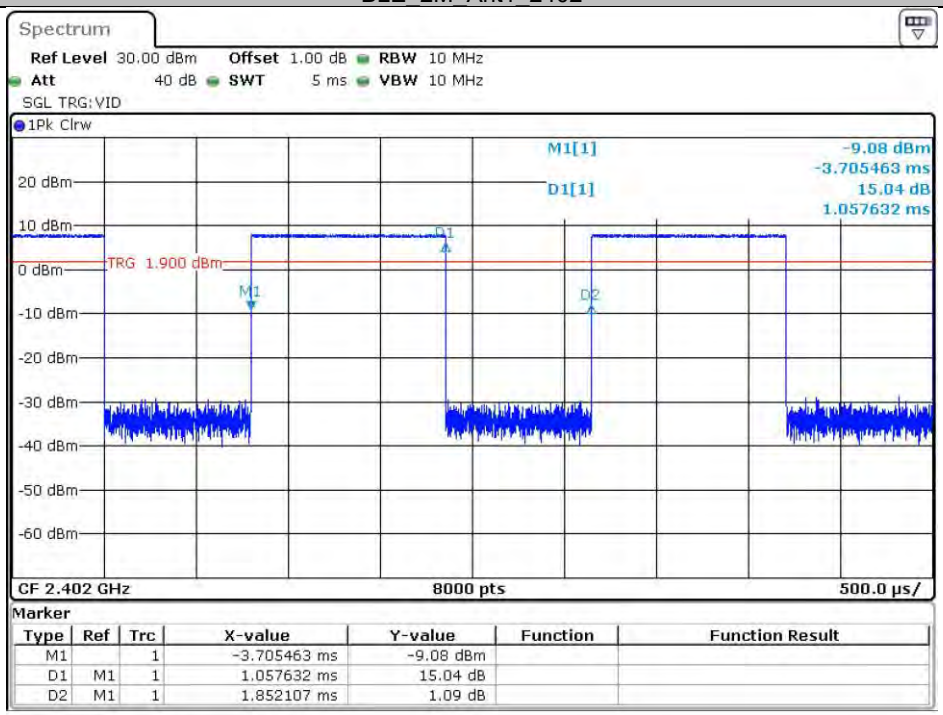


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	-4.939992 ms	-11.49 dBm		
D1	M1	1	2.100888 ms	17.14 dB		
D2	M1	1	2.469684 ms	7.13 dB		

Date: 17.MAY.2021 03:49:57

BLE_2M_Ant1_2402

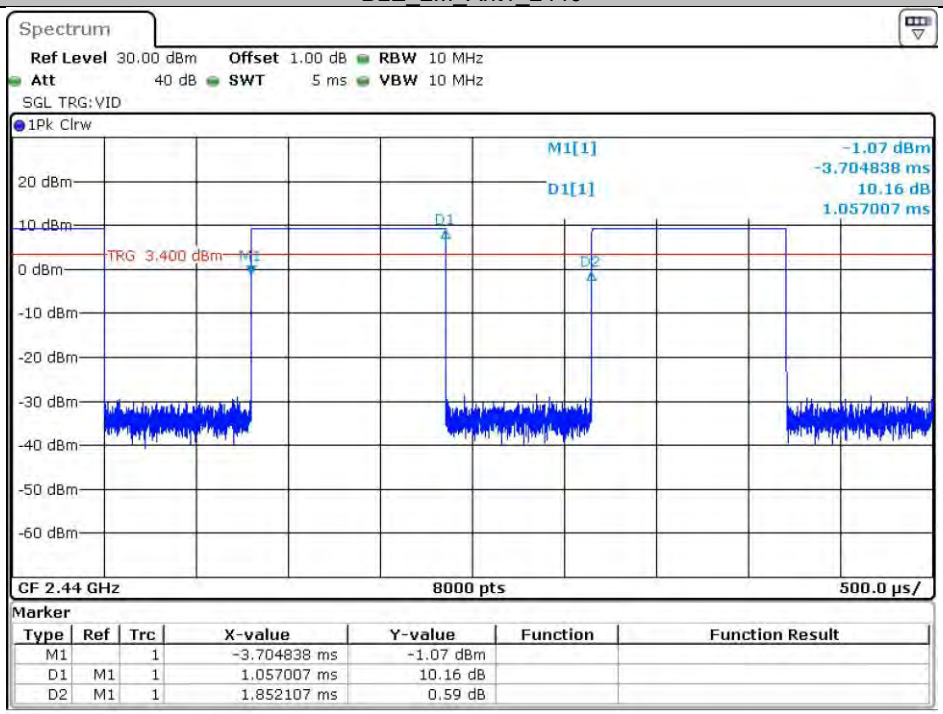


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	-3.705463 ms	-9.08 dBm		
D1	M1	1	1.057632 ms	15.04 dB		
D2	M1	1	1.852107 ms	1.09 dB		

Date: 17.MAY.2021 03:51:38

BLE_2M_Ant1_2440

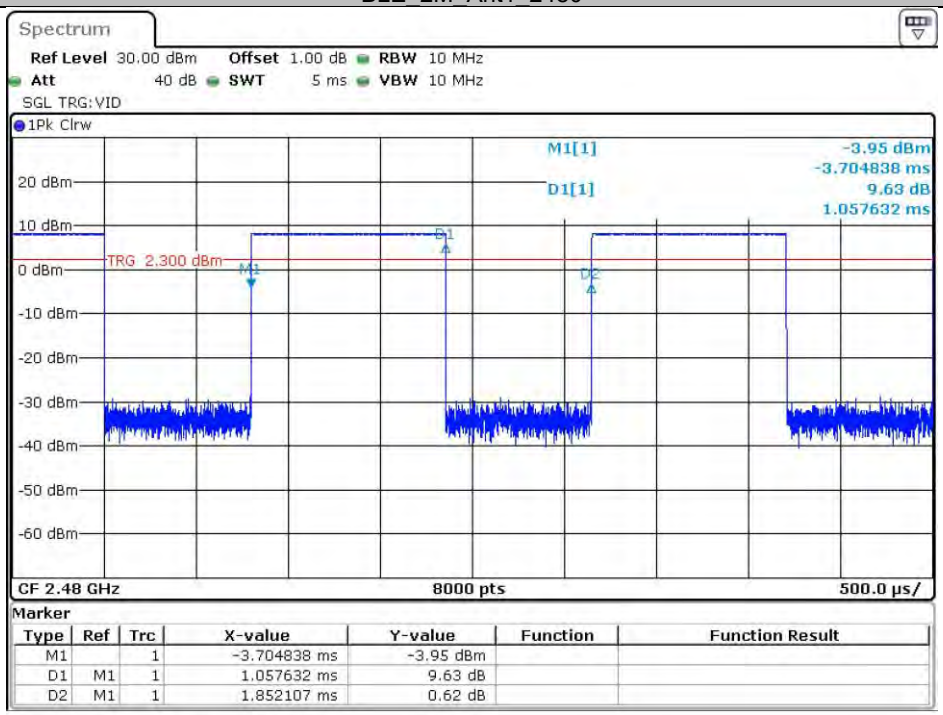


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	-3.704838 ms	-1.07 dBm		
D1	M1	1	1.057007 ms	10.16 dB		
D2	M1	1	1.852107 ms	0.59 dB		

Date: 17.MAY.2021 03:53:29

BLE_2M_Ant1_2480



The End