



FCC Radio Test Report

FCC ID: 2AKBP-BR1

Applicant : Shenzhen Hysiry Technology Co., Ltd.

Equipment Under Test (EUT)

EUT Name : Bluetooth remote control

Model(s) : BR1

Series Model No. : N/A

Brand Name :  HYSIRY
汇思锐

Receipt Date : 2019-10-24

Test Date : 2019-10-24 to 2019-11-2

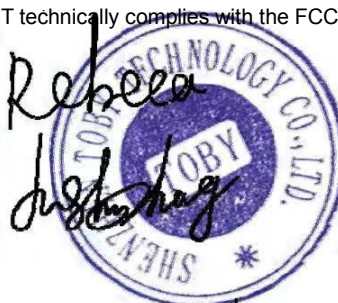
Issue Date : 2019-11-11

Standards : FCC Part 15, Subpart C (15.247: 2018)

Conclusions : **PASS**

In the configuration tested, the EUT complied with the standards specified above
The EUT technically complies with the FCC requirements

Test/Witness Engineer :



Approved & Authorized :



This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

Contents

CONTENTS.....	2
1. GENERAL INFORMATION.....	4
1.1 Client Information.....	4
1.2 General Description of EUT (Equipment Under Test).....	4
1.3 Block Diagram Showing The Configuration of System Tested.....	5
1.4 Description of Support Units.....	5
1.5 Description of Test Mode.....	6
1.6 Description of Test Software Setting.....	7
2. TEST SUMMARY.....	9
3. TEST EQUIPMENT.....	10
4. CONDUCTED EMISSION TEST.....	12
4.1 Test Standard and Limit.....	12
4.2 Test Setup.....	12
4.3 Test Procedure.....	12
4.4 EUT Operating Mode.....	13
4.5 Test Data.....	13
5. RADIATED EMISSION TEST.....	14
5.1 Test Standard and Limit.....	14
5.2 Test Setup.....	14
5.3 Test Procedure.....	15
5.4 EUT Operating Condition.....	16
5.5 Test Data.....	16
6. RESTRICTED BANDS REQUIREMENT.....	17
6.1 Test Standard and Limit.....	17
6.2 Test Setup.....	17
6.3 Test Procedure.....	17
6.4 EUT Operating Condition.....	18
6.5 Test Data.....	18
7. BANDWIDTH TEST.....	19
7.1 Test Standard and Limit.....	19
7.2 Test Setup.....	19
7.3 Test Procedure.....	19
7.4 EUT Operating Condition.....	19
7.5 Test Data.....	19
8. PEAK OUTPUT POWER TEST.....	20
8.1 Test Standard and Limit.....	20
8.2 Test Setup.....	20
8.3 Test Procedure.....	20

8.4 EUT Operating Condition.....	20
8.5 Test Data.....	20
9. POWER SPECTRAL DENSITY TEST.....	21
9.1 Test Standard and Limit.....	21
9.2 Test Setup.....	21
9.3 Test Procedure.....	21
9.4 EUT Operating Condition.....	21
9.5 Test Data.....	22
10. ANTENNA REQUIREMENT.....	23
10.1 Test Standard and Limit.....	23
10.2 Antenna Connected Construction.....	23
ATTACHMENT A-- RADIATED EMISSION TEST DATA.....	24
ATTACHMENT B-- RESTRICTED BANDS& BAND-EDGE REQUIREMENT.....	38
ATTACHMENT C-- BANDWIDTH TEST DATA.....	48
ATTACHMENT D-- PEAK OUTPUT POWER TEST DATA.....	52
ATTACHMENT E-- POWER SPECTRAL DENSITY TEST DATA.....	54

1. General Information

1.1 Client Information

Applicant	:	Shenzhen Hysiry Technology Co., Ltd.
Address	:	2403D, 24th floor, coast huanqing building, no.24 futian road, xu town community, futian street, futian district, shenzhen
Manufacturer	:	Shenzhen Hysiry Technology Co., Ltd.
Address	:	2403D, 24th floor, coast huanqing building, no.24 futian road, xu town community, futian street, futian district, shenzhen

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Bluetooth remote control	
Model(s)	:	BR1	
Series Model No.	:	N/A	
Product Description	:	Operation Frequency:	2402MHz~2480MHz
		Number of Channel:	40
		RF Output Power:	BLE 1M:-9.51dBm BLE 2M:-9.48dBm
		Antenna Gain:	1.7dBi PCB Antenna
		Modulation Type:	GFSK
		Bluetooth version:	Bluetooth 5.0
Power Supply	:	DC Voltage Supplied	
Power Rating	:	Input: DC 3V for button battery	
Software Version	:	V1.0	
Hardware Version	:	V1.0	
Connecting I/O Port(S)	:	Please refer to the User's Manual	

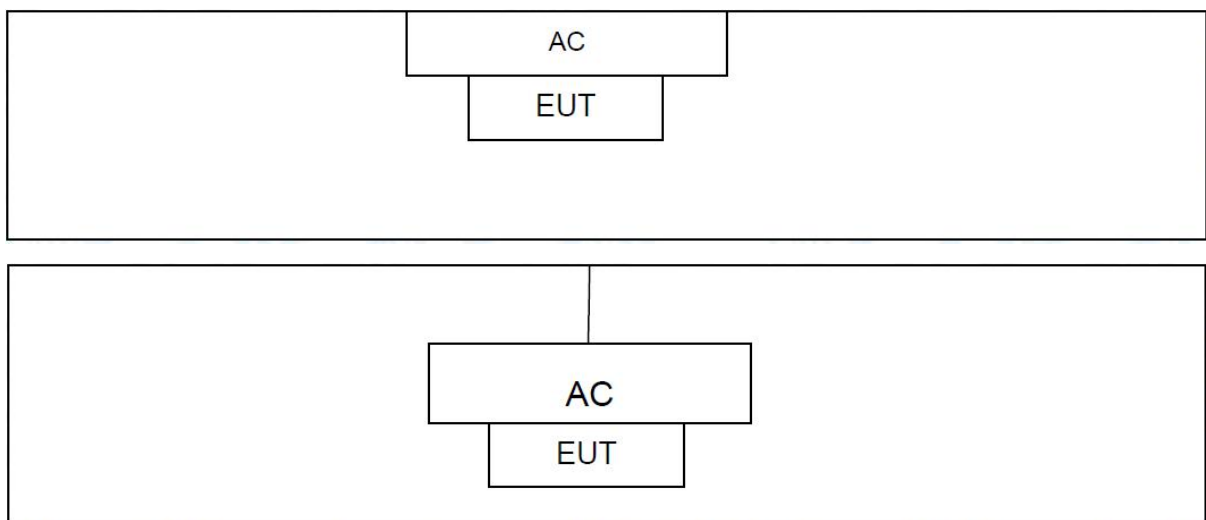
Note:

- (1) This Test Report is FCC Part 15.247, the test procedure follows the FCC KDB 558074 D01 DTS Meas Guidance v05.
- (2) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (3) Channel list

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	14	2430	28	2458
01	2404	15	2432	29	2460
02	2406	16	2434	30	2462
03	2408	17	2436	31	2464
04	2410	18	2438	32	2466
05	2412	19	2440	33	2468
06	2414	20	2442	34	2470
07	2416	21	2444	35	2472
08	2418	22	2446	36	2474
09	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456		

(4) The Antenna information about the equipment is provided by the applicant.

1.3 Block Diagram Showing The Configuration of System Tested



1.4 Description of Support Units

The EUT has been tested as an independent unit.

1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

For Conducted Test	
Final Test Mode	Description
Mode 1	BLE 1M Channel 00
For Radiated Test	
Final Test Mode	Description
Mode 2	BLE 1M Channel 00/19/39
Mode 3	BLE 2M Channel 00/19/39

Note:

- (1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.
According to ANSI C63.10 standards, the measurements are performed at the highest, Middle, lowest available channels, and the worst case data rate as follows:
BLE 1M Channel 00/19/39
BLE 2M Channel 00/19/39
- (2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.
- (3) The EUT is considered a mobile unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

1.6 Description of Test Software Setting

During testing channel & Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of Bluetooth.

Test Software Version	EMI_TEST_v1.4
Power Setting	Power Setting: not applicable, test used software default power level.

1.7 Measurement Uncertainty

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

Test Item	Parameters	Expanded Uncertainty (ULab)
Conducted Emission	Level Accuracy: 9kHz~150kHz	± 3.42 dB
	150kHz to 30MHz	± 3.42 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	± 4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	± 4.40 dB
Radiated Emission	Level Accuracy: Above 1000MHz	± 4.20 dB

1.8 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

A2LA Certificate No.: 4750.01

The laboratory has been accredited by American Association for Laboratory

Accreditation(A2LA) to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01. FCC Accredited Test Site Number: 854351.

IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

2. Test Summary

FCC Part 15 Subpart C(15.247)/ RSS 247 Issue 2				
Standard Section		Test Item	Judgment	Remark
FCC	IC			
15.203	/	Antenna Requirement	PASS	N/A
15.207	RSS-GEN 7.2.4	Conducted Emission	N/A	N/A
15.205	RSS-GEN 7.2.2	Restricted Bands	PASS	N/A
15.247(a)(2)	RSS 247 5.2 (1)	6dB Bandwidth	PASS	N/A
15.247(b)	RSS 247 5.4 (4)	Peak Output Power	PASS	N/A
15.247(e)	RSS 247 5.2 (2)	Power Spectral Density	PASS	N/A
15.247(d)	RSS 247 5.5	Band Edge	PASS	N/A
15.247(d)& 15.209	RSS 247 5.5	Transmitter Radiated Spurious Emission	PASS	N/A
Note: “/” for no requirement for this test item. N/A is an abbreviation for Not Applicable.				

3. Test equipment

Conducted Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Jul. 20, 2019	Jul. 19, 2020
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Jul. 20, 2019	Jul. 19, 2020
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Jul. 20, 2019	Jul. 19, 2020
LISN	Rohde & Schwarz	ENV216	101131	Jul. 20, 2019	Jul. 19, 2020
Radiation Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 20, 2019	Jul. 19, 2020
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 20, 2019	Jul. 19, 2020
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 25, 2019	Mar. 24, 2020
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 24, 2019	Mar. 23, 2020
Pre-amplifier	Sonoma	310N	185903	Mar.24, 2019	Mar. 23, 2020
Pre-amplifier	HP	8449B	3008A00849	Mar.25, 2019	Mar. 24, 2020
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 24, 2019	Mar. 23, 2020
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Antenna Conducted Emission					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 20, 2019	Jul. 19, 2020
Spectrum Analyzer	Rohde & Schwarz	ESCI	100010/007	Jul. 20, 2019	Jul. 19, 2020
MXA Signal Analyzer	Agilent	N9020A	MY49100060	Jul. 20, 2019	Jul. 19, 2020
Vector Signal Generator	Agilent	N5182A	MY50141294	Jul. 20, 2019	Jul. 19, 2020
Analog Signal Generator	Agilent	N5181A	MY50141953	Jul. 20, 2019	Jul. 19, 2020
RF Power	DARE!!	RadiPowerRP	17I00015SNO	Jul. 20, 2019	Jul. 19, 2020

Sensor	Instruments	R3006W	26		
	DARE!! Instruments	RadiPowerRP R3006W	17I00015SNO 29	Jul. 20, 2019	Jul. 19, 2020
	DARE!! Instruments	RadiPowerRP R3006W	17I00015SNO 31	Jul. 20, 2019	Jul. 19, 2020
	DARE!! Instruments	RadiPowerRP R3006W	17I00015SNO 33	Jul. 20, 2019	Jul. 19, 2020

4. Conducted Emission Test

4.1 Test Standard and Limit

4.1.1 Test Standard

FCC Part 15.207

4.1.2 Test Limit

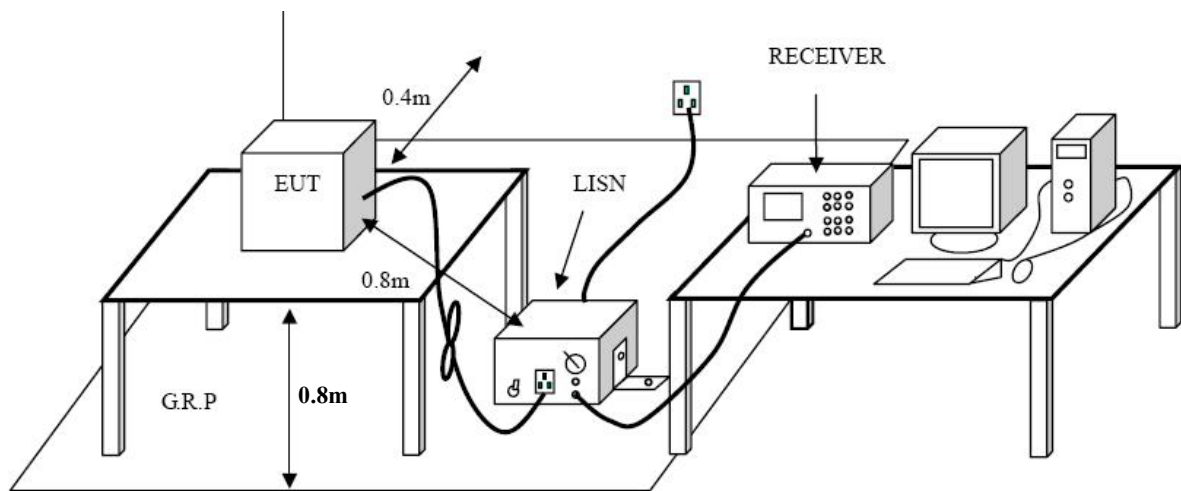
Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dB μ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Notes:

- (1) *Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2 Test Setup



4.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

4.4 EUT Operating Mode

Please refer to the description of test mode.

4.5 Test Data

Not Applicable.

5. Radiated Emission Test

5.1 Test Standard and Limit

5.1.1 Test Standard

FCC Part 15.209

5.1.2 Test Limit

Radiated Emission Limits (9 kHz~1000 MHz)

Frequency MHz	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	3
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Radiated Emission Limit (Above 1000MHz)

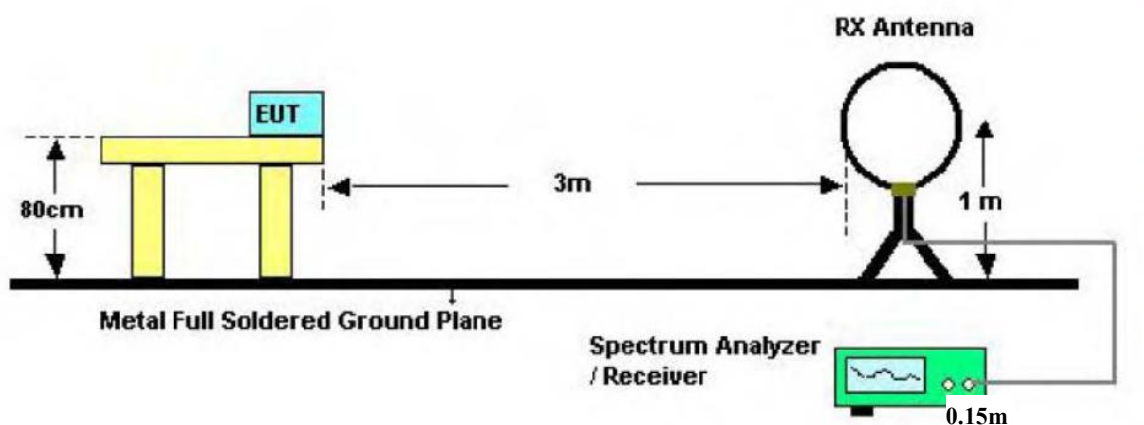
Frequency MHz	Distance of 3m (dBuV/m)	
	Peak	Average
Above 1000	74	54

Note:

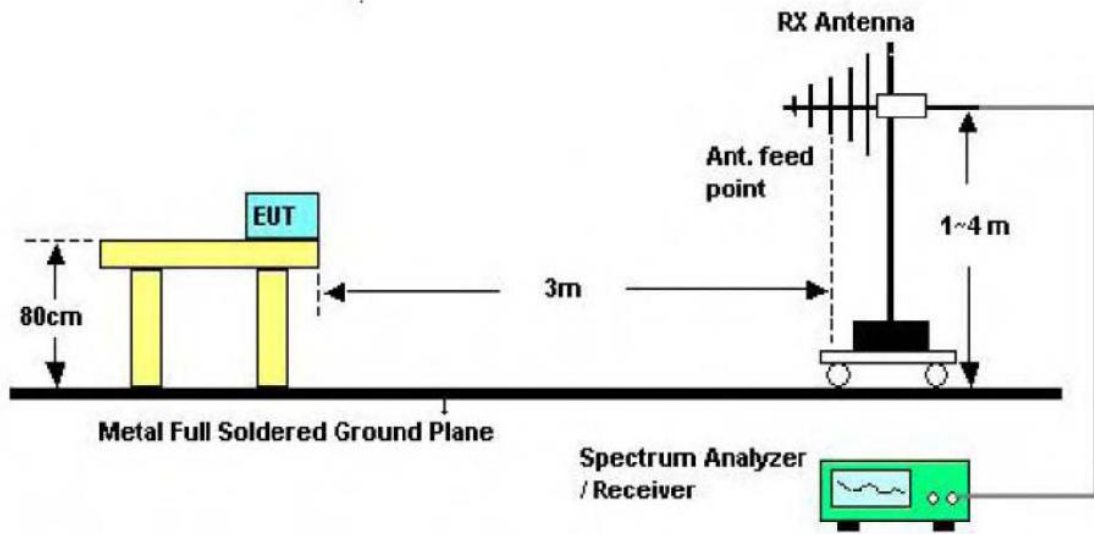
(1) The tighter limit applies at the band edges.

(2) Emission Level(dBuV/m)=20log Emission Level(uV/m).

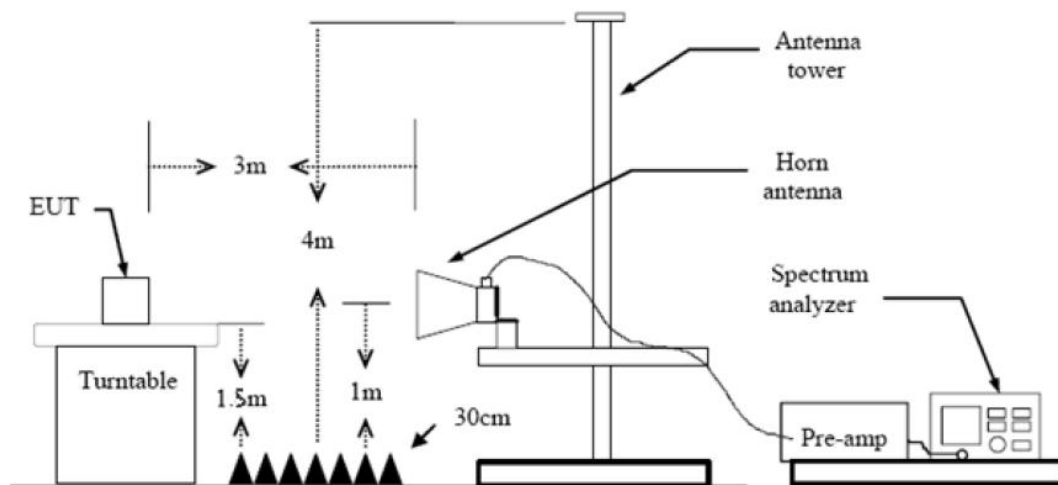
5.2 Test Setup



Below 30MHz Test Setup



Below 1000MHz Test Setup



Above 1GHz Test Setup

5.3 Test Procedure

- (1) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency Below 1GHz. The EUT was placed on a rotating 0.8m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to

determine the position of the highest radiation.

- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.

5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

5.5 Test Data

Please refer to the following pages.

6. Restricted Bands Requirement

6.1 Test Standard and Limit

6.1.1 Test Standard

FCC Part 15.247(d)

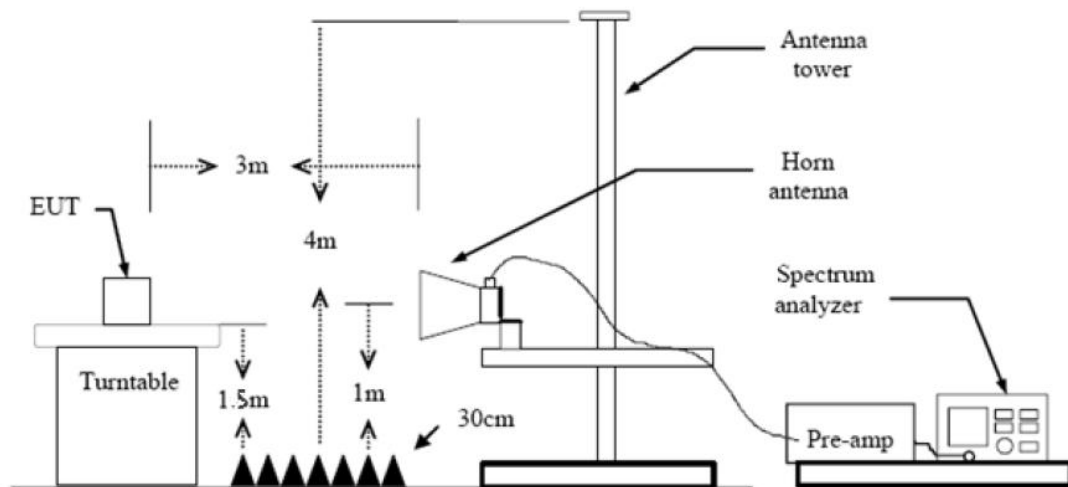
FCC Part 15.209

FCC Part 15.205

6.1.2 Test Limit

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

6.2 Test Setup



6.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency Below 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.

-
-
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
 - (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
 - (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
 - (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
 - (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
 - (8) For the actual test configuration, please see the test setup photo.

6.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

6.5 Test Data

Please refer to the Attachment B.

7. Bandwidth Test

7.1 Test Standard and Limit

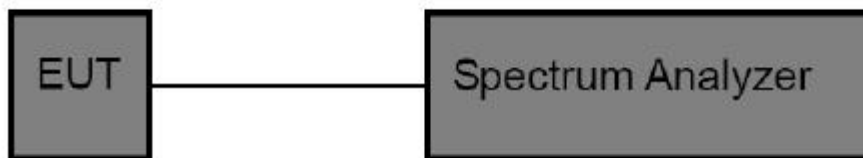
7.1.1 Test Standard

FCC Part 15.247(a)(2)

7.1.2 Test Limit

FCC Part 15 Subpart C(15.247)		
Test Item	Limit	Frequency Range(MHz)
Bandwidth	≥ 500 KHz (6dB bandwidth)	2400~2483.5

7.2 Test Setup



7.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst –case (i.e the widest) bandwidth.
- (3) Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:100 kHz, and Video Bandwidth:300 kHz, Detector: Peak, Sweep Time set auto.

7.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, Digital photo framesdle and high channel for the test.

7.5 Test Data

Please refer to the Attachment C.

8. Peak Output Power Test

8.1 Test Standard and Limit

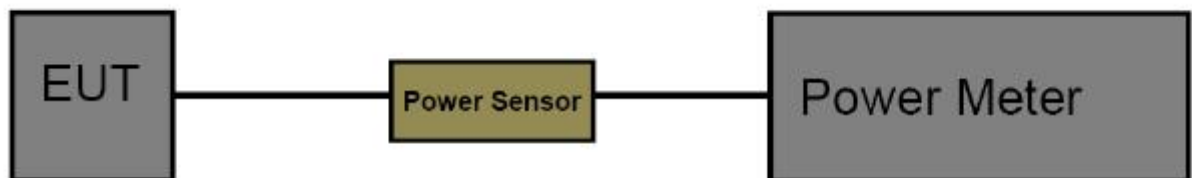
8.1.1 Test Standard

FCC Part 15.247(b)

8.1.2 Test Limit

FCC Part 15 Subpart C(15.247)		
Test Item	Limit	Frequency Range(MHz)
Peak Output Power	1 Watt or 30 dBm	2400~2483.5

8.2 Test Setup



8.3 Test Procedure

The measurement is according to section 9.1.2 of KDB 558074 D01 DTS Meas Guidance v05. The EUT was connected to RF power meter via a broadband power sensor as show the block above. The power sensor video bandwidth is greater than or equal to the DTS bandwidth of the equipment.

8.4 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.

8.5 Test Data

Please refer to the Attachment D.

9. Power Spectral Density Test

9.1 Test Standard and Limit

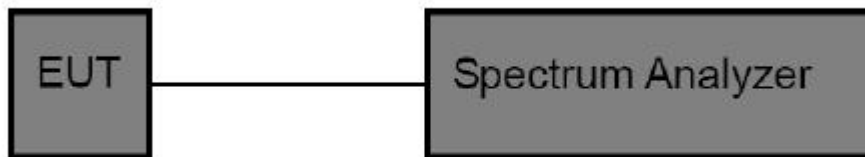
9.1.1 Test Standard

FCC Part 15.247(e)

9.1.2 Test Limit

FCC Part 15 Subpart C(15.247)		
Test Item	Limit	Frequency Range(MHz)
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5

9.2 Test Setup



9.3 Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v05.

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Set analyser center frequency to DTS channel center frequency.
- (3) Set the span to 1.5 times the DTS bandwidth.
- (4) Set the RBW to: 3 kHz
- (5) Set the VBW to: 10 kHz
- (6) Detector: peak
- (7) Sweep time: auto
- (8) Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

9.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, Digital photo framesdle and high channel for the test.

9.5 Test Data

Please refer to the Attachment E.

10. Antenna Requirement

10.1 Test Standard and Limit

10.1.1 Standard

FCC Part 15.203

10.1.2 Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. 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.

10.2 Antenna Connected Construction

The gains of the antenna used for transmitting is 1.7dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

Result

The EUT antenna is a PCB Antenna. It complies with the standard requirement.

Antenna Type
☒ Permanent attached antenna
☐ Unique connector antenna
☐ Professional installation antenna

Attachment A-- Radiated Emission Test Data

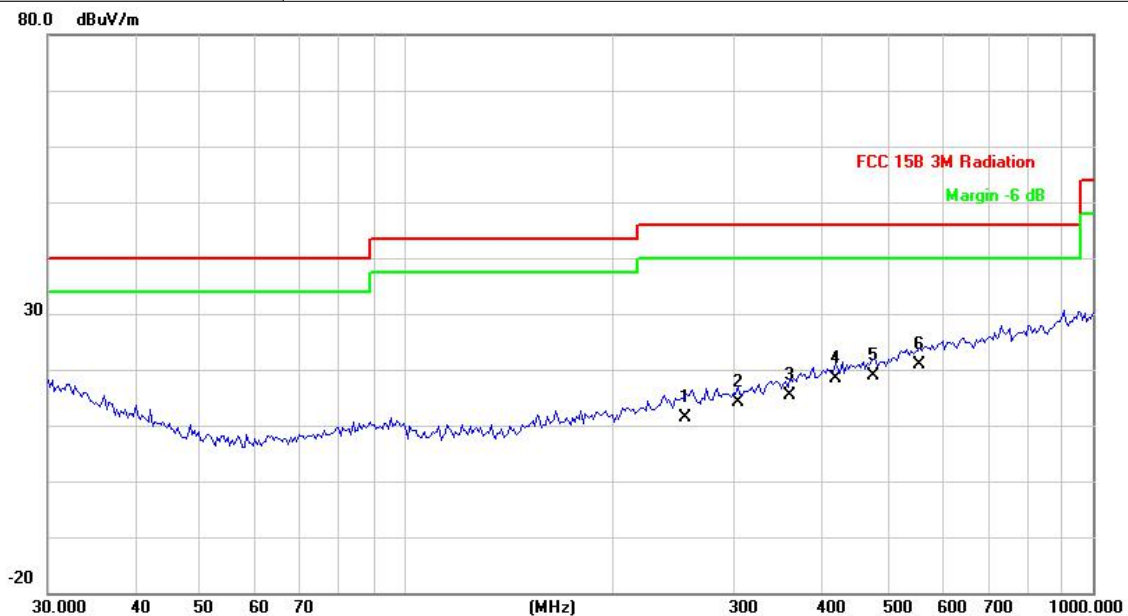
9KHz~30MHz

From 9KHz to 30MHz: Conclusion: PASS

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

30MHz~1GHz

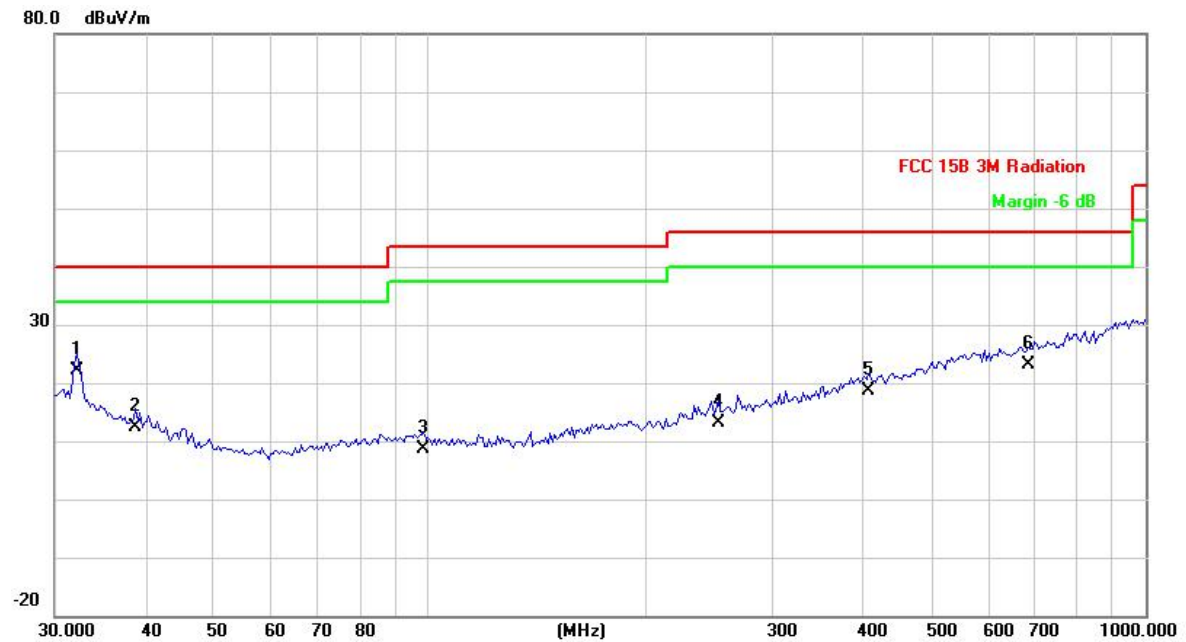
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Horizontal		
Test Mode:	TX BLE 1M Mode 2402MHz		
Remark:	Only worse case is reported		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		254.7284	28.44	-16.94	11.50	46.00	-34.50	QP
2		303.5437	29.97	-15.87	14.10	46.00	-31.90	QP
3		361.7139	29.25	-13.85	15.40	46.00	-30.60	QP
4		422.0577	30.45	-11.95	18.50	46.00	-27.50	QP
5		478.8456	29.77	-10.97	18.80	46.00	-27.20	QP
6	*	558.7302	29.50	-8.70	20.80	46.00	-25.20	QP

Emission Level= Read Level+ Correct Factor

Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Vertical		
Test Mode:	TX BLE 1M Mode 2402MHz		
Remark:	Only worse case is reported		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	32.1795	36.75	-14.65	22.10	40.00	-17.90	QP
2		38.8878	31.14	-18.64	12.50	40.00	-27.50	QP
3		98.1419	30.81	-22.11	8.70	43.50	-34.80	QP
4		252.9482	30.08	-16.98	13.10	46.00	-32.90	QP
5		410.3825	30.62	-12.02	18.60	46.00	-27.40	QP
6		684.7454	30.18	-6.98	23.20	46.00	-22.80	QP

Emission Level= Read Level+ Correct Factor

Above 1G

Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Horizontal		
Test Mode:	TX BLE 1M Mode 2402MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.712	28.31	12.42	40.73	54.00	-13.27	AVG
2		4803.820	42.00	12.42	54.42	74.00	-19.58	peak

Emission Level= Read Level+ Correct Factor

Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3.3V		
Ant. Pol.	Vertical		
Test Mode:	TX BLE 1M Mode 2402MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4804.096	40.53	12.42	52.95	74.00	-21.05	peak
2	*	4804.168	28.22	12.42	40.64	54.00	-13.36	AVG

Emission Level= Read Level+ Correct Factor

Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Horizontal		
Test Mode:	TX BLE 1M Mode 2442MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4882.722	28.14	12.90	41.04	54.00	-12.96	AVG
2		4883.736	42.61	12.90	55.51	74.00	-18.49	peak

Emission Level= Read Level+ Correct Factor

Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Vertical		
Test Mode:	TX BLE 1M Mode 2442MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4882.518	28.11	12.90	41.01	54.00	-12.99	AVG
2		4882.560	42.08	12.90	54.98	74.00	-19.02	peak

Emission Level= Read Level+ Correct Factor

Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Horizontal		
Test Mode:	TX BLE 1M Mode 2480MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4960.696	41.58	13.38	54.96	74.00	-19.04	peak
2	*	4960.906	27.98	13.38	41.36	54.00	-12.64	AVG

Emission Level= Read Level+ Correct Factor

Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Vertical		
Test Mode:	TX BLE 1M Mode 2480MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4960.606	27.99	13.38	41.37	54.00	-12.63	AVG
2		4961.122	41.44	13.38	54.82	74.00	-19.18	peak

Emission Level= Read Level+ Correct Factor

Temperature:	26 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Horizontal		
Test Mode:	TX BLE 2M Mode 2402MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4802.956	41.84	12.41	54.25	74.00	-19.75	peak
2	*	4804.762	27.94	12.43	40.37	54.00	-13.63	AVG

Emission Level= Read Level+ Correct Factor

Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Vertical		
Test Mode:	TX BLE 2M Mode 2402MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4803.700	42.06	12.42	54.48	74.00	-19.52	peak
2	*	4804.408	27.98	12.42	40.40	54.00	-13.60	AVG

Emission Level= Read Level+ Correct Factor

Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Horizontal		
Test Mode:	TX BLE 2M Mode 2442MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4883.328	42.19	12.90	55.09	74.00	-18.91	peak
2	*	4885.368	27.99	12.92	40.91	54.00	-13.09	AVG

Emission Level= Read Level+ Correct Factor

Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Vertical		
Test Mode:	TX BLE 2M Mode 2442MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4882.500	28.19	12.90	41.09	54.00	-12.91	AVG
2		4884.552	42.09	12.92	55.01	74.00	-18.99	peak

Emission Level= Read Level+ Correct Factor

Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Horizontal		
Test Mode:	TX BLE 2M Mode 2480MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4961.296	41.80	13.38	55.18	74.00	-18.82	peak
2		4961.458	27.92	13.39	41.31	74.00	-32.69	peak

Emission Level= Read Level+ Correct Factor

Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Vertical		
Test Mode:	TX BLE 2M Mode 2480MHz		
Remark:	No report for the emission which more than 10 dB below the prescribed limit.		

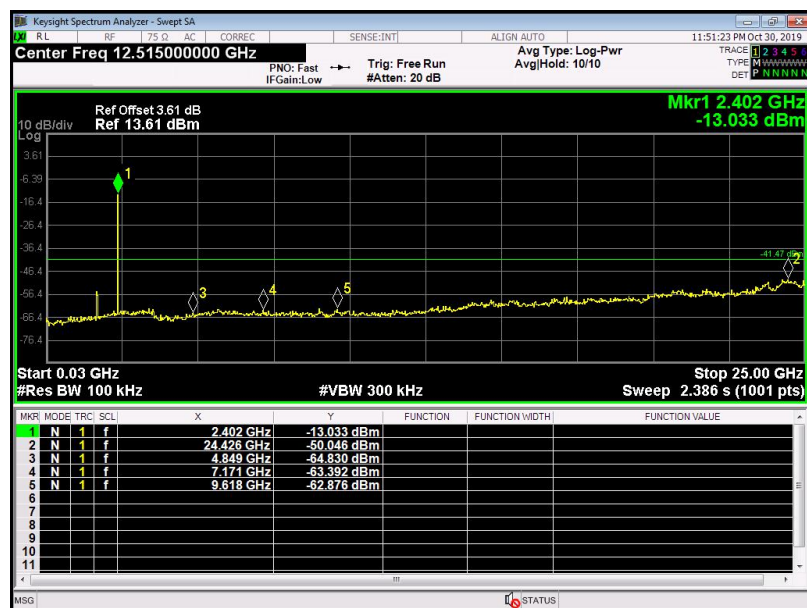
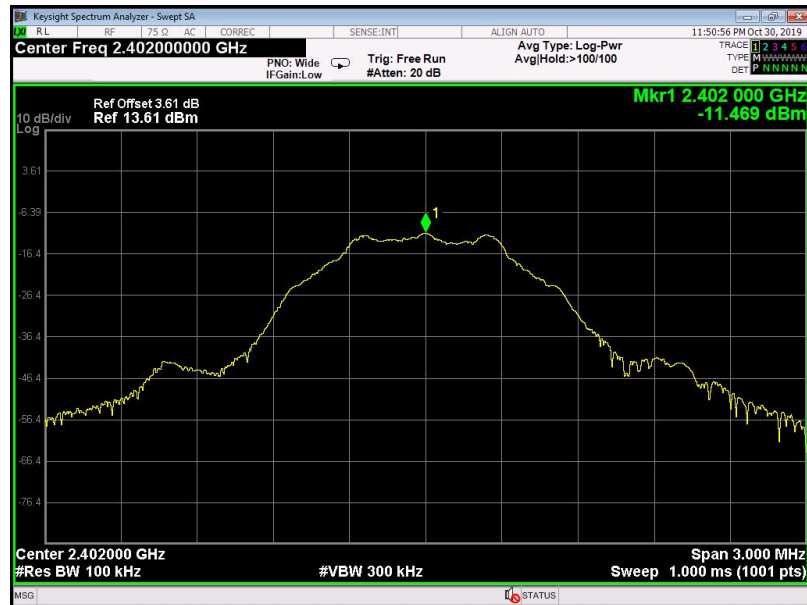
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4960.258	42.27	13.37	55.64	74.00	-18.36	peak
2	*	4961.284	27.93	13.38	41.31	54.00	-12.69	AVG

Emission Level= Read Level+ Correct Factor

Conducted Emission Test Data

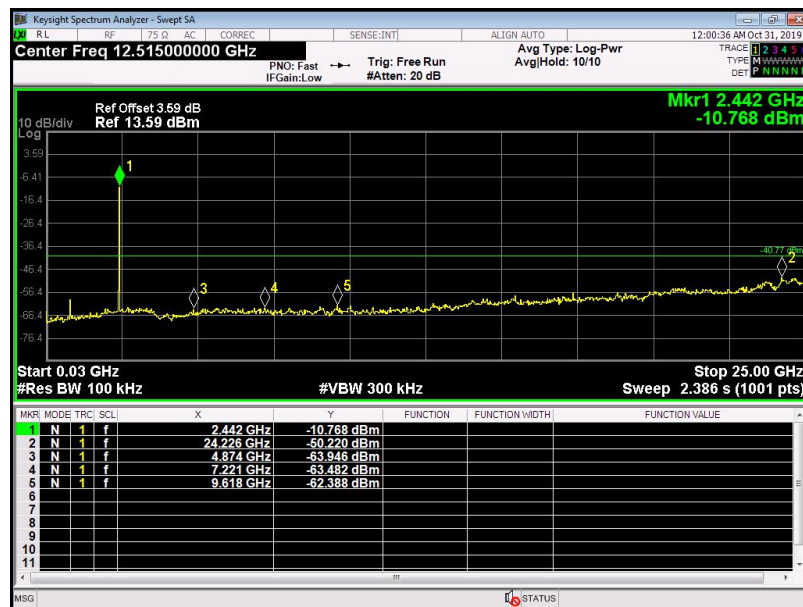
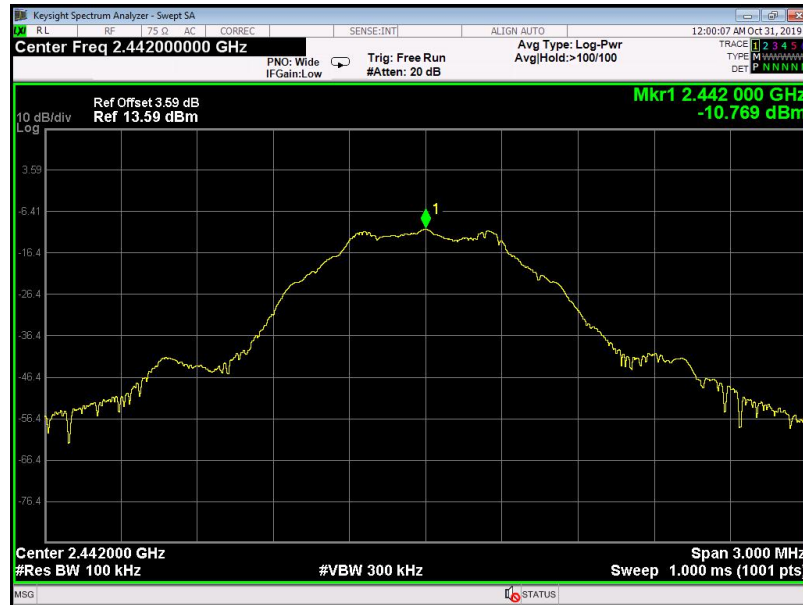
BLE 1M Mode

2402MHz



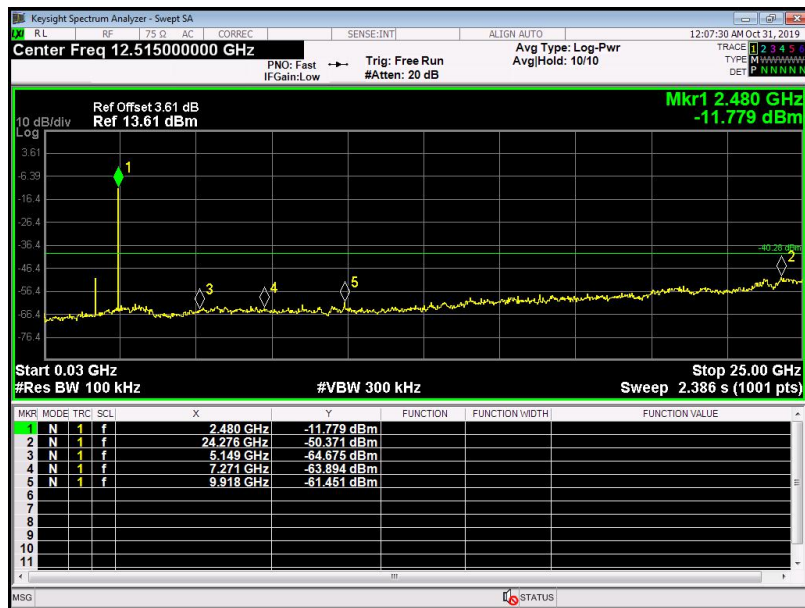
BLE 1M Mode

2442MHz



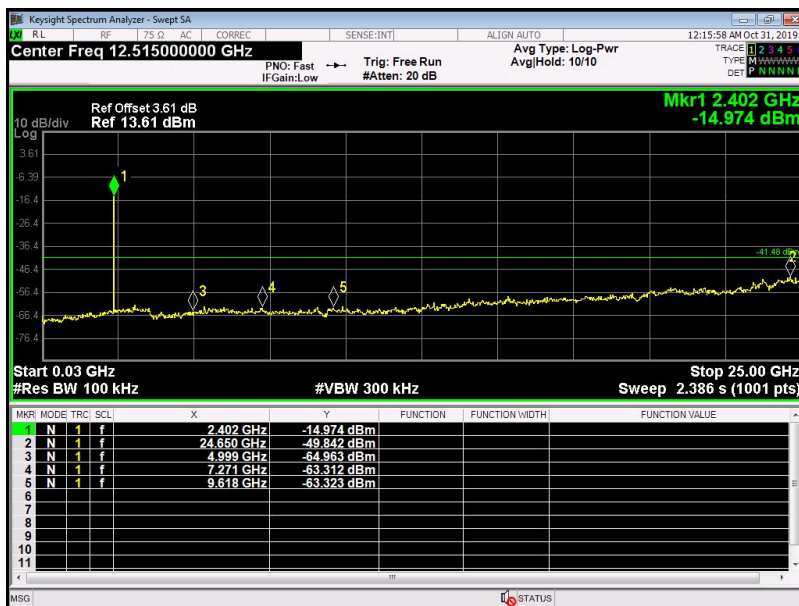
BLE 1M Mode

2480MHz



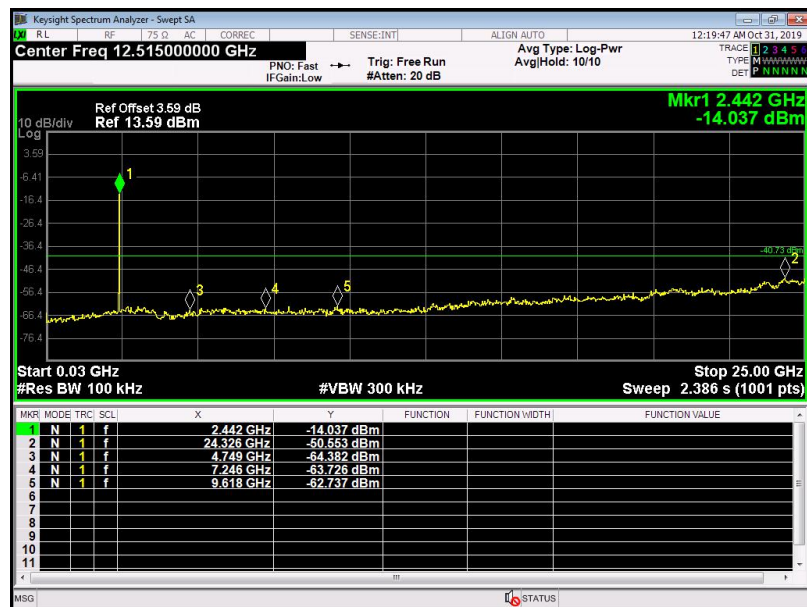
BLE 2M Mode

2402MHz



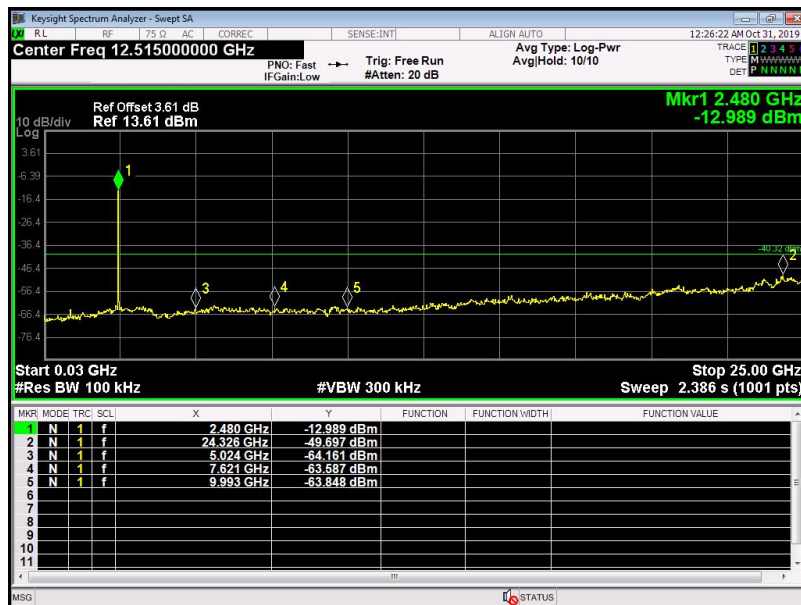
BLE 2M Mode

2442MHz



BLE 2M Mode

2480MHz



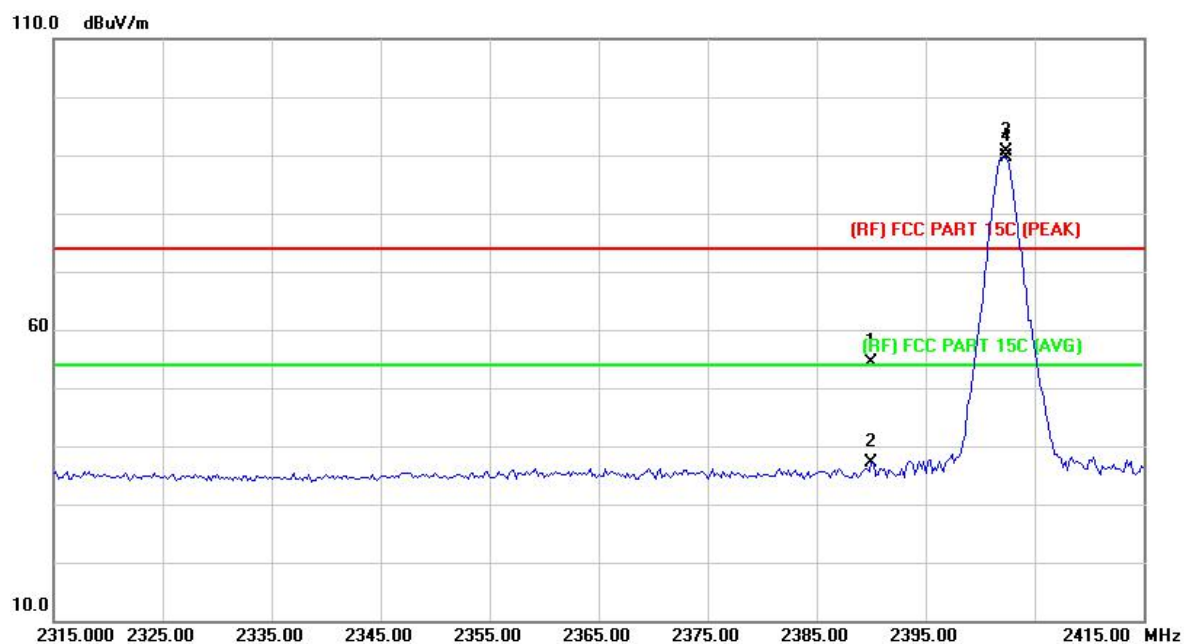
Attachment B-- Restricted Bands& Band-edge Requirement

Test Data

(1) Radiation Test



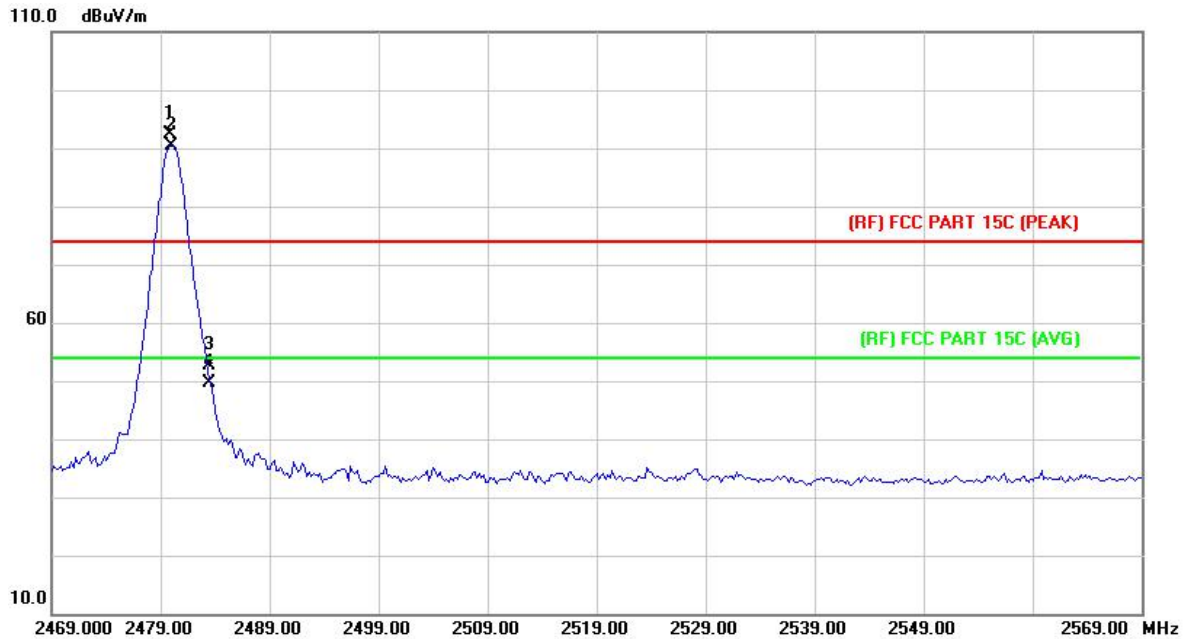
Temperature:	26 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Vertical		
Test Mode:	BLE 1M Mode 2402MHz		
Remark:	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	52.87	1.51	54.38	74.00	-19.62	peak
2		2390.000	35.64	1.51	37.15	54.00	-16.85	AVG
3	X	2402.400	89.12	1.56	90.68	74.00	16.68	peak
4	*	2402.400	88.10	1.56	89.66	54.00	35.66	AVG

Emission Level= Read Level+ Correct Factor

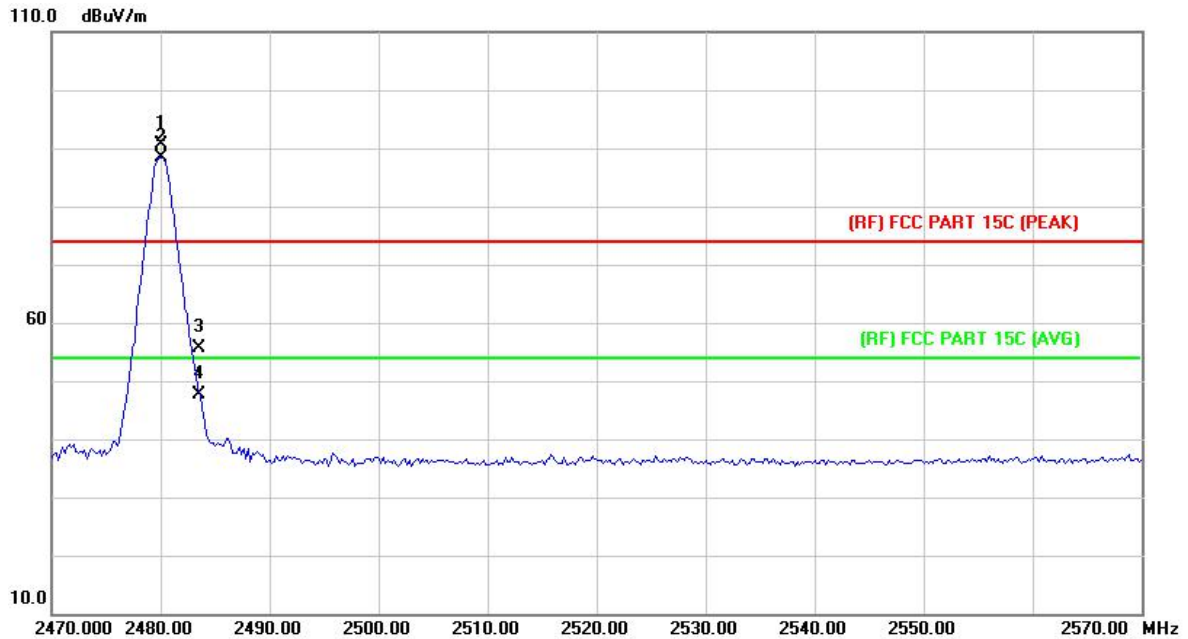
Temperature:	26 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Horizontal		
Test Mode:	BLE 1M Mode 2480MHz		
Remark:	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	X	2479.800	90.40	2.07	92.47	74.00	18.47	peak
2	*	2480.000	88.41	2.07	90.48	54.00	36.48	AVG
3		2483.500	50.55	2.10	52.65	74.00	-21.35	peak
4		2483.500	47.52	2.10	49.62	54.00	-4.38	AVG

Emission Level= Read Level+ Correct Factor

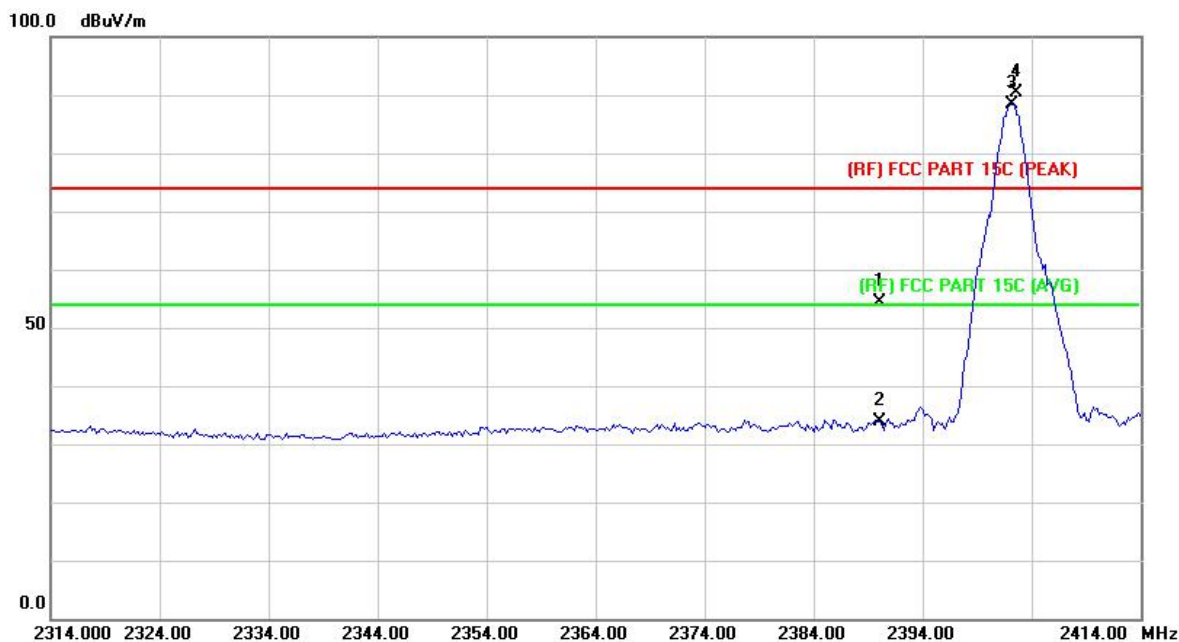
Temperature:	26 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Horizontal		
Test Mode:	BLE 1M Mode 2480MHz		
Remark:	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	X	2480.000	88.50	2.07	90.57	74.00	16.57	peak
2	*	2480.000	86.40	2.07	88.47	54.00	34.47	AVG
3		2483.500	53.54	2.10	55.64	74.00	-18.36	peak
4		2483.500	45.48	2.10	47.58	54.00	-6.42	AVG

Emission Level= Read Level+ Correct Factor

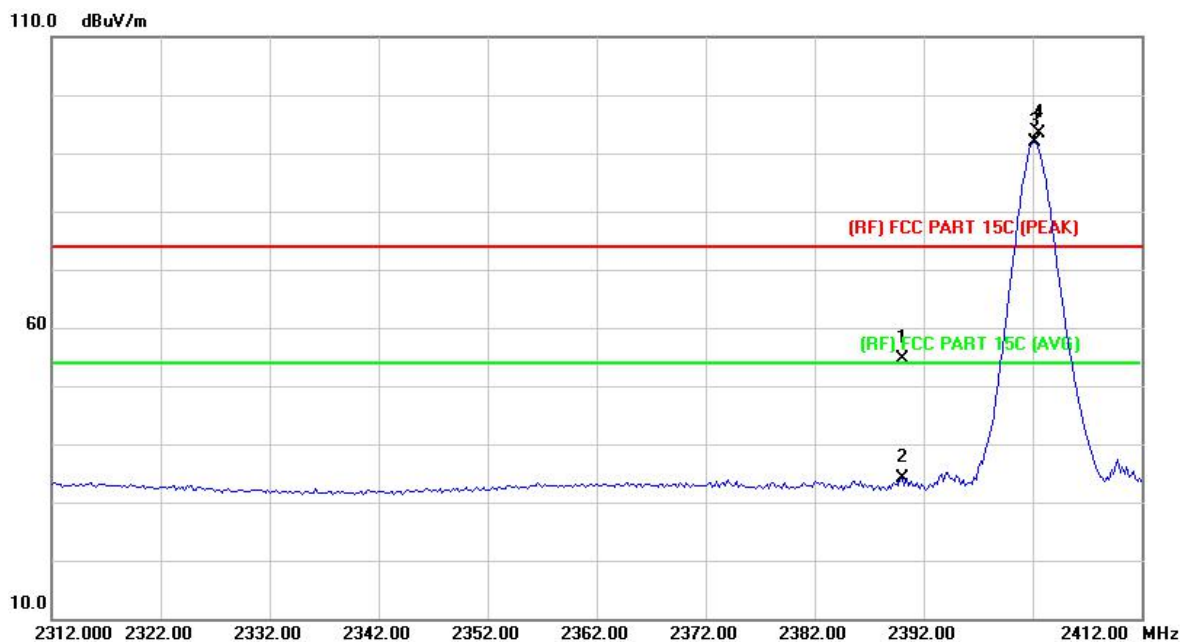
Temperature:	26 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Horizontal		
Test Mode:	BLE 2M Mode 2402MHz		
Remark:	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	52.81	1.51	54.32	74.00	-19.68	peak
2		2390.000	32.48	1.51	33.99	54.00	-20.01	AVG
3	*	2402.200	86.76	1.56	88.32	54.00	34.32	AVG
4	X	2402.600	88.81	1.56	90.37	74.00	16.37	peak

Emission Level= Read Level+ Correct Factor

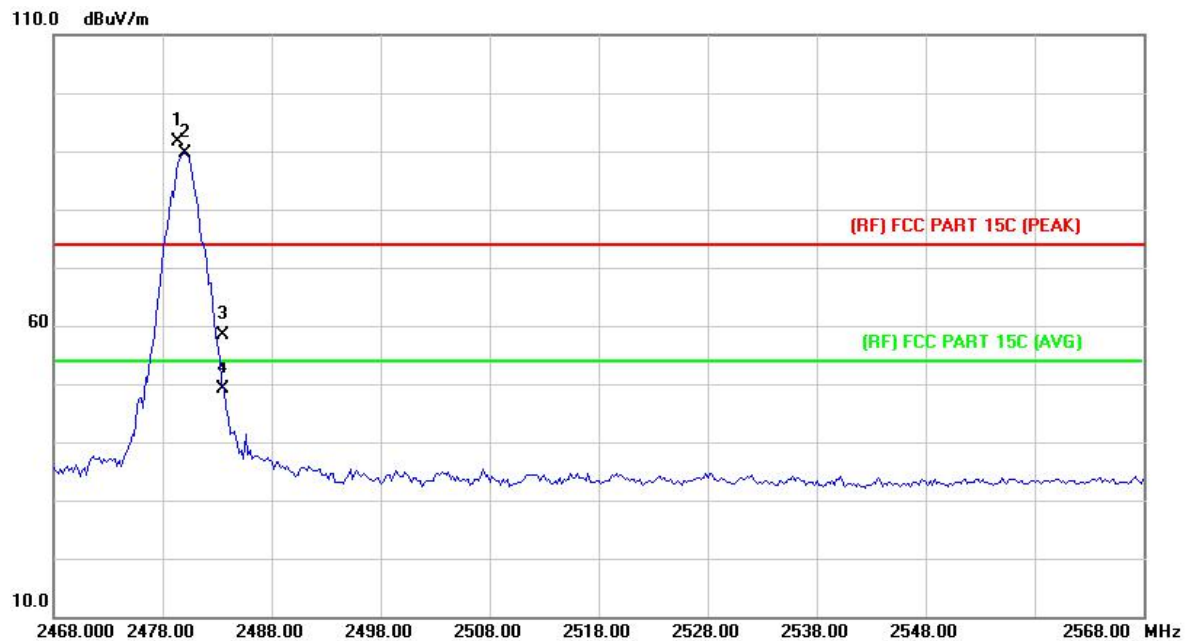
Temperature:	26 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Vertical		
Test Mode:	BLE 2M Mode 2402MHz		
Remark:	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	53.01	1.51	54.52	74.00	-19.48	peak
2		2390.000	32.50	1.51	34.01	54.00	-19.99	AVG
3	*	2402.200	90.43	1.56	91.99	54.00	37.99	AVG
4	X	2402.600	91.90	1.56	93.46	74.00	19.46	peak

Emission Level= Read Level+ Correct Factor

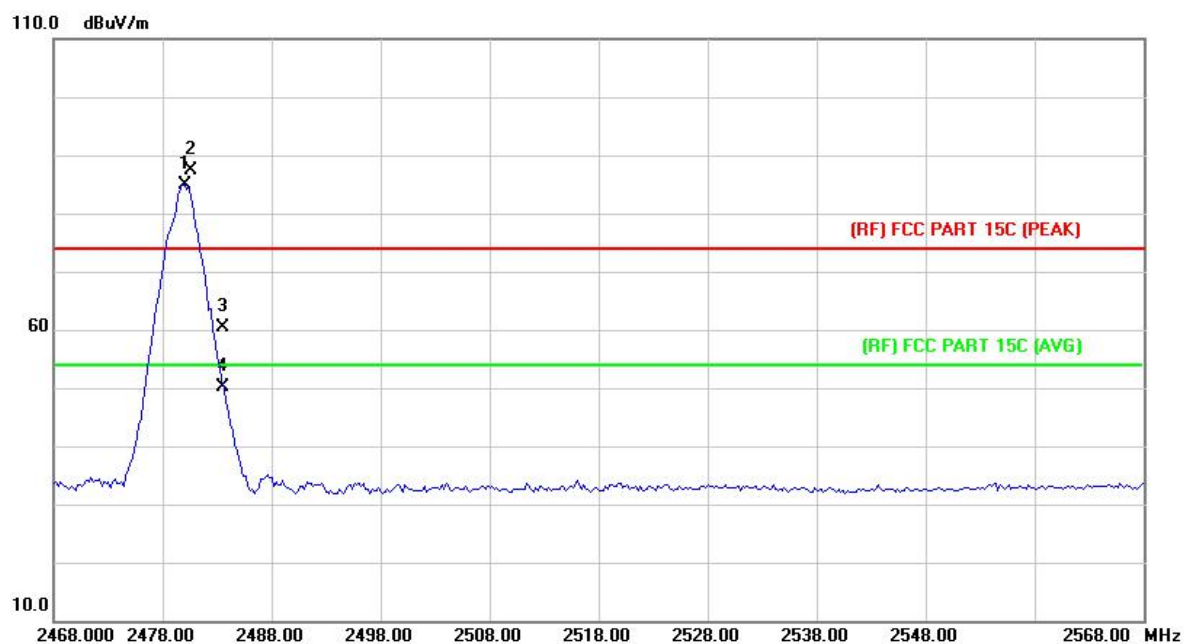
Temperature:	26 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Horizontal		
Test Mode:	BLE 2M Mode 2480MHz		
Remark:	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	X	2479.400	89.60	2.07	91.67	74.00	17.67	peak
2	*	2480.000	87.48	2.07	89.55	54.00	35.55	AVG
3		2483.500	56.25	2.10	58.35	74.00	-15.65	peak
4		2483.500	46.94	2.10	49.04	54.00	-4.96	AVG

Emission Level= Read Level+ Correct Factor

Temperature:	26 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Ant. Pol.	Vertical		
Test Mode:	BLE 2M Mode 2480MHz		
Remark:	N/A		

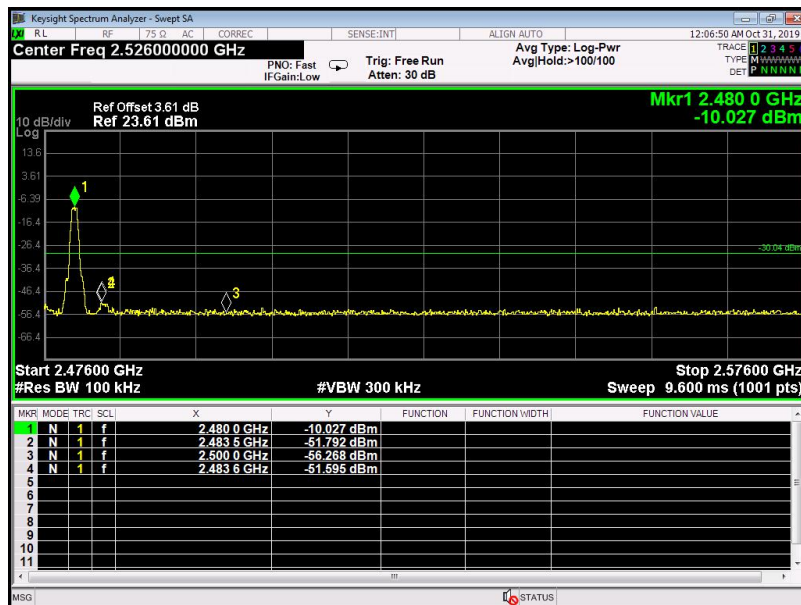
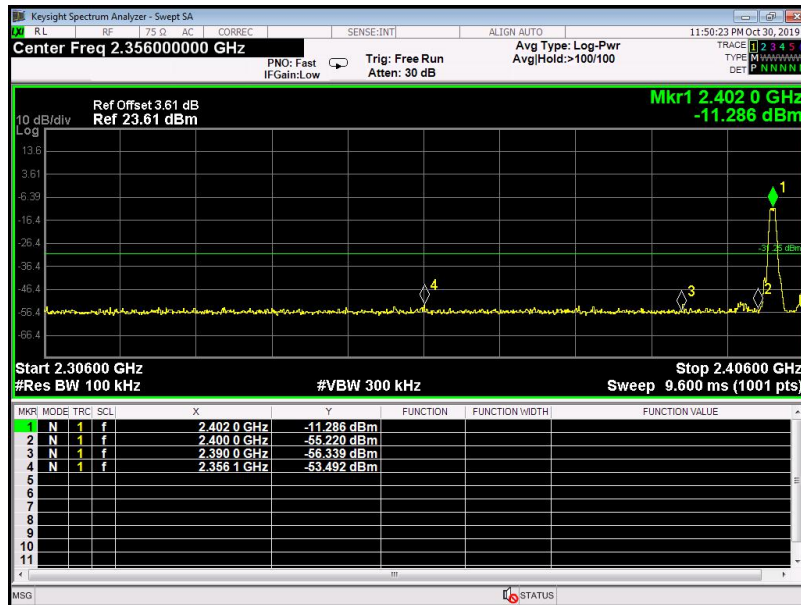


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2480.000	82.85	2.07	84.92	54.00	30.92	AVG
2	X	2480.600	85.31	2.07	87.38	74.00	13.38	peak
3		2483.500	58.37	2.10	60.47	74.00	-13.53	peak
4		2483.500	48.14	2.10	50.24	54.00	-3.76	AVG

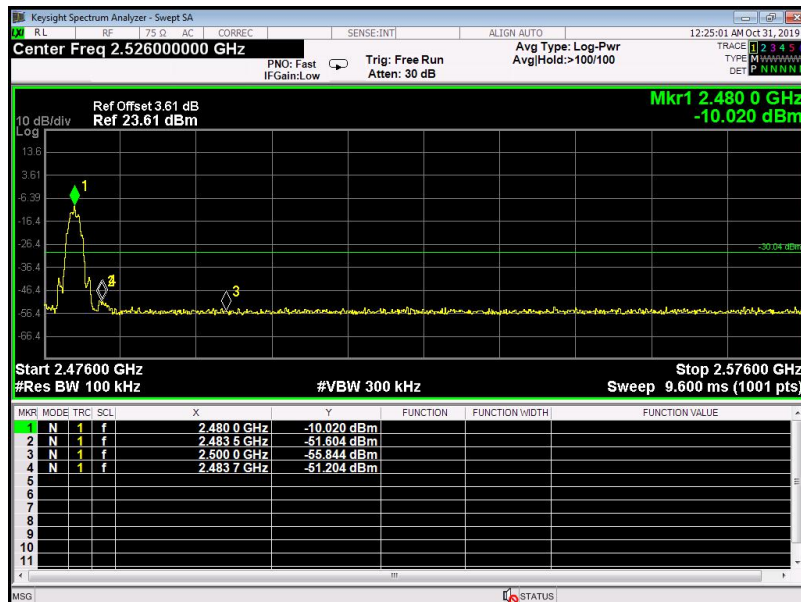
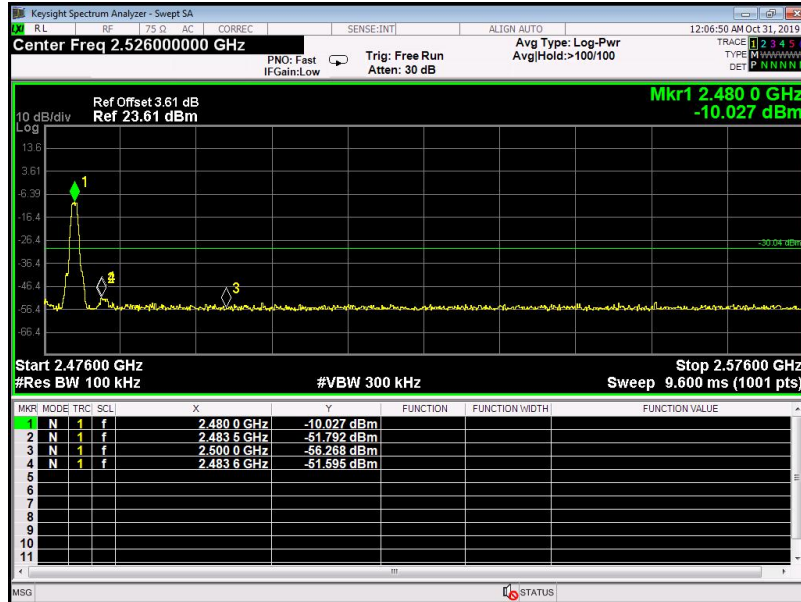
Emission Level= Read Level+ Correct Factor

(2) Conducted Test

Temperature:	26 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Test Mode:	BLE 1M Mode 2402MHz / BLE 1M Mode 2480MHz		
Remark:	The EUT is programed in continuously transmitting mode		

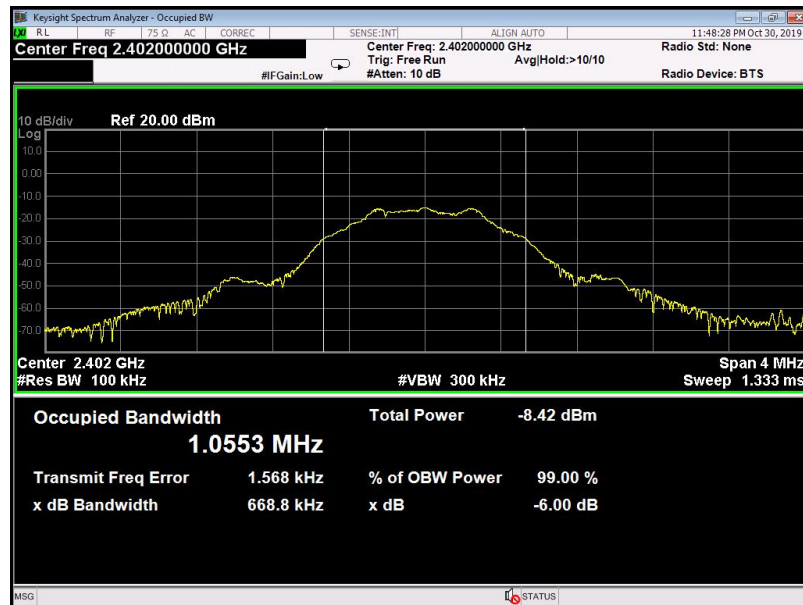


Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Test Mode:	BLE 2M Mode 2402MHz / BLE 2M Mode 2480MHz		
Remark:	The EUT is programed in continuously transmitting mode		

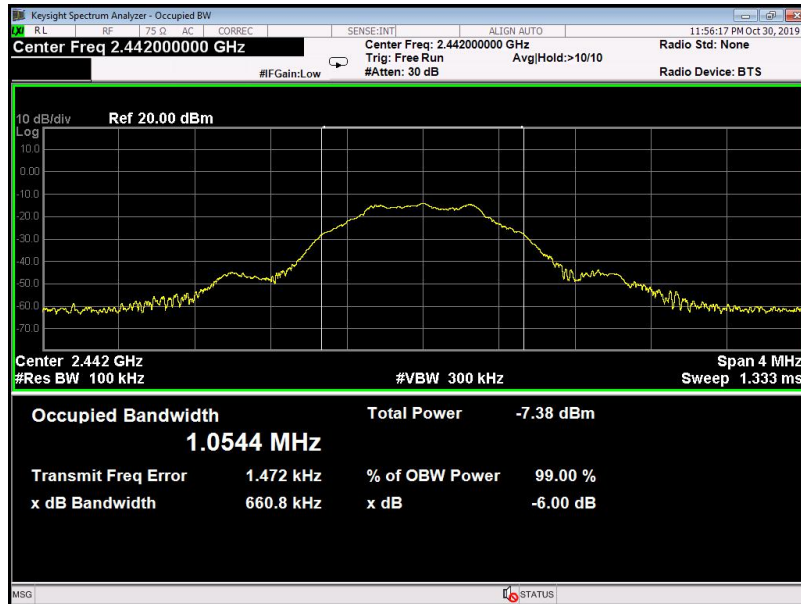


Attachment C-- Bandwidth Test Data

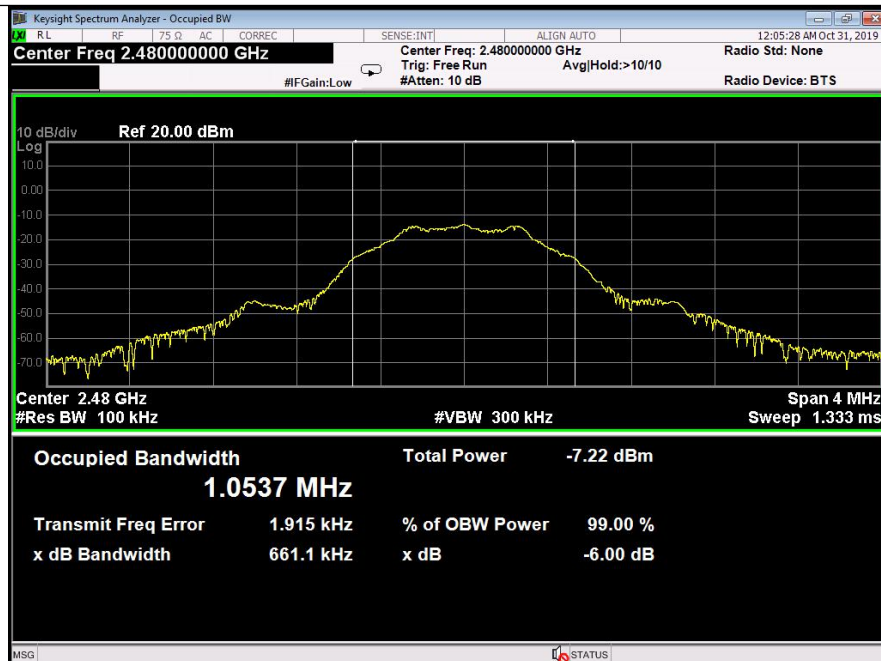
Temperature:	26 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Test Mode:	BLE 1M		
Channel frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)
2402	0.669	1.055	≥0.5
2442	0.661	1.054	
2480	0.661	1.054	
2402 MHz			



2442 MHz



2480 MHz



Temperature:	26 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Test Mode:	BLE 2M		
Channel frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)
2402	1.118	2.069	≥0.5
2442	1.113	2.065	
2480	1.136	2.068	
2402 MHz			

Keysight Spectrum Analyzer - Occupied BW

RL

RF

FS OFF

AC

CORREC

SENSE INT

ALIGN AUTO

12:11:56 AM Oct 31, 2019

Center Freq 2.402000000 GHz

Trig: Free Run

Avg/Hold:>10/10

Radio Std: None

#IFGain:Low

#Atten: 10 dB

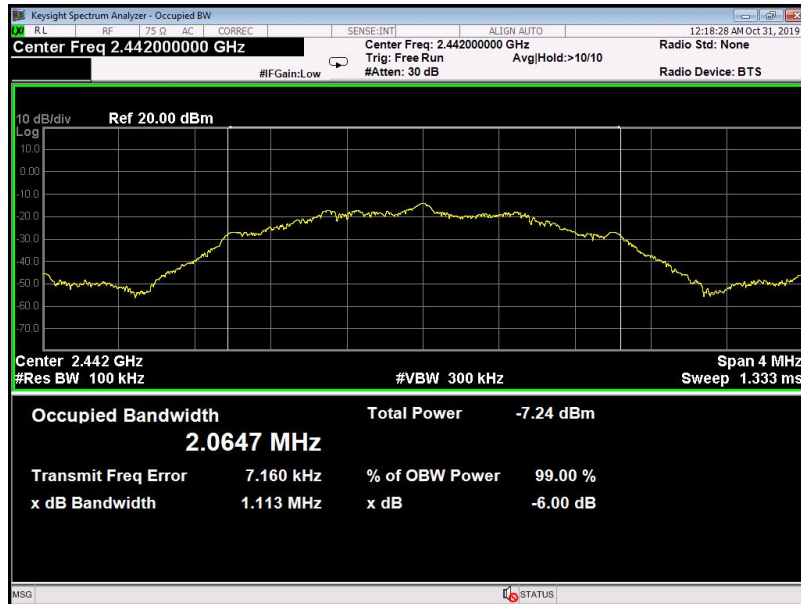
Radio Device: BTS

10 dB/div

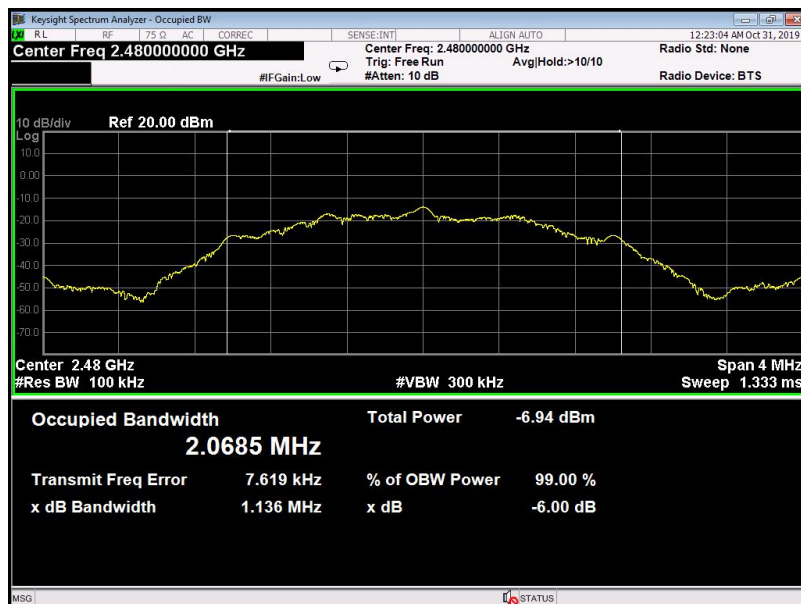
Ref 20.00 dBm

Log

2442 MHz



2480 MHz

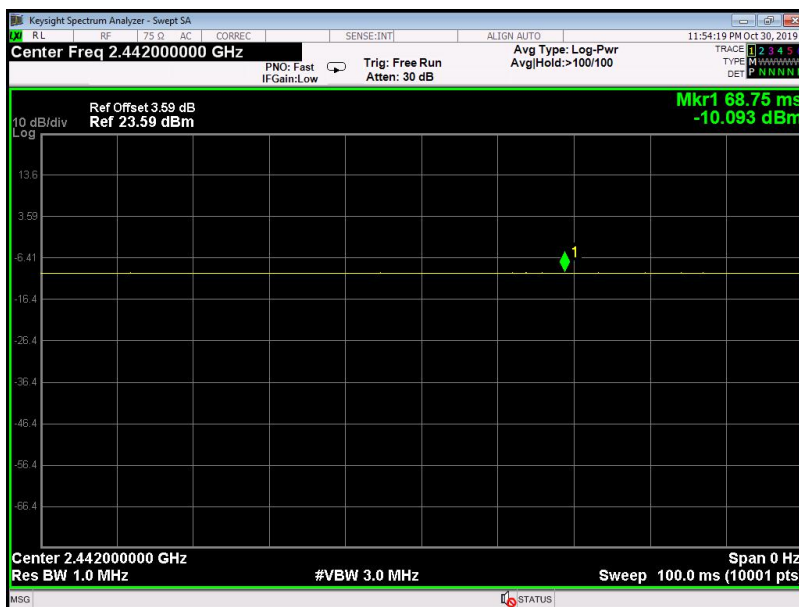


Attachment D-- Peak Output Power Test Data

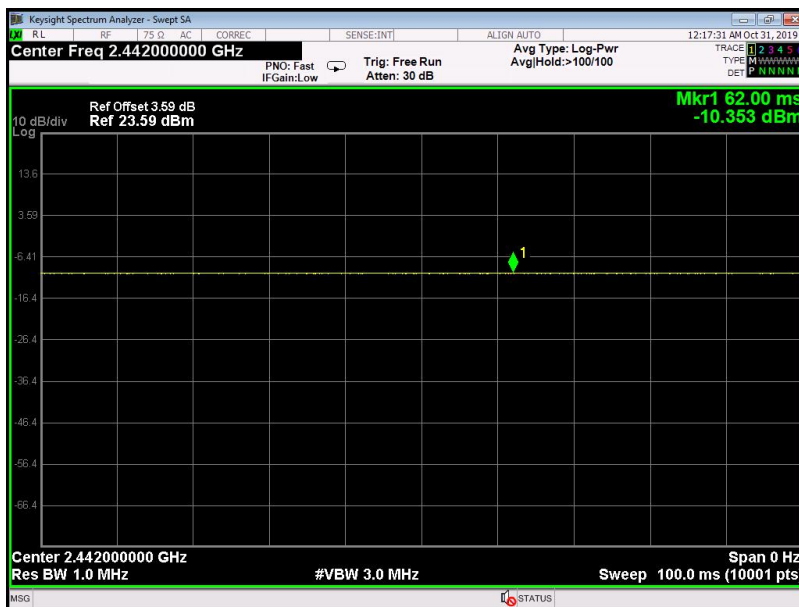
Temperature:	26 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Mode	Channel frequency (MHz)	Test Result (dBm)	Limit (dBm)
BLE 1M	2402	-10.755	30
	2442	-9.975	
	2480	-9.511	
BLE 2M	2402	-10.709	
	2442	-9.937	
	2480	-9.477	
Result: PASS			

Duty Cycle		
Mode	Channel frequency (MHz)	Test Result (dBm) Limit (dBm)
BLE 1M	2402	>98%
	2442	
	2480	
BLE 2M	2402	
	2442	
	2480	
Please see below plots		

GFSK 1M Mode 2442 MHz

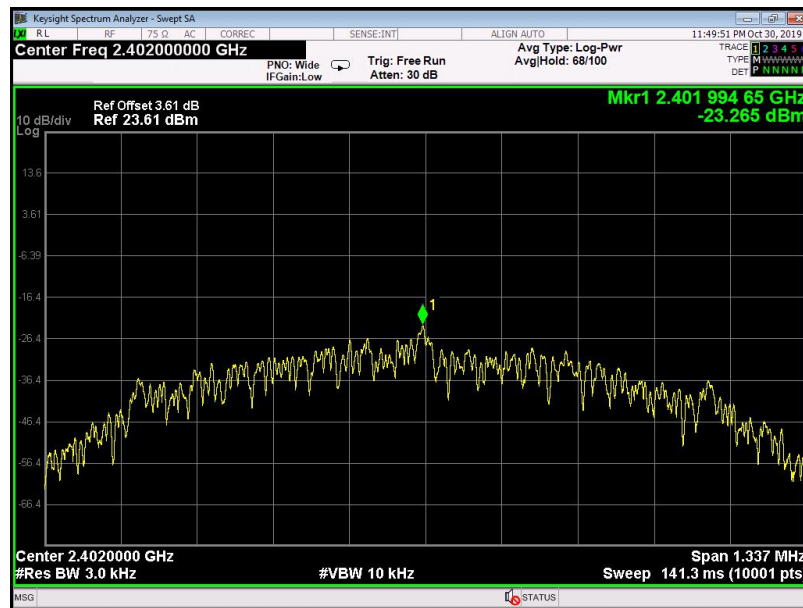


GFSK 2M Mode 2442 MHz

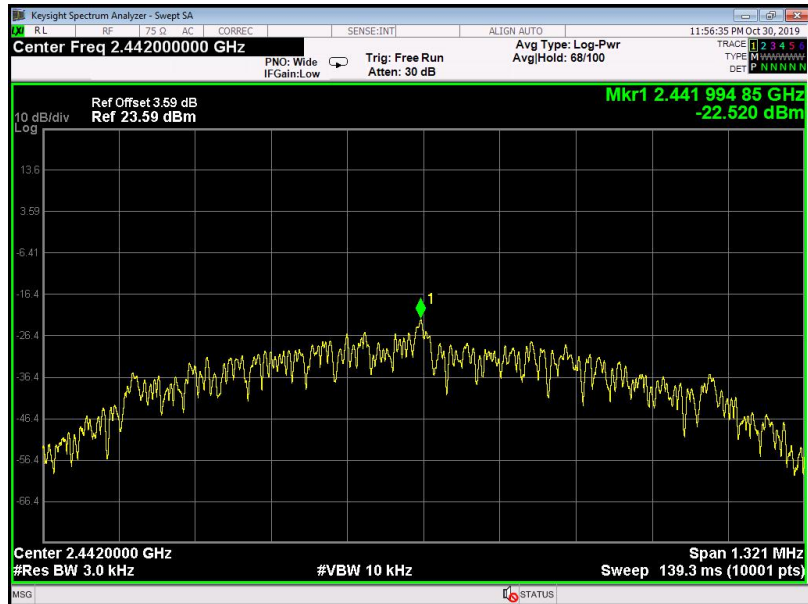


Attachment E-- Power Spectral Density Test Data

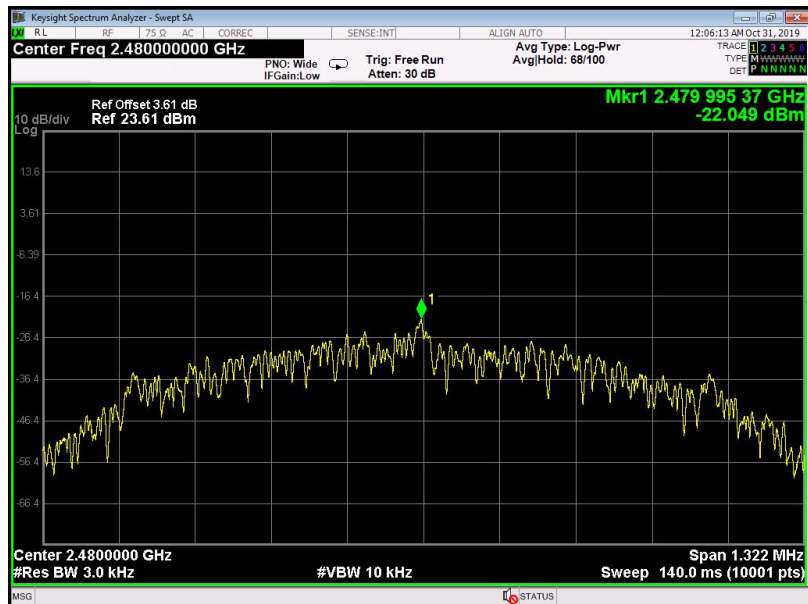
Temperature:	26 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Test Mode:	BLE 1M		
Channel Frequency (MHz)	Power Density (dBm/3 kHz)	Limit (dBm/3kHz)	
2402	-23.265	8	
2442	-22.519		
2480	-22.049		
2402 MHz			



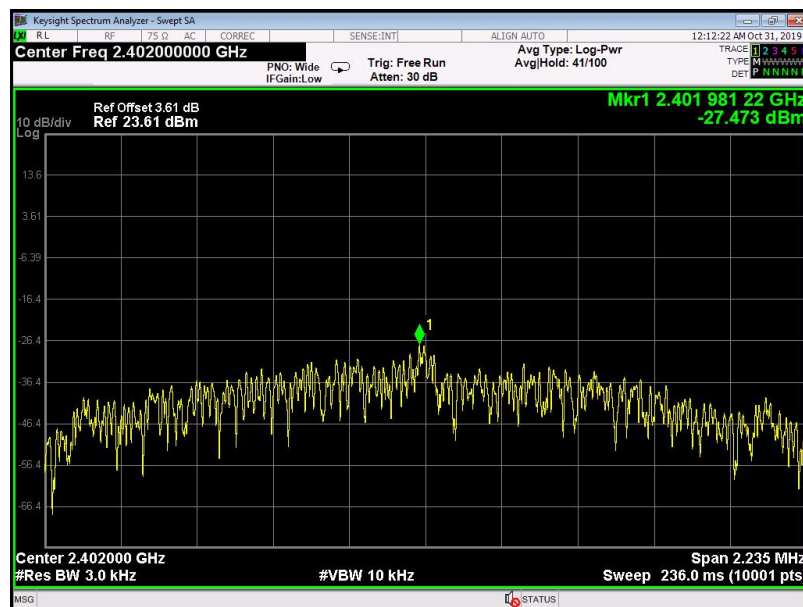
2442 MHz



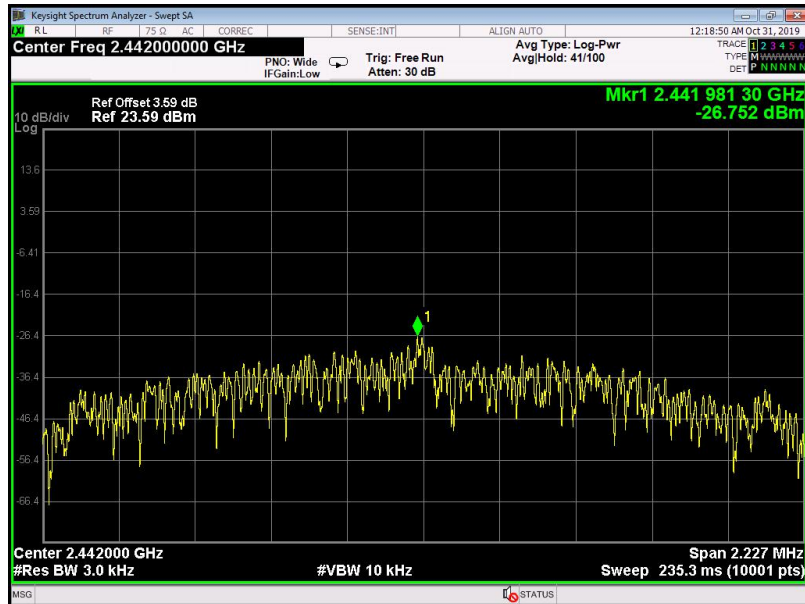
2480 MHz



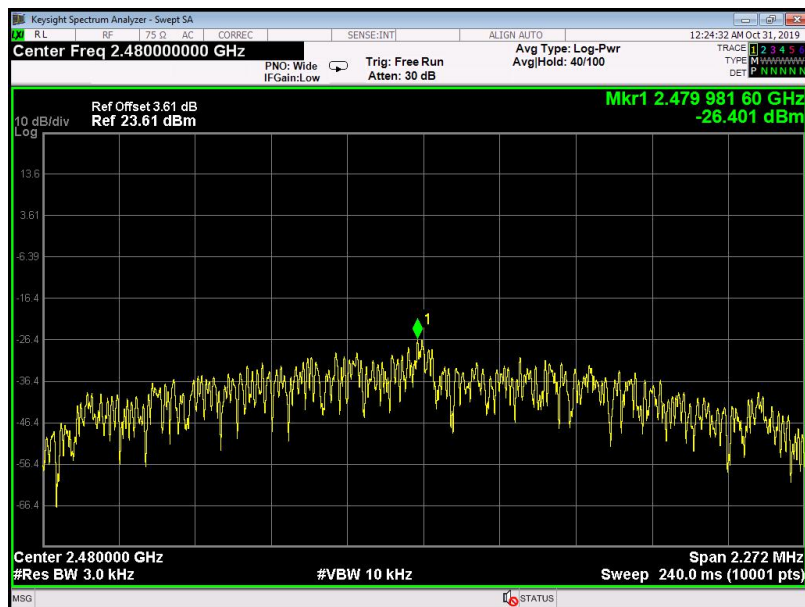
Temperature:	26 °C	Relative Humidity:	55%
Test Voltage:	DC 3V		
Test Mode:	BLE 2M		
Channel Frequency (MHz)	Power Density (dBm/3 kHz)	Limit (dBm/3kHz)	
2402	-27.473	8	
2442	-26.752		
2480	-26.401		
2402 MHz			



2442 MHz



2480 MHz



-----END OF REPORT-----