Microtest
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Test Report

Report No.:	MTi230530003-02E2
Date of issue:	2023-07-17
Applicant:	Zhuhai Quin Technology Co., Ltd.
Product:	Desktop Printer
Model(s):	R831, R831Pro, R831Plus, R831W, R831S, R831K, R831Max, R831SE, R831C, R831B, D831, D831Pro, D831Plus, D831W, D831S, D831K, D831Max, D831SE, D831C, D831B, R8A31, R8A31Pro, R8A31Plus, R8A31W, R8A31S, R8A31K, R8A31Max, R8A31SE, R8A31C, R8A31B, D8A31, D8A31Pro, D8A31Plus, D8A31W, D8A31S, D8A31K, D8A31Max, D8A31SE, D8A31C, D8A31B
FCC ID:	2ASRB-R831

Shenzhen Microtest Co., Ltd.

http://www.mtitest.com

The test report is only used for customer scientific research, teaching, internal quality control and other purposes, and is for internal reference only.

Address: 101, No. 7, Zone 2, Xinxing Industrial Park, Fuhai Avenue, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
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Instructions

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2. The test results in this test report are only responsible for the samples submitted

3. This test report is invalid without the seal and signature of the laboratory.

4. This test report is invalid if transferred, altered, or tampered with in any form without authorization.

5. Any objection to this test report shall be submitted to the laboratory within 15 days from the date of receipt of the report.

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Test Result Certification	
Applicant:	Zhuhai Quin Technology Co., Ltd.
Address:	ROOM 103-029(CENTRALIZED OFFICE AREA) , 1F, BUILDING 1, NO. 18 FUTIAN ROAD, XIANGZHOU DISTRICT, ZHUHAI CITY, CHINA
Manufacturer:	Zhuhai Quin Technology Co., Ltd.
Address:	ROOM 103-029(CENTRALIZED OFFICE AREA) , 1F, BUILDING 1, NO. 18 FUTIAN ROAD, XIANGZHOU DISTRICT, ZHUHAI CITY, CHINA
Product description	
Product name:	Desktop Printer
Trade mark:	N/A
Model name:	R831
Series Model:	R831Pro, R831Pro, R831Plus, R831W, R831S, R831K, R831Max, R831SE, R831C, R831B, D831, D831Pro, D831Plus, D831W, D831S, D831K, D831Max, D831SE, D831C, D831B, R8A31, R8A31Pro, R8A31Plus, R8A31W, R8A31S, R8A31K, R8A31Max, R8A31SE, R8A31C, R8A31B, D8A31, D8A31Pro, D8A31Plus, D8A31W, D8A31S, D8A31K, D8A31Max, D8A31SE, D8A31C, D8A31B
Standards:	FCC 47 CFR Part 15 Subpart C
Test method:	ANSI C63.10-2013 KDB 558074 D01 15.247 Meas Guidance v05r02
Date of Test	
Date of test:	2023-07-12 to 2023-07-15
Test result:	Pass

Test Engineer	:	Letter. Lan.
		(Letter Lan)
Reviewed By	:	Leon chen
		(Leon Chen)
Approved By	:	Tom Xue
		(Tom Xue)

1 General Description

1.1 Description of the EUT

Product name:	Desktop Printer
Model name:	R831
Series Model:	R831Pro, R831Plus, R831W, R831S, R831K, R831Max, R831SE, R831C, R831B, D831, D831Pro, D831Plus, D831W, D831S, D831K, D831Max, D831SE, D831C, D831B, R8A31, R8A31Pro, R8A31Plus, R8A31W, R8A31S, R8A31K, R8A31Max, R8A31SE, R8A31C, R8A31B, D8A31, D8A31Pro, D8A31Plus, D8A31W, D8A31S, D8A31K, D8A31Max, D8A31SE, D8A31C, D8A31B
Model difference:	All the models are the same circuit and module, except the model name, colour and silk-screen.
Electrical rating:	Intput: 18V/3A 54W
Accessories:	Adaptor: Adapter: Model: MKF-1803000H Input: 100-240V~ 50/60Hz 2.0A(Max) Output: 18V/3A 54W Cable: USB-A to Type-C cable(1.5m)
Hardware version:	Q 254_A
Software version:	0.1.0
Test sample(s) number:	MTi230530003-01S1001
RF specification	
Bluetooth version:	V5.2
Operating frequency range:	2402MHz to 2480MHz
Channel number:	40
Modulation type:	GFSK
Antenna(s) type:	FPC Antenna
Antenna(s) gain:	3.27dBi

1.2 Description of test modes

No.	Emission test modes
Mode1	TX mode

1.2.1 Operation channel list

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2402	11	2422	21	2442	31	2462
2	2404	12	2424	22	2444	32	2464
3	2406	13	2426	23	2446	33	2466
4	2408	14	2428	24	2448	34	2468
5	2410	15	2430	25	2450	35	2470
6	2412	16	2432	26	2452	36	2472
7	2414	17	2434	27	2454	37	2474

8	2416	18	2436	28	2456	38	2476
9	2418	19	2438	29	2458	39	2478
10	2420	20	2440	30	2460	40	2480

Note: The test software provided by manufacturer is used to control EUT for working in engineering mode, that enables selectable channel, and capable of continuous transmitting mode.

Test Software: FCC Assist 1.1.5

For power setting, refer to below table.

Mode	2402MHz	2440MHz	2480MHz
1M	/	/	/

1.3 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15°C ~ 35°C
Humidity:	20% RH ~ 75% RH
Atmospheric pressure:	98 kPa ~ 101 kPa

1.4 Description of support units

The EUT was tested as an independent device.

1.5 Measurement uncertainty

Measurement	Uncertainty
Conducted emissions (AMN 150kHz~30MHz)	3.1dB
Occupied channel bandwidth	±3 %
RF output power, conducted	±1 dB
Power Spectral Density, conducted	±1 dB
Unwanted Emissions, conducted	±1 dB
Radiated spurious emissions (1GHz~25GHz)	5.3dB
Radiated spurious emissions (9kHz~30MHz)	4.3dB
Radiated spurious emissions (30MHz~1GHz)	4.7dB
Temperature	±1 °C
Humidity	± 5 %

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2 Summary of Test Result

No.	FCC reference	Description of test	Result
1	§ 15.203	Antenna requirement	Pass
2	§ 15.207	AC power line conducted emissions	Pass
3	§ 15.247(d), 15.209, 15.205	Radiated spurious emissions	Pass
4	§ 15.247(a)(2)	DTS bandwidth	Pass
5	§ 15.247(b)(3)	Maximum conducted output power	Pass
6	§ 15.247(e)	Power Spectral Density	Pass
7	§ 15.247(d)	Conducted emission at the band edge	Pass
8	§ 15.247(d)	Conducted spurious emissions	Pass
9	/	Duty Cycle	Pass

3 Test Facilities and accreditations

3.1 Test laboratory

Test laboratory:	Shenzhen Microtest Co., Ltd.
Test site location:	101, No.7, Zone 2, Xinxing Industrial Park, Fuhai Avenue, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Telephone:	(86-755)88850135
Fax:	(86-755)88850136
CNAS Registration No.:	CNAS L5868
FCC Registration No.:	448573

4 List of test equipment

No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
Conducted Emission at AC power line						
1	EMI Test Receiver	Rohde&schwarz	ESCI3	101368	2023-04-26	2024-04-25
2	Artificial mains network	Schwarzbeck	NSLK 8127	183	2023-05-05	2024-05-04
3	Artificial Mains Network	Schwarzbeck	NSLK 8127	1001	2023-05-06	2024-05-05
Occupied Bandwidth						
1	Wideband Radio Communication Tester	Rohde&schwarz	CMW500	149155	2023-04-26	2024-04-25
2	ESG Series Analog Ssignal Generator	Agilent	E4421B	GB40051240	2023-04-25	2024-04-24
3	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2023-04-25	2024-04-24
4	Synthesized Sweeper	Agilent	83752A	3610A01957	2023-04-25	2024-04-24
5	MXA Signal Analyzer	Agilent	N9020A	MY50143483	2023-04-26	2024-04-25
6	RF Control Unit	Tonscend	JS0806-1	19D8060152	2023-04-26	2024-04-25
7	Band Reject Filter Group	Tonscend	JS0806-F	19D8060160	2023-05-05	2024-05-04
8	ESG Vector Signal Generator	Agilent	N5182A	MY50143762	2023-04-25	2024-04-24
9	DC Power Supply	Agilent	E3632A	MY40027695	2023-05-05	2024-05-04
Maximum Conducted Output Power						
1	Wideband Radio Communication Tester	Rohde&schwarz	CMW500	149155	2023-04-26	2024-04-25
2	ESG Series Analog Ssignal Generator	Agilent	E4421B	GB40051240	2023-04-25	2024-04-24
3	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2023-04-25	2024-04-24
4	Synthesized Sweeper	Agilent	83752A	3610A01957	2023-04-25	2024-04-24
5	MXA Signal Analyzer	Agilent	N9020A	MY50143483	2023-04-26	2024-04-25
6	RF Control Unit	Tonscend	JS0806-1	19D8060152	2023-04-26	2024-04-25
7	Band Reject Filter Group	Tonscend	JS0806-F	19D8060160	2023-05-05	2024-05-04
8	ESG Vector Signal Generator	Agilent	N5182A	MY50143762	2023-04-25	2024-04-24
9	DC Power Supply	Agilent	E3632A	MY40027695	2023-05-05	2024-05-04
Power Spectral Density						
1	Wideband Radio Communication Tester	Rohde&schwarz	CMW500	149155	2023-04-26	2024-04-25
2	ESG Series Analog Ssignal Generator	Agilent	E4421B	GB40051240	2023-04-25	2024-04-24
3	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2023-04-25	2024-04-24
4	Synthesized Sweeper	Agilent	83752A	3610A01957	2023-04-25	2024-04-24

No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
5	MXA Signal Analyzer	Agilent	N9020A	MY50143483	2023-04-26	2024-04-25
6	RF Control Unit	Tonscend	JS0806-1	19D8060152	2023-04-26	2024-04-25
7	Band Reject Filter Group	Tonscend	JS0806-F	19D8060160	2023-05-05	2024-05-04
8	ESG Vector Signal Generator	Agilent	N5182A	MY50143762	2023-04-25	2024-04-24
9	DC Power Supply	Agilent	E3632A	MY40027695	2023-05-05	2024-05-04
Emissions in frequency bands						
1	Wideband Radio Communication Tester	Rohde&schwarz	CMW500	149155	2023-04-26	2024-04-25
2	ESG Series Analog Ssignal Generator	Agilent	E4421B	GB40051240	2023-04-25	2024-04-24
3	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2023-04-25	2024-04-24
4	Synthesized Sweeper	Agilent	83752A	3610A01957	2023-04-25	2024-04-24
5	MXA Signal Analyzer	Agilent	N9020A	MY50143483	2023-04-26	2024-04-25
6	RF Control Unit	Tonscend	JS0806-1	19D8060152	2023-04-26	2024-04-25
7	Band Reject Filter Group	Tonscend	JS0806-F	19D8060160	2023-05-05	2024-05-04
8	ESG Vector Signal Generator	Agilent	N5182A	MY50143762	2023-04-25	2024-04-24
9	DC Power Supply	Agilent	E3632A	MY40027695	2023-05-05	2024-05-04
Band edge emissions (Radiated)						
1	EMI Test Receiver	Rohde&schwarz	ESCI7	101166	2023-04-26	2024-04-25
2	Double Ridged Broadband Horn Antenna	schwarabeck	BBHA 9120 D	2278	2023-05-26	2024-05-25
3	Amplifier	Agilent	8449B	3008A01120	2023-05-26	2024-05-25
4	Multi-device Controller	TuoPu	TPMDC	/	/	/
5	MXA signal analyzer	Agilent	N9020A	MY54440859	2023-05-05	2024-05-04
Emissions in frequency bands (below 1GHz)						
1	EMI Test Receiver	Rohde&schwarz	ESCI7	101166	2023-04-26	2024-04-25
2	TRILOG Broadband Antenna	schwarabeck	VULB 9163	9163-1338	2023-06-11	2025-06-10
3	Amplifier	Hewlett-Packard	8447F	3113A06184	2023-04-26	2024-04-25
4	Multi-device Controller	TuoPu	TPMDC	/	/	/
5	Active Loop Antenna	Schwarzbeck	FMZB 1519 B	00066	2021/05/30	2024/05/29
Emissions in frequency bands (above 1GHz)						
1	EMI Test Receiver	Rohde&schwarz	ESCI7	101166	2023-04-26	2024-04-25
2	Double Ridged Broadband Horn Antenna	schwarabeck	BBHA 9120 D	2278	2023-05-26	2024-05-25

No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
3	Amplifier	Agilent	8449B	3008A01120	2023-05-26	2024-05-25
4	Multi-device Controller	TuoPu	TPMDC	/	/	/
5	MXA signal analyzer	Agilent	N9020A	MY54440859	2023-05-05	2024-05-04

5 Evaluation Results (Evaluation)

5.1 Antenna requirement

Test Requirement:	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.
Description of the antenna of EUT:	The antenna of the EUT is permanently attached.
Conclusion:	The EUT complies with the requirement of FCC PART 15.203.

6 Radio Spectrum Matter Test Results (RF)

6.1 Conducted Emission at AC power line

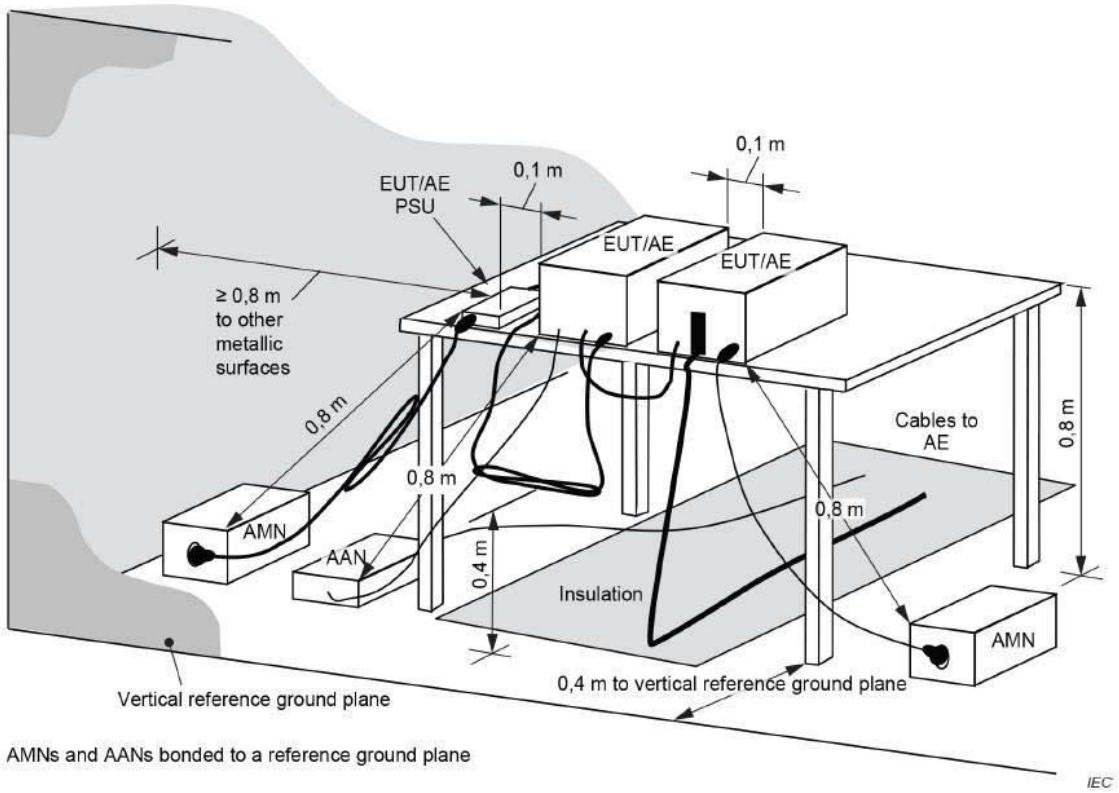
Test Requirement:	Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.
Test Limit:	Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.
Test Method:	Occupied bandwidth—relative measurement procedure
Procedure:	a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. d) Steps a) through c) might require iteration to adjust within the specified tolerances. e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “−xx dB down” requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value. f) Set detection mode to peak and trace mode to max hold. g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value). h) Determine the “−xx dB down amplitude” using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument. i) If the reference value is determined by an unmodulated carrier, then turn

<table>
<tr><td></td><td>the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).
j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “-xx dB down amplitude” determined in step h). If a marker is below this “−xx dB down amplitude” value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “-xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.
k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td rowspan="2">Frequency of emission (MHz)</td><td colspan="2">Conducted limit (dBμV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
*Decreases with the logarithm of the frequency.
</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2013 section 6.2</td></tr>
<tr><td>Procedure:</td><td>Refer to ANSI C63.10-2013 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices</td></tr>
</table>

6.1.1 E.U.T. Operation:

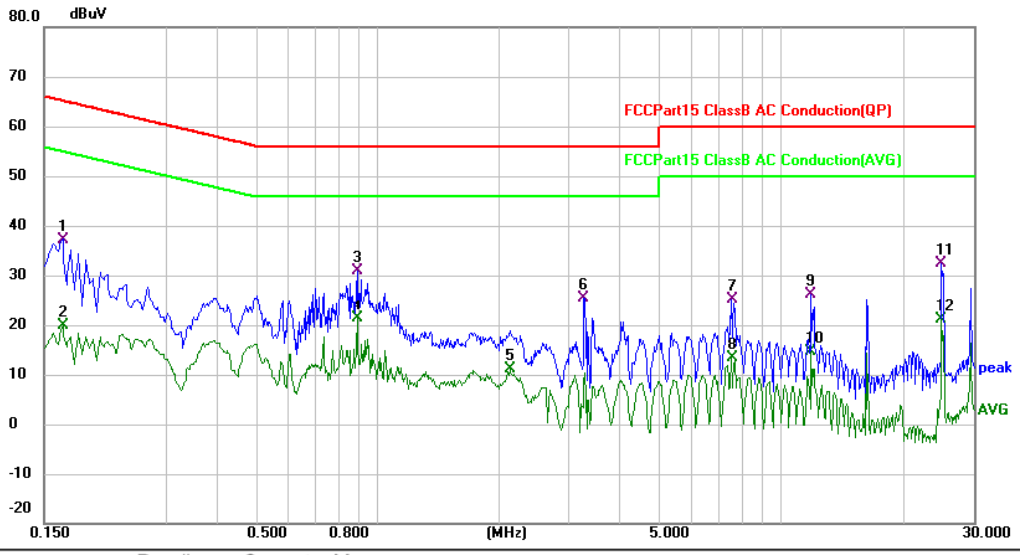
<table>
<tr><td colspan="6">Operating Environment:</td></tr>
<tr><td>Temperature:</td><td>25.2 °C</td><td>Humidity:</td><td>50.2 %</td><td>Atmospheric Pressure:</td><td>99 kPa</td></tr>
<tr><td>Pre test mode:</td><td colspan="5">Mode1</td></tr>
<tr><td>Final test mode:</td><td colspan="5">Mode1</td></tr>
</table>

6.1.2 Test Setup Diagram:



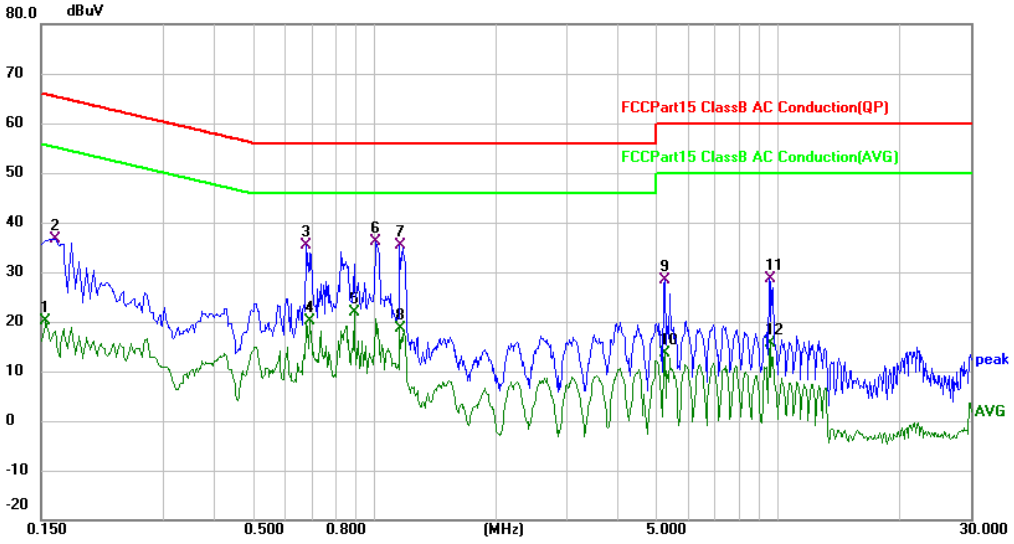
6.1.3 Test Data:

Mode1 / Line: Line / Band: 2.4G / BW: 1 / 120V/60Hz



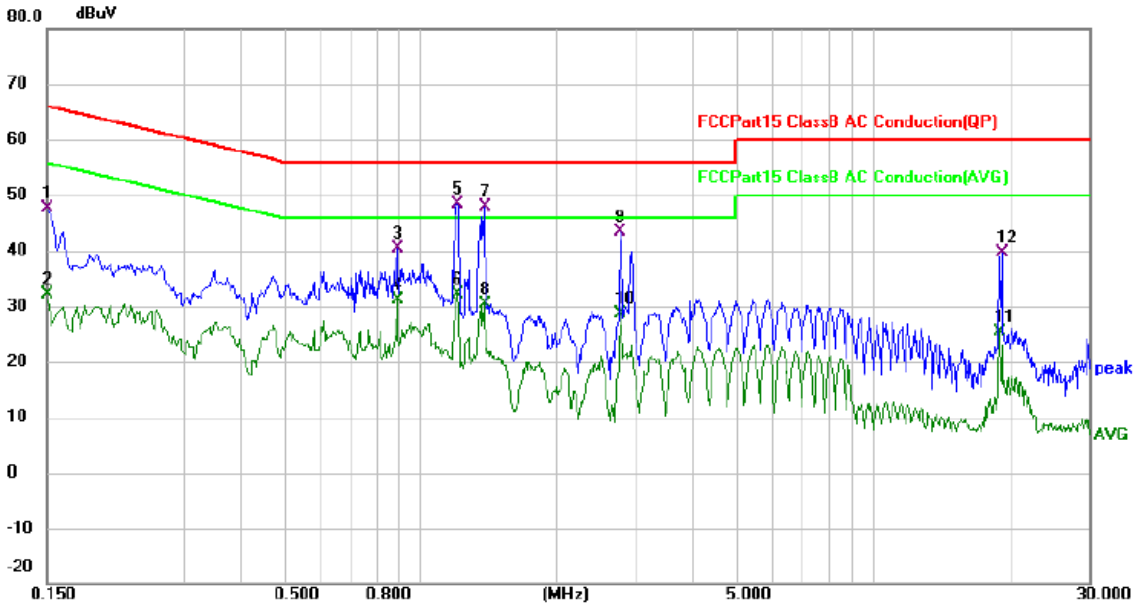
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1660	26.99	10.26	37.25	65.16	-27.91	QP	
2		0.1660	9.54	10.26	19.80	55.16	-35.36	AVG	
3		0.8940	18.87	12.13	31.00	56.00	-25.00	QP	
4	*	0.8940	9.29	12.13	21.42	46.00	-24.58	AVG	
5		2.1300	0.66	10.45	11.11	46.00	-34.89	AVG	
6		3.2740	15.11	10.29	25.40	56.00	-30.60	QP	
7		7.5539	14.87	10.29	25.16	60.00	-34.84	QP	
8		7.5539	3.21	10.29	13.50	50.00	-36.50	AVG	
9		11.8939	15.86	10.38	26.24	60.00	-33.76	QP	
10		11.8939	4.26	10.38	14.64	50.00	-35.36	AVG	
11		25.0300	21.54	10.79	32.33	60.00	-27.67	QP	
12		25.0300	10.30	10.79	21.09	50.00	-28.91	AVG	

Mode1 / Line: Neutral / Band: 2.4G / BW: 1 / 120V/60Hz



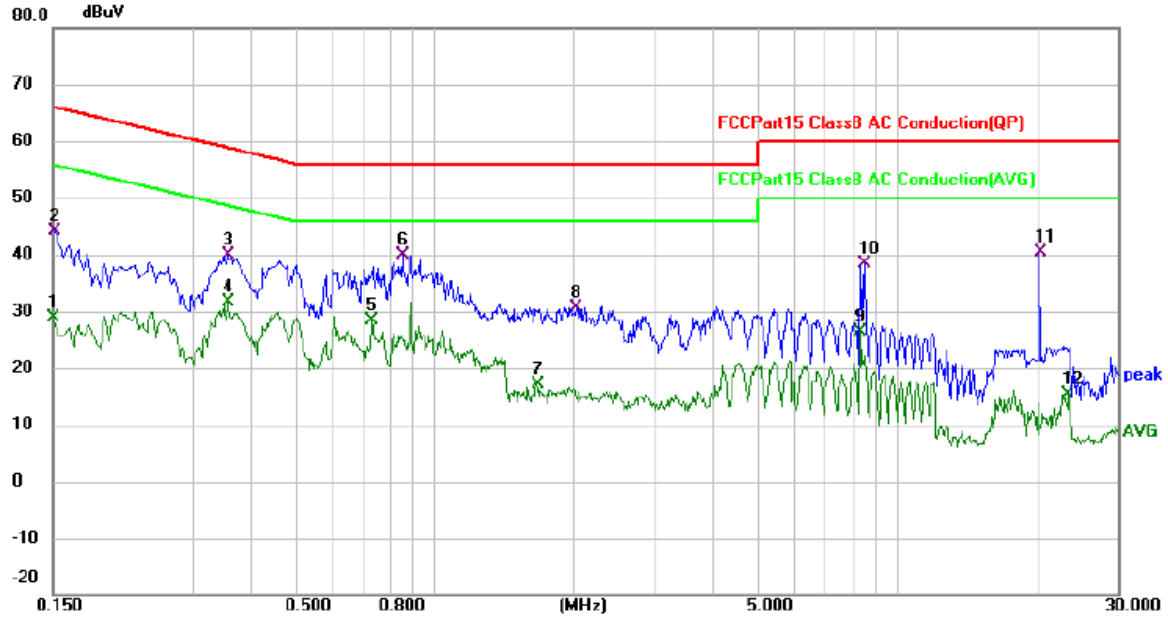
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1539	9.82	10.28	20.10	55.79	-35.69	AVG	
2		0.1620	26.46	10.27	36.73	65.36	-28.63	QP	
3		0.6820	23.66	11.74	35.40	56.00	-20.60	QP	
4		0.6900	8.34	11.77	20.11	46.00	-25.89	AVG	
5		0.8940	9.74	12.13	21.87	46.00	-24.13	AVG	
6	*	1.0060	23.90	12.35	36.25	56.00	-19.75	QP	
7		1.1580	22.81	12.67	35.48	56.00	-20.52	QP	
8		1.1580	5.98	12.67	18.65	46.00	-27.35	AVG	
9		5.2500	18.17	10.27	28.44	60.00	-31.56	QP	
10		5.2500	3.29	10.27	13.56	50.00	-36.44	AVG	
11		9.5380	18.32	10.30	28.62	60.00	-31.38	QP	
12		9.5580	5.21	10.30	15.51	50.00	-34.49	AVG	

Mode1 / Line: Line / Band: 2.4G / BW: 1 / 240V/60Hz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	37.38	10.28	47.66	66.00	-18.34	QP	
2		0.1500	21.95	10.28	32.23	56.00	-23.77	AVG	
3		0.8900	28.21	12.17	40.38	56.00	-15.62	QP	
4		0.8900	18.89	12.17	31.06	46.00	-14.94	AVG	
5	*	1.2137	35.71	12.74	48.45	56.00	-7.55	QP	
6		1.2137	19.47	12.74	32.21	46.00	-13.79	AVG	
7		1.3816	34.76	13.01	47.77	56.00	-8.23	QP	
8		1.3816	17.28	13.01	30.29	46.00	-15.71	AVG	
9		2.7780	33.26	10.22	43.48	56.00	-12.52	QP	
10		2.7780	18.46	10.22	28.68	46.00	-17.32	AVG	
11		19.0975	14.77	10.63	25.40	50.00	-24.60	AVG	
12		19.2419	29.04	10.63	39.67	60.00	-20.33	QP	

Mode1 / Line: Neutral / Band: 2.4G / BW: 1 / 240V/60Hz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	18.63	10.29	28.92	56.00	-27.08	AVG	
2		0.1514	33.84	10.29	44.13	65.92	-21.79	QP	
3		0.3573	28.92	10.96	39.88	58.79	-18.91	QP	
4		0.3573	20.61	10.96	31.57	48.79	-17.22	AVG	
5		0.7338	16.45	11.84	28.29	46.00	-17.71	AVG	
6	*	0.8538	27.74	12.06	39.80	56.00	-16.20	QP	
7		1.6656	3.31	13.76	17.07	46.00	-28.93	AVG	
8		2.0259	20.15	10.47	30.62	56.00	-25.38	QP	
9		8.3459	15.97	10.29	26.26	50.00	-23.74	AVG	
10		8.5300	28.06	10.30	38.36	60.00	-21.64	QP	
11		20.3416	29.72	10.69	40.41	60.00	-19.59	QP	
12		23.4740	4.57	10.76	15.33	50.00	-34.67	AVG	

6.2 Occupied Bandwidth

Test Requirement:	47 CFR 15.247(a)(2)
Test Limit:	Refer to 47 CFR 15.247(a)(2), Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Test Method:	ANSI C63.10-2013, section 11.8 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	a) Set RBW = 100 kHz. b) Set the VBW >= [3 × RBW]. c) Detector = peak. d) Trace mode = max hold. e) Sweep = auto couple. f) Allow the trace to stabilize. g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

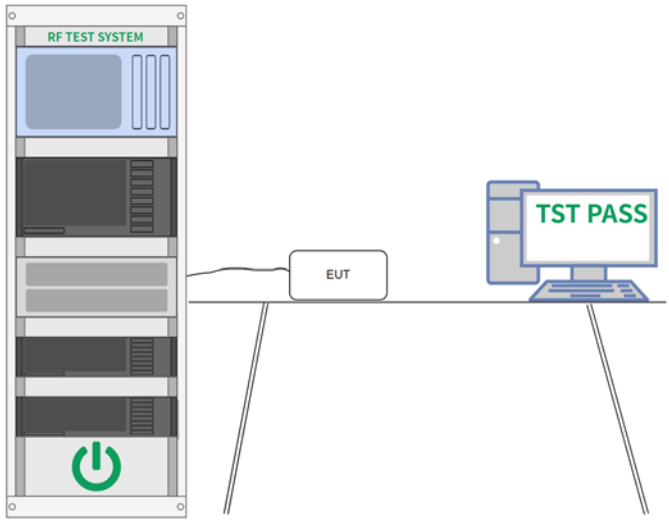
6.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	24.5 °C	Humidity:	34.5 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.2.2 Test Data:

Please Refer to Appendix for Details.

6.2.3 Test Setup Diagram:



6.3 Maximum Conducted Output Power

Test Requirement:	47 CFR 15.247(b)(3)
Test Limit:	Refer to 47 CFR 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
Test Method:	ANSI C63.10-2013, section 11.9.1 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013, section 11.9.1 Maximum peak conducted output power

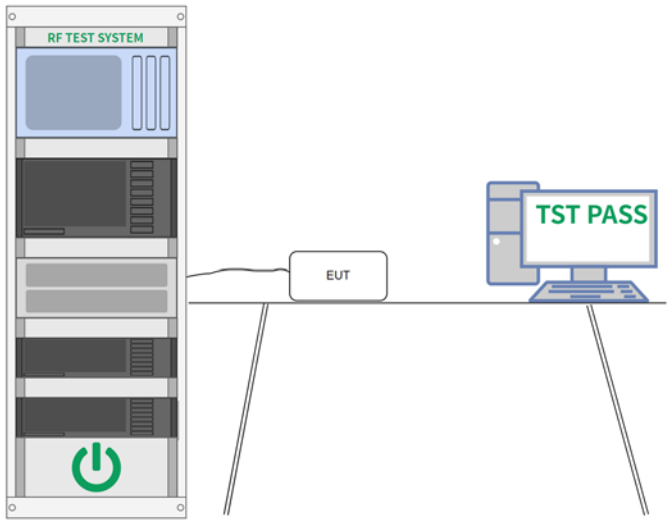
6.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	24.5 °C	Humidity:	34.5 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.3.2 Test Data:

Please Refer to Appendix for Details.

6.3.3 Test Setup Diagram:



6.4 Power Spectral Density

Test Requirement:	47 CFR 15.247(e)
Test Limit:	Refer to 47 CFR 15.247(e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
Test Method:	ANSI C63.10-2013, section 11.10 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013, section 11.10, Maximum power spectral density level in the fundamental emission

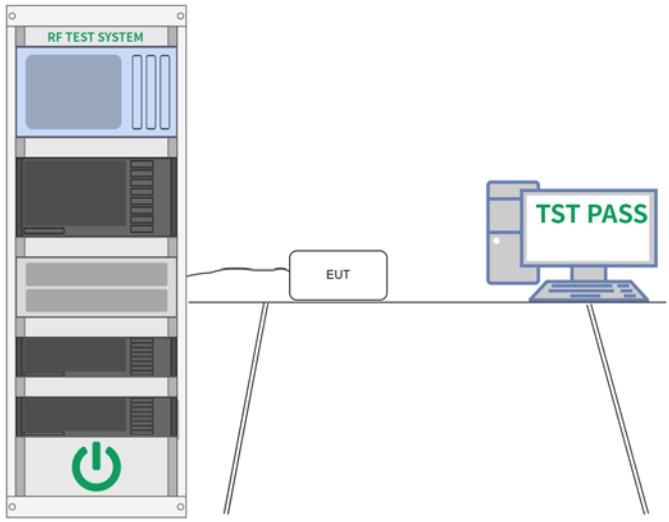
6.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	24.5 °C	Humidity:	34.5 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.4.2 Test Data:

Please Refer to Appendix for Details.

6.4.3 Test Setup Diagram:



6.5 RF conducted spurious emissions and band edge measurement

Test Requirement:	47 CFR 15.247(d)
Test Limit:	Refer to 47 CFR 15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Test Method:	ANSI C63.10-2013 section 11.11 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013 Section 11.11.1, Section 11.11.2, Section 11.11.3

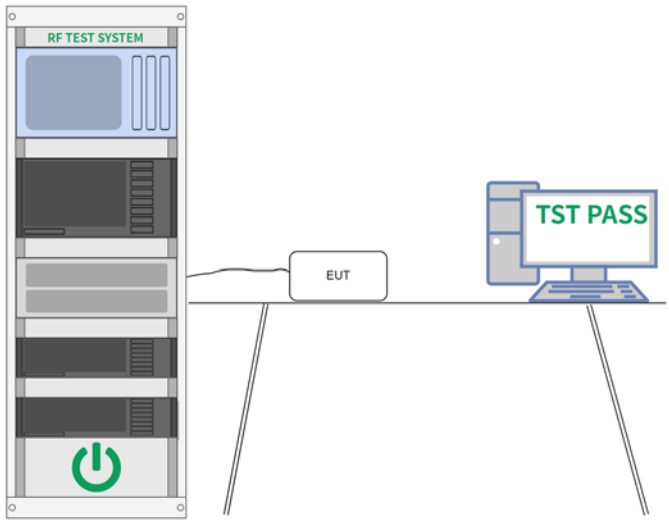
6.5.1 E.U.T. Operation:

Operating Environment:					
Temperature:	24.5 °C	Humidity:	34.5 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.5.2 Test Data:

Please Refer to Appendix for Details.

6.5.3 Test Setup Diagram:



6.6 Band edge emissions (Radiated)

Test Requirement:	Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`
Test Limit:	See table below
Test Method:	ANSI C63.10-2013 section 6.10 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013 section 6.10.5.2

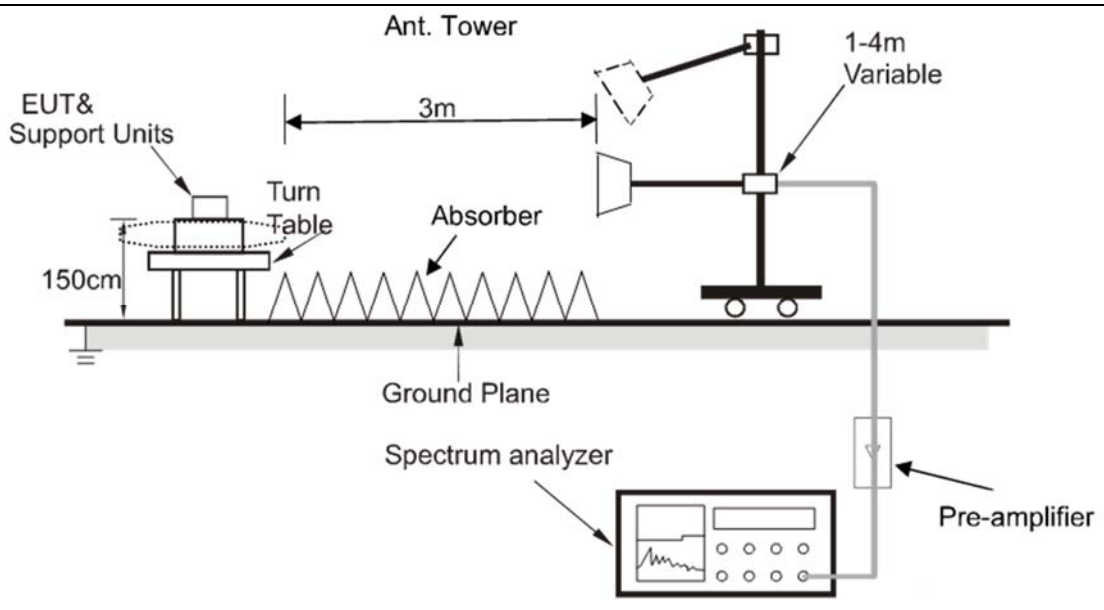
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g.,
§§ 15.231 and 15.241.

6.6.1 E.U.T. Operation:

Operating Environment:					
Temperature:	24 °C	Humidity:	57 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				
Note: All other emissions are attenuated 20dB below the limit, so does not recorded.					

6.6.2 Test Setup Diagram:



6.6.3 Test Data:

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 2402

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	47.81	-8.08	39.73	74.00	-34.27	peak
2		2310.000	38.07	-8.08	29.99	54.00	-24.01	AVG
3		2390.000	49.59	-7.71	41.88	74.00	-32.12	peak
4	*	2390.000	40.20	-7.71	32.49	54.00	-21.51	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 2402

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	46.59	-8.08	38.51	74.00	-35.49	peak
2		2310.000	37.43	-8.08	29.35	54.00	-24.65	AVG
3		2390.000	48.22	-7.71	40.51	74.00	-33.49	peak
4	*	2390.000	37.73	-7.71	30.02	54.00	-23.98	AVG

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 2480

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	54.61	-7.24	47.37	74.00	-26.63	peak
2	*	2483.500	45.92	-7.24	38.68	54.00	-15.32	AVG
3		2500.000	49.98	-7.17	42.81	74.00	-31.19	peak
4		2500.000	39.67	-7.17	32.50	54.00	-21.50	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 2480

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	47.87	-7.24	40.63	74.00	-33.37	peak
2	*	2483.500	38.11	-7.24	30.87	54.00	-23.13	AVG
3		2500.000	48.11	-7.17	40.94	74.00	-33.06	peak
4		2500.000	37.96	-7.17	30.79	54.00	-23.21	AVG

6.7 Radiated spurious emissions (below 1GHz)

<table>
<tr><td>Test Requirement:</td><td>Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g.,
§§ 15.231 and 15.241.
</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2013 section 6.6.4
KDB 558074 D01 15.247 Meas Guidance v05r02</td></tr>
<tr><td>Procedure:</td><td>ANSI C63.10-2013 section 6.6.4</td></tr>
</table>

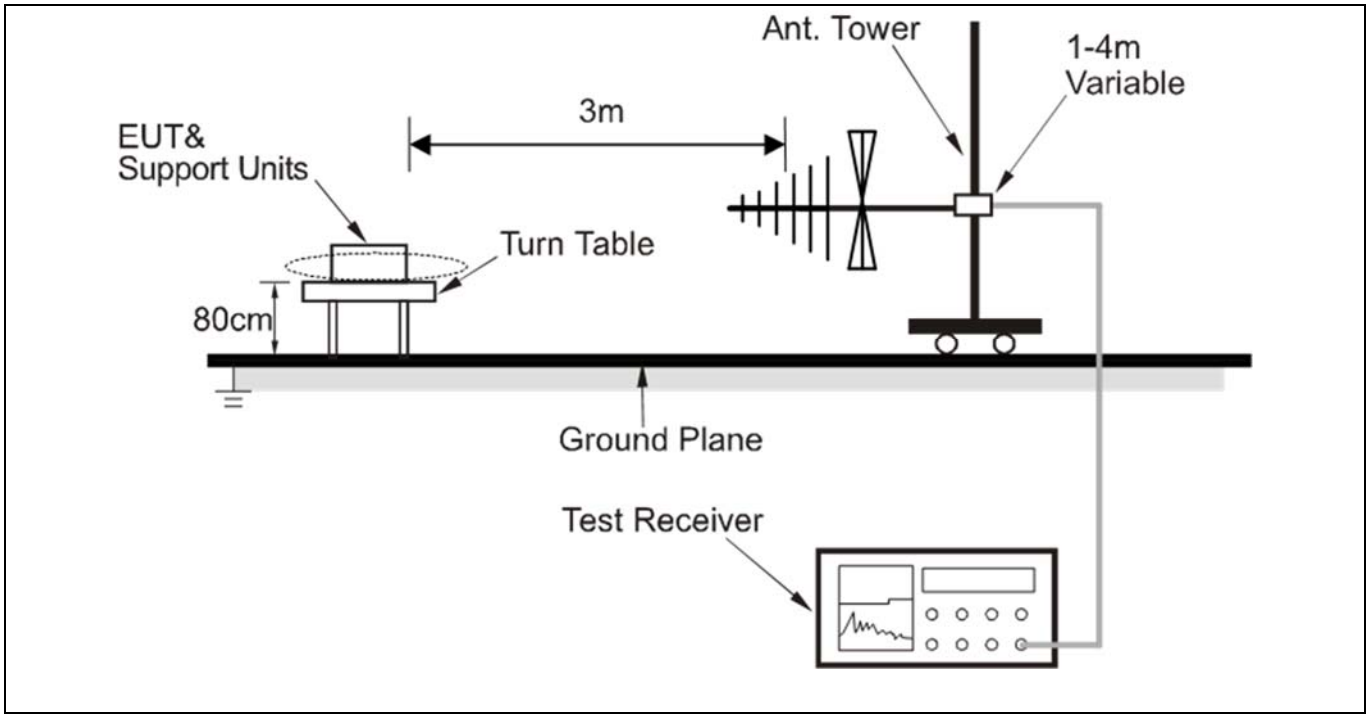
6.7.1 E.U.T. Operation:

<table>
<tr><td colspan="6">Operating Environment:</td></tr>
<tr><td>Temperature:</td><td>25 °C</td><td>Humidity:</td><td>58 %</td><td>Atmospheric Pressure:</td><td>100 kPa</td></tr>
<tr><td>Pre test mode:</td><td colspan="5">Mode1</td></tr>
<tr><td>Final test mode:</td><td colspan="5">Mode1</td></tr>
<tr><td colspan="6">Note:

The amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported.

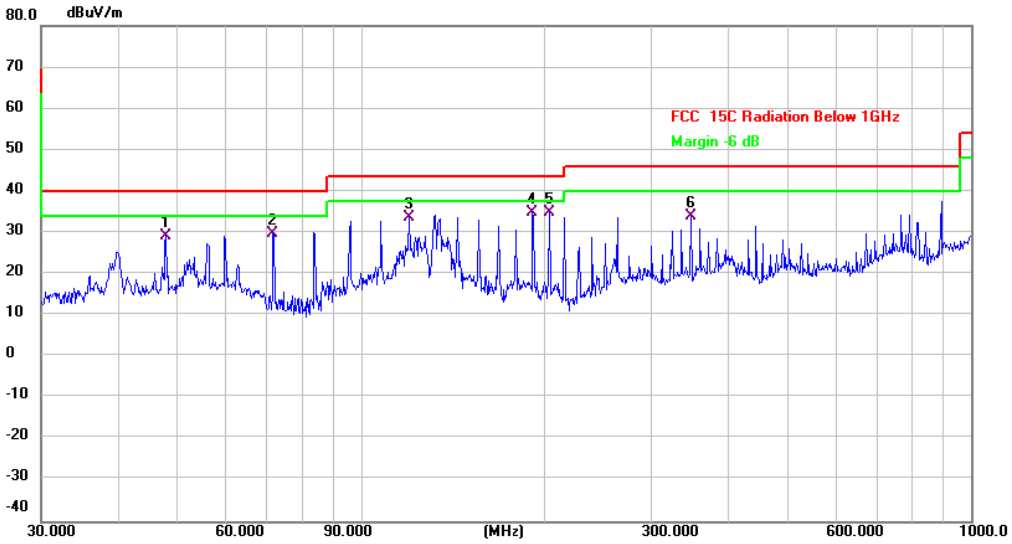
All modes of operation of the EUT were investigated, and only the worst-case results are reported. There were no emissions found below 30MHz within 20dB of the limit.</td></tr>
</table>

6.7.2 Test Setup Diagram:



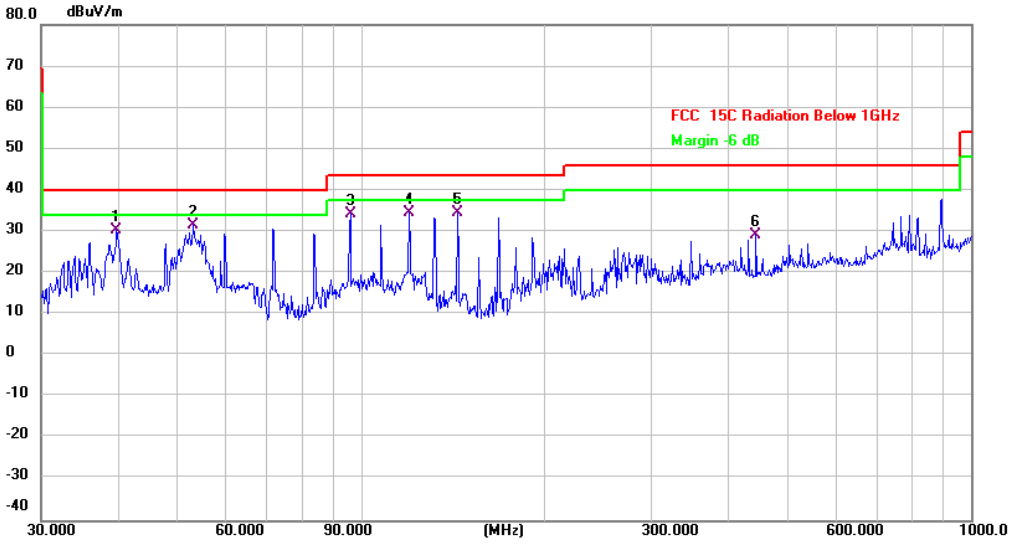
6.7.3 Test Data:

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 2480



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		47.9940	36.35	-7.05	29.30	40.00	-10.70	QP	
2		71.8320	39.79	-10.04	29.75	40.00	-10.25	QP	
3		119.8556	43.72	-10.20	33.52	43.50	-9.98	QP	
4	*	191.7450	44.40	-9.41	34.99	43.50	-8.51	QP	
5		204.2377	44.79	-9.82	34.97	43.50	-8.53	QP	
6		348.0274	41.02	-6.94	34.08	46.00	-11.92	QP	

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 2480



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		39.8542	37.98	-7.64	30.34	40.00	-9.66	QP	
2	*	53.1313	38.81	-7.35	31.46	40.00	-8.54	QP	
3		96.0986	42.29	-8.13	34.16	43.50	-9.34	QP	
4		119.8556	44.80	-10.20	34.60	43.50	-8.90	QP	
5		143.8295	45.74	-11.28	34.46	43.50	-9.04	QP	
6		444.8514	33.79	-4.72	29.07	46.00	-16.93	QP	

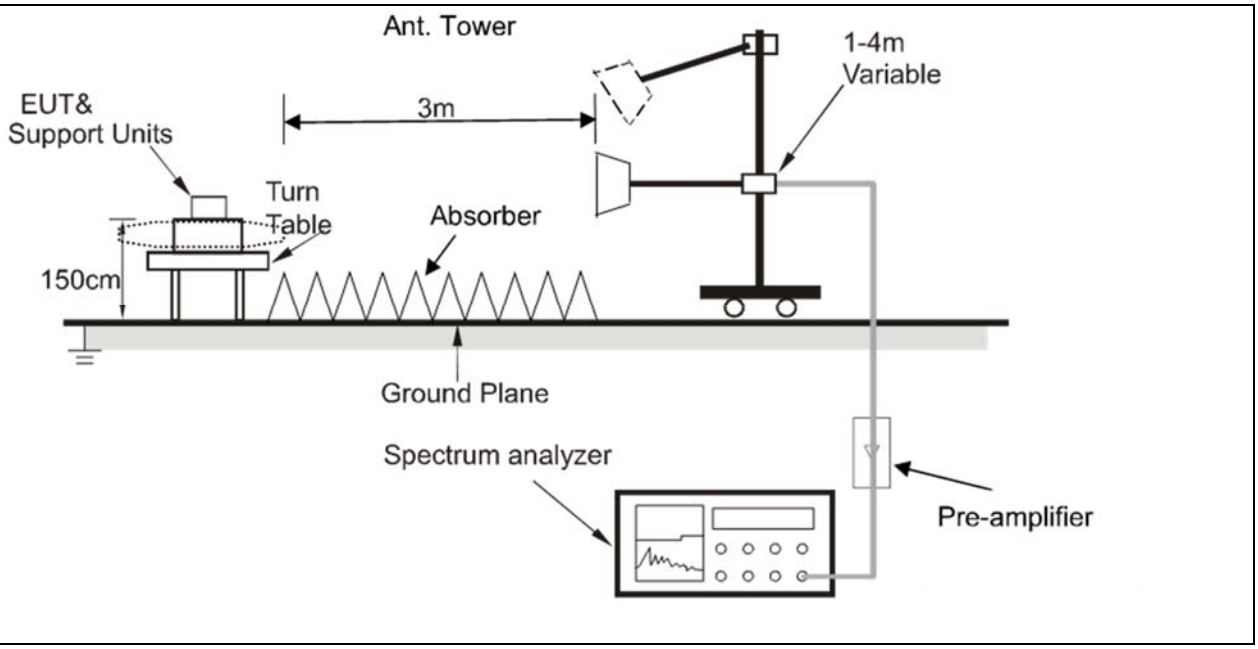
6.8 Radiated spurious emissions (above 1GHz)

Test Requirement:	In addition, radiated emissions which fall in the bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`
Test Limit:	<table><tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr><tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr><tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr><tr><td>1.705-30.0</td><td>30</td><td>30</td></tr><tr><td>30-88</td><td>100 **</td><td>3</td></tr><tr><td>88-216</td><td>150 **</td><td>3</td></tr><tr><td>216-960</td><td>200 **</td><td>3</td></tr><tr><td>Above 960</td><td>500</td><td>3</td></tr></table> ** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
Test Method:	ANSI C63.10-2013 section 6.6.4 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013 section 6.6.4

6.8.1 E.U.T. Operation:

Operating Environment:					
Temperature:	24 °C	Humidity:	57 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				
Note All other emissions are attenuated 20dB below the limit, so does not recorded.					

6.8.2 Test Setup Diagram:



6.8.3 Test Data:

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 2402

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4804.000	47.92	0.74	48.66	74.00	-25.34	peak
2	*	4804.000	44.78	0.74	45.52	54.00	-8.48	AVG
3		7206.000	38.38	6.02	44.40	74.00	-29.60	peak
4		7206.000	32.20	6.02	38.22	54.00	-15.78	AVG
5		9608.000	40.28	5.88	46.16	74.00	-27.84	peak
6		9608.000	34.22	5.88	40.10	54.00	-13.90	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 2402

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4804.000	40.66	0.74	41.40	74.00	-32.60	peak
2		4804.000	34.48	0.74	35.22	54.00	-18.78	AVG
3		7206.000	40.46	6.02	46.48	74.00	-27.52	peak
4	*	7206.000	34.30	6.02	40.32	54.00	-13.68	AVG
5		9608.000	40.62	5.88	46.50	74.00	-27.50	peak
6		9608.000	34.31	5.88	40.19	54.00	-13.81	AVG

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 2441

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4880.000	49.49	1.04	50.53	74.00	-23.47	peak
2	*	4880.000	46.37	1.04	47.41	54.00	-6.59	AVG
3		7320.000	39.32	5.93	45.25	74.00	-28.75	peak
4		7320.000	33.29	5.93	39.22	54.00	-14.78	AVG
5		9760.000	41.30	6.55	47.85	74.00	-26.15	peak
6		9760.000	34.78	6.55	41.33	54.00	-12.67	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 2441

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4880.000	40.26	1.04	41.30	74.00	-32.70	peak
2		4880.000	34.08	1.04	35.12	54.00	-18.88	AVG
3		7320.000	39.84	5.93	45.77	74.00	-28.23	peak
4		7320.000	33.40	5.93	39.33	54.00	-14.67	AVG
5		9760.000	41.01	6.55	47.56	74.00	-26.44	peak
6	*	9760.000	34.73	6.55	41.28	54.00	-12.72	AVG

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 2480

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4960.000	50.67	1.50	52.17	74.00	-21.83	peak
2	*	4960.000	47.72	1.50	49.22	54.00	-4.78	AVG
3		7440.000	39.98	5.61	45.59	74.00	-28.41	peak
4		7440.000	33.72	5.61	39.33	54.00	-14.67	AVG
5		9920.000	41.09	6.10	47.19	74.00	-26.81	peak
6		9920.000	35.07	6.10	41.17	54.00	-12.83	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 2480

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4960.000	44.41	1.50	45.91	74.00	-28.09	peak
2		4960.000	37.88	1.50	39.38	54.00	-14.62	AVG
3		7440.000	39.37	5.61	44.98	74.00	-29.02	peak
4		7440.000	32.83	5.61	38.44	54.00	-15.56	AVG
5		9920.000	40.71	6.10	46.81	74.00	-27.19	peak
6	*	9920.000	36.29	6.10	42.39	54.00	-11.61	AVG

Photographs of the test setup

Refer to Appendix - Test Setup Photos

Photographs of the EUT

Refer to Appendix - Test Setup Photos

Appendix

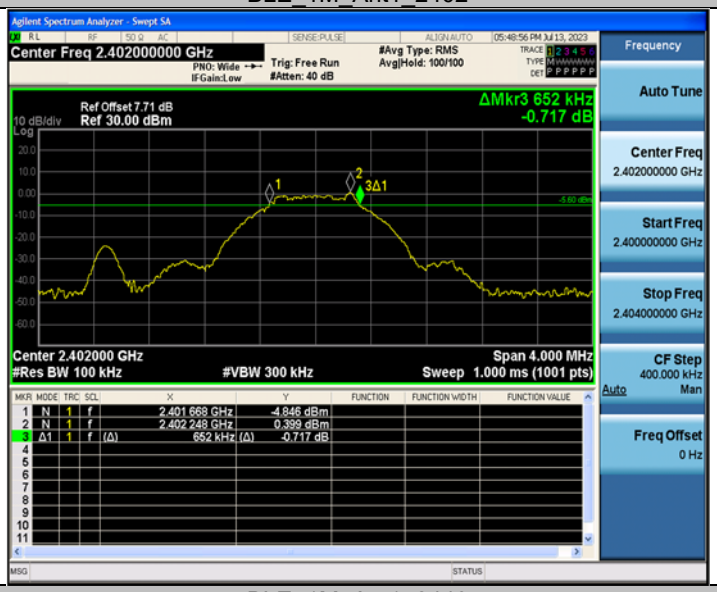
Appendix A: DTS Bandwidth

Test Result

Test Mode	Antenna	Frequency [MHz]	DTS BW [MHz]	Limit [MHz]	Verdict
BLE_1M	Ant1	2402	0.652	0.5	PASS
		2440	0.640	0.5	PASS
		2480	0.676	0.5	PASS

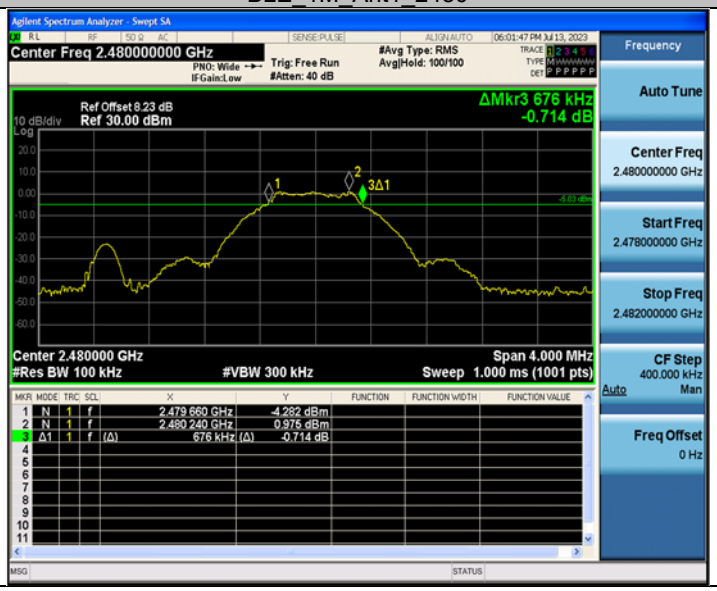
Test Graphs

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

BLE_1M_Ant1_2480



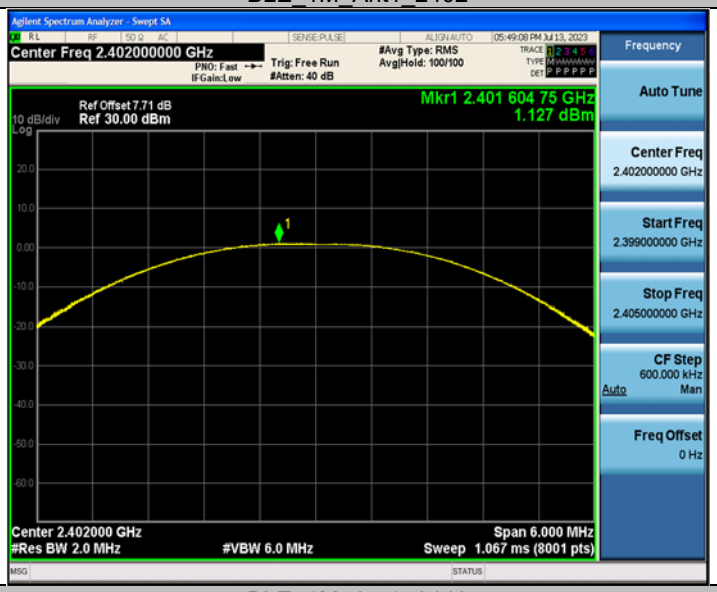
Appendix B: Maximum conducted output power

Test Result-Peak

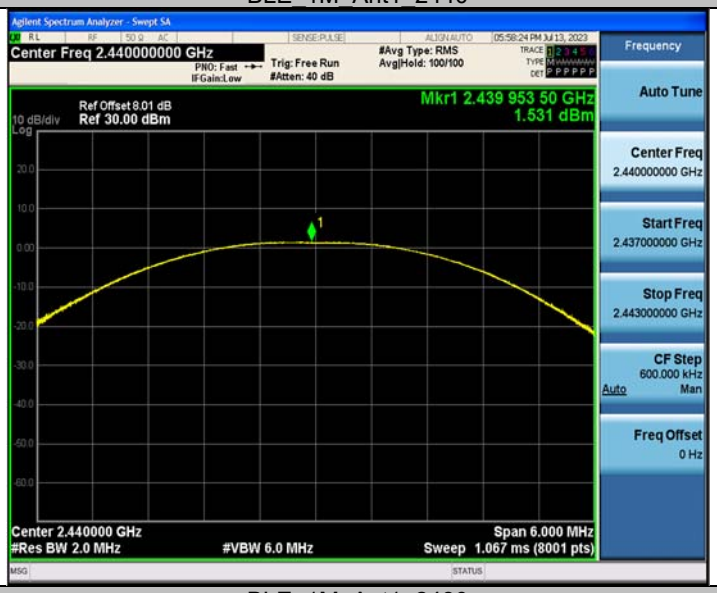
Test Mode	Antenna	Frequency [MHz]	Conducted Peak Power [dBm]	Limit [dBm]	Verdict
BLE_1M	Ant1	2402	1.13	≤30	PASS
		2440	1.53	≤30	PASS
		2480	2.37	≤30	PASS

Test Graphs

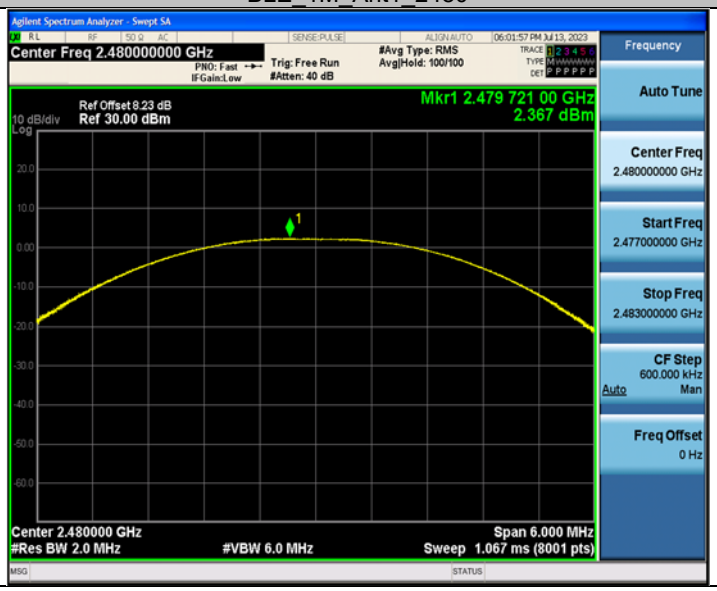
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



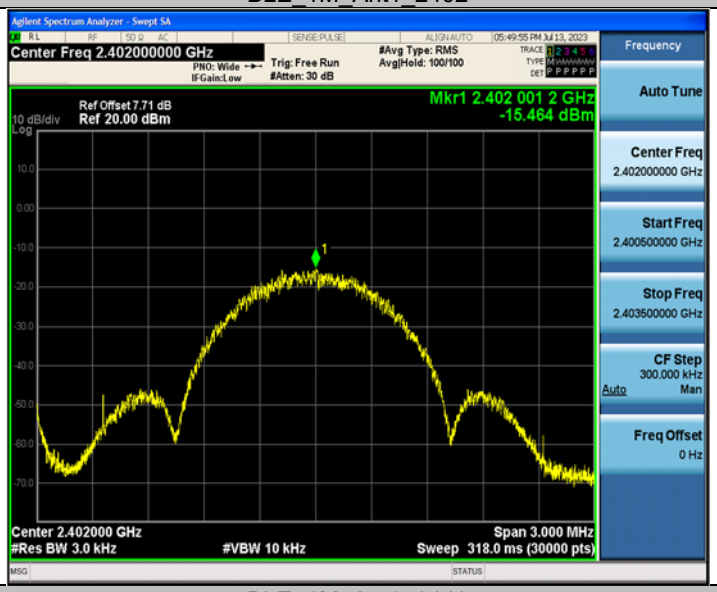
Appendix C: Maximum power spectral density

Test Result

Test Mode	Antenna	Frequency [MHz]	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-15.46	≤8.00	PASS
		2440	-14.91	≤8.00	PASS
		2480	-14.19	≤8.00	PASS

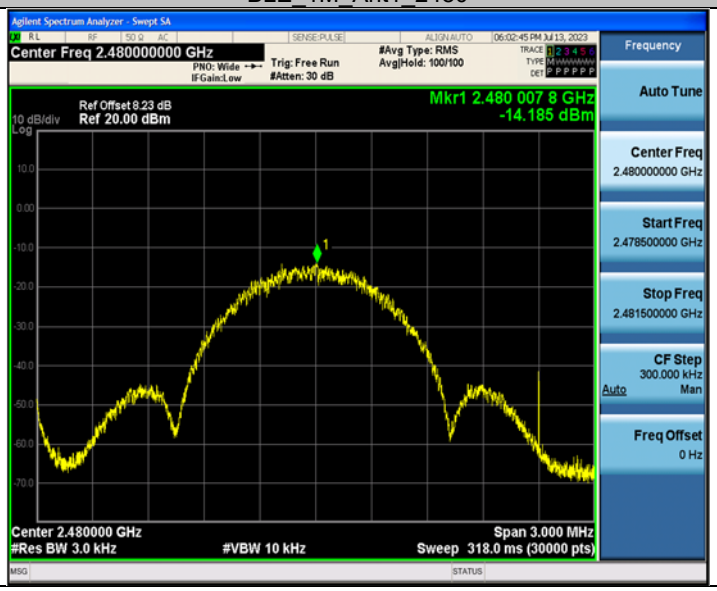
Test Graphs

BLE_1M_Ant1_2402



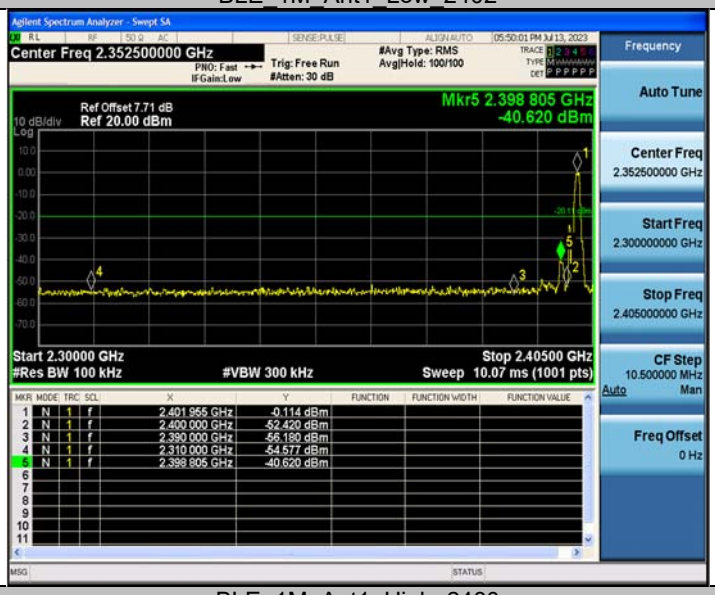
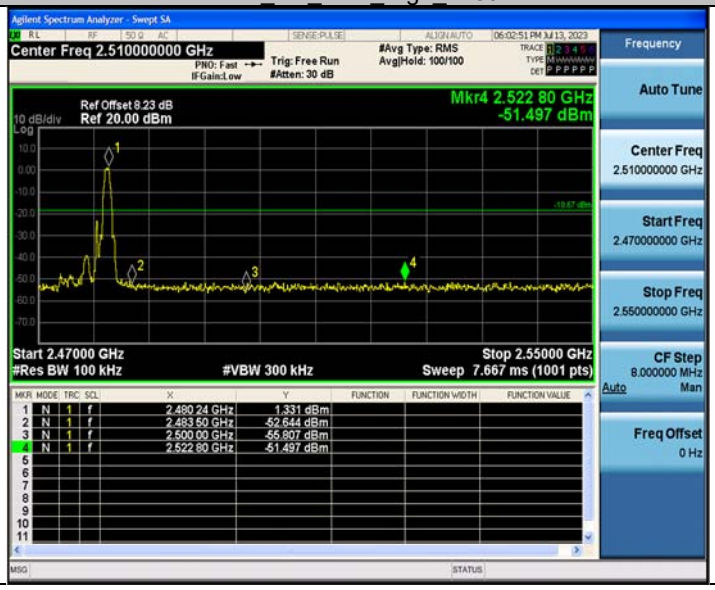
BLE_1M_Ant1_2440

BLE_1M_Ant1_2480



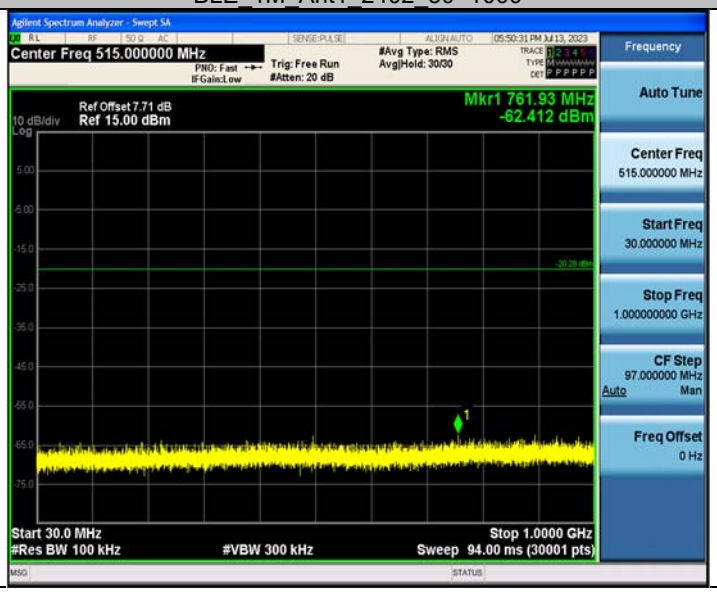
Appendix D: Band edge measurements

Test Graphs

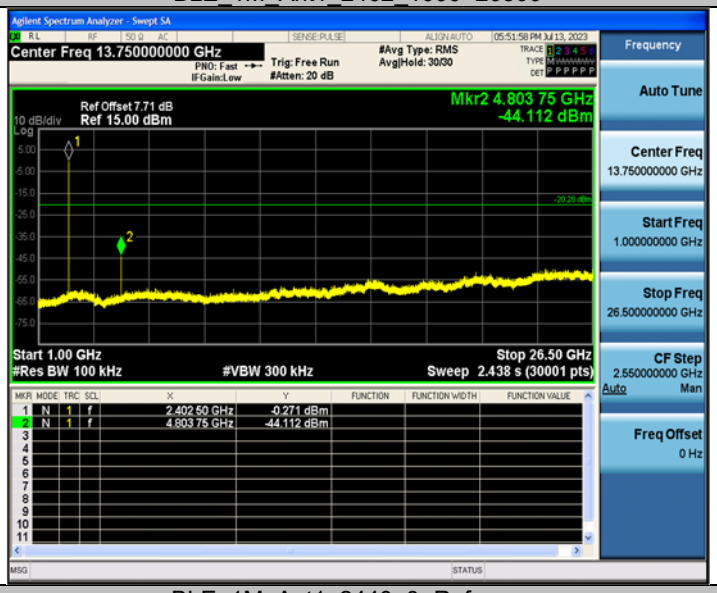
BLE_1M_Ant1_Low_2402

BLE_1M_Ant1_High_2480


Appendix E: Conducted Spurious Emission

Test Graphs

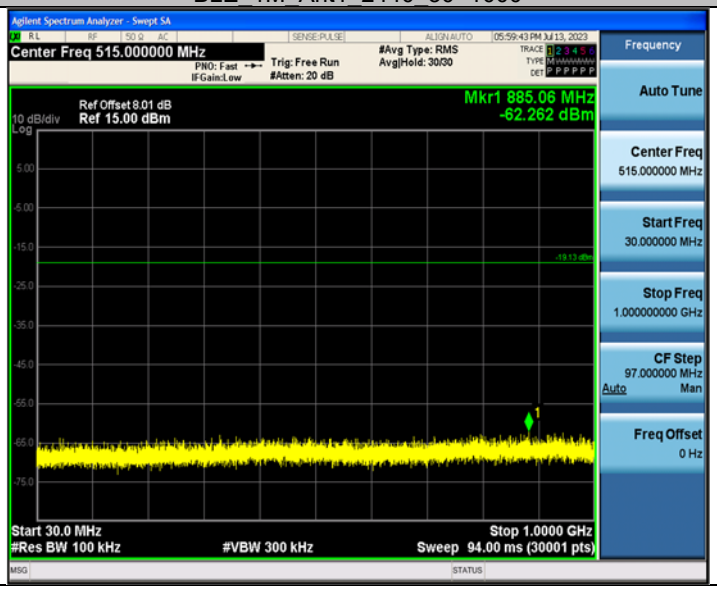
BLE_1M_Ant1_2402_0~Reference
BLE_1M_Ant1_2402_30~1000


BLE_1M_Ant1_2402_1000~26500

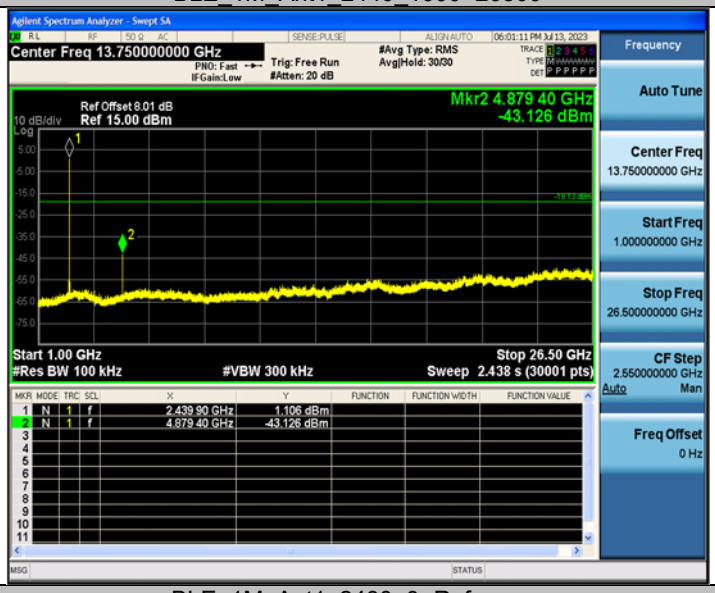


BLE_1M_Ant1_2440_0~Reference

BLE_1M_Ant1_2440_30~1000

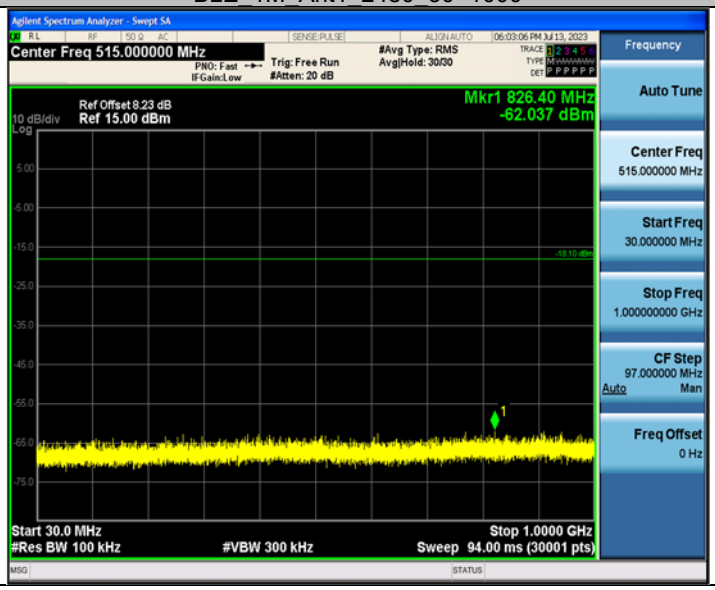


BLE_1M_Ant1_2440_1000~26500

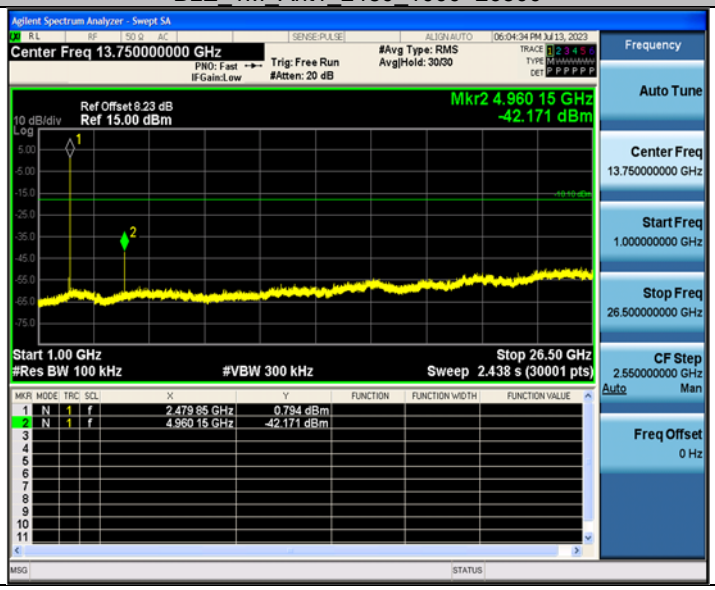


BLE_1M_Ant1_2480_0~Reference

BLE_1M_Ant1_2480_30~1000



BLE_1M_Ant1_2480_1000~26500



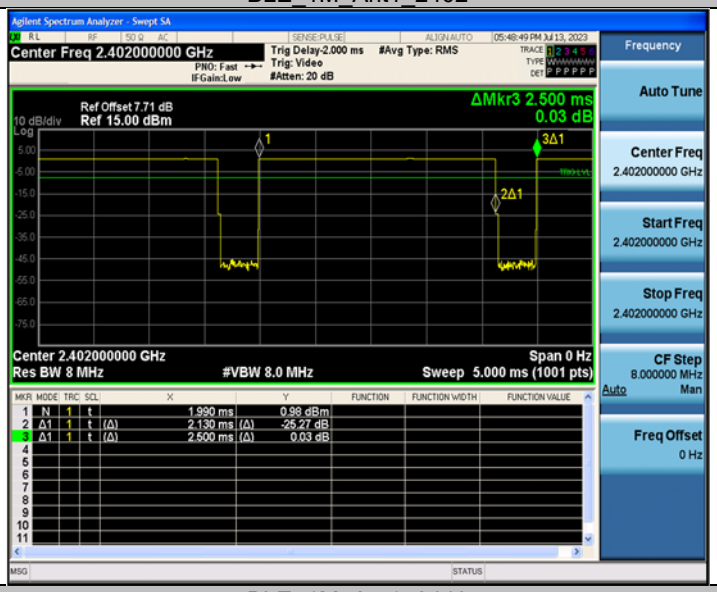
Appendix F: Duty Cycle

Test Result

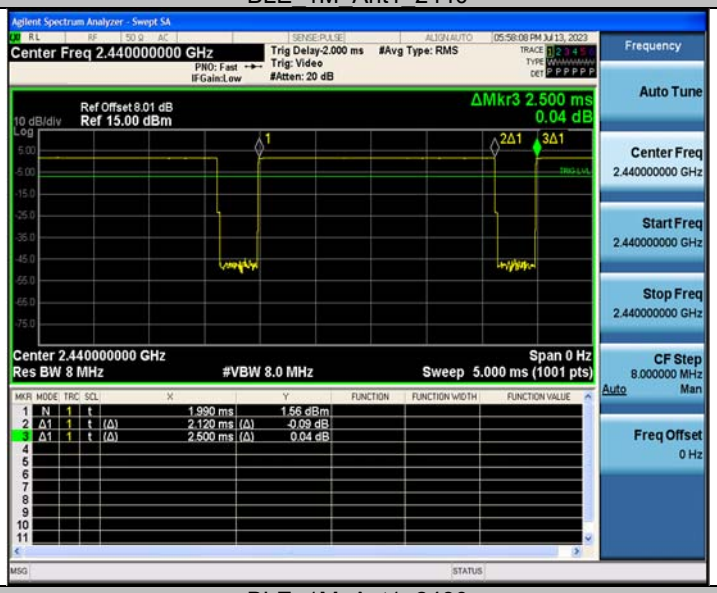
Test Mode	Antenna	Frequency [MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
BLE_1M	Ant1	2402	2.13	2.50	85.20	0.70
		2440	2.12	2.50	84.80	0.72
		2480	2.12	2.50	84.80	0.72

Test Graphs

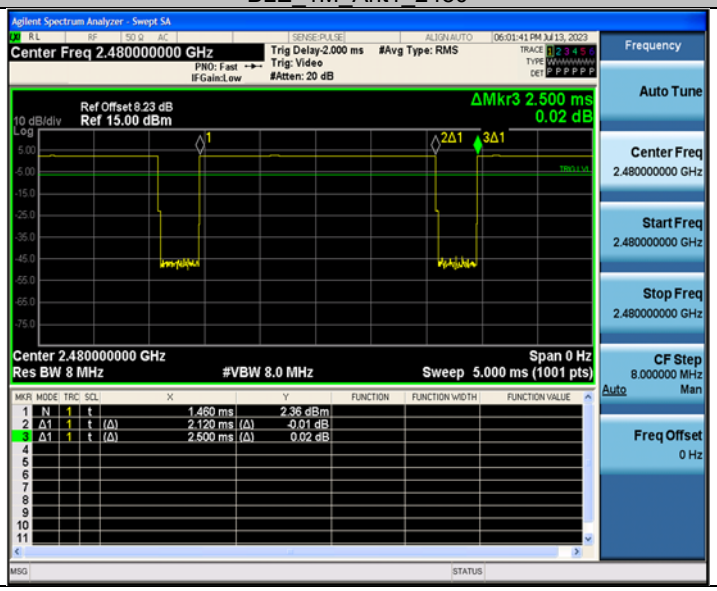
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



----End of Report----