Microtest
微 测 检 测

Test Report

Report No.:	MTi231201002-06E2
Date of issue:	2024-01-05
Applicant:	Zhuhai Quin Technology Co., Ltd.
Product:	Portable Printer
Model(s):	M832, M831, M833, M834, M835, AM-X2, M836, M837, M833W, M834W, M835W, M836W, M837W, M831W, M831S, M831Pro, M831HD, M831Plus, M821, M821W, M821S, M821Pro, M821HD, M821Plus, PR20, PR20S, PR80, PR80S, M20, M20S, AM-X2S, M832W, M832S, M832Pro, M832HD, M832XL, M832Plus, M832Max, M832SE, M832C, M8A32, M8A32W, M8A32S, M8A32Pro, M8A32HD, M8A32XL, M8A32Plus, M8A32Max, M8A32SE, M8A32C, M822, M822W, M822S, M822Pro, M822HD, M822XL, M822Plus, M822Max, M822SE, M822C, M8A22, M8A22W, M8A22S, M8A22Pro, M8A22HD, M8A22XL, M8A22PIUS, M8A22Max, M8A22SE, M8A22C
FCC ID	2ASRB-M832

Shenzhen Microtest Co., Ltd.

http://www.mtitest.com

Address: 101, No. 7, Zone 2, Xinxing Industrial Park, Fuhai Avenue, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Tel: (86-755)88850135 Fax: (86-755) 88850136 Web: www.mtitest.com E-mail: mti@51mti.com

Instructions

1. This test report shall not be partially reproduced without the written consent of the laboratory.

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.

Table of contents

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:	Portable Printer
Trade mark:	N/A
Model name:	M832
Series Model:	M831, M833, M834, M835, AM-X2, M836, M837, M833W, M834W, M835W, M836W, M837W, M831W, M831S, M831Pro, M831HD, M831Plus, M821, M821W, M821S, M821Pro, M821HD, M821Plus, PR20, PR20S, PR80, PR80S, M20, M20S, AM-X2S, M832W, M832S, M832Pro, M832HD, M832XL, M832Plus, M832Max, M832SE, M832C, M8A32, M8A32W, M8A32S, M8A32Pro, M8A32HD, M8A32XL, M8A32Plus, M8A32Max, M8A32SE, M8A32C, M822, M822W, M822S, M822Pro, M822HD, M822XL, M822Plus, M822Max, M822SE, M822C, M8A22, M8A22W, M8A22S, M8A22Pro, M8A22HD, M8A22XL, M8A22PIUS, M8A22Max, M8A22SE, M8A22C
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:	2023-07-07 to 2023-07-10 2023-12-26 to 2024-01-02
Test result:	Pass

Note: This report adds series models and PCB antenna(Antenna gain -0.58 dBi) is replaced by FPC antenna(Antenna gain 2.36 dBi), changing partial EMC peripheral circuitry that doesn't affect the RF performance. Based on the original test report MTi230609004-05E2, the date is 2023-07-14. The Radiated emissions (Below 1GHz) and Radiated emissions (Above 1GHz) are tested for differences. The report adds the difference data and new sample photos.

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:	Portable Printer
Model name:	M832
Series Model:	M831, M833, M834, M835, AM-X2, M836, M837, M833W, M834W, M835W, M836W, M837W, M831W, M831S, M831Pro, M831HD, M831Plus, M821, M821W, M821S, M821Pro, M821HD, M821Plus, PR20, PR20S, PR80, PR80S, M20, M20S, AM-X2S, M832W, M832S, M832Pro, M832HD, M832XL, M832Plus, M832Max, M832SE, M832C, M8A32, M8A32W, M8A32S, M8A32Pro, M8A32HD, M8A32XL, M8A32Plus, M8A32Max, M8A32SE, M8A32C, M822, M822W, M822S, M822Pro, M822HD, M822XL, M822Plus, M822Max, M822SE, M822C, M8A22, M8A22W, M8A22S, M8A22Pro, M8A22HD, M8A22XL, M8A22PIUS, M8A22Max, M8A22SE, M8A22C
Model difference:	All the models are the same circuit and module, except the model name, appearance, colour and silk-screen.
Electrical rating:	Input: 5V dc 2A Battery: 7.4V dc 2600mAh
Accessories:	Cable: USB-A to USB-C 0.8m cable
Hardware version:	Q252_A
Software version:	0.1.0
Test sample(s) number:	MTi230609004-05S1001 MTi231201002-01S1001
RF specification	
Bluetooth version:	V5.1
Operating frequency range:	2402MHz to 2480MHz
Channel number:	40
Modulation type:	GFSK
Antenna(s) type:	FPC Antenna
Antenna(s) gain:	2.36 dBi

1.2 Description of test modes

No.	Emission test modes
Mode1	TX mode（GFSK-1M）

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:

For power setting, refer to below table.

Mode	Test Software	FCC Assist 1.0.2.2		
	Channel	2402MHz	2441MHz	2480MHz
GFSK	Power setting	/	/	/

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 has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Support equipment list			
Description	Model	Serial No.	Manufacturer
MI CHARGE(18W）	MDY-08-EH	YJ2808215006999	MI
Support cable list			
Description	Length (m)	From	To
/	/	/	/

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 non-restricted 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 restricted 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	/	/	/
Emissions in restricted 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
3	Amplifier	Agilent	8449B	3008A01120	2023-05-26	2024-05-25

No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
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)

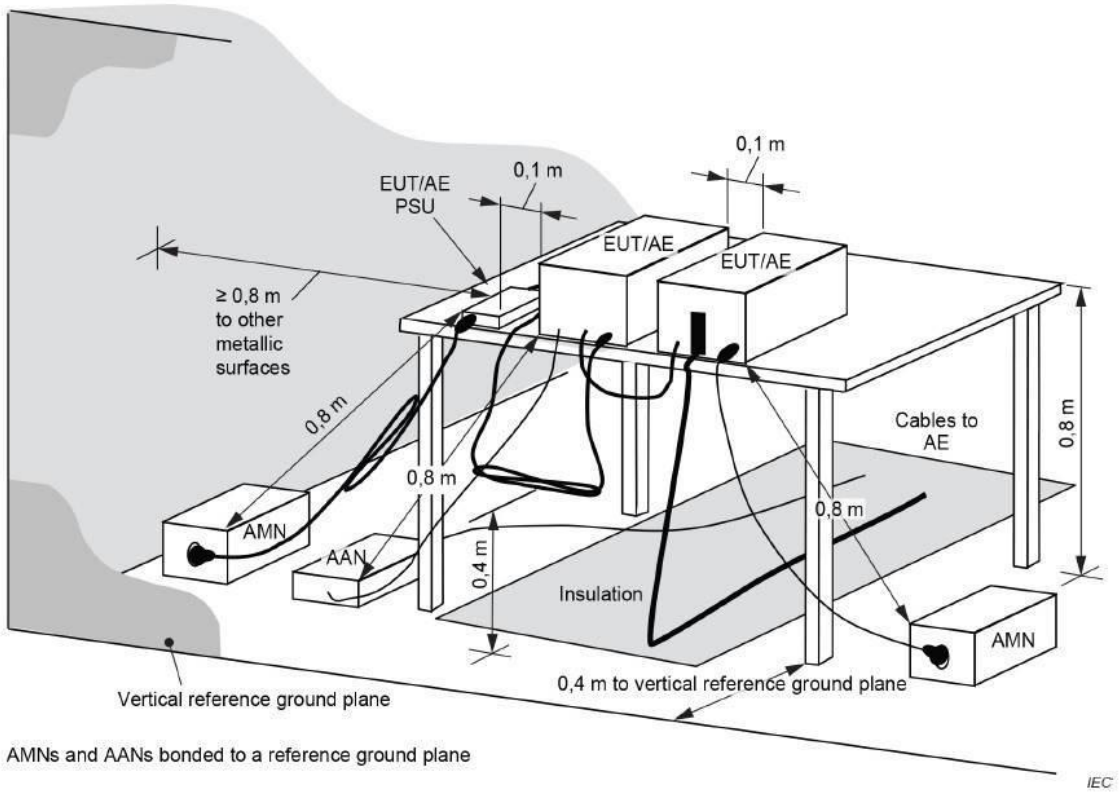
6.1 Conducted Emission at AC power line

Test Requirement:	Except as shown in paragraphs (b)and (c)of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).
Test Limit:	Frequency of emission (MHz) / Conducted limit (dBμV): 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 Method:	Refer to ANSI C63.10-2013 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices

6.1.1 E.U.T. Operation:

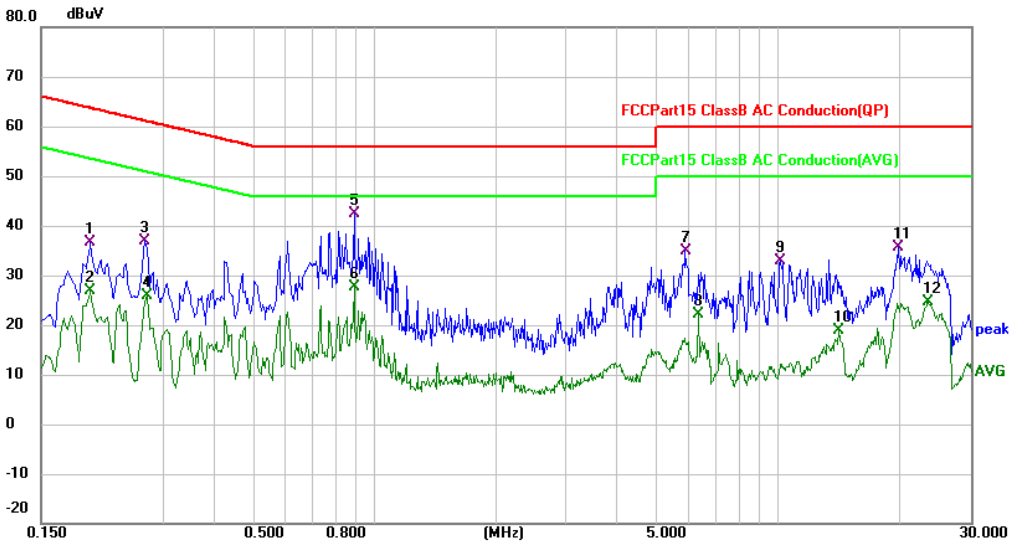
Operating Environment:					
Temperature:	25.6 °C	Humidity:	56 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.1.2 Test Setup Diagram:



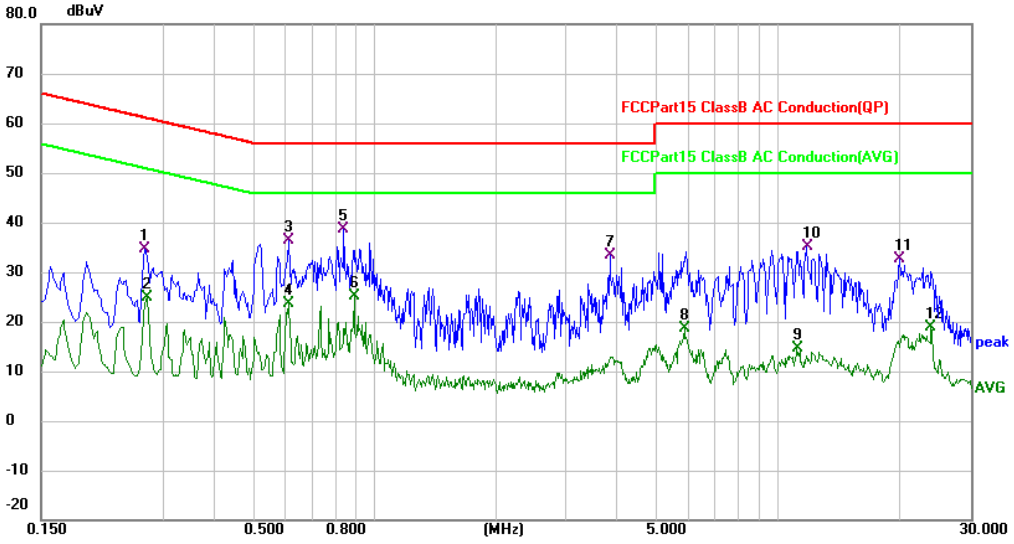
6.1.3 Test Data:

Mode1 / Line: Line / CH: 120V/60Hz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1980	25.83	10.68	36.51	63.69	-27.18	QP	
2		0.1980	16.11	10.68	26.79	53.69	-26.90	AVG	
3		0.2700	26.16	10.81	36.97	61.12	-24.15	QP	
4		0.2740	15.08	10.81	25.89	51.00	-25.11	AVG	
5	*	0.8940	30.27	12.17	42.44	56.00	-13.56	QP	
6		0.8940	15.55	12.17	27.72	46.00	-18.28	AVG	
7		5.9219	24.60	10.27	34.87	60.00	-25.13	QP	
8		6.3700	11.96	10.28	22.24	50.00	-27.76	AVG	
9		10.1539	22.58	10.41	32.99	60.00	-27.01	QP	
10		14.1979	8.39	10.49	18.88	50.00	-31.12	AVG	
11		19.8900	24.93	10.65	35.58	60.00	-24.42	QP	
12		23.5380	13.96	10.74	24.70	50.00	-25.30	AVG	

Mode1 / Line: Neutral / CH: 120V/60Hz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2700	23.96	10.76	34.72	61.12	-26.40	QP	
2		0.2740	14.11	10.76	24.87	51.00	-26.13	AVG	
3		0.6140	24.91	11.58	36.49	56.00	-19.51	QP	
4		0.6140	11.97	11.58	23.55	46.00	-22.45	AVG	
5	*	0.8420	26.53	12.04	38.57	56.00	-17.43	QP	
6		0.8940	13.07	12.13	25.20	46.00	-20.80	AVG	
7		3.8580	23.20	10.28	33.48	56.00	-22.52	QP	
8		5.8780	8.24	10.27	18.51	50.00	-31.49	AVG	
9		11.1780	4.16	10.35	14.51	50.00	-35.49	AVG	
10		11.7540	24.74	10.38	35.12	60.00	-24.88	QP	
11		20.0180	21.94	10.69	32.63	60.00	-27.37	QP	
12		23.9980	8.09	10.77	18.86	50.00	-31.14	AVG	

6.2 Occupied Bandwidth

Test Requirement:	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 Limit:	Section (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:	DTS bandwidth
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:	25 °C	Humidity:	50 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.2.2 Test Data:

Please Refer to Appendix for Details.

6.3 Maximum Conducted Output Power

Test Requirement:	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 Limit:	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:	Maximum peak conducted output power
Procedure:	ANSI C63.10-2013, section 11.9.1 Maximum peak conducted output power

6.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	25 °C	Humidity:	50 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.3.2 Test Data:

Please Refer to Appendix for Details.

6.4 Power Spectral Density

Test Requirement:	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 Limit:	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:	Maximum power spectral density level in the fundamental emission

6.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	25 °C	Humidity:	50 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.4.2 Test Data:

Please Refer to Appendix for Details.

6.5 Emissions in non-restricted frequency bands

Test Requirement:	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 Limit:	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:	Emissions in nonrestricted frequency bands
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:	25 °C	Humidity:	50 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.5.2 Test Data:

Please Refer to Appendix for Details.

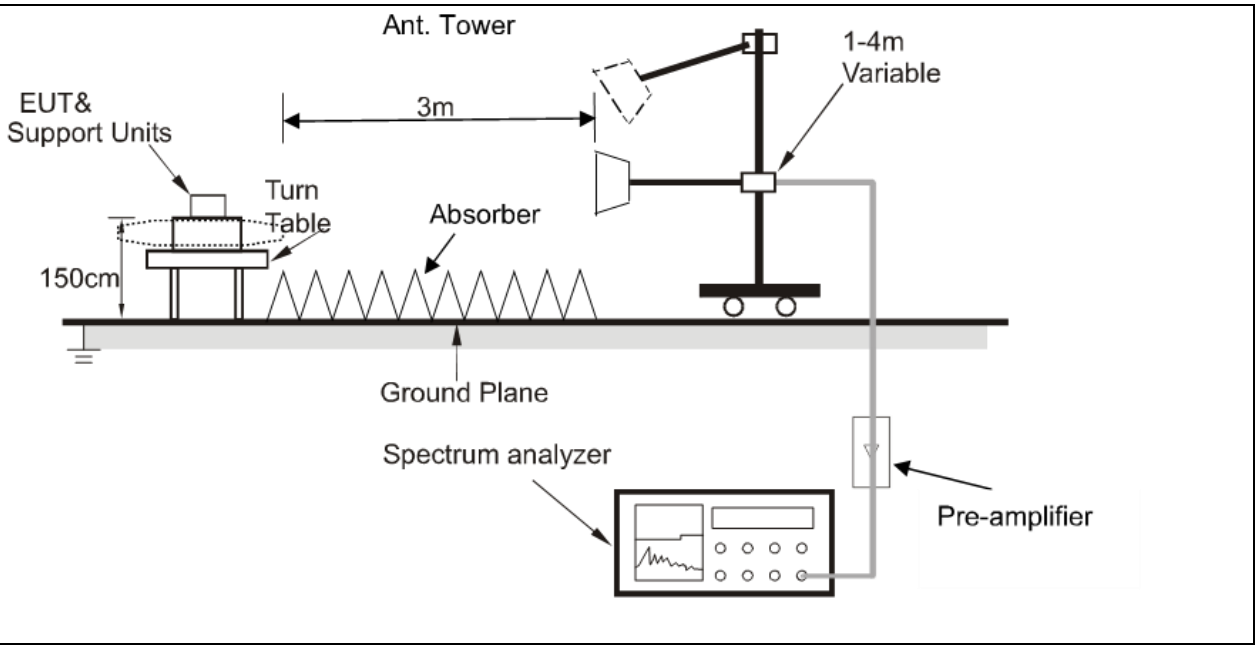
6.6 Band edge emissions (Radiated)

Test Requirement:	In addition, radiated emissions which fall in the restricted 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:	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.
Test Method:	Radiated emissions tests
Procedure:	ANSI C63.10-2013 section 6.10.5.2

6.6.1 E.U.T. Operation:

Operating Environment:					
Temperature:	24 °C	Humidity:	58 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.6.2 Test Setup Diagram:



6.6.3 Test Data:

FPC Antenna:

Mode1 / Polarization: Horizontal / 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	53.37	-12.83	40.54	74.00	-33.46	peak
2		2310.000	42.77	-12.83	29.94	54.00	-24.06	AVG
3		2390.000	61.58	-12.42	49.16	74.00	-24.84	peak
4	*	2390.000	52.21	-12.42	39.79	54.00	-14.21	AVG

Mode1 / Polarization: Vertical / 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	52.17	-12.83	39.34	74.00	-34.66	peak
2		2310.000	42.82	-12.83	29.99	54.00	-24.01	AVG
3		2390.000	56.30	-12.42	43.88	74.00	-30.12	peak
4	*	2390.000	47.97	-12.42	35.55	54.00	-18.45	AVG

Mode1 / Polarization: Horizontal / 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	56.24	-12.44	43.80	74.00	-30.20	peak
2		2483.500	48.32	-12.44	35.88	54.00	-18.12	AVG
3		2500.000	58.77	-12.35	46.42	74.00	-27.58	peak
4	*	2500.000	49.62	-12.35	37.27	54.00	-16.73	AVG

Mode1 / Polarization: Vertical / 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	63.39	-12.44	50.95	74.00	-23.05	peak
2	*	2483.500	56.96	-12.44	44.52	54.00	-9.48	AVG
3		2500.000	66.09	-12.35	53.74	74.00	-20.26	peak
4		2500.000	56.38	-12.35	44.03	54.00	-9.97	AVG

6.7 Emissions in restricted frequency bands (below 1GHz)

Test Requirement:	In addition, radiated emissions which fall in the restricted 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:	Radiated emissions tests
Procedure:	ANSI C63.10-2013 section 6.6.4

6.7.1 E.U.T. Operation:

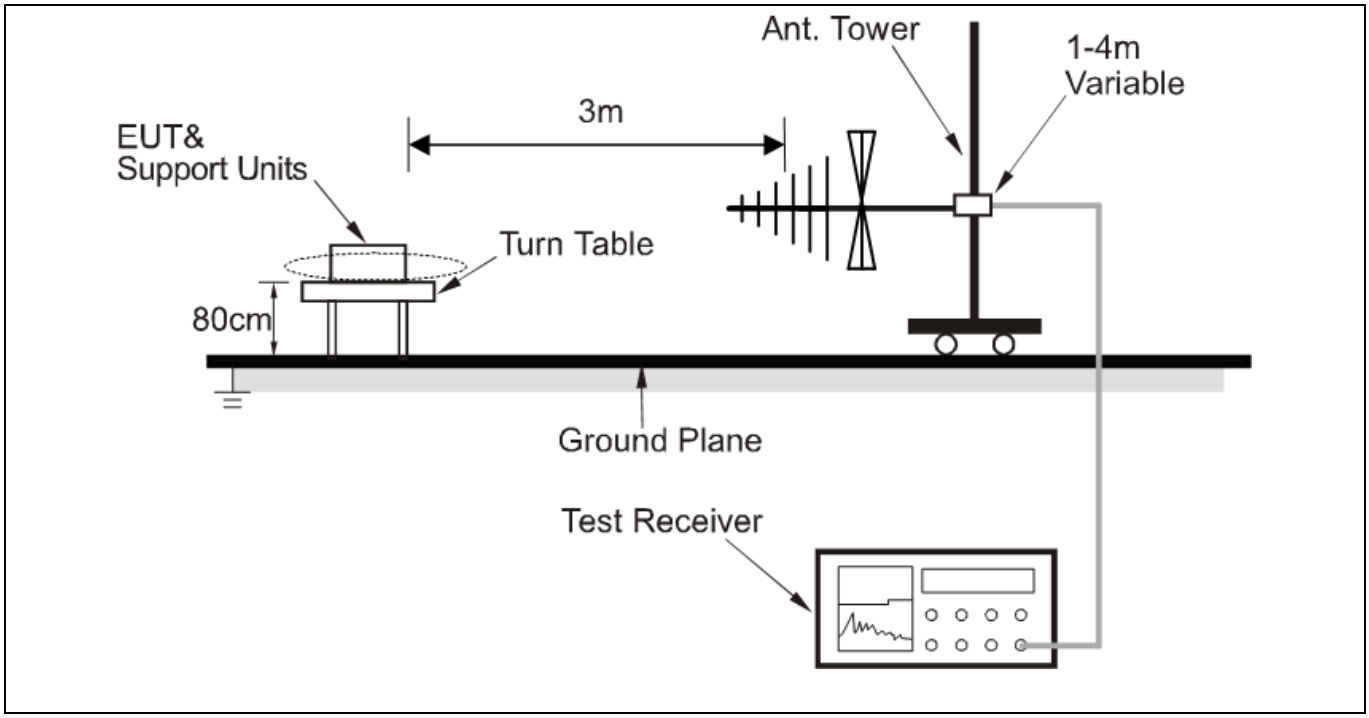
Operating Environment:					
Temperature:	24 °C	Humidity:	57 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

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.

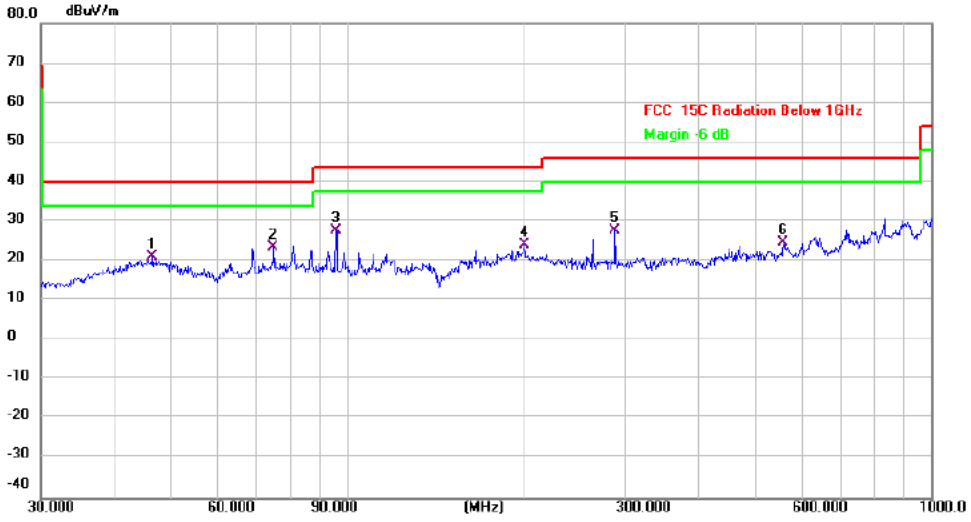
6.7.2 Test Setup Diagram:



6.7.3 Test Data:

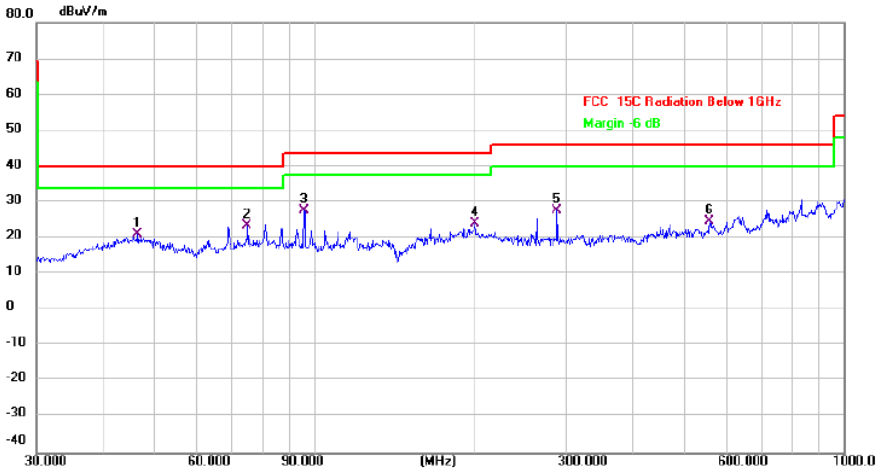
FPC Antenna:

Mode1 / Polarization: Horizontal / CH: 2480



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		46.5030	28.47	-7.32	21.15	40.00	-18.85	QP	
2		74.9191	35.85	-12.42	23.43	40.00	-16.57	QP	
3	*	95.7622	38.30	-10.60	27.70	43.50	-15.80	QP	
4		201.3930	30.49	-6.57	23.92	43.50	-19.58	QP	
5		287.9904	33.18	-5.60	27.58	46.00	-18.42	QP	
6		558.7300	26.41	-1.65	24.76	46.00	-21.24	QP	

Mode1 / Polarization: Vertical / CH: 2480



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		46.5030	28.47	-7.32	21.15	40.00	-18.85	QP	
2		74.9191	35.85	-12.42	23.43	40.00	-16.57	QP	
3	*	95.7622	38.30	-10.60	27.70	43.50	-15.80	QP	
4		201.3930	30.49	-6.57	23.92	43.50	-19.58	QP	
5		287.9904	33.18	-5.60	27.58	46.00	-18.42	QP	
6		558.7300	26.41	-1.65	24.76	46.00	-21.24	QP	

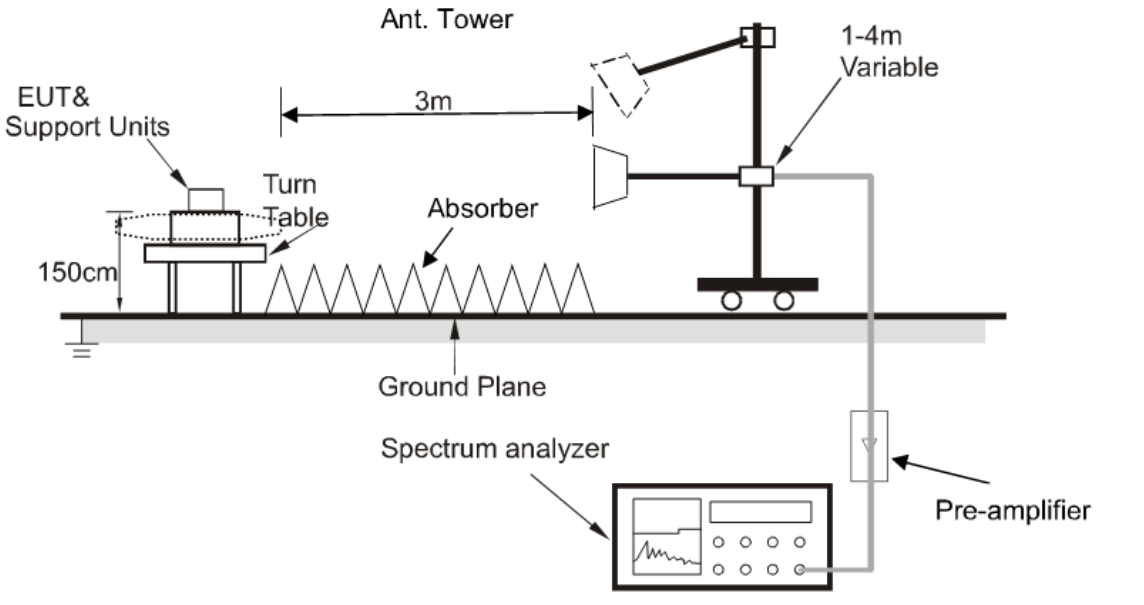
6.8 Emissions in restricted frequency bands (above 1GHz)

Test Requirement:	In addition, radiated emissions which fall in the restricted 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:	Radiated emissions tests
Procedure:	ANSI C63.10-2013 section 6.6.4

6.8.1 E.U.T. Operation:

Operating Environment:					
Temperature:	25 °C	Humidity:	59 %	Atmospheric Pressure:	101 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:

FPC Antenna:

Mode1 / Polarization: Horizontal / 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	53.53	-7.40	46.13	74.00	-27.87	peak
2		4804.000	47.42	-7.40	40.02	54.00	-13.98	AVG
3		7206.000	47.43	0.96	48.39	74.00	-25.61	peak
4		7206.000	41.37	0.96	42.33	54.00	-11.67	AVG
5		9608.000	48.54	2.16	50.70	74.00	-23.30	peak
6	*	9608.000	42.16	2.16	44.32	54.00	-9.68	AVG

Mode1 / Polarization: Vertical / 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	50.70	-7.40	43.30	74.00	-30.70	peak
2		4804.000	45.94	-7.40	38.54	54.00	-15.46	AVG
3		7206.000	47.91	0.96	48.87	74.00	-25.13	peak
4		7206.000	41.69	0.96	42.65	54.00	-11.35	AVG
5		9608.000	48.64	2.16	50.80	74.00	-23.20	peak
6	*	9608.000	41.99	2.16	44.15	54.00	-9.85	AVG

Mode1 / Polarization: Horizontal / CH: 2440

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4880.000	50.40	-7.45	42.95	74.00	-31.05	peak
2		4880.000	43.96	-7.45	36.51	54.00	-17.49	AVG
3		7320.000	48.15	0.77	48.92	74.00	-25.08	peak
4		7320.000	41.92	0.77	42.69	54.00	-11.31	AVG
5		9760.000	47.39	3.11	50.50	74.00	-23.50	peak
6	*	9760.000	41.01	3.11	44.12	54.00	-9.88	AVG

Mode1 / Polarization: Vertical / CH: 2440

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4880.000	49.96	-7.45	42.51	74.00	-31.49	peak
2		4880.000	43.69	-7.45	36.24	54.00	-17.76	AVG
3		7320.000	45.88	0.77	46.65	74.00	-27.35	peak
4		7320.000	39.97	0.77	40.74	54.00	-13.26	AVG
5		9760.000	48.54	3.11	51.65	74.00	-22.35	peak
6	*	9760.000	42.64	3.11	45.75	54.00	-8.25	AVG

Mode1 / Polarization: Horizontal / 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	51.59	-7.20	44.39	74.00	-29.61	peak
2		4960.000	45.43	-7.20	38.23	54.00	-15.77	AVG
3		7440.000	46.34	0.98	47.32	74.00	-26.68	peak
4		7440.000	40.23	0.98	41.21	54.00	-12.79	AVG
5		9920.000	47.62	3.02	50.64	74.00	-23.36	peak
6	*	9920.000	41.65	3.02	44.67	54.00	-9.33	AVG

Mode1 / Polarization: Vertical / 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	50.27	-7.20	43.07	74.00	-30.93	peak
2		4960.000	45.85	-7.20	38.65	54.00	-15.35	AVG
3		7440.000	47.66	0.98	48.64	74.00	-25.36	peak
4		7440.000	41.40	0.98	42.38	54.00	-11.62	AVG
5		9920.000	48.61	3.02	51.63	74.00	-22.37	peak
6	*	9920.000	42.65	3.02	45.67	54.00	-8.33	AVG

Photographs of the test setup

Refer to Appendix - Test Setup Photos

Photographs of the EUT

Refer to Appendix - EUT Photos

Appendix

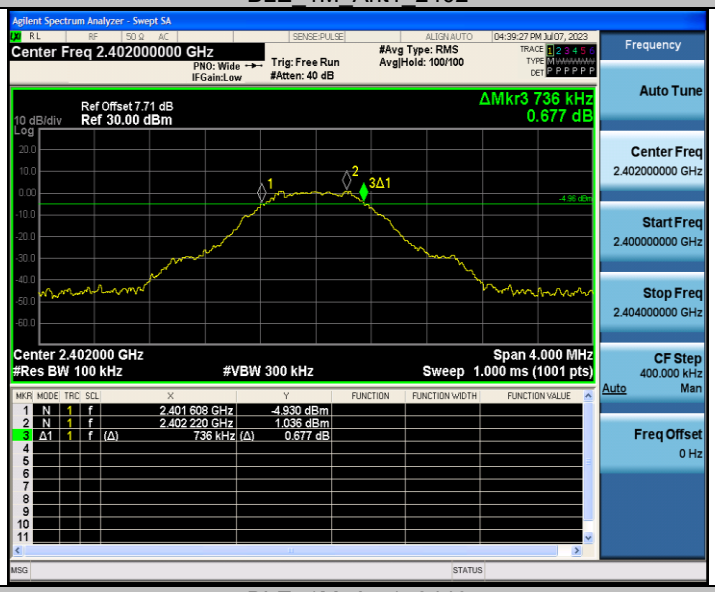
Appendix A: DTS Bandwidth

Test Result

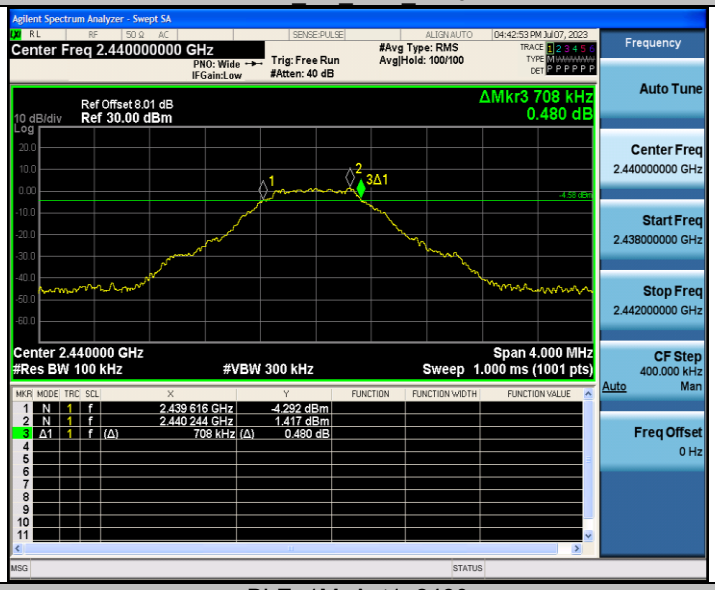
Test Mode	Antenna	Frequency [MHz]	DTS BW [MHz]	Limit [MHz]	Verdict
BLE_1M	Ant1	2402	0.736	0.5	PASS
		2440	0.708	0.5	PASS
		2480	0.676	0.5	PASS

Test Graphs

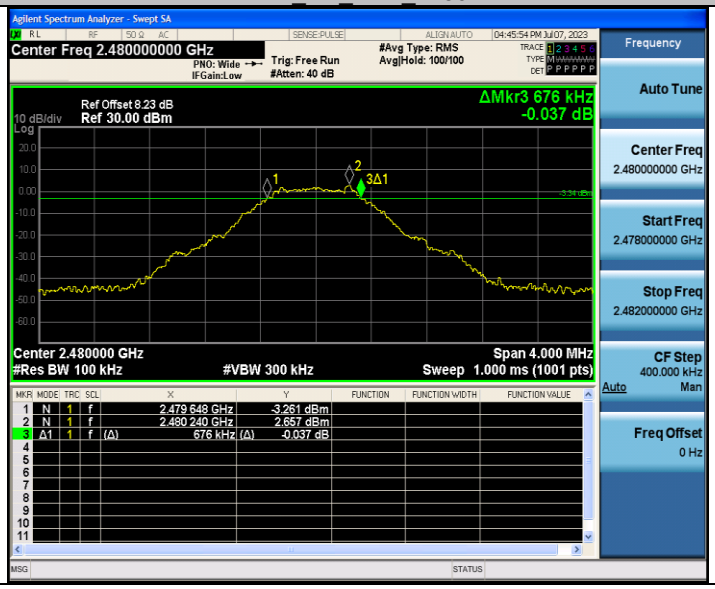
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



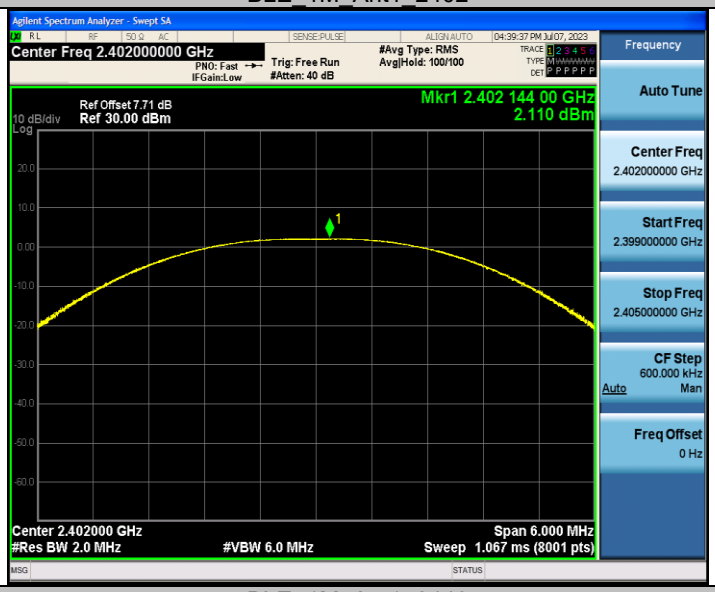
Appendix B: Maximum conducted output power

Test Result-Peak

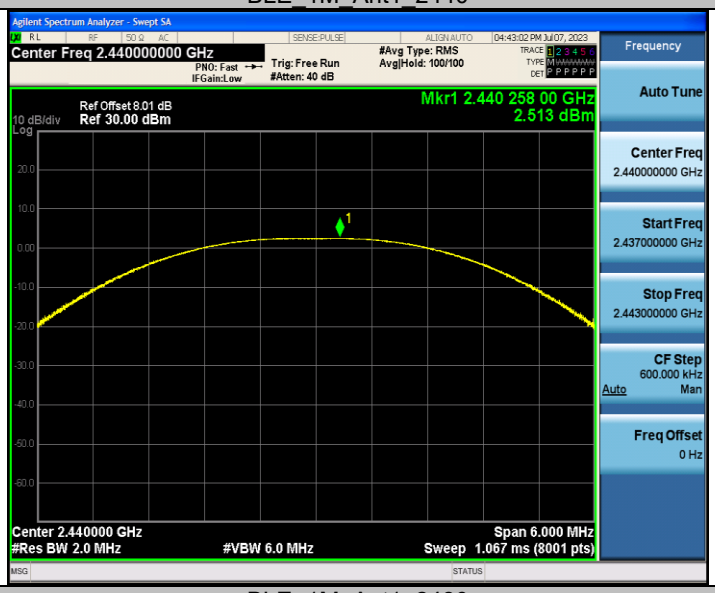
Test Mode	Antenna	Frequency [MHz]	Conducted Peak Power [dBm]	Limit [dBm]	Verdict
BLE_1M	Ant1	2402	2.11	≤30	PASS
		2440	2.51	≤30	PASS
		2480	2.96	≤30	PASS

Test Graphs

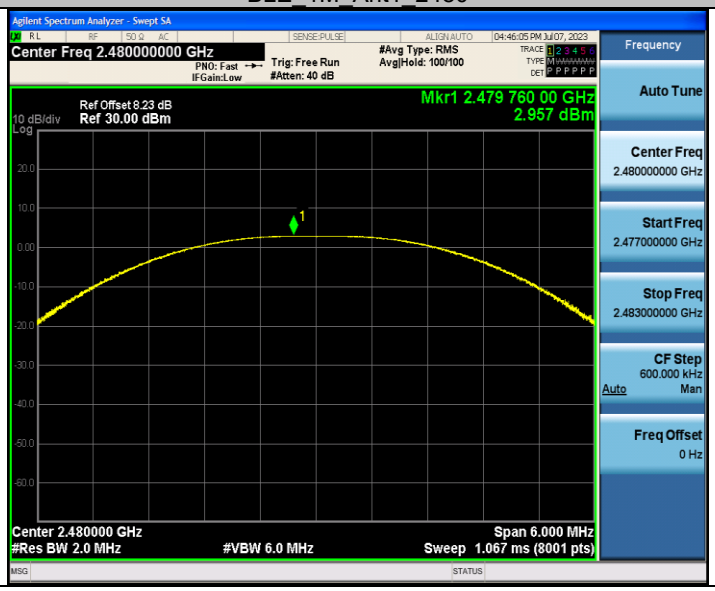
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



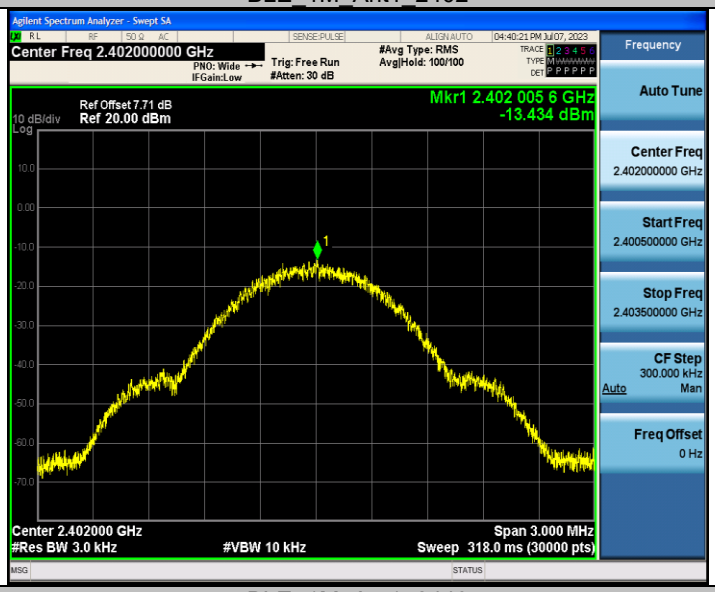
Appendix C: Maximum power spectral density

Test Result

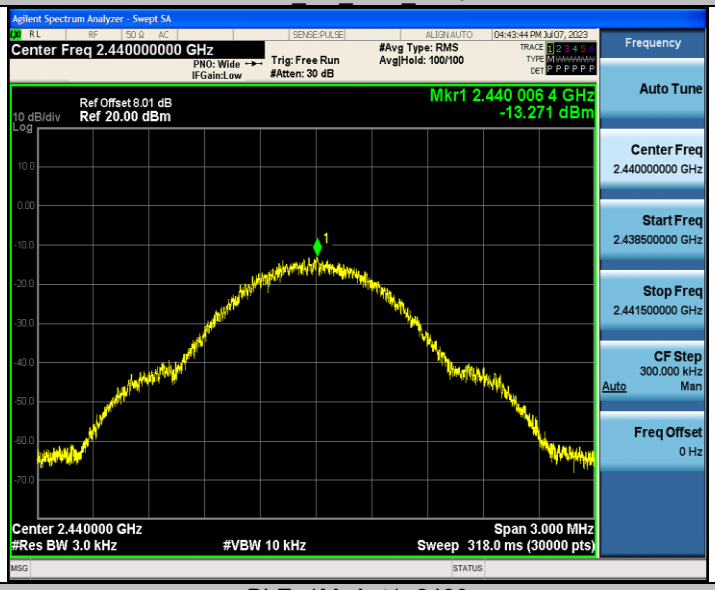
Test Mode	Antenna	Frequency [MHz]	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-13.43	≤8.00	PASS
		2440	-13.27	≤8.00	PASS
		2480	-12.55	≤8.00	PASS

Test Graphs

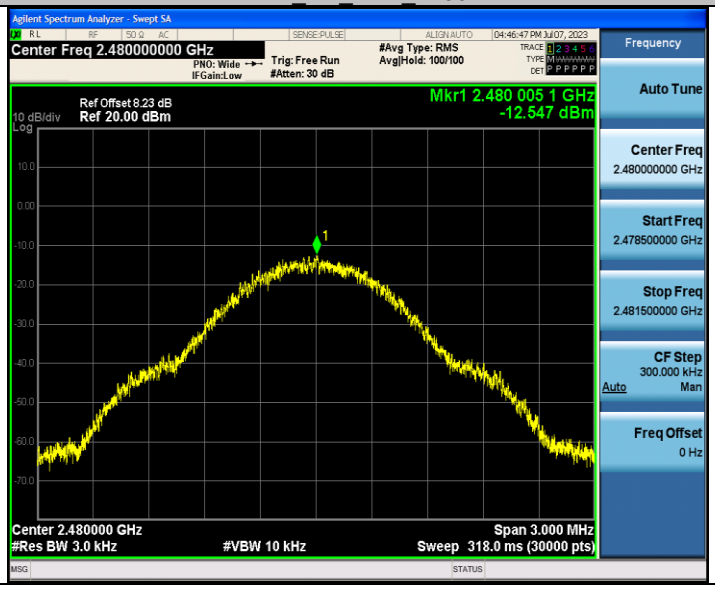
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



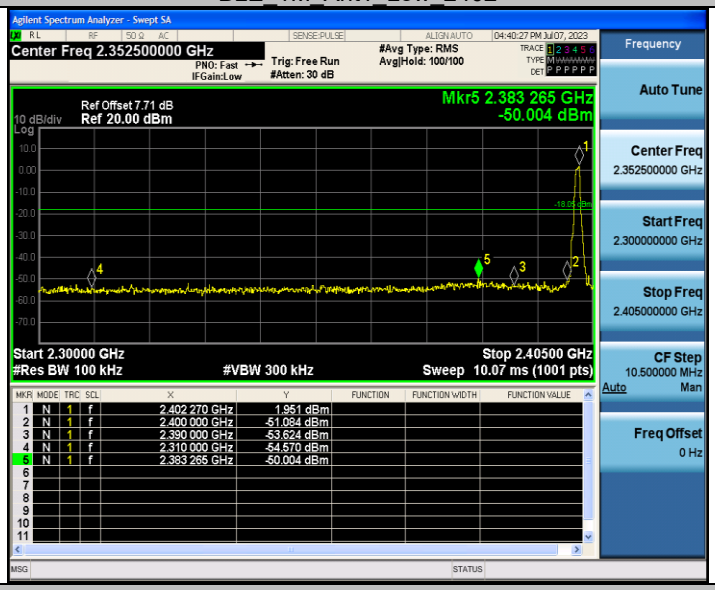
BLE_1M_Ant1_2480



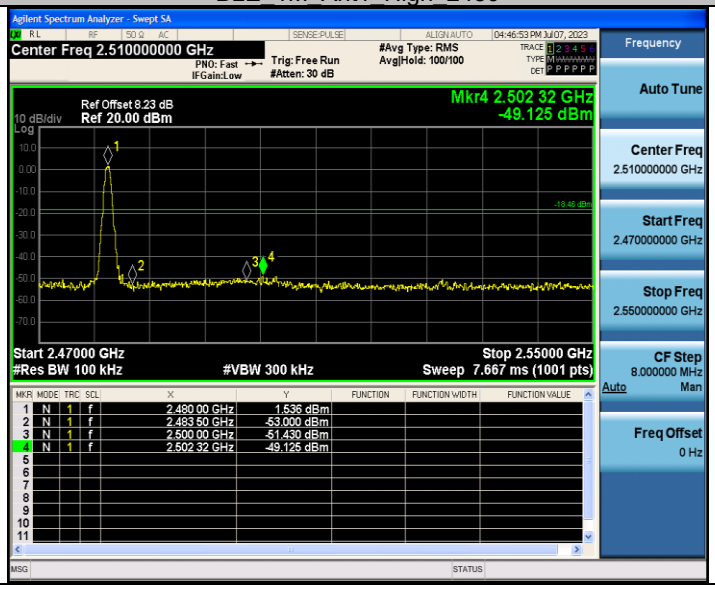
Appendix D: Band edge measurements

Test Graphs

BLE_1M_Ant1_Low_2402



BLE_1M_Ant1_High_2480

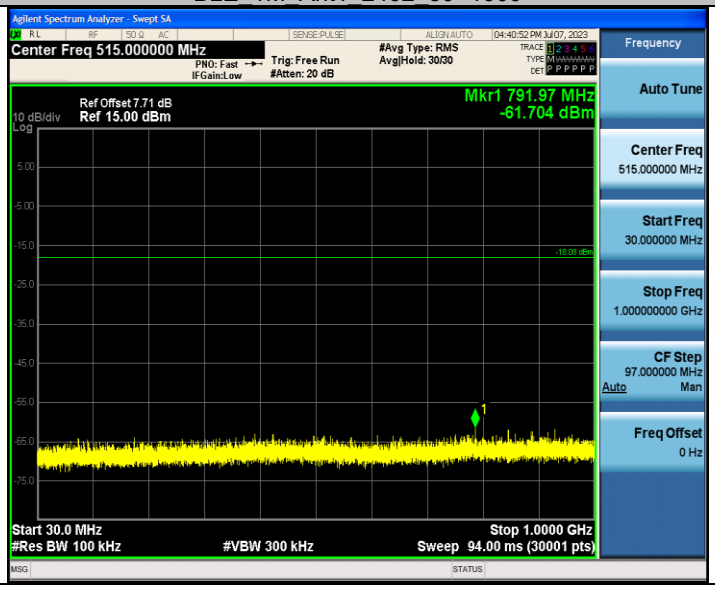


Appendix E: Conducted Spurious Emission

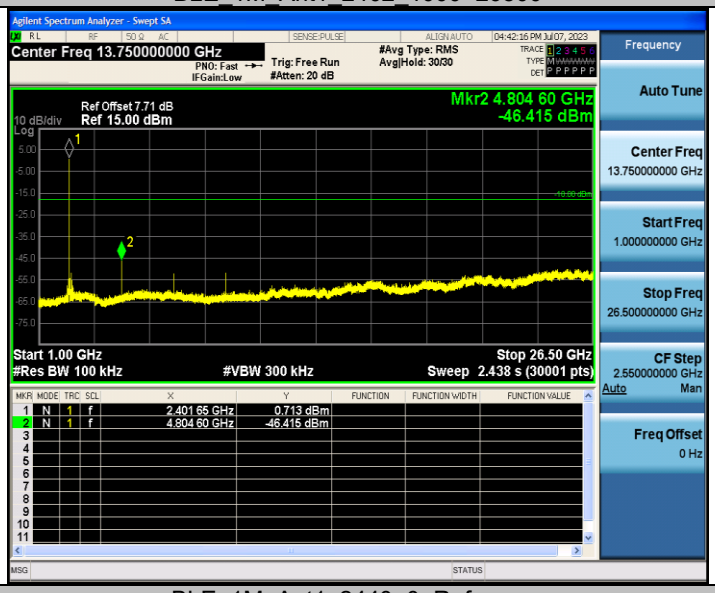
Test Graphs

BLE_1M_Ant1_2402_0~Reference

BLE_1M_Ant1_2402_30~1000

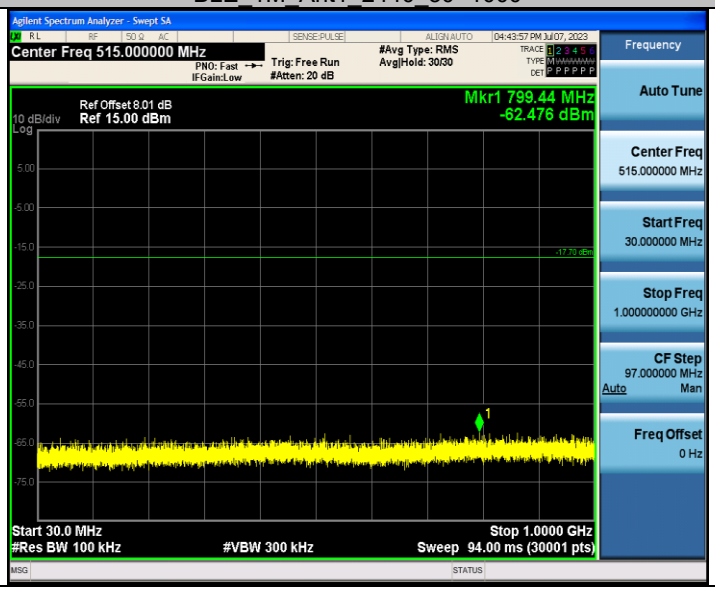


BLE_1M_Ant1_2402_1000~26500

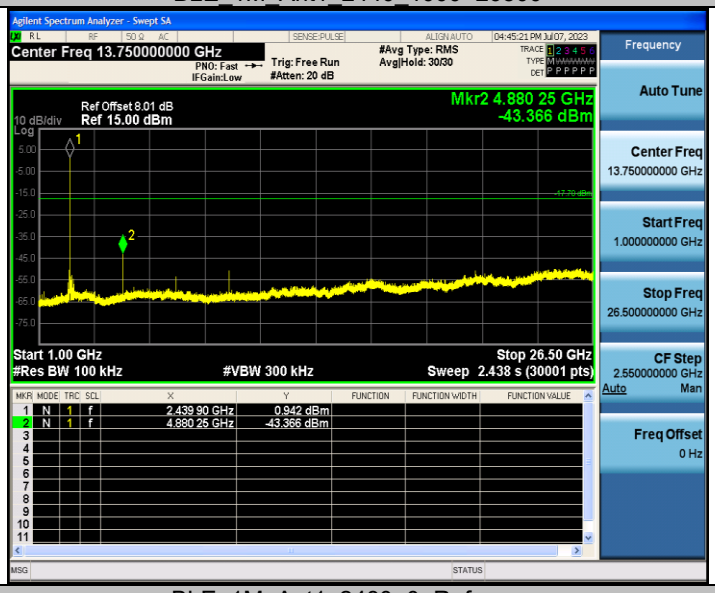


BLE_1M_Ant1_2440_0~Reference

BLE_1M_Ant1_2440_30~1000

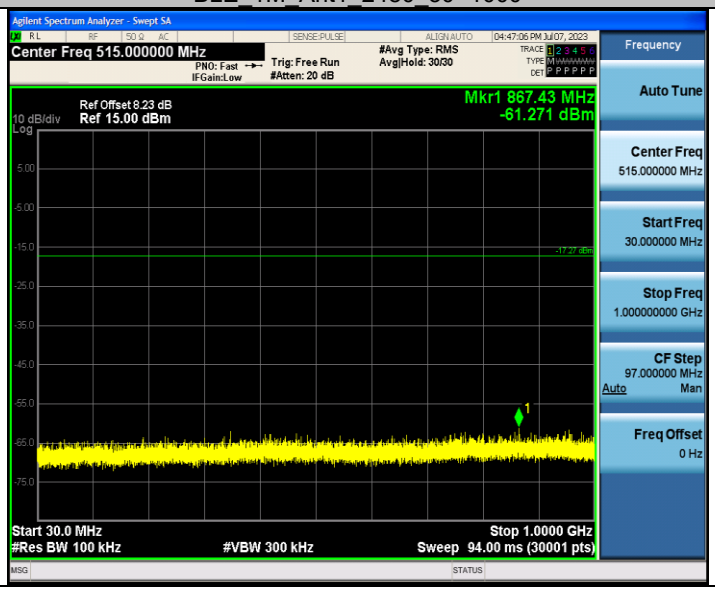


BLE_1M_Ant1_2440_1000~26500

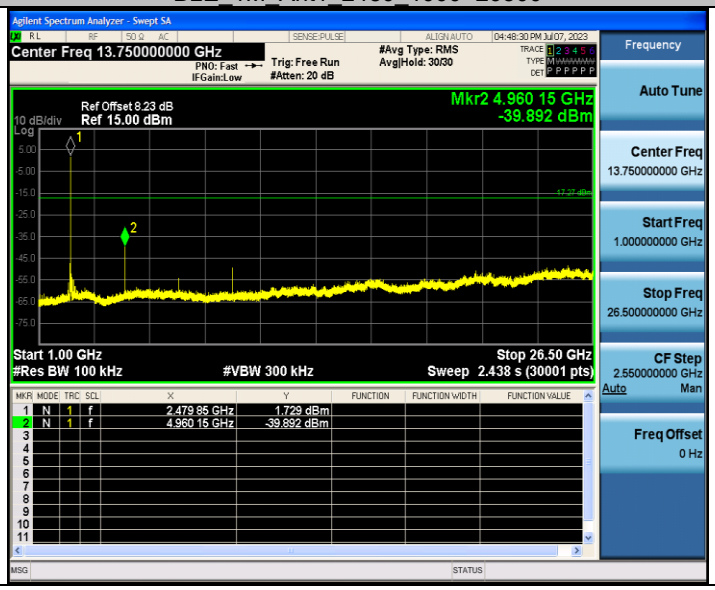


BLE_1M_Ant1_2480_0~Reference

BLE_1M_Ant1_2480_30~1000



BLE_1M_Ant1_2480_1000~26500



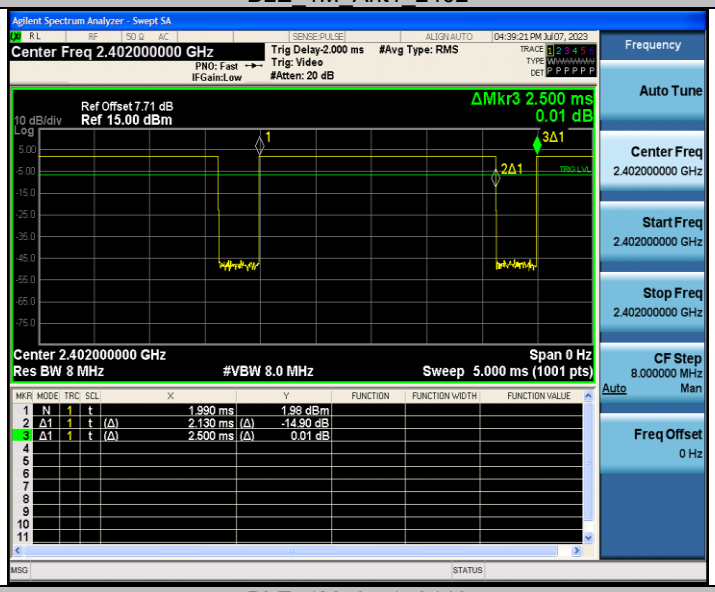
Appendix F: Duty Cycle

Test Result

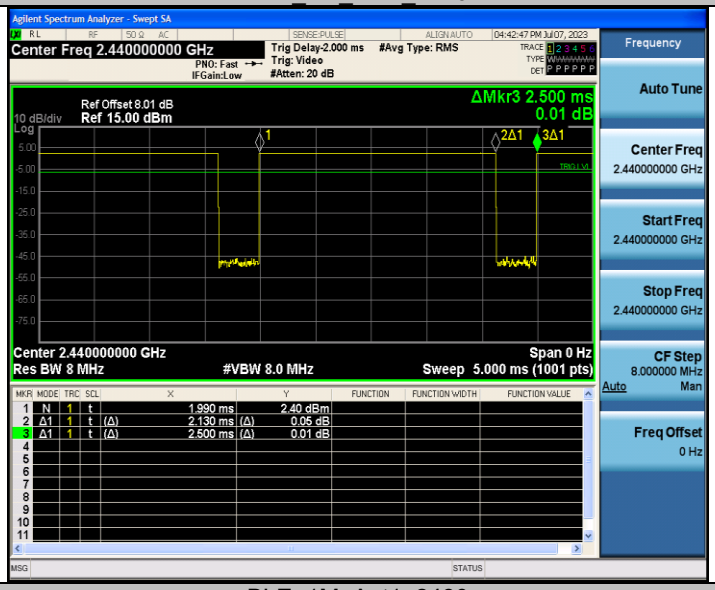
Test Mode	Antenna	Frequency [MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
BLE_1M	Ant1	2402	2.13	2.50	85.20	0.70
		2440	2.13	2.50	85.20	0.70
		2480	2.13	2.50	85.20	0.70

Test Graphs

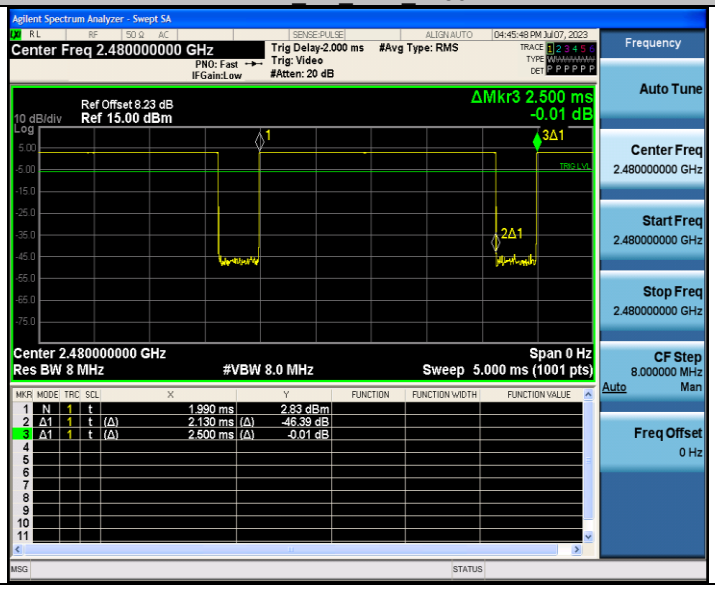
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



----End of Report----