Microtest
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Test Report

Report No.:	MTi230606006-01E1
Date of issue:	2023-06-28
Applicant:	Joint Chinese Ltd
Product:	Smart Health Bracelet
Model(s):	2208A, 2208B, 2208C, 2208D, 2208E, 2208F, 2208G, 2208H, 2208I, 2208J
FCC ID:	2AB73-2208A

Shenzhen Microtest Co., Ltd.

http://www.mtitest.com

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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.

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Test Result Certification	
Applicant:	**Joint Chinese Ltd**
Address:	Building 6, Huafeng Tech Park, Luotian Industrial Area, Songgang Town, Bao'an District, Shenzhen, China
Manufacturer:	**Joint Chinese Ltd**
Address:	Building 6, Huafeng Tech Park, Luotian Industrial Area, Songgang Town, Bao'an District, Shenzhen, China
Product description	
Product name:	Smart Health Bracelet
Trademark:	N/A
Model name:	2208A
Series Model:	2208B, 2208C, 2208D, 2208E, 2208F, 2208G, 2208H, 2208I, 2208J
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:	2023-06-25 to 2023-06-26
Test result:	Pass

Test Engineer	David. Lee
	(David)
Reviewed By	Leon chen
	(Leon)
Approved By	Tom Xue
	(Tom Xue)

1 General Description

1.1 Description of the EUT

Product name:	Smart Health Bracelet
Model name:	2208A
Series Model:	2208B, 2208C, 2208D, 2208E, 2208F, 2208G, 2208H, 2208I, 2208J
Model difference:	All the models are the same circuit and module, except the model name.
Electrical rating:	Input: DC 5V90mA Battery: DC 3.7V 95mAh
Accessories:	USB-A charging cable 20cm
Hardware version:	2208AV021_1
Software version:	2208AV1.2
Test sample(s) number:	MTi230606006-01S1001
RF specification	
Bluetooth version:	V5.0
Operating frequency range:	2402MHz to 2480MHz
Channel number:	40
Modulation type:	GFSK
Antenna(s) information:	ANT type: Ceramic antenna ANT gain: 0.5dBi

1.2 Description of test modes

All the test modes were carried out with the EUT in normal operation, the final test mode of the EUT was the worst test mode for emission test, which was shown in this report and defined as:

No.	Emission test modes
Mode1	TX mode 1Mbps(CH00, CH19, CH39)
Mode2	TX mode 2Mbps(CH00, CH19, CH39)

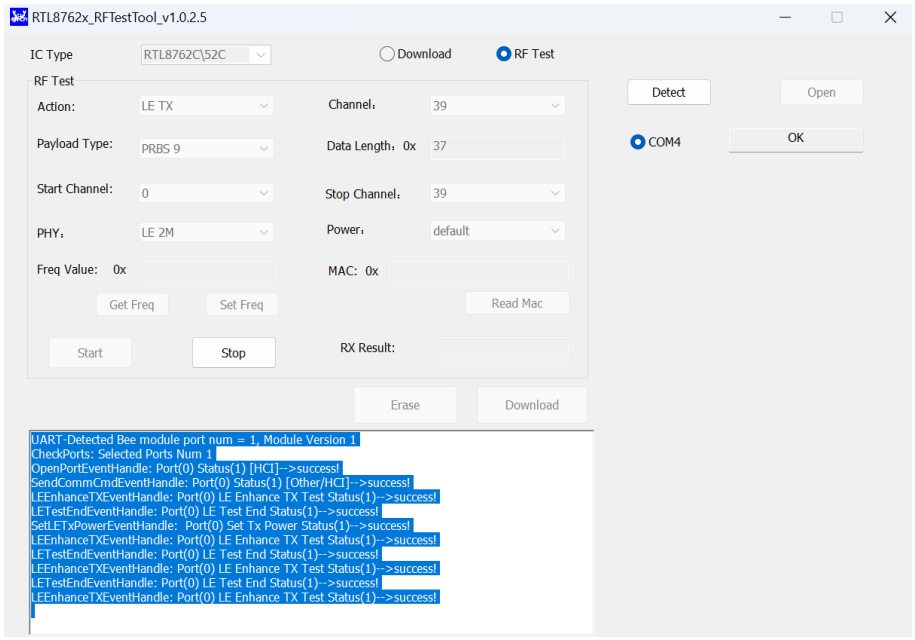
1.2.1 Operation channel list

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

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

Mode	Test Software	RTL8762x_RFTestTool_v1.0.2.5		
	Channel	2402MHz	2440MHz	2480MHz
BLE_1M	Power setting	DEF	DEF	DEF
BLE_2M	Power setting	DEF	DEF	DEF

The test software:



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 ~ 102 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
HUAWEI CHARGE（10W）	HW-050200C02	K95212KA103561	Huizhou BYD Electronics Co., Ltd.
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~40GHz)	5.3dB
Radiated spurious emissions (9kHz~30MHz)	4.3dB
Radiated spurious emissions (30MHz~1GHz)	4.7dB

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

Notes:

N/A means not applicable.

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
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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
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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.

6 Radio Spectrum Matter Test Results (RF)

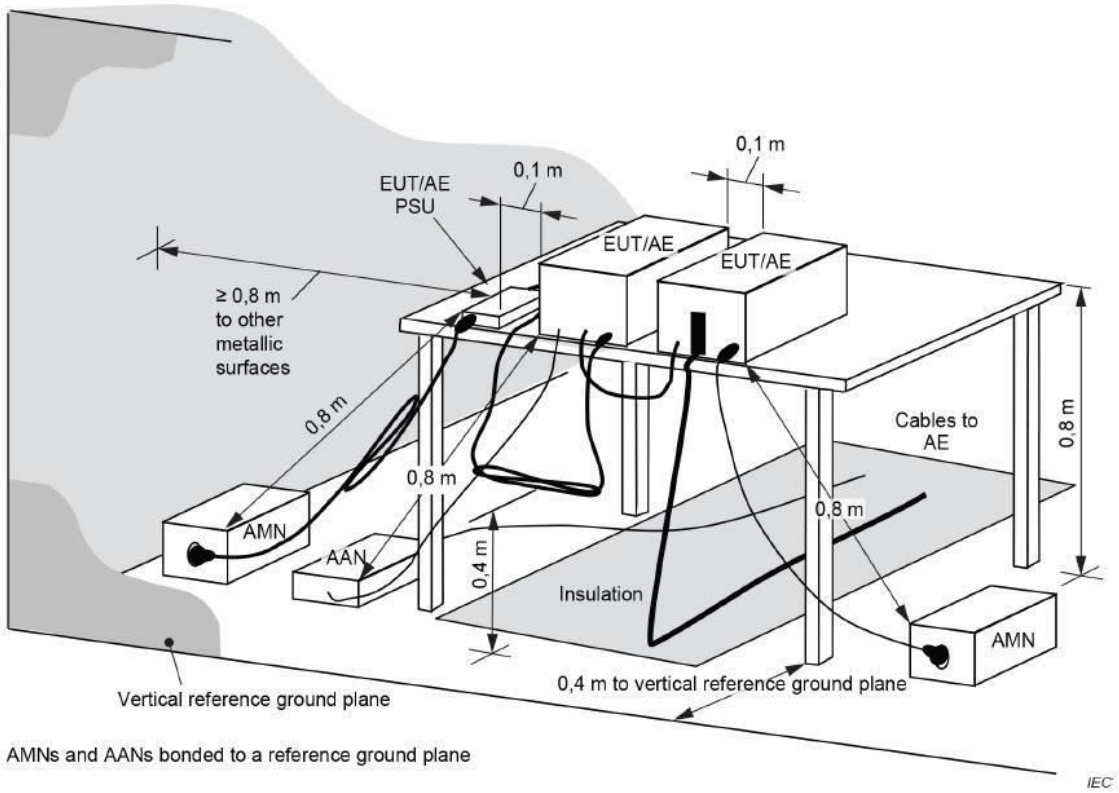
6.1 Conducted Emission at AC power line

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:

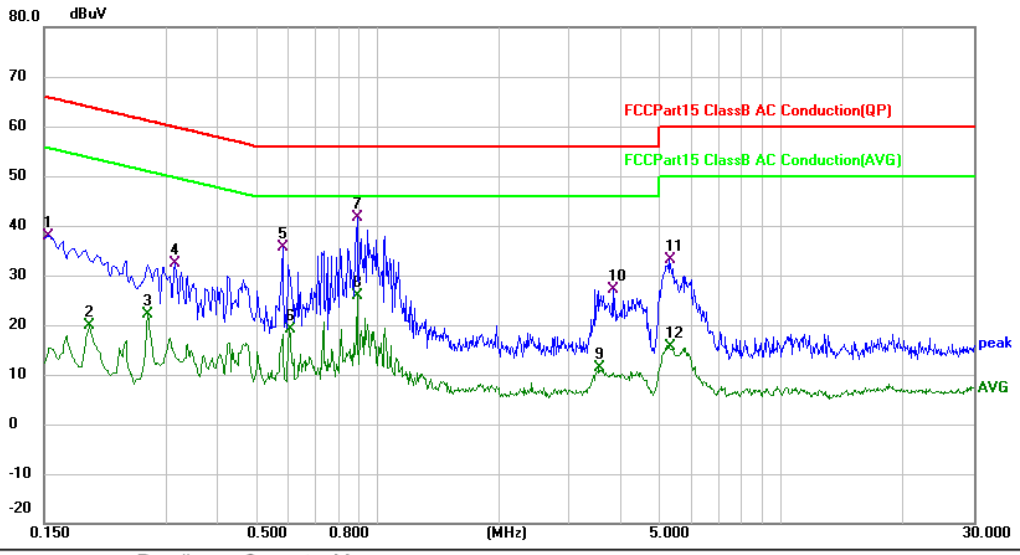
Operating Environment:					
Temperature:	25.1 °C	Humidity:	64 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2				
Final test mode:	Mode1				

6.1.2 Test Setup Diagram:



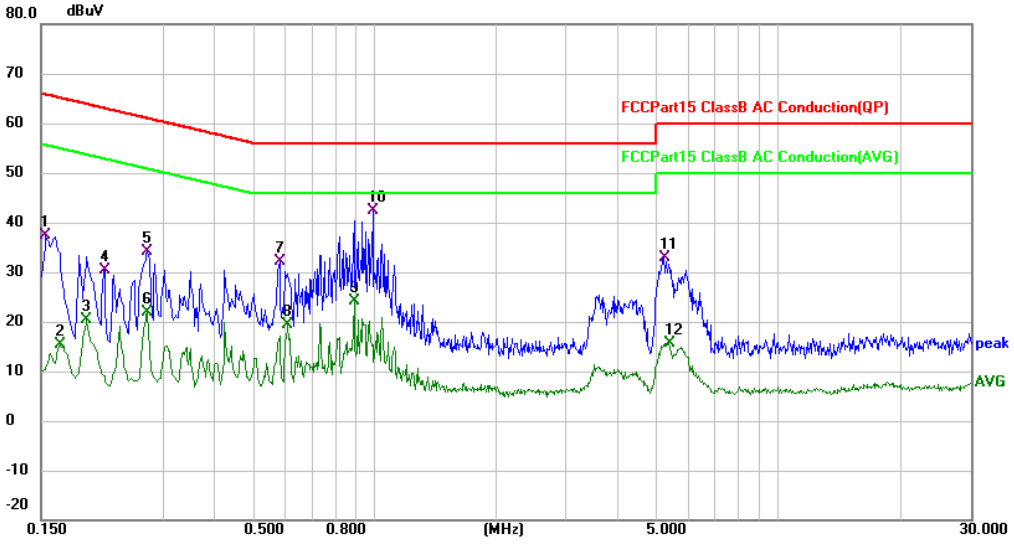
6.1.3 Test Data:

Mode1 / Line: Line / Band: 2.4G / CH: L



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1539	27.72	10.28	38.00	65.79	-27.79	QP	
2		0.1940	9.12	10.66	19.78	53.86	-34.08	AVG	
3		0.2700	11.37	10.81	22.18	51.12	-28.94	AVG	
4		0.3140	21.45	10.89	32.34	59.86	-27.52	QP	
5		0.5820	24.02	11.50	35.52	56.00	-20.48	QP	
6		0.6060	7.58	11.57	19.15	46.00	-26.85	AVG	
7	*	0.8900	29.48	12.17	41.65	56.00	-14.35	QP	
8		0.8900	13.68	12.17	25.85	46.00	-20.15	AVG	
9		3.5620	1.17	10.27	11.44	46.00	-34.56	AVG	
10		3.8580	16.88	10.27	27.15	56.00	-28.85	QP	
11		5.3180	22.82	10.27	33.09	60.00	-26.91	QP	
12		5.3180	5.34	10.27	15.61	50.00	-34.39	AVG	

Mode1 / Line: Neutral / Band: 2.4G / CH: L



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1539	27.03	10.28	37.31	65.79	-28.48	QP	
2		0.1660	5.04	10.26	15.30	55.16	-39.86	AVG	
3		0.1940	9.67	10.59	20.26	53.86	-33.60	AVG	
4		0.2140	19.87	10.62	30.49	63.05	-32.56	QP	
5		0.2740	23.35	10.76	34.11	61.00	-26.89	QP	
6		0.2740	11.08	10.76	21.84	51.00	-29.16	AVG	
7		0.5820	20.65	11.51	32.16	56.00	-23.84	QP	
8		0.6100	7.68	11.58	19.26	46.00	-26.74	AVG	
9		0.8940	12.00	12.13	24.13	46.00	-21.87	AVG	
10	*	0.9900	30.18	12.31	42.49	56.00	-13.51	QP	
11		5.2340	22.73	10.27	33.00	60.00	-27.00	QP	
12		5.3620	5.41	10.28	15.69	50.00	-34.31	AVG	

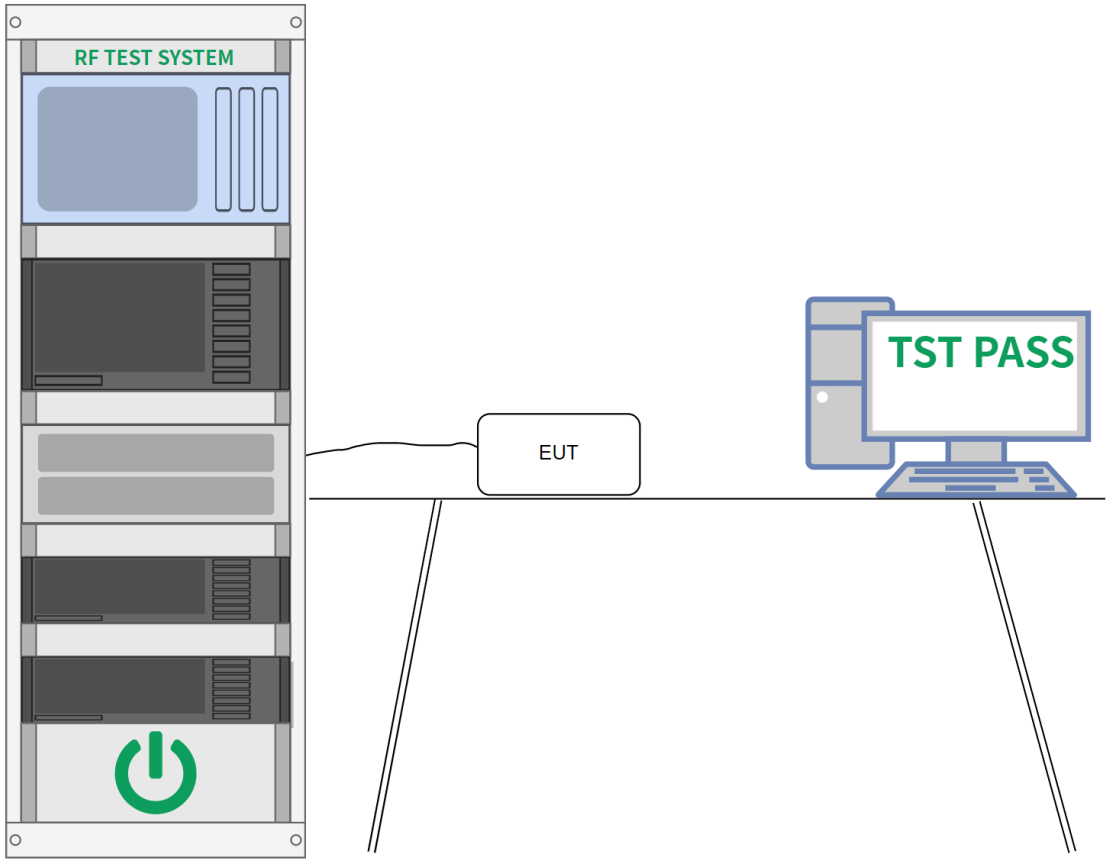
Occupied Bandwidth

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.

6.1.4 E.U.T. Operation:

Operating Environment:					
Temperature:	25 °C	Humidity:	60 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2				
Final test mode:	Mode1, Mode2				

6.1.5 Test Setup Diagram:



6.1.6 Test Data:

Please Refer to Appendix for Details.

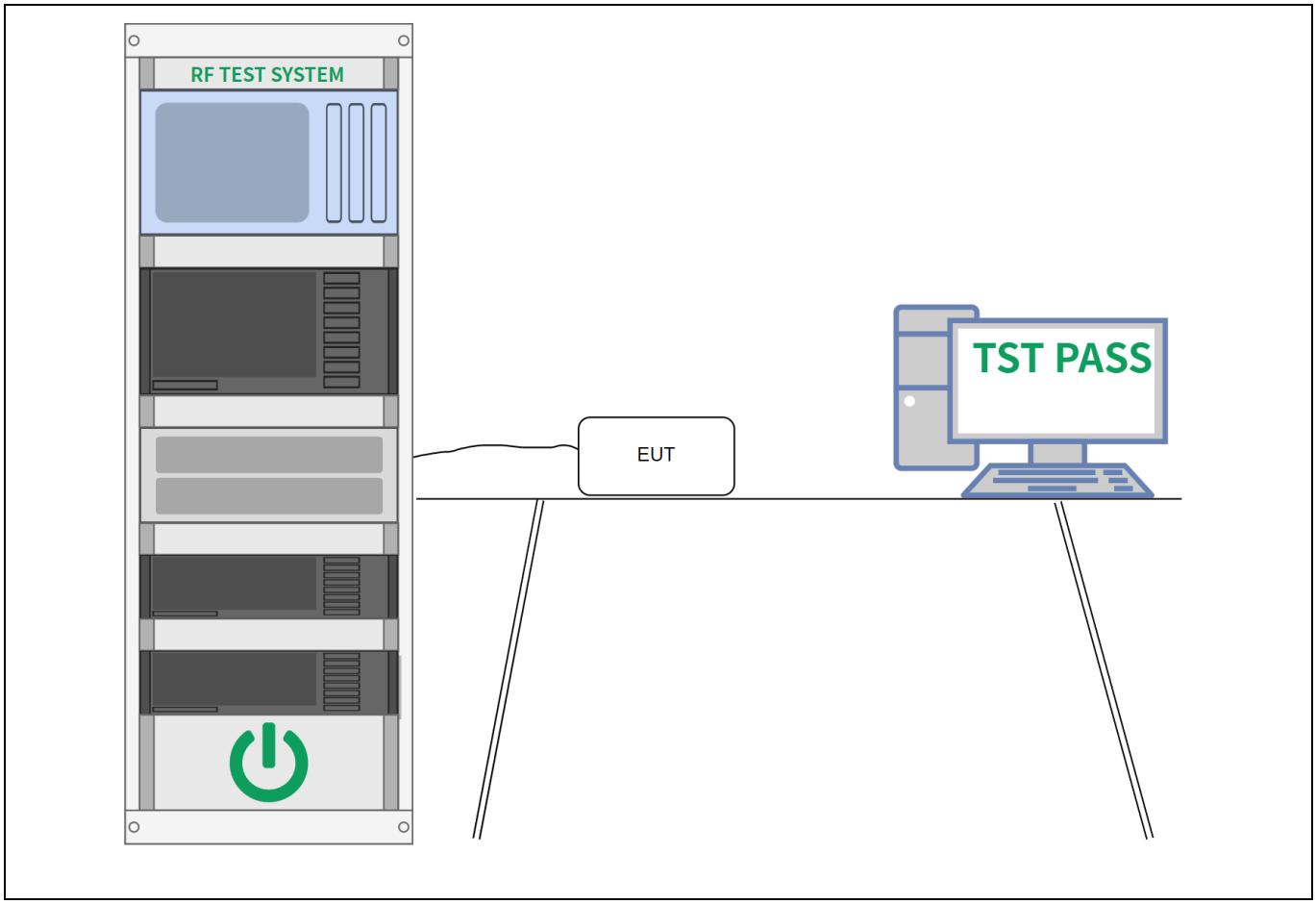
6.2 Maximum Conducted Output Power

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

6.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	25 °C	Humidity:	60 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2				
Final test mode:	Mode1, Mode2				

6.2.2 Test Setup Diagram:



6.2.3 Test Data:

Please Refer to Appendix for Details.

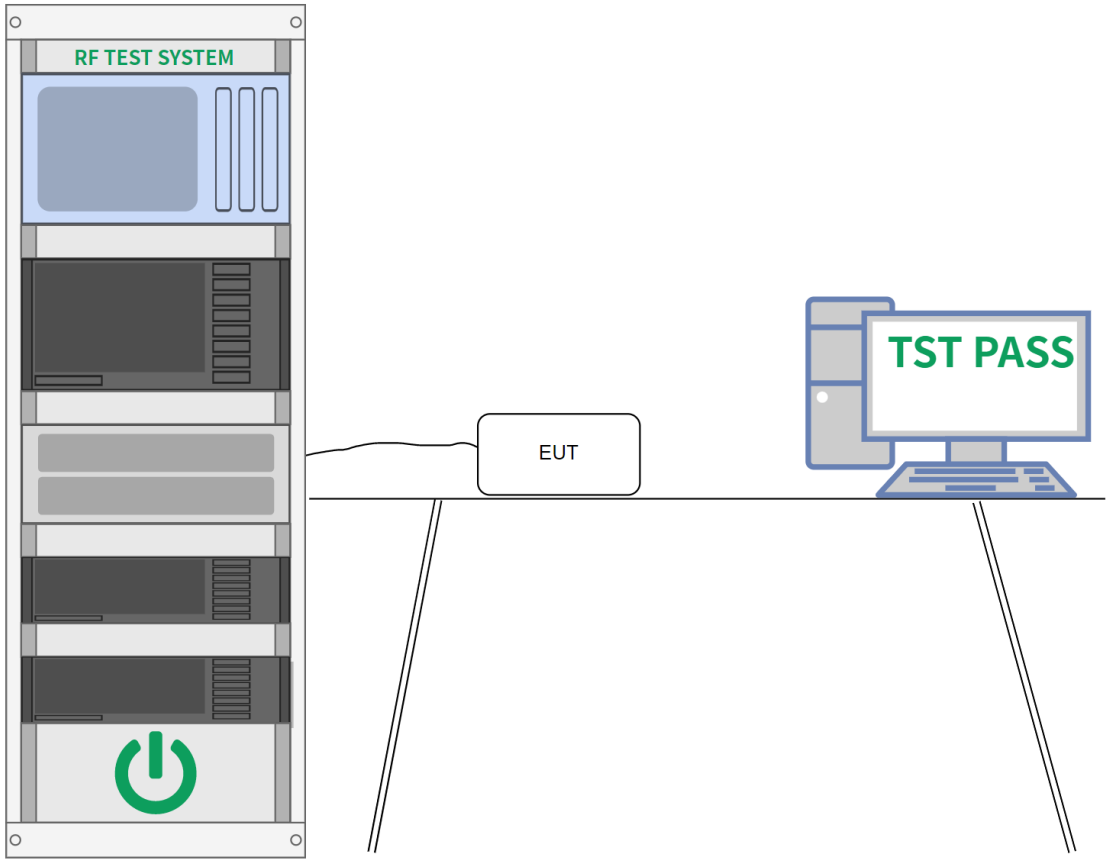
6.3 Power Spectral Density

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

6.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	25 °C	Humidity:	60 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2				
Final test mode:	Mode1, Mode2				

6.3.2 Test Setup Diagram:



6.3.3 Test Data:

Please Refer to Appendix for Details.

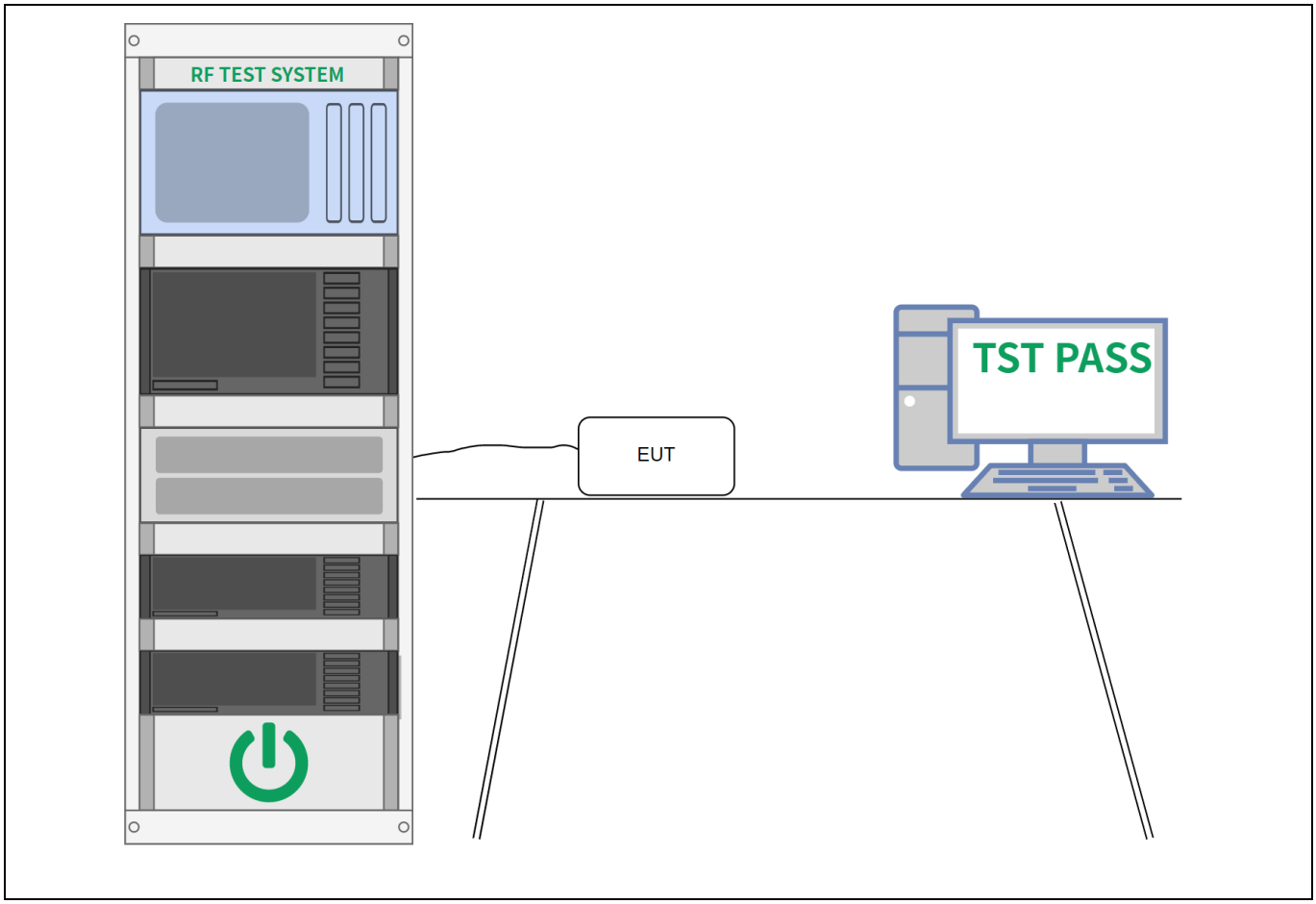
6.4 Emissions in non-restricted frequency bands

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

6.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	25 °C	Humidity:	60 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1, Mode2				
Final test mode:	Mode1, Mode2				

6.4.2 Test Setup Diagram:



6.4.3 Test Data:

Please Refer to Appendix for Details.

6.5 Band edge emissions (Radiated)

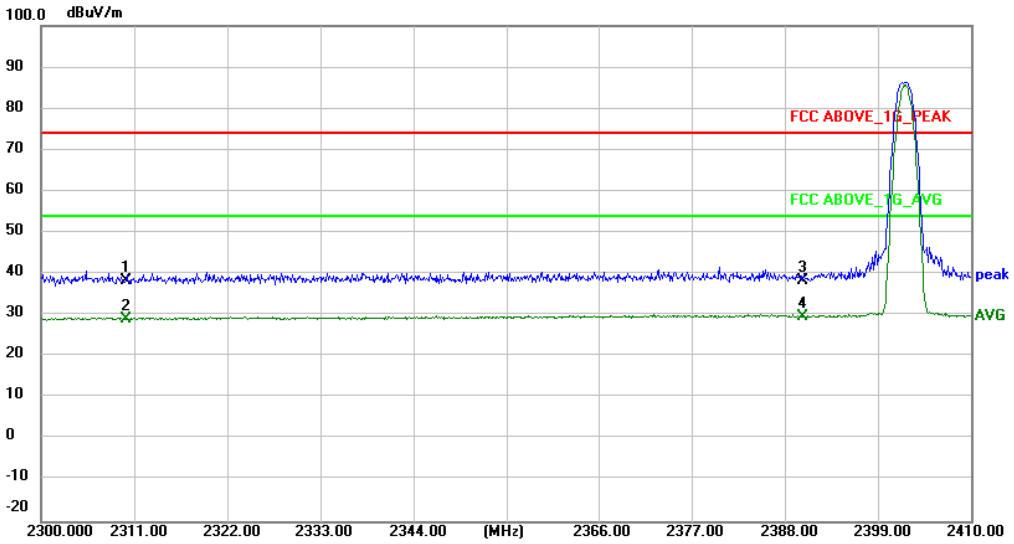
<table>
<tr><td>Test Requirement:</td><td>In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td>Frequency (MHz)</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>Radiated emissions tests</td></tr>
<tr><td>Procedure:</td><td>ANSI C63.10-2013 section 6.10</td></tr>
</table>

6.5.1 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>50 %</td><td>Atmospheric Pressure:</td><td>25 kPa</td></tr>
<tr><td>Pre test mode:</td><td colspan="5">Mode1, Mode2</td></tr>
<tr><td>Final test mode:</td><td colspan="5">Mode1</td></tr>
</table>

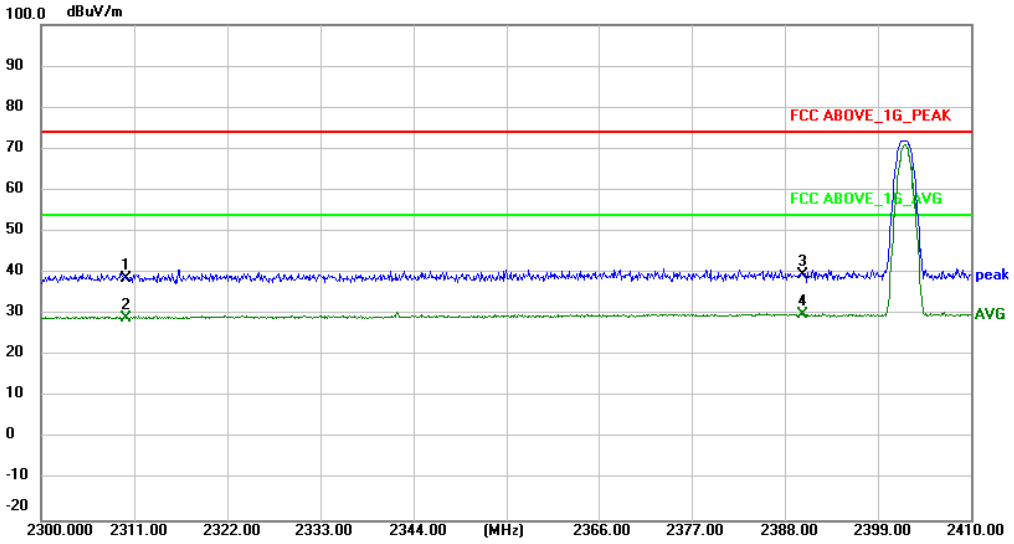
6.5.2 Test Data:

Mode1 / Polarization: Horizontal / Band: 2.4G / CH: 00



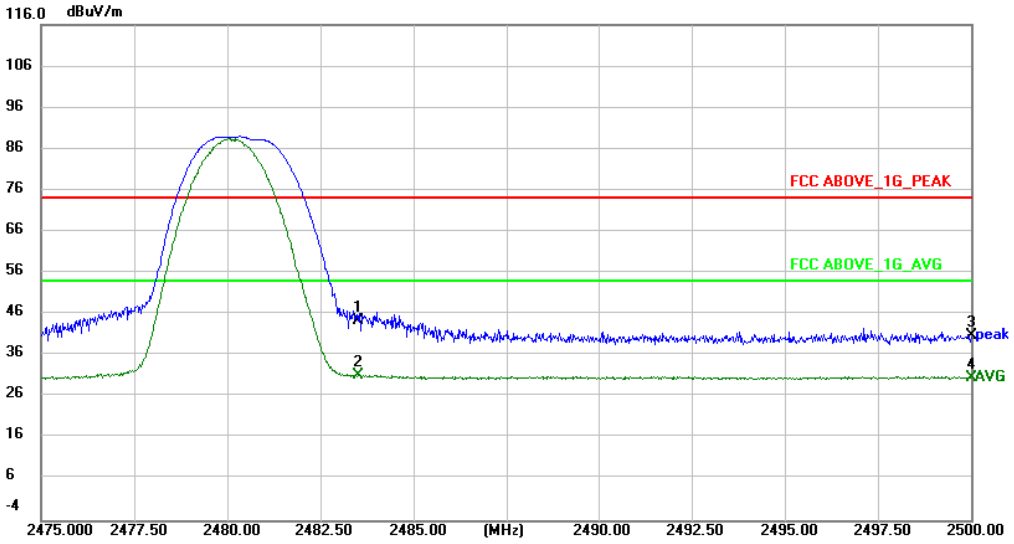
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2310.000	46.39	-8.08	38.31	74.00	-35.69	peak	
2		2310.000	37.28	-8.08	29.20	54.00	-24.80	AVG	
3		2390.000	46.08	-7.71	38.37	74.00	-35.63	peak	
4	*	2390.000	37.51	-7.71	29.80	54.00	-24.20	AVG	

Mode1 / Polarization: Vertical / Band: 2.4G / CH: 00



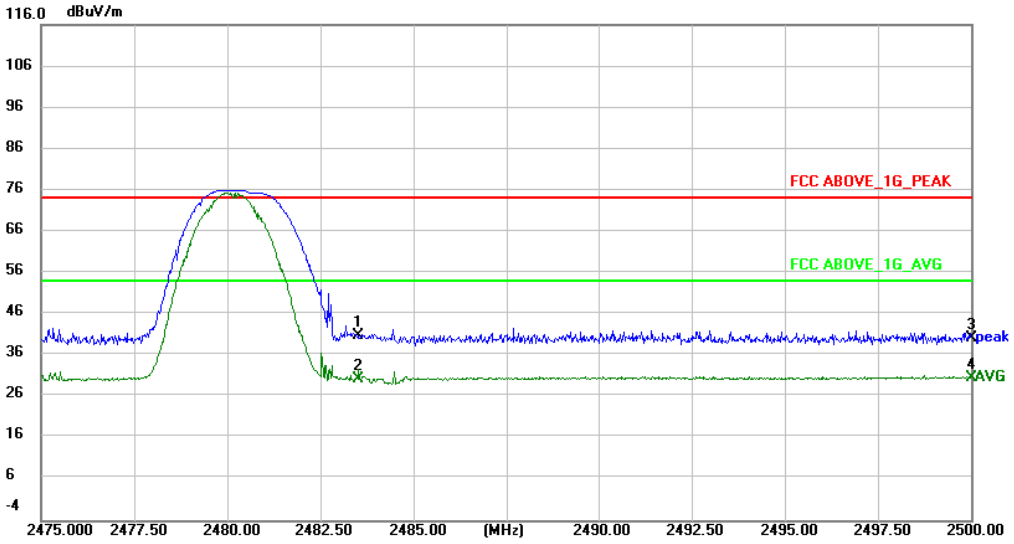
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2310.000	46.78	-8.08	38.70	74.00	-35.30	peak	
2		2310.000	37.10	-8.08	29.02	54.00	-24.98	AVG	
3		2390.000	47.33	-7.71	39.62	74.00	-34.38	peak	
4	*	2390.000	37.63	-7.71	29.92	54.00	-24.08	AVG	

Mode1 / Polarization: Horizontal / Band: 2.4G / CH: 39



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2483.500	51.58	-7.24	44.34	74.00	-29.66	peak	
2	*	2483.500	38.43	-7.24	31.19	54.00	-22.81	AVG	
3		2500.000	48.00	-7.17	40.83	74.00	-33.17	peak	
4		2500.000	37.84	-7.17	30.67	54.00	-23.33	AVG	

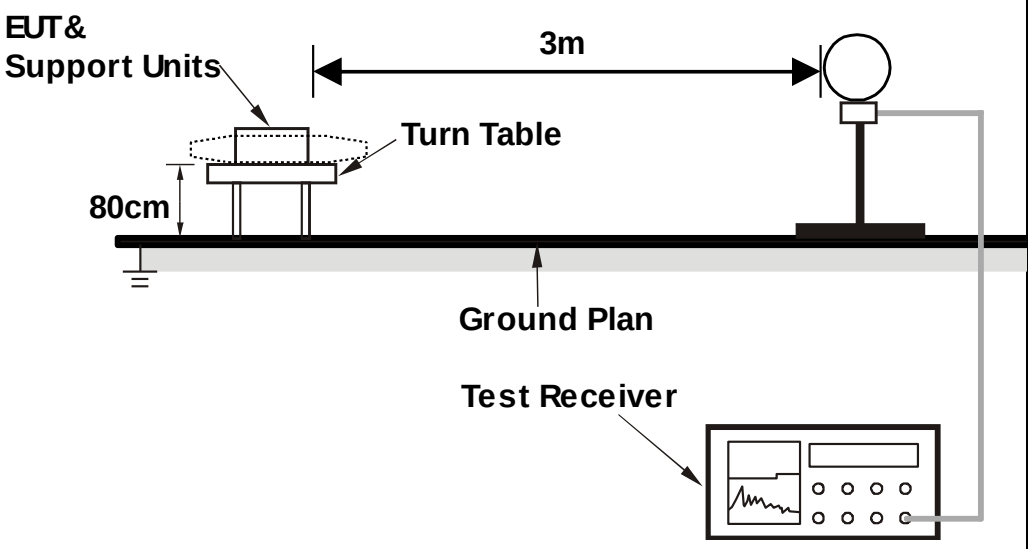
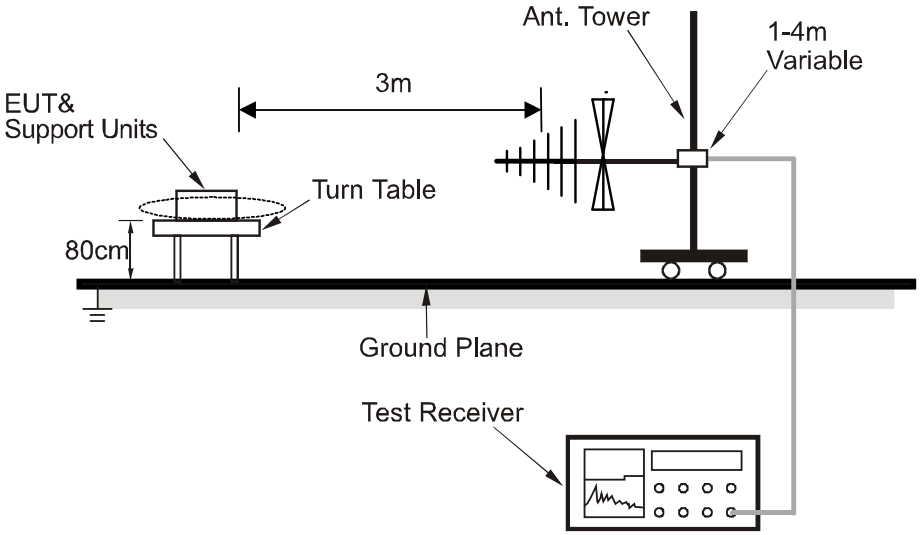
Mode1 / Polarization: Vertical / Band: 2.4G / CH: 39



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2483.500	48.08	-7.24	40.84	74.00	-33.16	peak	
2		2483.500	37.71	-7.24	30.47	54.00	-23.53	AVG	
3		2500.000	47.55	-7.17	40.38	74.00	-33.62	peak	
4	*	2500.000	37.68	-7.17	30.51	54.00	-23.49	AVG	

6.6 Emissions in restricted frequency bands (below 1GHz)

<table>
<tr><td>Test Requirement:</td><td>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)).`</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>Radiated emissions tests</td></tr>
<tr><td>Procedure:</td><td>ANSI C63.10-2013 section 6.6.4</td></tr>
</table>

Test setup:	Below 30MHz  30MHz~1GHz  For the actual test configuration, please refer to the related item – Photographs of the test setup.

6.6.1 E.U.T. Operation:

Operating Environment:					
Temperature:	25 °C	Humidity:	50 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1, Mode2				
Final test mode:	Mode1				

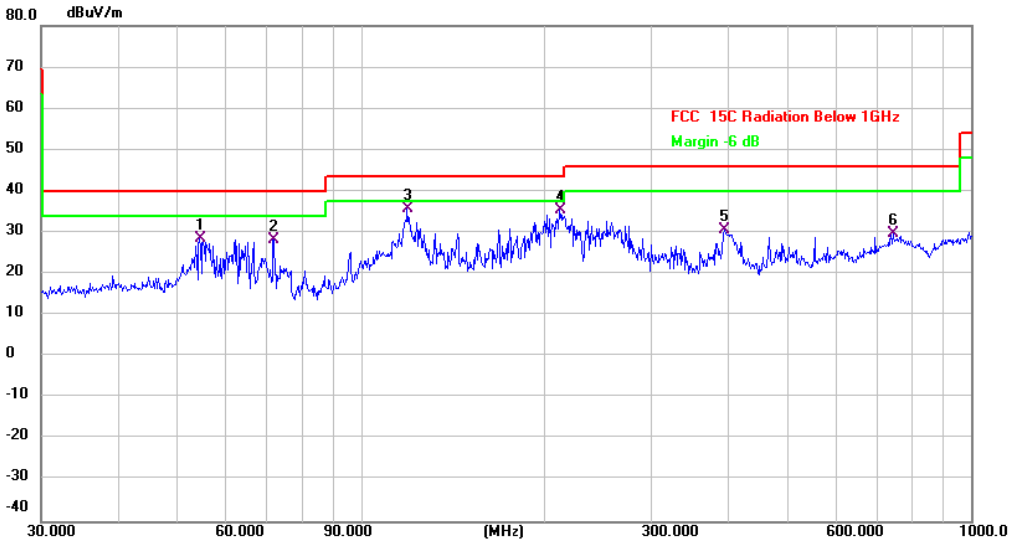
Note:

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.

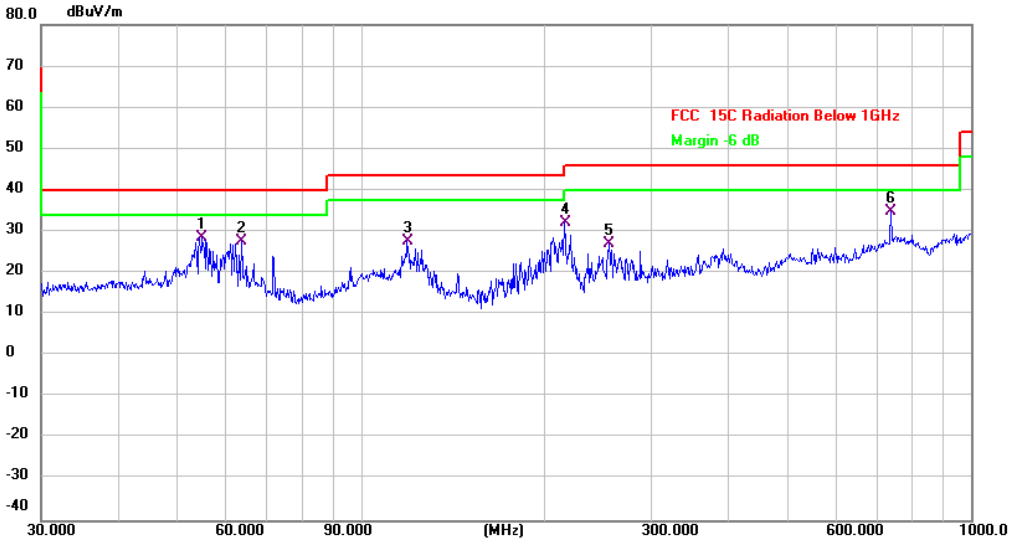
6.6.2 Test Data:

Mode1 / Polarization: Horizontal / Band: 2.4G / CH: 39



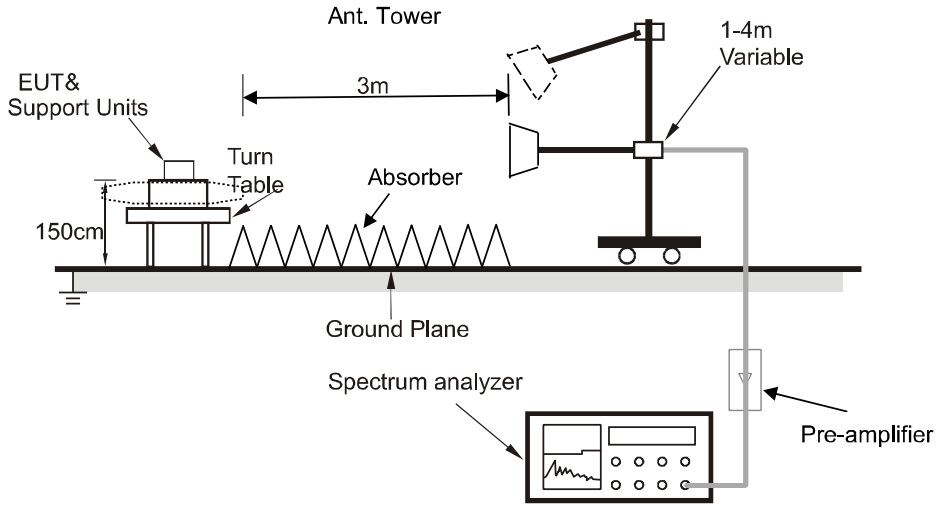
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		54.4516	35.82	-7.22	28.60	40.00	-11.40	QP	
2		72.0843	38.37	-10.08	28.29	40.00	-11.71	QP	
3	*	119.0180	45.79	-10.08	35.71	43.50	-7.79	QP	
4		212.2695	43.05	-7.64	35.41	43.50	-8.09	QP	
5		394.8545	35.00	-4.42	30.58	46.00	-15.42	QP	
6		744.8661	27.54	2.33	29.87	46.00	-16.13	QP	

Mode1 / Polarization: Vertical / Band: 2.4G / CH: 39



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		55.0274	35.81	-7.18	28.63	40.00	-11.37	QP	
2		63.7588	35.51	-7.85	27.66	40.00	-12.34	QP	
3		119.0180	37.70	-10.08	27.62	43.50	-15.88	QP	
4		216.0240	38.67	-6.62	32.05	46.00	-13.95	QP	
5		255.6231	34.99	-7.86	27.13	46.00	-18.87	QP	
6	*	739.6604	33.02	1.84	34.86	46.00	-11.14	QP	

6.7 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
Test setup:	Above 1GHz  For the actual test configuration, please refer to the related item – Photographs of the test setup.

6.7.1 E.U.T. Operation:

Operating Environment:					
Temperature:	25 °C	Humidity:	50 %	Atmospheric Pressure:	100 kPa
Pre test mode:	Mode1, Mode2				
Final test mode:	Mode1				
Note: Test frequency are from 1GHz to 25GHz, 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.					

6.7.2 Test Data:

Mode1 / Polarization: Horizontal / Band: 2.4G / CH: 00

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4804.000	43.79	0.74	44.53	74.00	-29.47	peak
2		4804.000	37.77	0.74	38.51	54.00	-15.49	AVG
3		7206.000	40.14	6.02	46.16	74.00	-27.84	peak
4		7206.000	34.01	6.02	40.03	54.00	-13.97	AVG
5		9608.000	41.38	5.88	47.26	74.00	-26.74	peak
6	*	9608.000	34.97	5.88	40.85	54.00	-13.15	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / CH: 00

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4804.000	41.86	0.74	42.60	74.00	-31.40	peak
2		4804.000	35.28	0.74	36.02	54.00	-17.98	AVG
3		7206.000	39.67	6.02	45.69	74.00	-28.31	peak
4		7206.000	33.72	6.02	39.74	54.00	-14.26	AVG
5		9608.000	41.13	5.88	47.01	74.00	-26.99	peak
6	*	9608.000	34.89	5.88	40.77	54.00	-13.23	AVG

Mode1 / Polarization: Horizontal / Band: 2.4G / CH: 19

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4880.000	40.68	1.04	41.72	74.00	-32.28	peak
2		4880.000	34.22	1.04	35.26	54.00	-18.74	AVG
3		7320.000	40.70	5.93	46.63	74.00	-27.37	peak
4		7320.000	34.35	5.93	40.28	54.00	-13.72	AVG
5		9760.000	41.31	6.55	47.86	74.00	-26.14	peak
6	*	9760.000	34.79	6.55	41.34	54.00	-12.66	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / CH: 19

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4880.000	48.43	1.04	49.47	74.00	-24.53	peak
2		4880.000	39.47	1.04	40.51	54.00	-13.49	AVG
3		7320.000	40.69	5.93	46.62	74.00	-27.38	peak
4		7320.000	34.22	5.93	40.15	54.00	-13.85	AVG
5		9760.000	40.98	6.55	47.53	74.00	-26.47	peak
6	*	9760.000	34.26	6.55	40.81	54.00	-13.19	AVG

Mode1 / Polarization: Horizontal / Band: 2.4G / CH: 39

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4960.000	48.30	1.50	49.80	74.00	-24.20	peak
2		4960.000	39.05	1.50	40.55	54.00	-13.45	AVG
3		7440.000	39.65	5.61	45.26	74.00	-28.74	peak
4		7440.000	33.48	5.61	39.09	54.00	-14.91	AVG
5		9920.000	41.30	6.10	47.40	74.00	-26.60	peak
6	*	9920.000	35.23	6.10	41.33	54.00	-12.67	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / CH: 39

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4960.000	41.63	1.50	43.13	74.00	-30.87	peak
2		4960.000	35.55	1.50	37.05	54.00	-16.95	AVG
3		7440.000	40.73	5.61	46.34	74.00	-27.66	peak
4		7440.000	34.55	5.61	40.16	54.00	-13.84	AVG
5		9920.000	40.57	6.10	46.67	74.00	-27.33	peak
6	*	9920.000	34.18	6.10	40.28	54.00	-13.72	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	0.644	0.5	PASS
		2440	0.684	0.5	PASS
		2480	0.840	0.5	PASS
BLE_2M	Ant1	2402	1.144	0.5	PASS
		2440	1.048	0.5	PASS
		2480	1.068	0.5	PASS

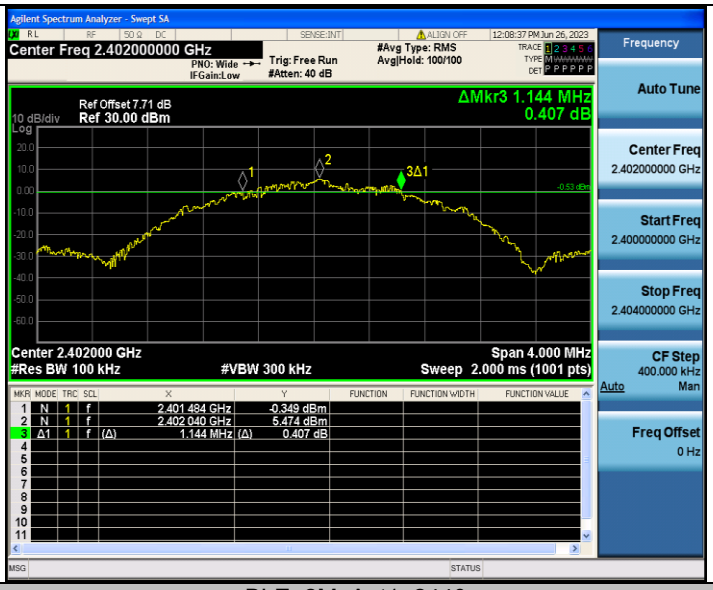
Test Graphs

BLE_1M_Ant1_2402

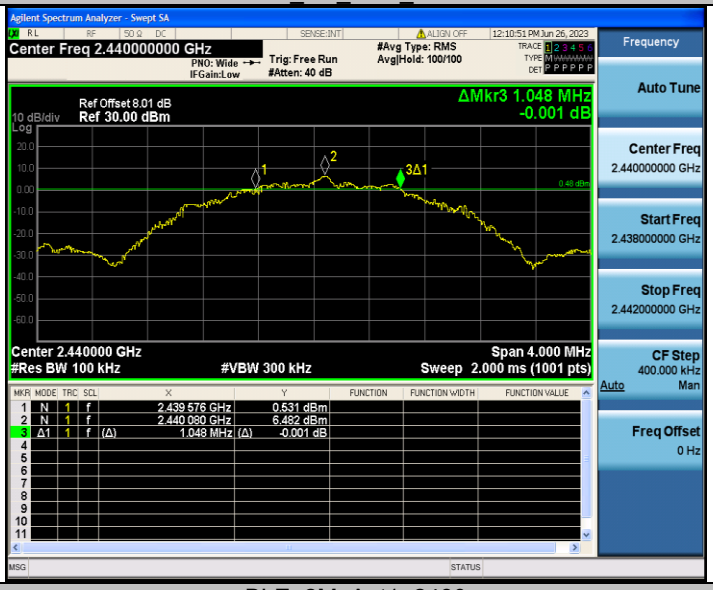
BLE_1M_Ant1_2440

BLE_1M_Ant1_2480

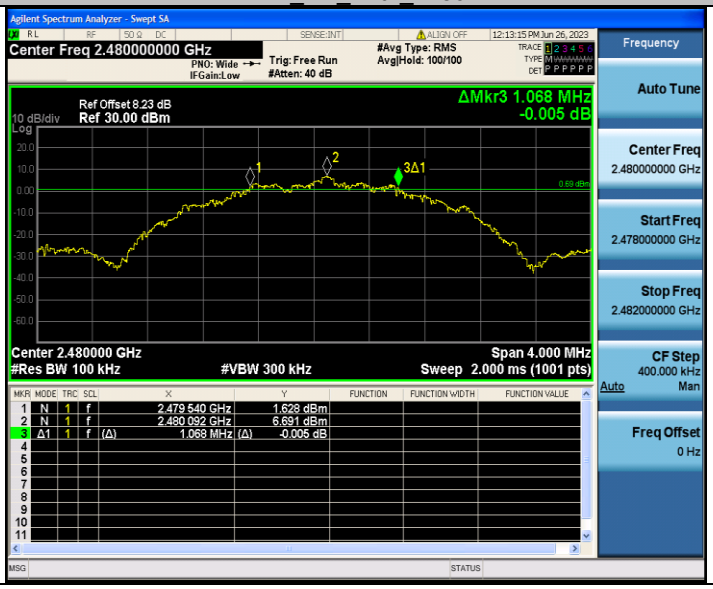
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



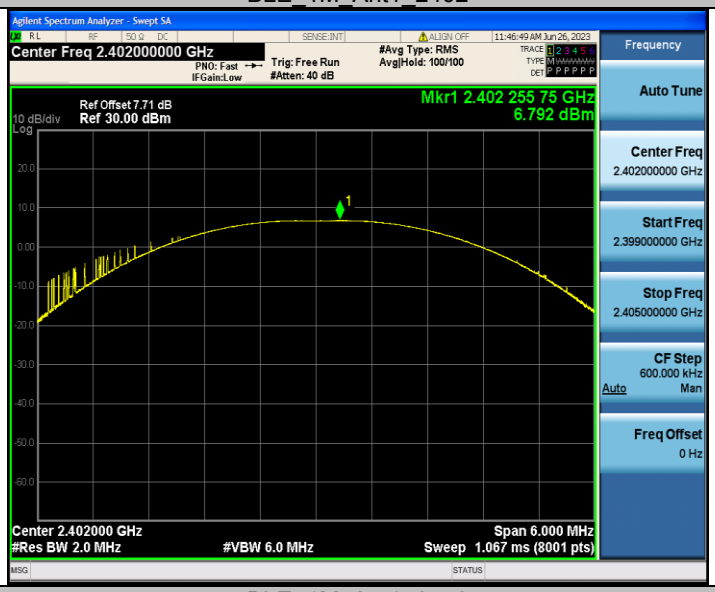
Appendix B: Maximum conducted output power

Test Result-Peak

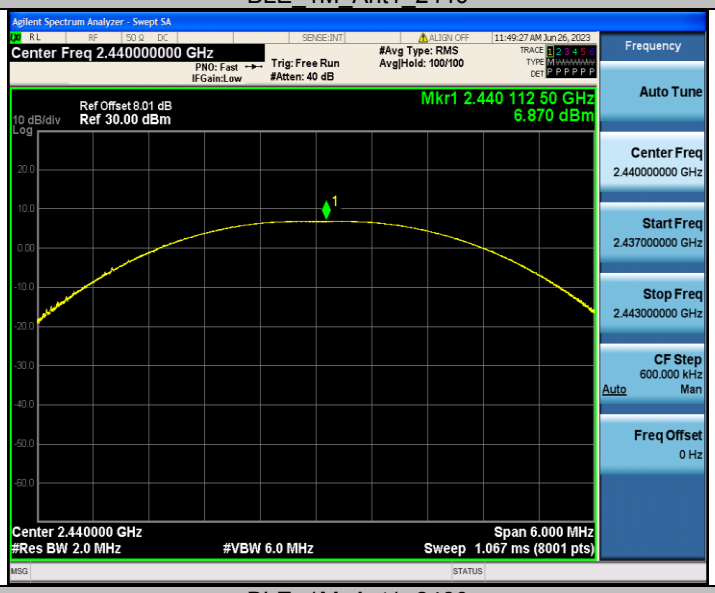
Test Mode	Antenna	Frequency [MHz]	Conducted Peak Power [dBm]	Limit [dBm]	Verdict
BLE_1M	Ant1	2402	6.79	≤30	PASS
		2440	6.87	≤30	PASS
		2480	7.06	≤30	PASS
BLE_2M	Ant1	2402	6.89	≤30	PASS
		2440	6.89	≤30	PASS
		2480	7.1	≤30	PASS

Test Graphs

BLE_1M_Ant1_2402

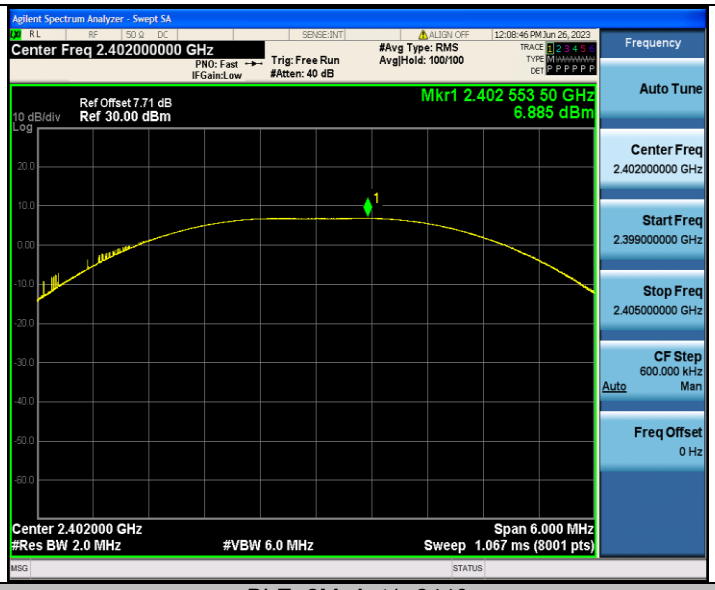


BLE_1M_Ant1_2440

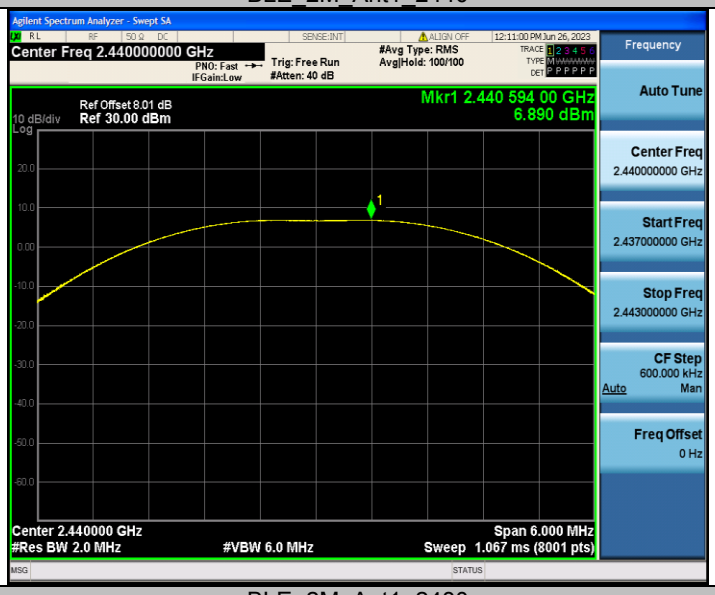


BLE_1M_Ant1_2480

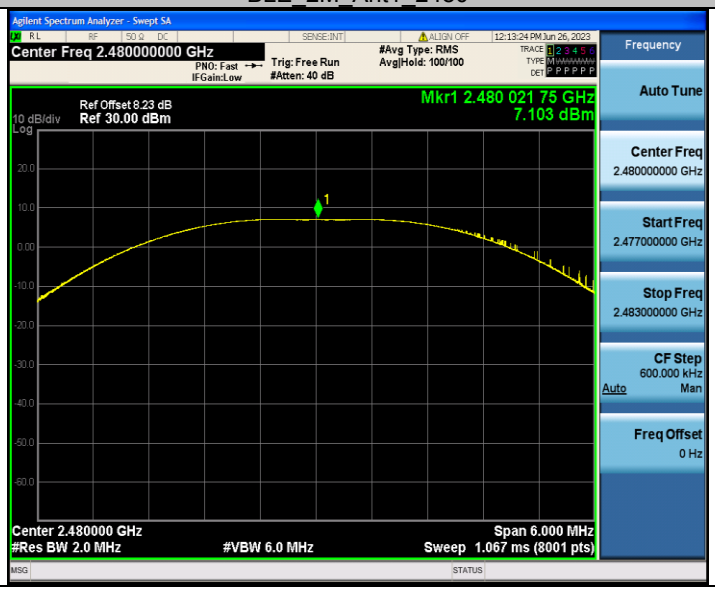
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



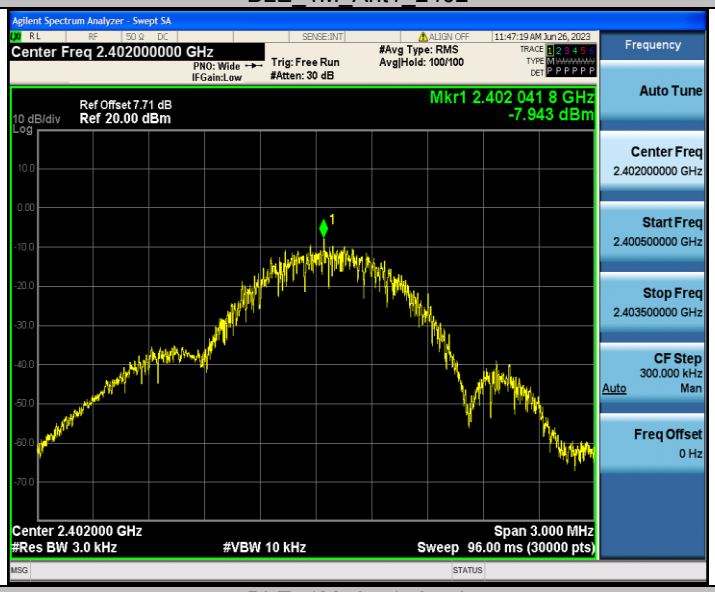
Appendix C: Maximum power spectral density

Test Result

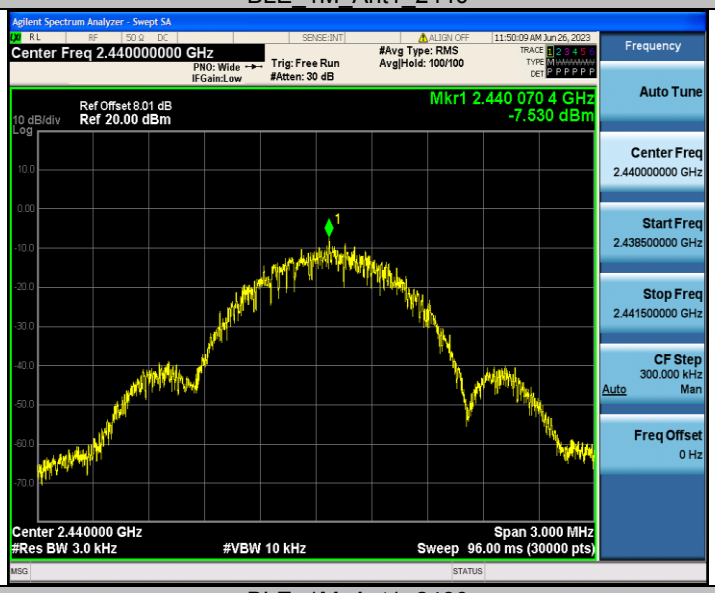
Test Mode	Antenna	Frequency [MHz]	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-7.94	≤8.00	PASS
		2440	-7.53	≤8.00	PASS
		2480	-8.44	≤8.00	PASS
BLE_2M	Ant1	2402	-11.47	≤8.00	PASS
		2440	-10.59	≤8.00	PASS
		2480	-9.82	≤8.00	PASS

Test Graphs

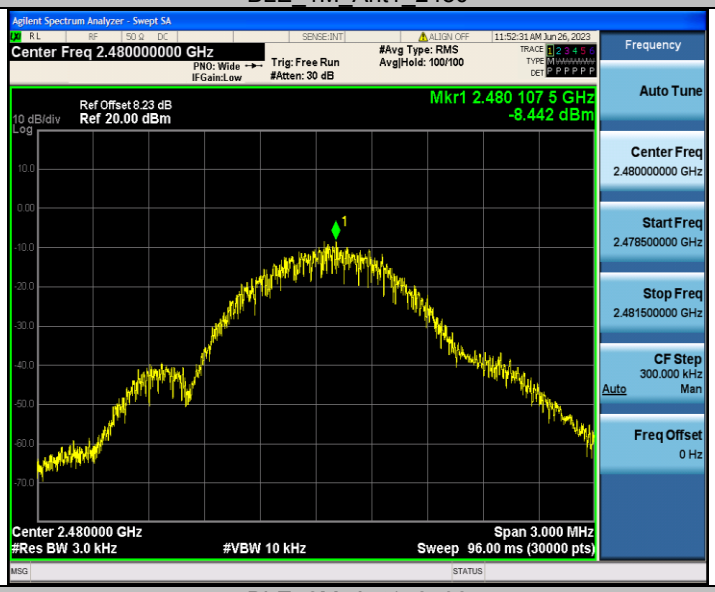
BLE_1M_Ant1_2402



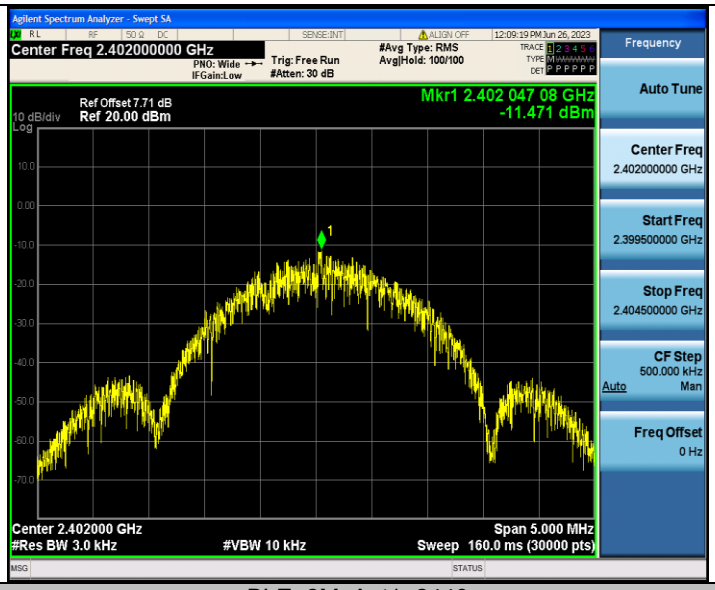
BLE_1M_Ant1_2440



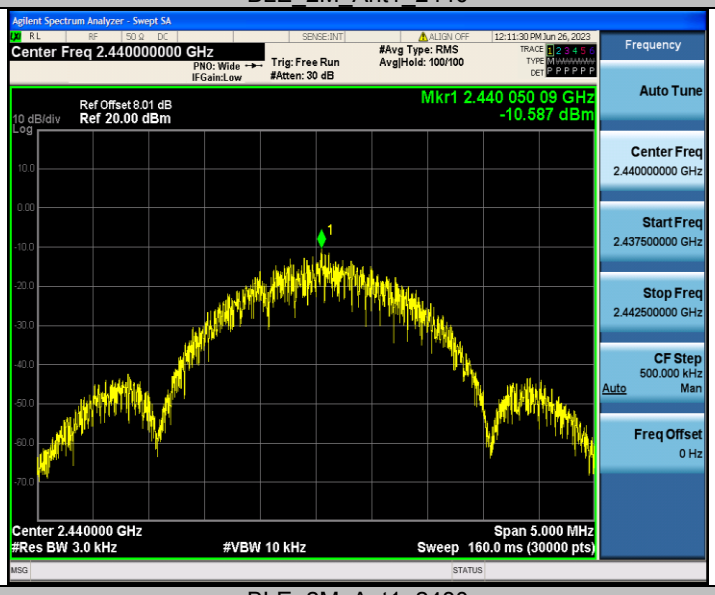
BLE_1M_Ant1_2480



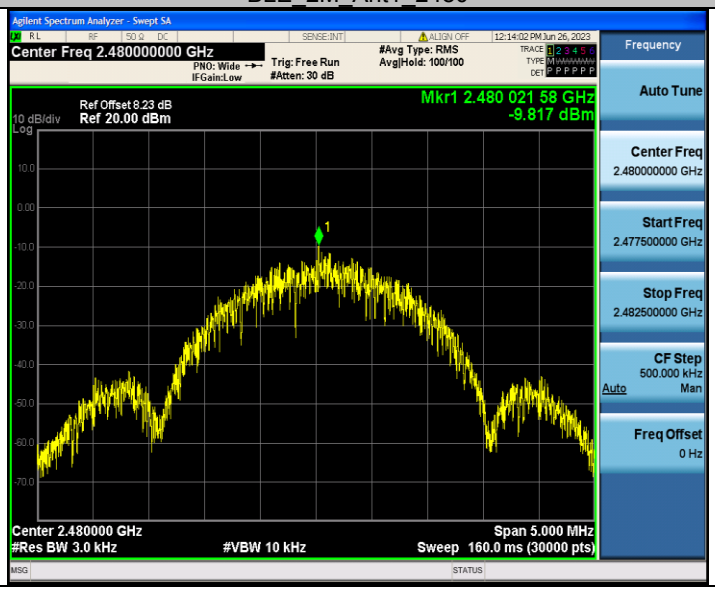
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



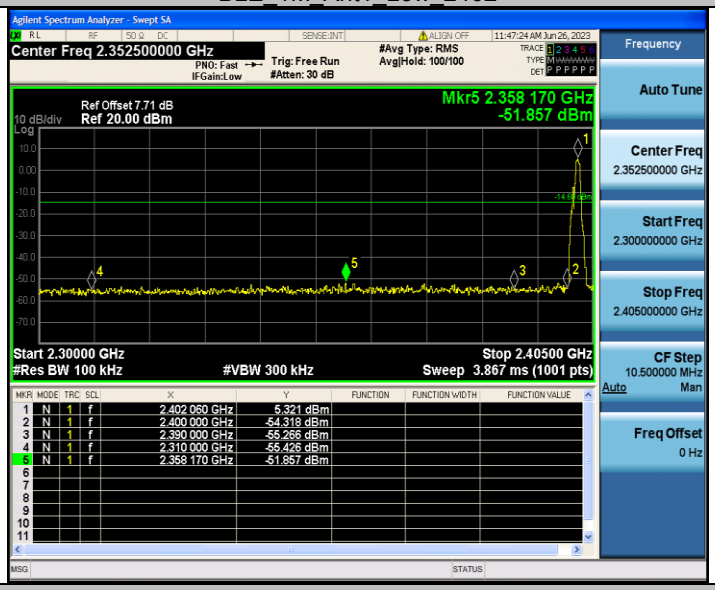
BLE_2M_Ant1_2480



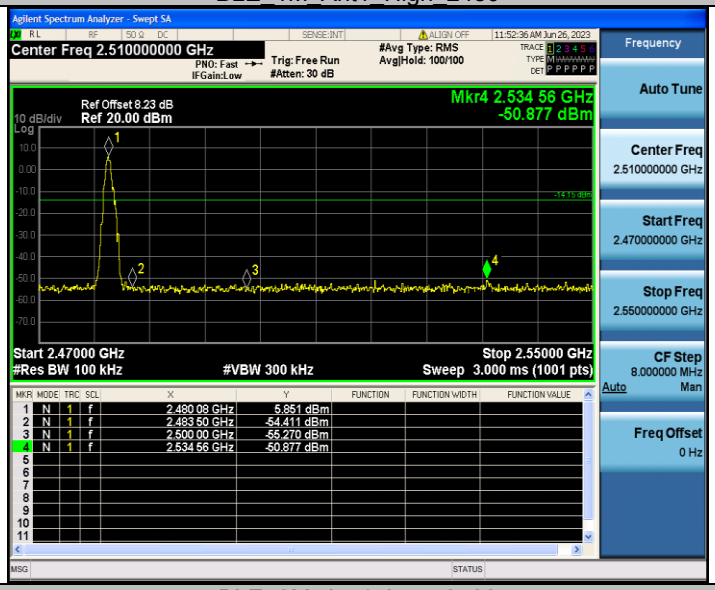
Appendix D: Band edge measurements

Test Graphs

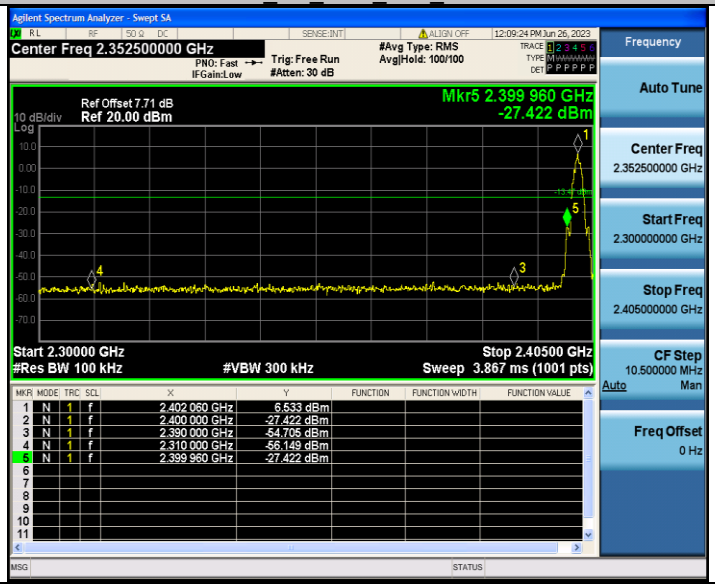
BLE_1M_Ant1_Low_2402



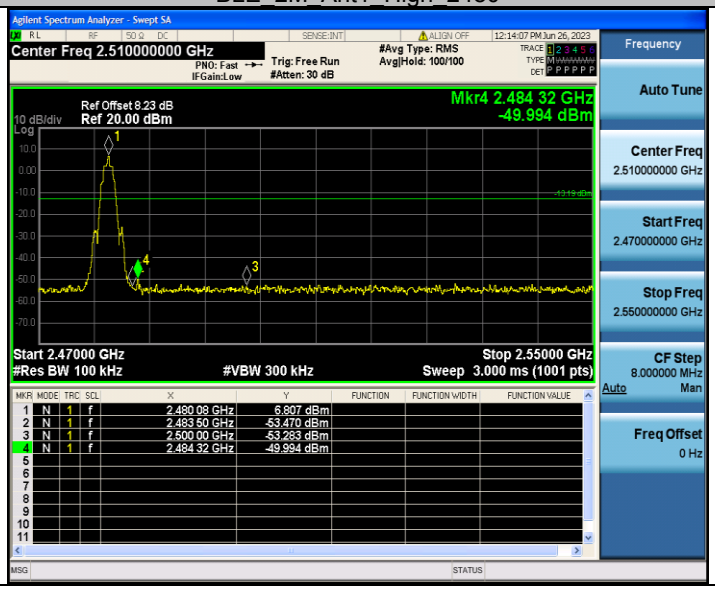
BLE_1M_Ant1_High_2480



BLE_2M_Ant1_Low_2402



BLE_2M_Ant1_High_2480

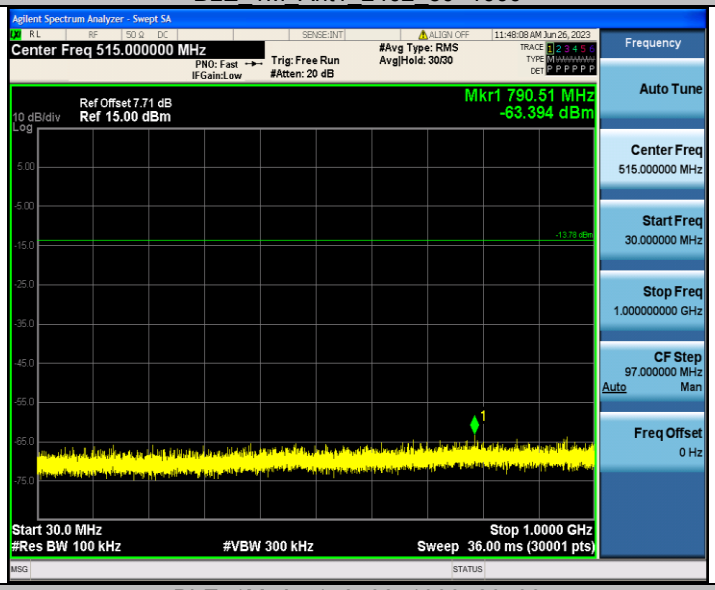


Appendix E: Conducted Spurious Emission

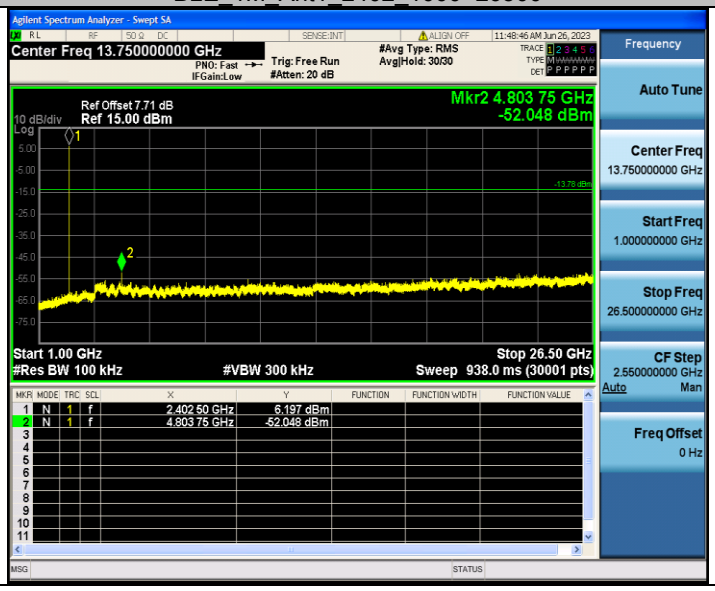
Test Graphs

BLE_1M_Ant1_2402_0~Reference

BLE_1M_Ant1_2402_30~1000

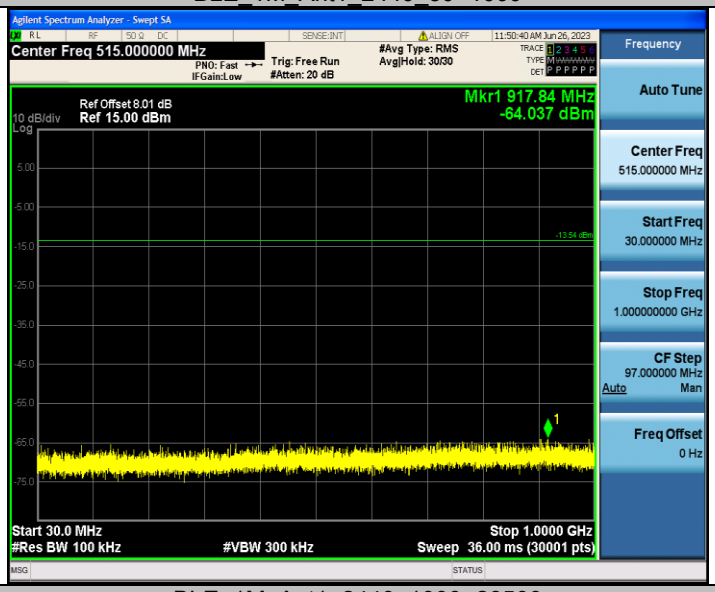


BLE_1M_Ant1_2402_1000~26500

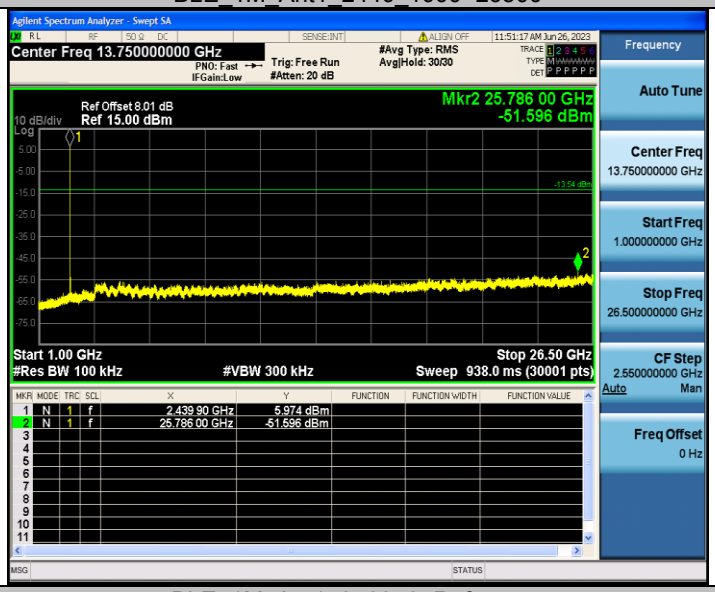


BLE_1M_Ant1_2440_0~Reference

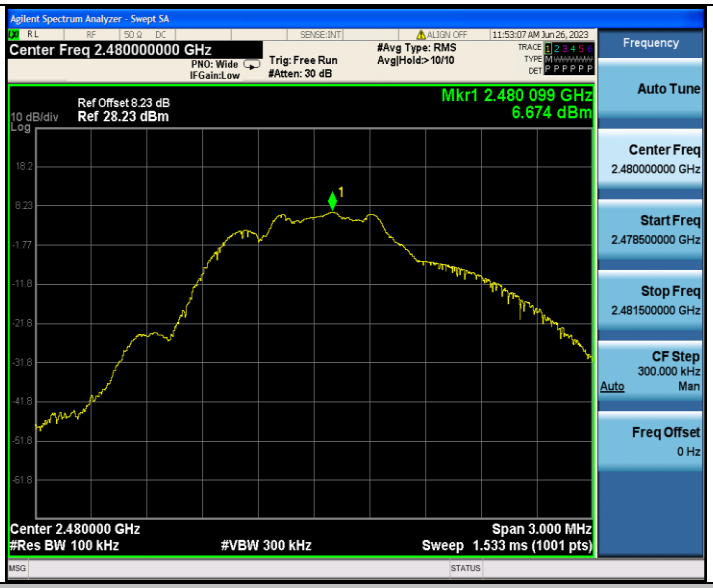
BLE_1M_Ant1_2440_30~1000



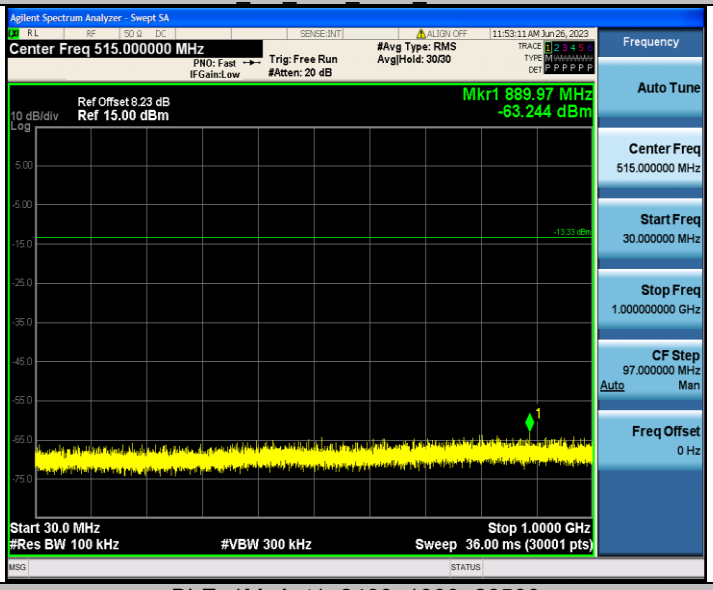
BLE_1M_Ant1_2440_1000~26500



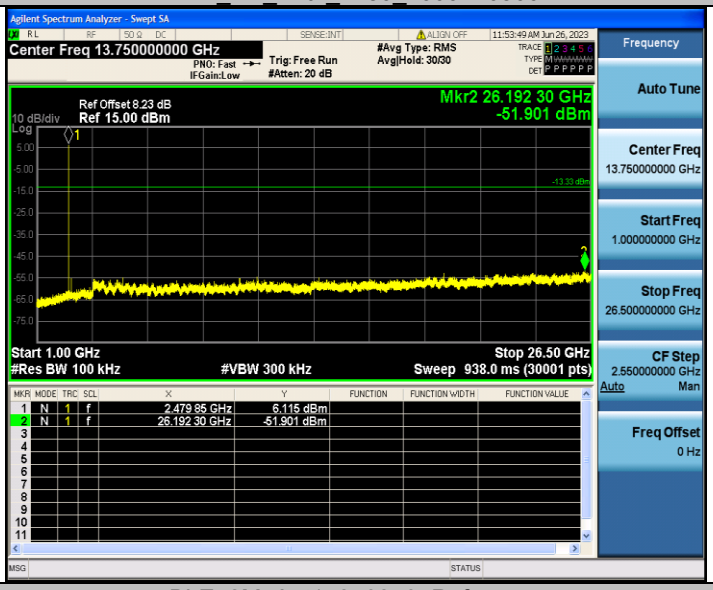
BLE_1M_Ant1_2480_0~Reference



BLE_1M_Ant1_2480_30~1000

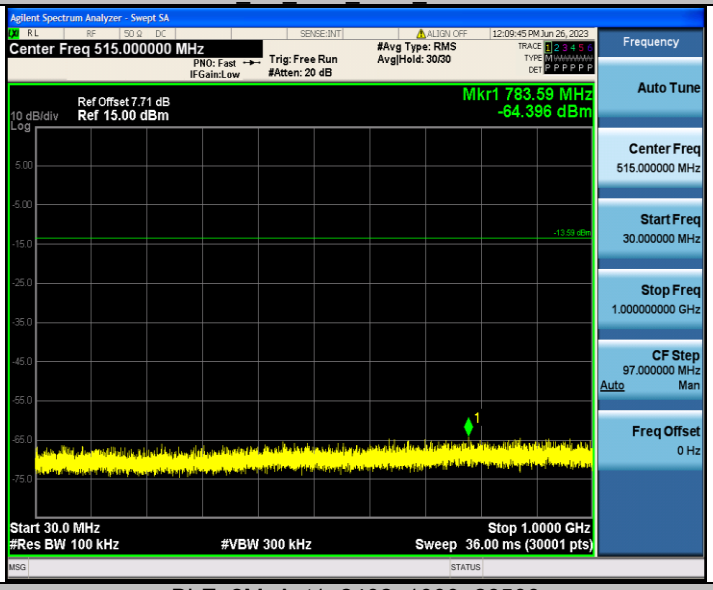


BLE_1M_Ant1_2480_1000~26500

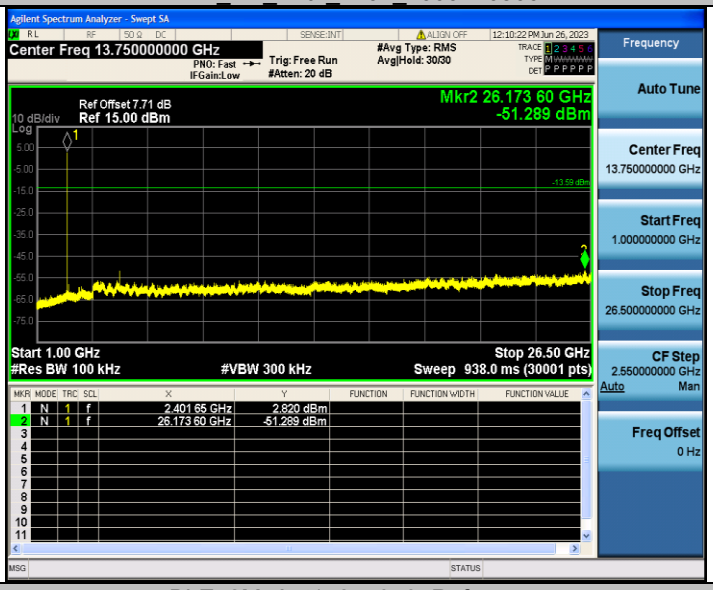


BLE_2M_Ant1_2402_0~Reference

BLE_2M_Ant1_2402_30~1000

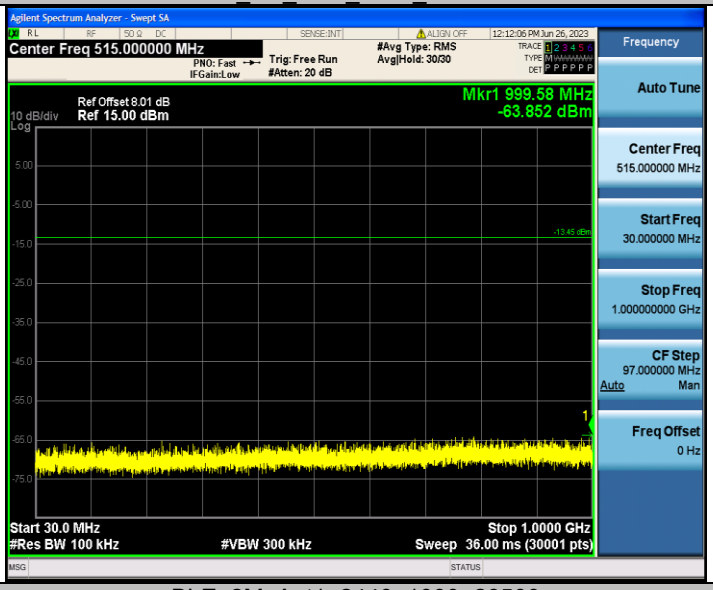


BLE_2M_Ant1_2402_1000~26500

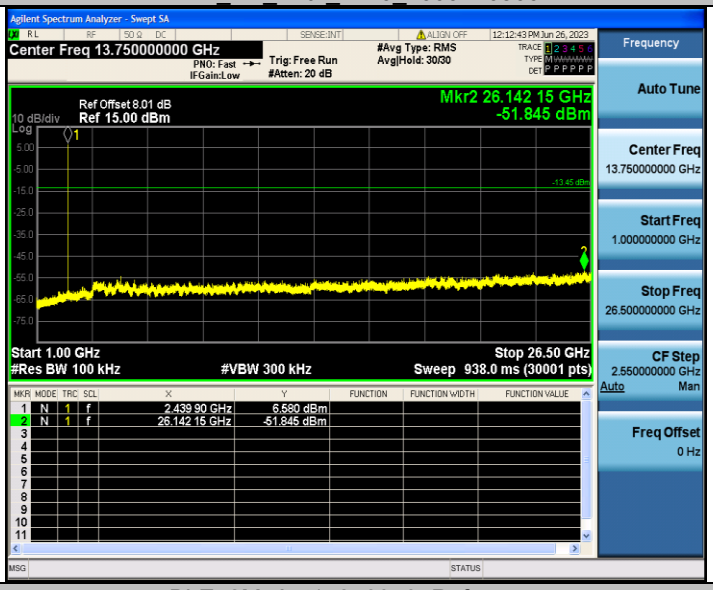


BLE_2M_Ant1_2440_0~Reference

BLE_2M_Ant1_2440_30~1000

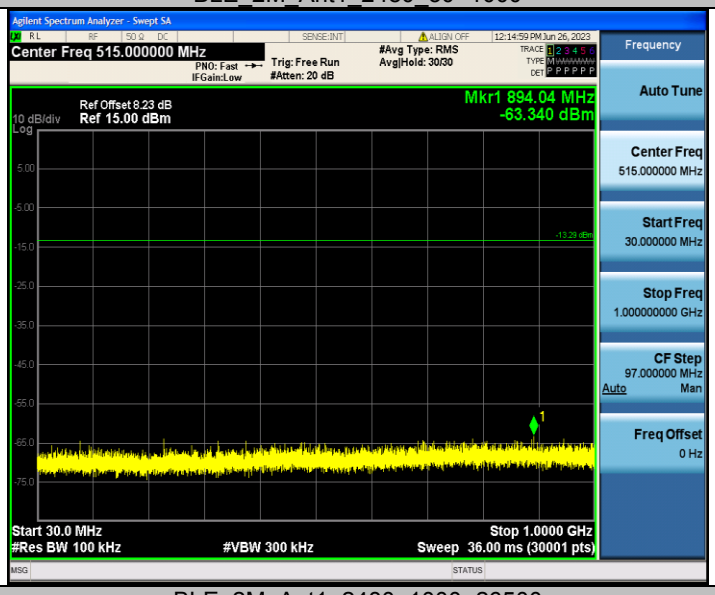


BLE_2M_Ant1_2440_1000~26500

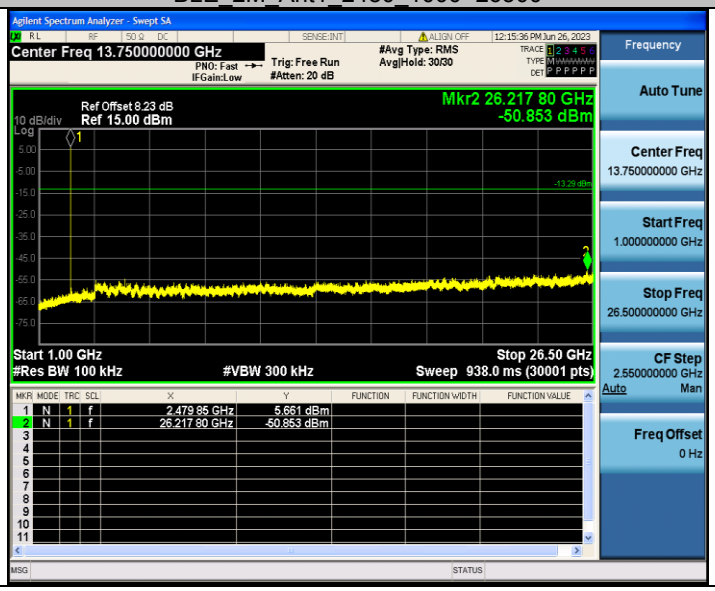


BLE_2M_Ant1_2480_0~Reference

BLE_2M_Ant1_2480_30~1000



BLE_2M_Ant1_2480_1000~26500



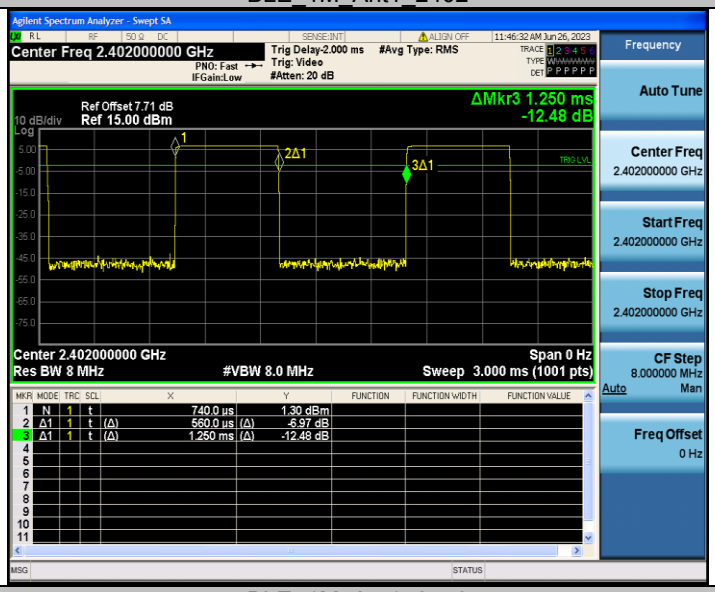
Appendix F: Duty Cycle

Test Result

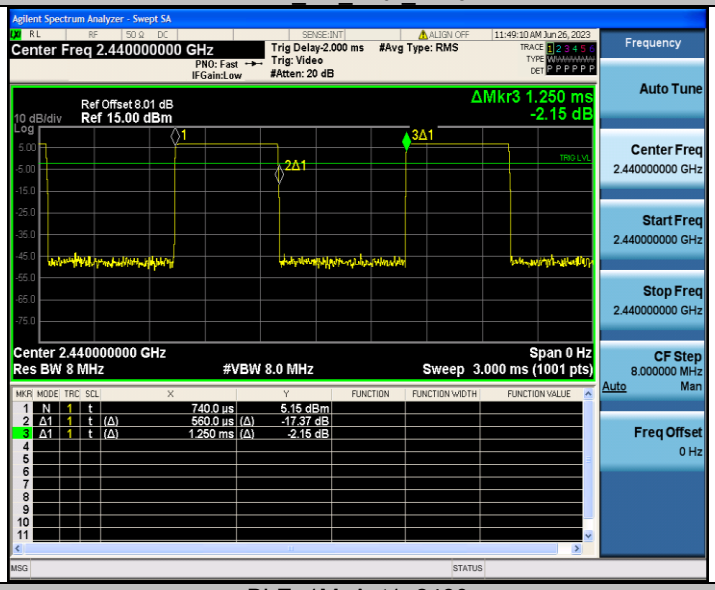
Test Mode	Antenna	Frequency [MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
BLE_1M	Ant1	2402	0.56	1.25	44.80	3.49
		2440	0.56	1.25	44.80	3.49
		2480	0.56	1.25	44.80	3.49
BLE_2M	Ant1	2402	0.30	0.62	48.39	3.15
		2440	0.30	0.62	48.39	3.15
		2480	0.30	0.62	48.39	3.15

Test Graphs

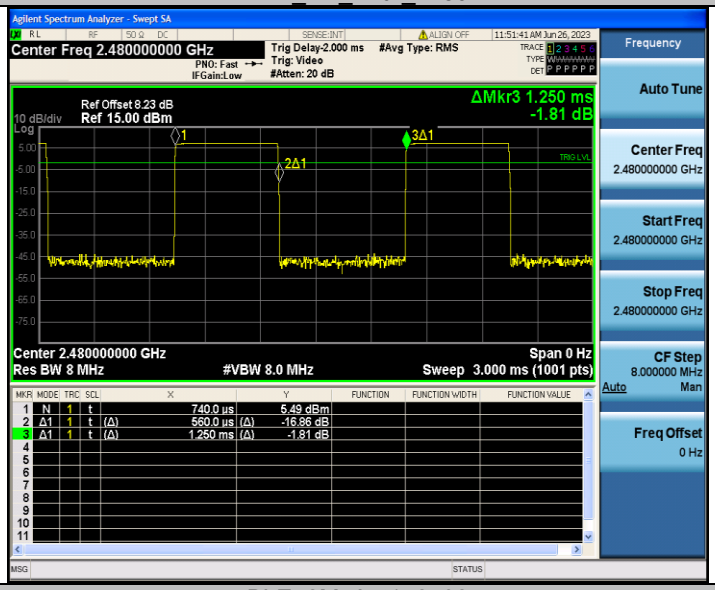
BLE_1M_Ant1_2402



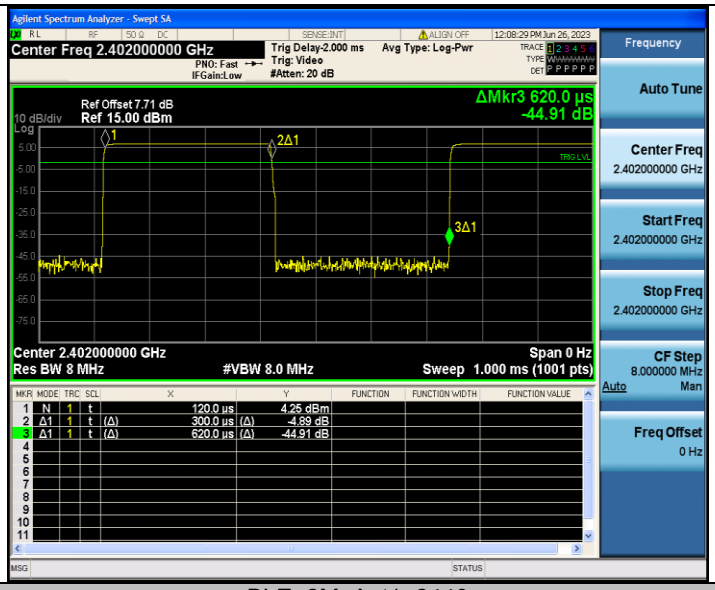
BLE_1M_Ant1_2440



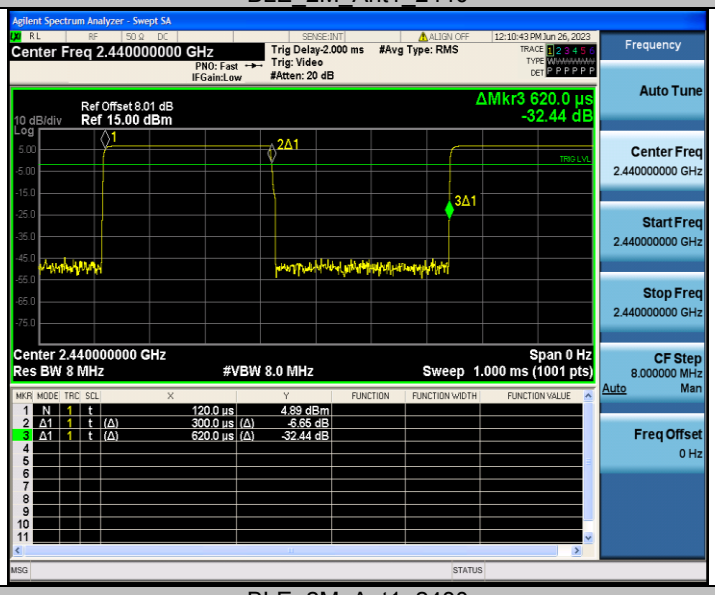
BLE_1M_Ant1_2480



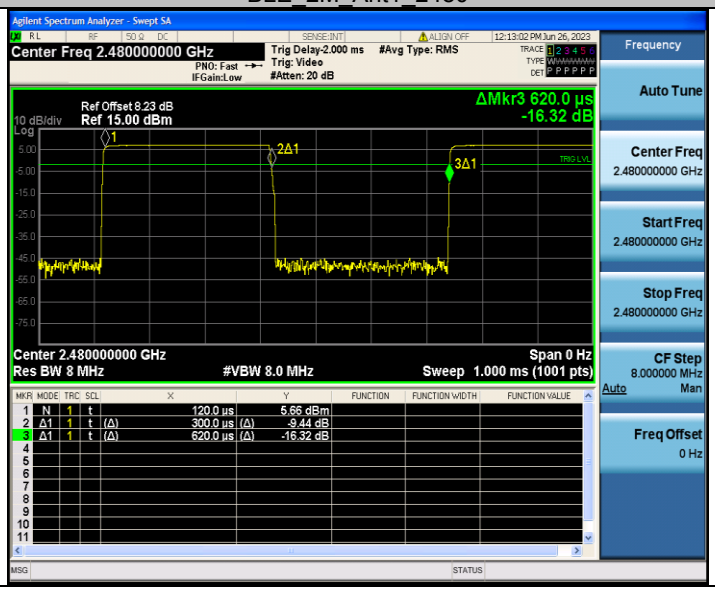
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



----End of Report----