

Test Report

Report No.: MTi230615006-05E1

Date of issue: 2023-08-04

Applicant: Shenzhen Teneth Technology Co., Ltd

Product: Cutting Plotter

Model(s): MINI140 PRO, MINI140

FCC ID: 2A33R-MINI140

Shenzhen Microtest Co., Ltd.

<http://www.mtitest.com>

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Test Result Certification	
Applicant:	Shenzhen Teneth Technology Co., Ltd
Address:	No.161, Pinghu street, Pinghu town, Longgang District, Shenzhen City, Guangdong Province, China
Manufacturer:	Shenzhen Teneth Technology Co., Ltd
Address:	No.161, Pinghu street, Pinghu town, Longgang District, Shenzhen City, Guangdong Province, China
Product description	
Product name:	Cutting Plotter
Trademark:	TENETH
Model name:	MINI140 PRO
Series Model:	MINI140
Standards:	47 CFR Part 15.247
Test Method:	ANSI C63.10 KDB 558074 D01 D15.247 Meas Guidance v05r02
Date of Test	
Date of test:	2023-07-19 to 2023-08-01
Test result:	Pass

Test Engineer	:	<i>Yanice Xie</i>
		(Yanice.Xie)
Reviewed By	:	<i>Leon Chen</i>
		(Leon Chen)
Approved By	:	<i>Tom Xue</i>
		(Tom Xue)

1 General Description

1.1 Description of the EUT

Product name:	Cutting Plotter
Model name:	MINI140 PRO
Series Model:	MINI140
Model difference:	All the models are the same circuit and module, except the model name, screen and RF function. MINI140 PRO is with screen and WIFI, MINI140 is without screen and WIFI.
Electrical rating:	Input:DC24V 1.75A
Accessories:	Adaptor: Model: GM42-240175-D INPUT: AC 100-240V 50/60Hz 1.5A OUTPUT: DC 24V 1.75A
Hardware version:	3.0
Software version:	2.6
Test sample(s) number:	MTi230615006-05S1001 MTi230615006-05S1002
RF specification	
Bluetooth version:	V4.2
Operating frequency range:	2402MHz to 2480MHz
Channel number:	40
Modulation type:	GFSK
Antenna(s) type:	PCB Antenna
Antenna(s) gain:	-0.1 dBi

1.2 Description of test modes

No.	Emission test modes
Mode1	TX-GFSK(CH00/CH19/CH39)

1.2.1 Operation channel list

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	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

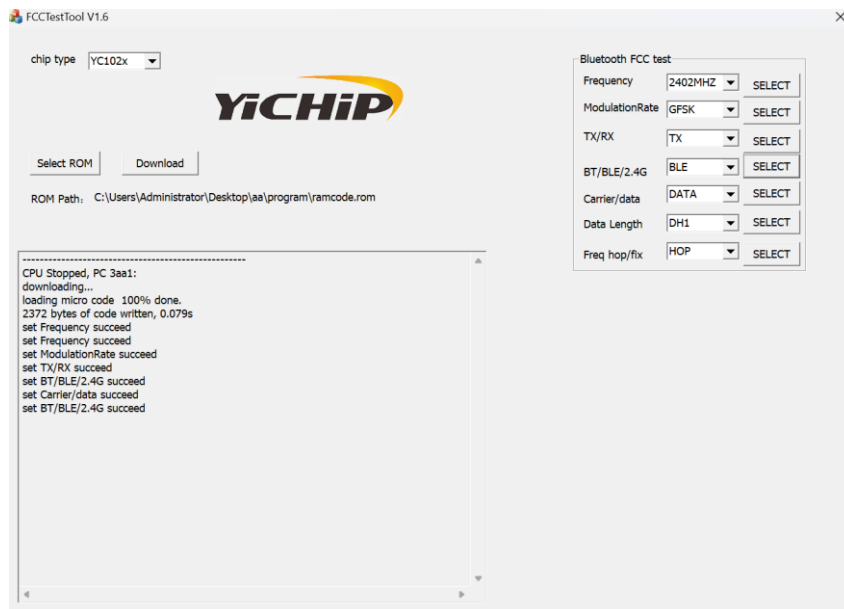
9	2420	19	2440	29	2460	39	2480
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Note: The test software provided by manufacturer is used to control EUT for working in engineering mode, that enables selectable channel, and capable of continuous transmitting mode.

Test Software:

For power setting, refer to below table.

Test Software:	FCC Test Tool V1.6		
Mode	2402MHz	2441MHz	2480MHz
GFSK	33	33	33
$\pi/4$ -DQPSK	33	33	33
8DPSK	33	33	33



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

Support equipment list			
Description	Model	Serial No.	Manufacturer
/	/	/	/
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.	Item	Standard	Requirement	Result
1	Antenna requirement	47 CFR Part 15.247	47 CFR 15.203	Pass
2	Conducted Emission at AC power line	47 CFR Part 15.247	47 CFR 15.207(a)	Pass
3	Occupied Bandwidth	47 CFR Part 15.247	47 CFR 15.247(a)(2)	Pass
4	Maximum Conducted Output Power	47 CFR Part 15.247	47 CFR 15.247(b)(3)	Pass
5	Power Spectral Density	47 CFR Part 15.247	47 CFR 15.247(e)	Pass
6	Emissions in non-restricted frequency bands	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
7	Band edge emissions (Radiated)	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
8	Emissions in restricted frequency bands (below 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
9	Emissions in restricted frequency bands (above 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d)	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
IC Registration No.:	21760
CABID:	CN0093

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	/	2023-05-04	2024-05-03
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	/	2023-05-04	2024-05-03
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	/	2023-05-04	2024-05-03
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)

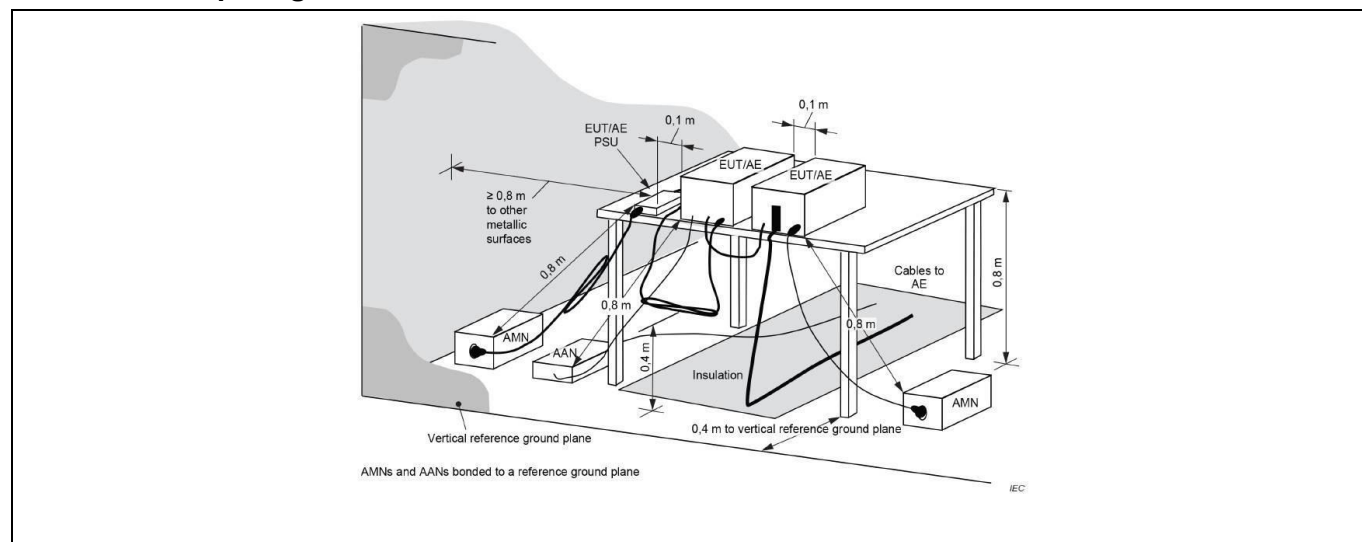
6.1 Conducted Emission at AC power line

Test Requirement:	Refer to 47 CFR 15.207(a), 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 μ H/50 ohms line impedance stabilization network (LISN).		
Test Limit:	Frequency of emission (MHz)	Conducted limit (dB μ V)	
		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.			

6.1.1 E.U.T. Operation:

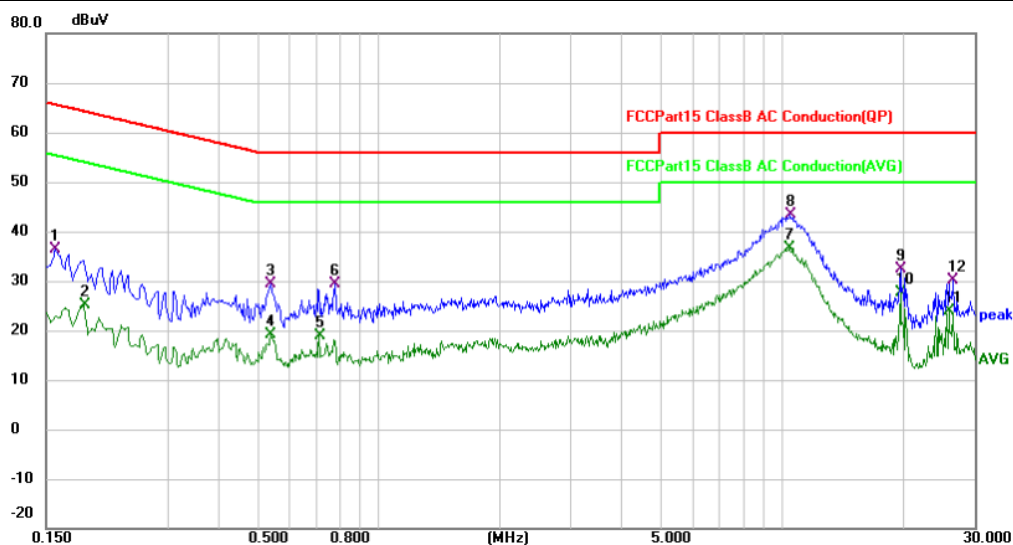
Operating Environment:					
Temperature:	26.2 °C	Humidity:	56.6 %	Atmospheric Pressure:	101 kPa
Pre test mode:	Mode1				
Final test mode:	Mode1				

6.1.2 Test Setup Diagram:



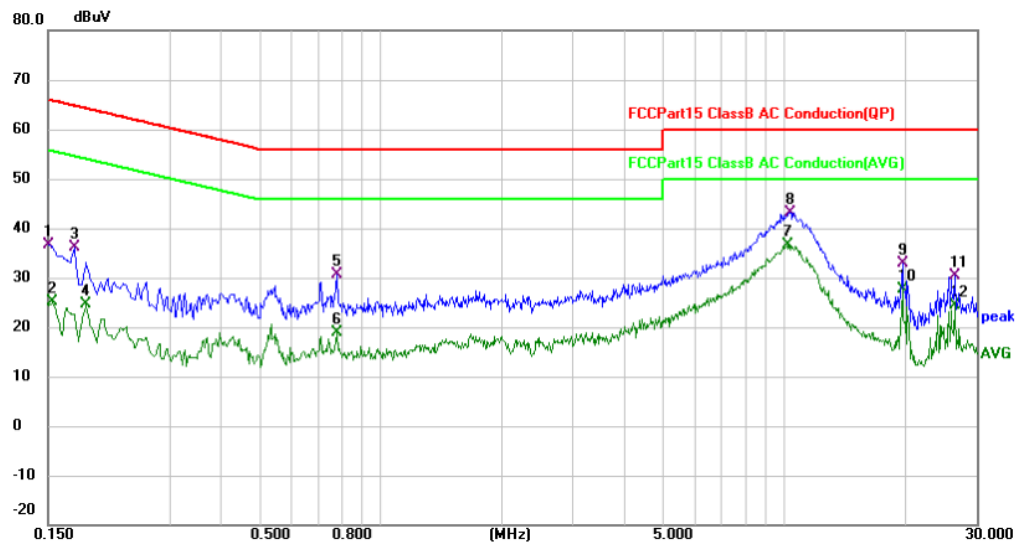
6.1.3 Test Data:

Mode1 (AC 120/60Hz)/ Line: Line / Band: 2.4G / BW: 2 / CH00



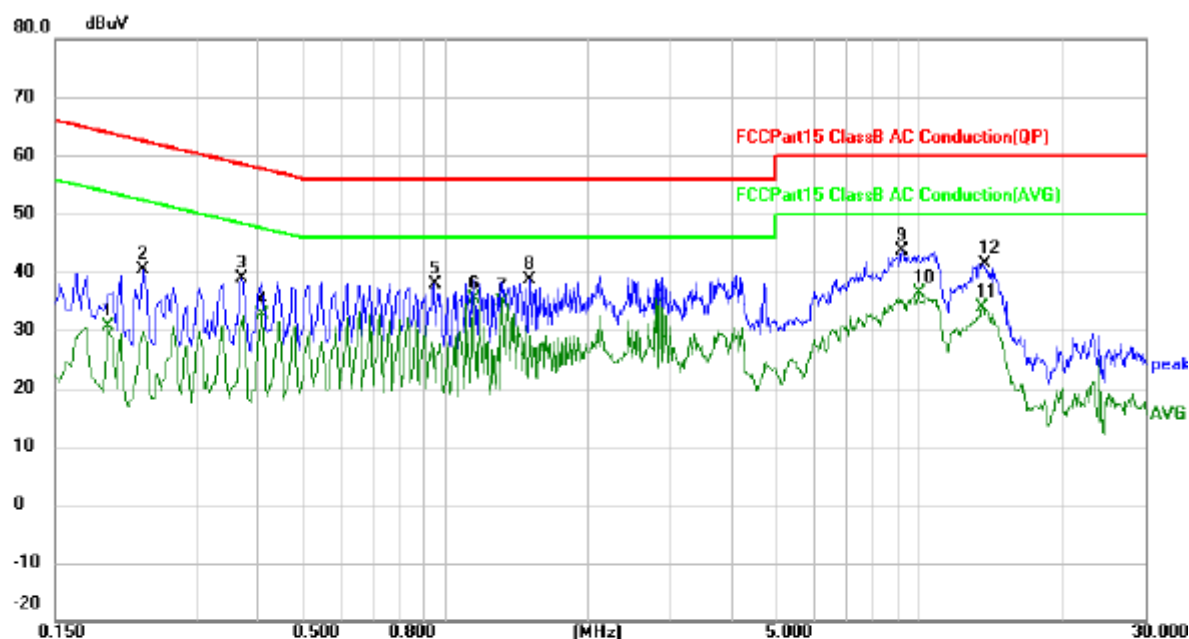
No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.1580	26.09	10.18	36.27	65.57	-29.30	QP	
2	0.1860	14.98	10.17	25.15	54.21	-29.06	AVG	
3	0.5420	19.08	10.23	29.31	56.00	-26.69	QP	
4	0.5420	8.99	10.23	19.22	46.00	-26.78	AVG	
5	0.7140	8.83	10.16	18.99	46.00	-27.01	AVG	
6	0.7820	19.32	10.14	29.46	56.00	-26.54	QP	
7 *	10.4180	25.83	10.75	36.58	50.00	-13.42	AVG	
8	10.4980	32.70	10.75	43.45	60.00	-16.55	QP	
9	19.7099	21.79	10.59	32.38	60.00	-27.62	QP	
10	19.7099	17.08	10.59	27.67	50.00	-22.33	AVG	
11	25.8779	13.17	10.70	23.87	50.00	-26.13	AVG	
12	26.6100	19.52	10.71	30.23	60.00	-29.77	QP	

Mode1 (AC 120/60Hz)/ Line: Neutral / Band: 2.4G / BW: 2 / CH00



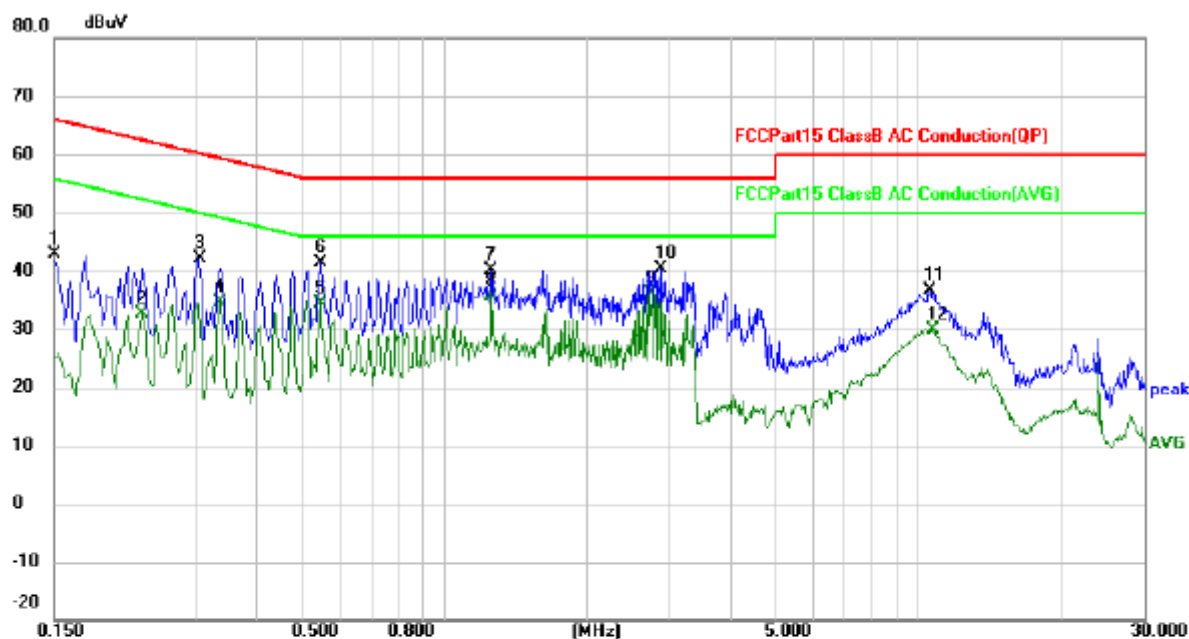
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	26.58	10.14	36.72	66.00	-29.28	QP	
2		0.1539	14.98	10.14	25.12	55.79	-30.67	AVG	
3		0.1740	25.91	10.11	36.02	64.77	-28.75	QP	
4		0.1860	14.45	10.10	24.55	54.21	-29.66	AVG	
5		0.7820	20.45	10.11	30.56	56.00	-25.44	QP	
6		0.7820	8.69	10.11	18.80	46.00	-27.20	AVG	
7	*	10.2220	25.92	10.72	36.64	50.00	-13.36	AVG	
8		10.3180	32.53	10.72	43.25	60.00	-16.75	QP	
9		19.7099	22.36	10.58	32.94	60.00	-27.06	QP	
10		19.7099	17.12	10.58	27.70	50.00	-22.30	AVG	
11		26.4860	19.66	10.70	30.36	60.00	-29.64	QP	
12		26.4860	13.80	10.70	24.50	50.00	-25.50	AVG	

Mode1 (AC 240/60Hz)/ Line: Line / Band: 2.4G / BW: 2 / CH00



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1940	19.88	10.66	30.54	53.86	-23.32	AVG	
2		0.2300	29.66	10.73	40.39	62.45	-22.06	peak	
3		0.3700	27.83	11.03	38.86	58.50	-19.64	peak	
4		0.4100	21.46	11.12	32.58	47.65	-15.07	AVG	
5		0.9460	25.63	12.31	37.94	56.00	-18.06	peak	
6	*	1.1420	22.73	12.63	35.36	46.00	-10.64	AVG	
7		1.3180	22.01	12.92	34.93	46.00	-11.07	AVG	
8		1.5100	25.40	13.22	38.62	56.00	-17.38	peak	
9		9.2020	33.25	10.38	43.63	60.00	-16.37	peak	
10		9.9940	25.85	10.41	36.26	50.00	-13.74	AVG	
11		13.5700	23.38	10.49	33.87	50.00	-16.13	AVG	
12		13.6820	30.88	10.49	41.37	60.00	-18.63	peak	

Mode1 (AC 240/60Hz)/ Line: Neutral / Band: 2.4G / BW: 2 / CH00



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	32.48	10.29	42.77	66.00	-23.23	peak	
2		0.2300	21.84	10.67	32.51	52.45	-19.94	AVG	
3		0.3020	31.37	10.84	42.21	60.19	-17.98	peak	
4		0.3339	23.77	10.90	34.67	49.35	-14.68	AVG	
5		0.5460	23.03	11.43	34.46	46.00	-11.54	AVG	
6		0.5500	30.04	11.43	41.47	56.00	-14.53	peak	
7		1.2620	27.22	12.89	40.11	56.00	-15.89	peak	
8		1.2620	22.75	12.89	35.64	46.00	-10.36	AVG	
9	*	2.7180	25.70	10.35	36.05	46.00	-9.95	AVG	
10		2.8620	30.13	10.32	40.45	56.00	-15.55	peak	
11		10.5340	26.37	10.33	36.70	60.00	-23.30	peak	
12		10.6940	19.61	10.34	29.95	50.00	-20.05	AVG	

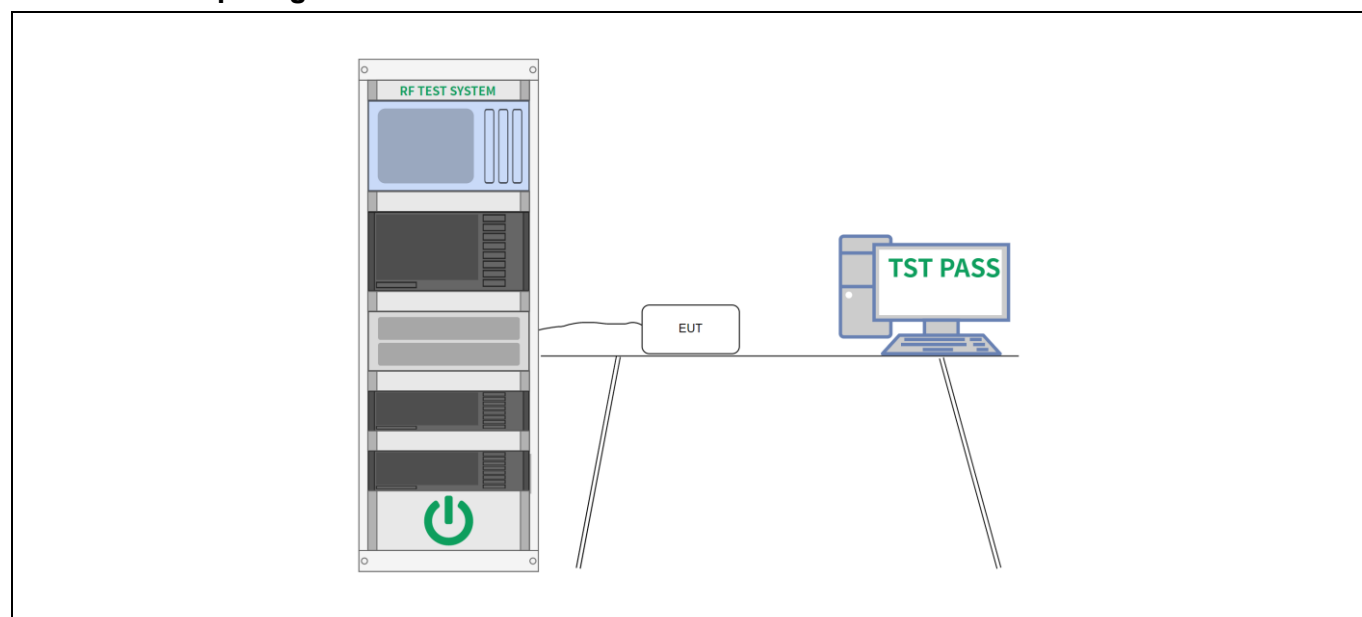
6.2 Occupied Bandwidth

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:	KDB 558074 D01 15.247 Meas Guidance v05r02

6.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	26.7 °C	Humidity:	54 %	Atmospheric Pressure:	100 kPa
Test mode:	Mode1				

6.2.2 Test Setup Diagram:



6.2.3 Test Data:

Please Refer to Appendix for Details.

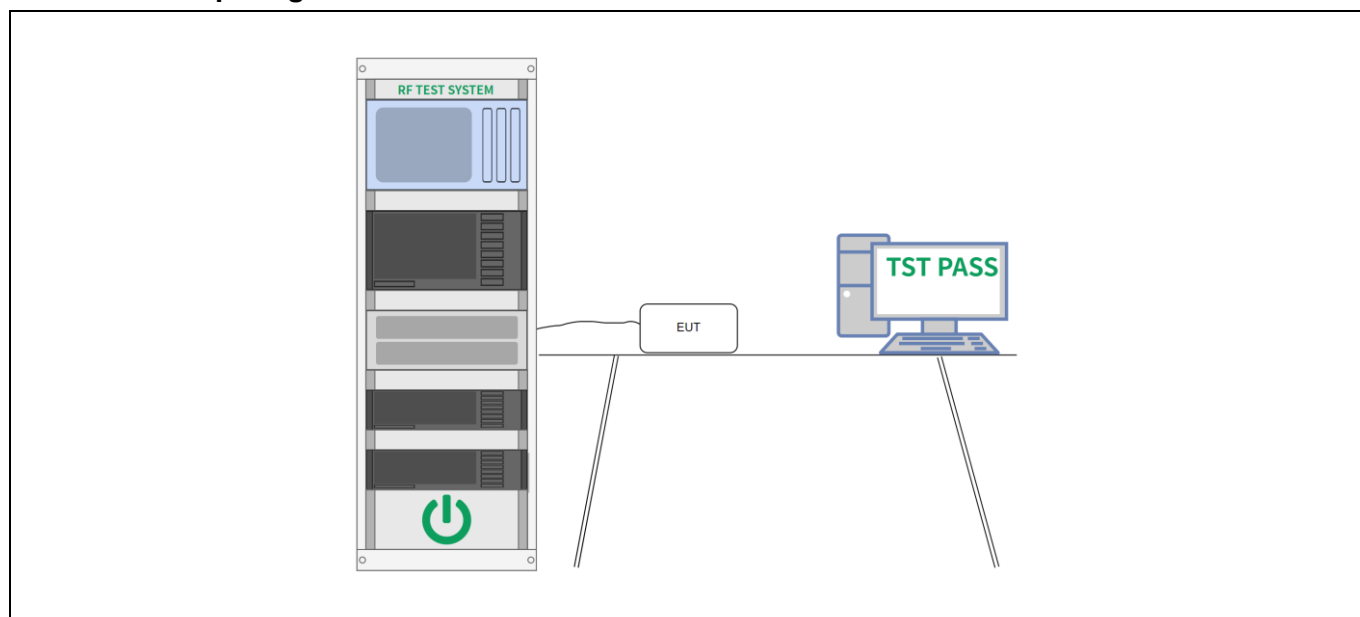
6.3 Maximum Conducted Output Power

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:	KDB 558074 D01 15.247 Meas Guidance v05r02

6.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	26.7 °C	Humidity:	54 %	Atmospheric Pressure:	100 kPa
Test mode:	Mode1				

6.3.2 Test Setup Diagram:



6.3.3 Test Data:

Please Refer to Appendix for Details.

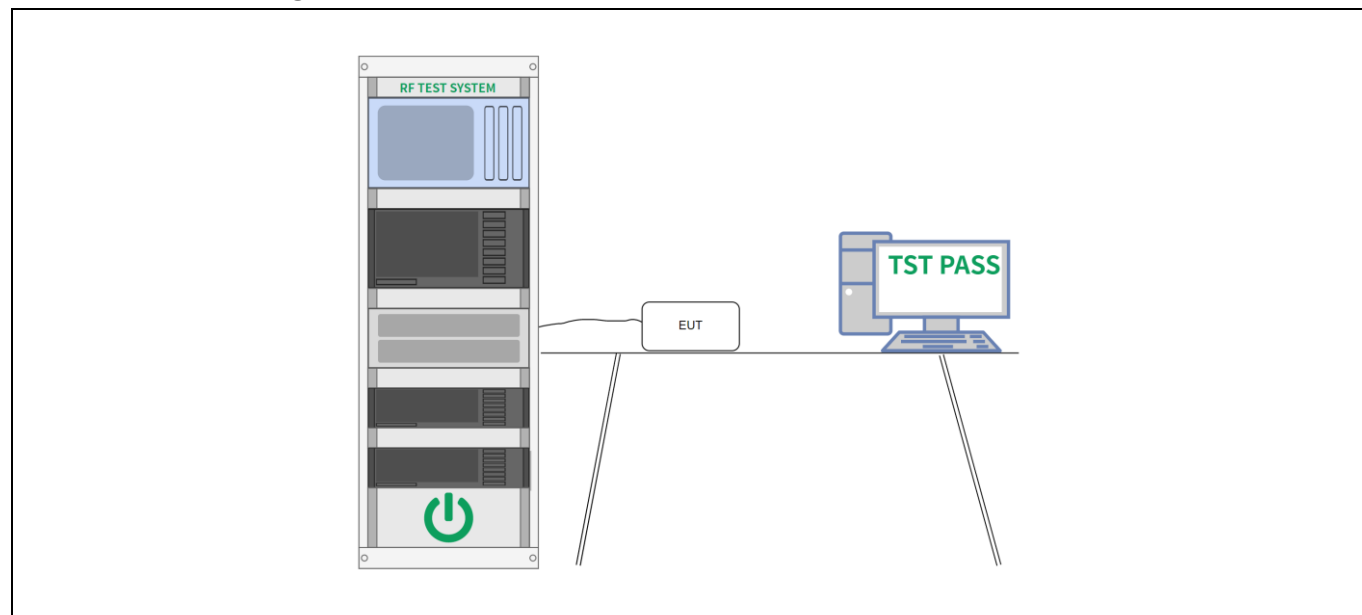
6.4 Power Spectral Density

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:	KDB 558074 D01 15.247 Meas Guidance v05r02

6.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	26.7 °C	Humidity:	54 %	Atmospheric Pressure:	100 kPa
Test mode:	Mode1				

6.4.2 Test Setup Diagram:



6.4.3 Test Data:

Please Refer to Appendix for Details.

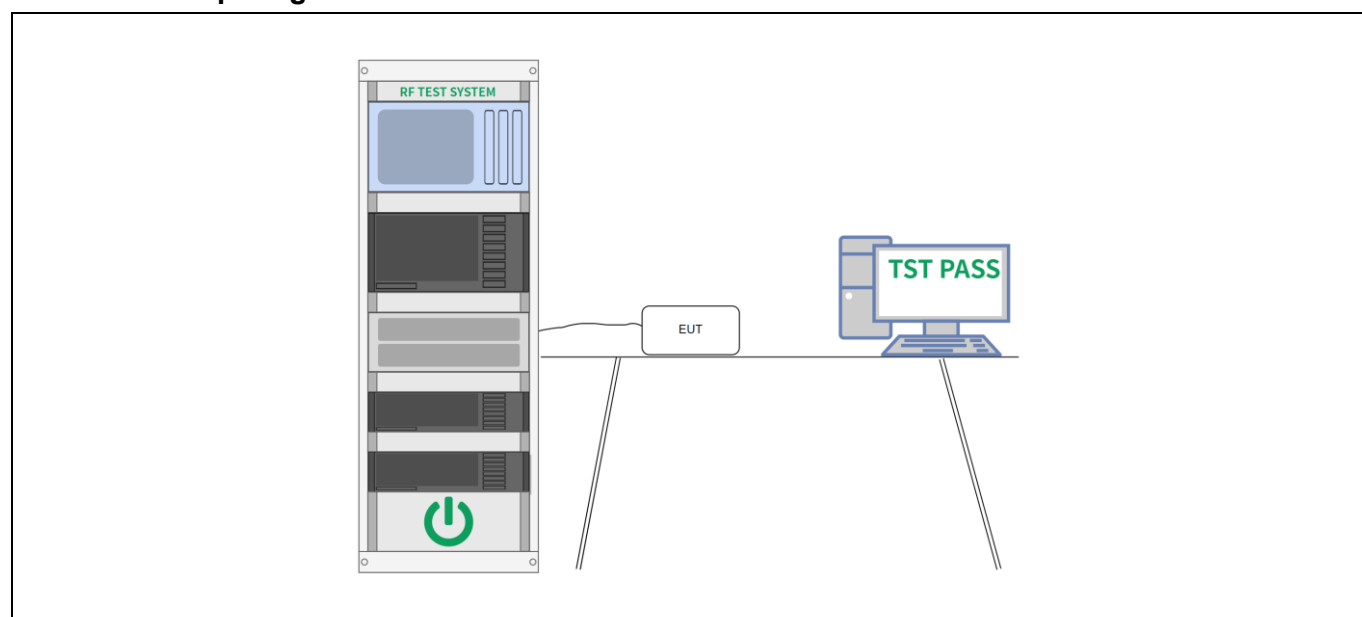
6.5 Emissions in non-restricted frequency bands

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:	KDB 558074 D01 15.247 Meas Guidance v05r02

6.5.1 E.U.T. Operation:

Operating Environment:					
Temperature:	26.7 °C	Humidity:	54 %	Atmospheric Pressure:	100 kPa
Test mode:	Mode1				

6.5.2 Test Setup Diagram:



6.5.3 Test Data:

Please Refer to Appendix for Details.

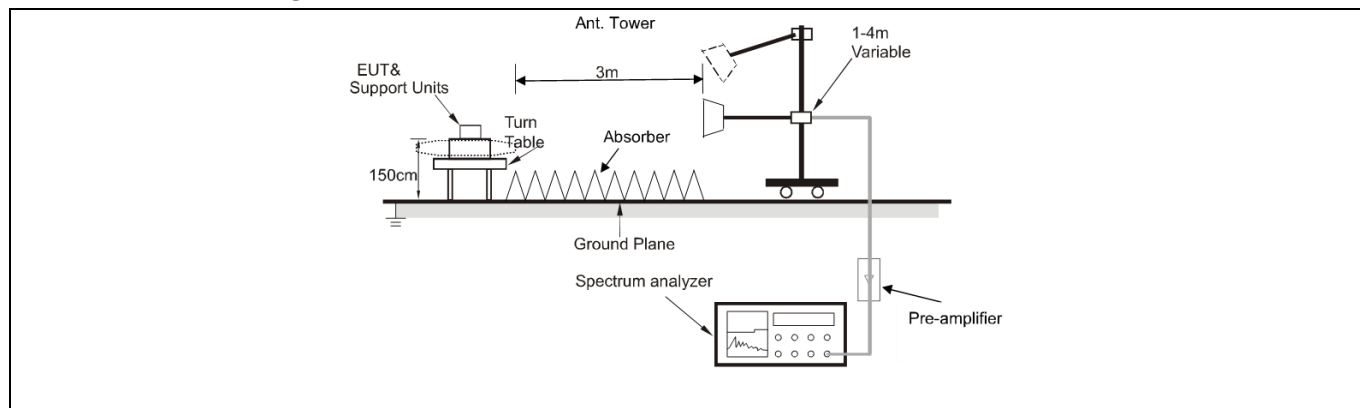
6.6 Band edge emissions (Radiated)

Test Requirement:	Refer to 47 CFR 15.247(d), 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:	KDB 558074 D01 15.247 Meas Guidance v05r02		

6.6.1 E.U.T. Operation:

Operating Environment:					
Temperature:	24.9 °C	Humidity:	61.9 %	Atmospheric Pressure:	100 kPa
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: 2 / CH00

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2310.000	46.90	-8.08	38.82	74.00	-35.18	peak
2		2310.000	37.24	-8.08	29.16	54.00	-24.84	AVG
3		2390.000	53.92	-7.71	46.21	74.00	-27.79	peak
4	*	2390.000	38.16	-7.71	30.45	54.00	-23.55	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 2 / CH00

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	46.95	-8.08	38.87	74.00	-35.13	peak
2		2310.000	37.27	-8.08	29.19	54.00	-24.81	AVG
3		2390.000	48.50	-7.71	40.79	74.00	-33.21	peak
4	*	2390.000	37.58	-7.71	29.87	54.00	-24.13	AVG

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 2 / CH39

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	2483.500	63.12	-7.24	55.88	74.00	-18.12	peak
2		2483.500	41.39	-7.24	34.15	54.00	-19.85	AVG
3		2500.000	50.33	-7.17	43.16	74.00	-30.84	peak
4		2500.000	38.06	-7.17	30.89	54.00	-23.11	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 2 / CH39

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	59.15	-7.24	51.91	74.00	-22.09	peak
2	*	2483.500	39.40	-7.24	32.16	54.00	-21.84	AVG
3		2500.000	46.93	-7.17	39.76	74.00	-34.24	peak
4		2500.000	37.86	-7.17	30.69	54.00	-23.31	AVG

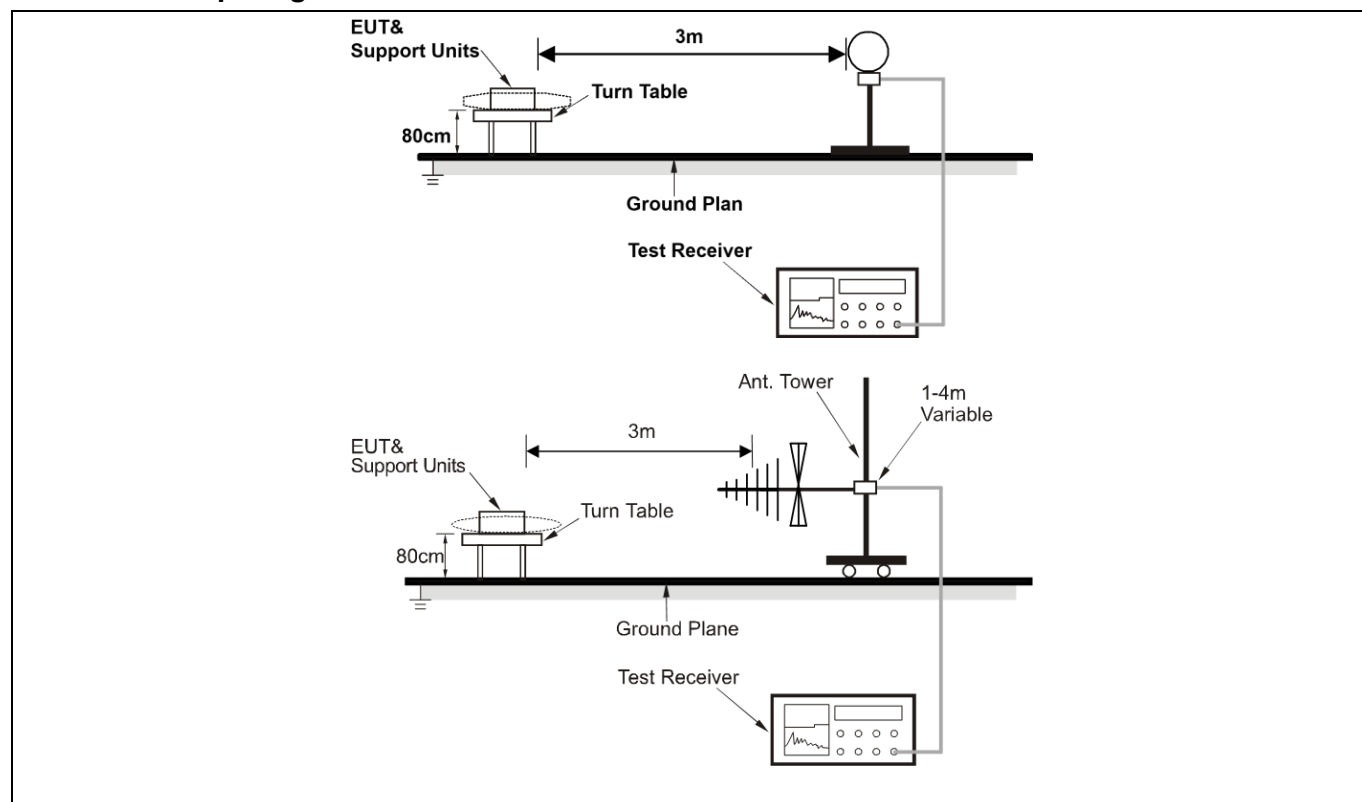
6.7 Emissions in restricted frequency bands (below 1GHz)

Test Requirement:	Refer to 47 CFR 15.247(d), 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:	KDB 558074 D01 15.247 Meas Guidance v05r02		

6.7.1 E.U.T. Operation:

Operating Environment:					
Temperature:	25.9 °C	Humidity:	61.9 %	Atmospheric Pressure:	100 kPa
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.					

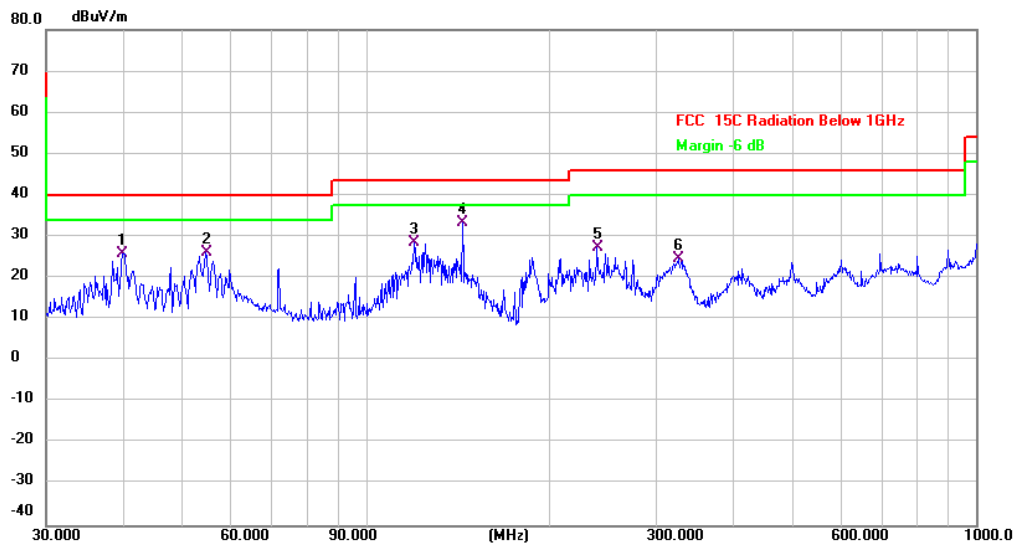
6.7.2 Test Setup Diagram:



Test Data:

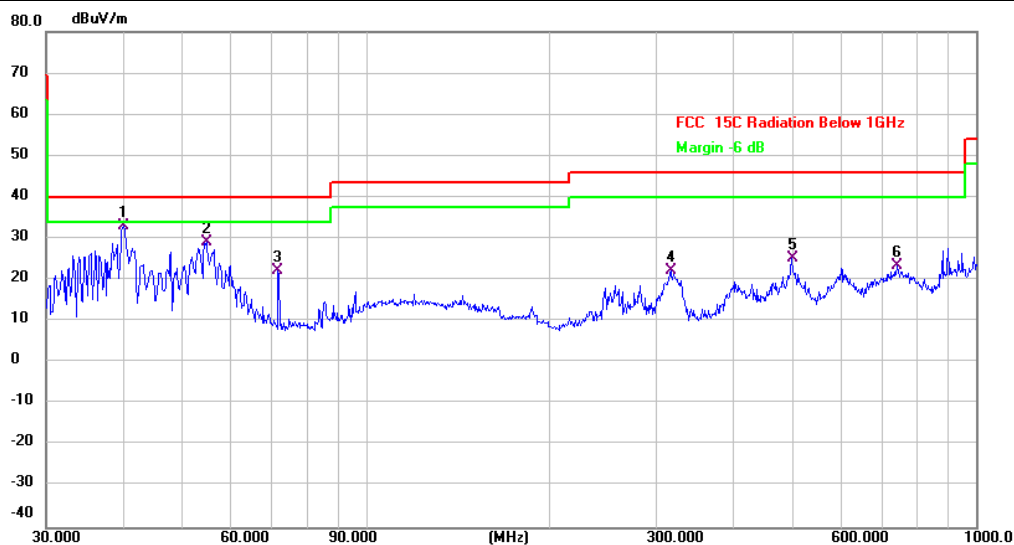
MINI140 PRO:

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 2 / CH39



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV/m	dBuV/m	dB		
1		39.9942	39.33	-13.34	25.99	40.00	-14.01	QP	
2		54.6429	38.72	-12.63	26.09	40.00	-13.91	QP	
3		119.8556	43.75	-15.24	28.51	43.50	-14.99	QP	
4	*	143.8295	46.88	-13.64	33.24	43.50	-10.26	QP	
5		239.9874	41.50	-14.21	27.29	46.00	-18.71	QP	
6		325.5958	35.11	-10.51	24.60	46.00	-21.40	QP	

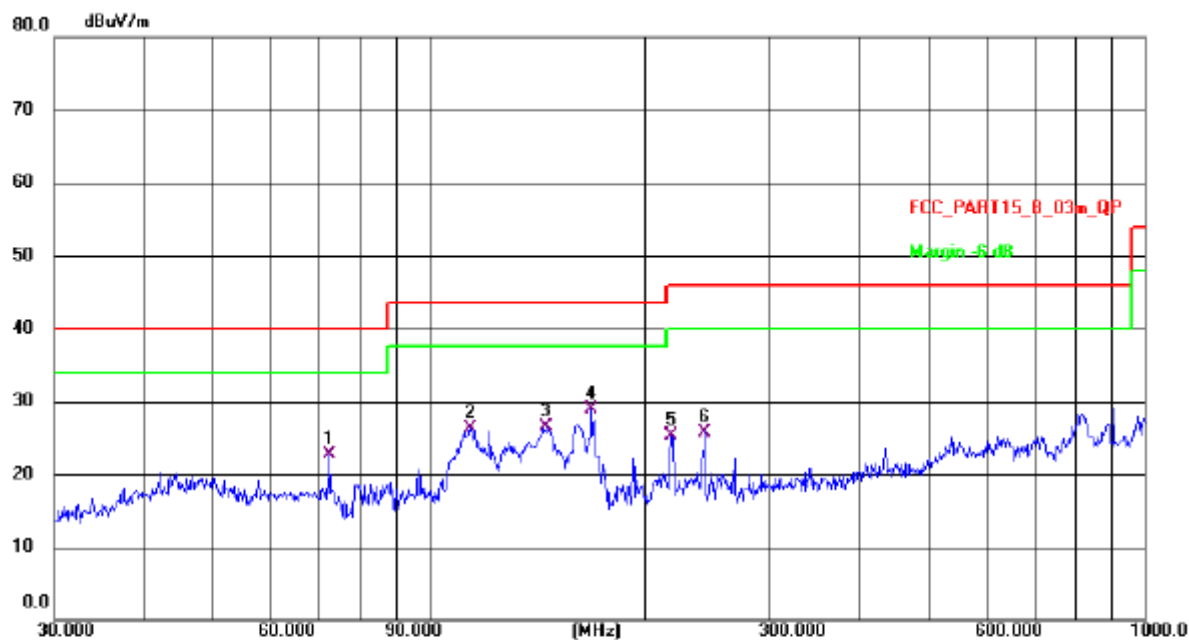
Mode1 / Polarization: Vertical / Band: 2.4G / BW: 2 / CH39



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	40.1347	46.21	-13.29	32.92	40.00	-7.08	QP	
2		54.8348	41.83	-12.60	29.23	40.00	-10.77	QP	
3		71.8320	36.93	-14.81	22.12	40.00	-17.88	QP	
4		316.5890	33.65	-11.40	22.25	46.00	-23.75	QP	
5		499.4247	32.92	-7.74	25.18	46.00	-20.82	QP	
6		742.2587	28.24	-4.91	23.33	46.00	-22.67	QP	

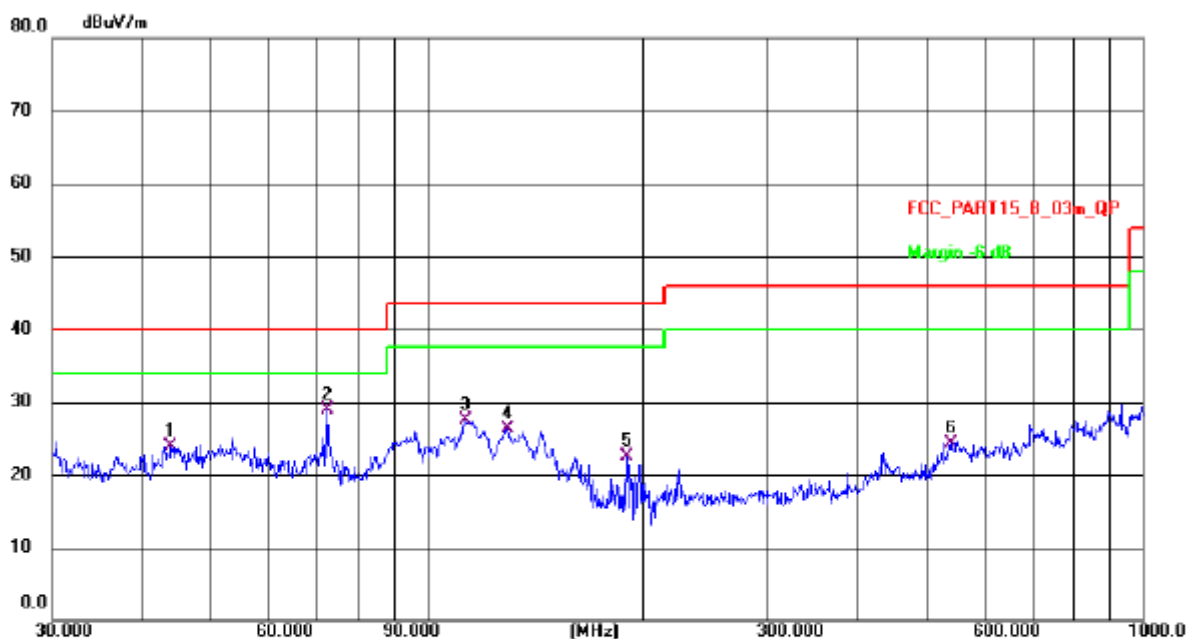
MINI140:

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 2 / CH39



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV/m	dBuV/m	dB		
1		72.8465	34.63	-12.01	22.62	40.00	-17.38	QP	
2		114.5146	36.66	-10.45	26.21	43.50	-17.29	QP	
3		145.8608	39.67	-13.18	26.49	43.50	-17.01	QP	
4	*	169.0053	40.96	-12.13	28.83	43.50	-14.67	QP	
5		218.3084	34.39	-9.04	25.35	46.00	-20.65	QP	
6		243.3771	34.40	-8.60	25.80	46.00	-20.20	QP	

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 2 / CH39



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		43.9658	32.41	-8.55	23.86	40.00	-16.14	QP	
2	*	72.8465	40.86	-12.01	28.85	40.00	-11.15	QP	
3		113.3161	37.72	-10.24	27.48	43.50	-16.02	QP	
4		129.9225	39.11	-12.83	26.28	43.50	-17.22	QP	
5		190.4050	32.96	-10.43	22.53	43.50	-20.97	QP	
6		539.4773	26.49	-2.13	24.36	46.00	-21.64	QP	

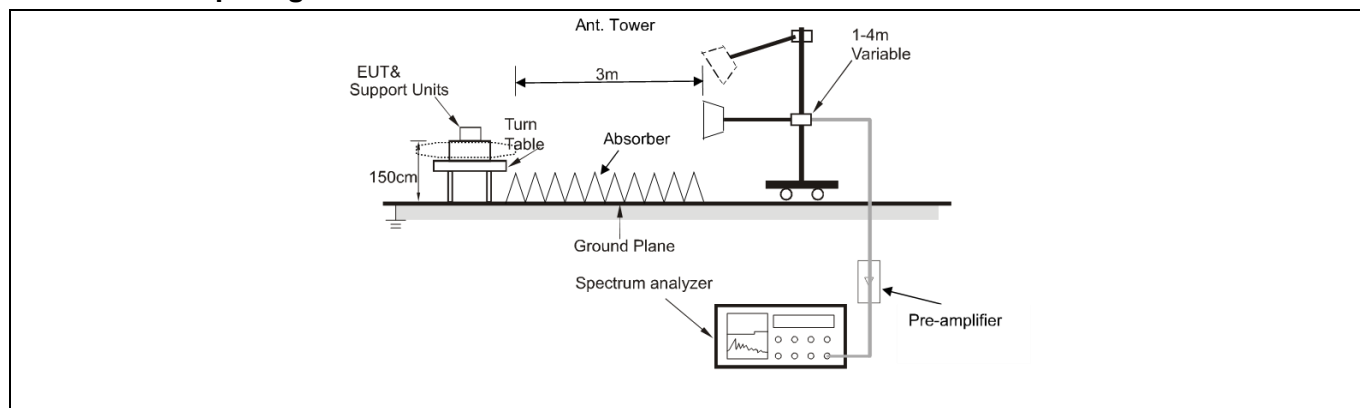
6.8 Emissions in restricted frequency bands (above 1GHz)

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:	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:	KDB 558074 D01 15.247 Meas Guidance v05r02		

6.8.1 E.U.T. Operation:

Operating Environment:					
Temperature:	24.9 °C	Humidity:	61.9 %	Atmospheric Pressure:	100 kPa
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.					

6.8.2 Test Setup Diagram:



6.8.3 Test Data:

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 2 / CH00

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4804.000	45.50	0.74	46.24	74.00	-27.76	peak
2		4804.000	37.40	0.74	38.14	54.00	-15.86	AVG
3		7206.000	40.24	6.02	46.26	74.00	-27.74	peak
4		7206.000	34.11	6.02	40.13	54.00	-13.87	AVG
5		9608.000	40.95	5.88	46.83	74.00	-27.17	peak
6	*	9608.000	34.51	5.88	40.39	54.00	-13.61	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 2 / CH00

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		4804.000	40.16	0.74	40.90	74.00	-33.10	peak
2		4804.000	33.82	0.74	34.56	54.00	-19.44	AVG
3		7206.000	40.58	6.02	46.60	74.00	-27.40	peak
4		7206.000	34.20	6.02	40.22	54.00	-13.78	AVG
5		9608.000	41.60	5.88	47.48	74.00	-26.52	peak
6	*	9608.000	35.34	5.88	41.22	54.00	-12.78	AVG

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 2 / CH19

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4880.000	40.59	1.04	41.63	74.00	-32.37	peak
2		4880.000	34.18	1.04	35.22	54.00	-18.78	AVG
3		7320.000	40.73	5.93	46.66	74.00	-27.34	peak
4		7320.000	34.36	5.93	40.29	54.00	-13.71	AVG
5		9760.000	41.53	6.55	48.08	74.00	-25.92	peak
6	*	9760.000	35.14	6.55	41.69	54.00	-12.31	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 2 / CH19

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4880.000	40.25	1.04	41.29	74.00	-32.71	peak
2		4880.000	34.14	1.04	35.18	54.00	-18.82	AVG
3		7320.000	40.67	5.93	46.60	74.00	-27.40	peak
4		7320.000	34.29	5.93	40.22	54.00	-13.78	AVG
5		9760.000	40.60	6.55	47.15	74.00	-26.85	peak
6	*	9760.000	34.53	6.55	41.08	54.00	-12.92	AVG

Mode1 / Polarization: Horizontal / Band: 2.4G / BW: 2 / CH39

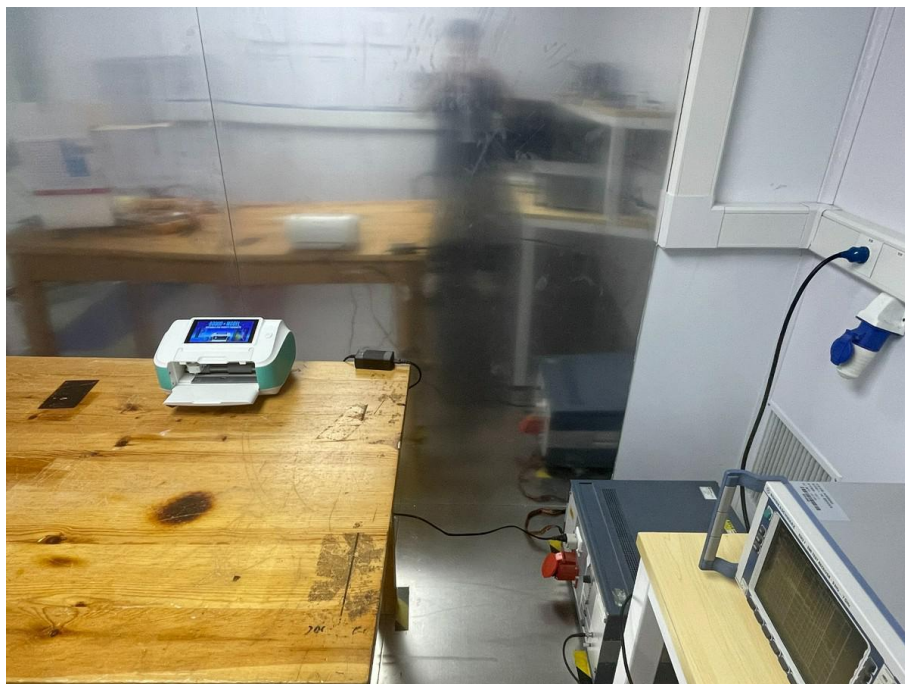
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4960.000	42.57	1.50	44.07	74.00	-29.93	peak
2		4960.000	36.60	1.50	38.10	54.00	-15.90	AVG
3		7440.000	40.61	5.61	46.22	74.00	-27.78	peak
4		7440.000	34.50	5.61	40.11	54.00	-13.89	AVG
5		9920.000	41.26	6.10	47.36	74.00	-26.64	peak
6	*	9920.000	35.12	6.10	41.22	54.00	-12.78	AVG

Mode1 / Polarization: Vertical / Band: 2.4G / BW: 2 / CH39

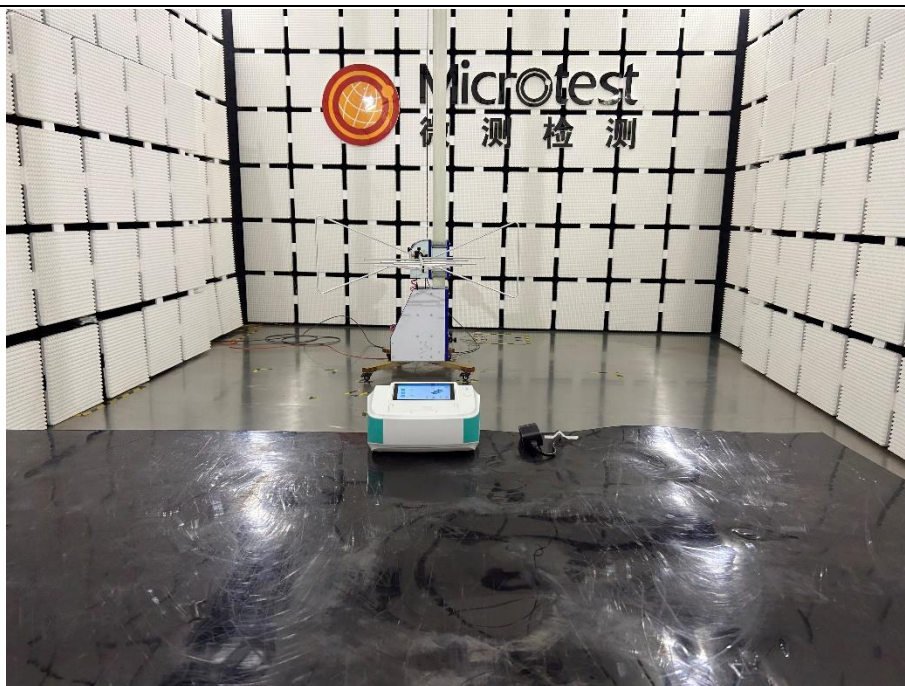
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4960.000	40.67	1.50	42.17	74.00	-31.83	peak
2		4960.000	34.61	1.50	36.11	54.00	-17.89	AVG
3		7440.000	39.86	5.61	45.47	74.00	-28.53	peak
4		7440.000	33.63	5.61	39.24	54.00	-14.76	AVG
5		9920.000	40.93	6.10	47.03	74.00	-26.97	peak
6	*	9920.000	34.29	6.10	40.39	54.00	-13.61	AVG

Photographs of the test setup

Conducted Emission at AC power line



Receiver spurious emissions (30MHz to 1GHz)



Receiver spurious emissions (above 1GHz)



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	0.720	0.5	PASS
		2440	0.712	0.5	PASS
		2480	0.688	0.5	PASS

Test Graphs

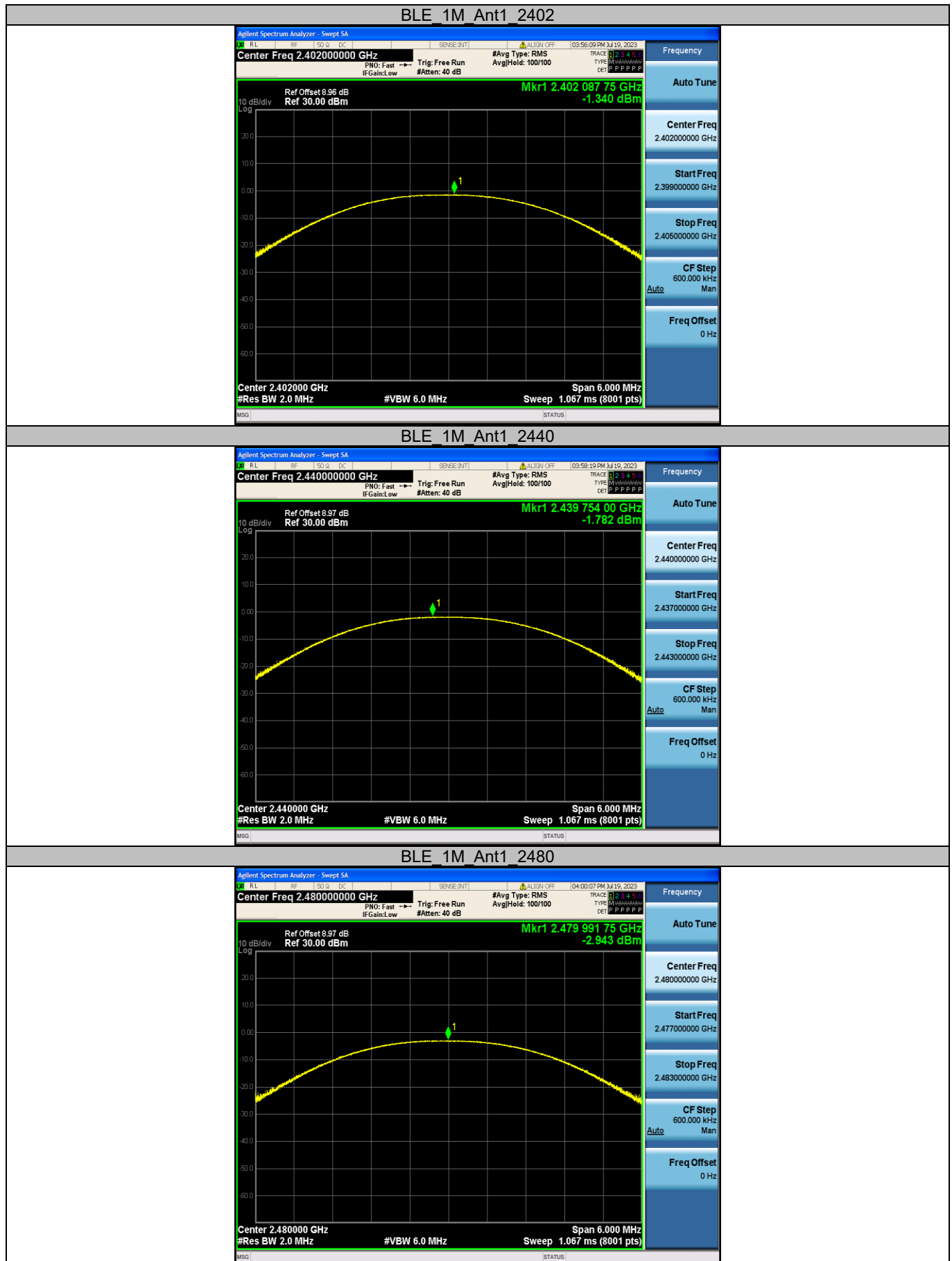


Appendix B: Maximum conducted output power

Test Result-Peak

Test Mode	Antenna	Frequency [MHz]	Conducted Peak Power [dBm]	Limit [dBm]	Verdict
BLE_1M	Ant1	2402	-1.34	≤30	PASS
		2440	-1.78	≤30	PASS
		2480	-2.94	≤30	PASS

Test Graphs

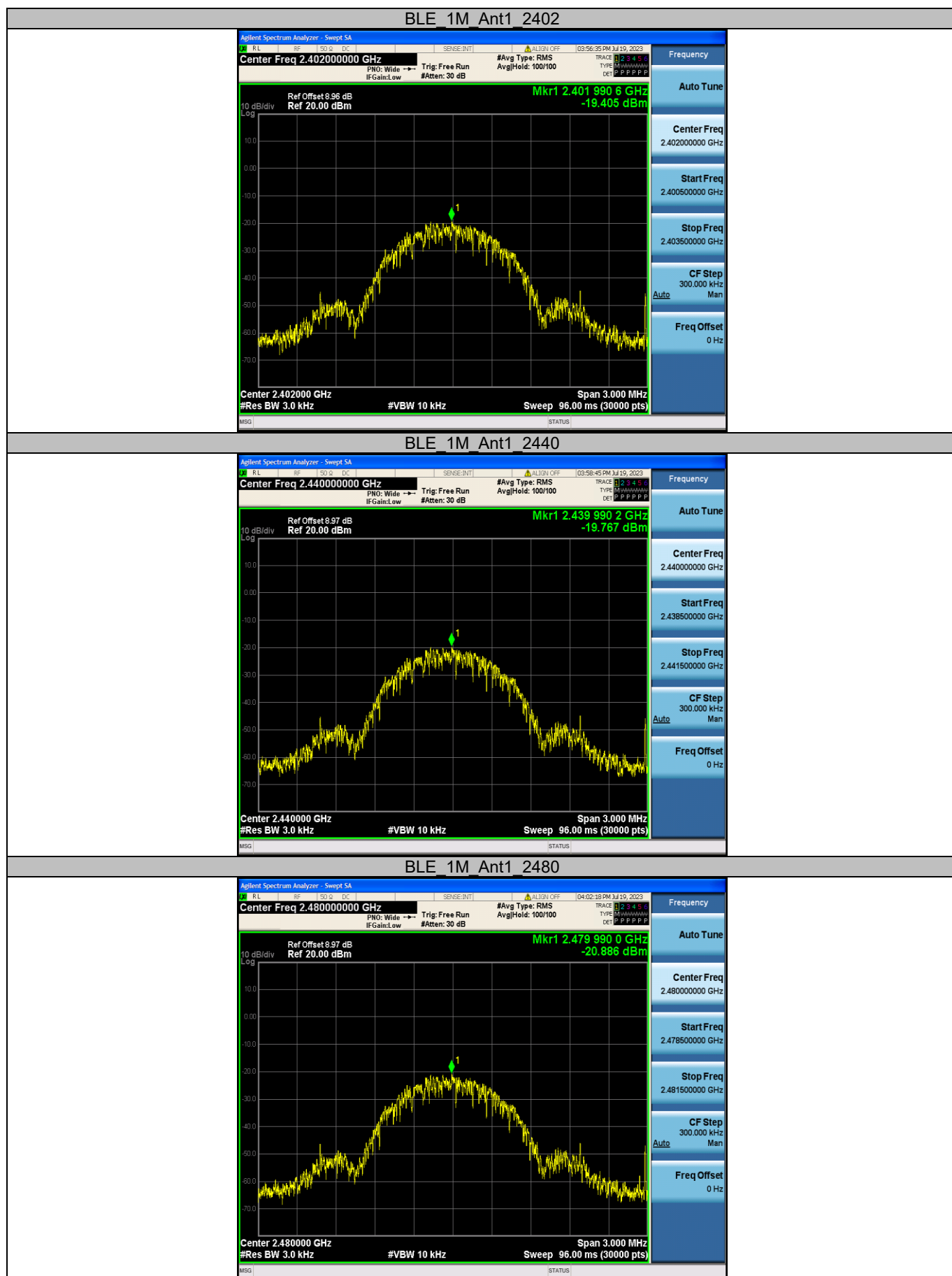


Appendix C: Maximum power spectral density

Test Result

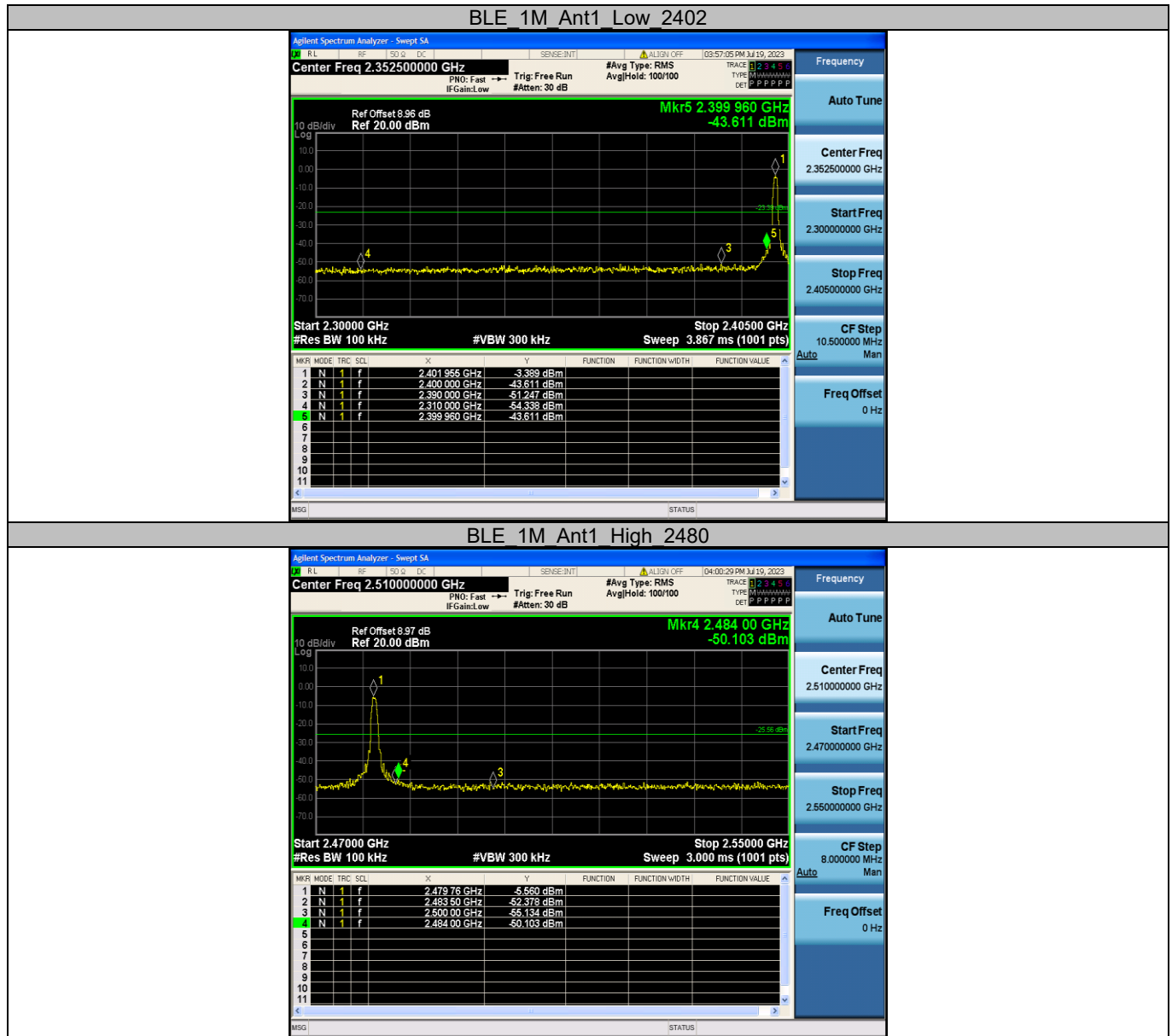
Test Mode	Antenna	Frequency [MHz]	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-19.41	≤8.00	PASS
		2440	-19.77	≤8.00	PASS
		2480	-20.89	≤8.00	PASS

Test Graphs



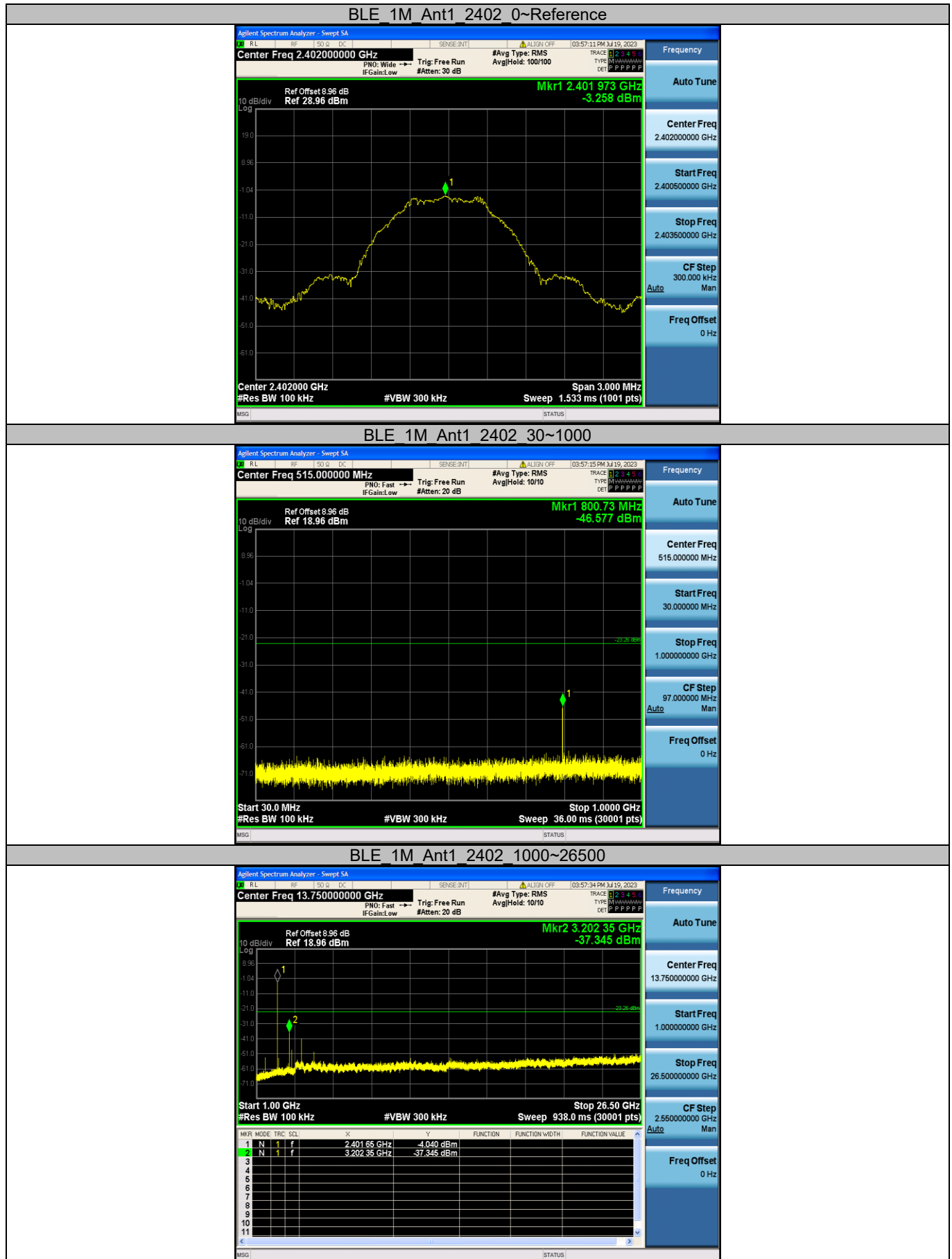
Appendix D: Band edge measurements

Test Graphs



Appendix E: Conducted Spurious Emission

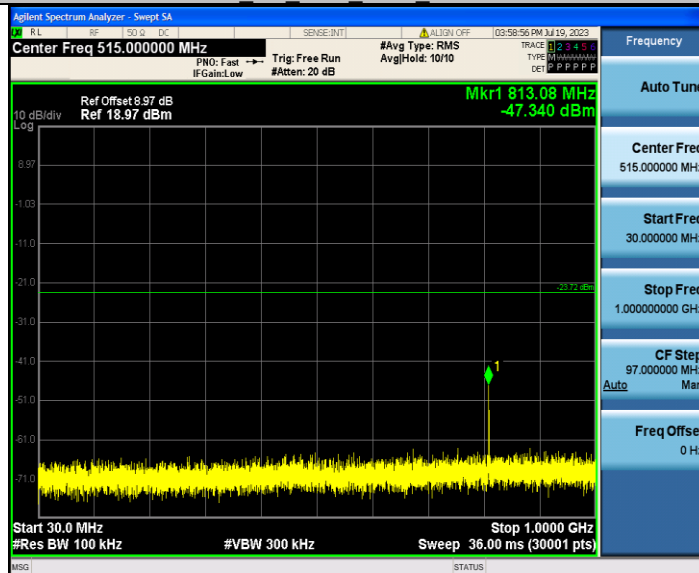
Test Graphs



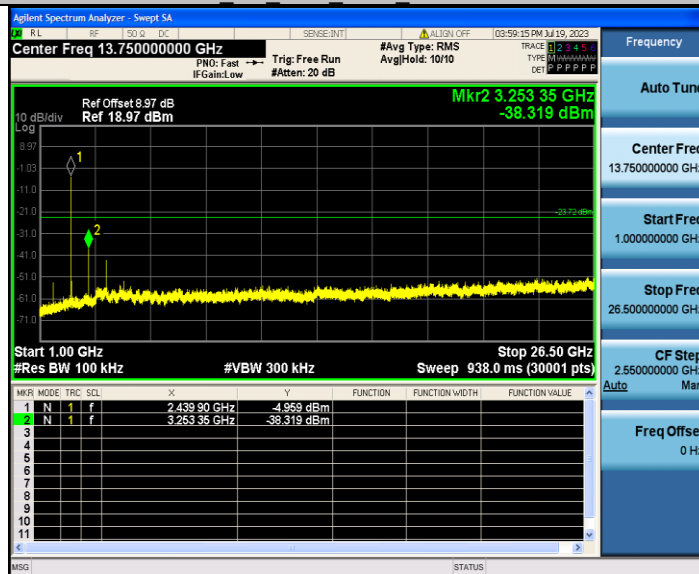
BLE 1M Ant1 2440 0~Reference



BLE 1M Ant1 2440 30~1000



BLE 1M Ant1 2440 1000~26500



BLE 1M Ant1 2480 0~Reference

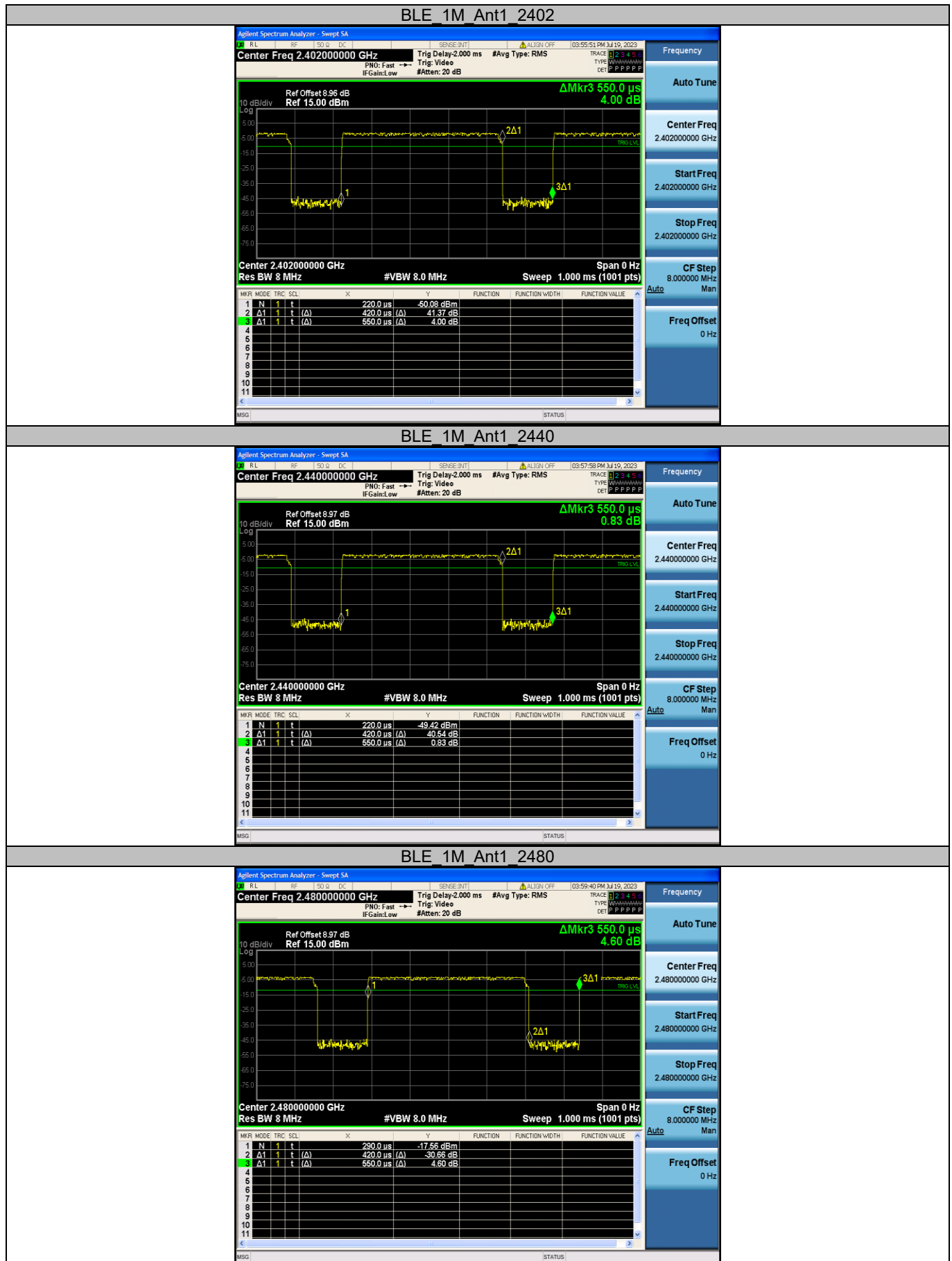


Appendix F: Duty Cycle

Test Result

Test Mode	Antenna	Frequency [MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
BLE_1M	Ant1	2402	0.42	0.55	76.36	1.17
		2440	0.42	0.55	76.36	1.17
		2480	0.42	0.55	76.36	1.17

Test Graphs



----End of Report----