

FCC TEST REPORT

Product : TPMS Activation and Diagnostic Tool
Trade mark : LAUNCH
Model/Type reference : CRT 511, CRT 5XXY, CRT 5XXX
("XX"=01~99,"XXX"=001~999, "Y"=A~Z or blank)
Serial Number : N/A
Report Number : EED32M003199
FCC ID : XUJCRT511
Date of Issue : Mar. 10, 2021
Test Standards : 47 CFR Part 15 Subpart C
Test result : PASS

Prepared for:

Launch Tech Co., Ltd.

**Launch Industrial Park, North of Wuhe Rd.,
Banxuegang, Longgang, Shenzhen, China**

Prepared by:

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Date:

Mar. 10, 2021



Check No.:4905393385

2 Version

Version No.	Date	Description
00	Mar. 10, 2021	Original

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	PASS
Spurious Emissions	47 CFR Part 15 Subpart C Section 15.209	ANSI C63.10-2013	PASS
Occupied Bandwidth	47 CFR Part 15 Subpart C Section 2.1049	ANSI C63.10-2013	PASS

Remark:

Company Name and Address shown on Report, the sample(s) and sample Information was/ were provided by the applicant who should be responsible for the authenticity which CTI hasn't verified.

Model No.: CRT 511, CRT 5XXY, CRT 5XXX ("XX"=01~99, "XXX"=001~999, "Y"=A~Z or blank)

Only the model CRT 511 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, Only the model name, soft plastic jacket and black plastic shell are different.

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5 General Information

5.1 Client Information

Applicant:	Launch Tech Co., Ltd.
Address of Applicant:	Launch Industrial Park, North of Wuhe Rd., Banxuegang, Longgang, Shenzhen, China
Manufacturer:	Launch Tech Co., Ltd.
Address of Manufacturer:	Launch Industrial Park, North of Wuhe Rd., Banxuegang, Longgang, Shenzhen, China

5.2 General Description of EUT

Product Name:	TPMS Activation and Diagnostic Tool
Model No.(EUT):	CRT 511
Add Model No.:	CRT 5XXY, CRT 5XXX ("XX"=01~99, "XXX"=001~999, "Y"=A~Z or blank)
Trade Mark:	LAUNCH
Frequency Range:	125kHz
Software Version:	V1.01
Hardware version:	V1.00.000
Modulation Type:	ASK
Number of Channels:	1 (declared by the client)
Sample Type:	Portable production
Antenna Type:	Loop antenna
Antenna Gain:	0dB
Power Supply:	Adapter: Model:SAPA05005US Rechargeable Li-ion Battery: 3.8V, Charge by USB
Sample Received Date:	Oct. 15, 2020
Sample tested Date:	Oct. 15, 2020 to Nov. 18, 2020

5.3 Test Environment and Mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	52 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with modulation.

5.4 Description of Support Units

The EUT has been tested with associated equipment below.

support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
Adapter	PENGSHENGYE	SAPA05005US	UL	Client

5.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd

Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

No tests were sub-contracted.

FCC Designation No.: CN1164

5.6 Deviation from Standards

None.

5.7 Abnormalities from Standard Conditions

None.

5.8 Other Information Requested by the Customer

None.

5.9 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.46dB (30MHz-1GHz)
		0.55dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.3dB (30MHz-1GHz)
		4.5dB (1GHz-18GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	3.8%
7	DC power voltages	0.026%

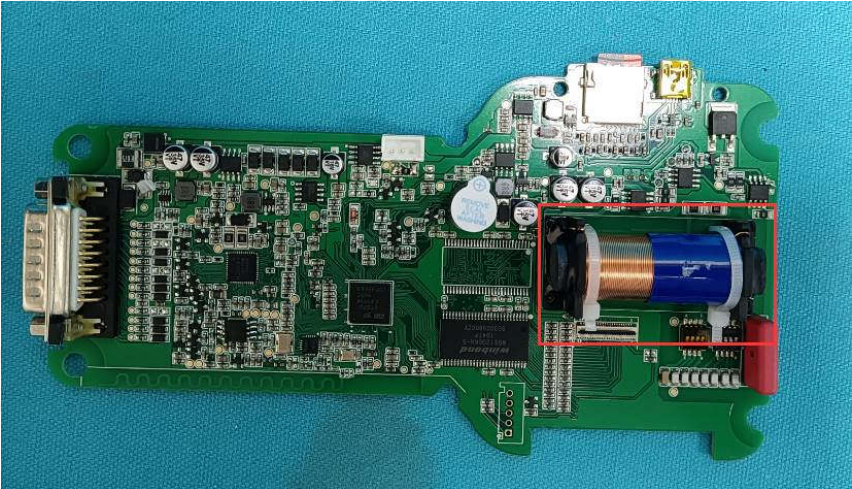
6 Equipment List

Conducted disturbance Test					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Receiver	R&S	ESCI	100435	04-28-2020	04-27-2021
Temperature/ Humidity Indicator	Defu	TH128	/	---	---
LISN	R&S	ENV216	100098	03-05-2020	03-04-2021
Barometer	changchun	DYM3	1188	---	---

3M Semi/full-anechoic Chamber					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
3M Chamber & Accessory Equipment	TDK	SAC-3	---	05-24-2019	05-23-2022
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-618	05-16-2020	05-15-2021
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B- 076	04-25-2018	04-24-2021
Receiver	R&S	ESCI7	100938- 003	10-16-2020	10-15-2021
Multi device Controller	maturu	NCD/070/107 11112	---	---	---
Temperature/ Humidity Indicator	Shanghai qixiang	HM10	1804298	06-29-2020	06-28-2021
Cable line	Fulai(7M)	SF106	5219/6A	---	---
Cable line	Fulai(6M)	SF106	5220/6A	---	---
Cable line	Fulai(3M)	SF106	5216/6A	---	---
Cable line	Fulai(3M)	SF106	5217/6A	---	---

7 Test results and Measurement Data

7.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203
<p>15.203 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p>	
EUT Antenna:	
<p>The antenna is integrated on the main PCB and no consideration of replacement. The best case gain Of the antenna is 0 dBi.</p>	

7.2 Conducted Emissions

Test Requirement: 47 CFR Part 15C Section 15.207
Test Method: ANSI C63.10
Test Frequency Range: 150kHz to 30MHz

Limit:

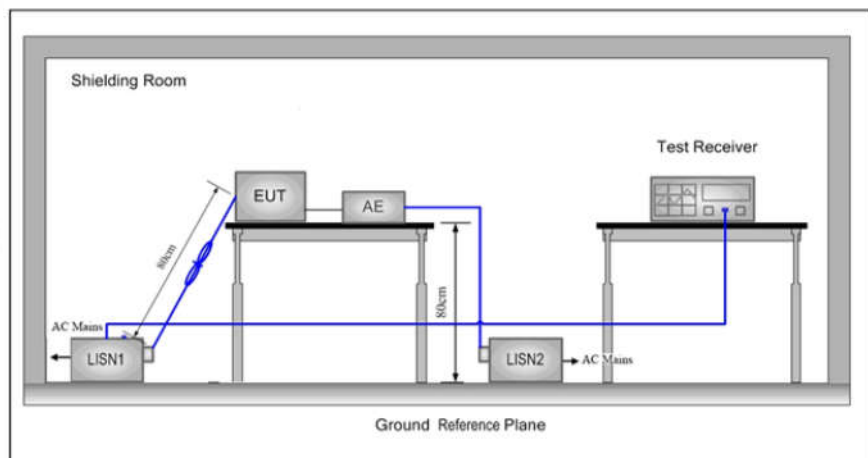
Frequency range (MHz)	Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test Procedure:

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.

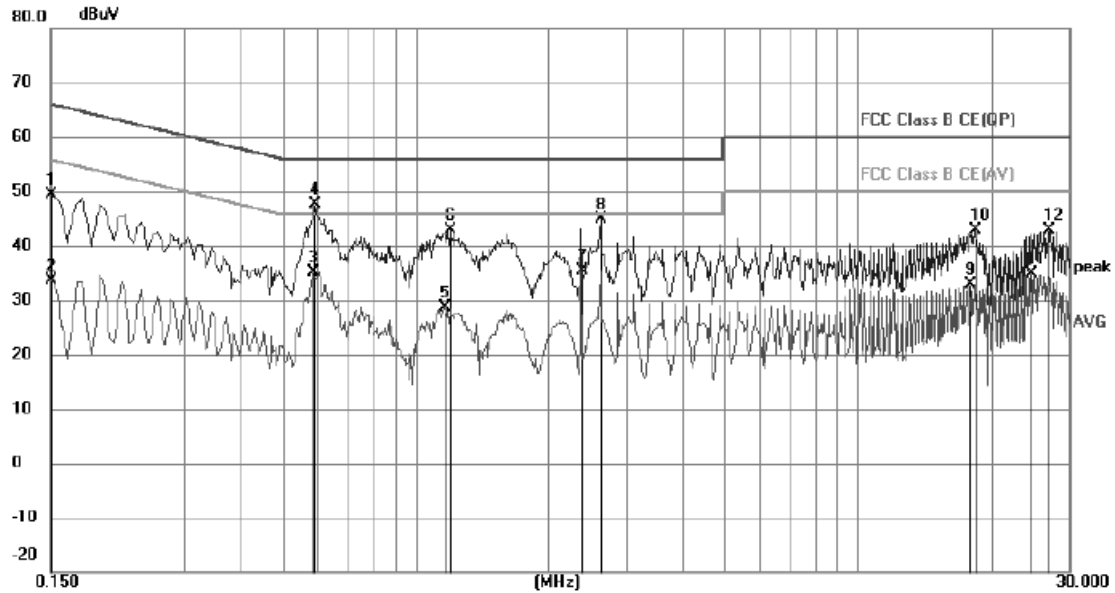
Test Setup:



Test Mode: Transmitting mode
Test voltage: 120V/60Hz
Instruments Used: Refer to section 6 for details
Test Results: Pass

Measurement Data

Live Line:

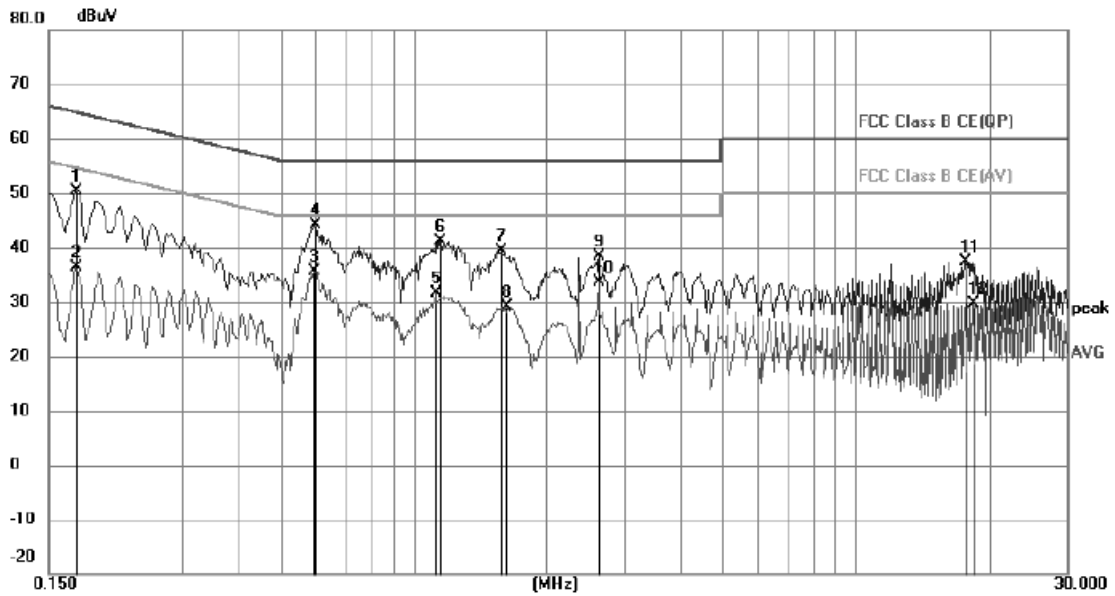


No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
		MHz	Level	Factor	ment				
			dBuV	dB	dBuV	dBuV	dB		
1		0.1500	39.53	9.87	49.40	66.00	-16.60	QP	
2		0.1500	23.87	9.87	33.74	56.00	-22.26	AVG	
3		0.5865	25.09	10.05	35.14	46.00	-10.86	AVG	
4	*	0.5910	37.56	10.06	47.62	56.00	-8.38	QP	
5		1.1625	18.75	9.82	28.57	46.00	-17.43	AVG	
6		1.1985	32.95	9.82	42.77	56.00	-13.23	QP	
7		2.3730	25.67	9.79	35.46	46.00	-10.54	AVG	
8		2.6250	35.13	9.79	44.92	56.00	-11.08	QP	
9		17.8755	22.81	9.95	32.76	50.00	-17.24	AVG	
10		18.3750	32.84	9.96	42.80	60.00	-17.20	QP	
11		24.6255	24.78	10.00	34.78	50.00	-15.22	AVG	
12		26.8755	32.79	10.01	42.80	60.00	-17.20	QP	

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.

Neutral Line:



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV	Limit dBuV	Margin dB	Detector	Comment
1	0.1725	40.44	9.87	50.31	64.84	-14.53	QP	
2	0.1725	26.55	9.87	36.42	54.84	-18.42	AVG	
3 *	0.5955	25.53	10.06	35.59	46.00	-10.41	AVG	
4	0.6000	34.08	10.07	44.15	56.00	-11.85	QP	
5	1.1265	21.71	9.82	31.53	46.00	-14.47	AVG	
6	1.1445	31.38	9.82	41.20	56.00	-14.80	QP	
7	1.5809	29.56	9.81	39.37	56.00	-16.63	QP	
8	1.6260	19.27	9.80	29.07	46.00	-16.93	AVG	
9	2.6250	28.58	9.79	38.37	56.00	-17.63	QP	
10	2.6250	23.81	9.79	33.60	46.00	-12.40	AVG	
11	17.6235	27.54	9.95	37.49	60.00	-22.51	QP	
12	18.3750	19.72	9.96	29.68	50.00	-20.32	AVG	

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.

7.3 Spurious Emissions

Test Requirement: 47 CFR Part 15C Section 15.231(b) and 15.209

Test Method: ANSI C63.10

Test Site: Measurement Distance: 3m (Semi-Anechoic Chamber)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Setup:

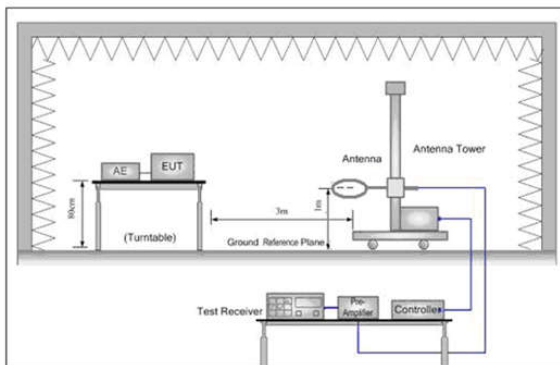


Figure 1. Below 30MHz

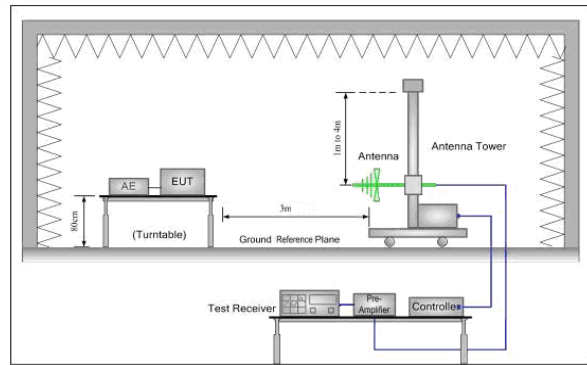


Figure 2. 30MHz to 1GHz

Test Procedure: **Below 1GHz test procedure as below:**

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

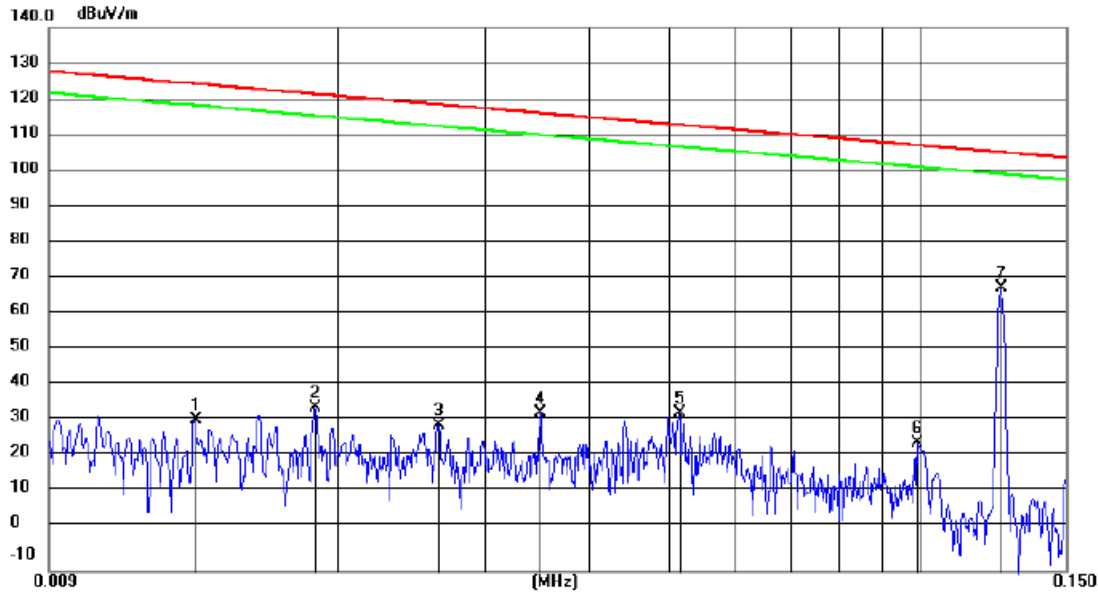
Limit:
(Spurious Emissions)

Frequency	Field strength (microvolt/meter)	Limit (dB μ V/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Test Mode: Transmitting mode
Test Voltage: DC 3.8V
Instruments Used: Refer to section 6 for details
Test Results: Pass

9kHz~150kHz:

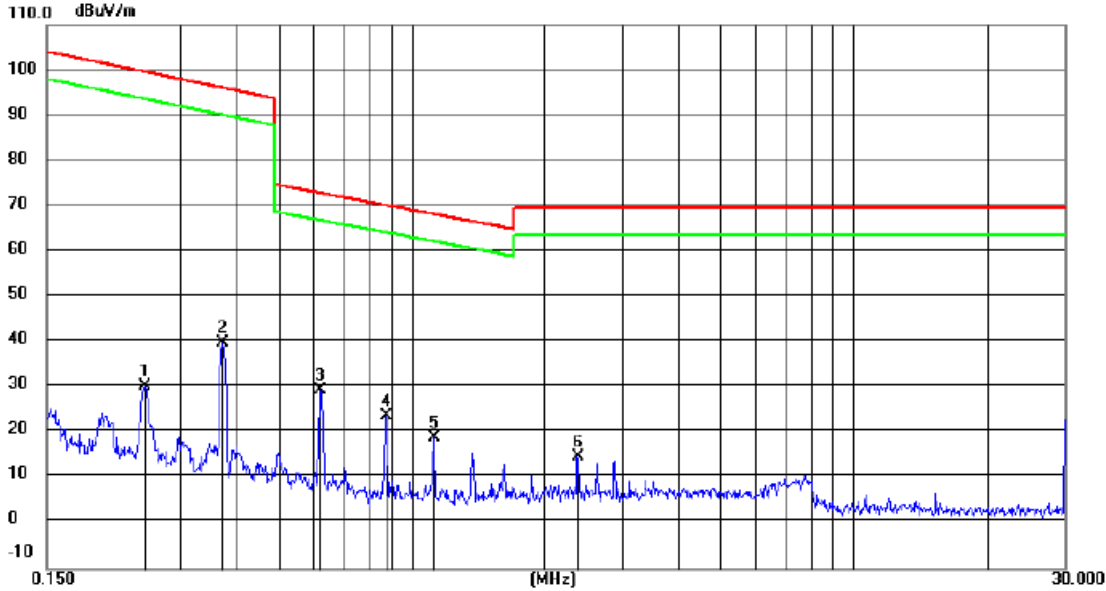


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Lim it dBuV/m	Margin dB	Detector	Antenna Height cm	Table Degree degree	Comment
1	0.0135	10.48	21.31	31.79	124.39	-92.60	peak			
2	0.0188	14.30	21.01	35.31	121.60	-86.29	peak			
3	0.0264	9.83	20.59	30.42	118.73	-88.31	peak			
4	0.0350	13.49	20.37	33.86	116.35	-82.49	peak			
5	0.0514	13.30	20.30	33.60	113.11	-79.51	peak			
6	0.0994	4.95	20.40	25.35	107.55	-82.20	peak			
7 *	0.1253	47.80	20.37	68.17	105.60	-37.43	peak			

Remark:

- The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- The field strength is calculated by adding the Antenna Factor, Cable Factor & Pre-amplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading - Correct Factor
Correct Factor = Pre-amplifier Factor - Antenna Factor - Cable Factor
- The highest frequency is 125kHz of the EUT, so upper frequency of measurement range is 30MHz.

150kHz~30MHz:



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Lim. it dBuV/m	Margin dB	Detector	Antenna Height cm	Table Degree	Comment
1		0.2495	10.07	20.20	30.27	99.66	-69.39	peak			
2		0.3751	19.44	20.40	39.84	96.12	-56.28	peak			
3	*	0.6238	9.02	20.55	29.57	72.90	-43.33	peak			
4		0.8757	3.15	20.45	23.60	70.22	-46.62	peak			
5		1.1233	-1.53	20.41	18.88	68.26	-49.38	peak			
6		2.3710	-5.64	20.47	14.83	69.54	-54.71	peak			

Remark:

- The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading - Correct Factor
Correct Factor = Preamplifier Factor - Antenna Factor - Cable Factor
- The highest frequency is 125kHz of the EUT, so upper frequency of measurement range is 30MHz.

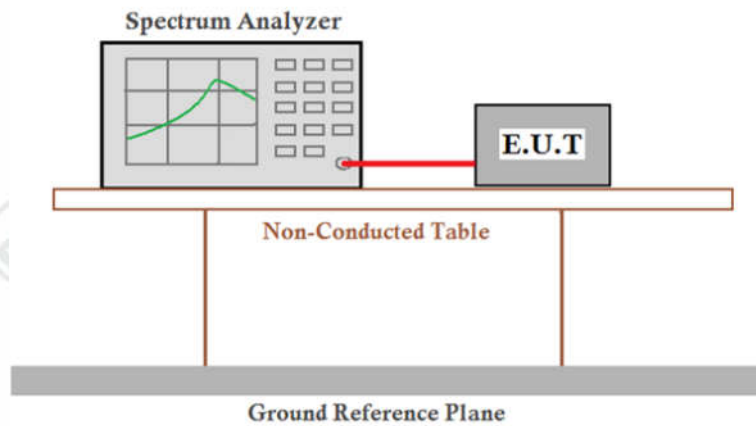
7.4 Occupied Bandwidth

Test Requirement: 47 CFR Part 15C Section 2.1049

Test Method: ANSI C63.10

Limit: The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated are each equal to 0.5% of the total mean power radiated by a given emission.

Test Setup:



Test Mode: Transmitting mode

Instruments Used: Refer to section 6 for details

Test Results: Pass

Measurement Data

Occupied bandwidth	Results
227.5Hz	Pass

Test plot as follows:

