

TEST REPORT

Product : ROBOTIC LAWN MOWER
Trade mark : AIRSEEKERS
Model/Type reference : TRON
Serial Number : N/A
Report Number : EED32R80464704
FCC ID : 2BPTW-TRONE1
Date of Issue : Jun. 04, 2025
Test Standards : 47 CFR Part 15 Subpart C
Test result : PASS

Prepared for:

Guangdong Changyao Innovation Technology Co., Ltd
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Jun. 04, 2025

Check No.: 9256020425

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2 Test Summary

Test Item	Test Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	PASS
Maximum Conducted Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(1)	PASS
20dB Emission Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	PASS
Carrier Frequency Separation	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	PASS
Number of Hopping Channels	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	PASS
Time of Occupancy	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	PASS
Band Edge Measurements	47 CFR Part 15, Subpart C Section 15.247(d)	PASS
Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	PASS
Radiated Spurious emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	PASS
Restricted bands around fundamental frequency	47 CFR Part 15, Subpart C Section 15.205/15.209	PASS

3 General Information

3.1 Client Information

Applicant:	Guangdong Changyao Innovation Technology Co., Ltd
Address of Applicant:	201, Building 1, No. 1322, Meijie Road, Xiangzhou District, Zhuhai
Manufacturer:	Guangdong Changyao Innovation Technology Co., Ltd
Address of Manufacturer:	201, Building 1, No. 1322, Meijie Road, Xiangzhou District, Zhuhai

3.2 General Description of EUT

Product Name:	ROBOTIC LAWN MOWER
Model No.:	TRON
Trade Mark:	AIRSEEKERS
Operation Frequency:	902.750MHz ~ 927.250MHz
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	LoRa
Number of Channel:	31
Hopping Channel Type:	Adaptive Frequency Hopping systems
Antenna Type:	FPC Antenna
Antenna Gain:	2.3dBi
Power Supply:	Adapter: DC 24V
Test Voltage:	DC 24V
Sample Received Date:	Apr. 16, 2025
Sample tested Date:	Apr. 16, 2025 to May 26, 2025

Operation Frequency each of channel:							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	902.50	8	909.14	16	915.78	24	922.42
1	903.33	9	909.97	17	916.61	25	923.25
2	904.16	10	910.80	18	917.44	26	924.08
3	904.99	11	911.63	19	918.27	27	924.91
4	905.82	12	912.46	20	919.10	28	925.74
5	906.65	13	913.29	21	919.93	29	926.57
6	907.48	14	914.12	22	920.76	30	927.40
7	908.31	15	914.95	23	921.59		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The Lowest channel	902.50MHz
The Middle channel	915.78MHz
The Highest channel	927.40MHz

3.3 Test Configuration

EUT Test Software Settings:		
Software:	N/A	
EUT Power Grade:	Default (Power level is built-in set parameters and cannot be changed and selected)	
Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.		
Mode	Channel	Frequency(MHz)
LoRa	CH0	902.50
	CH16	915.78
	CH30	927.40

3.4 Test Environment

Operating Environment:	
Radiated Spurious Emissions:	
Temperature:	22~25.0 °C
Humidity:	50~55 % RH
Atmospheric Pressure:	1010mbar
RF Conducted:	
Temperature:	22~25.0 °C
Humidity:	50~55 % RH
Atmospheric Pressure:	1010mbar

3.5 Description of Support Units

The EUT has been tested with associated equipment below.

1) Support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
Netbook	Dell	P77F	FCC&CE	CTI

3.6 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

3.7 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-40GHz)
3	Radiated Spurious emission test	3.3dB (9kHz-30MHz)
		4.3dB (30MHz-1GHz)
		4.5dB (1GHz-18GHz)
		3.4dB (18GHz-40GHz)
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%

3.8 Equipment List

RF test system					
Equipment	Manufacturer	Model No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Spectrum Analyzer	Keysight	N9010A	MY54510339	12-05-2024	12-04-2025
Signal Generator	Keysight	N5182B	MY53051549	11-30-2024	11-29-2025
DC Power	Keysight	E3642A	MY56376072	11-30-2024	11-29-2025
Communication test set	R&S	CMW500	169004	03-03-2025	03-02-2026
RF control unit(power unit)	JS Tonscend	JS0806-2	22G8060592	07-22-2024	07-21-2025
Wi-Fi 7GHz Band Extender	JS Tonscend	TS-WF7U2	2206200002	05-31-2024	05-30-2025
High-low temperature test chamber	Dong Guang Qin Zhuo	LK-80GA	QZ20150611879	11-30-2024	11-29-2025
Temperature/ Humidity Indicator	biaozhi	HM10	1804186	05-29-2024	05-28-2025
BT&WI-FI Automatic test software	JS Tonscend	JS1120-3	V3.3.20	---	---
Spectrum Analyzer	R&S	FSV3044	101509	02-14-2025	02-13-2026

Conducted disturbance Test					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
				(mm-dd-yyyy)	(mm-dd-yyyy)
Receiver	R&S	ESCI	100435	04-08-2025	04-07-2026
Temperature/ Humidity Indicator	Defu	TH128	/	03-31-2025	03-30-2026
LISN	R&S	ENV216	100098	09-19-2024	09-18-2025
Barometer	changchun	DYM3	1188	---	---

Test software	Fara	EZ-EMC	EMC-CON 3A1.1	---	---
Capacitive voltage probe	Schwarzbeck	CVP 9222C	00124	06-18-2024	06-17-2025
ISN	TESEQ	ISN T800	30297	12-05-2024	12-04-2025

3M Semi-anechoic Chamber (2)- Radiated disturbance Test					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
				(mm-dd-yyyy)	(mm-dd-yyyy)
3M Chamber & Accessory Equipment	TDK	SAC-3	---	01/13/2024	01/12/2027
Receiver	R&S	ESCI7	100938-003	09/07/2024	09/06/2025
Spectrum Analyzer	R&S	FSV40	101200	07/18/2024	07/17/2025
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	9163-618	05/22/2022 05/14/2025	05/21/2025 05/13/2026
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-076	04/07/2025	04/06/2026
Microwave Preamplifier	Tonscend	EMC051845SE	980380	12/05/2024	12/04/2025
Horn Antenna	A.H.SYSTEMS	SAS-574	374	07/02/2023	07/01/2026
Horn Antenna	ETS-LINGREN	BBHA 9120D	9120D-1869	04/07/2025	04/06/2026
Preamplifier	Agilent	11909A	12-1	03/03/2025	03/02/2026
Preamplifier	CD	PAP-1840-60	6041.6042	06/19/2024	06/18/2025
Test software	Fara	EZ-EMC	EMEC-3A1-Pre	---	---
Cable line	Fulai(7M)	SF106	5219/6A	01/13/2024	01/12/2027
Cable line	Fulai(6M)	SF106	5220/6A	01/13/2024	01/12/2027
Cable line	Fulai(3M)	SF106	5216/6A	01/13/2024	01/12/2027
Cable line	Fulai(3M)	SF106	5217/6A	01/13/2024	01/12/2027

3M full-anechoic Chamber					
Equipment	Manufacturer	Model No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Fully Anechoic Chamber	TDK	FAC-3	---	01-09-2024	01-08-2027
Receiver	Keysight	N9038A	MY57290136	01-04-2025	01-03-2026
Spectrum Analyzer	Keysight	N9020B	MY57111112	01-14-2025	01-13-2026
Spectrum Analyzer	Keysight	N9030B	MY57140871	01-14-2025	01-13-2026
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	9163-1148	04-12-2025	04-11-2026
Horn Antenna	Schwarzbeck	BBHA 9170	9170-832	04-12-2025	04-11-2026
Horn Antenna	ETS-LINDGREN	3117	57407	07-03-2024	07-02-2025
Preamplifier	EMCI	EMC001330	980563	03-03-2025	03-02-2026
Preamplifier	Tonscend	TAP-011858	AP21B806112	07-18-2024	07-17-2025
Preamplifier	Tonscend	EMC051845SE	980380	12-05-2024	12-04-2025
Communication test set	R&S	CMW500	102898	01-04-2025	01-03-2026
Temperature/Humidity Indicator	biaozhi	GM1360	EE1186631	03-31-2025	03-30-2026
RSE Automatic test software	JS Tonscend	JS36-RSE	V4.0.0.0	---	---
Cable line	Times	SFT205-NMSM-2.50M	394812-0001	01-09-2024	01-08-2027
Cable line	Times	SFT205-NMSM-2.50M	394812-0002	01-09-2024	01-08-2027
Cable line	Times	SFT205-NMSM-2.50M	394812-0003	01-09-2024	01-08-2027
Cable line	Times	SFT205-NMSM-2.50M	393495-0001	01-09-2024	01-08-2027
Cable line	Times	EMC104-NMNM-1000	SN160710	01-09-2024	01-08-2027
Cable line	Times	SFT205-NMSM-3.00M	394813-0001	01-09-2024	01-08-2027
Cable line	Times	SFT205-NMNM-1.50M	381964-0001	01-09-2024	01-08-2027
Cable line	Times	SFT205-NMSM-7.00M	394815-0001	01-09-2024	01-08-2027
Cable line	Times	HF160-KMKM-3.00M	393493-0001	01-09-2024	01-08-2027

4 Test results and Measurement Data

4.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
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.	
15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
EUT Antenna:	Please see Internal photos
The antenna is FPC Antenna. The best case gain of the antenna is 2.3dBi.	

4.2 AC Power Line Conducted Emissions

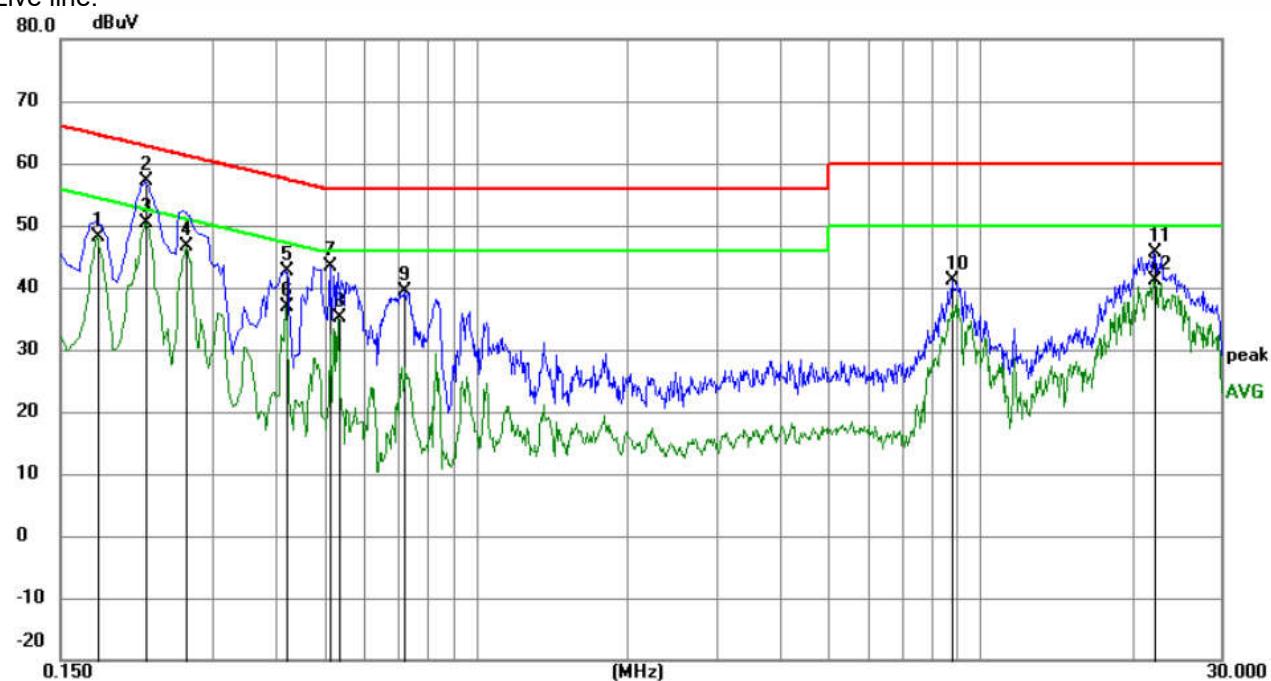
Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150kHz to 30MHz		
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto		
Limit:	Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average	
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50

* Decreases with the logarithm of the frequency.

	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.
Exploratory Test Mode:	Non-hopping transmitting mode with all kind of modulation and all kind of data type at the lowest, middle, high channel.
Final Test Mode:	Through Pre-scan, find the DH5 of data type and GFSK modulation at the lowest channel is the worst case. Only the worst case is recorded in the report.
Test Results:	Pass

Measurement Data

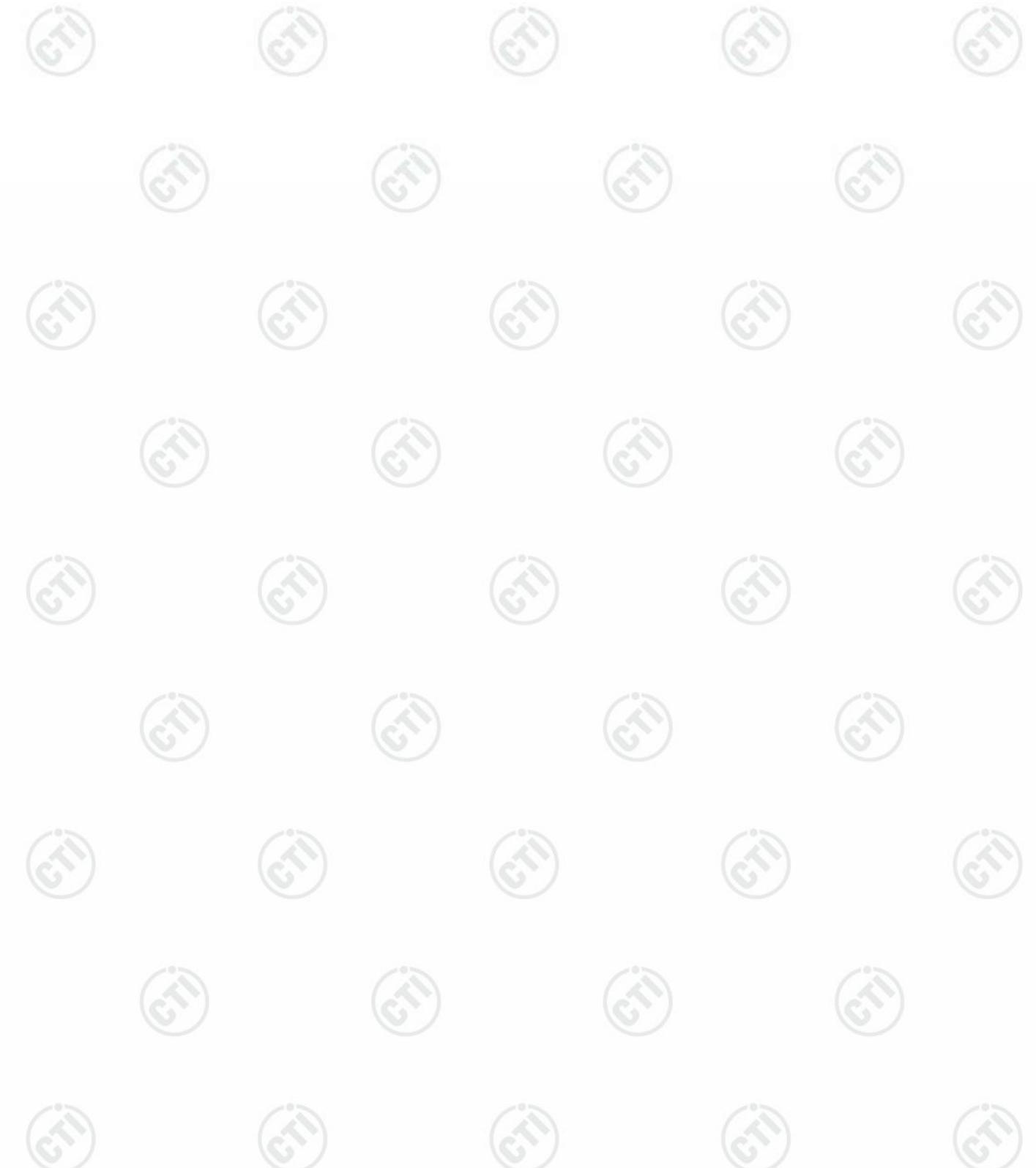
Live line:



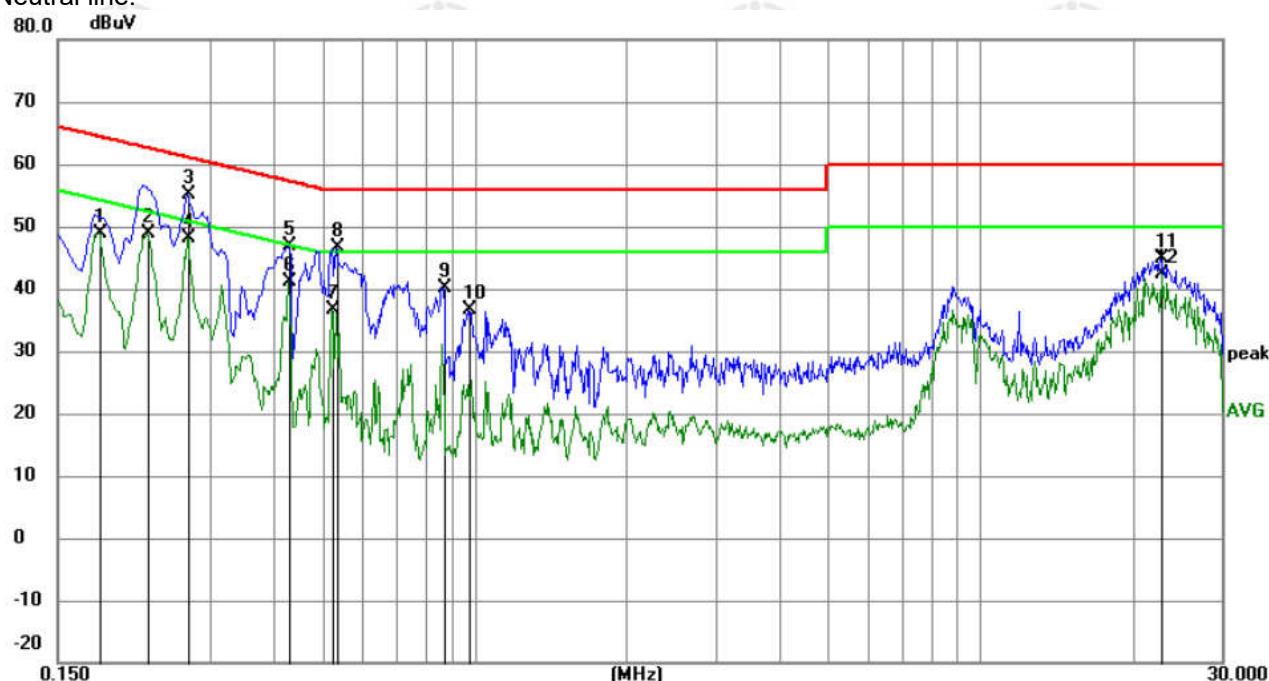
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector	Comment
			Level	Factor	ment				
1		0.1770	38.01	10.24	48.25	54.63	-6.38	AVG	
2		0.2220	47.01	10.19	57.20	62.74	-5.54	QP	
3 *		0.2220	40.16	10.19	50.35	52.74	-2.39	AVG	
4		0.2670	36.37	10.16	46.53	51.21	-4.68	AVG	
5		0.4200	32.57	10.09	42.66	57.45	-14.79	QP	
6		0.4200	26.70	10.09	36.79	47.45	-10.66	AVG	
7		0.5144	33.19	10.08	43.27	56.00	-12.73	QP	
8		0.5325	25.13	10.09	35.22	46.00	-10.78	AVG	
9		0.7215	29.28	10.14	39.42	56.00	-16.58	QP	
10		8.8035	31.24	9.98	41.22	60.00	-18.78	QP	
11		22.1235	35.74	9.80	45.54	60.00	-14.46	QP	
12		22.1235	31.35	9.80	41.15	50.00	-8.85	AVG	

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.



Neutral line:

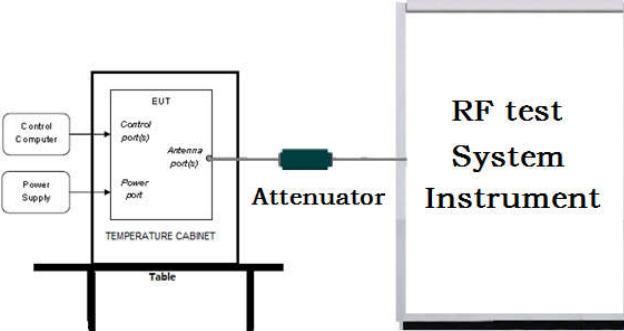


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1815	38.67	10.24	48.91	54.42	-5.51		AVG
2		0.2265	38.64	10.19	48.83	52.58	-3.75		AVG
3		0.2714	45.08	10.15	55.23	61.07	-5.84		QP
4	*	0.2714	37.95	10.15	48.10	51.07	-2.97		AVG
5		0.4290	36.74	10.09	46.83	57.27	-10.44		QP
6		0.4290	31.08	10.09	41.17	47.27	-6.10		AVG
7		0.5235	26.63	10.08	36.71	46.00	-9.29		AVG
8		0.5325	36.44	10.09	46.53	56.00	-9.47		QP
9		0.8700	30.07	10.17	40.24	56.00	-15.76		QP
10		0.9780	26.38	10.18	36.56	56.00	-19.44		QP
11		22.7265	34.98	9.81	44.79	60.00	-15.21		QP
12		22.8840	32.49	9.81	42.30	50.00	-7.70		AVG

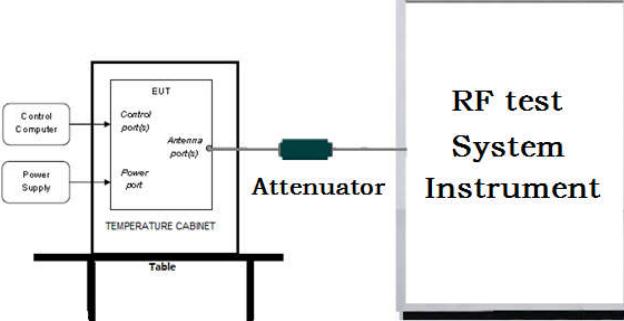
Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

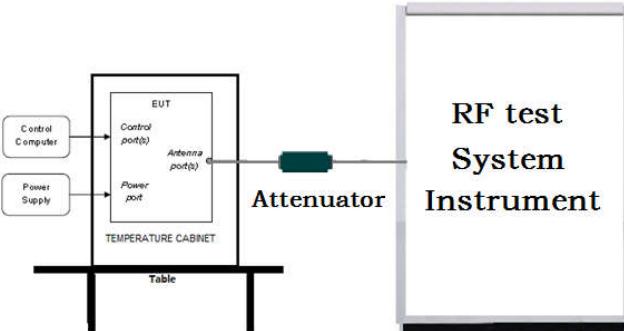
4.3 Maximum Conducted Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 <p>Remark: Offset=Cable loss+ attenuation factor.</p>
Test Procedure:	<p>Use the following spectrum analyzer settings:</p> <p>Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel</p> <p>RBW > the 20 dB bandwidth of the emission being measured $VBW \geq RBW$</p> <p>Sweep = auto</p> <p>Detector function = peak</p> <p>Trace = max hold</p> <p>Allow the trace to stabilize.</p> <p>Use the marker-to-peak function to set the marker to the peak of the emission.</p>
Limit:	21dBm
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type
Test Results:	Refer to Appendix A

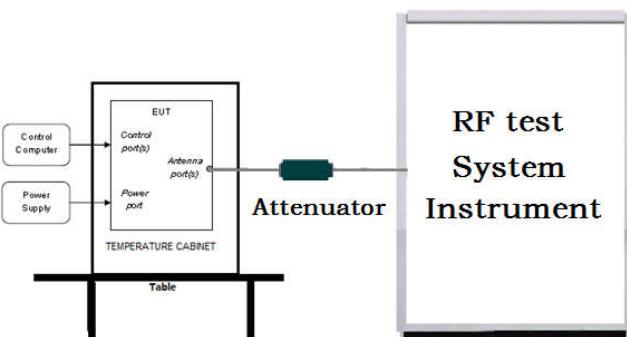
4.4 20dB Emission Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 <p>Remark: Offset=Cable loss+ attenuation factor.</p>
Test Procedure:	<ol style="list-style-type: none"> 1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Use the following spectrum analyzer settings for 20dB Bandwidth measurement. Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel; $1\% \leq RBW \leq 5\%$ of the 20 dB bandwidth; $VBW \geq 3RBW$; Sweep = auto; Detector function = peak; Trace = max hold. 4. Measure and record the results in the test report.
Limit:	<p>Frequency hopping systems in the 902-928 MHz band:</p> <p>① If Number of Hopping Channel ≥ 50, 20dB Emission Bandwidth $< 250\text{kHz}$; ② If Number of Hopping Channel ≥ 25, 20dB Emission Bandwidth $\geq 250\text{kHz}$;</p>
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type
Test Results:	Refer to Appendix A

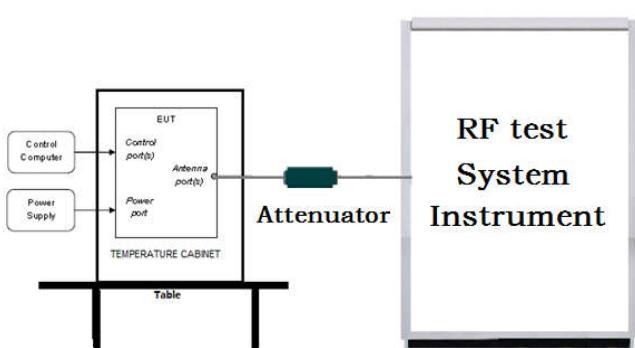
4.5 Carrier Frequency Separation

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 <p>Remark: Offset=Cable loss+ attenuation factor.</p>
Test Procedure:	<ol style="list-style-type: none"> 1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Enable the EUT hopping function. 4. Use the following spectrum analyzer settings: Span = wide enough to capture the peaks of two adjacent channels; RBW is set to approximately 30% of the channel spacing, adjust as necessary to best identify the center of each individual channel; VBW\geqRBW; Sweep = auto; Detector function = peak; Trace = max hold. 5. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Record the value in report.
Limit:	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.
Exploratory Test Mode:	Hopping transmitting with all kind of modulation and all kind of data type
Test Results:	Refer to Appendix A

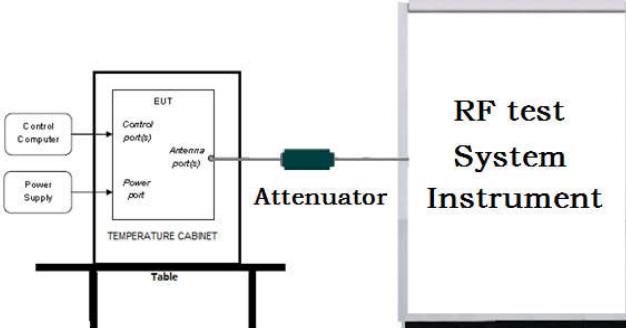
4.6 Number of Hopping Channel

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 <p>Remark: Offset=Cable loss+ attenuation factor.</p>
Test Procedure:	<ol style="list-style-type: none"> 1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Enable the EUT hopping function. 4. Use the following spectrum analyzer settings: Span = the frequency band of operation; set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller; $VBW \geq RBW$; Sweep= auto; Detector function = peak; Trace = max hold. 5. The number of hopping frequency used is defined as the number of total channel. 6. Record the measurement data in report.
Limit:	<p>Frequency hopping systems in the 902-928 MHz band:</p> <p>① If $20\text{dB Emission Bandwidth} < 250\text{kHz}$, Number of Hopping Channel ≥ 50;</p> <p>② If $20\text{dB Emission Bandwidth} \geq 250\text{kHz}$, Number of Hopping Channel ≥ 25;</p>
Test Mode:	Hopping transmitting with all kind of modulation
Test Results:	Refer to Appendix A

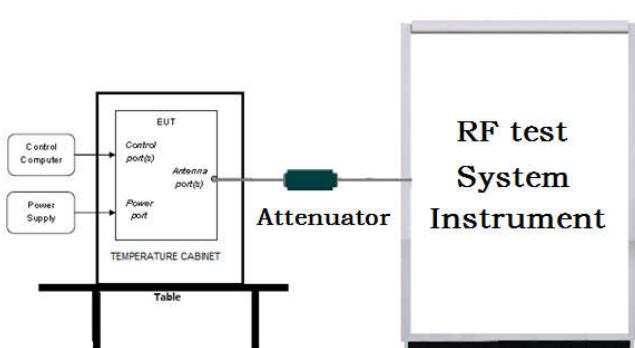
4.7 Time of Occupancy

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 <p>Remark: Offset=Cable loss+ attenuation factor.</p>
Test Procedure:	<ol style="list-style-type: none"> 1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Enable the EUT hopping function. 4. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW shall be \leq channel spacing and where possible RBW should be set $\gg 1 / T$, where T is the expected dwell time per channel; $VBW \geq RBW$; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold. 5. Measure and record the results in the test report.
Limit:	The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.
Test Mode:	Hopping transmitting with all kind of modulation and all kind of data type.
Test Results:	Refer to Appendix A

4.8 Band edge Measurements

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
Test Setup:	 <p>Remark: Offset=Cable loss+ attenuation factor.</p>
Test Procedure:	<ol style="list-style-type: none"> 1. Set to the maximum power setting and enable the EUT transmit continuously. 2. Set RBW = 100 kHz, VBW = 300 kHz (\geqRBW). Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used. 3. Enable hopping function of the EUT and then repeat step 2 and 3. 4. Measure and record the results in the test report.
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Exploratory Test Mode:	Hopping and Non-hopping transmitting with all kind of modulation and all kind of data type
Test Results:	Refer to Appendix A

4.9 Conducted Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
Test Setup:	 <p>Remark: Offset=Cable loss+ attenuation factor.</p>
Test Procedure:	<ol style="list-style-type: none"> 1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Set RBW = 100 kHz, VBW = 300kHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. 4. Measure and record the results in the test report. 5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type
Test Results:	Refer to Appendix A

4.10 Radiated Spurious Emission & Restricted bands

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205				
Test Method:	ANSI C63.10: 2013				
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	Peak	100 kHz	300kHz	Peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10kHz	Average
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBuV/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.				

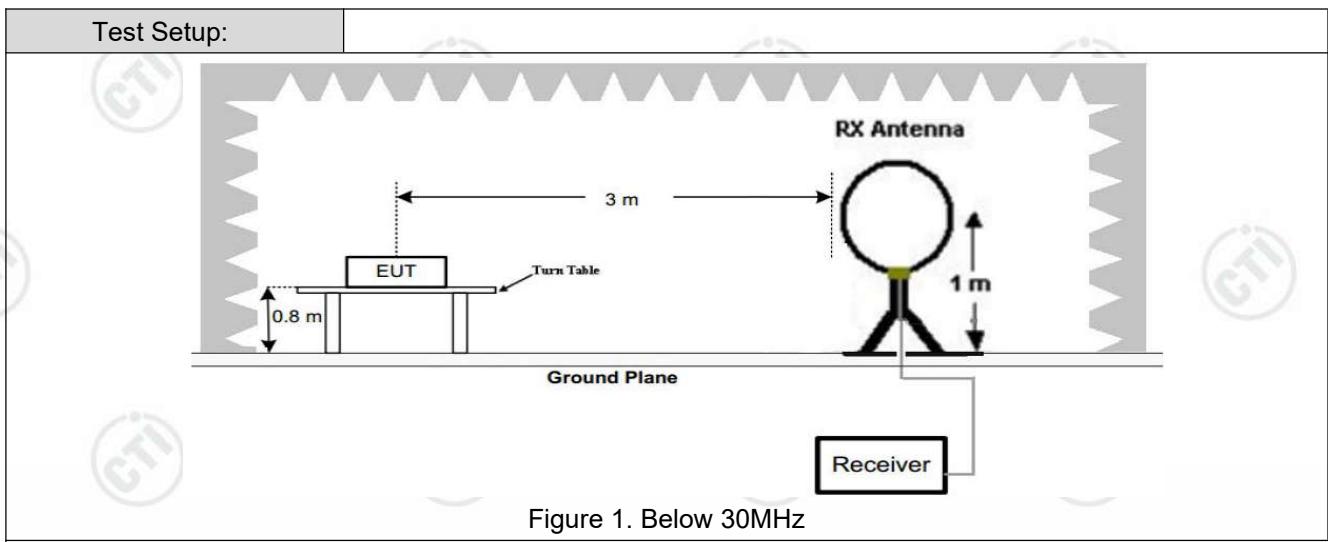


Figure 1. Below 30MHz

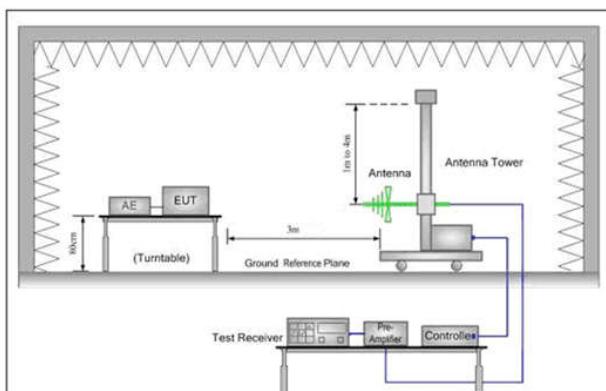


Figure 2. 30MHz to 1GHz

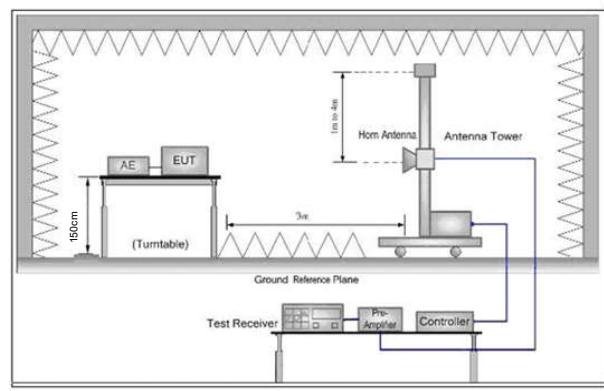


Figure 3. Above 1 GHz

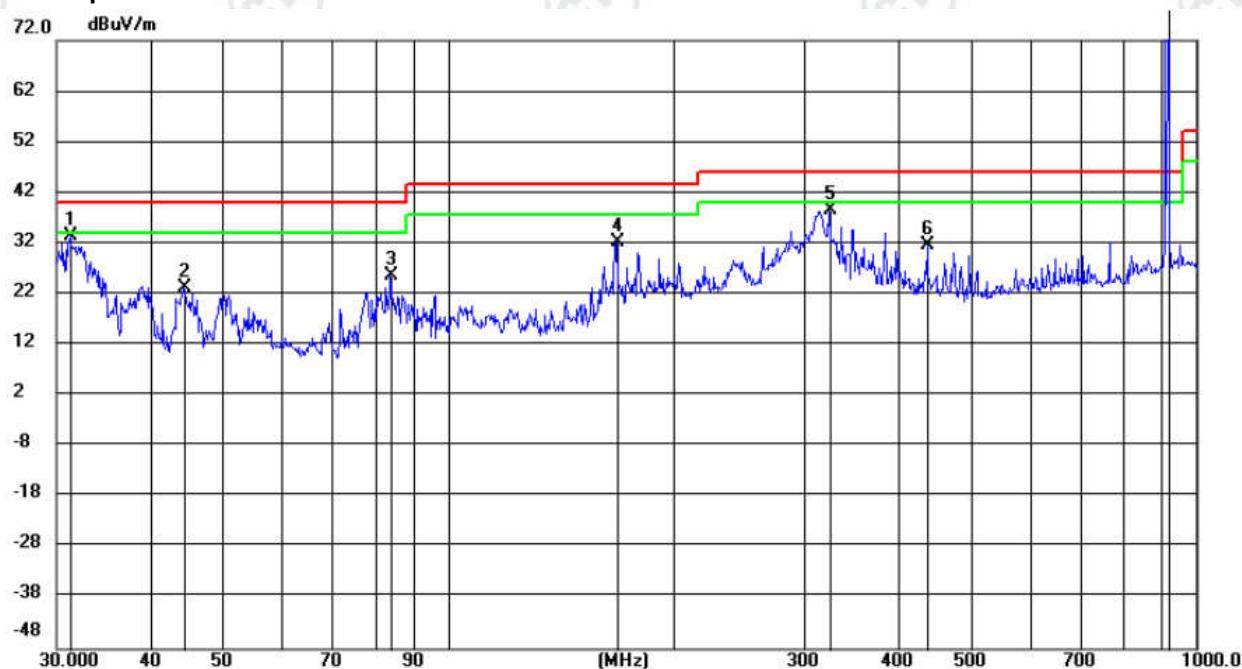
Test Procedure:	<p>a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>2) Above 1G: The EUT was placed on the top of a rotating table 1.5 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.</p> <p>Note: For the radiated emission test above 1GHz: Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.</p> <p>b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</p> <p>c. 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.</p> <p>d. 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>f. 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.</p> <p>g. Test the EUT in the lowest channel (2402MHz), the middle channel (2441MHz), the Highest channel (2480MHz)</p> <p>h. 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.</p> <p>i. Repeat above procedures until all frequencies measured was complete.</p>
Exploratory Test Mode:	Non-hopping transmitting mode with all kind of modulation and all kind of data type
Test Results:	Pass

Radiated Spurious Emission below 1GHz:

During the test, the Radiated Emission from 30MHz to 1GHz was performed in all modes, only the worst case the Lowest channel mode was recorded in the report.

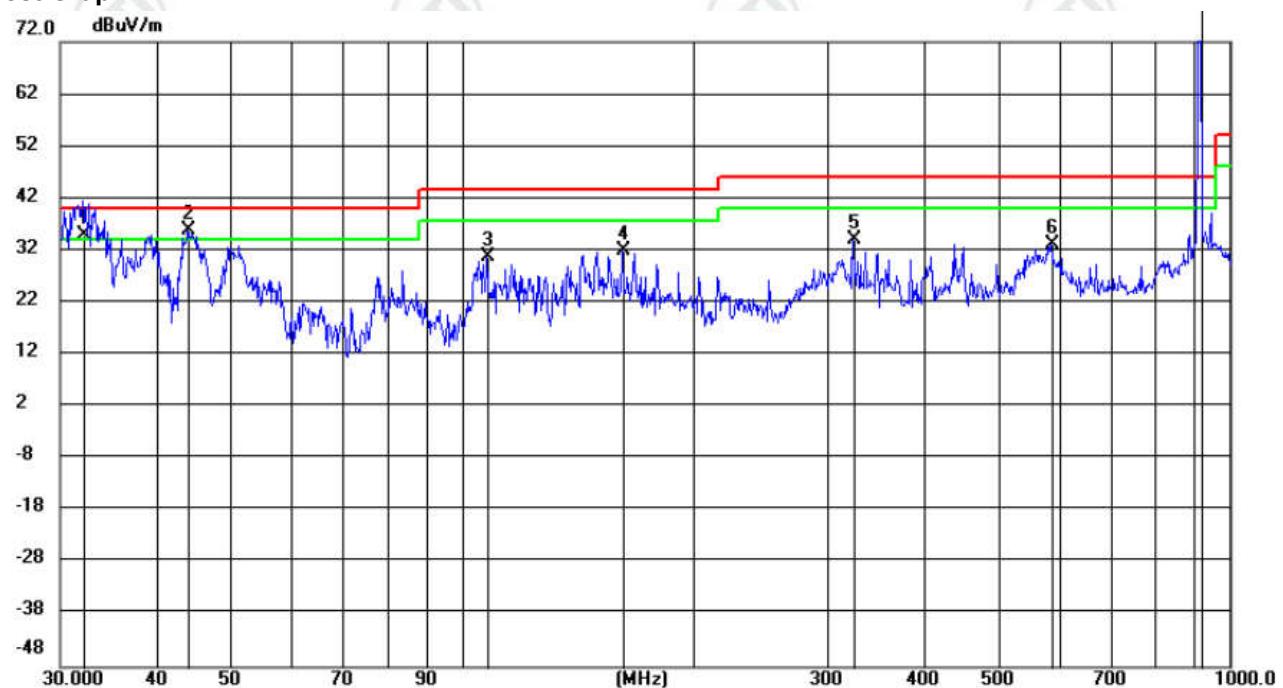
Horizontal:

Test Graph



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Antenna	Table		
			Level	Factor	ment				Height	Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	
1		31.3002	20.93	12.43	33.36	40.00	-6.64	QP	199	7	
2		44.4073	9.71	13.66	23.37	40.00	-16.63	QP	199	196	
3		83.9626	15.24	10.31	25.55	40.00	-14.45	QP	199	91	
4		167.8536	20.98	11.26	32.24	43.50	-11.26	QP	199	165	
5		323.9445	21.19	17.30	38.49	46.00	-7.51	QP	100	123	
6		437.7334	11.57	20.05	31.62	46.00	-14.38	QP	100	237	
7	*	916.7113	75.35	27.37	102.72	46.00	56.72	peak	199	7	

Vertical:

Test Graph


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	!	32.1682	22.42	12.48	34.90	40.00	-5.10	QP	100	72
2	!	44.1202	22.18	13.62	35.80	40.00	-4.20	QP	100	72
3		108.0581	16.88	14.00	30.88	43.50	-12.62	QP	100	104
4		162.2404	21.22	10.86	32.08	43.50	-11.42	QP	100	241
5		324.0581	16.86	17.30	34.16	46.00	-11.84	QP	100	83
6		585.4050	10.15	22.98	33.13	46.00	-12.87	QP	100	348
7	*	917.5153	78.96	27.37	106.33	46.00	60.33	peak	100	7

Radiated Spurious Emission above 1GHz:

Mode:		LORA Transmitting			Channel:		902.5 MHz		
NO	Freq. [MHz]	Factor [dB]	Reading [dB μ V]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Result	Polarity	Remark
1	1080.1387	-22.73	61.10	38.37	74.00	35.63	Pass	H	PK
2	2279.952	-18.28	57.43	39.15	74.00	34.85	Pass	H	PK
3	3031.2021	-14.48	55.51	41.03	74.00	32.97	Pass	H	PK
4	4993.6829	-8.14	53.68	45.54	74.00	28.46	Pass	H	PK
5	7220.0813	-3.23	50.29	47.06	74.00	26.94	Pass	H	PK
6	10237.5825	1.87	45.09	46.96	74.00	27.04	Pass	H	PK
7	1245.483	-22.35	66.76	44.41	74.00	29.59	Pass	V	PK
8	2707.5805	-16.54	64.01	47.47	74.00	26.53	Pass	V	PK
9	3193.0629	-14.48	63.03	48.55	74.00	25.45	Pass	V	PK
10	4512.0008	-9.61	59.51	49.90	74.00	24.10	Pass	V	PK
11	7218.7813	-3.24	56.36	53.12	74.00	20.88	Pass	V	PK
12	9928.1619	1.50	47.40	48.90	74.00	25.10	Pass	V	PK
13	7220.0813	-3.23	53.81	50.58	54.00	3.42	Pass	V	AV

Mode:		LORA Transmitting			Channel:		915.78 MHz		
NO	Freq. [MHz]	Factor [dB]	Reading [dB μ V]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Result	Polarity	Remark
1	1390.426	-21.75	59.91	38.16	74.00	35.84	Pass	H	PK
2	1593.3729	-21.03	63.94	42.91	74.00	31.09	Pass	H	PK
3	3023.4016	-14.52	54.73	40.21	74.00	33.79	Pass	H	PK
4	4512.0008	-9.61	54.98	45.37	74.00	28.63	Pass	H	PK
5	7220.0813	-3.23	50.42	47.19	74.00	26.81	Pass	H	PK
6	12349.5733	4.17	44.20	48.37	74.00	25.63	Pass	H	PK
7	1392.6928	-21.73	66.30	44.57	74.00	29.43	Pass	V	PK
8	2395.8264	-17.89	61.13	43.24	74.00	30.76	Pass	V	PK
9	3198.9133	-14.46	60.25	45.79	74.00	28.21	Pass	V	PK
10	4512.6508	-9.61	60.71	51.10	74.00	22.90	Pass	V	PK
11	7220.0813	-3.23	55.81	52.58	74.00	21.42	Pass	V	PK
12	9926.8618	1.50	45.48	46.98	74.00	27.02	Pass	V	PK
13	7220.7314	-3.22	50.20	46.98	54.00	7.02	Pass	V	AV

Mode:			LORA Transmitting			Channel:		927.4 MHz	
NO	Freq. [MHz]	Factor [dB]	Reading [dB μ V]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Result	Polarity	Remark
1	1265.351	-22.27	64.84	42.57	74.00	31.43	Pass	H	PK
2	1854.857	-20.02	70.70	50.68	74.00	23.32	Pass	H	PK
3	2782.7855	-16.24	57.53	41.29	74.00	32.71	Pass	H	PK
4	4636.8091	-9.24	52.26	43.02	74.00	30.98	Pass	H	PK
5	6491.3828	-4.46	53.46	49.00	74.00	25.00	Pass	H	PK
6	9337.9225	1.00	45.46	46.46	74.00	27.54	Pass	H	PK
7	1393.8929	-21.73	62.66	40.93	74.00	33.07	Pass	V	PK
8	1854.9903	-20.02	71.57	51.55	74.00	22.45	Pass	V	PK
9	3194.363	-14.48	58.93	44.45	74.00	29.55	Pass	V	PK
10	4637.4592	-9.24	56.32	47.08	74.00	26.92	Pass	V	PK
11	6492.0328	-4.47	56.11	51.64	74.00	22.36	Pass	V	PK
12	7982.5822	-1.38	51.29	49.91	74.00	24.09	Pass	V	PK

Remark:

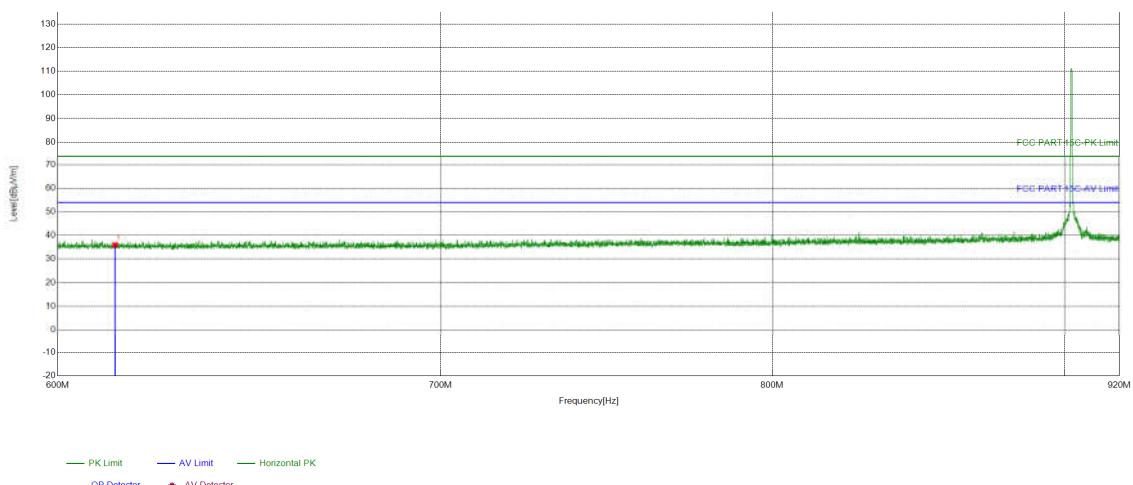
- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 2) Scan from 9kHz to 25GHz, the disturbance above 10GHz and below 30MHz was very low. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

Restricted bands:

Test plot as follows:

EUT_Name				Test_Model	
Test_Mode	Lora	Test_Frequency		902.5MHz	
Tset_Engineer	chenjun	Test_Date		2025/04/24	
Remark					

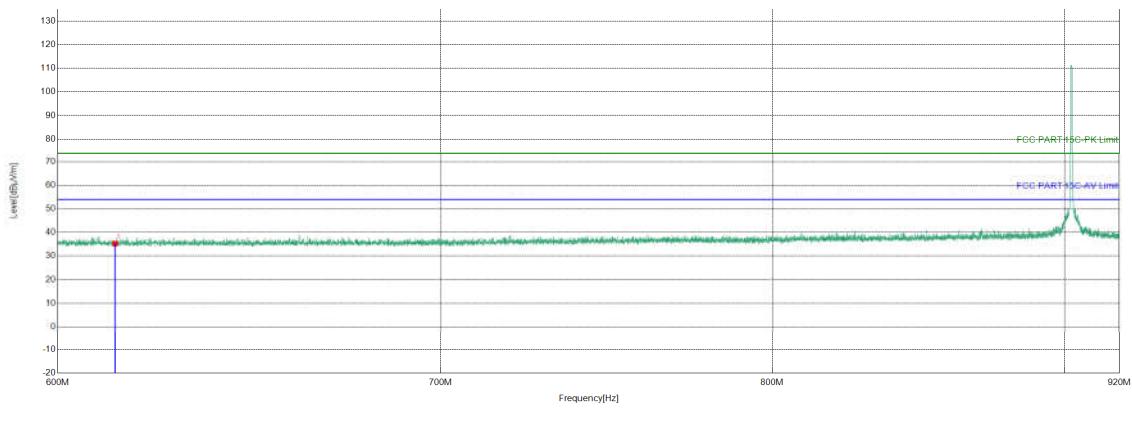
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	614	-8.49	44.42	35.93	74.00	38.07	PASS	Horizontal	PK

EUT_Name		Test_Model	
Test_Mode	Lora	Test_Frequency	902.5MHz
Tset_Engineer	chenjun	Test_Date	2025/04/24
Remark			

Test Graph

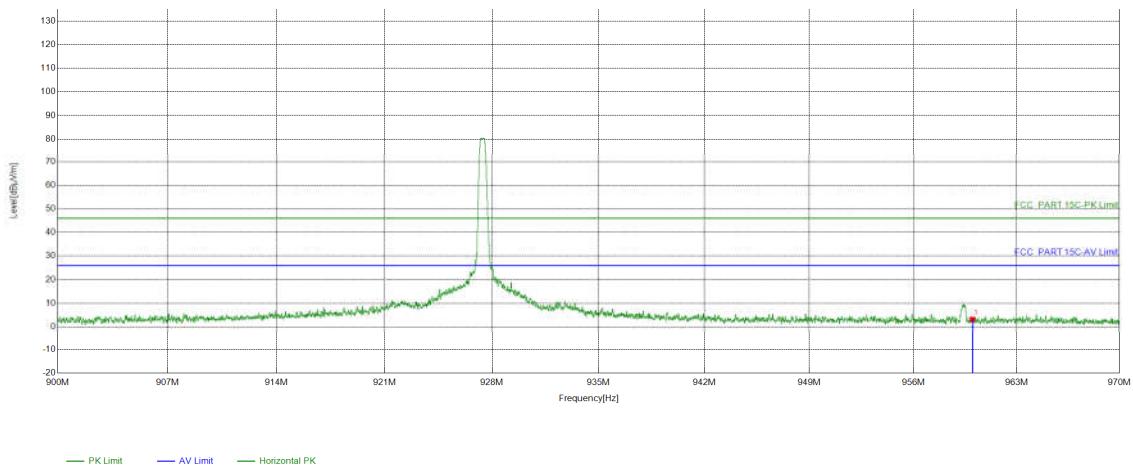


Suspected List

NO	Freq. [MHz]	Factor [dB]	Reading [dB μ V]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Result	Polarity	Remark
1	614	-8.49	43.72	35.23	74.00	38.77	PASS	Vertical	PK

EUT_Name		Test_Model	
Test_Mode	Lora	Test_Frequency	927.4MHz
Tset_Engineer	chenjun	Test_Date	2025/04/24
Remark			

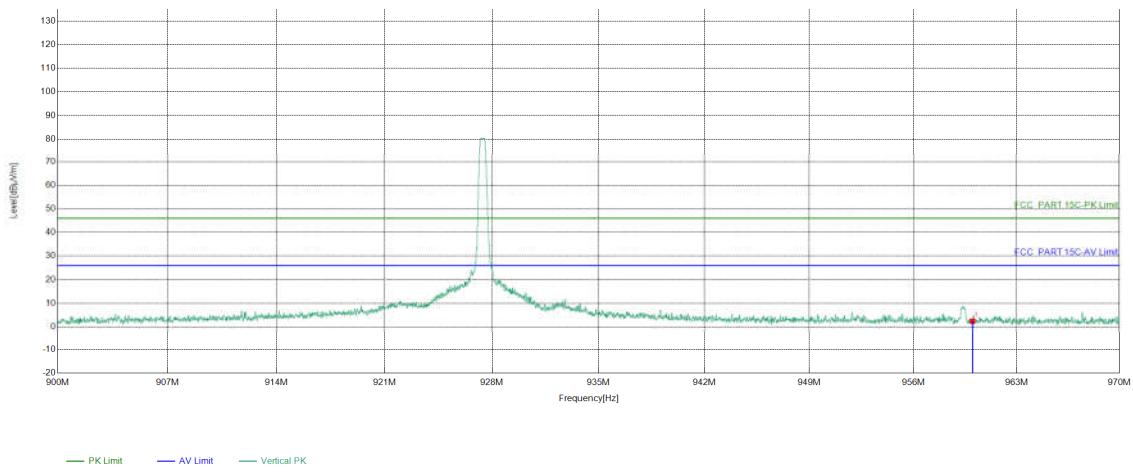
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	960	-35.46	38.62	3.16	46.00	42.84	PASS	Horizontal	PK

EUT_Name		Test_Model	
Test_Mode	Lora	Test_Frequency	927.4MHz
Tset_Engineer	chenjun	Test_Date	2025/04/24
Remark			

Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	960	-35.46	37.82	2.36	46.00	43.64	PASS	Vertical	PK

Note:

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

5 Appendix A

Refer to Appendix:LoRa FHSS of EED32R80464704

7 PHOTOGRAPHS OF EUT Constructional Details

Refer to Report No. EED32R80464701 for EUT external and internal photos.



Statement

1. This report is considered invalid without approved signature, special seal and the seal on the perforation;
2. The Company Name shown on Report and Address, the sample(s) and sample information was/were provided by the applicant who should be responsible for the authenticity which CTI hasn't verified;
3. The result(s) shown in this report refer(s) only to the sample(s) tested;
4. Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule stated in ILAC-G8:09/2019/CNAS-GL015:2022;
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