FCC RADIO TEST REPORT

Applicant……	:	ShenZhen Landshr Electric Technology Co., Ltd.
Address……..	:	1201-1202, Building 3, Nantaiyun Chuanggu, Tangwei Community, Guangming District, Shenzhen
Manufacturer……..……	:	ShenZhen Landshr Electric Technology Co., Ltd.
Address……	:	1201-1202, Building 3, Nantaiyun Chuanggu, Tangwei Community, Guangming District, Shenzhen
Factory ……..……	:	ShenZhen Landshr Electric Technology Co., Ltd.
Address ……..….	:	1201-1202, Building 3, Nantaiyun Chuanggu, Tangwei Community, Guangming District, Shenzhen
Product Name……	:	Contactless IC card read and write module
Brand Name……..	:	landshr
Model No. …….....	:	LBD-MODE5T0
FCC ID…….	:	2BFGTLBD-MODE5T0
Measurement Standard……...	:	47 CFR FCC Part 15, Subpart C (Section 15.225)
Receipt Date of Samples…….	:	March 16, 2024
Date of Tested……	:	March 19, 2024 to April 18, 2024
Date of Report……	:	April 18, 2024

This report shows that above equipment is technically compliant with the requirements of the standards above. All test results in this report apply only to the tested sample(s). Without prior written approval of Dongguan Nore Testing Center Co., Ltd, this report shall not be reproduced except in full.

Prepared by

Julie Xiao / Project Engineer

Approved by

Iori Fan / Authorized Signatory

Dongguan Nore Testing Center Co., Ltd.
Address: Building D, Gaosheng Science and Technology park, Hongtu road, Nancheng district, Dongguan city, Guangdong province, China
Web: www.ntc-c.com Tel:+86-769-2202 2444 Fax:+86-769-2202 2799

Table of Contents

Revision History

Report Number	Description	Issued Date
NTC2403225FV00	Initial Issue	2024-04-18

1. Summary of Test Result

FCC Rules	Description of Test	Result	Remarks
§15.207 (a)	AC Power Line Conducted Emission	PASS	---
§15.225 & 15.209 & 15.205	Radiated Spurious Emission	PASS	---
§15.225(e)	Frequency Stability	PASS	---
§15.215(c)	20dB Emission Bandwidth Testing	PASS	---
§15.203	Antenna Requirement	PASS	---
Note: The EUT has been tested as an independent unit.			

2. General Description of EUT

Product Information	
Product Name:	Contactless IC card read and write module
Main Model Name:	LBD-MODE5T0
Additional Model Name:	N/A
Model Difference:	N/A
S/N:	2403-1195
Brand Name:	landshr
Hardware Version:	LBD-MODE5T0_V1.0
Software Version:	LBD_MODE5T0_V205H(EMC)
Rating:	DC 5V
Classification:	Class B
Typical arrangement:	Table-top
I/O Port:	N/A
Accessories Information	
Adapter:	N/A
Cable:	N/A
Other:	N/A
Additional Information	
Note:	N/A
Remark:	All the information above are provided by the manufacturer. More detailed feature of the EUT please refers to the user manual.

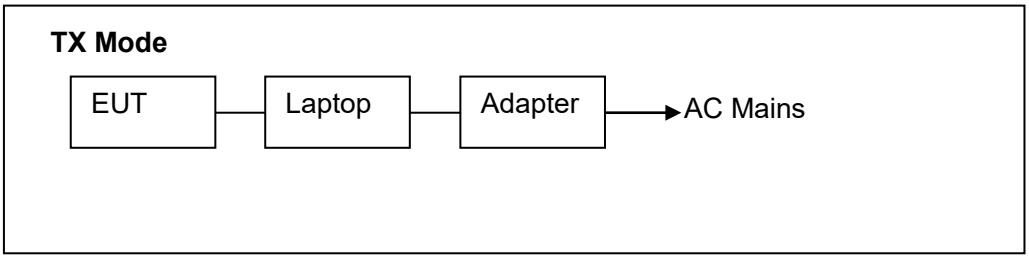
Technical Specification	
Declaring the Frequency:	13.5608MHz
Modulation Type:	ASK
Antenna Type:	PCB antenna
Antenna Gain:	0 dBi (Declared by manufacturer)
Number of Channels:	1

3. Test Channels and Modes Detail

Mode		Test Frequency (MHz)	Modulation	Data Rate (Mbps)
1	TX	13.5608MHz	ASK	----

Note: TX mode means that the EUT was programmed to be in continuously transmitting mode.

4. Configuration of EUT



5. Modification of EUT

No modifications are made to the EUT during all test items.

6. Description of Support Device

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.

No.	Equipment	Brand	M/N	S/N	Cable Specification	Remarks
1.	Laptop	Lenovo	R720-151KBN	PF0Z35FH	---	Provided by the Lab
2.	Adapter (Laptop)	Delta	ADL135NDC3A	---	---	Provided by the Lab

7. Test Facility and Location

Test Site	:	Dongguan Nore Testing Center Co., Ltd. (Dongguan NTC Co., Ltd.)
Accreditations and Authorizations	:	The Laboratory has been assessed and proved to be in compliance with CNAS/CL01 Listed by CNAS, August 13, 2018 The Certificate Registration Number is L5795. The Certificate is valid until August 13, 2024 The Laboratory has been assessed and proved to be in compliance with ISO17025 Listed by A2LA, November 01, 2017 The Certificate Registration Number is 4429.01 Listed by FCC, November 06, 2017 Test Firm Registration Number: 907417 Listed by Industry Canada, June 08, 2017 The Certificate Registration Number. Is 46405-9743A
Test Site Location	:	Building D, Gaosheng Science and Technology Park, Hongtu Road, Nancheng District, Dongguan City, Guangdong Province, China

8. Applicable Standards and References

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

Test Standards:

47 CFR Part 15, Subpart C, 15.225

ANSI C63.10-2013

References Test Guidance:

N/A

9. Deviations and Abnormalities from Standard Conditions

No additions, deviations and exclusions from the standard.

10. Test Conditions

No.	Test Item	Test Mode	Test Voltage	Tested by	Remarks
1.	AC Power Conducted Emission	1	AC 120V/60Hz	Sean	See note 1
2.	Radiated Emission	1	AC 120V/60Hz	Sean	See note 1
3.	Frequency Stability	1	AC 120V/60Hz	Sean	See note 1
4.	20dB Emission Bandwidth Testing	1	AC 120V/60Hz	Sean	See note 1
5.	Antenna Requirement	1	---	Sean	See note 1

Note:

1. The testing climatic conditions for temperature, humidity, and atmospheric pressure are within: 15~35℃, 30~70%, 86~106kPa

11. Measurement Uncertainty

No.	Test Item	Frequency	Uncertainty	Remarks
1.	Conducted Emission	150KHz ~ 30MHz	±2.52 dB	---
2.	Radiated Emission Test	9kHz ~ 30MHz	±5.66 dB	---
		30MHz ~ 1GHz	±5.66 dB	---
		1GHz ~ 18GHz	±5.19 dB	---
		18GHz ~ 40GHz	±5.19 dB	---
3.	Occupied Channel Bandwidth	---	±0.72%	---
4.	Frequency Stability	---	5×10^{-6}ppm	

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The measurement uncertainly levels above are estimated and calculated according to CISPR 16-4-2.
3. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

12. Sample Calculations

Conducted Emission						
Freq. (MHz)	**Reading Level (dBuV)**	**Correct Factor (dB)**	**Measurement (dBuV)**	**Limit (dBuV)**	**Over (dB)**	**Detector**
0.1500	16.51	20.59	37.10	66.00	-28.90	QP

Where,

Freq.	= Emission frequency in MHz
Reading Level	= Spectrum Analyzer/Receiver Reading
Corrector Factor	= Insertion loss of LISN + Cable Loss + RF Switching Unit attenuation
Measurement	= Reading + Corrector Factor
Limit	= Limit stated in standard
Margin	= Measurement - Limit
Detector	= Reading for Quasi-Peak / Average / Peak

Radiated Spurious Emissions						
Freq. (MHz)	**Reading Level (dBuV)**	**Correct Factor (dB/m)**	**Measurement (dBuV/m)**	**Limit (dBuV/m)**	**Over (dB)**	**Detector**
190.0500	42.01	-9.31	32.70	43.50	-10.80	QP

Where,

Freq.	= Emission frequency in MHz
Reading Level	= Spectrum Analyzer/Receiver Reading
Corrector Factor	= Antenna Factor + Cable Loss - Pre-amplifier
Measurement	= Reading + Corrector Factor
Limit	= Limit stated in standard
Over	= Margin, which calculated by Measurement - Limit
Detector	= Reading for Quasi-Peak / Average / Peak

Note: For all conducted test items, the spectrum analyzer offset or transducer is derived from RF cable loss and attenuator factor. The offset or transducer is equal to the RF cable loss plus attenuator factor.

13. Test Items and Results

13.1 Conducted Emissions Measurement

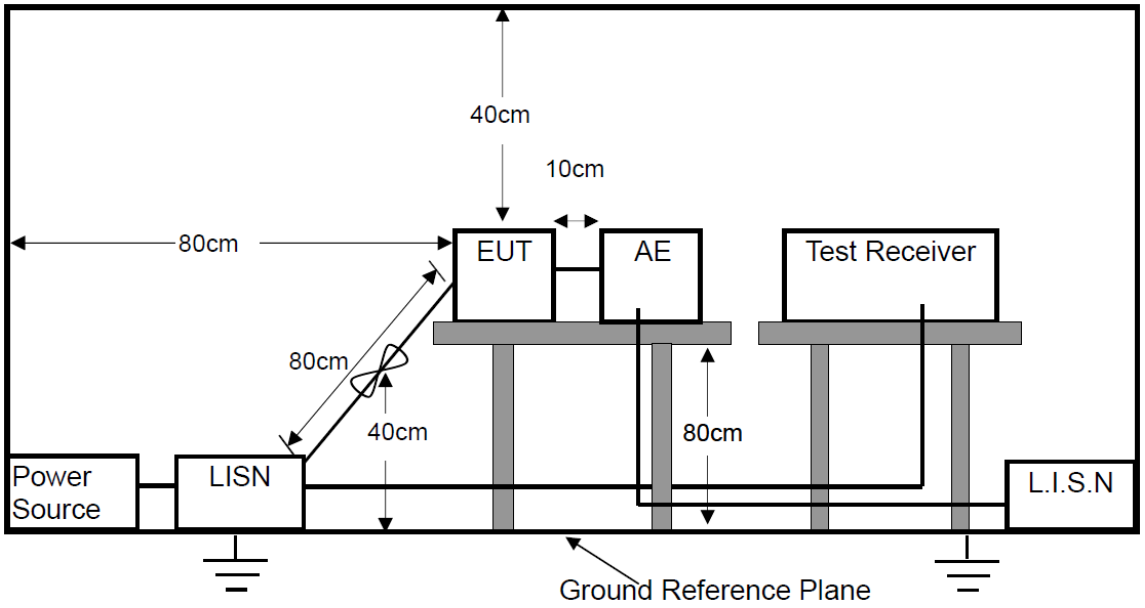
LIMIT

According to the requirements of FCC PART 15.207, the limits are as follows:

Frequency (MHz)	Quasi-peak	Average
0.15 to 0.5	66 to 56	56 to 46
0.5 to 5	56	46
5 to 30	60	50

Note: 1. If the limits for the average detector are met when using the quasi-peak detector, then the limits for the measurements with the average detector are considered to be met.
2. The lower limit shall apply at the transition frequencies.
3. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5MHz.

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

a. The EUT was placed on a wooden table 0.8m height from the metal ground plan and 0.4m from the conducting wall of the shielding room and it was kept at 0.8m from any other grounded conducting surface.

b. All I/O cables and support devices were positioned as per ANSI C63.10.

c. Connect mains power port of the EUT to a line impedance stabilization network (LISN).

d. Connect all support devices to the other LISN and AAN, if needed.

e. Scan the frequency range from 150KHz to 30MHz at both sides of AC line for maximum conducted interference checking and record the test data.

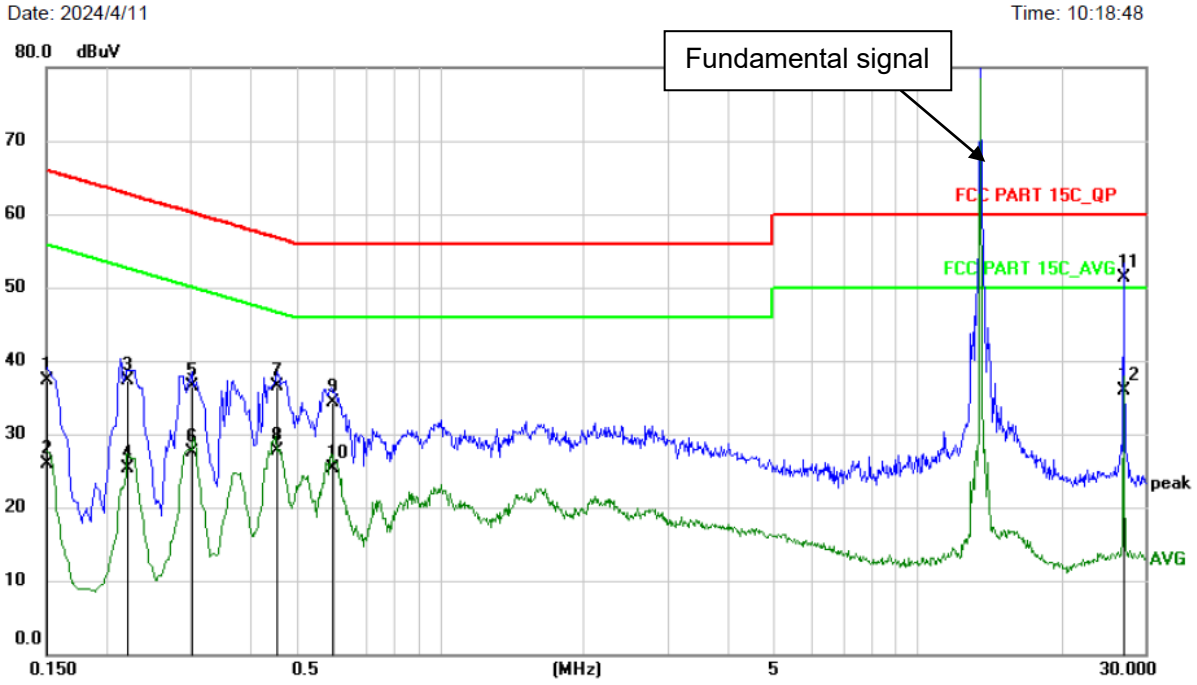
TEST RESULTS

PASS

Please refer to the following pages

M/N: LBD-MODE5T0	Testing Voltage: AC 120V / 60Hz
Phase: L1	Detector: QP & AVG
Test Mode: 1	Note: Test With Antenna

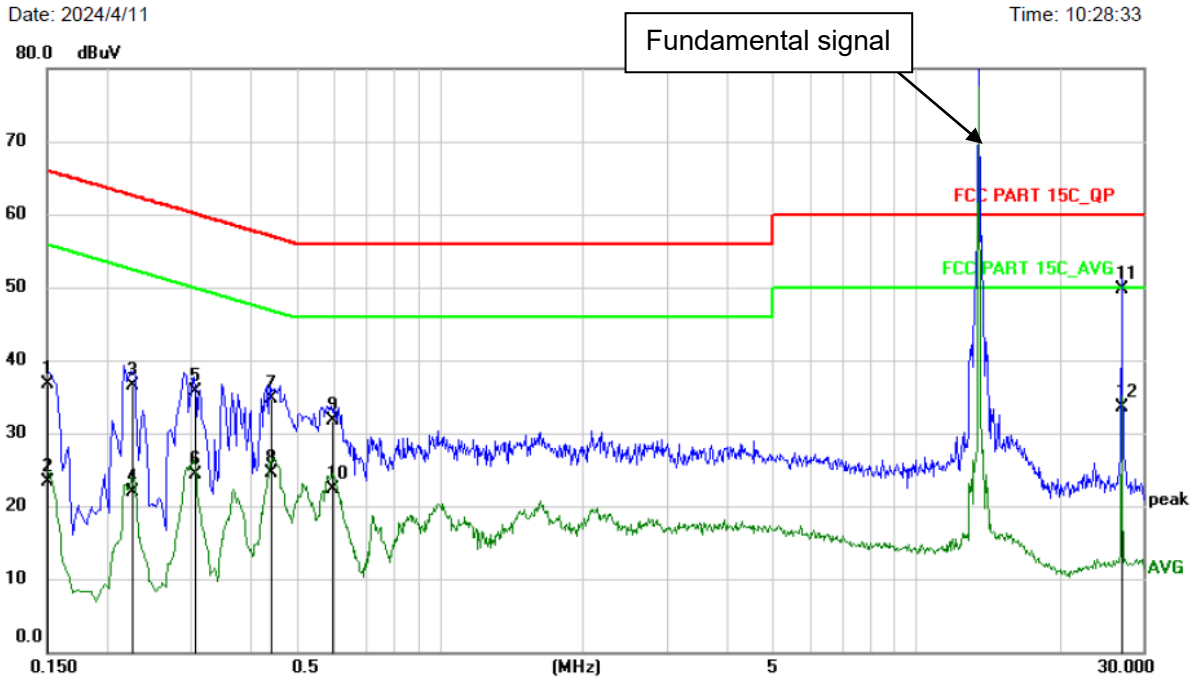
Conducted Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	27.27	9.98	37.25	66.00	-28.75	QP	
2		0.1500	15.99	9.98	25.97	56.00	-30.03	AVG	
3		0.2220	27.24	10.02	37.26	62.74	-25.48	QP	
4		0.2220	15.22	10.02	25.24	52.74	-27.50	AVG	
5		0.3020	26.48	10.06	36.54	60.19	-23.65	QP	
6		0.3020	17.35	10.06	27.41	50.19	-22.78	AVG	
7		0.4540	26.55	10.04	36.59	56.80	-20.21	QP	
8		0.4540	17.59	10.04	27.63	46.80	-19.17	AVG	
9		0.5940	24.24	10.02	34.26	56.00	-21.74	QP	
10		0.5940	15.20	10.02	25.22	46.00	-20.78	AVG	
11	*	27.1220	40.52	10.82	51.34	60.00	-8.66	QP	
12		27.1220	25.10	10.82	35.92	50.00	-14.08	AVG	

M/N: LBD-MODE5T0	Testing Voltage: AC 120V / 60Hz
Phase: N	Detector: QP & AVG
Test Mode: 1	Note: Test With Antenna

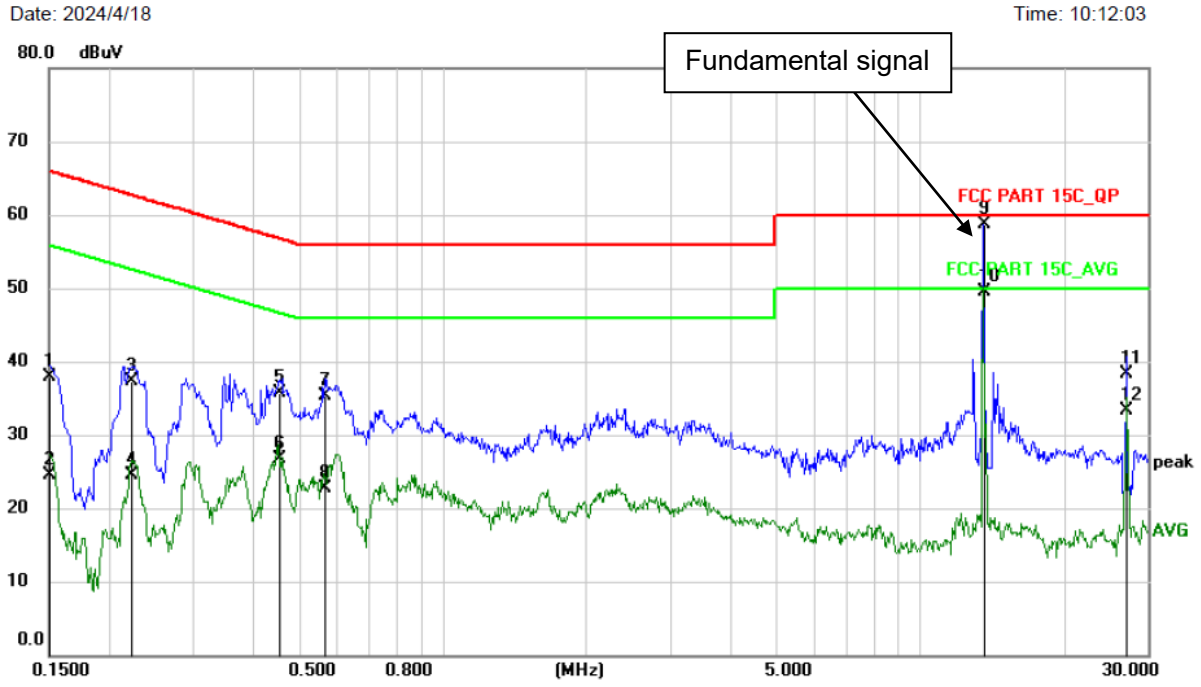
Conducted Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	26.72	9.94	36.66	66.00	-29.34	QP	
2		0.1500	13.45	9.94	23.39	56.00	-32.61	AVG	
3		0.2260	26.60	9.99	36.59	62.60	-26.01	QP	
4		0.2260	11.97	9.99	21.96	52.60	-30.64	AVG	
5		0.3060	25.67	10.02	35.69	60.08	-24.39	QP	
6		0.3060	14.23	10.02	24.25	50.08	-25.83	AVG	
7		0.4420	24.62	10.00	34.62	57.02	-22.40	QP	
8		0.4420	14.51	10.00	24.51	47.02	-22.51	AVG	
9		0.5940	21.77	9.99	31.76	56.00	-24.24	QP	
10		0.5940	12.37	9.99	22.36	46.00	-23.64	AVG	
11	*	27.1220	38.81	10.81	49.62	60.00	-10.38	QP	
12		27.1220	22.65	10.81	33.46	50.00	-16.54	AVG	

M/N: LBD-MODE5T0	Testing Voltage: AC 120V / 60Hz
Phase: L1	Detector: QP & AVG
Test Mode: 1	Note: Test Without Antenna

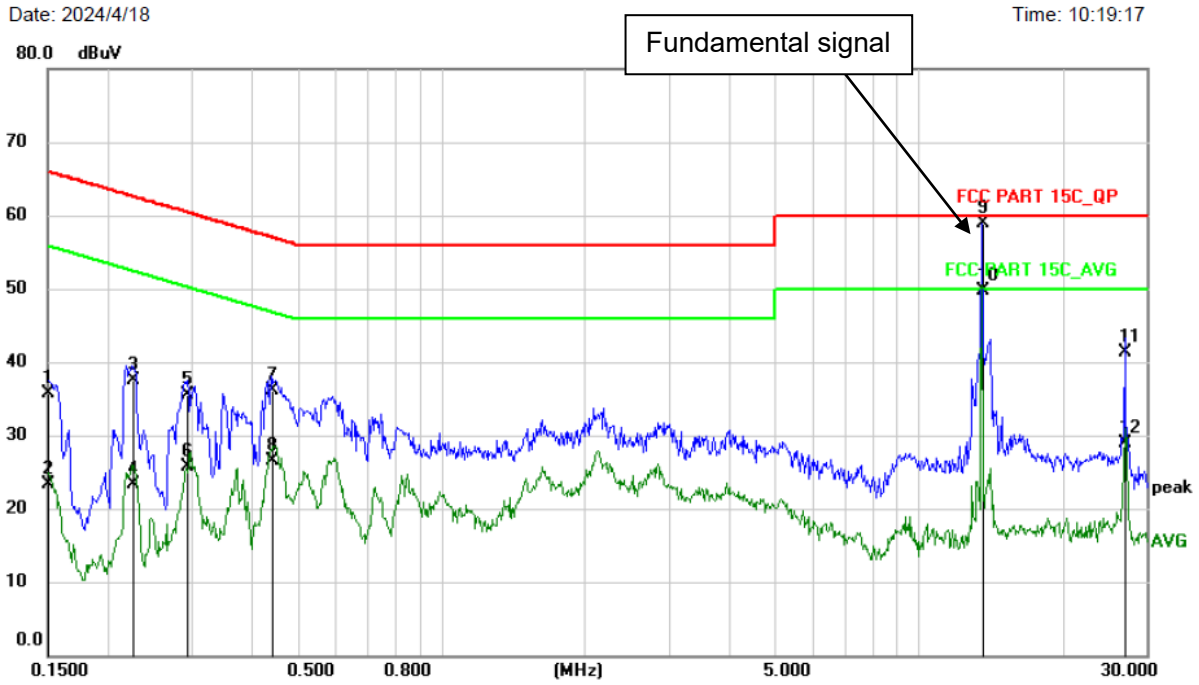
Conducted Emission Measurement



No. Mk.		Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	27.86	9.98	37.84	66.00	-28.16	QP	
2		0.1500	14.48	9.98	24.46	56.00	-31.54	AVG	
3		0.2230	27.28	10.01	37.29	62.71	-25.42	QP	
4		0.2230	14.58	10.01	24.59	52.71	-28.12	AVG	
5		0.4540	25.68	10.04	35.72	56.80	-21.08	QP	
6		0.4540	16.59	10.04	26.63	46.80	-20.17	AVG	
7		0.5658	25.19	10.02	35.21	56.00	-20.79	QP	
8		0.5658	12.76	10.02	22.78	46.00	-23.22	AVG	
9		13.5617	48.43	10.27	58.70	60.00	-1.30	QP	
10	*	13.5617	39.33	10.27	49.60	50.00	-0.40	AVG	
11		27.1219	27.44	10.82	38.26	60.00	-21.74	QP	
12		27.1219	22.43	10.82	33.25	50.00	-16.75	AVG	

M/N: LBD-MODE5T0	Testing Voltage: AC 120V / 60Hz
Phase: N	Detector: QP & AVG
Test Mode: 1	Note: Test Without Antenna

Conducted Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	25.72	9.94	35.66	66.00	-30.34	QP	
2		0.1500	13.45	9.94	23.39	56.00	-32.61	AVG	
3		0.2260	27.60	9.99	37.59	62.60	-25.01	QP	
4		0.2260	13.38	9.99	23.37	52.60	-29.23	AVG	
5		0.2938	25.44	10.02	35.46	60.42	-24.96	QP	
6		0.2938	15.65	10.02	25.67	50.42	-24.75	AVG	
7		0.4420	26.01	10.00	36.01	57.02	-21.01	QP	
8		0.4420	16.53	10.00	26.53	47.02	-20.49	AVG	
9		13.5617	48.86	10.14	59.00	60.00	-1.00	QP	
10	*	13.5617	39.56	10.14	49.70	50.00	-0.30	AVG	
11		27.1219	30.49	10.81	41.30	60.00	-18.70	QP	
12		27.1219	18.14	10.81	28.95	50.00	-21.05	AVG	

13.2 Radiated Spurious Emissions Measurement

LIMIT

Frequency range MHz	Distance Meters	Field Strengths Limit (15.209)
		μV/m
0.009 ~ 0.490	300	2400/F(kHz)
0.490 ~ 1.705	30	24000/F(kHz)
1.705 ~ 30	30	30
30 ~ 88	3	100
88 ~ 216	3	150
216 ~ 960	3	200
Above 960	3	500

Remark: (1) Emission level (dB)μV = 20 log Emission level μV/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

(4) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.

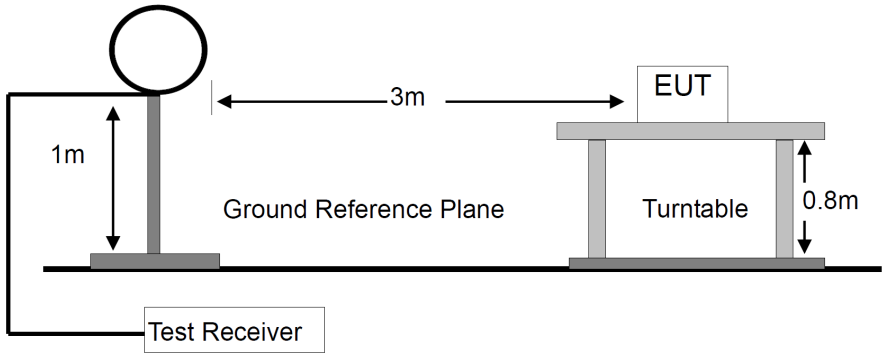
(5) §15.247(d) specifies that emissions which fall in the restricted bands, as defined in §15.205 comply with radiated emission limits specified in §15.209.

According to 15.225, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

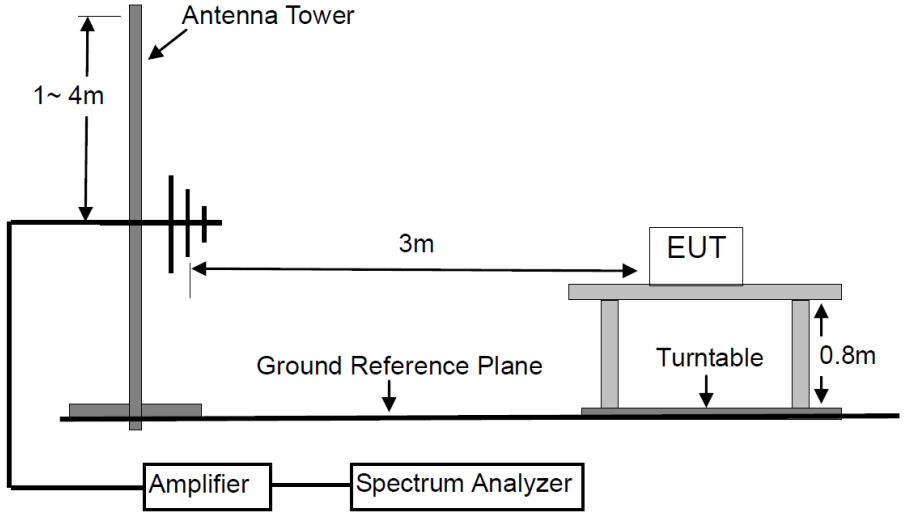
(a) The field strength of any emissions within the band 13. 553-13.567MHz shall not exceed 15,848 microvolts/ meter at 30 meters.
(b) Within the bands 13.410-13.553MHz and 13.567-13.710MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
(c) Within the bands 13.110-13410 MHz and 13.710-14.010MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
(d) The field strength of any emissions appearing outside of the 13.110-14.010MHz band shall not exceed the general radiated emission limits in 15.209.

BLOCK DIAGRAM OF TEST SETUP

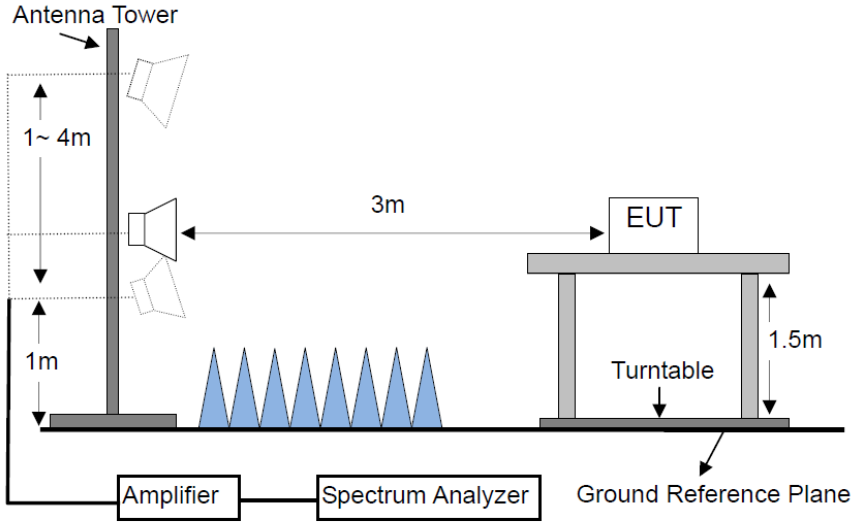
For Radiated Emission below 30MHz



For Radiated Emission 30-1000MHz



For Radiated Emission Above 1000MHz.



TEST PROCEDURES

a. Below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room.

b. For the radiated emission test above 1GHz:

The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. 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.

c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The height of antenna 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.

e. 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 and the rotatable 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.

f. A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Band (MHz)	Detector	Resolution Bandwidth	Video Bandwidth
0.009~0.15	QP	200Hz	1KHz
0.15 -30	QP	9KHz	30KHz
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	3 MHz
	Average	1 MHz	10 Hz

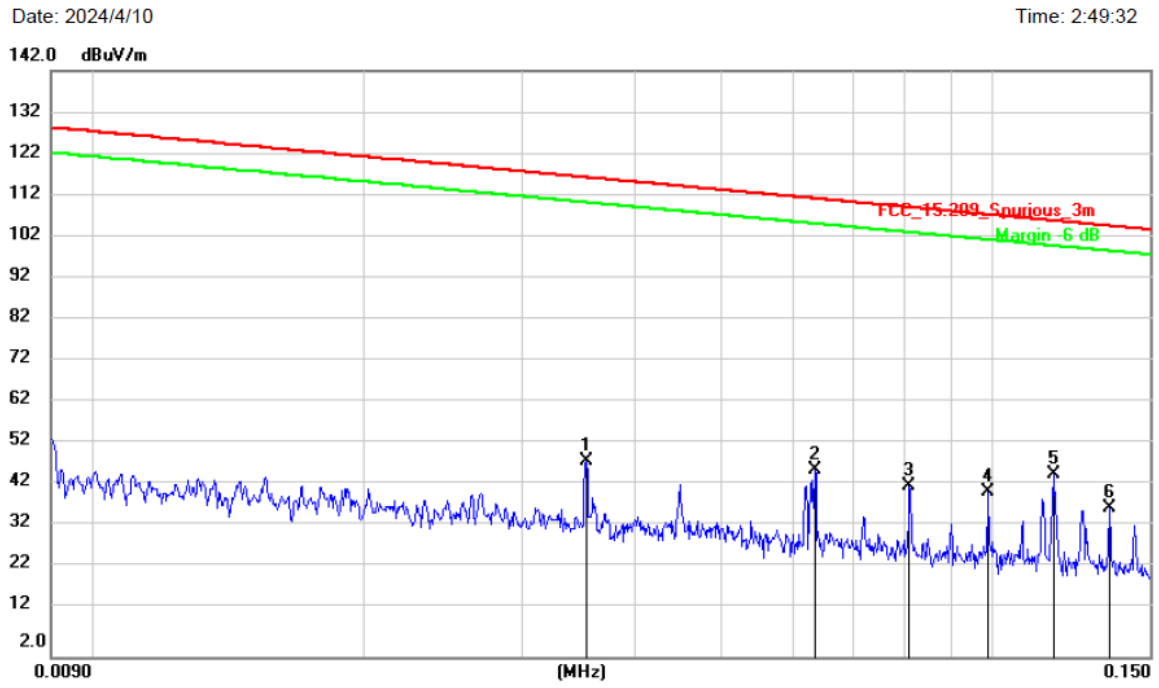
TEST RESULTS

PASS

Please refer to the following pages.

M/N: LBD-MODE5T0	Testing Voltage: AC 120V / 60Hz
Polarization: Horizontal	Detector: QP, AVG
Test Mode: TX	Distance: 3m

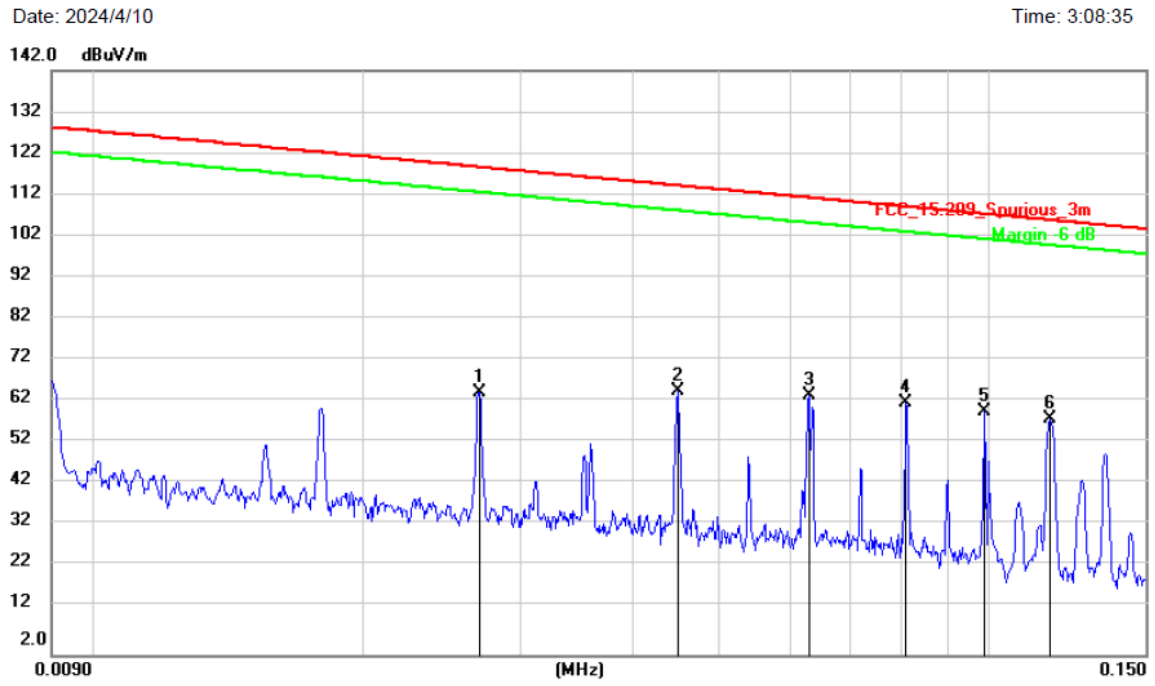
Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.0354	28.24	20.54	48.78	116.50	-67.72	AVG	
2		0.0635	25.97	20.55	46.52	111.45	-64.93	AVG	
3		0.0810	22.31	20.54	42.85	109.35	-66.50	AVG	
4		0.0991	20.82	20.54	41.36	107.61	-66.25	QP	
5	*	0.1171	25.05	20.53	45.58	106.16	-60.58	AVG	
6		0.1351	17.16	20.52	37.68	104.93	-67.25	AVG	

M/N: LBD-MODE5T0	Testing Voltage: AC 120V / 60Hz
Polarization: Vertical	Detector: QP, AVG
Test Mode: TX	Distance: 3m

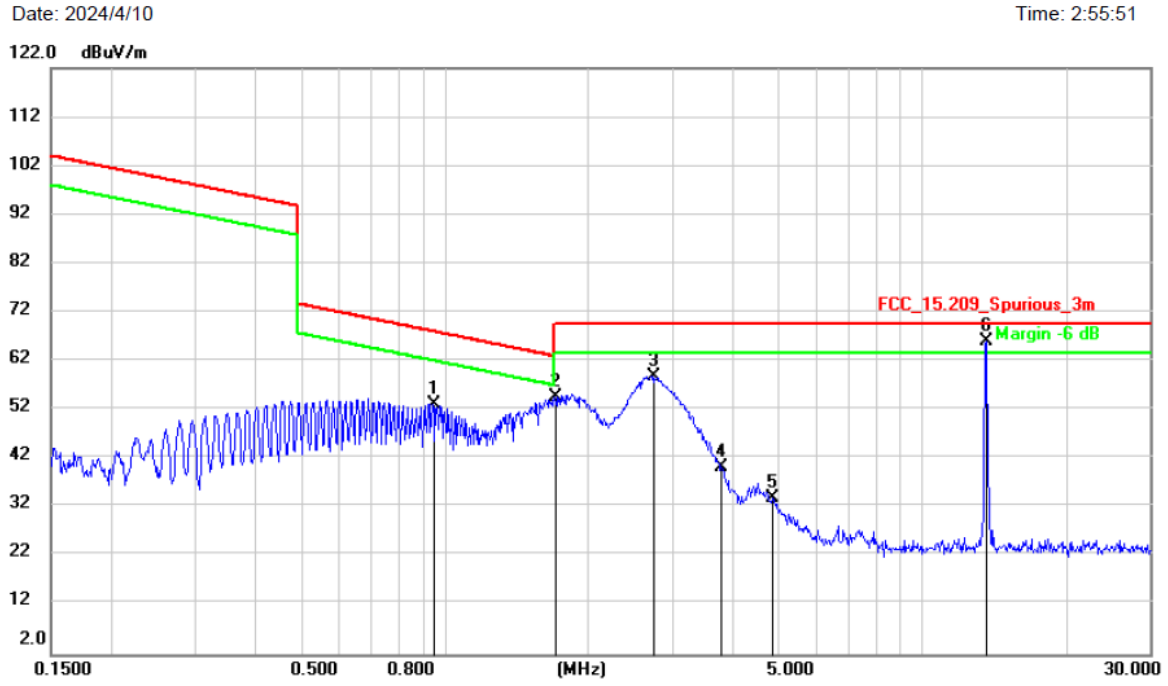
Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.0270	44.43	20.49	64.92	118.84	-53.92	AVG	
2		0.0449	44.47	20.59	65.06	114.44	-49.38	AVG	
3		0.0629	43.44	20.55	63.99	111.53	-47.54	AVG	
4	*	0.0810	41.74	20.54	62.28	109.35	-47.07	AVG	
5		0.0991	39.90	20.54	60.44	107.61	-47.17	QP	
6		0.1174	37.95	20.53	58.48	106.14	-47.66	AVG	

M/N: LBD-MODE5T0	Testing Voltage: AC 120V / 60Hz
Polarization: Horizontal	Detector: QP
Test Mode: TX	Distance: 3m

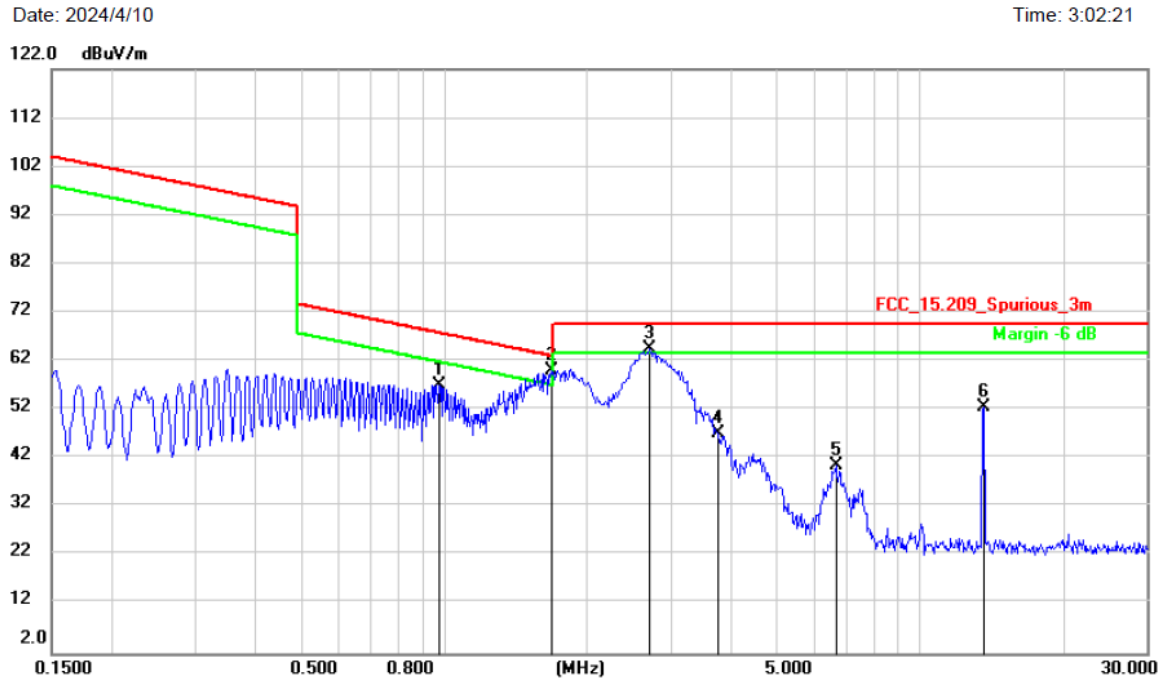
Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.9431	32.72	20.40	53.12	68.11	-14.99	QP	
2		1.6981	34.11	20.40	54.51	63.01	-8.50	QP	
3		2.7212	38.46	20.40	58.86	69.50	-10.64	QP	
4		3.7994	19.71	20.42	40.13	69.50	-29.37	QP	
5		4.8738	13.39	20.45	33.84	69.50	-35.66	QP	
6	*	13.6228	45.36	20.56	65.92	69.50	-3.58	QP	

M/N: LBD-MODE5T0	Testing Voltage: AC 120V / 60Hz
Polarization: Vertical	Detector: QP
Test Mode: TX	Distance: 3m

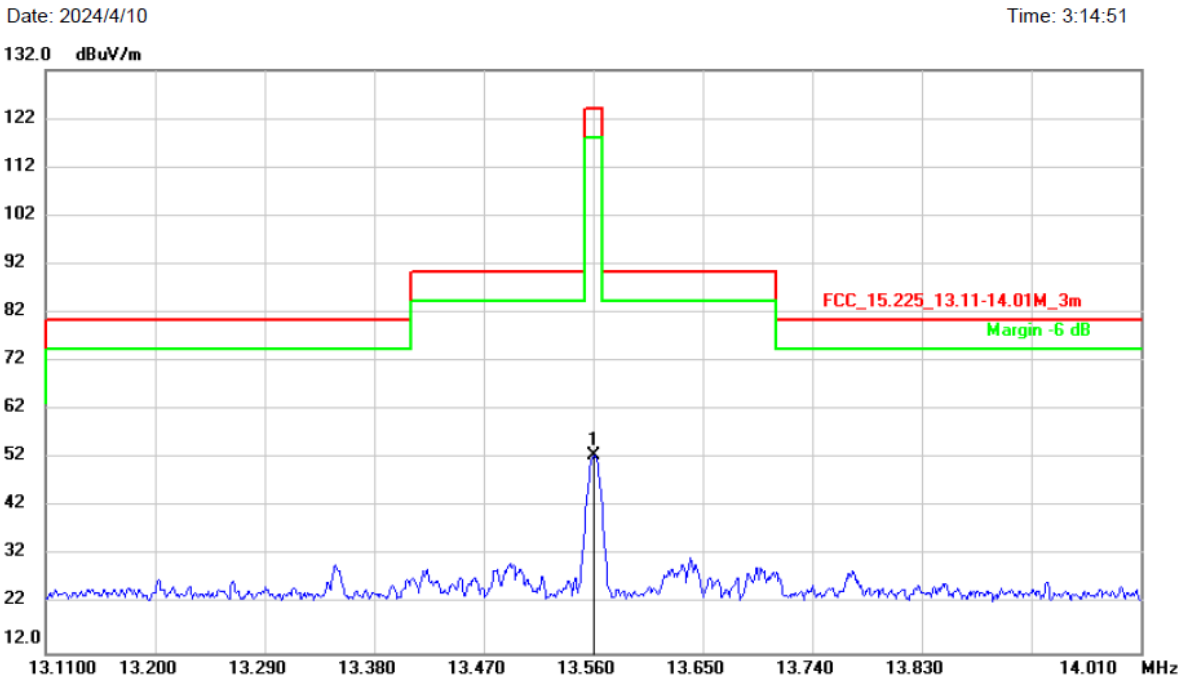
Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.9787	36.59	20.40	56.99	67.79	-10.80	QP	
2	*	1.6800	39.55	20.40	59.95	63.10	-3.15	QP	
3	!	2.7067	44.19	20.40	64.59	69.50	-4.91	QP	
4		3.7793	26.80	20.42	47.22	69.50	-22.28	QP	
5		6.6623	20.15	20.48	40.63	69.50	-28.87	QP	
6		13.6227	32.04	20.56	52.60	69.50	-16.90	QP	

M/N: LBD-MODE5T0	Testing Voltage: AC 120V / 60Hz
Polarization: Horizontal	Detector: QP
Test Mode: TX	Distance: 3m

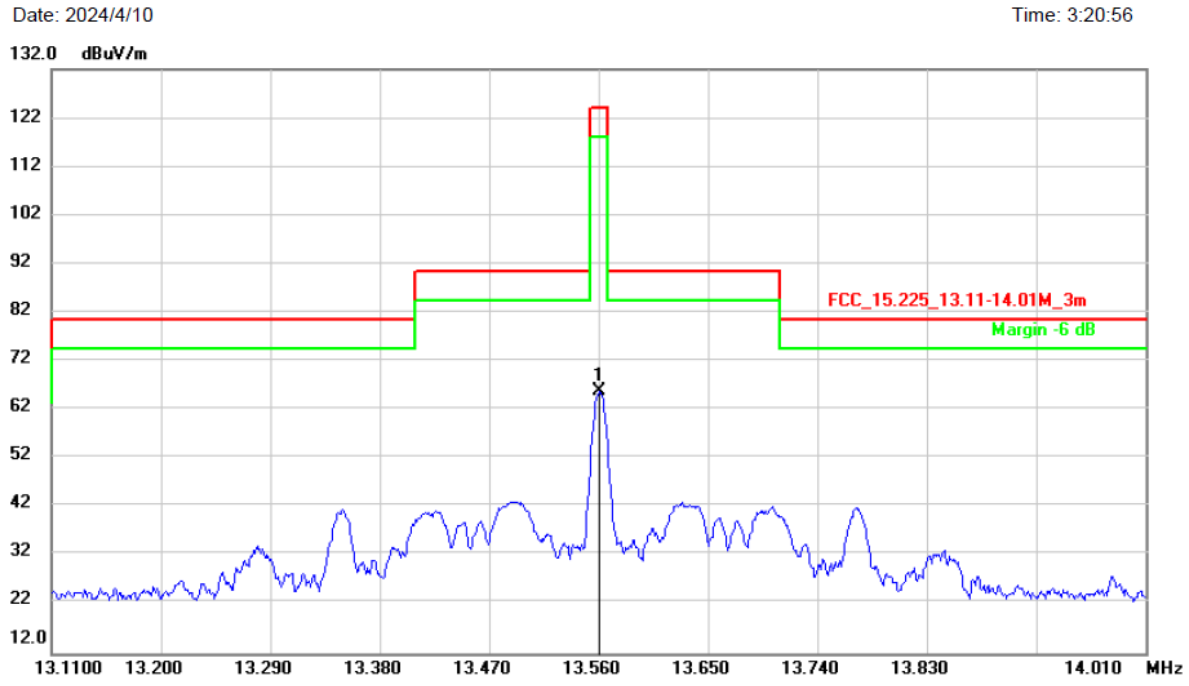
Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	13.5609	32.16	20.56	52.72	124.00	-71.28	QP	

M/N: LBD-MODE5T0	Testing Voltage: AC 120V / 60Hz
Polarization: Vertical	Detector: QP
Test Mode: TX	Distance: 3m

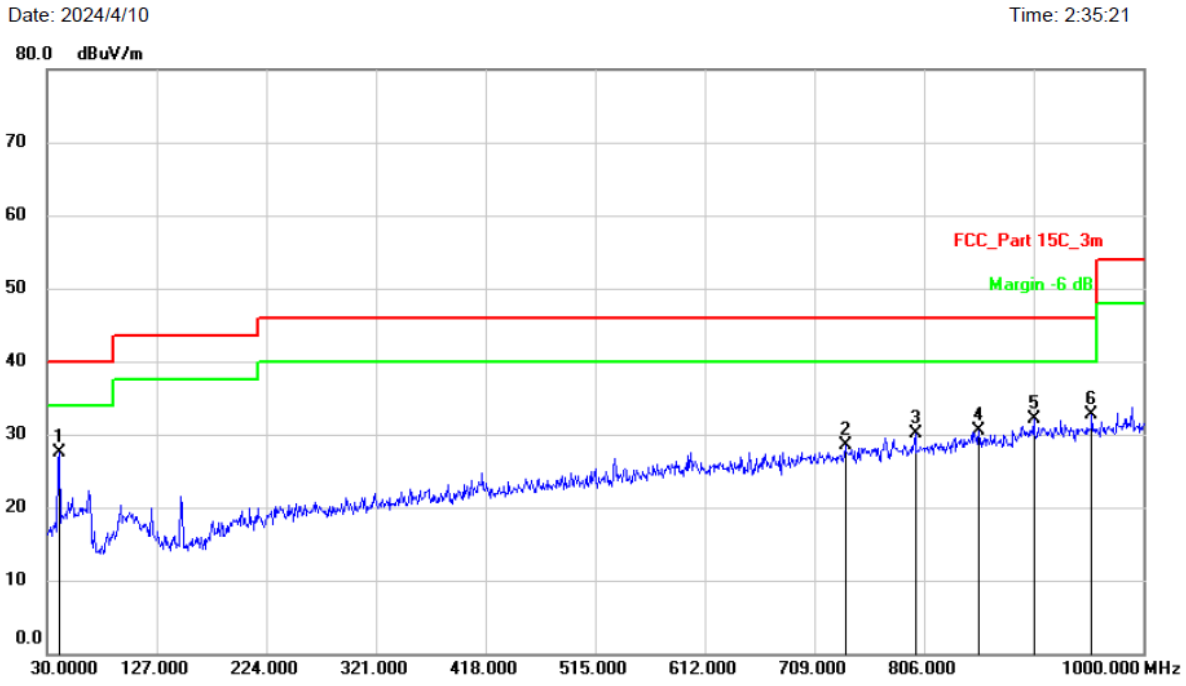
Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	13.5609	45.14	20.56	65.70	124.00	-58.30	QP	

M/N: LBD-MODE5T0	Testing Voltage: AC 120V / 60Hz
Polarization: Horizontal	Detector: QP
Test Mode: TX	Distance: 3m

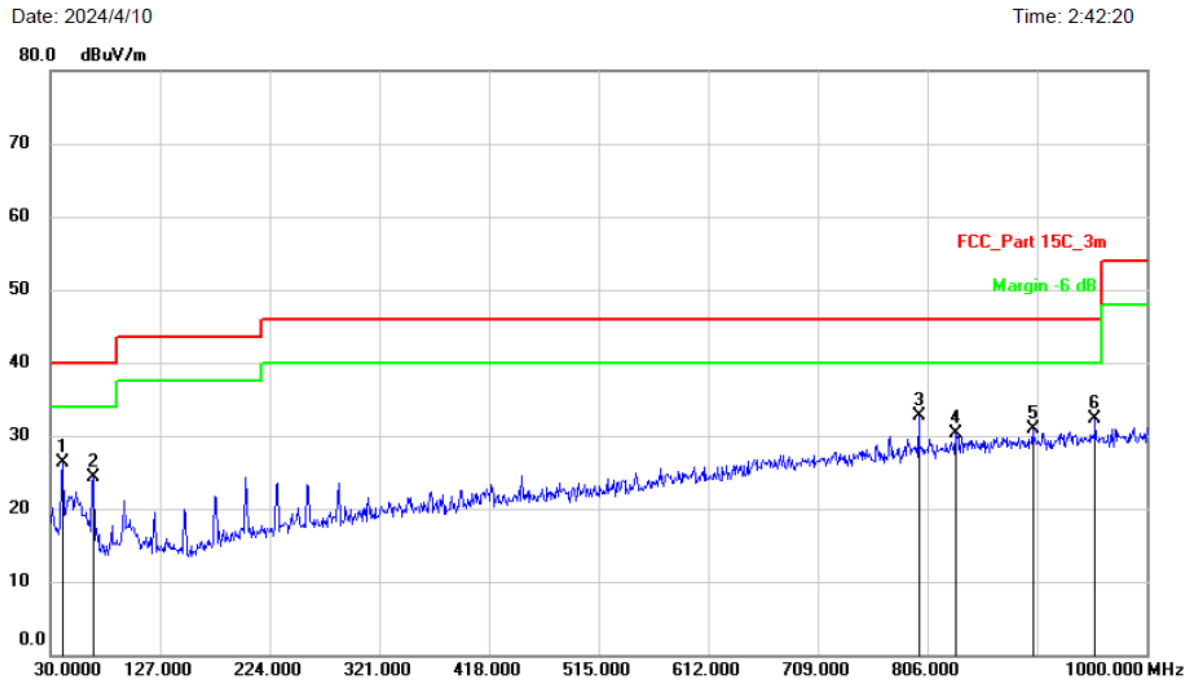
Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	40.6699	35.40	-7.84	27.56	40.00	-12.44	QP	
2		736.1599	25.61	2.81	28.42	46.00	-17.58	QP	
3		798.2400	26.23	3.92	30.15	46.00	-15.85	QP	
4		854.5000	25.66	4.83	30.49	46.00	-15.51	QP	
5		903.0000	25.92	6.20	32.12	46.00	-13.88	QP	
6		954.4100	26.50	6.28	32.78	46.00	-13.22	QP	

M/N: LBD-MODE5T0	Testing Voltage: AC 120V / 60Hz
Polarization: Vertical	Detector: QP
Test Mode: TX	Distance: 3m

Radiated Emission Measurement



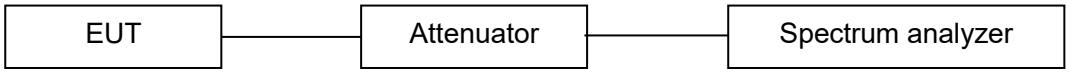
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		40.6699	34.07	-7.84	26.23	40.00	-13.77	QP	
2		67.8300	34.28	-10.06	24.22	40.00	-15.78	QP	
3	*	798.2400	28.71	3.92	32.63	46.00	-13.37	QP	
4		831.2199	25.82	4.50	30.32	46.00	-15.68	QP	
5		899.1200	25.86	4.96	30.82	46.00	-15.18	QP	
6		954.4100	27.29	5.10	32.39	46.00	-13.61	QP	

13.3 20dB Occupied Bandwidth

LIMIT

According to 15.215 (C), Intentional radiators operating under the alternative provisions to the general emission limits, as contained in 15.217through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whateverbandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within thefrequency band designated in the rule section under which the equipment is operated. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bandsidentified in that subp art. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employedas well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequencystability is not specified in the regulations, it is recommended that the fundam ental emission be kept within at least the central
80% of the permitted band in order to minimize the possibility of out- -of-band operation.

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

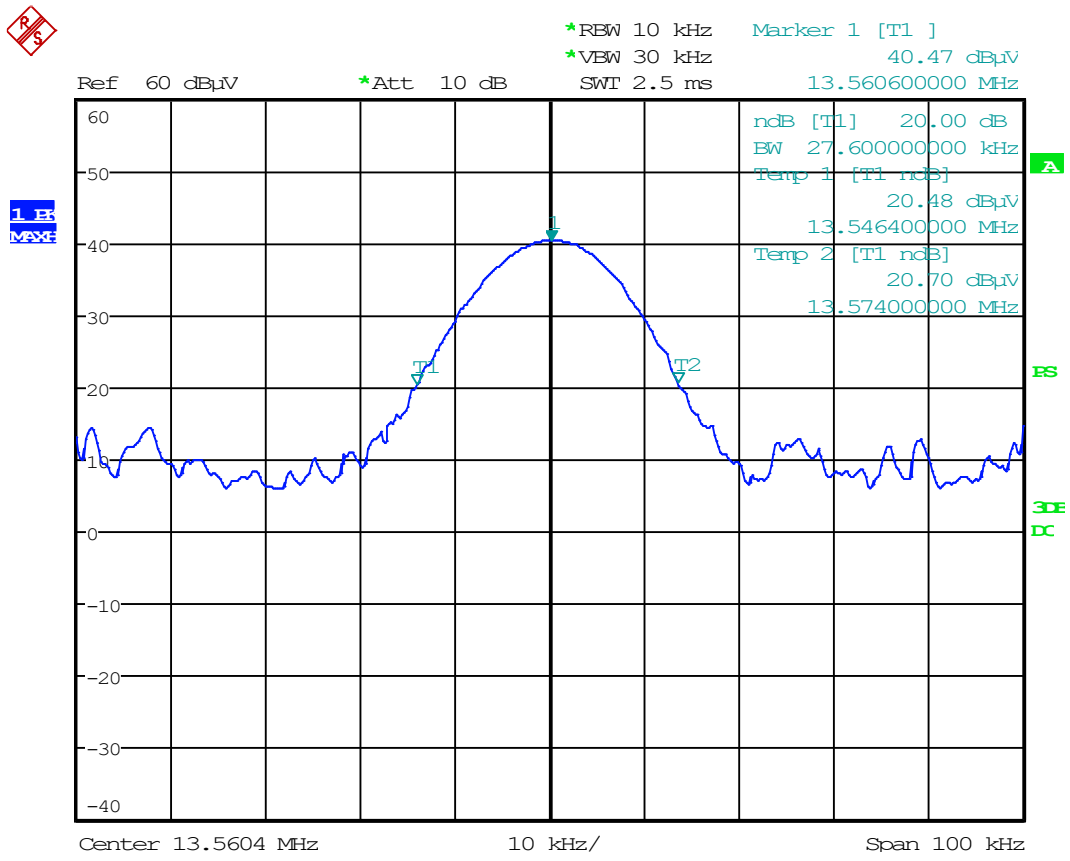
1. The output port (antenna) from the transmitter was connected to an attenuator and then to the input of the RF Spectrum analyzer.
2. Spectrum analyzer set the corresponding parameters for measurement and record the tested data

TEST RESULTS

PASS

Please refer to the following table.

Frequency (MHz)	20 dB Bandwidth (KHz)	Result
13.5606	27.60	PASS
Test Photo		

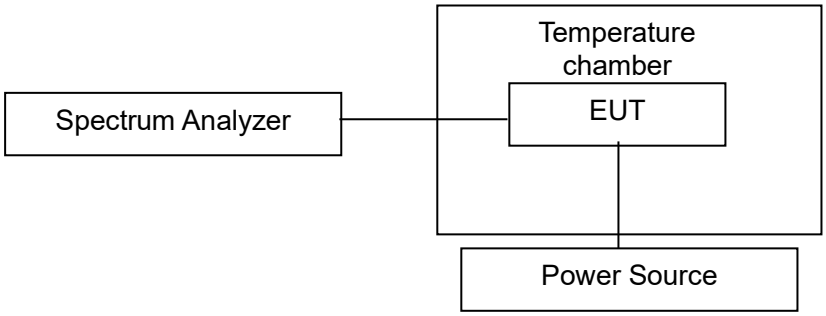


13.4 Frequency Stability

LIMIT

15.225 (e) The frequency tolerance of the carrier signal shall be maintained within 0.01 % of the operating frequency over atemperature variation of -20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, theequipment tests shall be performed using a new battery.

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

a. The EUT was placed inside the environmental test chamber and powered by Power source.
b. Turn the EUT on and couple its output to a spectrum analyzer.
c. Turn the EUT off and set the chamber to the highest temperature specified.
d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
f. The chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
Note: The EUT set at un-modulation mode during frequency stability test.

TEST RESULTS

PASS

Please refer to the following table.

Frequency (MHZ)	Temperature (℃)	Power Supplied (Vdc)	Measurement Frequency (MHZ)	Frequency Error (%)	Limit	Test Result
13.5608	-20	120	13.5609	0.00074%	±0.01%	Pass
	-10		13.5609	0.00074%	±0.01%	Pass
	0		13.5609	0.00074%	±0.01%	Pass
	10		13.5610	0.00147%	±0.01%	Pass
	20		13.5609	0.00074%	±0.01%	Pass
	30		13.5610	0.00147%	±0.01%	Pass
	40		13.5610	0.00147%	±0.01%	Pass
	50		13.5609	0.00074%	±0.01%	Pass
	20	102	13.5608	0.00000%	±0.01%	Pass
	20	138	13.5608	0.00000%	±0.01%	Pass

13.5 Antenna Requirement

STANDARD APPLICABLE

According to of FCC part 15C section 15.203:

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.

ANTENNA CONNECTED CONSTRUCTION

The antenna is PCB antenna that no antenna other than furnished by the responsible party shall be used with the device, and the best case gain of the antenna is 0dBi, Therefore, the antenna is consider meet the requirement.

14. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI7	100837	Mar. 13, 2024	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Mar. 23, 2024	2 Year
3.	Spectrum Analyzer	Keysight	N9020A	MY50510314	Mar. 13, 2024	1 Year
4.	Spectrum Analyzer	Keysight	N9020A	MY54200831	Mar. 13, 2024	1 Year
5.	Spectrum Analyzer	Rohde & Schwarz	FSV40	101094	Mar. 13, 2024	1 Year
6.	Horn Antenna	COM-Power	AH-840	10100020	Mar. 23, 2024	2 Year
7.	Power Sensor	DARE	RPR3006W	15I00041SNO 64	Mar. 13, 2024	1 Year
8.	Horn Antenna	COM-Power	AH-118	071078	Mar. 23, 2024	2 Year
9.	Pre-Amplifier	HP	HP 8449B	3008A00964	Mar. 13, 2024	1 Year
10.	Pre-Amplifier	HP	HP 8447D	1145A00203	Mar. 13, 2024	1 Year
11.	Loop Antenna	Schwarzbeck	FMZB 1513	1513-272	Mar. 23, 2024	2 Year
12.	Test Receiver	Rohde & Schwarz	ESCI	101152	Mar. 13, 2024	1 Year
13.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	Mar. 13, 2024	1 Year
14.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	Mar.13, 2024	1 Year
15.	Temporary antenna connector	TESCOM	SS402	N/A	N/A	N/A
16.	Test Software	EZ	EZ_EMC NTC-3A1.1	N/A	N/A	N/A

Note: For photographs of EUT and measurement, please refer to appendix in separate documents.

---End---