

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. : LSD1U-4R5x, LSD1U-6Rx (For model difference refer to section 2)
FCC ID..... : 2BFGT-LSD1U
Measurement Standard..... : 47 CFR FCC Part 15, Subpart C (Section 15.225)
Receipt Date of Samples..... : January 22, 2025
Date of Tested..... : January 22, 2025 to February 26, 2025
Date of Report..... : March 08, 2025

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 NTC approval of Dongguan
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Prepared by

Jenny Liu / Project Engineer



Approved by

Iori Fan / Authorized Signatory

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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:	LSD1U-4R5C
Additional Model Name:	LSD1U-4R5x, LSD1U-6Rx (x can be 1, 2, 4, 6, C)
Model Difference:	These models have the same circuitry, electrical mechanical, PCB Layout and construction. The differences are model name, series, pins, communication mode, power and baud rate due to marketing purpose. Details refer to page 6.
S/N:	2501-1009
Brand Name:	LANDSHR
Hardware Version:	LSD1Useries
Software Version:	03
Rating:	DC 5V come from Laptop
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:	According to model differences, all the test were performed on the model LSD1U-4R5C
Remark:	All the information above are provided by the manufacturer. More detailed feature of the EUT please refers to the user manual.

Model differences

LSD1U-4R5x (x can be 1, 2, 4, 6, C)

LS	D	1U	4	R	5	x
Manufacturer	Product code	Series	Pins	Communication code	Power	Baud rate
Landshr	Contactless IC card read and write module	1U series	4 pins	R: RS232 T: TTL	5: DC 5V	1: 9600 2: 19200 4: 38400 6: 57600 C: 115200

LSD1U-6Rx (x can be 1, 2, 4, 6, C)

LS	D	5U	6	R	x
Manufacturer	Product code	Series	Pins	Communication code	Baud rate
Landshr	Contactless IC card read and write module	5U series	6 pins	R: RS232 T: TTL	1: 9600 2: 19200 4: 38400 6: 57600 C: 115200

Technical Specification

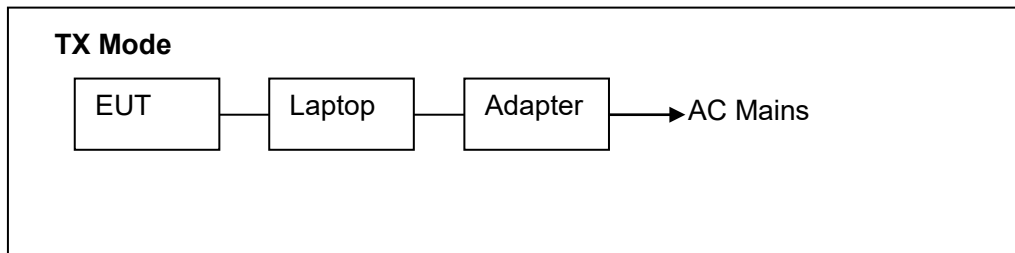
Declaring the Frequency:	13.5612MHz
Modulation Type:	ASK
Antenna Type:	PCB antenna
Antenna Gain:	0 dBi (Declared by manufacturer)
Number of Channels:	1

3. Test Channels and Modes Detail

Mode		Test Frequency (MHz)	Modulation	Data Rate (Mbps)
1	TX	13.5612MHz	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 1	Lenovo	R720-151KBN	PF0Z35FH	---	Provided by the Lab
2.	Adapter (Laptop)	Delta	ADL135NDC3A	---	AC Line: 1.10m unshielded DC Line: 1.15m unshielded with a core	Provided by the Lab
3.	Laptop 2	DELL	VOSTR03400	H3K2XA01	---	Provided by the Lab
4.	Adapter (Laptop)	DELL	HA45NM140	---	AC Line: 1.13m unshielded DC Line: 1.15m unshielded with a core	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, 2030 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 The Certificate is valid until December 31, 2025 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:

- The testing climatic conditions for temperature, humidity, and atmospheric pressure are within: 15~35°C, 30~70%, 86~106kPa.
- AC 120V 60Hz come from the PC.

11. Measurement Uncertainty

No.	Test Item	Frequency	Uncertainty	Remarks
1.	Conducted Emission	150KHz ~ 30MHz	±2.52 dB	---
2.	Radiated Emission Test	9kHz ~ 30MHz	±5.60 dB	---
		30MHz ~ 1GHz	±5.60 dB	---
		1GHz ~ 18GHz	±5.22 dB	---
		18GHz ~ 40GHz	±5.22 dB	---
3.	Occupied Channel Bandwidth	---	±1.05%	---
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 uncertainty 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

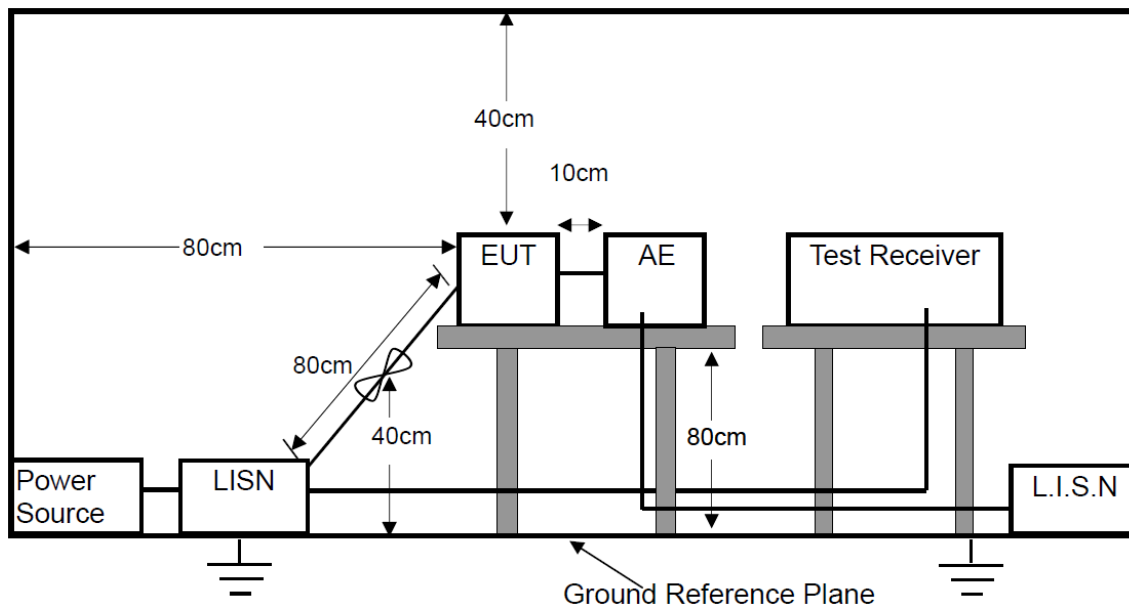
LIMIT

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

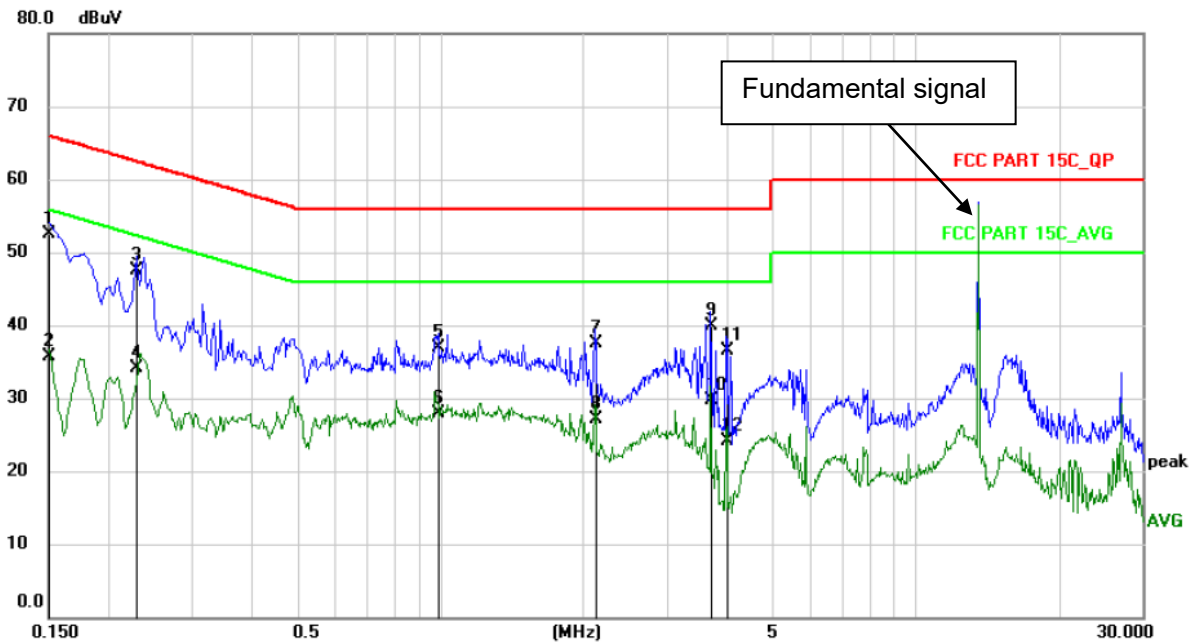
Please refer to the following pages.

M/N: LSD1U-4R5C	Testing Voltage: AC 120V 60Hz
Phase: L1	Detector: QP, AVG
Test Mode: TX	

Conducted Emission Measurement

Date: 2025/2/26

Time: 9:13:05



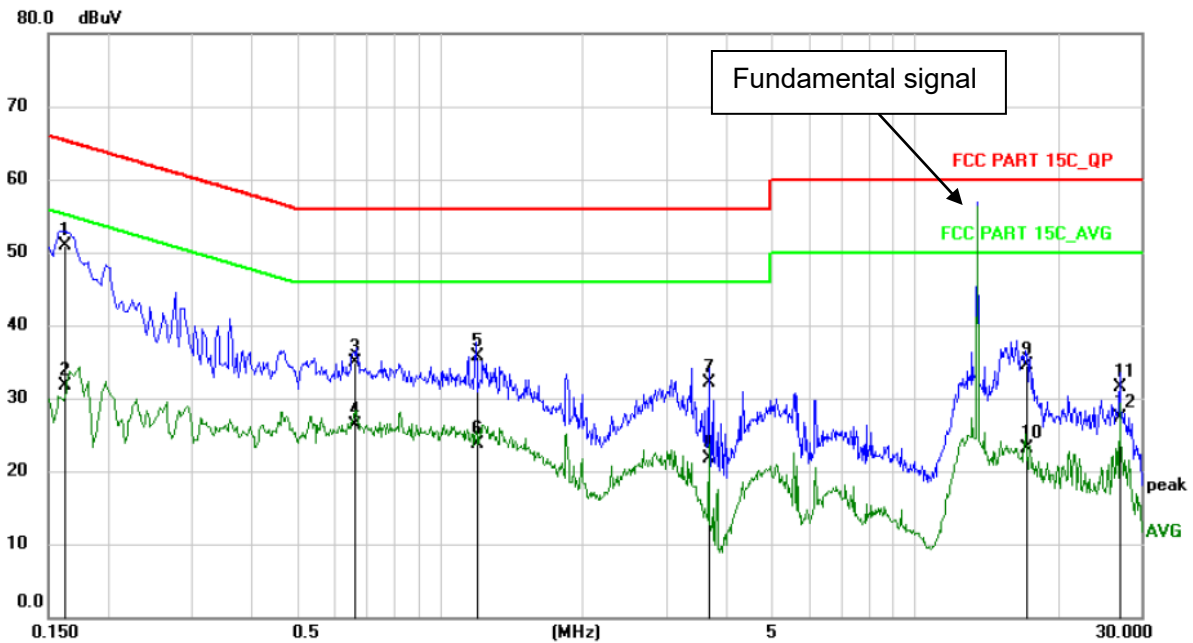
No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1 *	0.1500	42.48	9.98	52.46	66.00	-13.54	QP	
2	0.1500	25.72	9.98	35.70	56.00	-20.30	AVG	
3	0.2300	37.46	10.02	47.48	62.45	-14.97	QP	
4	0.2300	24.06	10.02	34.08	52.45	-18.37	AVG	
5	0.9900	26.94	10.00	36.94	56.00	-19.06	QP	
6	0.9900	17.90	10.00	27.90	46.00	-18.10	AVG	
7	2.1180	27.46	10.01	37.47	56.00	-18.53	QP	
8	2.1180	17.16	10.01	27.17	46.00	-18.83	AVG	
9	3.7060	29.80	10.05	39.85	56.00	-16.15	QP	
10	3.7060	19.72	10.05	29.77	46.00	-16.23	AVG	
11	4.0020	26.45	10.05	36.50	56.00	-19.50	QP	
12	4.0020	14.11	10.05	24.16	46.00	-21.84	AVG	

M/N: LSD1U-4R5C	Testing Voltage: AC 120V 60Hz
Phase: N	Detector: QP, AVG
Test Mode: TX	

Conducted Emission Measurement

Date: 2025/2/26

Time: 9:20:36



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
	MHz	dBuV	dB	dBuV	dBuV	dB		
1 *	0.1620	40.97	9.95	50.92	65.36	-14.44	QP	
2	0.1620	21.74	9.95	31.69	55.36	-23.67	AVG	
3	0.6620	24.94	9.98	34.92	56.00	-21.08	QP	
4	0.6620	16.41	9.98	26.39	46.00	-19.61	AVG	
5	1.1940	25.70	9.96	35.66	56.00	-20.34	peak	
6	1.1940	13.80	9.96	23.76	46.00	-22.24	AVG	
7	3.6980	22.02	10.01	32.03	56.00	-23.97	QP	
8	3.6980	11.72	10.01	21.73	46.00	-24.27	AVG	
9	17.1140	24.19	10.25	34.44	60.00	-25.56	QP	
10	17.1140	12.80	10.25	23.05	50.00	-26.95	AVG	
11	27.1220	20.72	10.81	31.53	60.00	-28.47	QP	
12	27.1220	16.43	10.81	27.24	50.00	-22.76	AVG	

13.2 Radiated Spurious Emissions Measurement

LIMIT

Frequency range MHz	Distance Meters	Field Strengths Limit (15.209)
		$\mu\text{V/m}$
0.009 ~ 0.490	300	$2400/F(\text{kHz})$
0.490 ~ 1.705	30	$24000/F(\text{kHz})$
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 $(\text{dB})\mu\text{V} = 20 \log \text{Emission level } \mu\text{V/m}$

(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.

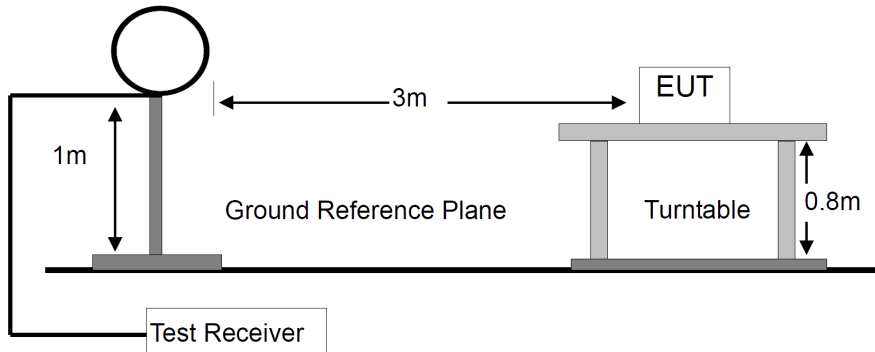
(5) §15.247(d) specifies that emissions which fall in the restricted bands, as defined in §15.205 comply with radiated emission limits specified in §15.209.

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

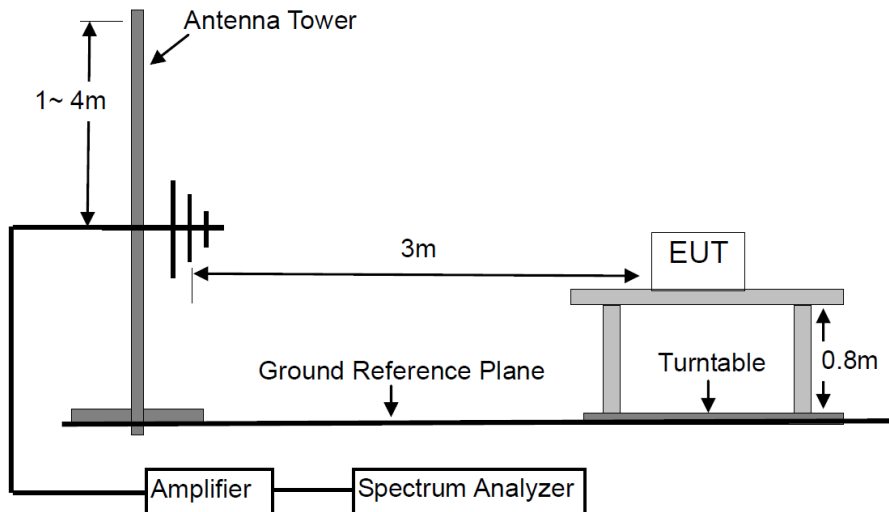
- (a) The field strength of any emissions within the band 13.553-13.567MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410-13.553MHz and 13.567-13.710MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110-13.410 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

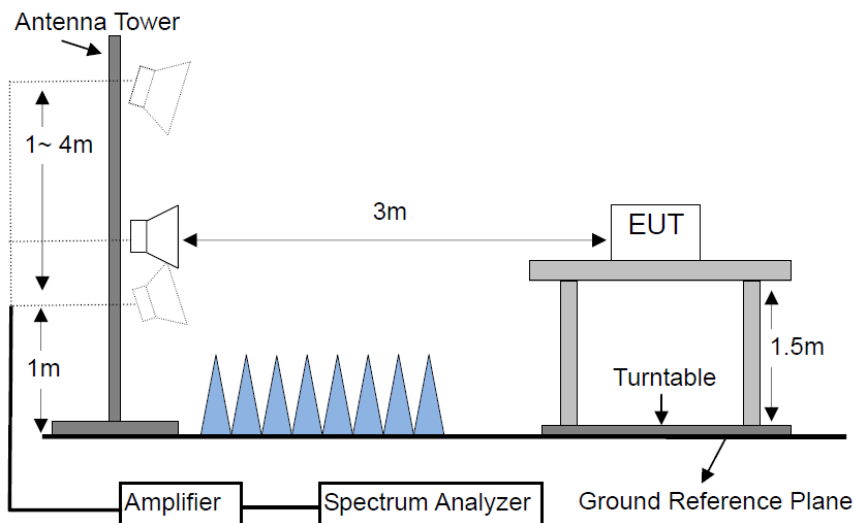
For Radiated Emission below 30MHz



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
0.009~0.09	AVG	300Hz	1KHz
0.091~0.109	QP	300Hz	1KHz
0.110~0.490	AVG	300Hz/ 9KHz	1KHz / 30KHz
0.15 -30	QP	10KHz	30KHz
30 to 1000	QP	120KHz	300KHz
Above 1000	Peak	1 MHz	3 MHz
	Average	1 MHz	10 Hz

TEST RESULTS

PASS

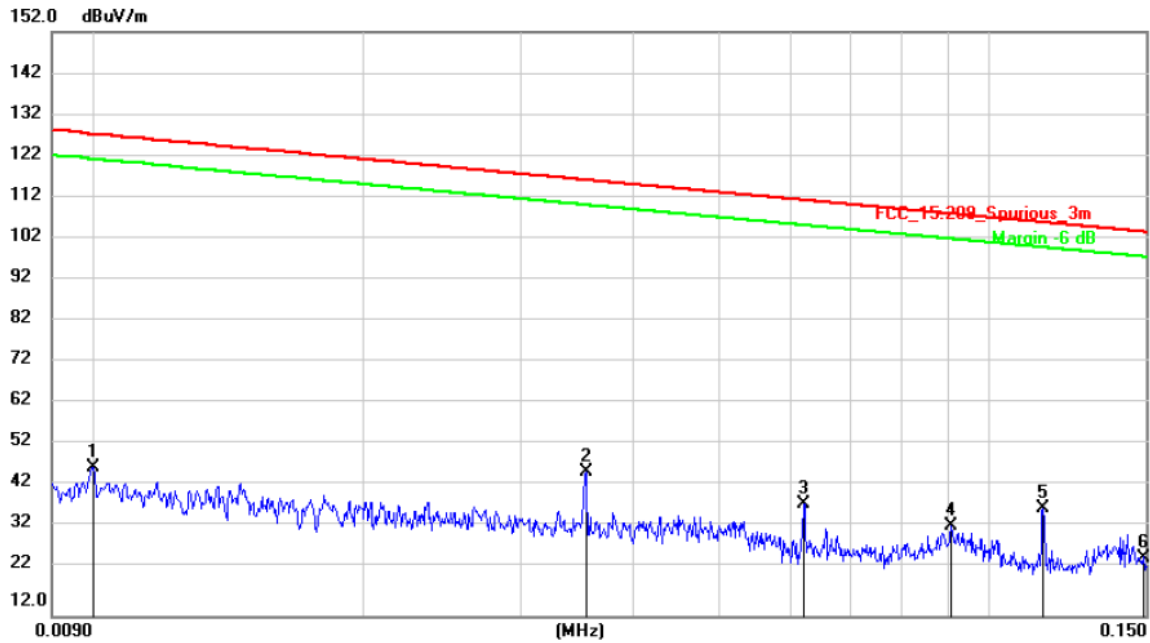
Please refer to the following pages.

M/N: LSD1U-4R5C	Testing Voltage: AC 120V 60Hz
Polarization: Horizontal	Detector: QP, AVG
Test Mode: TX	Distance: 3m

Radiated Emission Measurement

Date: 2025/2/8

Time: 9:12:15



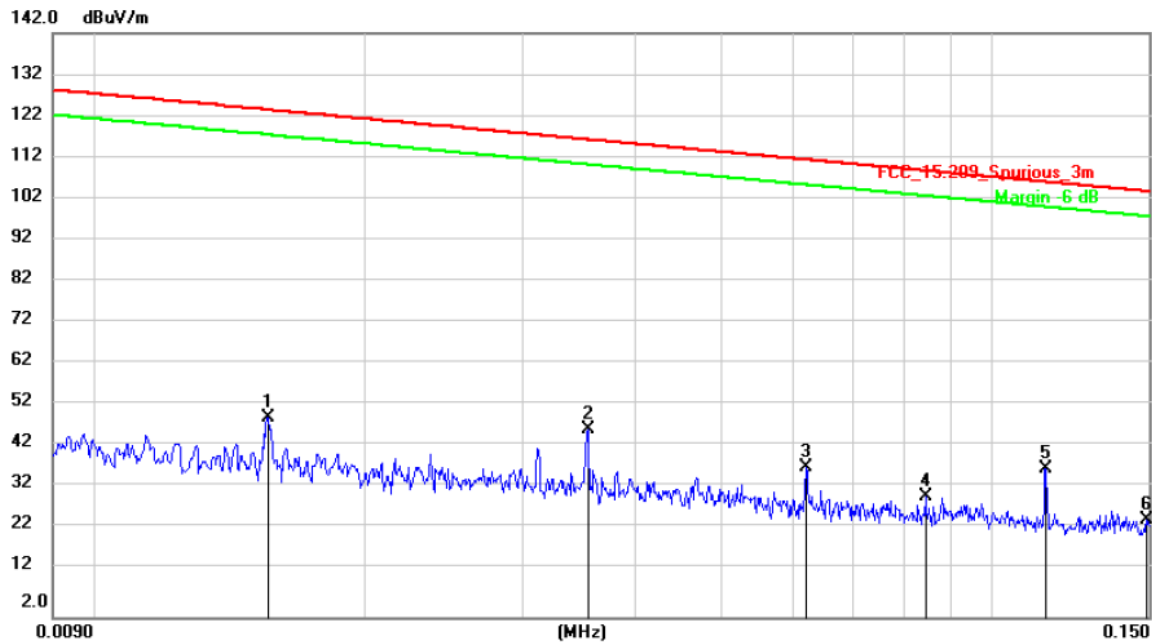
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.0100	28.16	19.51	47.67	127.42	-79.75	AVG	
2		0.0355	26.00	20.54	46.54	116.47	-69.93	AVG	
3		0.0621	18.17	20.54	38.71	111.64	-72.93	AVG	
4		0.0909	12.92	20.54	33.46	108.35	-74.89	QP	
5	*	0.1151	17.23	20.53	37.76	106.31	-68.55	AVG	
6		0.1491	5.48	20.52	26.00	104.08	-78.08	AVG	

M/N: LSD1U-4R5C	Testing Voltage: AC 120V 60Hz
Polarization: Vertical	Detector: AVG
Test Mode: TX	Distance: 3m

Radiated Emission Measurement

Date: 2025/2/8

Time: 9:33:27



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		0.0156	29.61	20.05	49.66	123.57	-73.91	AVG
2		0.0355	26.50	20.54	47.04	116.47	-69.43	AVG
3		0.0621	17.28	20.54	37.82	111.64	-73.82	AVG
4		0.0844	10.40	20.54	30.94	108.99	-78.05	AVG
5	*	0.1151	17.02	20.53	37.55	106.31	-68.76	AVG
6		0.1491	4.73	20.52	25.25	104.08	-78.83	AVG

M/N: LSD1U-4R5C

Testing Voltage: AC 120V 60Hz

Polarization: Horizontal

Detector: QP

Test Mode: TX

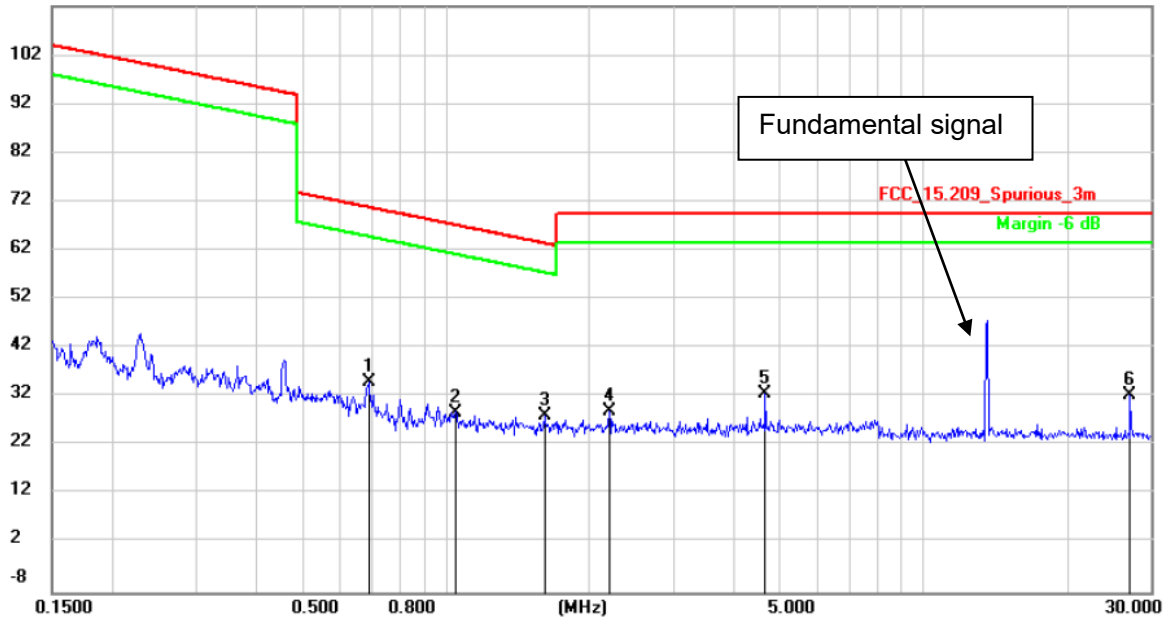
Distance: 3m

Radiated Emission Measurement

Date: 2025/2/8

Time: 9:19:58

112.0 dBuV/m



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.6900	14.59	20.41	35.00	70.83	-35.83	QP	
2		1.0485	8.50	20.40	28.90	67.19	-38.29	QP	
3	*	1.6104	7.86	20.40	28.26	63.47	-35.21	QP	
4		2.2014	8.62	20.40	29.02	69.50	-40.48	QP	
5		4.6715	12.35	20.45	32.80	69.50	-36.70	QP	
6		27.1269	11.82	20.59	32.41	69.50	-37.09	QP	

M/N: LSD1U-4R5C

Testing Voltage: AC 120V 60Hz

Polarization: Vertical

Detector: QP

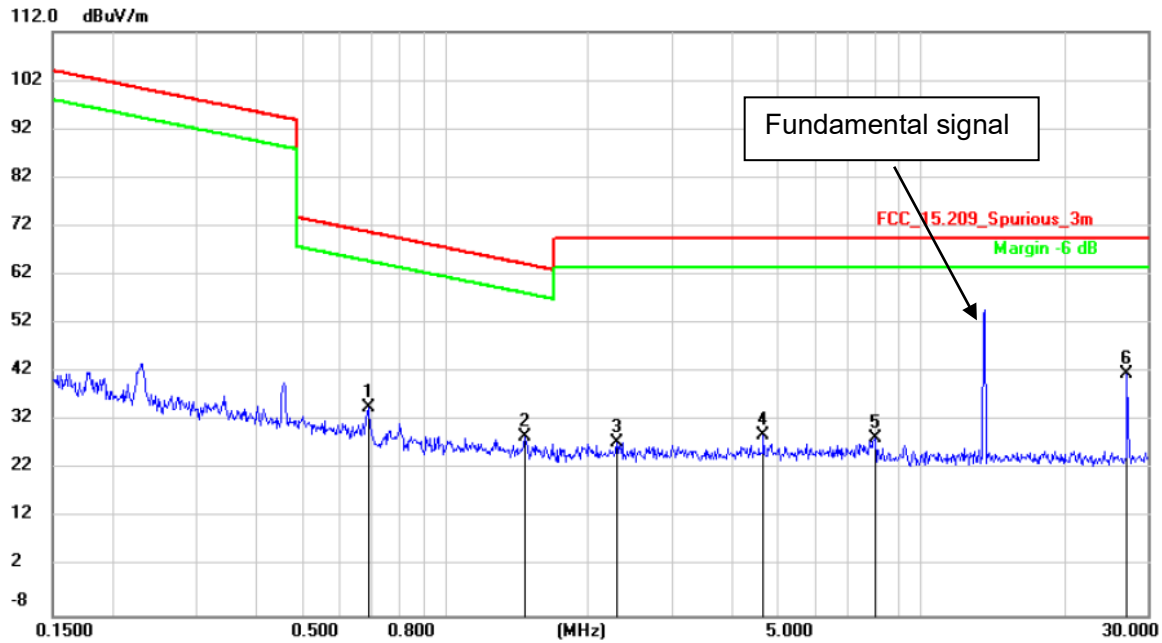
Test Mode: TX

Distance: 3m

Radiated Emission Measurement

Date: 2025/2/8

Time: 9:26:50



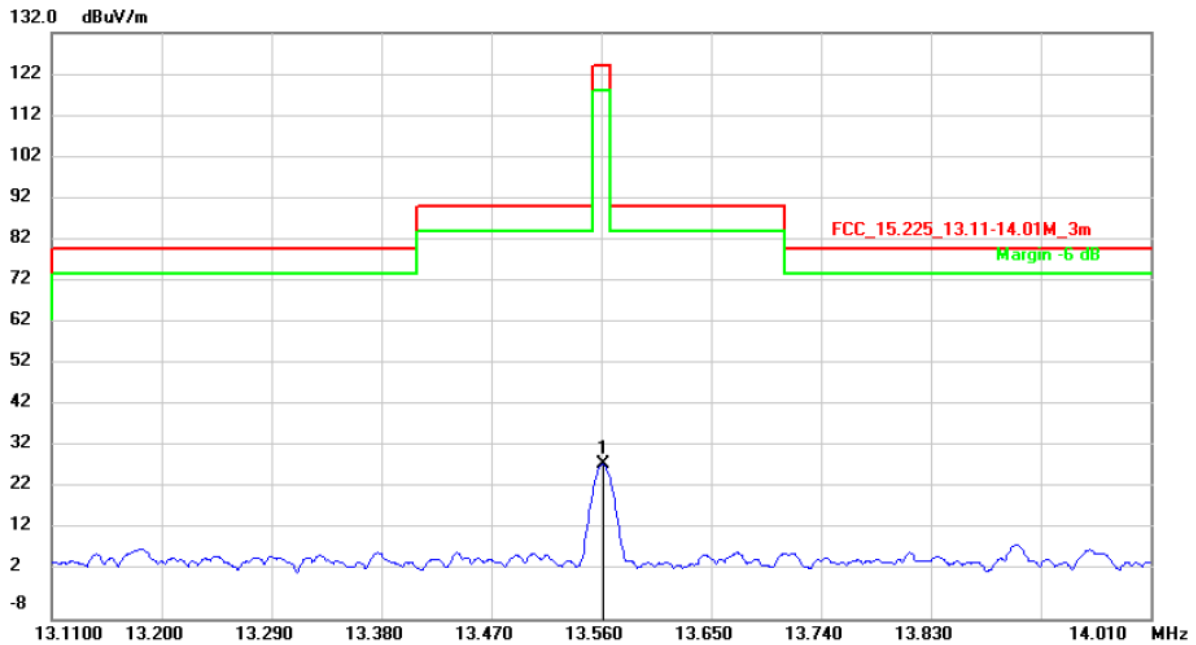
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector Comment
1		0.6900	14.35	20.41	34.76	70.83	-36.07	QP
2		1.4717	8.32	20.40	28.72	64.25	-35.53	QP
3		2.2967	7.25	20.40	27.65	69.50	-41.85	QP
4		4.6715	8.62	20.45	29.07	69.50	-40.43	QP
5		8.0198	7.85	20.51	28.36	69.50	-41.14	QP
6	*	27.1269	21.05	20.59	41.64	69.50	-27.86	QP

M/N: LSD1U-4R5C	Testing Voltage: AC 120V 60Hz
Polarization: Horizontal	Detector: QP
Test Mode: TX	Distance: 3m

Radiated Emission Measurement

Date: 2025/2/8

Time: 9:46:27



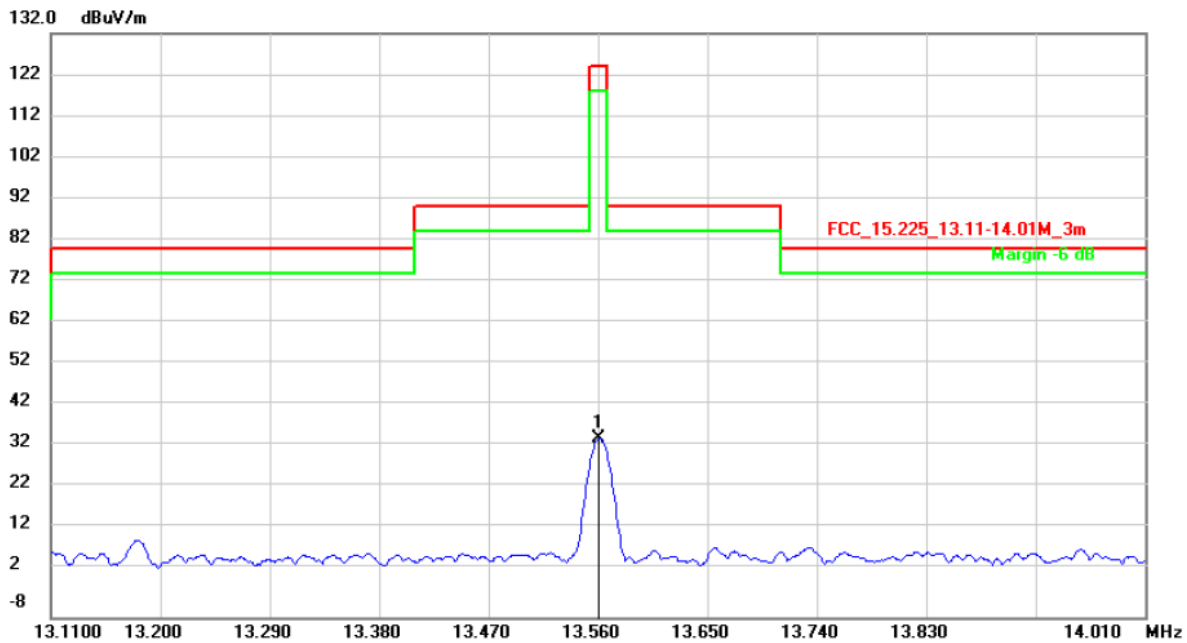
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	*	13.5612	8.36	20.56	28.92	124.00	-95.08	peak	

M/N: LSD1U-4R5C	Testing Voltage: AC 120V 60Hz
Polarization: Vertical	Detector: QP
Test Mode: TX	Distance: 3m

Radiated Emission Measurement

Date: 2025/2/8

Time: 9:40:37



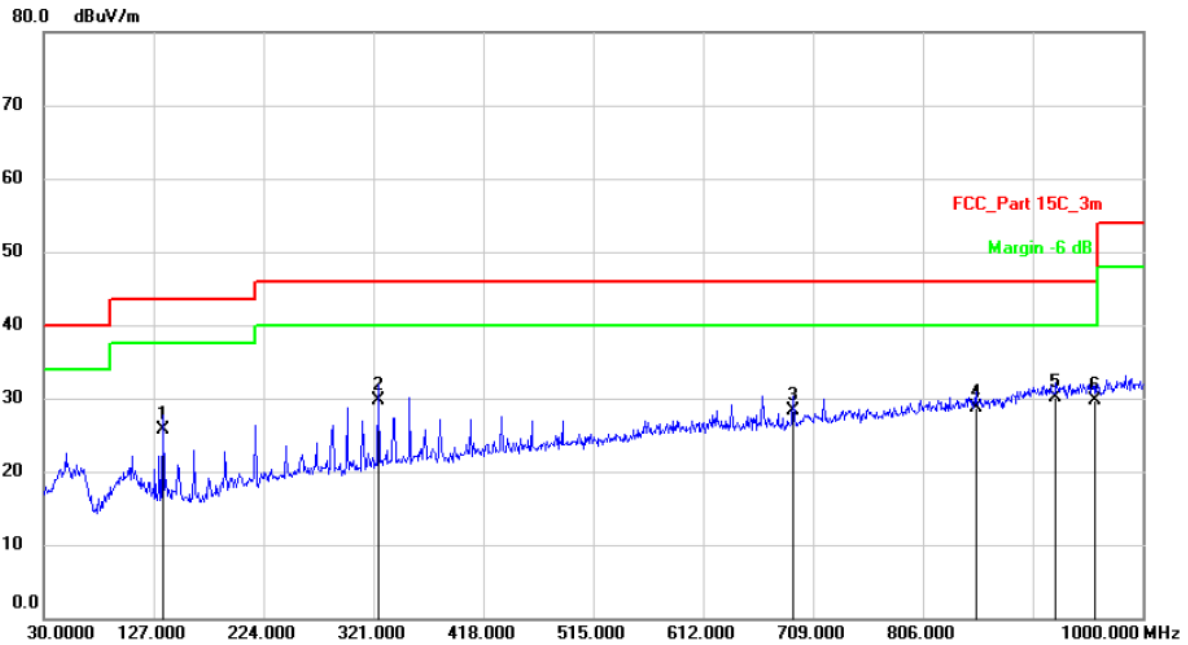
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	13.5612	14.46	20.56	35.02	124.00	-88.98	peak	

M/N: LSD1U-4R5C	Testing Voltage: AC 120V 60Hz
Polarization: Horizontal	Detector: QP
Test Mode: TX	Distance: 3m

Radiated Emission Measurement

Date: 2025/2/21

Time: 23:48:58



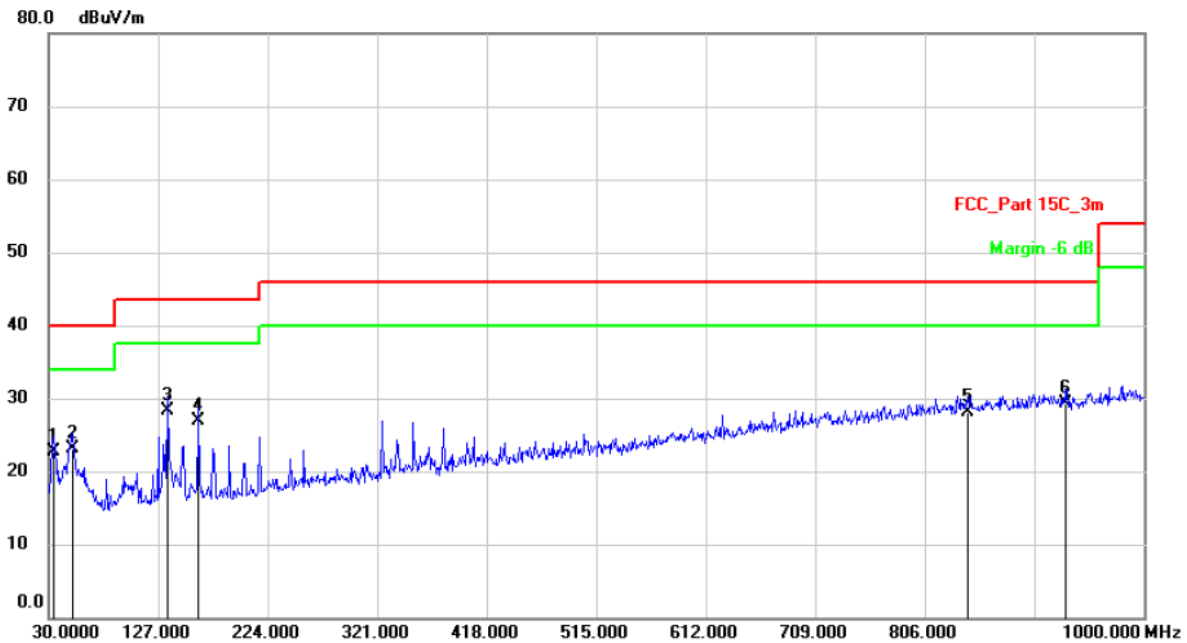
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		134.7600	36.43	-10.73	25.70	43.50	-17.80	QP	
2		324.8800	34.63	-4.83	29.80	46.00	-16.20	QP	
3		691.5400	26.28	2.02	28.30	46.00	-17.70	QP	
4		852.5600	23.98	4.82	28.80	46.00	-17.20	QP	
5	*	923.3700	23.86	6.24	30.10	46.00	-15.90	QP	
6		958.2900	23.41	6.29	29.70	46.00	-16.30	QP	

M/N: LSD1U-4R5C	Testing Voltage: AC 120V 60Hz
Polarization: Vertical	Detector: QP
Test Mode: TX	Distance: 3m

Radiated Emission Measurement

Date: 2025/2/21

Time: 23:55:52



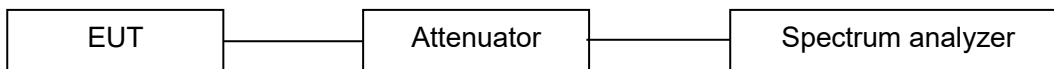
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB/m	dBuV/m	dBuV/m	dB		
1		33.8800	32.20	-9.40	22.80	40.00	-17.20	QP	
2		51.3400	30.33	-7.13	23.20	40.00	-16.80	QP	
3	*	135.7300	39.66	-11.36	28.30	43.50	-15.20	QP	
4		162.8900	37.64	-10.74	26.90	43.50	-16.60	QP	
5		843.8300	23.51	4.69	28.20	46.00	-17.80	QP	
6		931.1300	24.30	5.00	29.30	46.00	-16.70	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 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency 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 bands identified in that subpart. 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 employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental 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

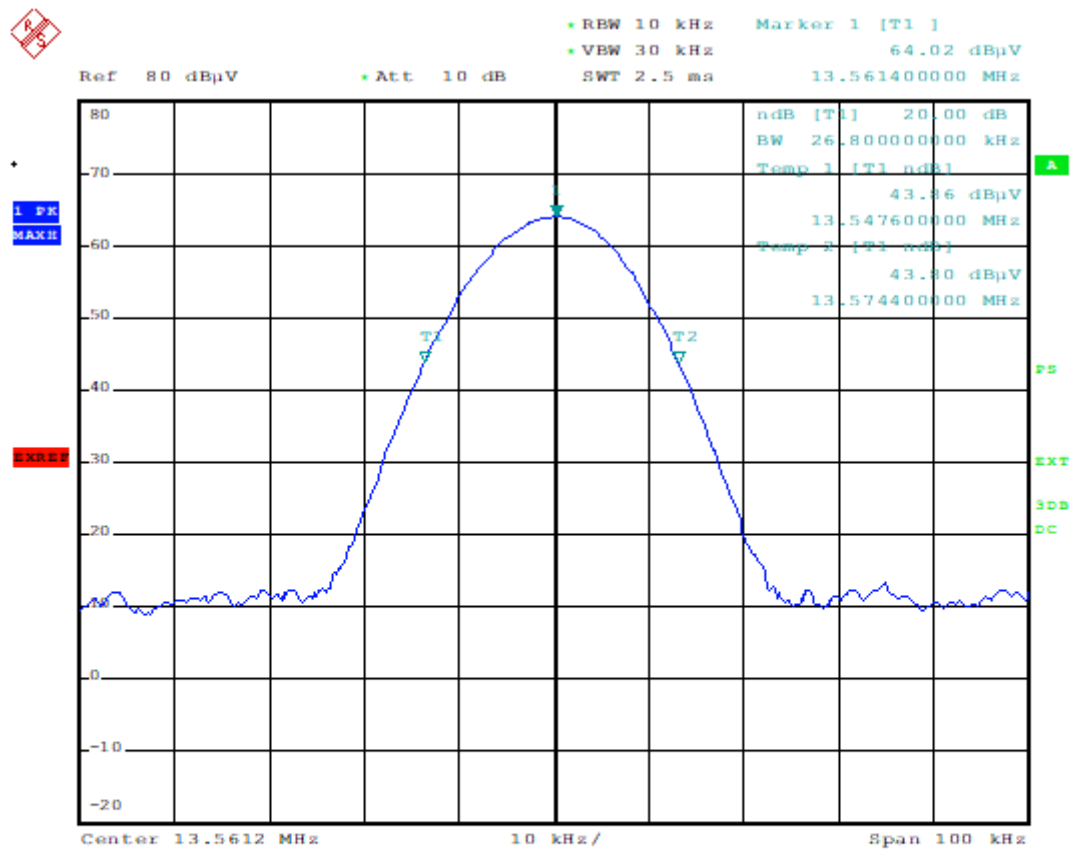
TEST RESULTS

PASS

Please refer to the following table.

Frequency (MHz)	20 dB Bandwidth (KHz)	Result
13.5614	26.80	PASS

Test Photo



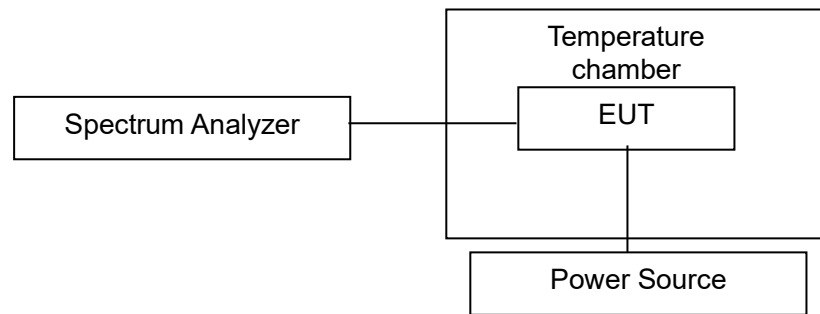
Date: 8.FEB.2025 10:04:07

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 a temperature 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, the equipment tests shall be performed using a new battery.

BLOCK DIAGRAM OF TEST SETUP



TEST PROCEDURES

- The EUT was placed inside the environmental test chamber and powered by Power source.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- 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.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- 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 (°C)	Power Supplied (Vdc)	Measurement Frequency (MHZ)	Frequency Error (%)	Limit	Test Result
13.5612	-30	120	13.5610	-0.00147%	±0.01%	Pass
	-20		13.5610	-0.00147%	±0.01%	Pass
	-10		13.5610	-0.00147%	±0.01%	Pass
	0		13.5610	-0.00147%	±0.01%	Pass
	10		13.5610	-0.00147%	±0.01%	Pass
	20		13.5610	-0.00147%	±0.01%	Pass
	30		13.5610	-0.00147%	±0.01%	Pass
	40		13.5610	-0.00147%	±0.01%	Pass
	50		13.5610	-0.00147%	±0.01%	Pass
	20	102	13.5610	-0.00147%	±0.01%	Pass
	20	138	13.5610	-0.00147%	±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. 12, 2024	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Mar. 23, 2024	2 Year
3.	Spectrum Analyzer	Keysight	N9020A	MY54200831	Mar. 12, 2024	1 Year
4.	Spectrum Analyzer	Keysight	N9010B	MY62170254	Aug. 14, 2024	1 Year
5.	Power Sensor	DARE	RPR3006W	15I00041SNO 64	Mar. 12, 2024	1 Year
6.	Horn Antenna	COM-Power	AH-118	071078	Mar. 23, 2024	2 Year
7.	Pre-Amplifier	HP	HP 8449B	3008A00964	Mar. 12, 2024	1 Year
8.	Pre-Amplifier	HP	HP 8447D	1145A00203	Mar. 12, 2024	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1513	1513-272	Mar. 23, 2024	2 Year
10.	Horn Antenna	COM-Power	AH-840	10100020	Mar. 23, 2024	2 Year
11.	Test Receiver	Rohde & Schwarz	ESCI	101152	Mar. 12, 2024	1 Year
12.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	Mar. 12, 2024	1 Year
13.	L.I.S.N	Rohde & Schwarz	ESH2-Z5	893606/014	Mar. 12, 2024	1 Year
14.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	Mar. 12, 2024	1 Year
15.	Temperature & Humidity Chamber	Wanshun	SS-HWHS-80	N/A	Mar. 12, 2024	1 Year
16.	DC Source	Maynuo	MY8811	N/A	Mar. 12, 2024	1 Year
17.	Temporary antenna connector	TESCOM	SS402	N/A	N/A	N/A
18.	Chamber	SAEMC	9*7*7m	N/A	Apr. 21, 2023	2 Year
19.	Test Software	EZ	EZ_EMG, NTC-3A1.1	N/A	N/A	N/A
20.	Test Software	MWRF	MTS 8310, V2.0.0.0	N/A	N/A	N/A

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

---End---