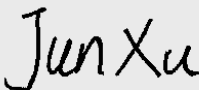
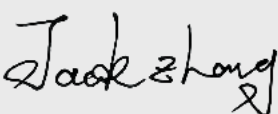


Test report No:
2430061R-RF-US-P06V01

FCC&ISED TEST REPORT

Product Name	LoRa Module
Trademark	Murata
Model and /or type reference	1SJ
FCC ID	VPYLBAA0QB1SJ
IC	772C-LBAA0QB1SJ
Applicant's name / address	Murata Manufacturing Co., Ltd. 10-1, Higashikotari 1-chome, Nagaokakyo-shi, Kyoto 617-8555, Japan
Test method requested, standard	47 CFR FCC Part 15 (Section 15.247) ANSI C63.10: 2013 RSS-Gen Issue 5 RSS-247 Issue 3
Verdict Summary	IN COMPLIANCE
Tested by (name / position & signature)	Jun Xu / Project Engineer 
Approved by (name / position & signature)	Jack Zhang/ Manager 
Date of issue	2024-06-11
Report Version	V1.0
Report template No	Template_FCC 15.247-RF-V1.0

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COMPETENCES AND GUARANTEES

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA.

GENERAL CONDITIONS

Test Location	No. 99, Hongye Road, Suzhou Industrial Park Suzhou, 215006, P.R. China
Date(receive sample)	Apr. 07, 2024
Date (start test)	Apr. 10, 2024
Date (finish test)	May. 22, 2024

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.

ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15 °C - 35 °C
Relative Humidity air	30% - 60%

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT	: Equipment Under Test
QP	: Quasi-Peak
CAV	: CISPR Average
AV	: Average
CDN	: Coupling Decoupling Network
SAC	: Semi-Anechoic Chamber
OATS	: Open Area Test Site
BW	: Bandwidth
AM	: Amplitude Modulation
PM	: Pulse Modulation
HCP	: Horizontal Coupling Plane
VCP	: Vertical Coupling Plane
U_N	: Nominal voltage
T_x	: Transmitter
R_x	: Receiver
N/A	: Not Applicable
N/M	: Not Measured

DOCUMENT HISTORY

Report No.	Version	Description	Issued Date
2430061R-RF-US-P06V01	V1.0	Initial issue of report.	2024-06-11

REMARKS AND COMMENTS

1. The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).
2. This product has been passed FCC & IC certification, now a new antenna is added, after retest output power and radiated surprious emission, this change confirm with class II premissive change and C2PC requirements. These test results on a sample of the device are for the purpose of demonstrating Compliance with 47 CFR FCC Part 15 (Section 15.247), RSS-247 Issue 3. RSS-Gen Issue 5.
3. The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to account the uncertainty associated with the measurement result.
4. The test results presented in this report relate only to the object tested.
5. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification (Suzhou) Co., Ltd.
6. This report will not be used for social proof function in China market.
7. DEKRA declines any responsibility with the following test data provided by customer that may affect the validity of result:
 - Chapter 1.1 General Description of the Item(s);
 - Chapter 1.2 Antenna Informaion;
 - Chapter 1.3 Data Rate;
 - Chapter 1.4 Channel List;
 - Chapter 1.5 Power Setting

USED EQUIPMENT

Conducted Test/ TR8

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date	Firmware Version	Software version
Wireless Connectivity Tester	R&S	CMW 270	102593	2023.05.20	2024.05.19	V 4.0.60	N/A
Wireless Connectivity Tester	R&S	CMW 270	102593	2024.05.15	2025.05.15	V 4.0.60	N/A
Coaxial Cable	N/A	N/A	2477	2023.06.08	2024.06.07	N/A	N/A
Coaxial Cable	N/A	N/A	2478	2023.06.08	2024.06.07	N/A	N/A
High and low temperature and fast temperature change test box	ASTUOD	ASTD-FBT-225K	N/A	2023.04.25	2024.4.24	N/A	N/A
High and low temperature and fast temperature change test box	ASTUOD	ASTD-FBT-225K	N/A	2024.04.21	2025.4.20	N/A	N/A
Temperature/Humidity Meter	RTS	RTS-8S	RF08	2023.08.25	2024.08.24	N/A	N/A
Test system							
Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date	Firmware Version	Software version
MAX Signal Analyzer	Keysight	N9010A	MY48030494	2023.11.08	2024.11.07	A.14.03	N/A
RF Control Unit	Tonscend	JS0806-2	22G8060594	2024.02.06	2025.02.05	N/A	N/A
RF Control Unit	Tonscend	JS0806-2	22G8060594	2024.01.31	2025.01.30	N/A	N/A
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY61252529	2023.05.20	2024.05.19	B.01.96	N/A
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY61252529	2024.05.12	2025.05.11	B.01.96	N/A
Frequency extender for EXG or MXG	Keysight	N5182BX07	MY59362500	2024.03.20	2025.03.19	N/A	N/A
EXG-B MW Analog Signal Generator	Keysight	N5173B	MY61252566	2023.08.26	2024.08.25	B.01.95	N/A
Test Software	Tonscend	TS1120	JS1120-3	N/A	N/A	N/A	V3.0.22

Radiated Emission(9KHz-1GHz) / AC2

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date	Firmware Version	Software version
EMI Test Receiver	R&S	ESCI	100573	2023.09.15	2024.09.14	4.42 SP3	N/A
Loop Antenna	R&S	HFH2-Z2E	101149	2024.03.27	2025.03.26	N/A	N/A
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2023.09.13	2024.09.12	N/A	N/A
Temperature/Humidity Meter	RTS	RTS-8S	AC2-TH	2023.08.25	2024.08.24	N/A	N/A
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2023.08.21	2024.08.20	N/A	N/A
Dekra test software	Dekra	N/A	N/A	N/A	N/A	N/A	3

Radiated Emission (1GHz-40GHz) / AC5

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date	Firmware Version	Software version
EXA Spectrum Analyzer	Keysight	N9020B	MY60112218	2023.11.08	2024.11.07	A.31.05	N/A
Pre-Amplifier	SKET	LNPA_0118 G-45	SK2021090101	2023.05.14	2024.05.13	N/A	N/A
Pre-Amplifier	SKET	LNPA_0118 G-45	SK2021090101	2023.04.27	2025.04.26	N/A	N/A
Preamplifier	CHENGYI	EMC184045 SE	980263	2023.07.09	2024.07.08	N/A	N/A
DRG Horn	ETS-Lindgren	3117	00123988	2023.09.16	2024.09.15	N/A	N/A
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2023.05.31	2024.05.30	N/A	N/A
Filter Switch Box	MVE	MSW-F196	C070001S	2023.05.21	2024.05.20	N/A	N/A
Filter Switch Box	MVE	MSW-F196	C070001S	2023.04.20	2025.04.19	N/A	N/A
Temperature / Humidity Meter	RTS	RTS-8S	AC5-TH	2023.08.19	2024.08.18	N/A	N/A
Coaxial Cable	ROSENBERGER	LA1-C011-2000/3000	AC5-40G	2024.01.25	2025.01.24	N/A	N/A
Coaxial Cable	ROSENBERGER	LA1-C011-2000/3000	AC5-40G-2	2023.08.21	2024.08.20	N/A	N/A
Cable	Rosenberger	LA1-C011-1000	0523	2023.08.21	2024.08.20	N/A	N/A
Dekra test software	Dekra	N/A	N/A	N/A	N/A	N/A	3

UNCERTAINTY

Uncertainties have been calculated according to the DEKRA internal document. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%. Uncertainties is comply with standard required as below.

Test item	Uncertainty
AC Power Line Conducted Emission	± 2.92 dB
Peak Power Output	± 1.13 dB
Radiated Emission(30MHz~1GHz)	Horizontal: 30MHz~200MHz: 4.60 dB 200MHz~1GHz: 4.10 dB Vertical: 30MHz~200MHz: 4.80 dB 200MHz~1GHz: 4.10 dB
Radiated Emission(1GHz~26.5GHz)	Horizontal: 1GHz~18GHz: 5.00 dB Vertical: 1GHz~18GHz: 4.80 dB Horizontal: 18GHz~40GHz: 4.70 dB Vertical: 18GHz~40GHz: 4.60 dB
RF antenna conducted test	± 1.13 dB
Radiated Emission Band Edge	± 5.00 dB
DTS Bandwidth	± 279 Hz
Occupied Bandwidth	± 279 Hz
Power Density	± 1.13 dB

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Product Name..... :	LoRa Module
Model No. :	1SJ
FCC ID..... :	VPYLBAA0QB1SJ
IC..... :	772C-LBAA0QB1SJ
Applicant..... :	Murata Manufacturing Co., Ltd.
Applicant Address..... :	10-1, Higashikotari 1-chome, Nagaokakyo-shi, Kyoto 617-8555, Japan
Factory..... :	Shenzhen Murata Technology Co., Ltd.
Factory Address..... :	15 Cuijing Road, Shenzhen Grand Industrial Zone, PingShan New District, Shenzhen, Guangdong, China

Wireless specifiction..... :	LoRa
Operating frequency range(s) :	125kHz: 902.3 ~ 914.9 MHz; 500kHz: 903 ~914.2 MHz
Modulation..... :	LoRa
Number of channel..... :	125kHz: 64 500kHz: 8
Data Rate..... :	125kHz bandwidth LoRa: DR0~3 500kHz bandwidth LoRa: DR4
Device category..... :	☐ Fixed point-to-point
	☐ Emit multiple directional beams, simultaneously or sequentially
	☒ Other cases

Rated power supply	Voltage and Frequency	
	☐	AC: 220 - 240 V, 50/60 Hz
	☐	AC: 100 - 240 V, 50/60 Hz
	☒	DC: 2.0 – 3.6V, Typical 3.3V
	☐	Battery:
	☐	USB
Mounting position.....:	☐	Table top equipment
	☐	Wall/Ceiling mounted equipment
	☐	Floor standing equipment
	☐	Hand-held equipment
	☒	Other: Module

1.2 Antenna Information

Antenna model / type number.....:	W935D0		
Antenna serial number	H2B4SD1F2C0100		
Antenna Delivery	☒	1TX + 1RX	
	☐	2TX + 2RX	
	☐	Others:.....	
Antenna technology.....:	☒	SISO	
	☐	MIMO	☐ Basic ☐ CDD ☐ Sectorized ☐ Beam-forming
Antenna Type.....:	☒	External	☐ Dipole ☒ FPC ☐ Sectorized
	☐	Internal	☐ PIFA ☐ PCB ☐ Metal Antenna
Antenna Gain	2.3dBi		

1.3 Channel List

LoRa Working Frequency of Each Channel: (For 125kHz)

Channel NO.	Frequency (MHz)	Channel NO.	Frequency (MHz)	Channel NO.	Frequency (MHz)	Channel NO.	Frequency (MHz)
0	902.3	1	902.5	2	902.7	3	902.9
4	903.1	5	903.3	6	903.5	7	903.7
8	903.9	9	904.1	10	904.3	11	904.5
12	904.7	13	904.9	14	905.1	15	905.3
16	905.5	17	905.7	18	905.9	19	906.1
20	906.3	21	906.5	22	906.7	23	906.9
24	907.1	25	907.3	26	907.5	27	907.7
28	907.9	29	908.1	30	908.3	31	908.5
32	908.7	33	908.9	34	909.1	35	909.3
36	909.5	37	909.7	38	909.9	39	910.1
40	910.3	41	910.5	42	910.7	43	910.9
44	911.1	45	911.3	46	911.5	47	911.7
48	911.9	49	912.1	50	912.3	51	912.5
52	912.7	53	912.9	54	913.1	55	913.3
56	913.5	57	913.7	58	913.9	59	914.1
60	914.3	61	914.5	62	914.7	63	914.9

LoRa Working Frequency of Each Channel: (For 500kHz)

Channel NO.	Frequency (MHz)	Channel NO.	Frequency (MHz)	Channel NO.	Frequency (MHz)	Channel NO.	Frequency (MHz)
64	903	65	904.6	66	906.2	67	907.8
68	909.4	69	911	70	912.6	71	914.2

1.4 Power Setting

Mode	Frequency (MHz)	Power Setting
Mode 1 LoRa 125kHz	902.3	22
	908.5	22
	914.9	22
Mode 2 LoRa 500kHz	903.0	22
	907.8	22
	914.2	22

Note: The General Description of the Item, antenna information, Channel List and power setting in clause 1 are provided and confirmed by the client.

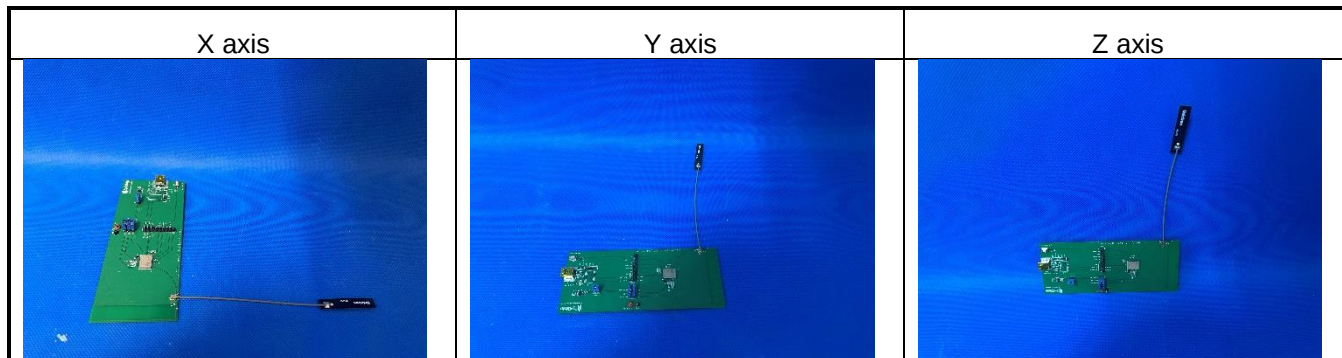
2 DESCRIPTION OF TEST SETUP

2.1 Operating mode(s) used for tests

During the tests the following operating mode(s) has(have) been used.

Test Mode	Mode 1: Transmit by LoRa_125kHz
	Mode 2: Transmit by LoRa_500kHz

Note : For client device, radiated tests was verified over X, Y, Z axis, and shown the worst case Y axis on this report.



2.2 Support / Auxiliary equipment / unit / Test software for the EUT

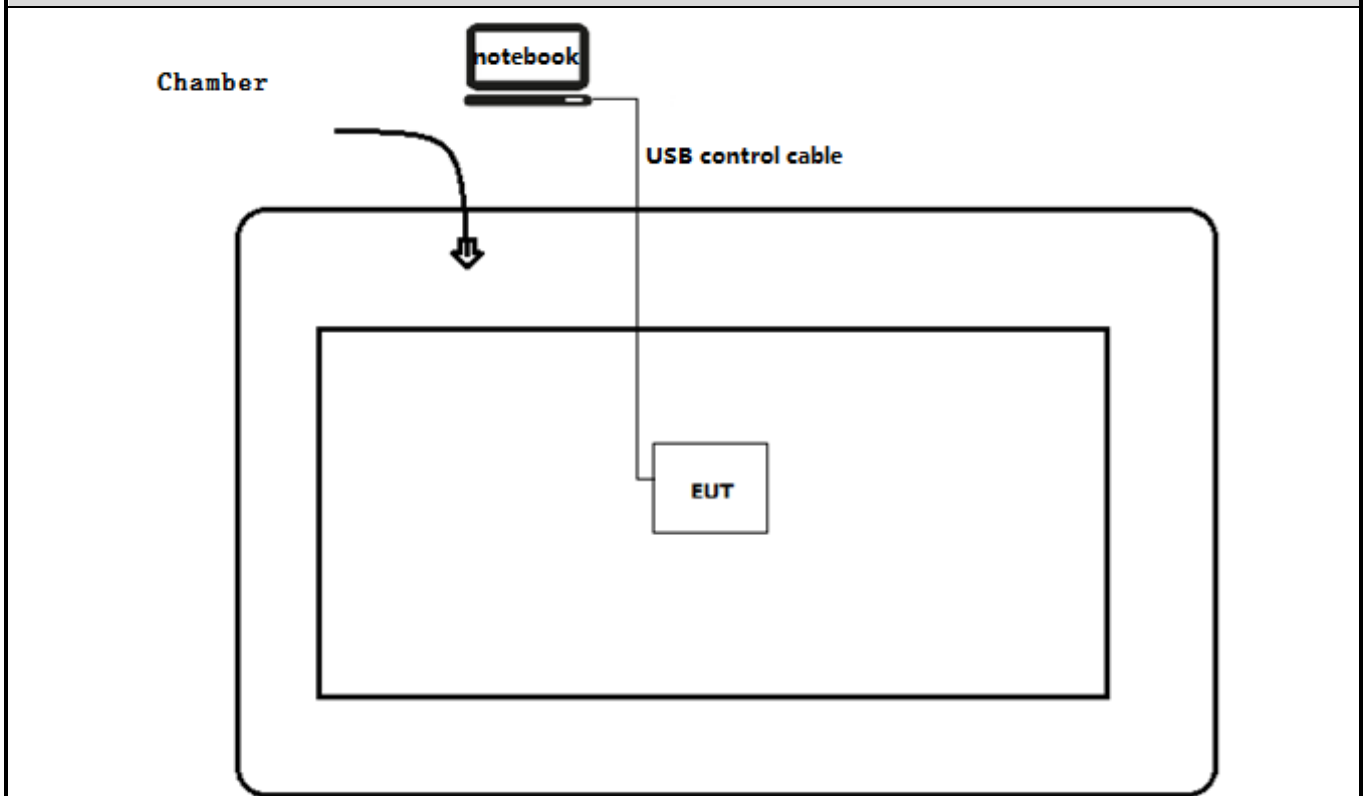
The EUT has been tested with the following auxiliary equipment / unit / software:

Auxiliary equipment	Type / Version	Manufacturer	Supplied by
Notebook	Think pad x280	Lenovo	Adapter
software	Type / Version	Manufacturer	Supplied by
SSCOM	5.13.1	N/A	N/A

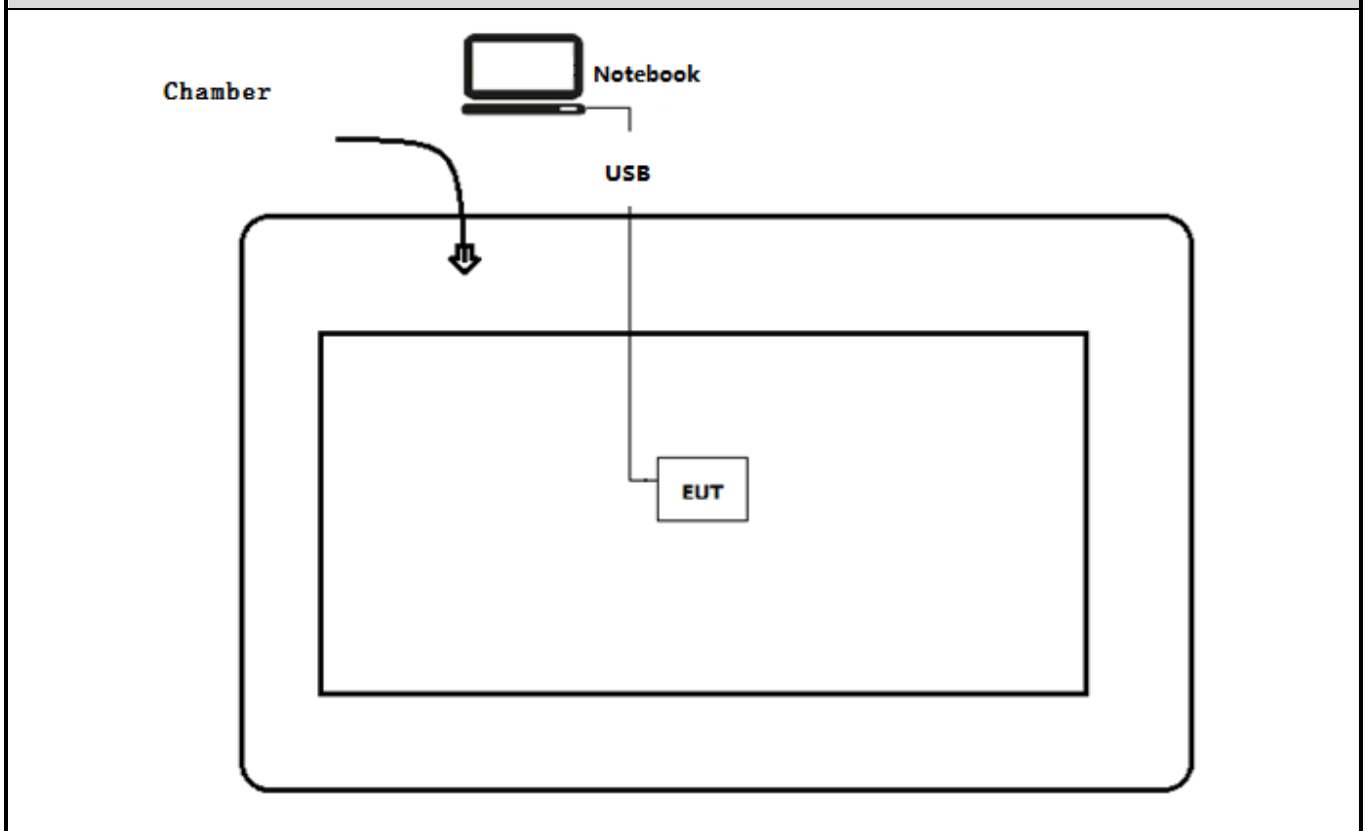
2.3 Test Configuration / Block diagram used for tests

The following test setup / configuration / block diagram has been used during the tests:

Test setup Diagram- Conducted test



Test setup Diagram- Radiated test



2.4 Testing process

1	Setup the EUT as shown in Section 2.4.
2	Run the software "SSCOM" on the notebook computer.
3	Open the serial port and enter the corresponding commands to configure the test mode, test channel, test power and data rate.
4	Verify that the EUT works properly.

3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

3.1 Standards

Standard	Year	Description
FCC CFR Title 47 Part 15 Subpart C Section 15.247	2024	Operation within the bands 902 – 928 MHz, 2400 – 2483.5 MHz, and 5725 – 5850 MHz.
ANSI C63.10	2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
RSS-Gen Issue 5 Amendment 2	2021	General Requirements for Compliance of Radio Apparatus
RSS-247 Issue 2	2017	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

3.2 Overview of results

For FCC:

Requirement – Test case	Basic standard(s)	Verdict	Remark
Emissions in restricted frequency bands	FCC 15.247(d), 15.209	PASS	---
Fundamental emission output power	FCC 15.247(b)(3)	PASS	---

For ISED:

Requirement – Test case	Basic standard(s)	Verdict	Remark
Emissions in restricted frequency bands	RSS-Gen Issue 5 Section 8.9	PASS	---
Fundamental emission output power	RSS-247 Issue 2 SectionA5.4(4)	PASS	---

3.3 Test Facility

USA	:	FCC Designation Number: CN1199
-----	---	--------------------------------

Canada	:	CAB identifier Number: CN0040
--------	---	-------------------------------

4 TEST RESULTS

4.1 Emissions in restricted frequency bands	VERDICT: PASS
--	----------------------

4.1.1 Limit			
Standard		FCC Part 15 Subpart C Paragraph 15.205; 15.209	
Restricted Bands of operation for FCC			
Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.81425 - 8.81475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	Above 38.6
13.36 - 13.41	--	--	--
Restricted Bands of operation for ISCED			
0.090 - 0.110	13.36 - 13.41	960 - 1427	9.0 - 9.2
0.495 - 0.505	16.42 - 16.423	1435 - 1626.5	9.3 - 9.5
2.1735 - 2.1905	16.69475 - 16.69525	1645.5 - 1646.5	10.6 - 12.7
3.020 - 3.026	16.80425 - 16.80475	1660 - 1710	13.25 - 13.4
4.125 - 4.128	25.5 - 25.67	1718.8 - 1722.2	14.47 - 14.5
4.17725 - 4.17775	37.5 - 38.25	2200 - 2300	15.35 - 16.2
4.20725 - 4.20775	73 - 74.6	2310 - 2390	17.7 - 21.4
5.677 - 5.683	74.8 - 75.2	2483.5 - 2500	22.01 - 23.12
6.215 - 6.218	108 - 138	2655 - 2900	23.6 - 24.0
6.26775 - 6.26825	149.9 - 150.05	3260 - 3267	31.2 - 31.8
6.31175 - 6.31225	156.52475 - 156.52525	3332 - 3339	36.43 - 36.5
8.291 - 8.294	156.7 - 156.9	3345.8 - 3358	Above 38.6
8.362 - 8.366	162.0125 - 167.17	3500 - 4400	--
8.37625 - 8.38675	167.72 - 173.2	4500 - 5150	--
8.41425 - 8.41475	240 - 285	5350 - 5460	--
12.29 - 12.293	322 - 335.4	7250 - 7750	--
12.51975 - 12.52025	399.9 - 410	8025 - 8500	--
12.57675 - 12.57725	608 - 614	--	--

Restricted Band Emissions Limit

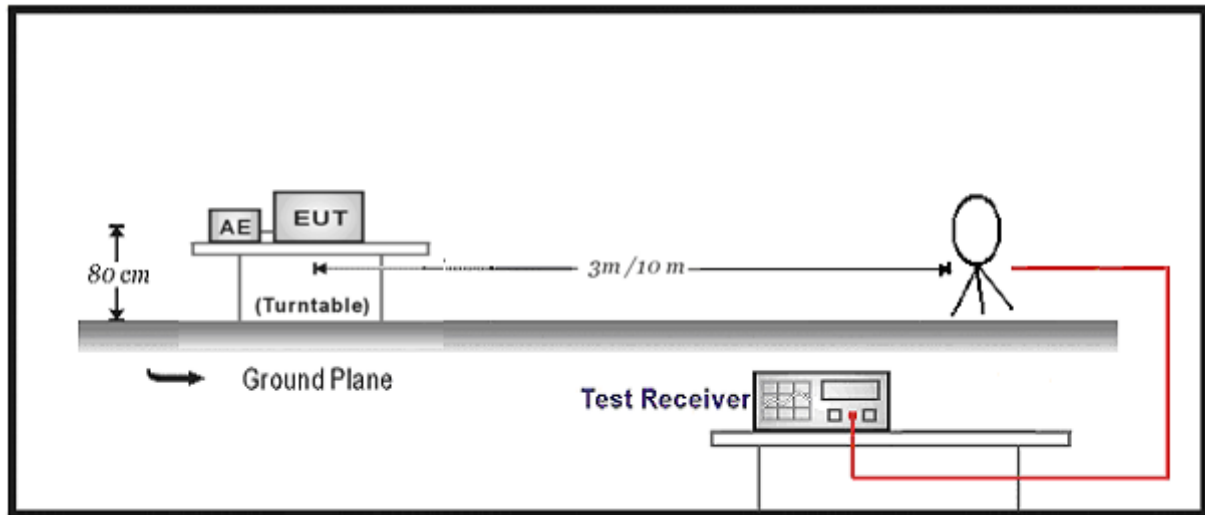
Frequency (MHz)	Field strength (μ V/m)	Field strength (dB μ V/m)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 - 13.8	300 ^(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30 ^(Note 1)
1.705 - 30	30	29.5	30 ^(Note 1)
30 - 88	100	40	3 ^(Note 2)
88 - 216	150	43.5	3 ^(Note 2)
216 - 960	200	46	3 ^(Note 2)
Above 960	500	54	3 ^(Note 2)

Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

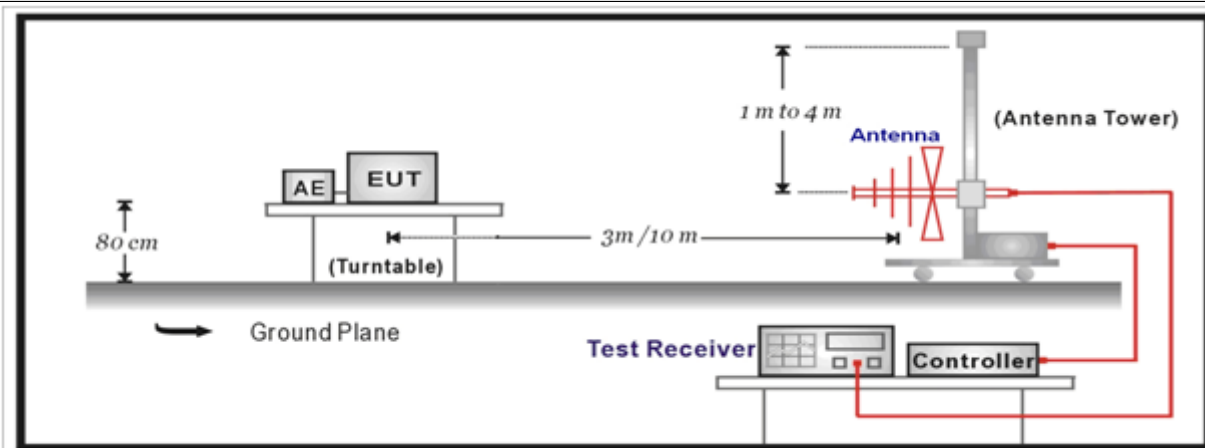
Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

4.1.2 Test Setup

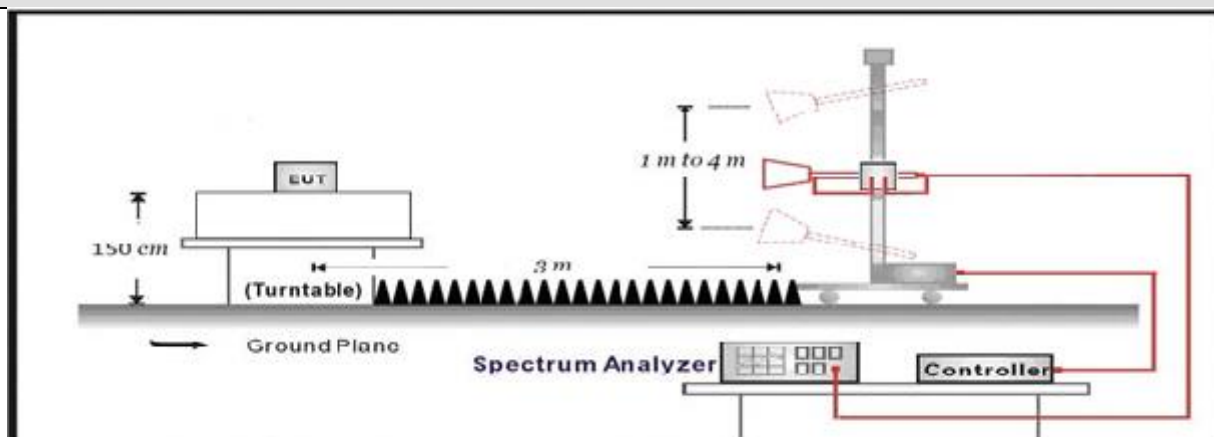
Below 30MHz Test Setup:



30MHz-1GHz Test Setup:



Above 1GHz Test Setup:

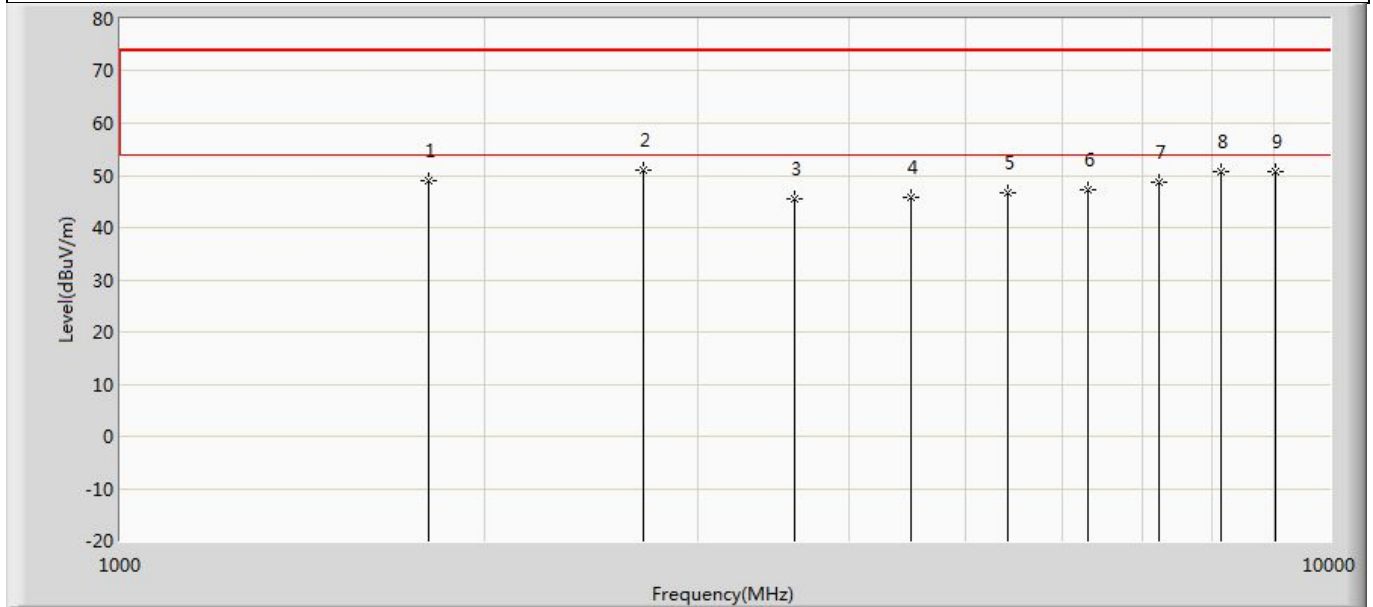


4.1.3 Test Procedure

	References Rule		Chapter	Description
☒	ANSI C63.10		11.12	Emissions in restricted frequency bands
	☒	ANSI C63.10	11.12.1	Radiated emission measurements
	☒	ANSI C63.10	6.3	Radiated spurious emission test
	☒	ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
	☒	ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
	☒	ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz
	☐	ANSI C63.10	11.12.2	Antenna-port conducted measurements
	☐	ANSI C63.10	11.12.2.3	Quasi-peak measurement procedure
	☐	ANSI C63.10	11.12.2.4	Peak power measurement procedure
	☐	ANSI C63.10	11.12.2.5	Average power measurement procedures
	☐	ANSI C63.10	11.12.2.5.1	Trace averaging with continuous EUT transmission at full power
	☐	ANSI C63.10	11.12.2.5.2	Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction
	☐	ANSI C63.10	11.12.2.5.3	Reduced VBW averaging across ON and OFF times of the EUT transmissions with max hold

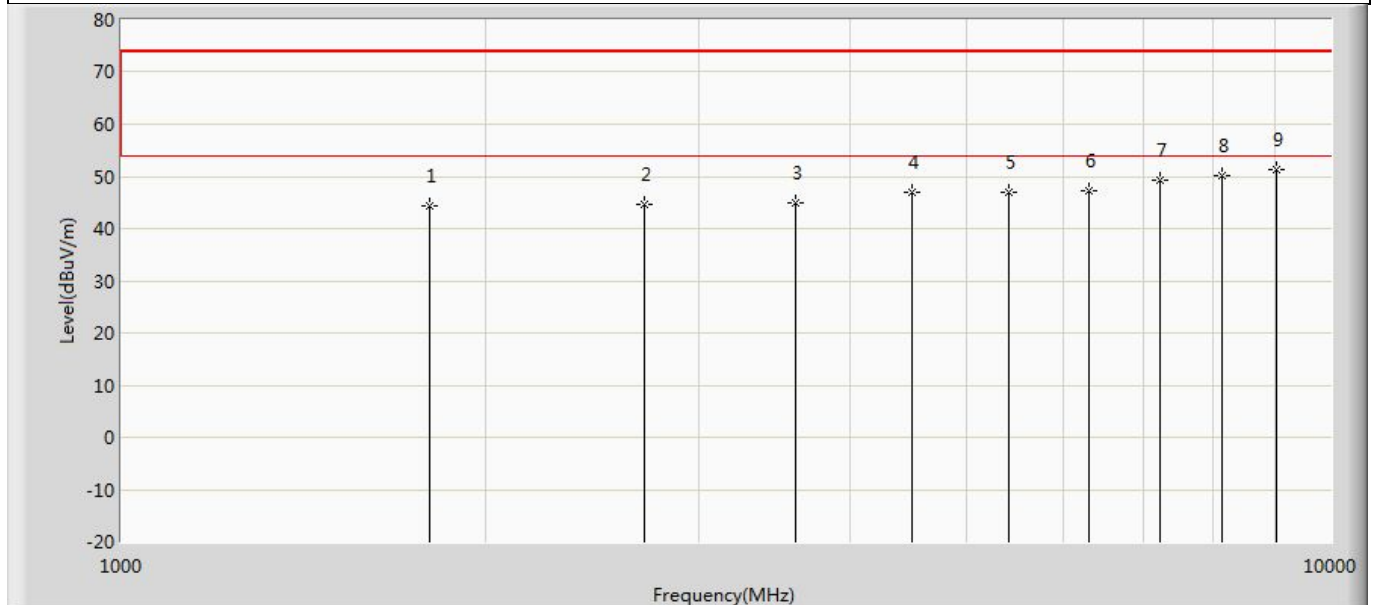
4.1.4 Test Data

Profile: 2430061R	Page No.: 13
Engineer: Pengcheng Yang	
Site: AC5	Time: 2024/05/16 - 18:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 1SJ	Power: 3.3Vdc
Note: Mode 1:Transmit at 902.3MHz by LoRa 125K	



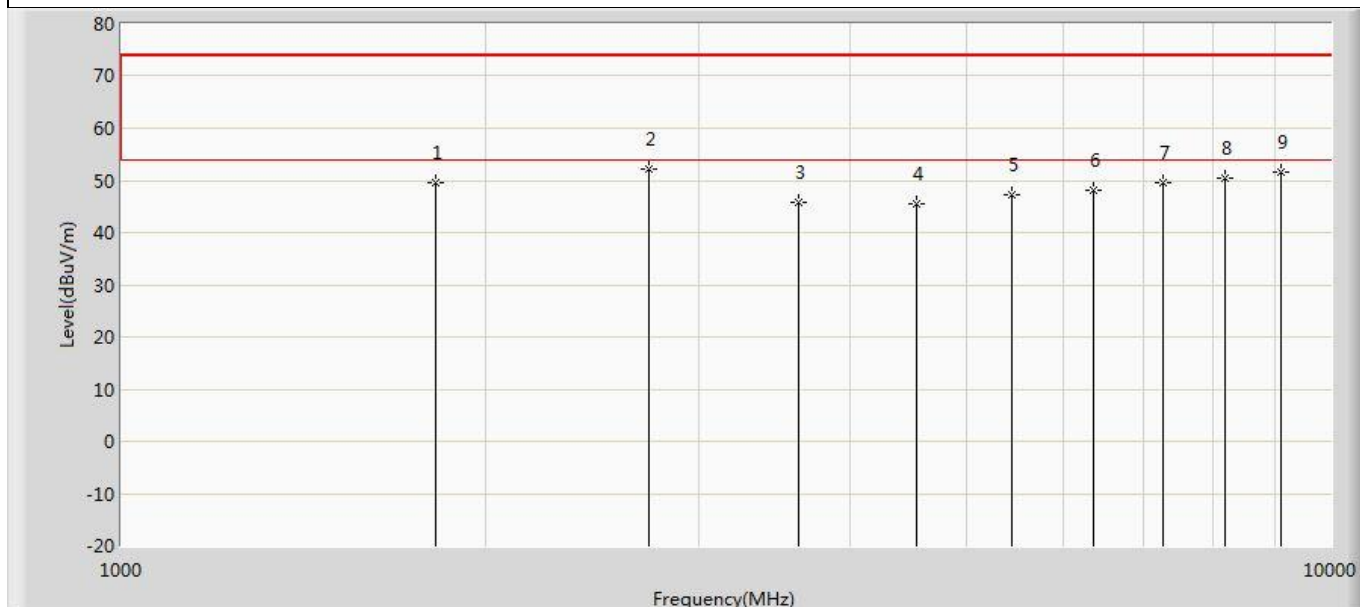
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		1801.000	48.871	67.567	-25.129	74.000	-18.697	PK
2	*	2710.000	50.888	67.056	-23.112	74.000	-16.169	PK
3		3609.200	45.496	60.077	-28.504	74.000	-14.581	PK
4		4511.500	45.776	58.262	-28.224	74.000	-12.485	PK
5		5413.800	46.694	57.428	-27.306	74.000	-10.734	PK
6		6316.100	47.340	55.839	-26.660	74.000	-8.500	PK
7		7218.400	48.551	55.727	-25.449	74.000	-7.176	PK
8		8120.700	50.772	57.066	-23.228	74.000	-6.294	PK
9		9023.000	50.744	56.324	-23.256	74.000	-5.581	PK

Profile: 2430061R	Page No.: 14
Engineer: Pengcheng Yang	
Site: AC5	Time: 2024/05/16 - 18:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 1SJ	Power: 3.3Vdc
Note: Mode 1:Transmit at 902.3MHz by LoRa 125K	



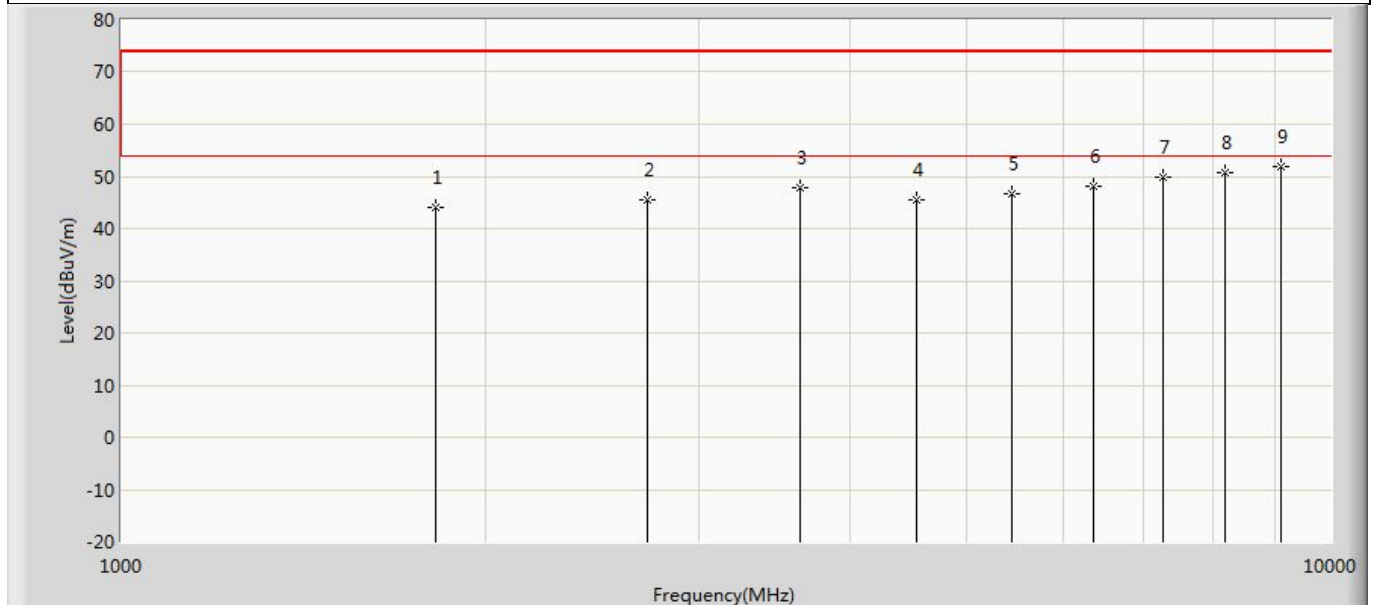
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		1801.000	44.259	62.955	-29.741	74.000	-18.697	PK
2		2706.900	44.625	60.856	-29.375	74.000	-16.231	PK
3		3609.200	45.015	59.596	-28.985	74.000	-14.581	PK
4		4511.500	46.995	59.481	-27.005	74.000	-12.485	PK
5		5413.800	46.830	57.564	-27.170	74.000	-10.734	PK
6		6316.100	47.238	55.737	-26.762	74.000	-8.500	PK
7		7218.400	49.321	56.497	-24.679	74.000	-7.176	PK
8		8120.700	50.245	56.539	-23.755	74.000	-6.294	PK
9	*	9023.000	51.197	56.777	-22.803	74.000	-5.581	PK

Profile: 2430061R	Page No.: 15
Engineer: Pengcheng Yang	
Site: AC5	Time: 2024/05/16 - 18:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 1SJ	Power: 3.3Vdc
Note: Mode 1:Transmit at 908.5MHz by LoRa 125K	



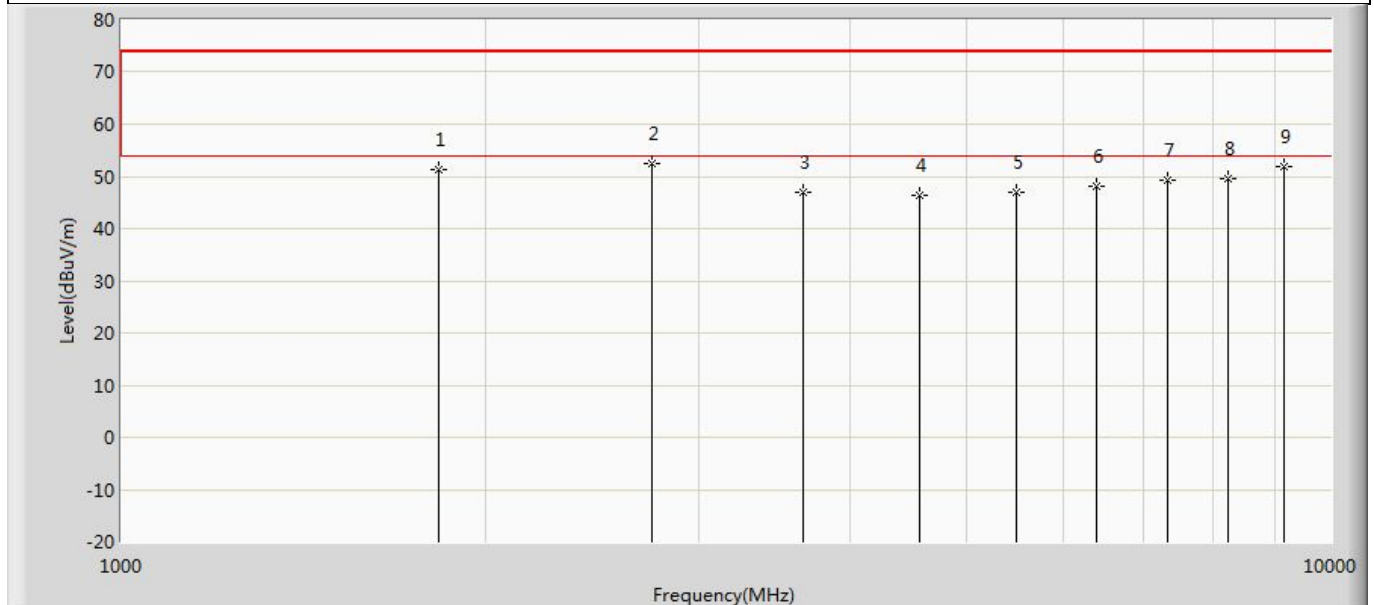
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		1819.000	49.669	68.105	-24.331	74.000	-18.436	PK
2	*	2728.000	52.233	68.607	-21.767	74.000	-16.374	PK
3		3634.000	45.752	60.325	-28.248	74.000	-14.573	PK
4		4542.500	45.647	58.331	-28.353	74.000	-12.684	PK
5		5451.000	47.316	57.620	-26.684	74.000	-10.303	PK
6		6359.500	48.054	56.245	-25.946	74.000	-8.190	PK
7		7268.000	49.581	56.218	-24.419	74.000	-6.637	PK
8		8176.500	50.339	56.282	-23.661	74.000	-5.943	PK
9		9085.000	51.611	56.487	-22.389	74.000	-4.876	PK

Profile: 2430061R	Page No.: 16
Engineer: Pengcheng Yang	
Site: AC5	Time: 2024/05/16 - 18:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 1SJ	Power: 3.3Vdc
Note: Mode 1:Transmit at 908.5MHz by LoRa 125K	



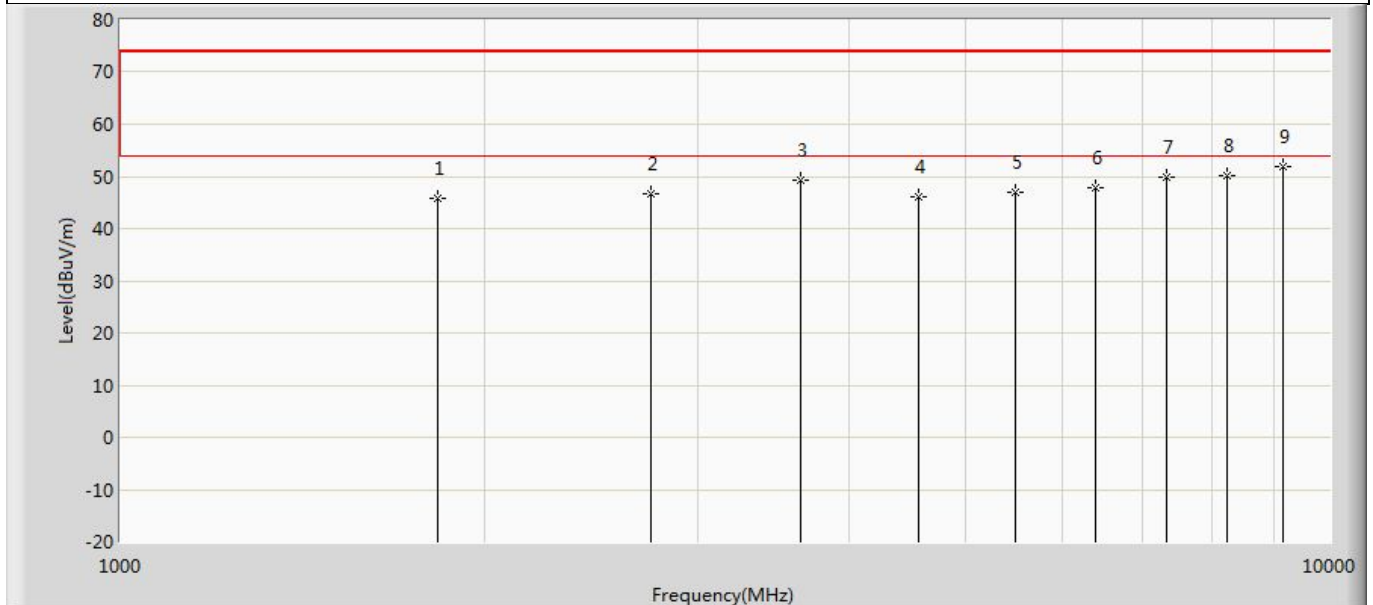
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		1819.000	44.184	62.620	-29.816	74.000	-18.436	PK
2		2725.500	45.386	61.681	-28.614	74.000	-16.296	PK
3		3637.000	47.827	62.383	-26.173	74.000	-14.555	PK
4		4542.500	45.387	58.071	-28.613	74.000	-12.684	PK
5		5451.000	46.542	56.846	-27.458	74.000	-10.303	PK
6		6359.500	48.159	56.350	-25.841	74.000	-8.190	PK
7		7268.000	49.903	56.540	-24.097	74.000	-6.637	PK
8		8176.500	50.616	56.559	-23.384	74.000	-5.943	PK
9	*	9085.000	51.811	56.687	-22.189	74.000	-4.876	PK

Profile: 2430061R	Page No.: 17
Engineer: Pengcheng Yang	
Site: AC5	Time: 2024/05/16 - 18:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 1SJ	Power: 3.3Vdc
Note: Mode 1:Transmit at 914.9MHz by LoRa 125K	



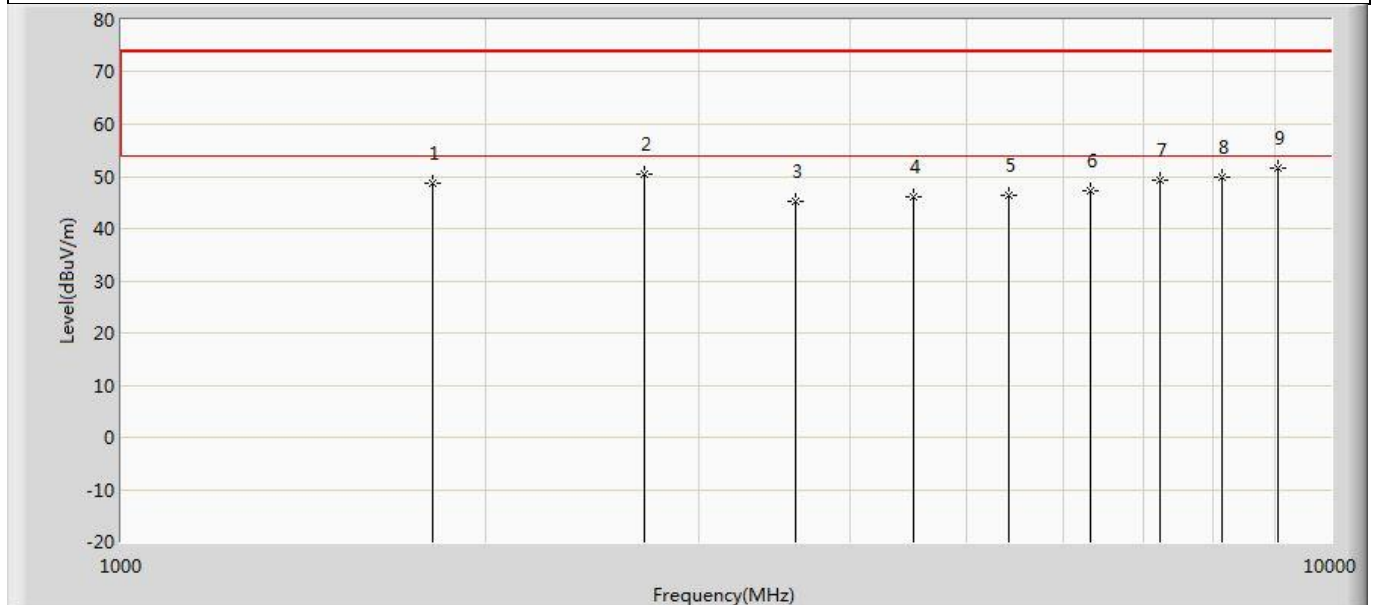
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		1828.000	51.429	69.951	-22.571	74.000	-18.522	PK
2	*	2746.000	52.370	68.423	-21.630	74.000	-16.053	PK
3		3664.000	47.091	61.417	-26.909	74.000	-14.325	PK
4		4574.500	46.283	58.572	-27.717	74.000	-12.289	PK
5		5489.400	46.893	56.600	-27.107	74.000	-9.707	PK
6		6404.300	48.017	56.631	-25.983	74.000	-8.614	PK
7		7319.200	49.260	56.632	-24.740	74.000	-7.372	PK
8		8234.100	49.610	56.117	-24.390	74.000	-6.506	PK
9		9149.000	51.873	56.382	-22.127	74.000	-4.509	PK

Profile: 2430061R	Page No.: 18
Engineer: Pengcheng Yang	
Site: AC5	Time: 2024/05/16 - 18:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 1SJ	Power: 3.3Vdc
Note: Mode 1:Transmit at 914.9MHz by LoRa 125K	



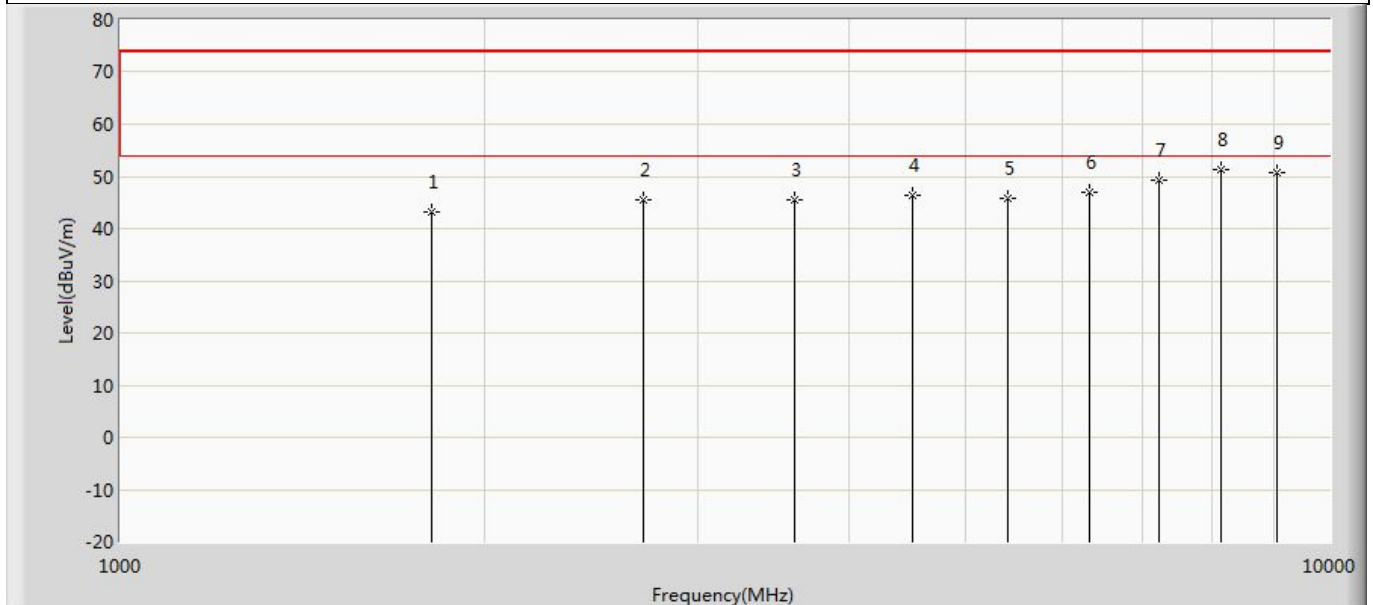
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		1828.000	45.655	64.177	-28.345	74.000	-18.522	PK
2		2746.000	46.586	62.639	-27.414	74.000	-16.053	PK
3		3655.000	49.193	63.553	-24.807	74.000	-14.359	PK
4		4574.500	46.161	58.450	-27.839	74.000	-12.289	PK
5		5489.400	46.837	56.544	-27.163	74.000	-9.707	PK
6		6404.300	47.828	56.442	-26.172	74.000	-8.614	PK
7		7319.200	49.744	57.116	-24.256	74.000	-7.372	PK
8		8234.100	50.071	56.578	-23.929	74.000	-6.506	PK
9	*	9149.000	51.742	56.251	-22.258	74.000	-4.509	PK

Profile: 2430061R	Page No.: 19
Engineer: Pengcheng Yang	
Site: AC5	Time: 2024/05/16 - 18:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 1SJ	Power: 3.3Vdc
Note: Mode 2:Transmit at 903MHz by LoRa 500K	



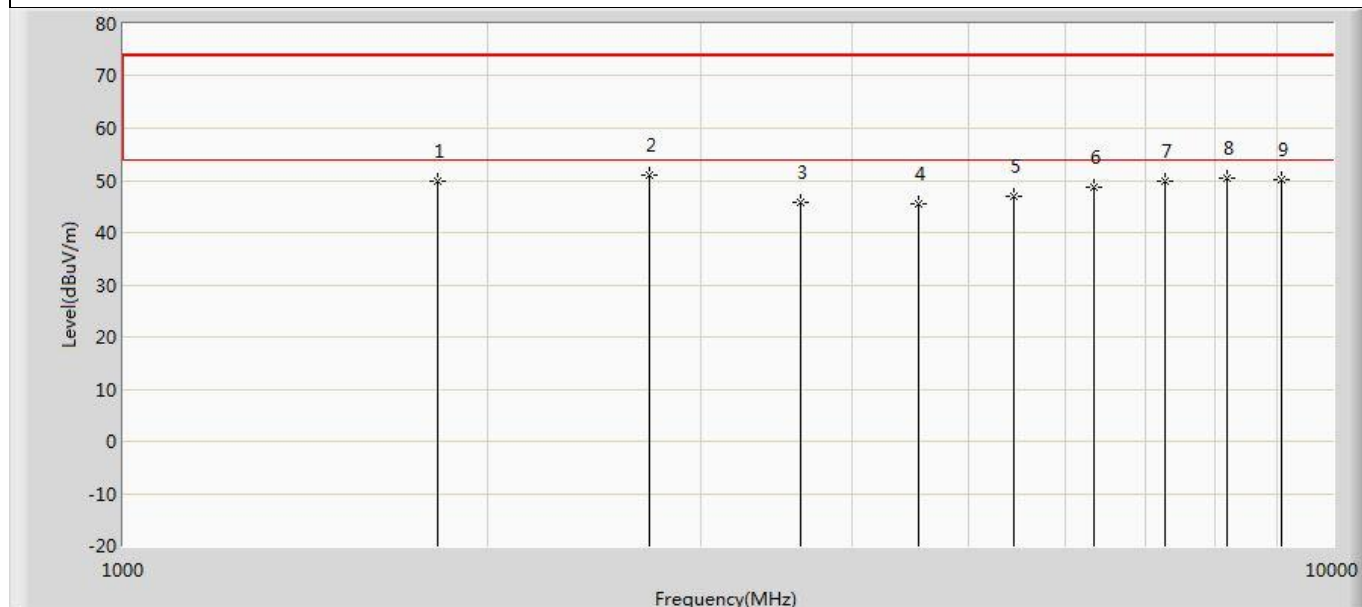
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		1810.000	48.800	67.323	-25.200	74.000	-18.523	PK
2		2710.000	50.482	66.650	-23.518	74.000	-16.169	PK
3		3612.000	45.316	59.856	-28.684	74.000	-14.540	PK
4		4515.000	46.114	58.615	-27.886	74.000	-12.501	PK
5		5418.000	46.479	57.307	-27.521	74.000	-10.827	PK
6		6321.000	47.226	55.714	-26.774	74.000	-8.488	PK
7		7224.000	49.283	56.601	-24.717	74.000	-7.317	PK
8		8127.000	49.943	56.224	-24.057	74.000	-6.282	PK
9	*	9030.000	51.686	57.028	-22.314	74.000	-5.342	PK

Profile: 2430061R	Page No.: 20
Engineer: Pengcheng Yang	
Site: AC5	Time: 2024/05/16 - 18:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 1SJ	Power: 3.3Vdc
Note: Mode 2:Transmit at 903MHz by LoRa 500K	



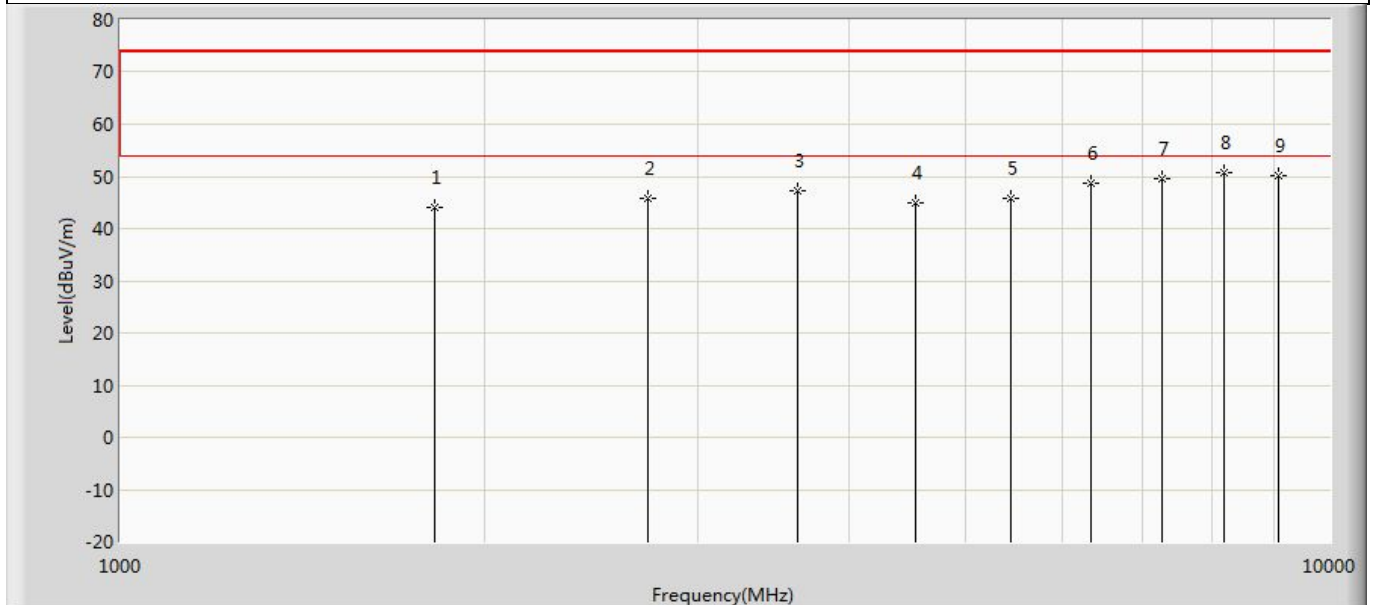
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		1810.000	43.177	61.700	-30.823	74.000	-18.523	PK
2		2709.000	45.521	61.710	-28.479	74.000	-16.189	PK
3		3612.000	45.431	59.971	-28.569	74.000	-14.540	PK
4		4515.000	46.341	58.842	-27.659	74.000	-12.501	PK
5		5418.000	45.932	56.760	-28.068	74.000	-10.827	PK
6		6321.000	46.934	55.422	-27.066	74.000	-8.488	PK
7		7224.000	49.165	56.483	-24.835	74.000	-7.317	PK
8	*	8127.000	51.271	57.552	-22.729	74.000	-6.282	PK
9		9030.000	50.696	56.038	-23.304	74.000	-5.342	PK

Profile: 2430061R	Page No.: 21
Engineer: Pengcheng Yang	
Site: AC5	Time: 2024/05/16 - 18:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 1SJ	Power: 3.3Vdc
Note: Mode 2:Transmit at 907.8MHz by LoRa 500K	



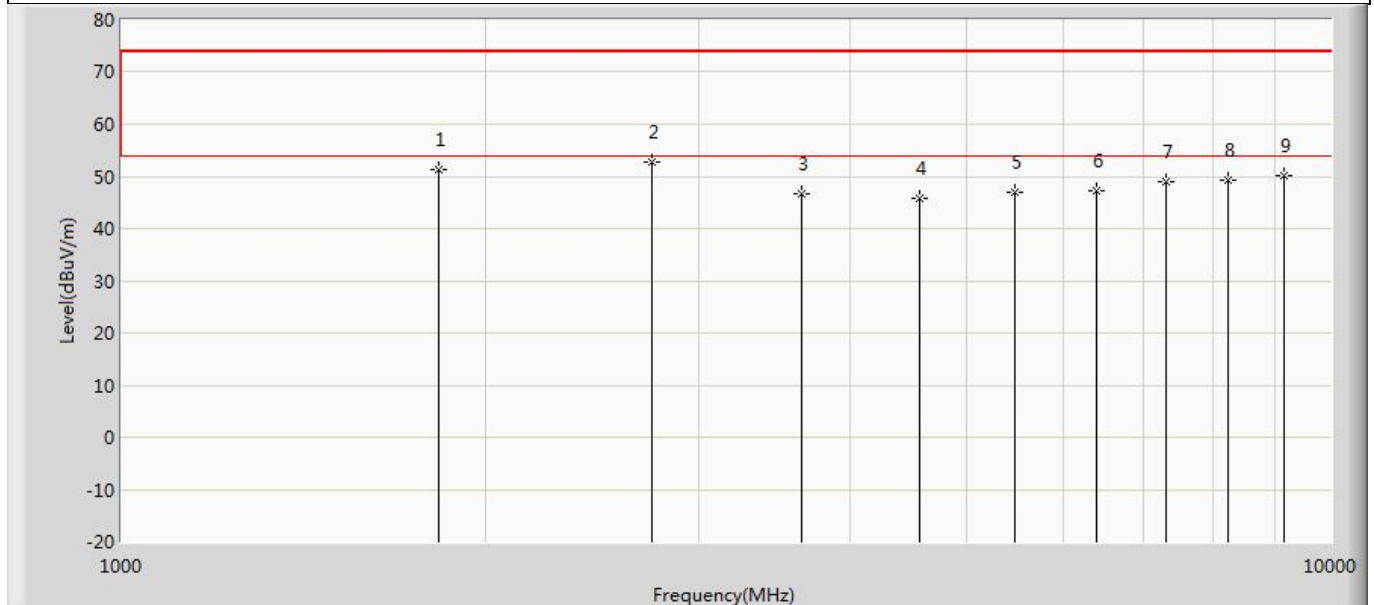
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		1819.000	50.000	68.436	-24.000	74.000	-18.436	PK
2	*	2719.000	50.882	66.972	-23.118	74.000	-16.091	PK
3		3631.200	45.662	60.214	-28.338	74.000	-14.552	PK
4		4539.000	45.379	58.122	-28.621	74.000	-12.743	PK
5		5446.800	46.907	57.253	-27.093	74.000	-10.346	PK
6		6354.600	48.564	56.729	-25.436	74.000	-8.164	PK
7		7262.400	49.968	56.637	-24.032	74.000	-6.668	PK
8		8170.200	50.576	56.523	-23.424	74.000	-5.946	PK
9		9078.000	50.179	54.905	-23.821	74.000	-4.726	PK

Profile: 2430061R	Page No.: 22
Engineer: Pengcheng Yang	
Site: AC5	Time: 2024/05/16 - 18:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 1SJ	Power: 3.3Vdc
Note: Mode 2:Transmit at 907.8MHz by LoRa 500K	



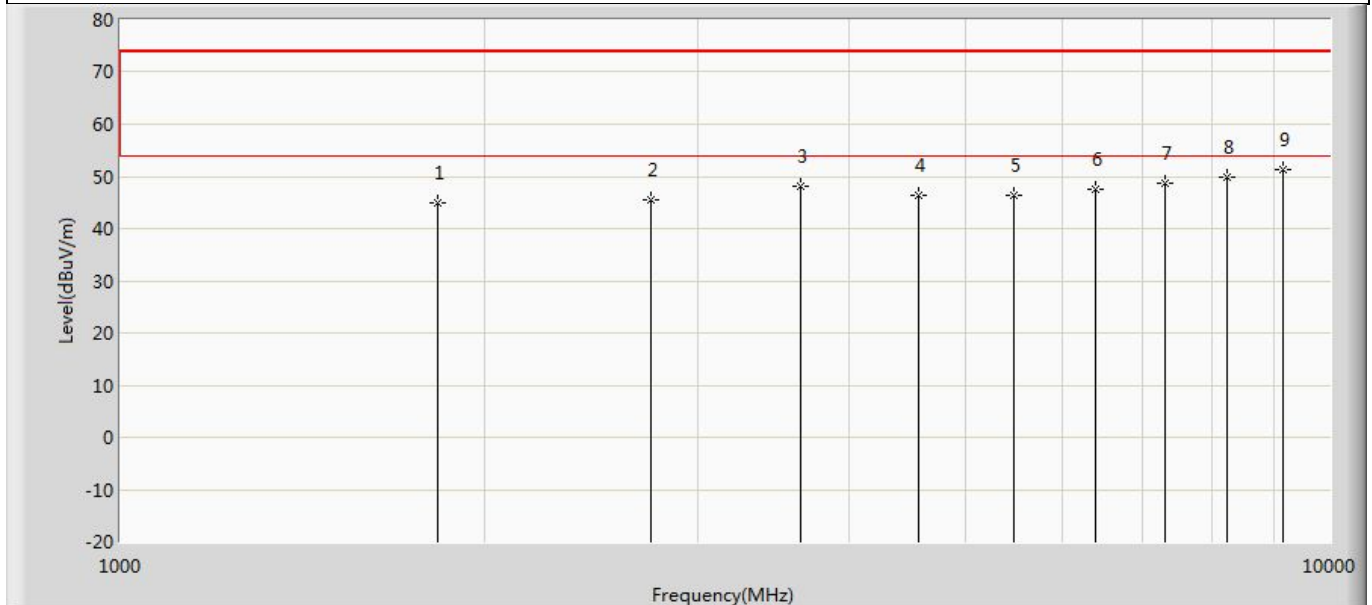
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		1819.000	43.919	62.355	-30.081	74.000	-18.436	PK
2		2728.000	45.892	62.266	-28.108	74.000	-16.374	PK
3		3628.000	47.304	61.832	-26.696	74.000	-14.527	PK
4		4539.000	44.931	57.674	-29.069	74.000	-12.743	PK
5		5446.800	45.881	56.227	-28.119	74.000	-10.346	PK
6		6354.600	48.674	56.839	-25.326	74.000	-8.164	PK
7		7262.400	49.558	56.227	-24.442	74.000	-6.668	PK
8	*	8170.200	50.587	56.534	-23.413	74.000	-5.946	PK
9		9078.000	50.070	54.796	-23.930	74.000	-4.726	PK

Profile: 2430061R	Page No.: 23
Engineer: Pengcheng Yang	
Site: AC5	Time: 2024/05/16 - 18:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Horizontal
EUT: 1SJ	Power: 3.3Vdc
Note: Mode 2:Transmit at 914.2MHz by LoRa 500K	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		1828.000	51.176	69.698	-22.824	74.000	-18.522	PK
2	*	2746.000	52.688	68.741	-21.312	74.000	-16.053	PK
3		3655.000	46.756	61.116	-27.244	74.000	-14.359	PK
4		4571.000	45.869	58.204	-28.131	74.000	-12.335	PK
5		5485.200	46.846	56.735	-27.154	74.000	-9.889	PK
6		6399.400	47.110	55.673	-26.890	74.000	-8.563	PK
7		7313.600	49.002	56.459	-24.998	74.000	-7.456	PK
8		8227.800	49.250	55.869	-24.750	74.000	-6.619	PK
9		9142.000	50.053	54.758	-23.947	74.000	-4.705	PK

Profile: 2430061R	Page No.: 24
Engineer: Pengcheng Yang	
Site: AC5	Time: 2024/05/16 - 18:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_00167055(1-18GHz)	Polarity: Vertical
EUT: 1SJ	Power: 3.3Vdc
Note: Mode 2:Transmit at 914.2MHz by LoRa 500K	

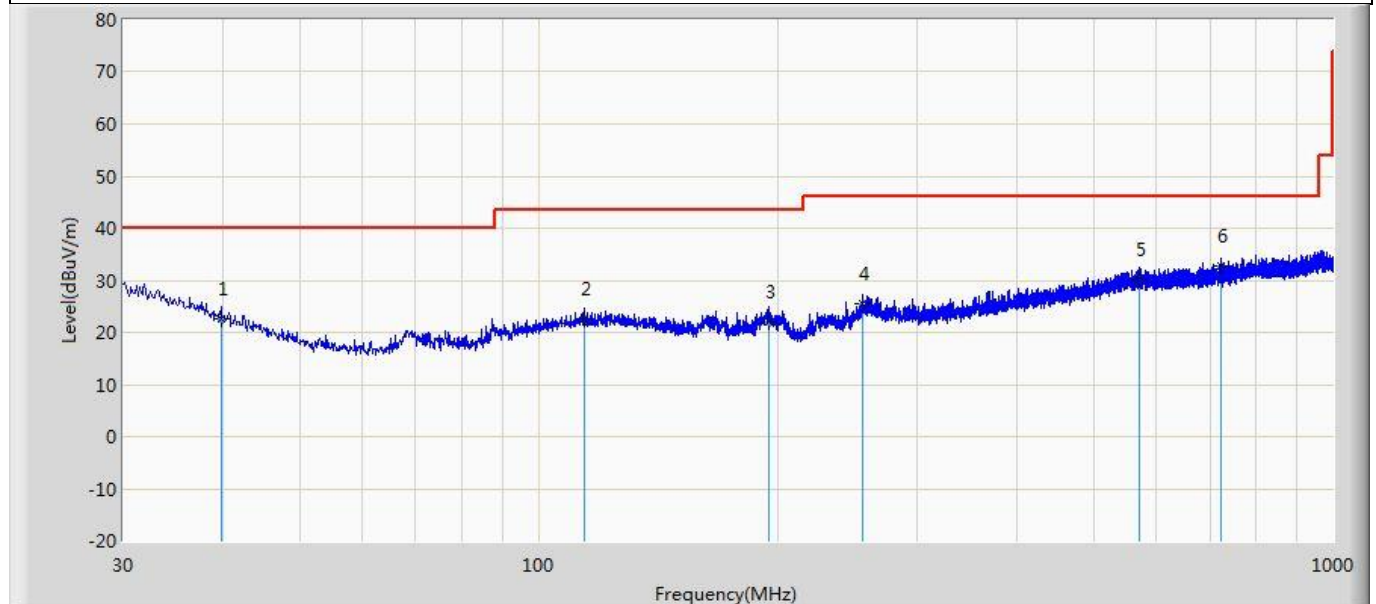


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		1828.000	44.813	63.335	-29.187	74.000	-18.522	PK
2		2746.000	45.646	61.699	-28.354	74.000	-16.053	PK
3		3655.000	48.027	62.387	-25.973	74.000	-14.359	PK
4		4571.000	46.345	58.680	-27.655	74.000	-12.335	PK
5		5485.200	46.514	56.403	-27.486	74.000	-9.889	PK
6		6399.400	47.607	56.170	-26.393	74.000	-8.563	PK
7		7313.600	48.669	56.126	-25.331	74.000	-7.456	PK
8		8227.800	49.835	56.454	-24.165	74.000	-6.619	PK
9	*	9142.000	51.261	55.966	-22.739	74.000	-4.705	PK

Remark	1. " * ", means this data is the worst emission level. 2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp). 3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed. 4. The emissions of the 2nd harmonics shall apply to the limit of emissions in non-restricted frequency band.
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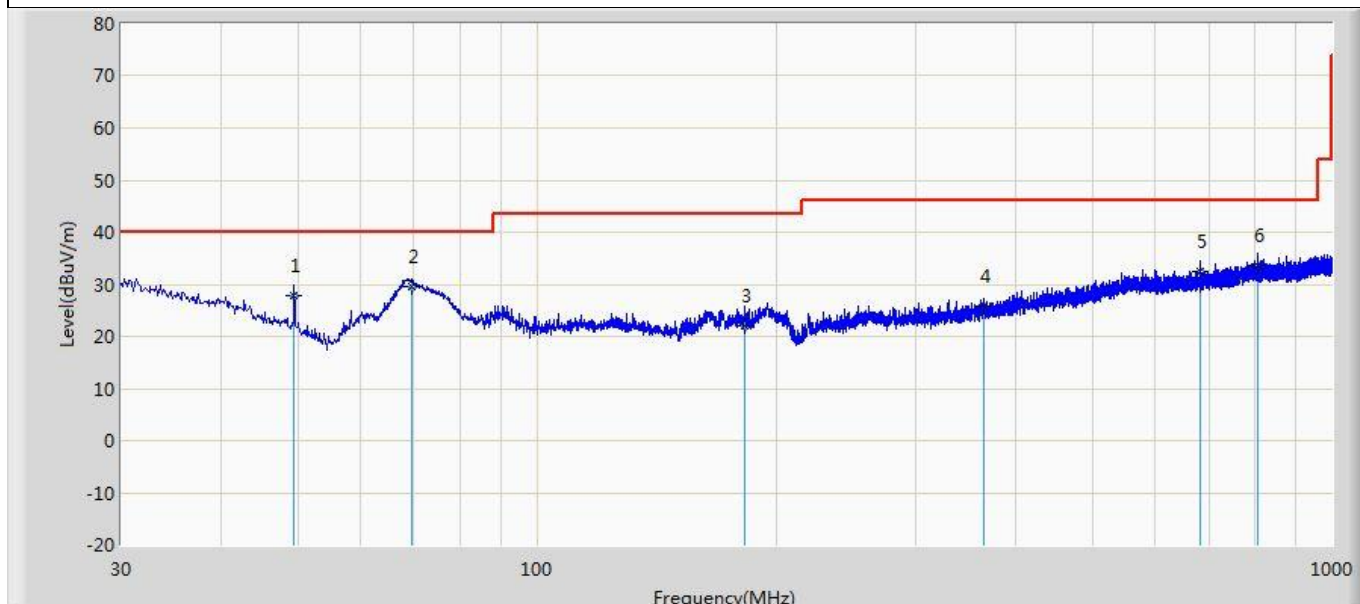
The worst case of Radiated Emission below 1GHz:

Profile: 2430061R	Page No.: 1
Engineer: Pengchengyang	
Site: AC2	Time: 2024/05/22 - 09:36
Limit: FCC_Part 15.109_RE (3m)_Class B	Margin: 0
Probe: CBL6112D_27613(30-1000MHz)	Polarity: Horizontal
EUT: 1SJ	Power: 3.3Vdc
Note: Mode 1: Transmit at 902.3MHz by LoRa 125K	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		39.821	22.479	2.807	-17.521	40.000	19.672	QP
2		114.026	22.567	3.353	-20.933	43.500	19.214	QP
3		195.385	22.168	5.769	-21.332	43.500	16.399	QP
4		256.010	25.532	5.073	-20.468	46.000	20.459	QP
5		569.441	30.115	2.974	-15.885	46.000	27.141	QP
6	*	724.035	32.630	4.539	-13.370	46.000	28.091	QP

Profile: 2430061R	Page No.: 2
Engineer: Pengchengyang	
Site: AC2	Time: 2024/05/22 - 09:39
Limit: FCC_Part 15.109_RE (3m)_Class B	Margin: 0
Probe: CBL6112D_27613(30-1000MHz)	Polarity: Vertical
EUT: 1SJ	Power: 3.3Vdc
Note: Mode 1: Transmit at 902.3MHz by LoRa 125K	

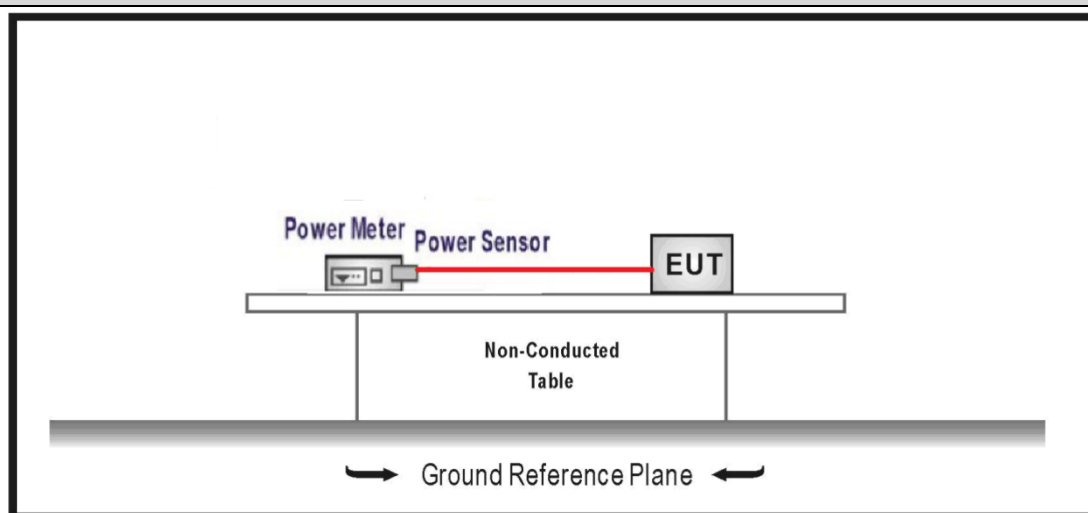


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		49.521	27.928	12.839	-12.072	40.000	15.089	QP
2	*	69.649	29.531	16.537	-10.469	40.000	12.993	QP
3		182.533	22.088	5.728	-21.412	43.500	16.360	QP
4		364.892	25.810	3.207	-20.190	46.000	22.603	QP
5		683.174	32.570	4.922	-13.430	46.000	27.648	QP
6		806.849	33.569	4.165	-12.431	46.000	29.404	QP

Remark	1. " * ", means this data is the worst emission level. 2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp). 3. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary. 4. We tested all the modes and showed the worst mode in the report. 5. The test frequency range, 9KHz~30MHz, all is the noise base, therefore no data appear in the report.
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4.2 Fundamental emission output power**VERDICT: PASS****4.2.1 Limit**

Standard		FCC Part 15 Subpart C Paragraph 15.247 (b)(3)	
☒	GTX < 6dBi		Pout≤30dBm
☐	GTX > 6dBi		
	☐	Non-Fix point-point	Pout≤30-(GTX -6)
	☐	Fix point-point	Pout≤30-[(GTX-6)]/3
	☐	Point-to-multipoint	Pout≤30-(GTX-6)
	☐	Overlap Beams	Pout≤30-[(GTX-6)]/3
	☐	Aggregate power transmitted simultaneously on all beams	Pout≤30-[(GTX-6)]/3
	☐	single directional beam	Pout≤30-[(GTX-6)]/3+8dB
☒	For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels		
Note 1 : GTX directional gain of transmitting antennas.			
Note 2 : Pout is maximum peak conducted output power .			

4.2.2 Test Setup

4.2.3 Test Procedure						
	References Rule			Chapter	Description	
☒	ANSI C63.10			11.9	Fundamental emission output power	
	☐	ANSI C63.10		11.9.1	Maximum peak conducted output power	
		☐	ANSI C63.10	11.9.1.1	RBW ≥ DTS bandwidth	
		☐	ANSI C63.10	11.9.1.2	Integrated band power method	
		☐	ANSI C63.10	11.9.1.3	PKPM1 Peak power meter method	
	☒	ANSI C63.10		11.9.2	Maximum conducted (average) output power	
		☒	ANSI C63.10		11.9.2.2	Measurement using a spectrum analyzer (SA)
			☐	ANSI C63.10	11.9.2.2.2	Method AVGSA-1(Duty cycle≥98%)
			☐	ANSI C63.10	11.9.2.2.3	Method AVGSA-1A(Duty cycle≥98%)
			☒	ANSI C63.10	11.9.2.2.4	Method AVGSA-2(Duty cycle≤98%)
			☐	ANSI C63.10	11.9.2.2.5	Method AVGSA-2A(Duty cycle≤98%)
			☐	ANSI C63.10	11.9.2.2.4	Method AVGSA-3
			☐	ANSI C63.10	11.9.2.2.5	Method AVGSA-3A
		☒	ANSI C63.10		11.9.2.3	Measurement using a power meter (PM)
			☒	ANSI C63.10	11.9.2.3.1	Method AVGPM
			☐	ANSI C63.10	11.9.2.3.2	Method AVGPM-G
☒	ANSI C63.10			7.8.5	Output power test procedure for frequency-hopping spread-spectrum (FHSS) devices	

4.2.4 Test Data

Mode	Channel	Test Frequency (MHz)	Output Power (dBm)	E.I.R.P (dBm)	Conducted Limit (dBm)	E.I.R.P Limit (dBm)	Result
1	00	902.3	20.44	22.74	30.00	36.00	Pass
	31	908.5	20.36	22.66	30.00	36.00	Pass
	63	914.9	20.31	22.61	30.00	36.00	Pass
2	64	903.0	20.42	22.72	30.00	36.00	Pass
	67	907.8	20.37	22.67	30.00	36.00	Pass
	71	914.2	20.30	22.60	30.00	36.00	Pass

Note:

1. E.I.R.P.= Output Power + Antenna Gain
2. Please refer to clause 1.2 for antenna gain.

5 TEST SETUP PHOTO AND EUT PHOTO	VERDICT: PASS
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Remark: The test setup photo and EUT Photo please see appendix.

_____ The End _____