

TEST REPORT

Applicant Name: Dragino Technology Co., Limited.
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Report Number: 2504A05297E-RF-00A
FCC ID: ZHZTHERMOSTAT1

Test Standard (s)

FCC PART 15.247

Sample Description

Product Name: LoRaWAN Thermostat
Model No.: Thermostat1
Trade Mark: DRAGINO
Received Date: 2025-12-25
Report Date: 2026-08-25

Test Result:	The EUT complied with the standards above.
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Prepared and Checked By:

Amanda Wei

Amanda Wei
Engineer

Approved By:

Bob. Liao

Bob.Liao
Supervisor

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TABLE OF CONTENTS

DOCUMENT REVISION HISTORY	4
GENERAL INFORMATION.....	5
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	5
OBJECTIVE	5
TEST METHODOLOGY	5
TEST FACILITY	6
MEASUREMENT UNCERTAINTY	6
SYSTEM TEST CONFIGURATION	7
DESCRIPTION OF TEST CONFIGURATION.....	7
EUT EXERCISE SOFTWARE AND POWER LEVEL [#]	7
SPECIAL ACCESSORIES AND EQUIPMENT MODIFICATIONS	7
SUPPORT EQUIPMENT LIST AND DETAILS	7
EXTERNAL I/O CABLE.....	7
BLOCK DIAGRAM OF TEST SETUP	8
SUMMARY OF TEST RESULTS	10
TEST EQUIPMENT LIST	11
ANTENNA REQUIREMENT.....	12
APPLICABLE STANDARD.....	12
ANTENNA CONNECTOR CONSTRUCTION	12
AC LINE CONDUCTED EMISSIONS	13
APPLICABLE STANDARD.....	13
EUT SETUP.....	13
EMI TEST RECEIVER SETUP.....	13
TEST PROCEDURE	13
CALCULATION	14
TEST DATA	14
RADIATED SPURIOUS EMISSIONS	17
APPLICABLE STANDARD.....	17
EUT SETUP.....	17
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	18
TEST PROCEDURE	19
CALCULATION	19
TEST DATA	20
20 DB EMISSION BANDWIDTH.....	38
APPLICABLE STANDARD.....	38
TEST PROCEDURE	38
TEST DATA	39
CHANNEL SEPARATION TEST	40
APPLICABLE STANDARD.....	40
TEST PROCEDURE	40
TEST DATA	40
TIME OF OCCUPANCY (DWELL TIME).....	41
APPLICABLE STANDARD.....	41
TEST PROCEDURE	41
TEST DATA	41

MAXIMUM CONDUCTED OUTPUT POWER.....	42
APPLICABLE STANDARD.....	42
TEST PROCEDURE	42
TEST DATA	42
CONDUCTED SPURIOUS EMISSIONS	43
APPLICABLE STANDARD.....	43
TEST PROCEDURE	43
TEST DATA	44
POWER SPECTRAL DENSITY	45
APPLICABLE STANDARD.....	45
TEST PROCEDURE	45
TEST DATA	45
DUTY CYCLE.....	46
TEST PROCEDURE	46
TEST DATA	46
APPENDIX	47
20 dB EMISSION BANDWIDTH	48
CHANNEL SEPARATION.....	49
MAXIMUM CONDUCTED OUTPUT POWER	50
POWER SPECTRAL DENSITY	51
DUTY CYCLE.....	52
TIME OF OCCUPANCY (DWELL TIME)	53
CONDUCTED SPURIOUS EMISSION	54
EXHIBIT A-EUT PHOTOGRAPHS	56
EXHIBIT B-TEST SETUP PHOTOGRAPHS	57

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
Rev.00	2504A05297E-RF-00A	Original Report	2026-08-25

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product Name	LoRaWAN Thermostat
Tested Model	Thermostat1
Voltage Range [#]	AC 18-30V

Frequency Range	Lora: 902.3-914.9MHz
Maximum Conducted Output Power(Peak) (actual test result)	8.21 dBm
Technique	Hybrid System
Antenna Specification [#]	Internal Antenna, Gain: -9.59 dBi (It is provided by the applicant.)
Sample Serial Number	For CE&RSE Test: 3F4F-2 For RF Conducted Test: 3F4F-1 (Assigned by BACL, Shenzhen, Guangming)
Sample/EUT Status	Good condition

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2020, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices. And KDB 558074 D01 15.247 Meas Guidance v05r02.

Unless otherwise stated there are no any additions to, deviations, or exclusions from the method.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen, Guangming) to collect test data is located on the Floor 1, KuMaKe Building, Dongzhou Community, Guangming Street, Guangming District, Shenzhen, Guangdong, China.

Accredited by American Association for Laboratory Accreditation (A2LA).The Certificate Number is 4297.01.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5 %
RF Frequency		0.064×10^{-7}
RF output power, conducted		0.3 dB
Unwanted Emission, conducted		1.2 dB
AC Power Lines Conducted Emissions		2.7 dB
Emissions, Radiated	9kHz - 30MHz	2.1 dB
	30MHz - 1GHz	4.3 dB
	1GHz - 18GHz	4.9 dB
Temperature		1 °C
Humidity		2 %
Supply voltages		0.4 %

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For 125kHz mode, 64 channels are provided to testing:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	902.3	16	905.5	32	908.7	48	911.9
1	902.5	17	905.7	33	908.9	49	912.1
2	902.7	18	905.9	34	909.1	50	912.3
...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...
13	904.9	29	908.1	45	911.3	61	914.5
14	905.1	30	908.3	46	911.5	62	914.7
15	905.3	31	908.5	47	911.7	63	914.9

EUT was tested with channel 0, 31, 63.

EUT Exercise Software and Power Level[#]

Exercise Software:	sscom v5.13.1
Power Level:	11

Note: The information in the above table is provided by the applicant.

Special Accessories and Equipment Modifications

No special accessories or modifications were used on the device under test (EUT) during the test.

Support Equipment List and Details

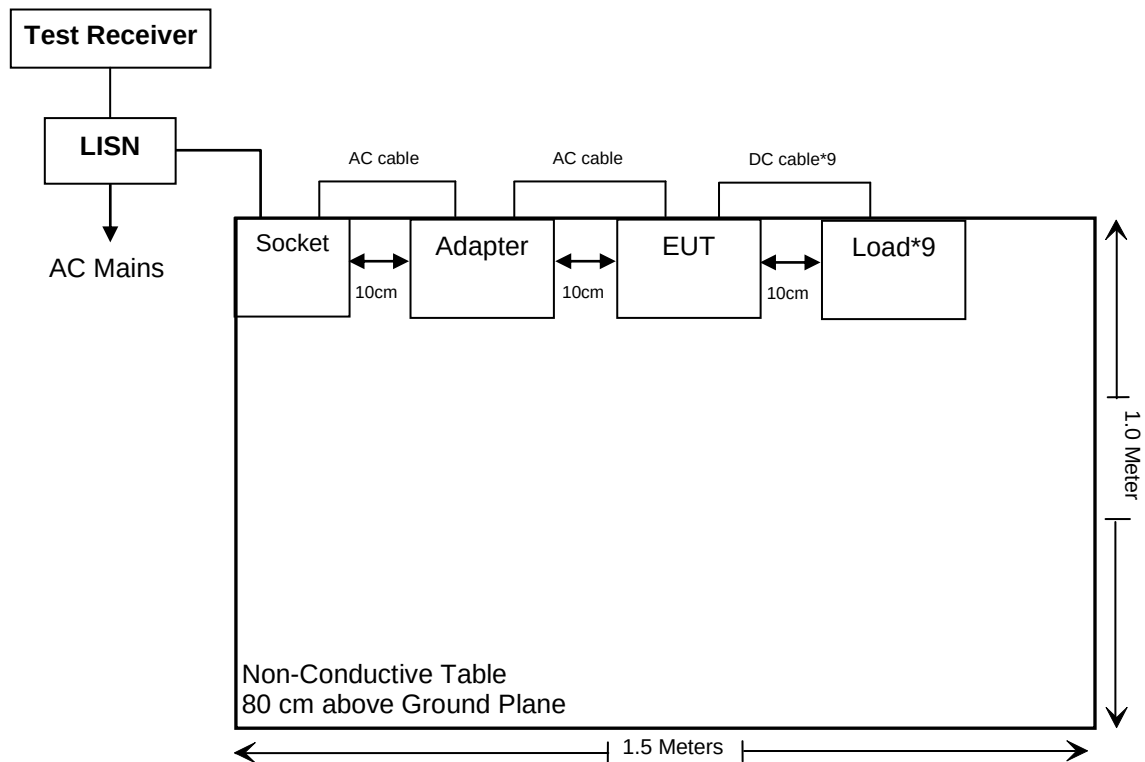
Manufacturer	Description	Model	Serial Number
Unknown	Adapter	SH66-24035AC Input: AC 120V 60Hz Output: AC 24V 3.5A	Unknown
Unknown	Load*9	Unknown	Unknown

External I/O Cable

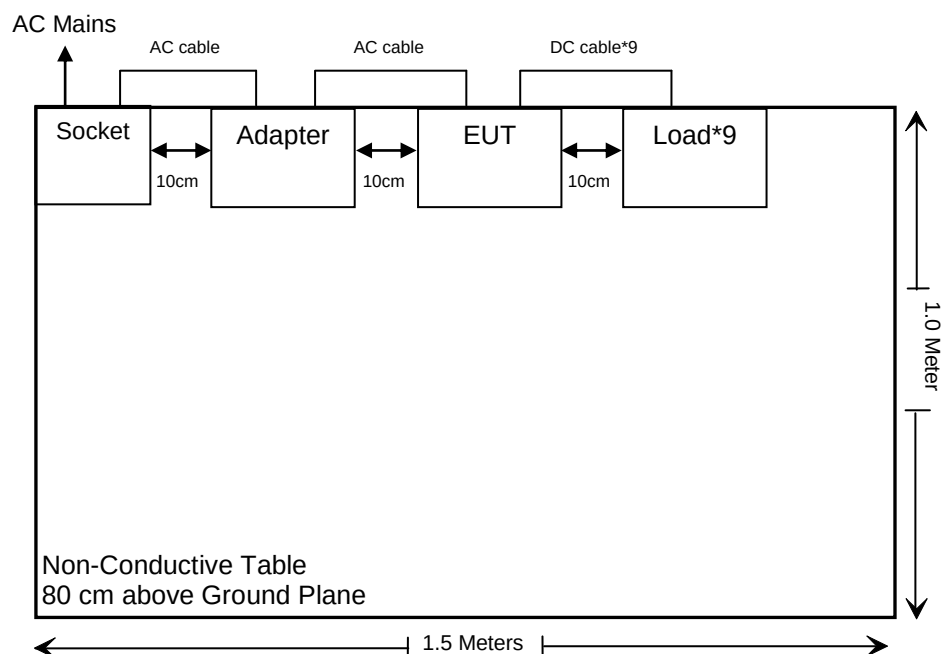
Cable Description	Shielding Type	Length (m)	From Port	To
AC Cable	NO	0.6	Socket	Adapter
AC Cable	NO	1.4	Adapter	EUT
DC Cable*9	NO	0.5	EUT	Load*9

Block Diagram of Test Setup

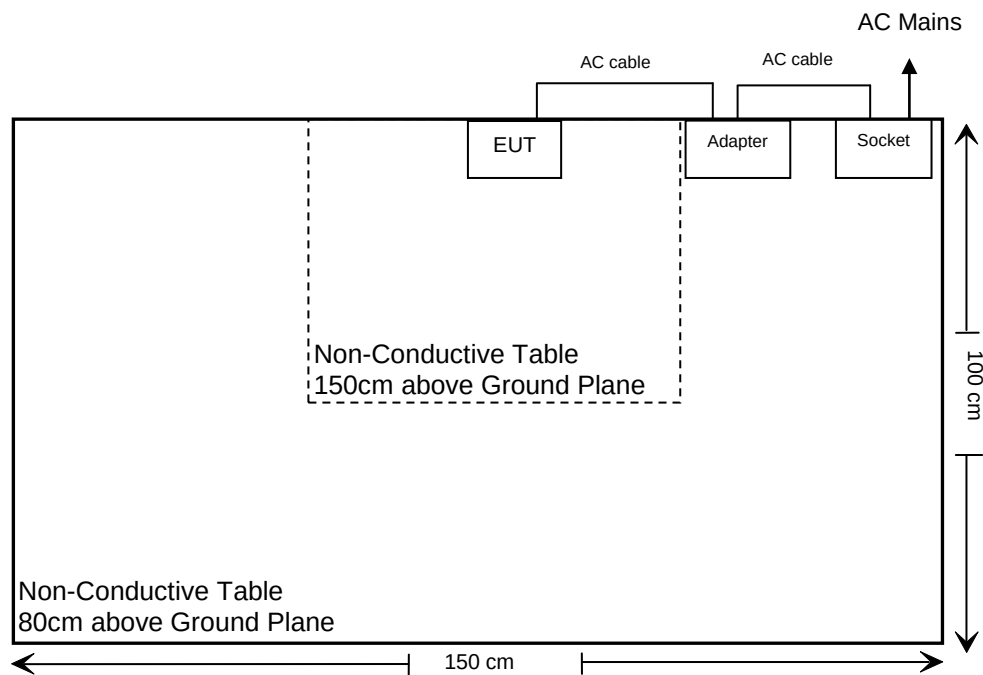
For Conducted Emission:



For Radiated Emission (Below 1GHz):



For Radiated Emission (Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209 §15.247(d)	Radiated Spurious Emissions	Compliance
§15.247(a)(1)(i)	20dB Emission Bandwidth	Compliance
§15.247(a)(1)	Channel Separation Test	Compliance
§15.247(f)	Time of Occupancy (Dwell Time)	Compliance
§15.247(b)(2)(3)	Maximum Conducted Output Power	Compliance
§15.247(d)	Conducted Spurious Emissions	Compliance
§15.247(f)	Power Spectral Density	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100784	2026/05/07	2027/05/06
Rohde & Schwarz	L.I.S.N.	ENV216	101314	2026/05/07	2027/05/06
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2026/05/07	2027/05/06
Rohde & Schwarz	Pulse Limiter	ESH3-Z2	100312	2026/05/07	2027/05/06
Unknown	RF Coaxial Cable	No.17	N0350	2026/05/07	2027/05/06
Test Software: e3 191218 (V9)					
Radiated Spurious Emission Test (Below 1GHz)					
Rohde & Schwarz	Test Receiver	ESR	102725	2026/05/07	2027/05/06
SONOMA INSTRUMENT	Amplifier	310N	186131	2026/01/20	2027/01/19
Oulitong	Band Reject Filter	902-928MHz	OE01902501	2025/06/26	2026/06/25
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2024/08/08	2027/08/07
Unknown	RF Coaxial Cable	No.12	N040	2026/05/07	2027/05/06
Unknown	RF Coaxial Cable	No.13	N300	2026/05/07	2027/05/06
Unknown	RF Coaxial Cable	No.14	N800	2026/05/07	2027/05/06
BACL	LOOP ANTENNA	1313-1A	3110711	2024/01/16	2027/01/15
Test Software: e3 191218 (V9)					
Radiated Spurious Emission Test (Above 1GHz)					
Rohde & Schwarz	Spectrum Analyzer	FSV40	101948	2025/09/17	2026/09/16
Decentest	Filter Switch Unit	DT7220FSU	DQ77927	2025/09/18	2026/09/17
Decentest	Multiplex Switch Test Control Set	DT7220CSU	DQ77924	2025/09/18	2026/09/17
A.H. Systems, inc.	Preamplifier	PAM-0118	226	2026/01/20	2027/01/19
Schwarzbeck	Horn Antenna	BBHA9120D	837	2026/01/29	2029/01/30
Unknown	RF Coaxial Cable	No.10	N050	2025/05/30	2026/05/29
Unknown	RF Coaxial Cable	No.11	N1000	2025/05/30	2026/05/29
Unknown	RF Coaxial Cable	No.19	N500	2025/05/30	2026/05/29
Test Software: e3 191218 (V9)					
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSV40	101590	2025/09/17	2026/09/16
WEINSCHTEL	10dB Attenuator	5324	AU 3842	2026/01/20	2027/01/19

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen, Guangming) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

ANTENNA REQUIREMENT

Applicable Standard

According to § 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 shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.
- c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has one internal antenna arrangement, which were permanently attached to the EUT. The antenna gain is -9.59dBi[#]. Fulfill the requirement of this section. Please refer to the EUT photos.

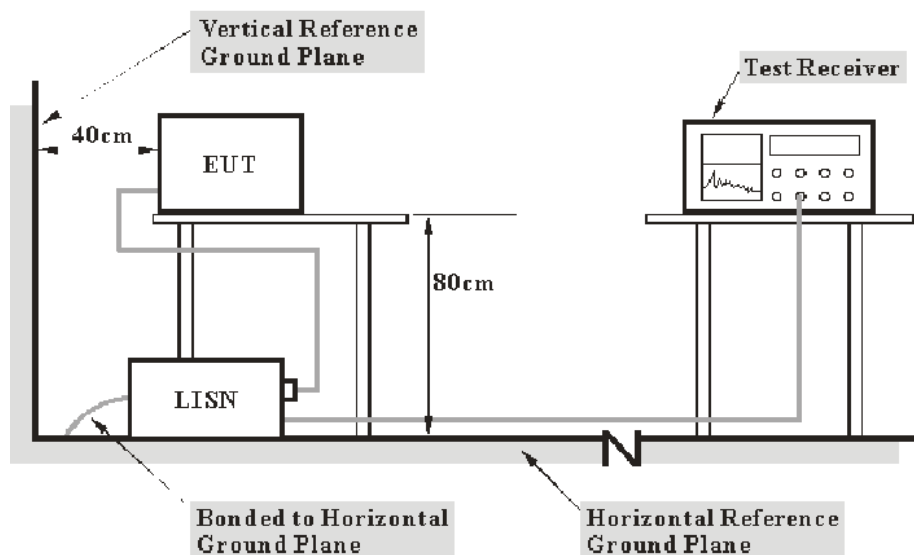
Result: Compliance.

AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with ANSI C63.10-2020. The related limit was specified in FCC Part 15.207.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Calculation

The factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

$$\text{Factor} = \text{LISN VDF} + \text{Cable Loss} + 10\text{dB Attenuation(Limiter)}$$

The “**Over limit**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over limit of -7 dB means the emission is 7 dB below the limit. The equation for calculation is as follows:

$$\text{Over Limit} = \text{Level} - \text{Limit}$$

$$\text{Level} = \text{Read Level} + \text{Factor}$$

Test Data

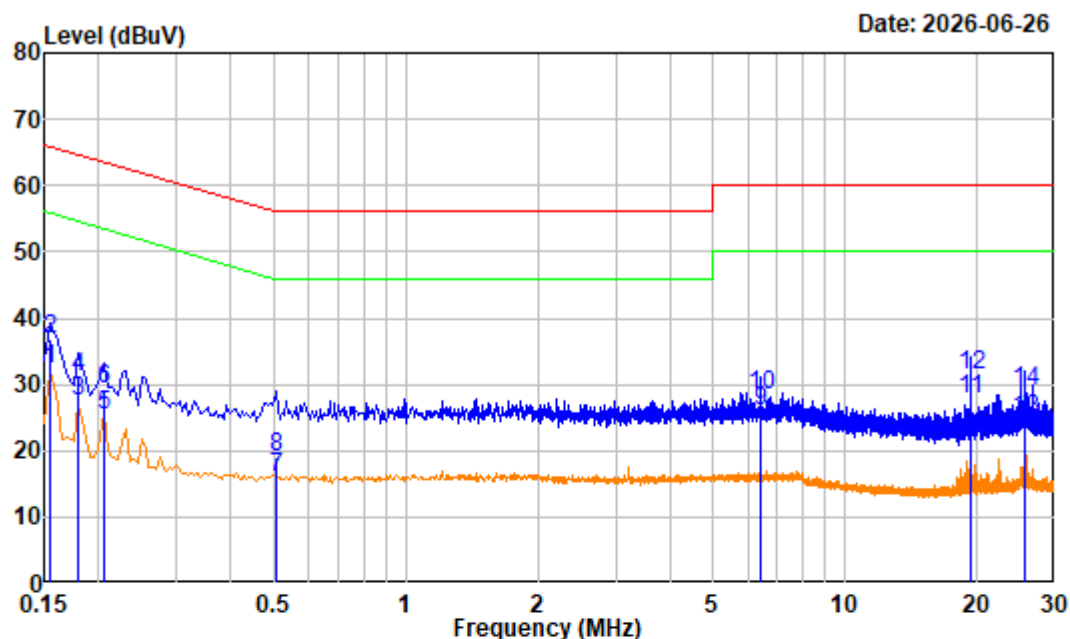
Environmental Conditions

Temperature:	24.1℃
Relative Humidity:	40 %
ATM Pressure:	100.1 kPa
Test Engineer:	Homelander Dai
Test Date:	2026-06-26
EUT Operation Mode:	Transmitting

Test Result: Compliance, please refer to the below data.

Note: The maximum output power channel was tested: Lora 125k Low channel.

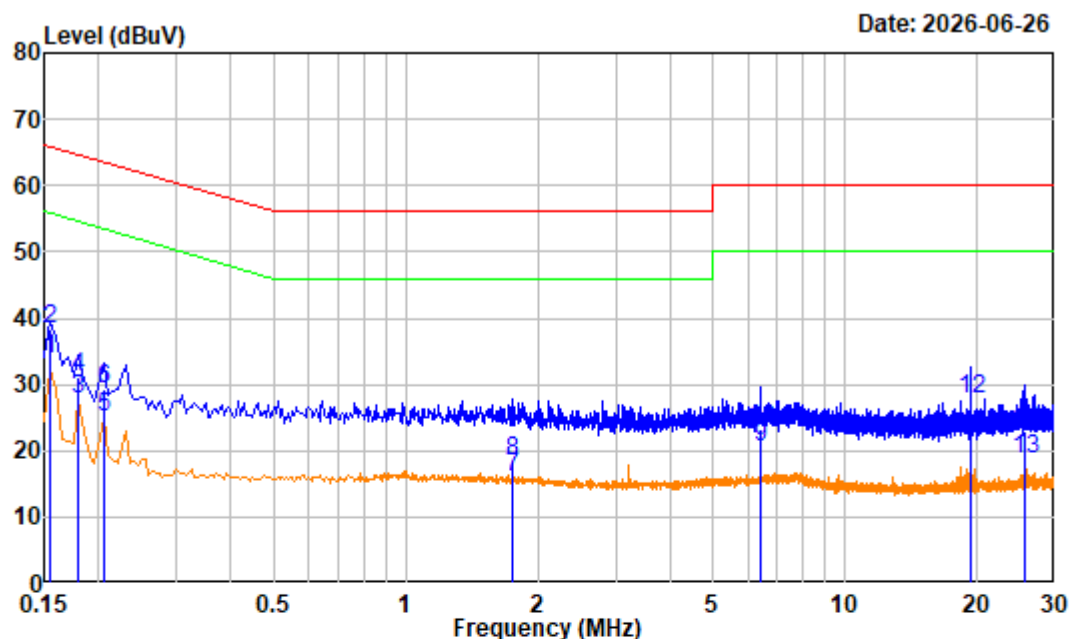
AC 120V/60Hz, Line:



Site : Shielding Room
 Condition : Line
 Job No. : 2504A05297E-RF
 Test Mode : Transmitting
 Tester : Homelander Dai
 Receiver Setting: IF B/W 9kHz PK/AV

	Freq	Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.155	19.75	12.58	32.33	55.73	-23.40	Average
2	0.155	19.75	17.15	36.90	65.73	-28.83	QP
3	0.180	19.95	7.60	27.55	54.49	-26.94	Average
4	0.180	19.95	11.19	31.14	64.49	-33.35	QP
5	0.205	20.11	5.29	25.40	53.41	-28.01	Average
6	0.205	20.11	9.24	29.35	63.41	-34.06	QP
7	0.505	20.02	-3.94	16.08	46.00	-29.92	Average
8	0.505	20.02	-1.07	18.95	56.00	-37.05	QP
9	6.440	20.63	5.37	26.00	50.00	-24.00	Average
10	6.440	20.63	7.62	28.25	60.00	-31.75	QP
11	19.325	19.66	8.21	27.87	50.00	-22.13	Average
12	19.325	19.66	11.78	31.44	60.00	-28.56	QP
13	25.760	19.47	5.27	24.74	50.00	-25.26	Average
14	25.760	19.47	9.39	28.86	60.00	-31.14	QP

AC 120V/60Hz, Neutral:



Site : Shielding Room
 Condition : neutral
 Job No. : 2504A05297E-RF
 Test Mode : Transmitting
 Tester : Homelander Dai
 Receiver Setting: IF B/W 9kHz PK/AV

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.155	19.41	14.39	33.80	55.73	-21.93	Average
2	0.155	19.41	18.81	38.22	65.73	-27.51	QP
3	0.180	19.46	8.17	27.63	54.49	-26.86	Average
4	0.180	19.46	11.65	31.11	64.49	-33.38	QP
5	0.205	19.52	5.57	25.09	53.41	-28.32	Average
6	0.205	19.52	9.72	29.24	63.41	-34.17	QP
7	1.745	20.10	-4.21	15.89	46.00	-30.11	Average
8	1.745	20.10	-1.58	18.52	56.00	-37.48	QP
9	6.445	20.44	0.04	20.48	50.00	-29.52	Average
10	6.445	20.44	2.92	23.36	60.00	-36.64	QP
11	19.325	20.00	2.05	22.05	50.00	-27.95	Average
12	19.325	20.00	7.91	27.91	60.00	-32.09	QP
13	25.760	19.96	-1.38	18.58	50.00	-31.42	Average
14	25.760	19.96	3.05	23.01	60.00	-36.99	QP

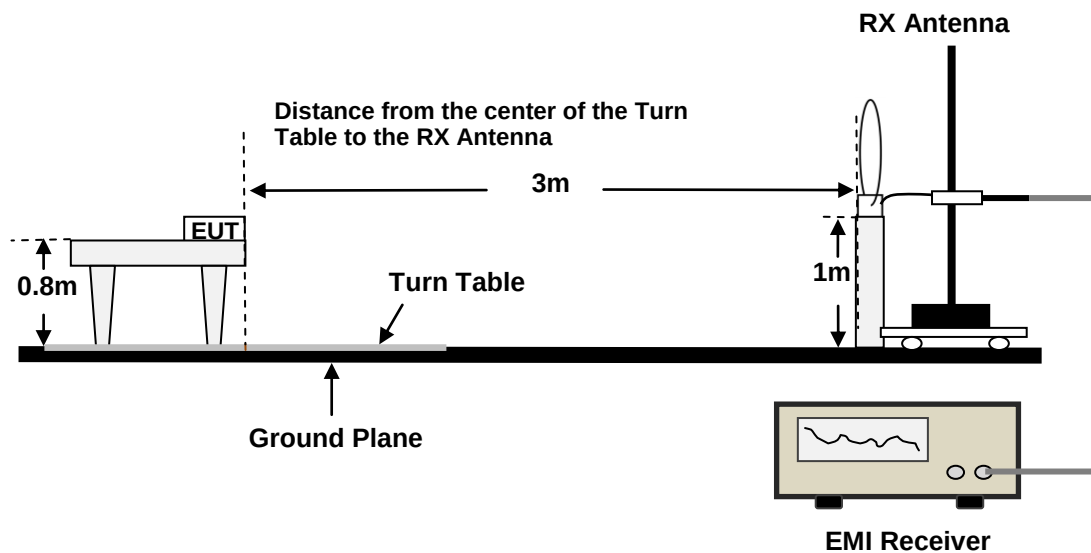
RADIATED SPURIOUS EMISSIONS

Applicable Standard

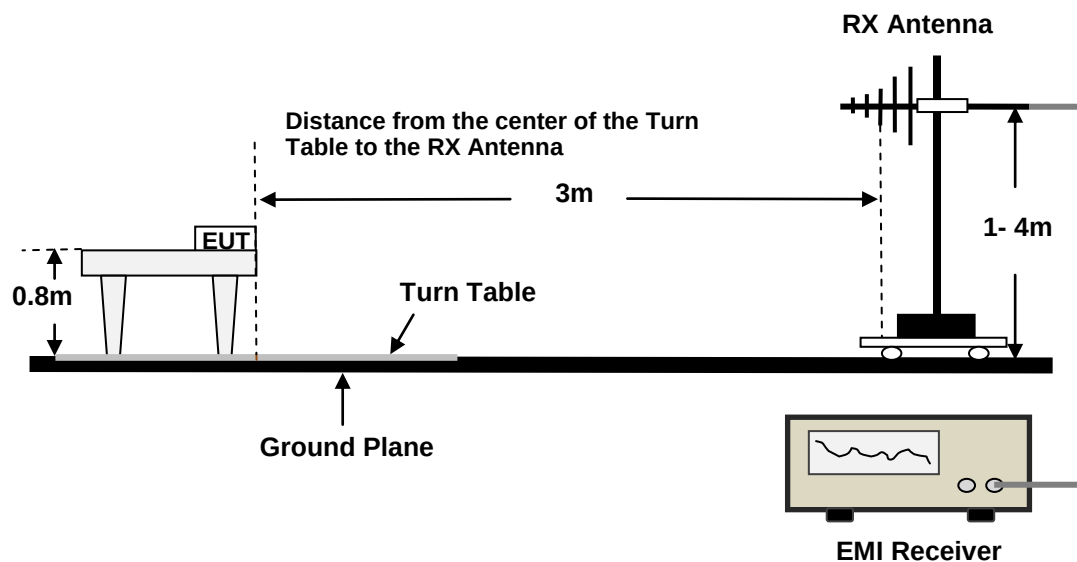
FCC §15.247 (d); §15.209; §15.205;

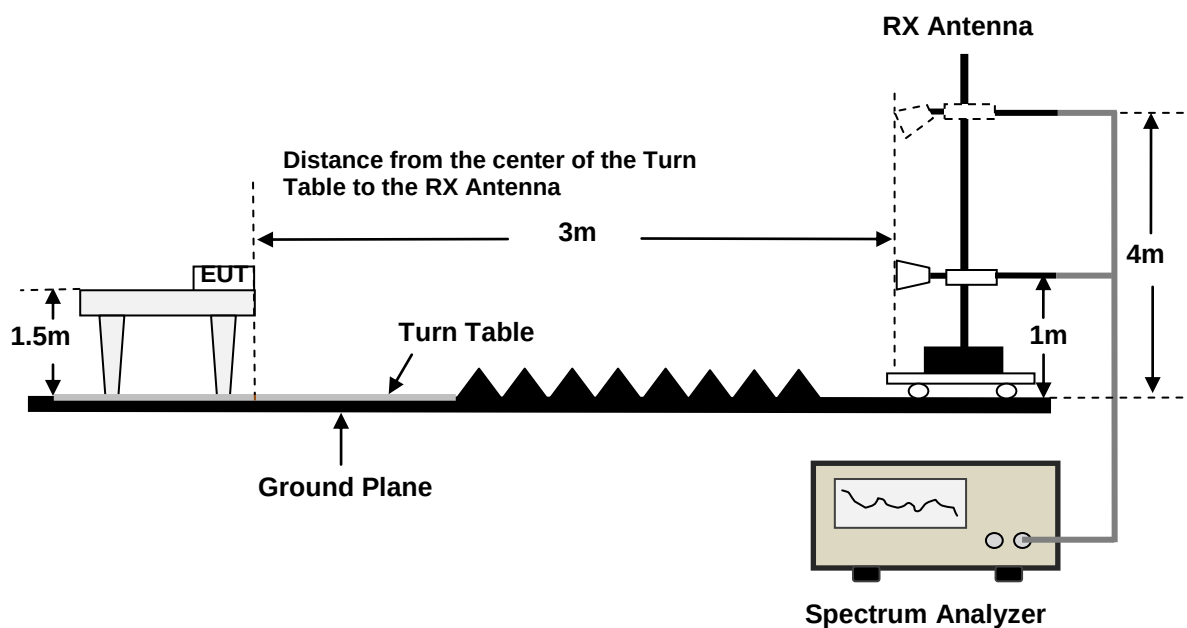
EUT Setup

9kHz - 30MHz:



30MHz - 1GHz:



Above 1GHz:

The radiated emission performed in the 3 meters, using the setup accordance with the ANSI C63.10-2020. The specification used was the FCC 15.209, FCC 15.247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9kHz to 10GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

9kHz - 1000MHz:

Frequency Range	Measurement	RBW	Video B/W	IF B/W	Detector
9kHz - 150kHz	PK	0.3kHz	1kHz	/	PK
	QP/AV	/	/	200Hz	QP/AV
150kHz - 30MHz	PK	10kHz	30kHz	/	PK
	QP/AV	/	/	9kHz	QP/AV
30MHz - 1000MHz	PK	100kHz	300kHz	/	PK
	QP	/	/	120kHz	QP

1GHz - 10GHz:

Pre-scan:

Measurement	Detector	RBW	Video B/W
PK	Peak	1MHz	3MHz
Ave.	Peak	1MHz	5kHz

Final measurement for emission identified during the pre-scan:

Harmonics

Measurement	Detector	Duty cycle	RBW	Video B/W
PK	Peak	Any	1MHz	3MHz
Ave.	Peak	>98%	1MHz	10Hz
	Peak	<98%	1MHz	≥1/ Ton

Band Edge & Other Emission

Measurement	Detector	RBW	Video B/W
PK	Peak	1MHz	3MHz
Ave.	Peak	1MHz	≥10Hz

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

According to FCC §15.209(e), the provisions in §15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

According to FCC§15.31 measurement standard (f)(2), 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). This paragraph (f) shall not apply to Access BPL devices operating below 30 MHz.

For 9kHz-30MHz, test distance is 3m, extrapolation limit shall be calculated using Equation:

$$E_{\text{limit-measure}} = E_{\text{limit-Standard}} + 40 \times \log_{10}\left(\frac{d_{\text{Standard}}}{d_{\text{measure}}}\right)$$

Note 1: If the maximized peak measured value is under the QP/Average limit by more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Note 2: For above 1GHz, the test result of peak was 20dB below to the limit of peak, which can be compliant to the average limit, so just peak value was recorded.

Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

$$\text{Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Over Limit/Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

$$\begin{aligned}\text{Over Limit/Margin} &= \text{Level / Corrected Amplitude} - \text{Limit} \\ \text{Level / Corrected Amplitude} &= \text{Read Level} + \text{Factor}\end{aligned}$$

Test Data

For Radiated Spurious Emissions, after pre-scan testing in the X, Y and Z axes of orientation, the worst case as setup photos was recorded.

9kHz-1GHz

Environmental Conditions

Temperature:	23.7 °C
Relative Humidity:	48 %
ATM Pressure:	100.3 kPa
Test Engineer:	Jayden Luo
Test Date:	2026-06-09
EUT Operation Mode:	Lora Transmitting

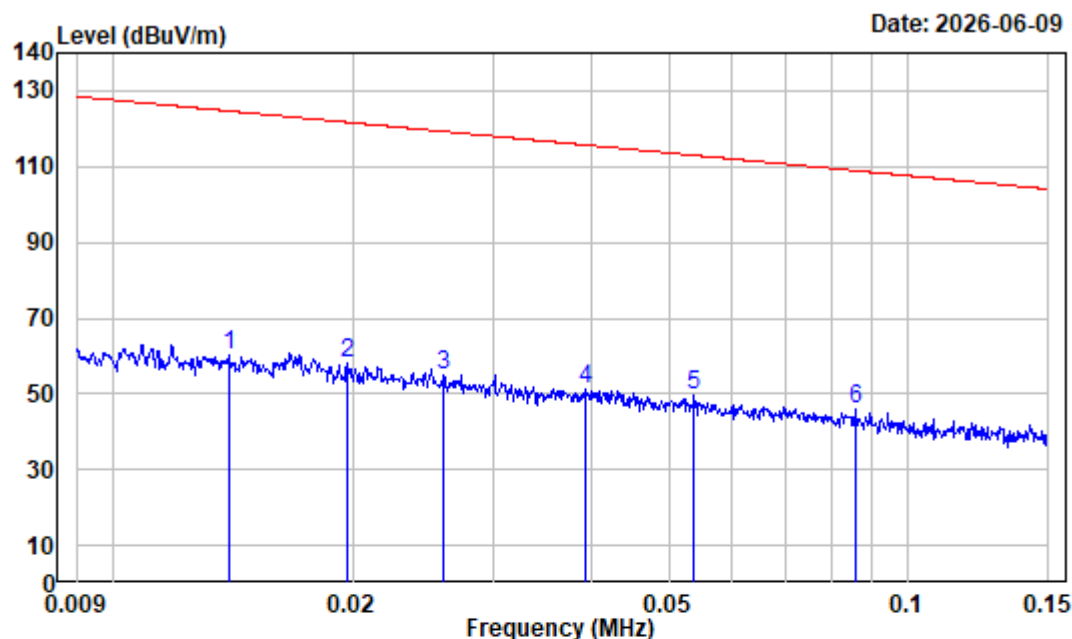
Test Result: Compliance, please refer to the below data.

Note 1: The Loop Antenna were tested in parallel, perpendicular, and ground-parallel. The worst orientation was parallel and the data was recorded in report.

Note 2: For 9kHz-30MHz, the maximum output power channel was tested: Lora 125k Low channel.

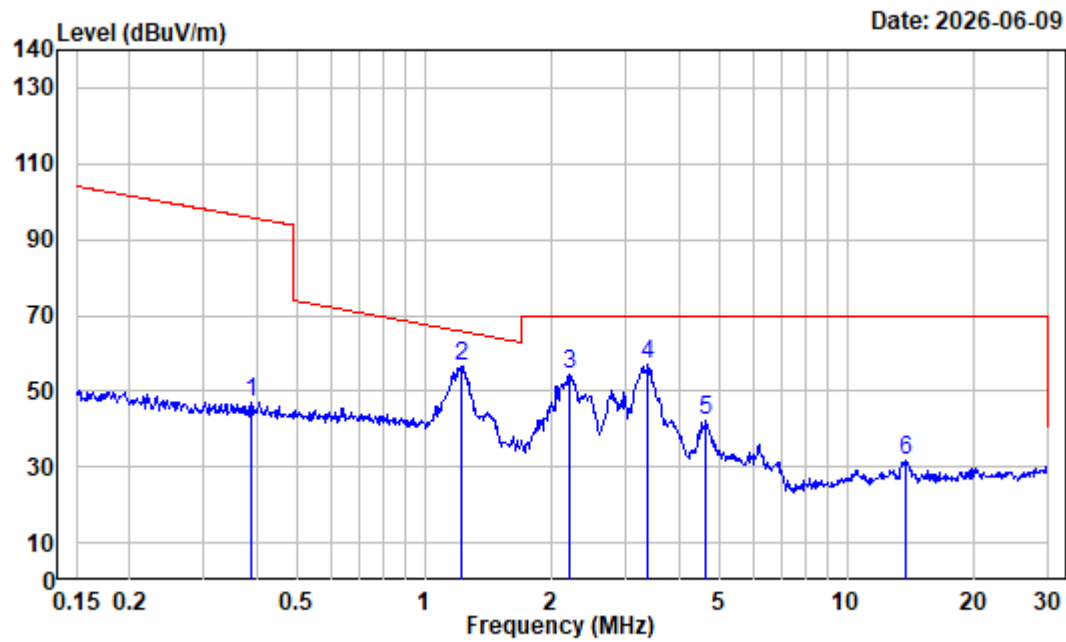
Note 3: For 30MHz-1GHz, the fundamental with filter.

9kHz~30MHz:



Site : chamber
 Condition : 3m
 Job No. : 2504A05297E-RF
 Polarization : Parallel Tester: Jayden Luo
 Test Mode : Transmitting
 Receiver Setting: RBW:300Hz VBW:1kHz

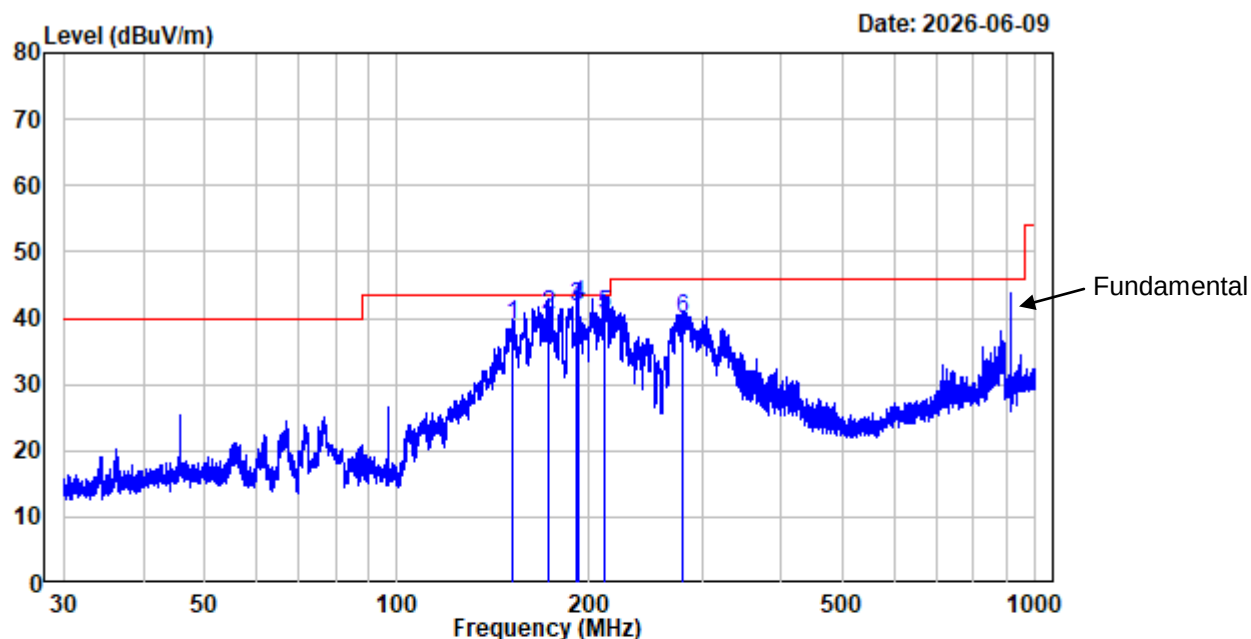
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.014	34.05	26.04	60.09	124.68	-64.59	Peak
2	0.020	31.53	26.37	57.90	121.73	-63.83	Peak
3	0.026	28.70	26.05	54.75	119.28	-64.53	Peak
4	0.039	25.02	26.32	51.34	115.71	-64.37	Peak
5	0.054	22.28	27.49	49.77	113.00	-63.23	Peak
6	0.086	17.93	27.81	45.74	108.95	-63.21	Peak



Site : chamber
 Condition : 3m
 Job No. : 2504A05297E-RF
 Polarization : Parallel Tester: Jayden Luo
 Test Mode : Transmitting
 Receiver Setting: RBW:10kHz VBW:30kHz

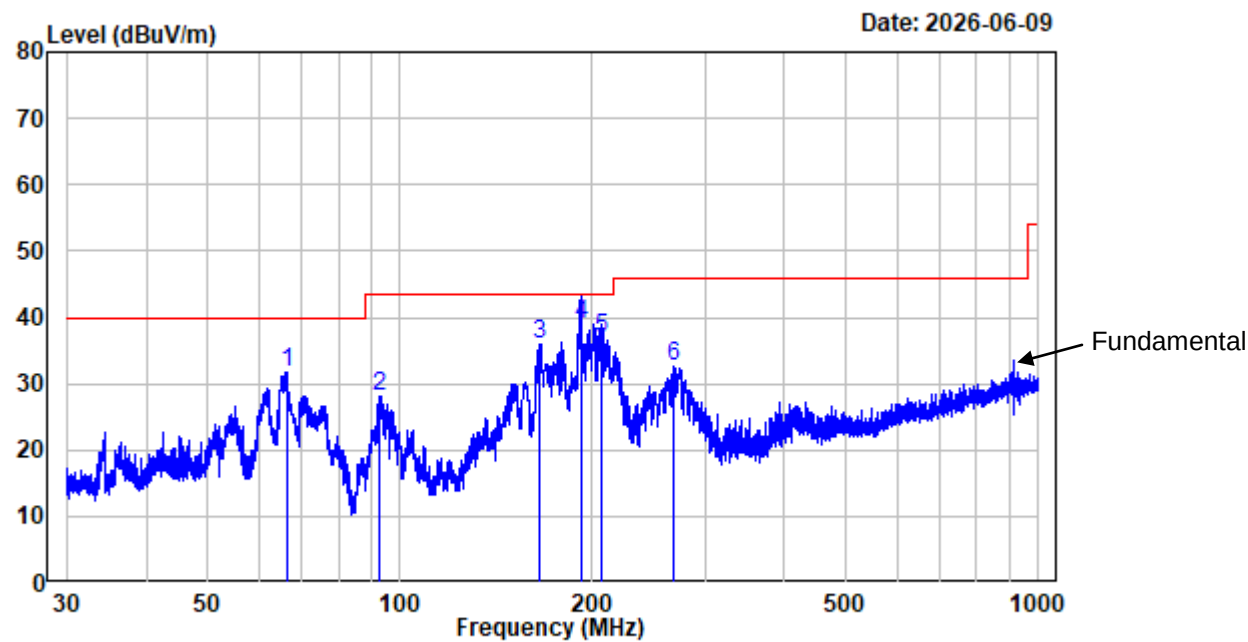
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.387	5.54	41.40	46.94	95.84	-48.90	Peak
2	1.223	-2.62	59.18	56.56	65.69	-9.13	Peak
3	2.201	-5.47	59.68	54.21	69.54	-15.33	Peak
4	3.381	-6.01	63.01	57.00	69.54	-12.54	Peak
5	4.647	-6.30	48.46	42.16	69.54	-27.38	Peak
6	13.768	-4.35	36.27	31.92	69.54	-37.62	Peak

30MHz~1GHz:



Site : chamber
 Condition : 3m HORIZONTAL
 Job No. : 2504A05297E-RF Tester: Jayden Luo
 Test Mode : Transmitting
 Receiver Setting: RBW:100kHz VBW:300kHz

	Freq	Factor	Read Level	Limit Level	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	151.996	-14.65	53.51	38.86	43.50	-4.64 QP
2	172.675	-13.42	53.86	40.44	43.50	-3.06 QP
3	191.493	-10.18	51.89	41.71	43.50	-1.79 QP
4	192.419	-10.05	51.93	41.88	43.50	-1.62 QP
5	211.249	-10.58	51.15	40.57	43.50	-2.93 QP
6	280.147	-9.22	48.97	39.75	46.00	-6.25 QP



Site : chamber

Condition : 3m VERTICAL

Job No. : 2504A05297E-RF Tester: Jayden Luo

Test Mode : Transmitting

Receiver Setting: RBW:100kHz VBW:300kHz

	Freq		Read		Limit	Over	Remark
	Factor		Level	Level	Line	Limit	
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	66.528	-13.06	44.86	31.80	40.00	-8.20	Peak
2	92.665	-12.83	40.89	28.06	43.50	-15.44	Peak
3	164.908	-13.86	49.88	36.02	43.50	-7.48	Peak
4	192.166	-10.10	49.11	39.01	43.50	-4.49	QP
5	206.579	-10.64	47.55	36.91	43.50	-6.59	QP
6	268.721	-9.74	42.29	32.55	46.00	-13.45	Peak

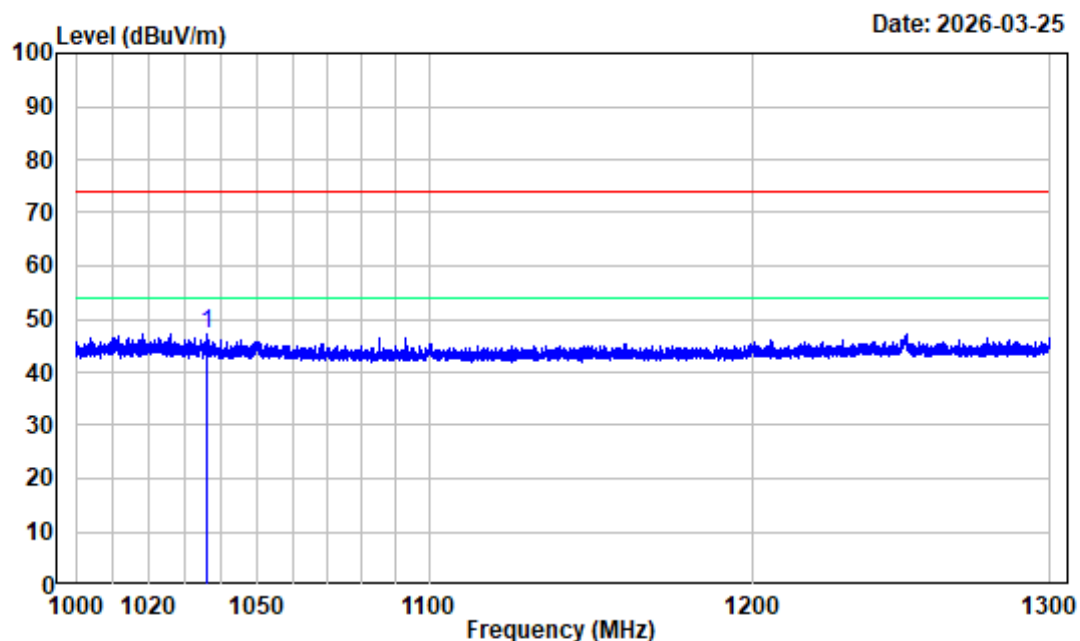
1GHz-10GHz

Environmental Conditions

Temperature:	23.9 °C
Relative Humidity:	50 %
ATM Pressure:	100.1 kPa
Test Engineer:	Angel Chen
Test Date:	2026-03-25
EUT Operation Mode:	Transmitting

Test Result: Compliance, please refer to the below data.

Lora 125K Low Channel 1GHz-1.3GHz_HORIZONTAL



Site : chamber

Condition : 3m HORIZONTAL

Project No.: 2504A05297E-RF

Test Mode : Transmitting

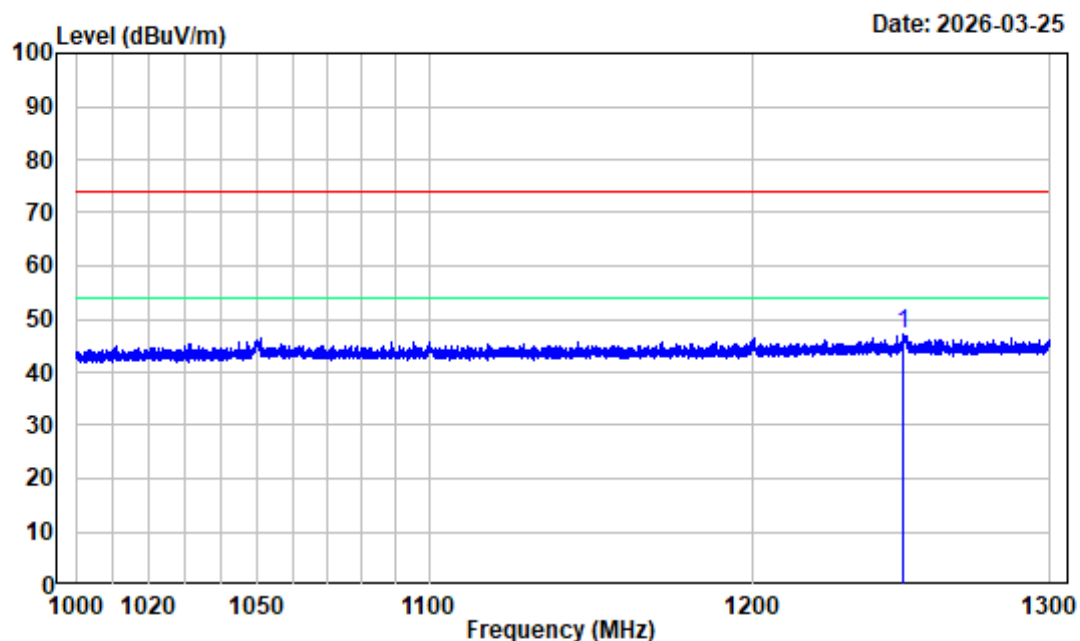
Tester:Angel Chen

Note : Lora 125K Low Channel 902.3MHz 1GHz-1.3GHz

SA setting : Peak:RBW:1MHz,VBW:3MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1036.037	-14.13	61.32	47.19	74.00	-26.81	peak

Lora 125K Low Channel 1GHz-1.3GHz_VERTICAL



Site : chamber

Condition : 3m VERTICAL

Project No.: 2504A05297E-RF

Test Mode : Transmitting

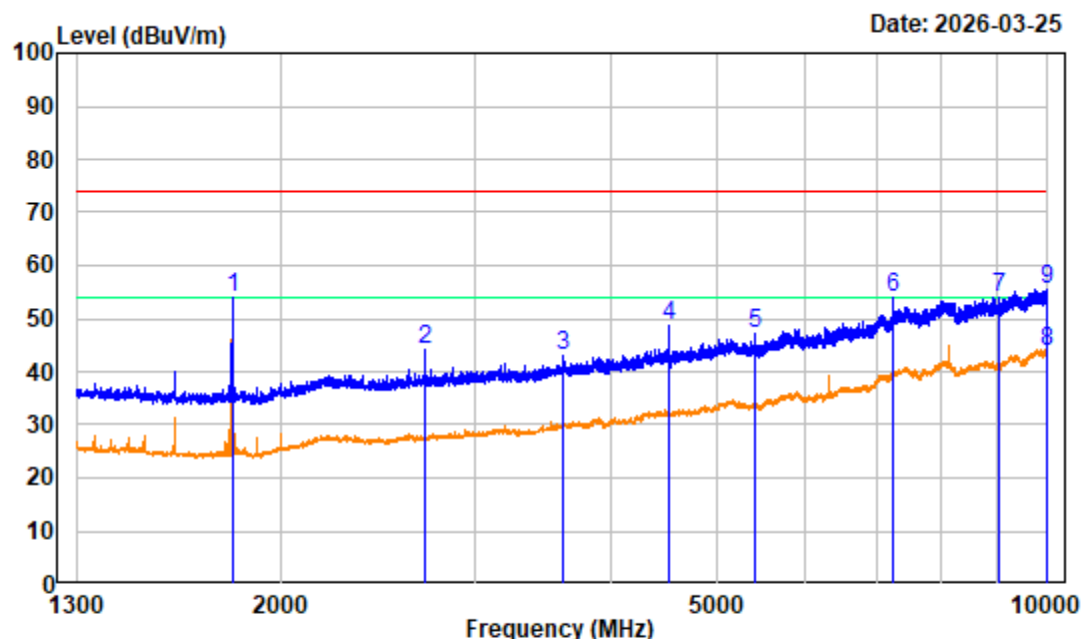
Tester: Angel Chen

Note : Lora 125K Low Channel 902.3MHz 1GHz-1.3GHz

SA setting : Peak:RBW:1MHz,VBW:3MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1249.787	-12.96	60.02	47.06	74.00	-26.94	peak

Lora 125K Low Channel 1.3GHz-10GHz_HORIZONTAL



Site : chamber

Condition : 3m HORIZONTAL

Project No.: 2504A05297E-RF

Test Mode : Transmitting

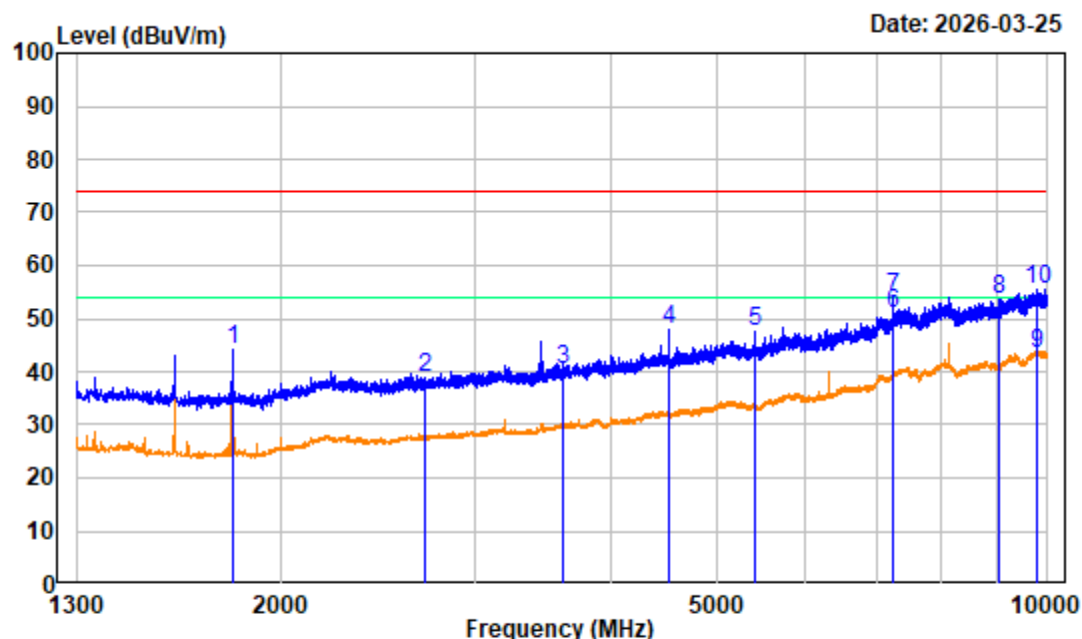
Tester: Angel Chen

Note : Lora 125K Low Channel 902.3MHz 1.3GHz-10GHz

SA setting : Peak:RBW:1MHz,VBW:3MHz Ave:RBW:1MHz,VBW:5kHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1804.600	-13.10	67.08	53.98	74.00	-20.02	Peak
2	2706.900	-10.39	54.36	43.97	74.00	-30.03	Peak
3	3609.200	-8.89	51.75	42.86	74.00	-31.14	Peak
4	4511.500	-7.43	55.96	48.53	74.00	-25.47	Peak
5	5413.800	-6.38	53.63	47.25	74.00	-26.75	Peak
6	7218.400	-1.63	55.42	53.79	74.00	-20.21	Peak
7	9023.000	0.13	53.69	53.82	74.00	-20.18	Peak
8	9972.813	2.74	40.91	43.65	54.00	-10.35	Average
9	9972.813	2.74	52.89	55.63	74.00	-18.37	Peak

Lora 125K Low Channel 1.3GHz-10GHz_VERTICAL



Site : chamber

Condition : 3m VERTICAL

Project No.: 2504A05297E-RF

Test Mode : Transmitting

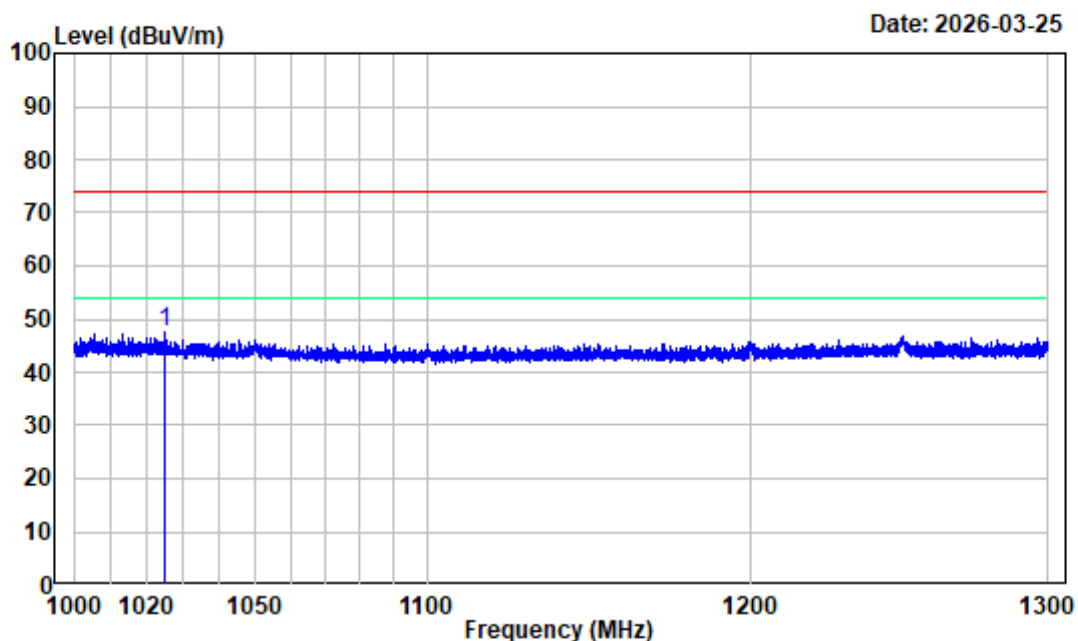
Tester: Angel Chen

Note : Lora 125K Low Channel 902.3MHz 1.3GHz-10GHz

SA setting : Peak:RBW:1MHz,VBW:3MHz Ave:RBW:1MHz,VBW:5kHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1804.600	-13.10	57.26	44.16	74.00	-29.84	Peak
2	2706.900	-10.39	49.22	38.83	74.00	-35.17	Peak
3	3609.200	-8.89	49.30	40.41	74.00	-33.59	Peak
4	4511.500	-7.43	55.34	47.91	74.00	-26.09	Peak
5	5413.800	-6.38	53.96	47.58	74.00	-26.42	Peak
6	7218.400	-1.63	52.48	50.85	54.00	-3.15	Average
7	7218.400	-1.63	55.68	54.05	74.00	-19.95	Peak
8	9023.000	0.13	53.42	53.55	74.00	-20.45	Peak
9	9766.188	2.68	40.78	43.46	54.00	-10.54	Average
10	9766.188	2.68	52.76	55.44	74.00	-18.56	Peak

Lora 125K Middle Channel 1GHz-1.3GHz_HORIZONTAL



Site : chamber

Condition : 3m HORIZONTAL

Project No.: 2504A05297E-RF

Test Mode : Transmitting

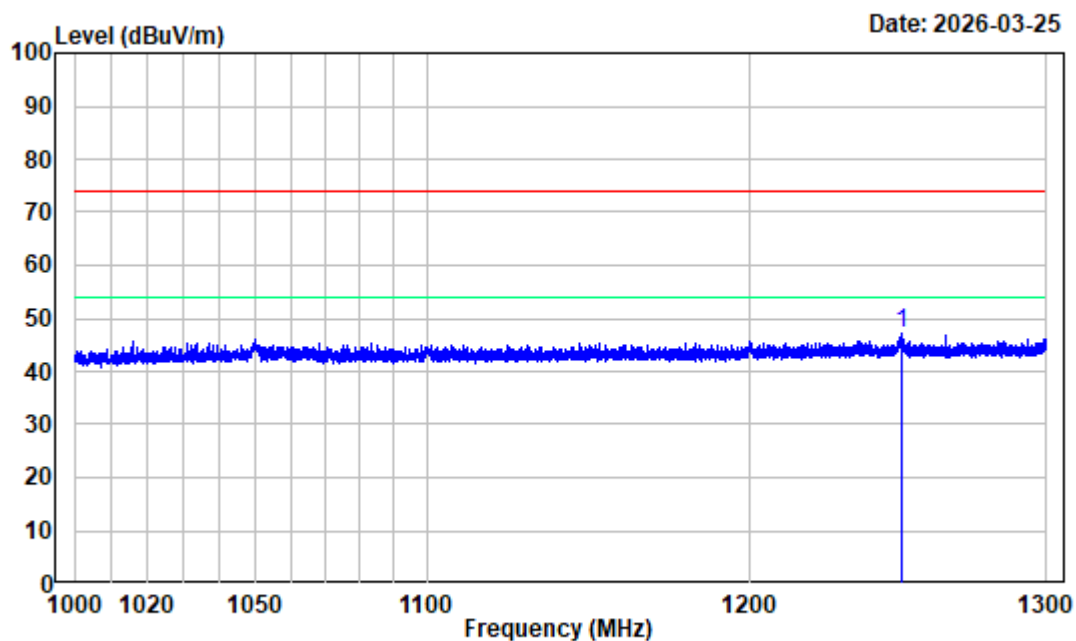
Tester:Angel Chen

Note : Lora 125K Middle Channel 908.5MHz 1GHz-1.3GHz

SA setting : Peak:RBW:1MHz,VBW:3MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1024.863	-14.34	61.78	47.44	74.00	-26.56	peak

Lora 125K Middle Channel 1GHz-1.3GHz_VERTICAL



Site : chamber

Condition : 3m VERTICAL

Project No.: 2504A05297E-RF

Test Mode : Transmitting

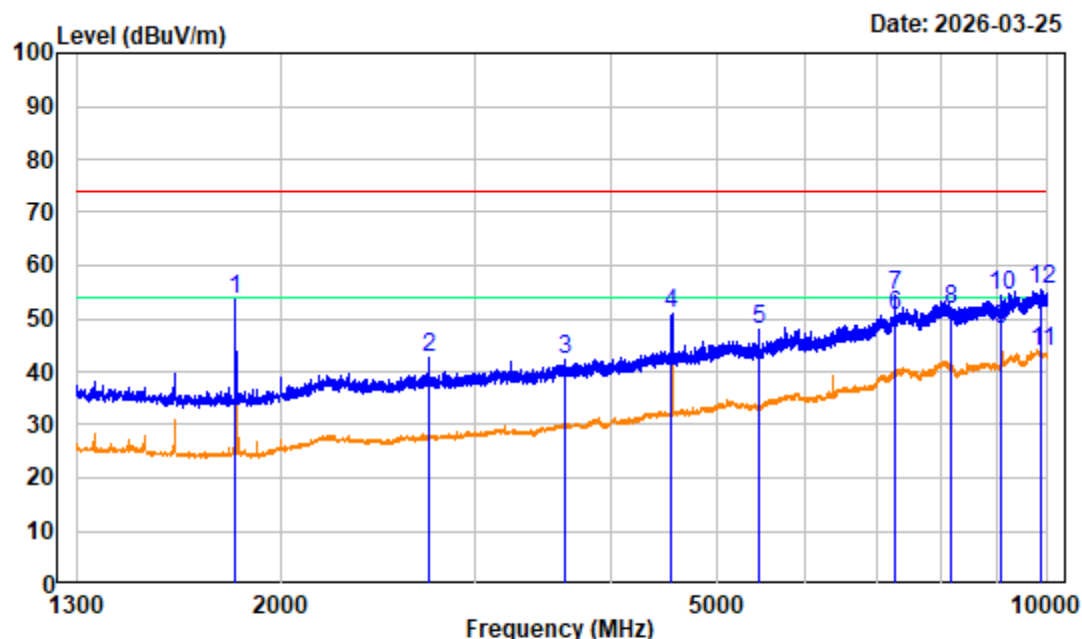
Tester: Angel Chen

Note : Lora 125K Middle Channel 908.5MHz 1GHz-1.3GHz

SA setting : Peak:RBW:1MHz,VBW:3MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1250.238	-12.96	60.12	47.16	74.00	-26.84	peak

Lora 125K Middle Channel 1.3GHz-10GHz_HORIZONTAL



Site : chamber

Condition : 3m HORIZONTAL

Project No.: 2504A05297E-RF

Test Mode : Transmitting

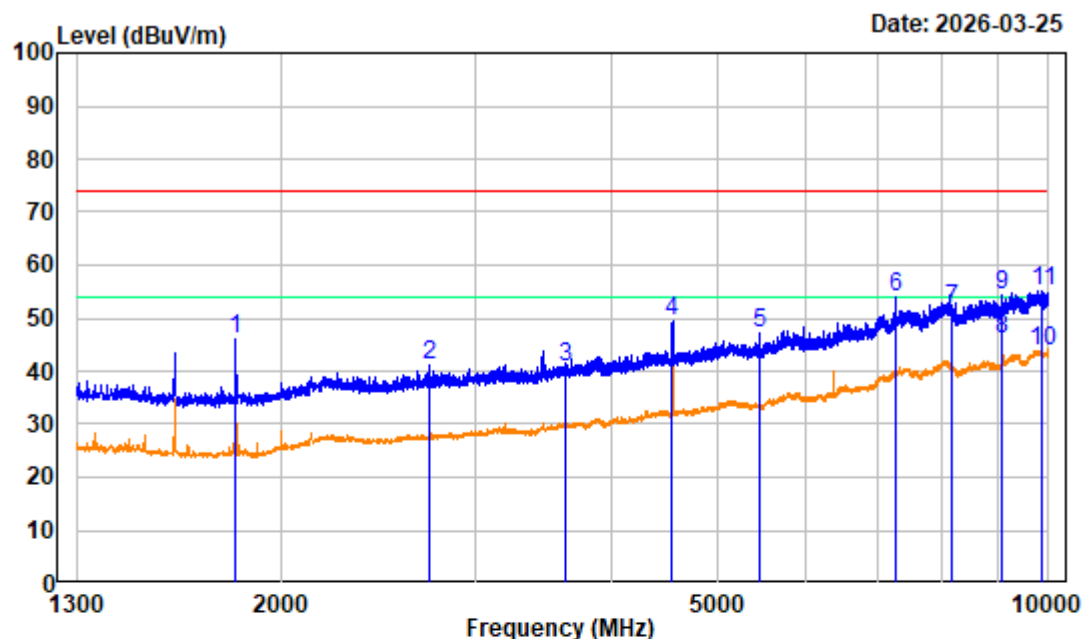
Tester: Angel Chen

Note : Lora 125K Middle Channel 908.5MHz 1.3GHz-10GHz

SA setting : Peak:RBW:1MHz,VBW:3MHz Ave:RBW:1MHz,VBW:5kHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1817.000	-13.03	66.45	53.42	74.00	-20.58	Peak
2	2725.500	-10.35	53.02	42.67	74.00	-31.33	Peak
3	3634.000	-8.86	51.31	42.45	74.00	-31.55	Peak
4	4542.500	-7.18	58.00	50.82	74.00	-23.18	Peak
5	5451.000	-6.44	54.44	48.00	74.00	-26.00	Peak
6	7268.000	-1.40	51.81	50.41	54.00	-3.59	Average
7	7268.000	-1.40	55.78	54.38	74.00	-19.62	Peak
8	8176.500	-0.32	52.10	51.78	74.00	-22.22	Peak
9	9085.000	0.37	47.74	48.11	54.00	-5.89	Average
10	9085.000	0.37	54.11	54.48	74.00	-19.52	Peak
11	9873.850	2.91	40.69	43.60	54.00	-10.40	Average
12	9873.850	2.91	52.57	55.48	74.00	-18.52	Peak

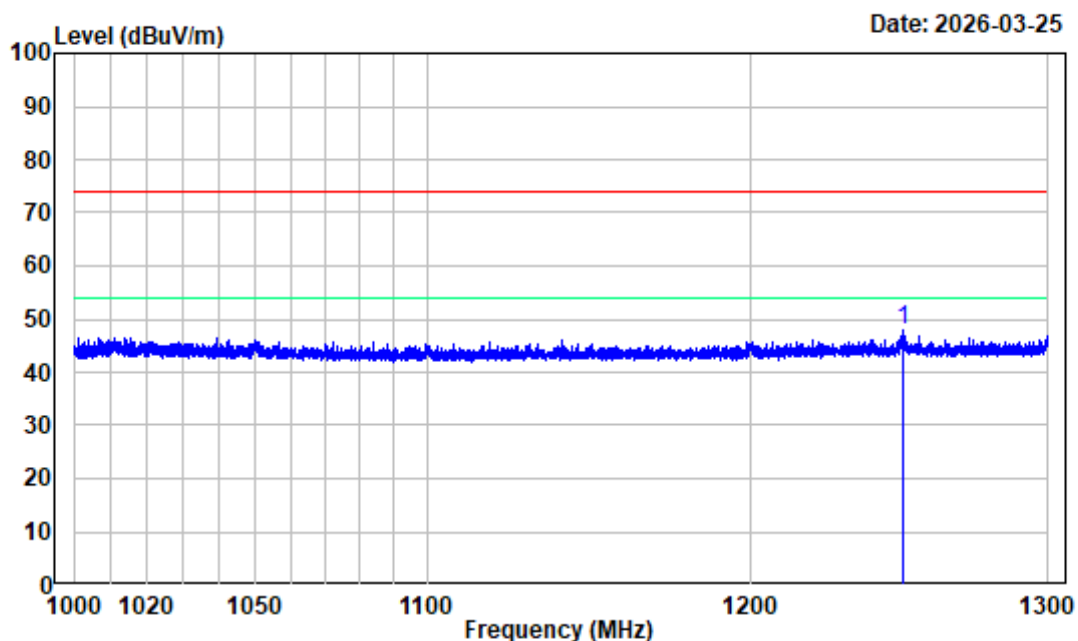
Lora 125K Middle Channel 1.3GHz-10GHz_VERTICAL



Site : chamber
 Condition : 3m VERTICAL
 Project No.: 2504A05297E-RF
 Test Mode : Transmitting Tester: Angel Chen
 Note : Lora 125K Middle Channel 908.5MHz 1.3GHz-10GHz
 SA setting : Peak:RBW:1MHz,VBW:3MHz Ave:RBW:1MHz,VBW:5kHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1817.000	-13.03	59.13	46.10	74.00	-27.90	Peak
2	2725.500	-10.35	51.38	41.03	74.00	-32.97	Peak
3	3634.000	-8.86	49.46	40.60	74.00	-33.40	Peak
4	4542.500	-7.18	56.67	49.49	74.00	-24.51	Peak
5	5451.000	-6.44	53.64	47.20	74.00	-26.80	Peak
6	7268.000	-1.40	55.35	53.95	74.00	-20.05	Peak
7	8176.500	-0.32	52.05	51.73	74.00	-22.27	Peak
8	9085.000	0.37	45.67	46.04	54.00	-7.96	Average
9	9085.000	0.37	54.15	54.52	74.00	-19.48	Peak
10	9879.287	2.86	40.87	43.73	54.00	-10.27	Average
11	9879.287	2.86	52.31	55.17	74.00	-18.83	Peak

Lora 125K High Channel 1GHz-1.3GHz_HORIZONTAL



Site : chamber

Condition : 3m HORIZONTAL

Project No.: 2504A05297E-RF

Test Mode : Transmitting

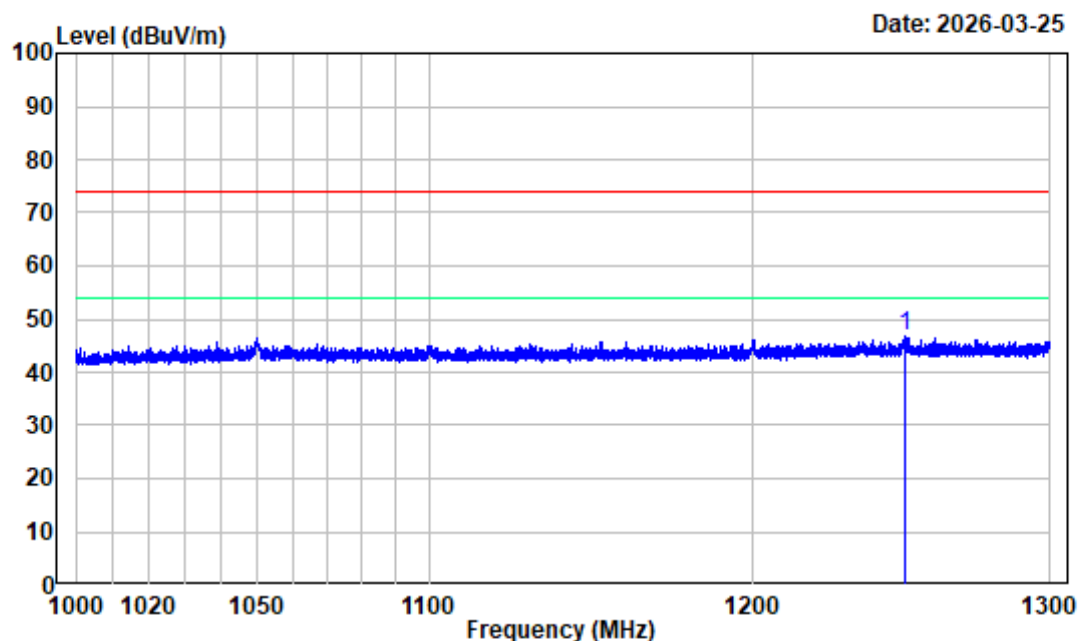
Tester: Angel Chen

Note : Lora 125K High Channel 914.9MHz 1GHz-1.3GHz

SA setting : Peak:RBW:1MHz,VBW:3MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1250.387	-12.96	60.81	47.85	74.00	-26.15	peak

Lora 125K High Channel 1GHz-1.3GHz_VERTICAL



Site : chamber

Condition : 3m VERTICAL

Project No.: 2504A05297E-RF

Test Mode : Transmitting

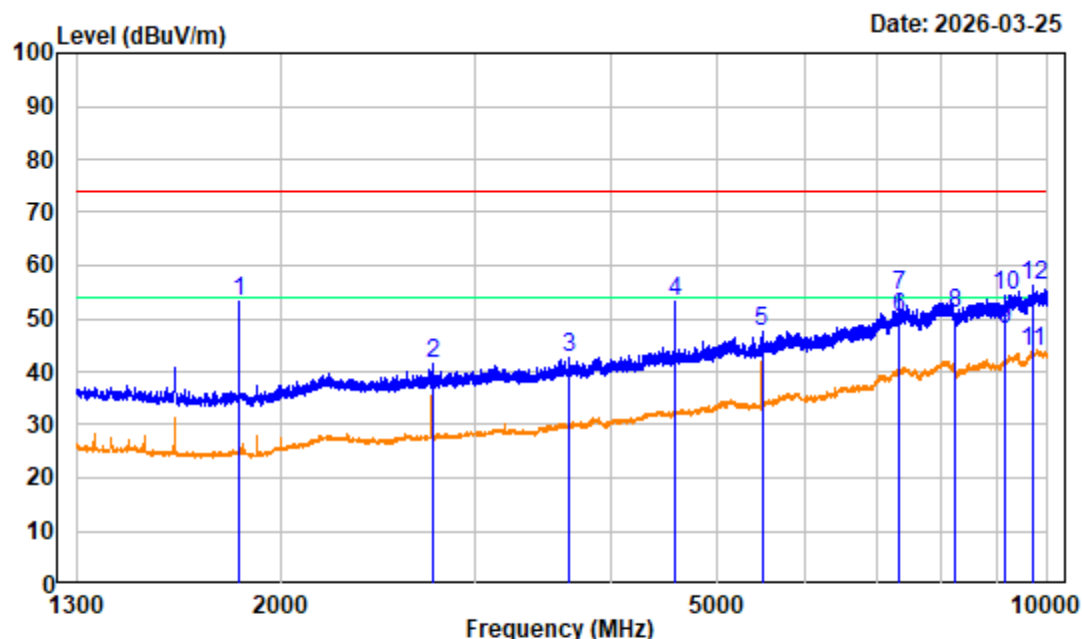
Tester: Angel Chen

Note : Lora 125K High Channel 914.9MHz 1GHz-1.3GHz

SA setting : Peak:RBW:1MHz,VBW:3MHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1250.200	-12.96	59.60	46.64	74.00	-27.36	peak

Lora 125K High Channel 1.3GHz-10GHz_HORIZONTAL



Site : chamber

Condition : 3m HORIZONTAL

Project No.: 2504A05297E-RF

Test Mode : Transmitting

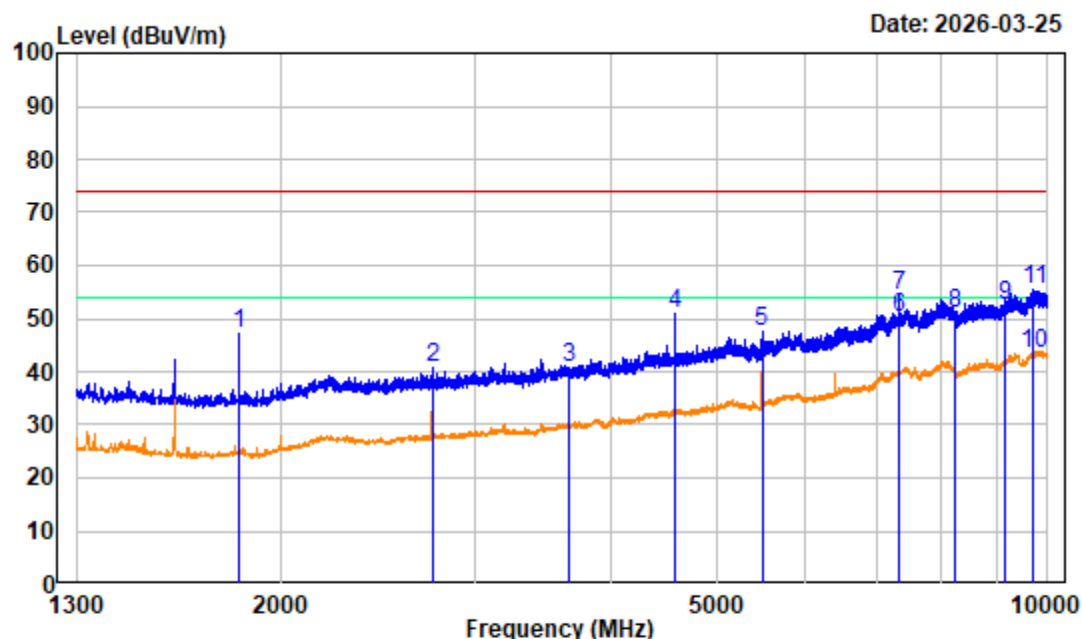
Tester: Angel Chen

Note : Lora 125K High Channel 914.9MHz 1.3GHz-10GHz

SA setting : Peak:RBW:1MHz,VBW:3MHz Ave:RBW:1MHz,VBW:5kHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1829.800	-12.97	66.13	53.16	74.00	-20.84	Peak
2	2744.700	-10.29	51.94	41.65	74.00	-32.35	Peak
3	3659.600	-8.86	51.51	42.65	74.00	-31.35	Peak
4	4574.500	-6.99	60.11	53.12	74.00	-20.88	Peak
5	5489.400	-6.27	53.75	47.48	74.00	-26.52	Peak
6	7319.200	-1.27	51.47	50.20	54.00	-3.80	Average
7	7319.200	-1.27	55.55	54.28	74.00	-19.72	Peak
8	8234.100	-0.92	51.82	50.90	74.00	-23.10	Peak
9	9149.000	1.02	46.91	47.93	54.00	-6.07	Average
10	9149.000	1.02	53.28	54.30	74.00	-19.70	Peak
11	9700.938	2.83	41.11	43.94	54.00	-10.06	Average
12	9700.938	2.83	53.34	56.17	74.00	-17.83	Peak

Lora 125K High Channel 1.3GHz-10GHz_VERTICAL



Site : chamber

Condition : 3m VERTICAL

Project No.: 2504A05297E-RF

Test Mode : Transmitting

Tester: Angel Chen

Note : Lora 125K High Channel 914.9MHz 1.3GHz-10GHz

SA setting : Peak:RBW:1MHz,VBW:3MHz Ave:RBW:1MHz,VBW:5kHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1829.800	-12.97	60.12	47.15	74.00	-26.85	Peak
2	2744.700	-10.29	51.06	40.77	74.00	-33.23	Peak
3	3659.600	-8.86	49.48	40.62	74.00	-33.38	Peak
4	4574.500	-6.99	58.05	51.06	74.00	-22.94	Peak
5	5489.400	-6.27	53.70	47.43	74.00	-26.57	Peak
6	7319.200	-1.27	51.56	50.29	54.00	-3.71	Average
7	7319.200	-1.27	55.76	54.49	74.00	-19.51	Peak
8	8234.100	-0.92	51.77	50.85	74.00	-23.15	Peak
9	9149.000	1.02	51.50	52.52	74.00	-21.48	Peak
10	9715.075	2.78	40.55	43.33	54.00	-10.67	Average
11	9715.075	2.78	52.51	55.29	74.00	-18.71	Peak

20 dB EMISSION BANDWIDTH

Applicable Standard

According to FCC §15.247(a)(1)(i):

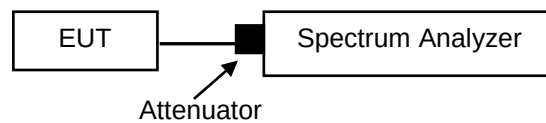
For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Test Procedure

According to ANSI C63.10-2020, section 6.9.2:

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be at least three times RBW, unless otherwise specified by the applicable requirement.
- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.6.2.
- d) Steps a) through c) might require iteration to adjust within the specified tolerances.
- e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “-xx dB down” requirement; that is, if the requirement calls for measuring the -20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.
- f) Set detection mode to peak and trace mode to max-hold.
- g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
- h) Determine the “-xx dB down amplitude” using $[(\text{reference value}) - xx]$. Alternatively, this calculation may be made by using the marker-delta function of the instrument.
- i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

- j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “-xx dB down amplitude” determined in step h). If a marker is below this “-xx dB down amplitude” value, then it shall be as close as possible to this value. The dBc bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “-xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.
- k) The dBc bandwidth shall be reported by providing spectral plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).



Note: Offset = RF cable loss(0.5dB[#]) + Attenuator(10dB)

Test Data

Test Result: Please refer to the Appendix.

CHANNEL SEPARATION TEST

Applicable Standard

According to FCC §15.247(a)(1):

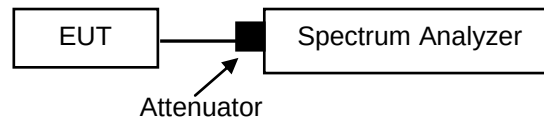
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

Test Procedure

According to ANSI C63.10-2020, section 7.8.2:

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

- Span: Wide enough to capture the peaks of two adjacent channels.
- RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- Video (or average) bandwidth (VBW) $\geq$ RBW.
- Sweep: No faster than coupled (auto) time.
- Detector function: Peak.
- Trace: Max-hold.
- Allow the trace to stabilize.



Note: Offset = RF cable loss(0.5dB[#]) + Attenuator(10dB)

Test Data

Test Result: Please refer to the Appendix.

TIME OF OCCUPANCY (DWELL TIME)

Applicable Standard

According to FCC §15.247(f):

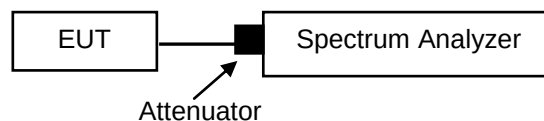
For the purposes of this section, hybrid systems are those that employ a combination of both frequency hopping and digital modulation techniques. The frequency hopping operation of the hybrid system, with the direct sequence or digital modulation operation turned-off, shall have an average time of occupancy on any frequency not to exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4.

Test Procedure

According to ANSI C63.10-2020, section 7.8.4

Use the following spectrum analyzer settings to determine the dwell time per hop:

- Span: Zero span, centered on a hopping channel.
- RBW shall be $\leq$ channel spacing and where possible RBW should be set $\gg 1/T$, where T is the expected transmission time per hop.
- Sweep time: Set so that the start of the first transmission and end of the last transmission for the hop are clearly captured. Setting the sweep time to be slightly longer than the hopping period per channel (hopping period = $1/\text{hopping rate}$) should achieve this.
- Use a video trigger, where possible with a trigger delay, so that the start of the transmission is clearly observed. The trigger level might need adjustment to reduce the chance of triggering when the system hops on an adjacent channel.
- Detector function: Peak.
- Trace: Clear-write, single sweep.
- Place markers at the start of the first transmission on the channel and at the end of the last transmission. The dwell time per hop is the time between these two markers.



Note: Offset = RF cable loss(0.5dB[#]) + Attenuator(10dB)

Test Data

Test Result: Please refer to the Appendix.

MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to §15.247(b)(2):

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, as permitted under paragraph (a)(1)(i) of this section.

According to §15.247(b)(3):

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

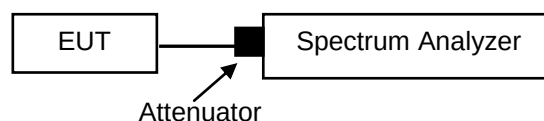
Test Procedure

According to ANSI C63.10-2020, section 7.8.5

Use the following spectrum analyzer settings:

- Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
- RBW > 20 dB bandwidth of the emission being measured.
- VBW ≥ RBW.
- Sweep: No faster than coupled (auto) time.
- Detector function: Peak.
- Trace: Max-hold.
- Allow trace to stabilize.
- Use the marker-to-peak function to set the marker to the peak of the emission.
- The indicated level is the peak output power, after any corrections for external attenuators and cables.

NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.



Note: Offset = RF cable loss(0.5dB[#]) + Attenuator(10dB)

Test Data

Test Result: Please refer to the Appendix.

CONDUCTED SPURIOUS EMISSIONS

Applicable Standard

According to FCC §15.247(d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

According to ANSI C63.10-2020, section 7.8.7

7.8.7.1 General considerations

To demonstrate compliance with the relative out-of-band emissions requirements conducted spurious emissions shall be measured for the transmit frequencies, per 5.5 and 5.6, and at the maximum transmit powers. Frequency hopping shall be disabled for this test with the exception of measurements at the allocated band-edges which shall be repeated with hopping enabled.

Connect the primary antenna port through an attenuator to the spectrum analyzer input; in the results, account for all losses between the unlicensed wireless device output and the spectrum analyzer. The frequency range of testing shall span 30 MHz to 10 times the operating frequency and this may be done in a single sweep or, to aid resolution, across a number of sweeps. The resolution bandwidth shall be 100 kHz, video bandwidth 300 kHz, and a coupled sweep time with a peak detector.

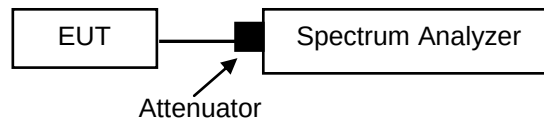
The limit is based on the highest in-band level across all channels measured using the same instrument settings (resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector). To help clearly demonstrate compliance a display line may be set at the required offset (typically 20 dB) below the highest in-band level. Where the highest in-band level is not clearly identified in the out-of-band measurements a separate spectral plot showing the in-band level shall be provided.

When conducted measurements cannot be made (for example a device with integrated, non-removable antenna) radiated measurements shall be used. The reference level for determining the limit shall be established by maximizing the field strength from the highest power channel and measuring using the resolution and video bandwidth settings and peak detector as described above. The field strength limit for spurious emissions outside of restricted-bands shall then be set at the required offset (typically 20 dB) below the highest in-band level. Radiated measurements will follow the standards measurement procedures described in Clause 6 with the exception that the resolution bandwidth shall be 100 kHz, video bandwidth 300 kHz, and a coupled sweep time with a peak detector. Note that use of wider measurement bandwidths are acceptable for measuring the spurious emissions provided that the peak detector is used and that the measured value of spurious emissions are compared to the highest in-band level measured with the 100 kHz / 300 kHz bandwidth settings to determine compliance.

7.8.7.2 & section 6.10 Band-edges

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW $\geq [3 \times \text{RBW}]$.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements. Report the three highest emissions relative to the limit.



Note: Offset = RF cable loss(0.5dB[#]/1.5dB[#]) + Attenuator(10dB)

The cable loss of 0.5dB[#] has been added into test result, except for test result of frequencies from 30 MHz to 10 GHz, where a maximum cable loss of 1.5dB[#] has been added.

Test Data

Test Result: Please refer to the Appendix.

POWER SPECTRAL DENSITY

Applicable Standard

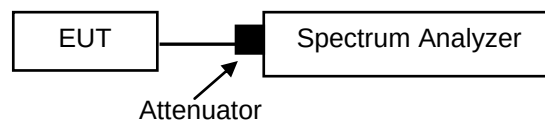
According to FCC §15.247(f):

For the purposes of this section, hybrid systems are those that employ a combination of both frequency hopping and digital modulation techniques. The frequency hopping operation of the hybrid system, with the direct sequence or digital modulation operation turned-off, shall have an average time of occupancy on any frequency not to exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4. The power spectral density conducted from the intentional radiator to the antenna due to the digital modulation operation of the hybrid system, with the frequency hopping operation turned off, shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure

According to ANSI C63.10-2020, section 11.10.2

- Set analyzer center frequency to DTS channel center frequency.
- Set the span >1.5 times the DTS bandwidth.
- Set the RBW to $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq [3 \times \text{RBW}]$.
- Detector = peak.
- Sweep time = No faster than coupled (auto) time.
- Trace mode = max-hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.
- If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.



Note: Offset = RF cable loss(0.5dB[#]) + Attenuator(10dB)

Test Data

Test Result: Please refer to the Appendix.

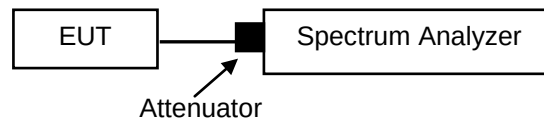
DUTY CYCLE

Test Procedure

According to ANSI C63.10-2020 Section 11.6

Measurements of duty cycle and transmission duration shall be performed using one of the following techniques:

- A diode detector and an oscilloscope that together have a sufficiently short response time to permit accurate measurements of the ON and OFF times of the transmitted signal.
- The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:
 - Set the center frequency of the instrument to the center frequency of the transmission.
 - Set $RBW \geq OBW$ if possible; otherwise, set RBW to the largest available value.
 - Set $VBW \geq RBW$. Set detector = peak or average.
 - The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if $T \leq 16.7 \mu s$.)



Note: Offset = RF cable loss(0.5dB[#]) + Attenuator(10dB)

Test Data

Test Result: Please refer to the Appendix.

APPENDIX

Test Information:

Sample No.:	3F4F-1	Test Date:	2026/06/26~2026/08/24
Test Site:	RF	Test Mode:	Transmitting
Tester:	Cayde Hou	Test Result:	Pass

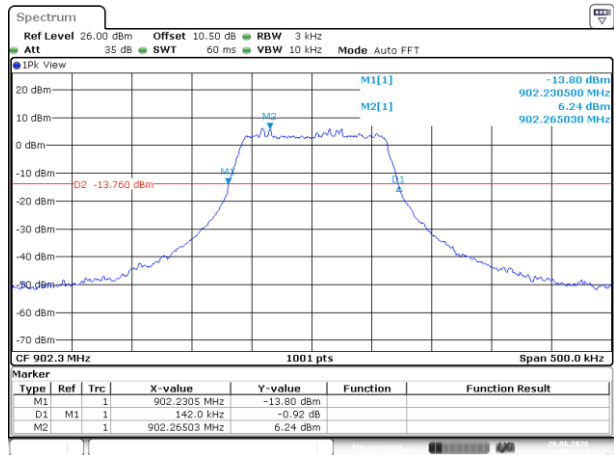
Environmental Conditions:

Temperature: (°C)	24.3-24.5	Relative Humidity: (%)	50-53	ATM Pressure: (kPa)	100.2-100.3
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20 dB Emission Bandwidth

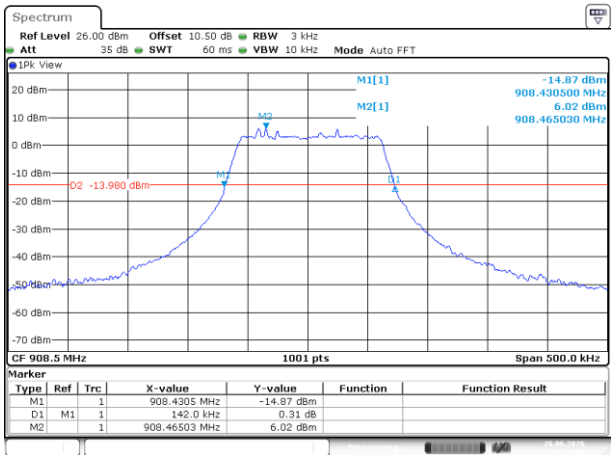
Mode	Channel	Result (MHz)	Limit (MHz)
Lora 125k	Low	0.142	0.5
	Middle	0.142	0.5
	High	0.142	0.5

Lora 125k_Low



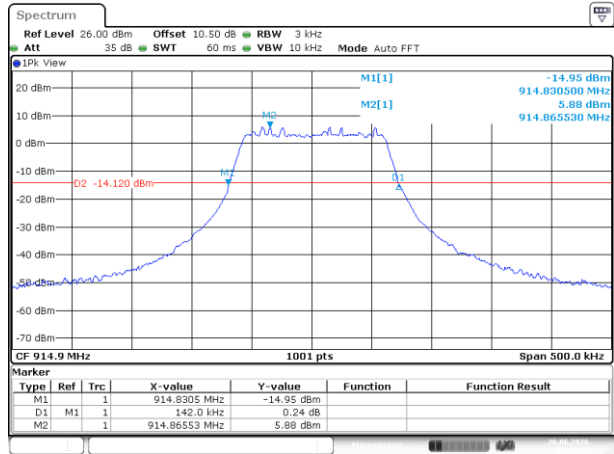
ProjectNo.:2504A05297E-RF Tester:Cayde Hou
Date: 26.JUN.2026 22:22:15

Lora 125k_Middle



ProjectNo.:2504A05297E-RF Tester:Cayde Hou
Date: 26.JUN.2026 22:25:17

Lora 125k_High



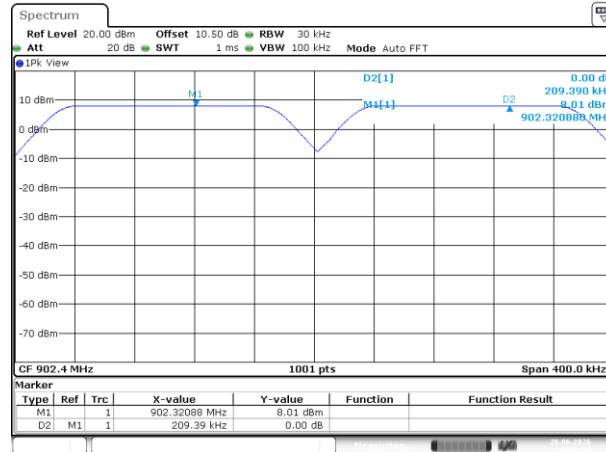
ProjectNo.:2504A05297E-RF Tester:Cayde Hou
Date: 26.JUN.2026 22:28:33

Channel Separation

Mode	Channel	Result (MHz)	Limit (MHz)	Verdict
Lora 125k	Middle	0.20939	0.142	Pass

Note: The limit is a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Lora 125k_Middle

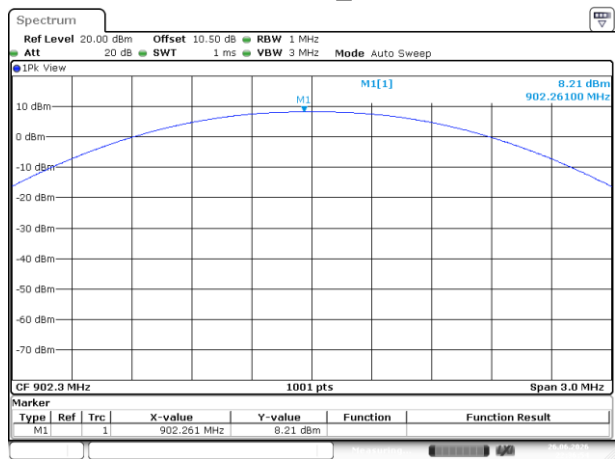


ProjectNo.:2504A05297E-RF Tester:Cayde Hou
Date: 26 JUN 2026 22:56:45

Maximum Conducted Output Power

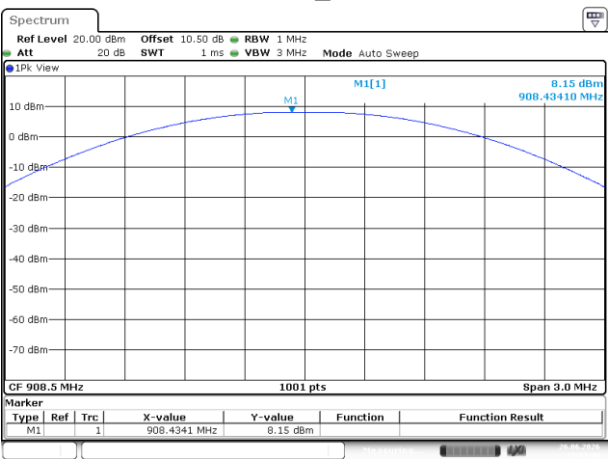
Mode	Test Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)	Verdict
Lora 125k	902.3	8.21	30	Pass
	908.5	8.15	30	Pass
	914.9	8.08	30	Pass

Lora 125k_Low



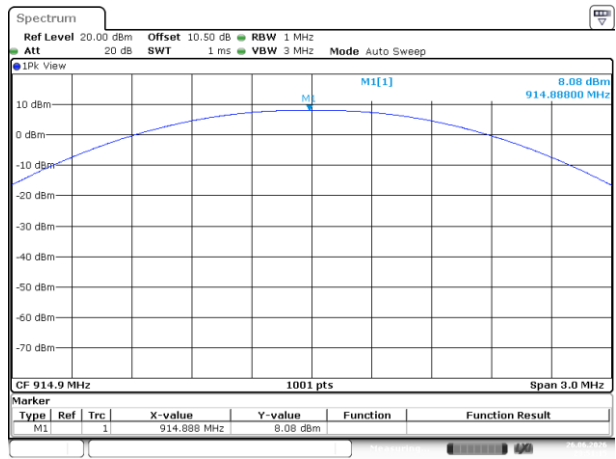
ProjectNo.:2504A05297E-RF Tester:Cayde Hou
Date: 26.JUN.2026 22:36:55

Lora 125k_Middle



ProjectNo.:2504A05297E-RF Tester:Cayde Hou
Date: 26.JUN.2026 23:53:44

Lora 125k_High



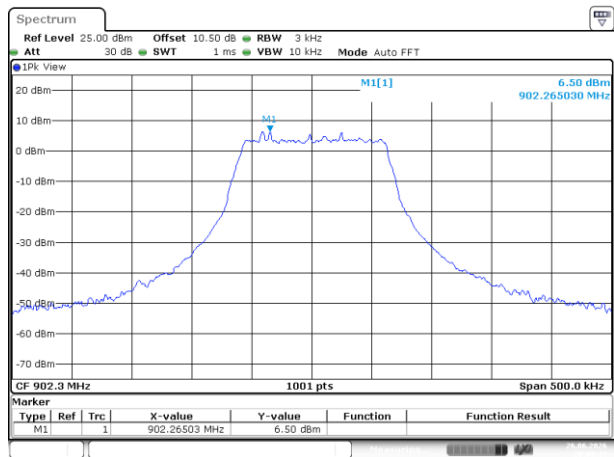
ProjectNo.:2504A05297E-RF Tester:Cayde Hou
Date: 26.JUN.2026 23:53:16

Power Spectral Density

Test Mode: Lora 125k

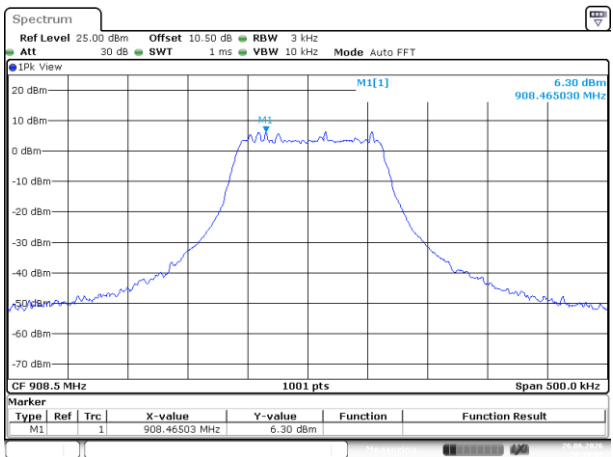
Channel	Result (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
Low	6.50	8	Pass
Middle	6.30	8	Pass
High	6.19	8	Pass

Lora 125k_Low



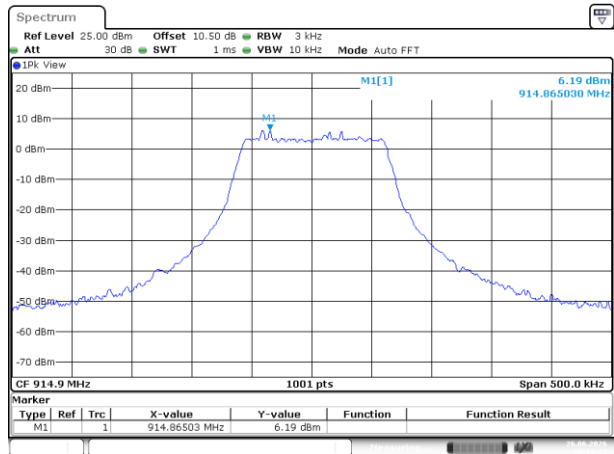
ProjectNo.:2504A05297E-RF Tester:Ouyde Hou
Date: 26.JUN.2026 20:08:18

Lora 125k_Middle



ProjectNo.:2504A05297E-RF Tester:Ouyde Hou
Date: 26.JUN.2026 20:18:18

Lora 125k_High

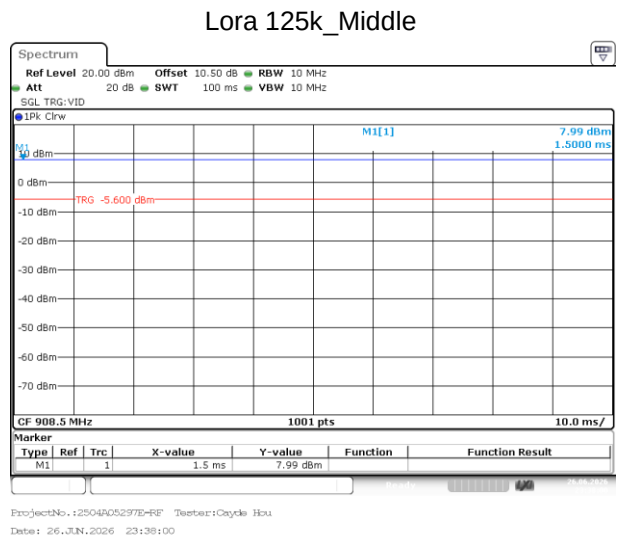


ProjectNo.:2504A05297E-RF Tester:Ouyde Hou
Date: 26.JUN.2026 20:11:27

Duty Cycle

Test Mode: Lora 125k

Channel	Ton (ms)	Ton+Toff (ms)	Duty Cycle (%)	Duty Cycle Factor(dB)	1/Ton (Hz)	VBW Setting (Hz)
Middle	100	100	100	/	/	10

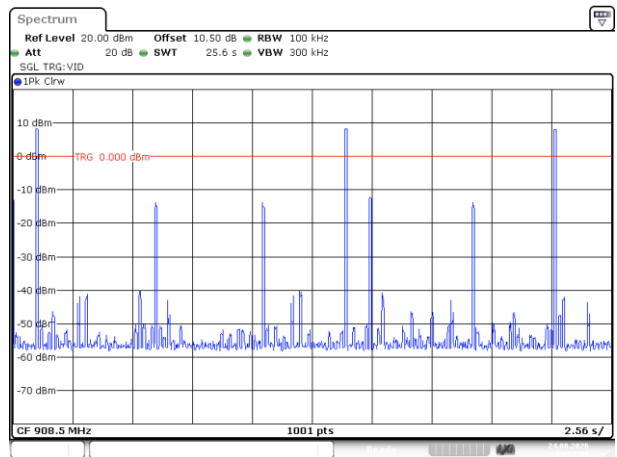


Time of Occupancy (dwell time)

Test Mode	Channel	BurstWidth (ms)	TotalHops (Num)	Result (s)	Limit (s)	Verdict
Lora 125k	Hopping	103.072	3	0.309	≤ 0.4	Pass

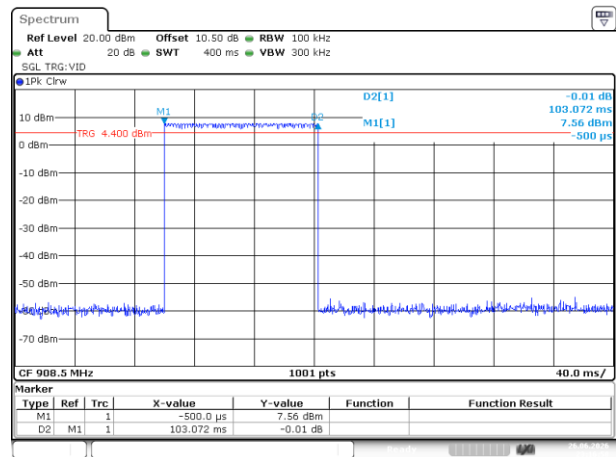
Note : A period time =0.4*64= 25.6(S), Result = BurstWidth * Totalhops

Lora 125k_Hopping



ProjectNo.:2504A05297E-RF Tester:Cayde Hou
Date: 24.AUG.2026 14:07:06

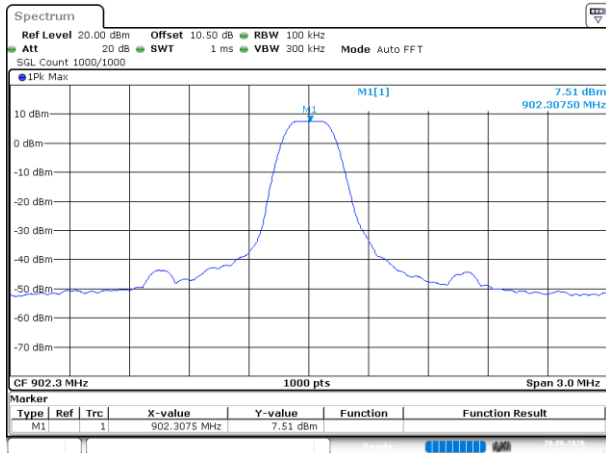
Lora 125k_Burst Width



ProjectNo.:2504A05297E-RF Tester:Cayde Hou
Date: 26.JUN.2026 23:16:58

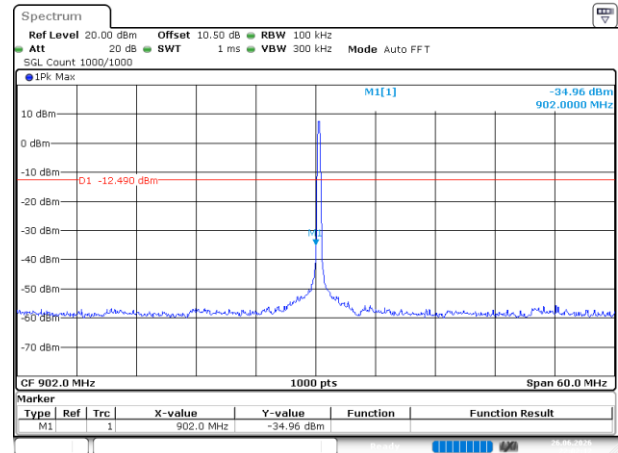
Conducted Spurious Emission

Lora 125k_Low



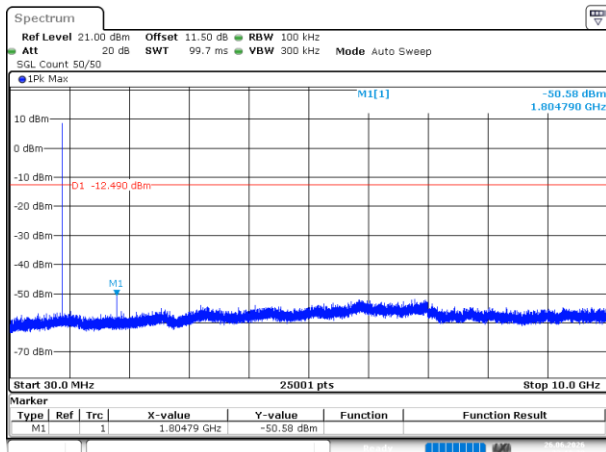
ProjectNo.:2504A05297E-RF Tester:Cayde Hou
Date: 26.JUN.2026 21:55:13

Lora 125k_Low



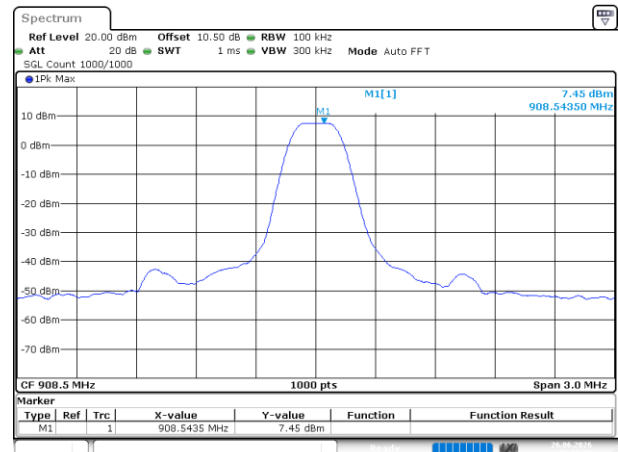
ProjectNo.:2504A05297E-RF Tester:Cayde Hou
Date: 26.JUN.2026 22:02:12

Lora 125k_Low



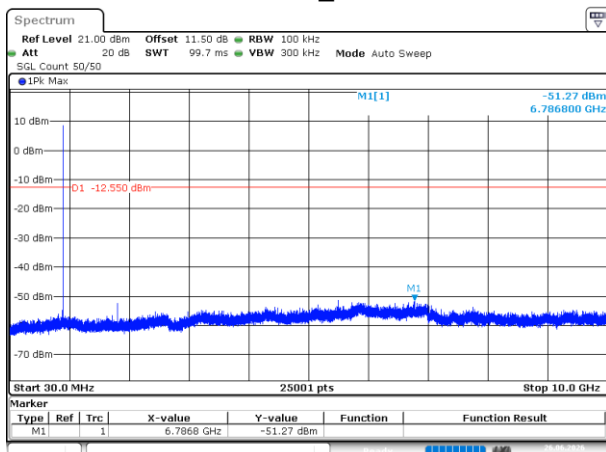
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Date: 26.JUN.2026 22:19:40

Lora 125k_Middle



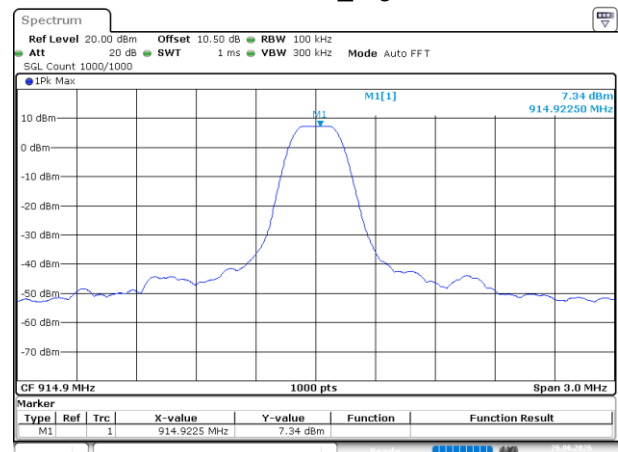
ProjectNo.:2504A05297E-RF Tester:Cayde Hou
Date: 26.JUN.2026 22:06:49

Lora 125k_Middle



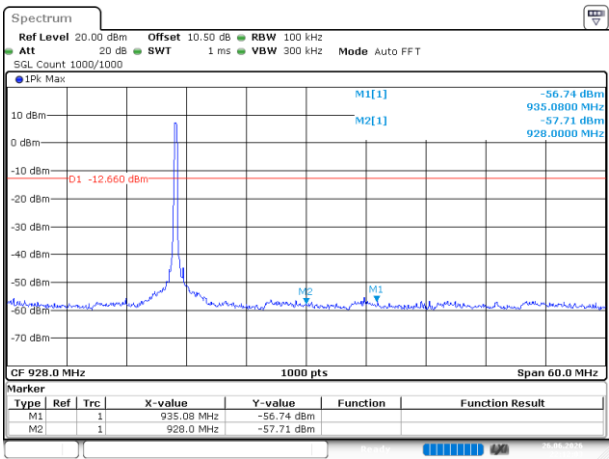
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Date: 26.JUN.2026 22:16:13

Lora 125k_High



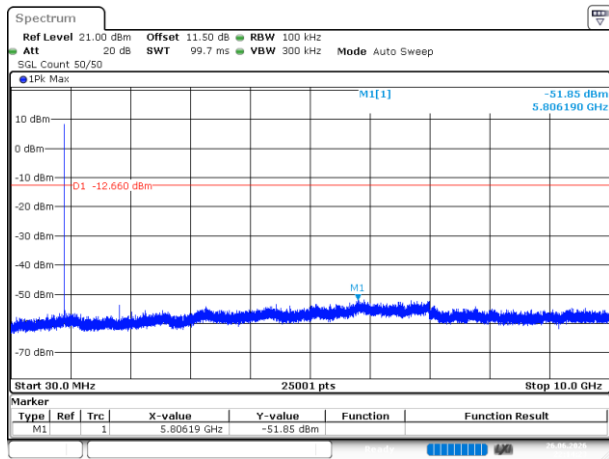
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Date: 26.JUN.2026 22:10:19

Lora 125k_High



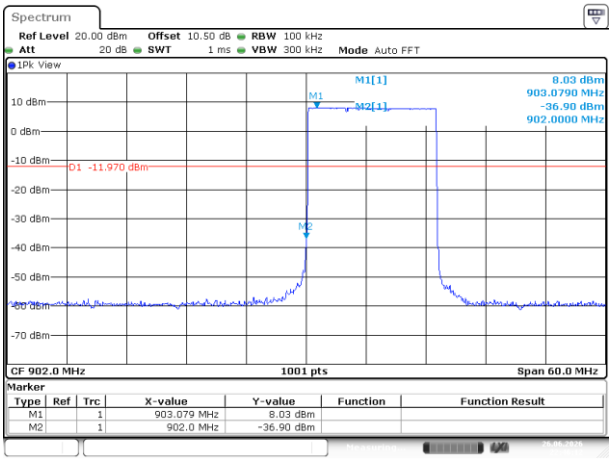
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Date: 26.JUN.2026 22:12:04

Lora 125k_High



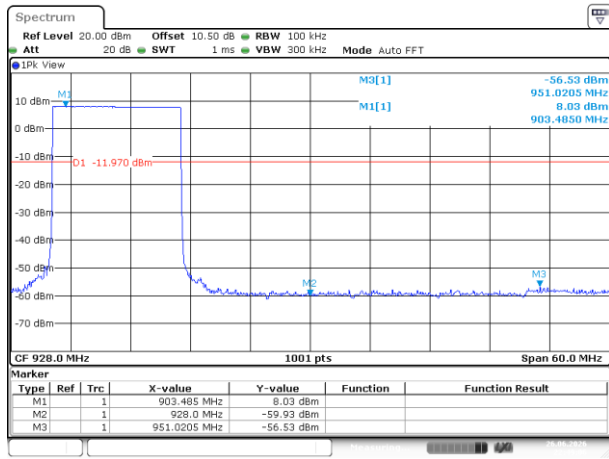
ProjectNo.:2504A05297E-RF Tester:Cayde Hou
Date: 26.JUN.2026 22:14:24

Lora 125k_Hopping_Lower



ProjectNo.:2504A05297E-RF Tester:Cayde Hou
Date: 26.JUN.2026 22:46:12

Lora 125k_Hopping_Upper



ProjectNo.:2504A05297E-RF Tester:Cayde Hou
Date: 26.JUN.2026 22:49:06

EXHIBIT A-EUT PHOTOGRAPHS

Please refer to the Attachment No.1 2504A05297E-RF EUT External Photos and Attachment No.2 2504A05297E-RF EUT Internal Photos.

EXHIBIT B-TEST SETUP PHOTOGRAPHS

Please refer to the Attachment No.3 2504A05297E-RF Test Photos.

***** END OF REPORT *****