Shenzhen Huatongwei International Inspection Co.,Ltd.
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TEST REPORT

For LORA

Report No. :	CHTW25040017
Project No :	SHT2409082801W
FCC ID :	2BQILN3US915
Applicant's name :	WIKA Alexander Wiegand SE & Co. KG
Address :	Alexander-Wiegand-Str. 30•63911 Klingenberg Germany
Product Name :	NETRIS ® 3
Trade Mark :	-
Model No. :	NETRIS ® 3 - *L2*
Listed Model(s) :	-
Standard :	**FCC CFR Title 47 Part 15 Subpart C § 15.247**
Date of receipt of test sample……:	2024/10/9
Date of testing……:	2024/12/14- 2025/4/10
Date of issue……:	2025/4/11
Result……:	**Pass**

Compiled by (Position+Printed name+Signature) :	File administrator	Xiaodong Zhao	Xiaodong Zhao
Supervised by (Position+Printed name+Signature) :	Project Engineer	Kiki Kong	Kiki Kong
Approved by (Position+Printed name+Signature) :	RF Manager	Xu Yang	Xu Yang

Testing Laboratory Name :	**Shenzhen Huatongwei International Inspection Co., Ltd.**
Address :	Building 7, Baiwang Idea Factory, No.1051, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong, China

Test Report Form No. :	R0054
Test Report Form(s) Originator :	Shenzhen Huatongwei International Inspection Co., Ltd.
Master TRF :	Dated 2025-04

Contents

1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

– FCC CFR Title 47 Part 15 Subpart C § 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

– ANSI C63.10:2020: American National Standard for Testing Unlicensed Wireless Devices

– KDB 558074 D01 15.247 Meas Guidance v05r02: Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of The FCC Rules

1.2. Report version

Revision No.	Date of issue	Description
N/A	2025-04-11	Original

2. TEST DESCRIPTION

Report clause	Test Items	Standard Requirement	Result	Test Engineer
5.1	Antenna Requirement	15.203/15.247 (c)	PASS	Chenxin Ling
5.2	AC Conducted Emission	15.207	N/A*2	N/A
5.3	Peak Output Power	15.247 (b)(1)	PASS	Chenxin Ling
5.4	20 dB Bandwidth	15.247 (a)(1)	PASS	Chenxin Ling
5.5	99% Occupied Bandwidth	-	PASS*1	Chenxin Ling
5.6	Carrier Frequency Separation	15.247 (a)(1)	PASS	Chenxin Ling
5.7	Hopping Channel Number	15.247 (a)(1)	PASS	Chenxin Ling
5.8	Dwell Time	15.247 (a)(1)	PASS	Chenxin Ling
5.9	Duty Cycle Correction Factor	-	PASS*1	Chenxin Ling
5.10	Pseudorandom Frequency Hopping Sequence	15.247(b)(4)	PASS	Chenxin Ling
5.11	Conducted Band Edge and Spurious Emission	15.247(d)/15.205	PASS	Chenxin Ling
5.12	Radiated Band Edge Emission	15.205/15.209	N/A*3	N/A
5.13	Radiated Spurious Emission	15.247(d)/15.205/15.209	N/A*3	N/A

Note:

– The measurement uncertainty is not included in the test result.

– *1: No requirement on standard, only report these test data.

– *2: This product is battery powered

– *3:Radiated Spurious Emission（1-10GHz） reference report：110704-FCC-ISED-1|

3. SUMMARY

3.1. Client Information

Applicant:	WIKA Alexander Wiegand SE & Co. KG
Address:	Alexander-Wiegand-Str. 30•63911 Klingenberg Germany
Manufacturer:	WIKA Alexander Wiegand SE & Co
Address:	Alexander-Wiegand-Straße 3063911 Klingenberg am Main DE
Factory:	WIKA Alexander Wiegand SE & Co
Address:	Alexander-Wiegand-Straße 3063911 Klingenberg am Main DE

3.2. Product Description

Main unit information:	
Product Name:	NETRIS ® 3
Trade Mark:	-
Model No.:	NETRIS ® 3 - *L2* * = configuration digit which are not relevant for the hardware or radio comportement (ex : customer personnalisation, mounting accessories
Listed Model(s):	-
Power supply:	DC 3.0V from Battery
Hardware version:	r7.v243
Software version:	3.5.0

3.3. Radio Specification Description

Support function:	LORA
Modulation:	Chip Spread Spectrum
Operation frequency:	902.3MHz~914.9MHz
Channel number:	64
Channel separation:	200kHz
Antenna type:	Monopol IFA PCB Antenna
Antenna gain:	2.16dBi

3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.	
Laboratory Location	Building 7, Baiwang Idea Factory, No.1051, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong, China	
Contact information:	Tel: 400-963-0755 E-mail: cs@szhtw.com.cn http://www.szhtw.com.cn	
Qualifications	Type	Accreditation Number
	FCC Registration Number	762235
	FCC Designation Number	CN1181

4. TEST CONFIGURATION

4.1. Test frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channels which were tested. The Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the below blue front.

Channel	Frequency (MHz)
CH_L	902.3
CH_M	908.5
CH_H	914.9

4.2. Descriptions of Test mode

For RF test items
The engineering test program was provided and enabled to make EUT continuous transmit (duty cycle>98%).
For AC power line conducted emissions:
The EUT connect to laptop by USB cable. the laptop control LORA transmitting.
For Radiated spurious emissions test item:
The engineering test program was provided and enabled to make EUT continuous transmit (duty cycle>98%). The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data Recorded in the report.

4.3. Test sample information

Test item	HTW sample no.
RF Conducted test items	Please refer to the description in the appendix report
RF Radiated test items	YPHT24090828001
EMI test items	YPHT24090828001

Note:

RF Conducted test items: Peak Output Power, 20 dB Bandwidth, 99% Occupied Bandwidth, Carrier Frequency Separation, Hopping Channel Number, Dwell Time, Duty Cycle Correction Factor, Pseudorandom Frequency Hopping Sequence ,Conducted Band Edge and Spurious Emission

RF Radiated test items: Radiated Band Edge Emission, Radiated Spurious Emission

EMI test items: AC Conducted Emission

4.4. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Whether support unit is used?			
✓ Yes(Provided by the laboratory)			
Item	Equipment	Trade Name	Model No.
1	Laptop	Lenovo	K4e-ACL
2			

4.5. Testing environmental condition

Type	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar

4.6. Statement of the measurement uncertainty

No.	Test Items	Measurement Uncertainty
1	AC Conducted Emission	3.21dB
2	Peak Output Power	1.07
3	Power Spectral Density	1.07
4	6dB Bandwidth	0.002%
5	99% Occupied Bandwidth	0.002%
6	Duty cycle	-
7	Conducted Band Edge and Spurious Emission	1.68dB
8	Radiated Band Edge Emission	4.54dB for 30MHz-1GHz 5.10dB for above 1GHz
9	Radiated Spurious Emission	4.54dB for 30MHz-1GHz 5.10dB for above 1GHz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.7. Equipment Used during the Test

● RF Conducted test item							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Signal and spectrum Analyzer	R&S	HTWE0242	FSV40	100048	2024/08/27	2025/08/26
●	Signal & Spectrum Analyzer	R&S	HTWE0262	FSW26	103440	2024/08/21	2025/08/20
●	Vector signal generator	R&S	HTWE0244	SMBV100A	260790	2024/03/14	2025/03/13
●	Test software	Tonscend	N/A	JS1120	N/A	N/A	N/A

● Conducted Emission							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2024/08/12	2025/08/11
●	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2024/08/12	2025/08/11
●	Protection Network	SCHWARZBECK	HTWE0567	VTSD9561FN	00899	2024/08/12	2025/08/11
●	ISN	FCC	HTWE0148	FCC-TLISN-T2-02	20371	2024/08/12	2025/08/11
●	ISN	FCC	HTWE0150	FCC-TLISN-T8-02	20375	2024/08/12	2025/08/11
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Radiated Emission – 9kHz~30MHz							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2023/04/06	2026/04/05
●	EMI Test Receiver	R&S	HTWE0099	ESCI 7	100900	2024/08/12	2025/08/11
●	Loop Antenna	R&S	HTWE0170	HFH2-Z2	100020	2024/04/08	2027/04/07
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Radiated Emission - 30MHz~1GHz							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2023/04/06	2026/04/05
●	EMI Test Receiver	R&S	HTWE0099	ESCI 7	100900	2024/08/12	2025/08/11
●	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0119	VULB9163	546	2023/02/22	2026/02/21
●	Pre-Amplifer	SCHWARZBECK	HTWE0295	BBV 9742	/	2024/05/24	2025/05/23
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Radiated emission- Above 1GHz							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	C11121	2023/04/17	2026/04/16
●	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2024/08/12	2025/08/11
●	Spectrum Analyzer	R&S	HTWE0385	N9020A	MY54486658	2024/08/12	2025/0811
●	Horn Antenna	SCHWARZBECK	HTWE0126	BBHA 9120D	1011	2023/02/14	2026/02/13
●	Pre-Amplifer	CD	HTWE0071	PAP-0102	12004	2024/06/06	2025/06/05
●	Broadband Pre-amplifier	SCHWARZBECK	HTWE0551	SCU18F	100855	2024/06/06	2025/06/05
●	Test Software	Audix	N/A	E3	N/A	N/A	N/A

5. TEST CONDITIONS AND RESULTS

5.1. Antenna Requirement

Requirement

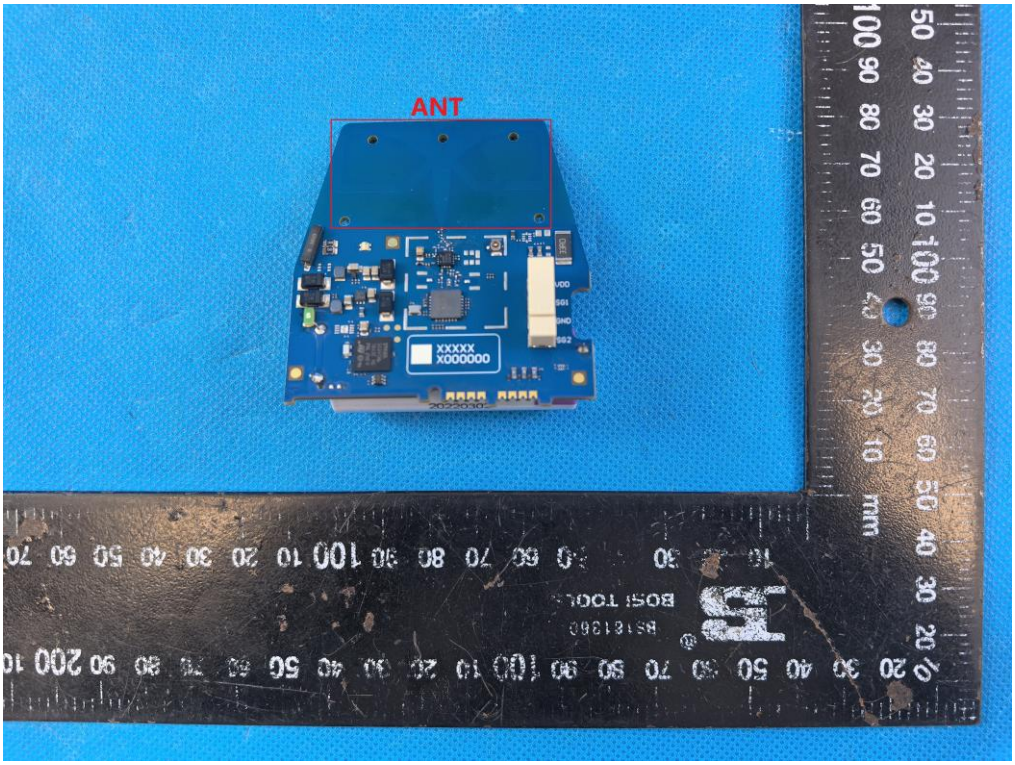
FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

The antenna type is a Monopol IFA PCB Antenna, please refer to the below antenna photo.



5.2. AC Conducted Emission

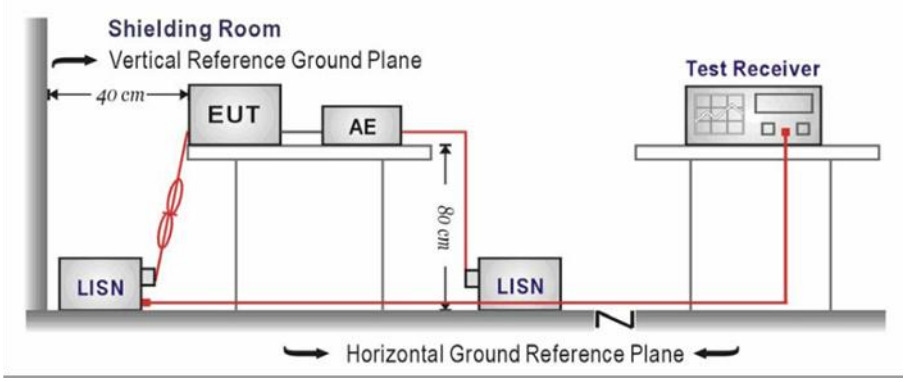
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

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

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST MODE:

Refer to the clause 4.2

TEST RESULT

☐ **Passed** ☒ **Not Applicable**

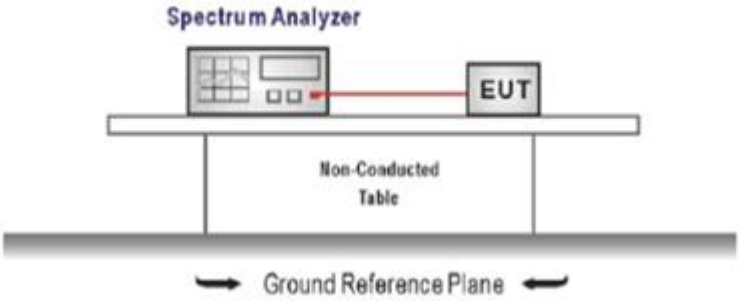
5.3. Peak Output Power

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1):

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.

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the pathloss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
   Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
   RBW≥ the 20 dB bandwidth of the emission being measured, VBW≥RBW
   Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE:

Refer to the clause 4.2

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

TEST DATA

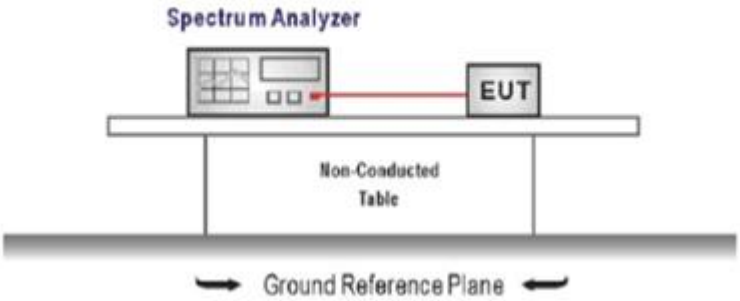
Refer to the appendix report

5.4. 20 dB Bandwidth

LIMIT

The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
   Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
   RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW
   Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE:

Refer to the clause 4.2

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

TEST DATA

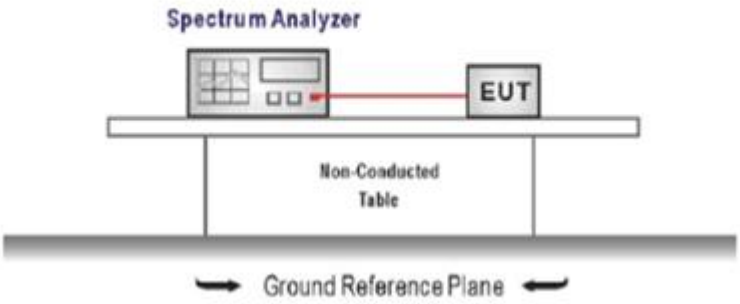
Refer to the appendix report

5.5. 99% Occupied Bandwidth

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output andthe spectrum analyzer).
   Center Frequency =channel center frequency
   Span≥1.5 x OBW
   RBW = 1%~5%OBW
   VBW ≥ 3 × RBW
   Sweep time= auto couple
   Detector = Peak
   Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.

TEST MODE:

Refer to the clause 4.2

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

TEST DATA

Refer to the appendix report

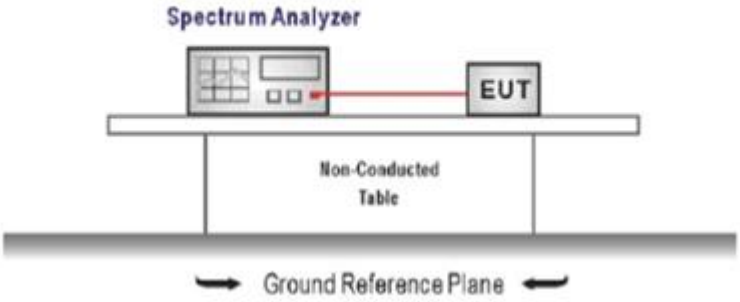
5.6. Carrier Frequencies Separation

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a):

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels
   RBW ≥ 1% of the span, VBW ≥ RBW
   Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE:
Refer to the clause 4.2

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

TEST DATA

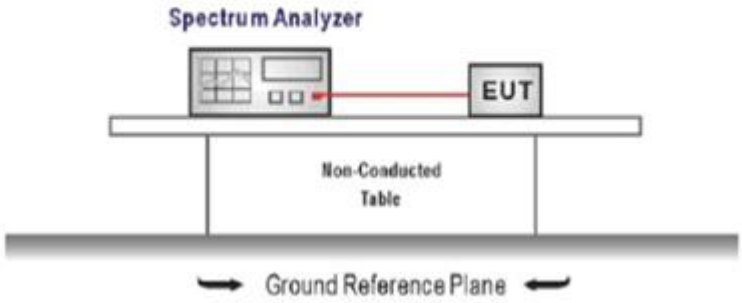
Refer to the appendix report

5.7. Hopping Channel Number

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):
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.

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
   Span = the frequency band of operation
   RBW ≥ 1% of the span, VBW ≥ RBW
   Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE:
Refer to the clause 4.2

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

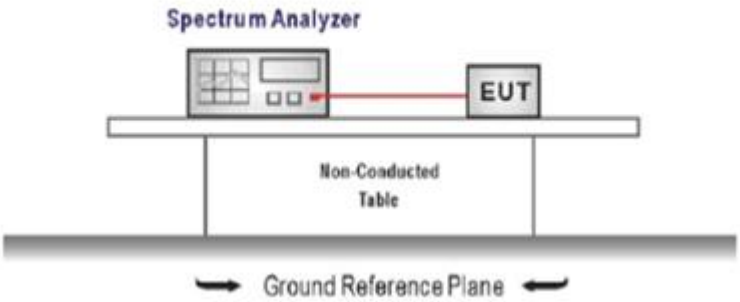
TEST DATA
Refer to the appendix report

5.8. Dwell Time

LIMIT

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..

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
   Span = zero span, centered on a hopping channel, RBW= 1 MHz, VBW ≥ RBW
   Sweep = as necessary to capture the entire dwell time per hopping channel,
   Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE:

Refer to the clause 4.2

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

TEST DATA

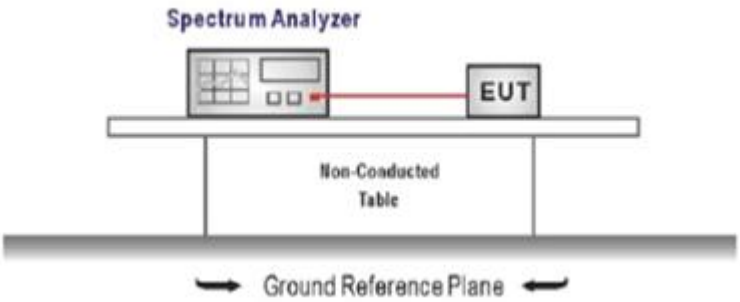
Refer to the appendix report

5.9. Duty Cycle Correction Factor (DCCF)

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
   Span = zero span, centered on a hopping channel, RBW= 1 MHz, VBW ≥ RBW
   Sweep = as necessary to capture the entire dwell time per hopping channel,
   Detector function = peak, Trigger mode
4. Measure and record the duty cycle data

TEST MODE:

Refer to the clause 4.2

TEST DATA

Refer to the appendix report

5.10. Pseudorandom Frequency Hopping Sequence

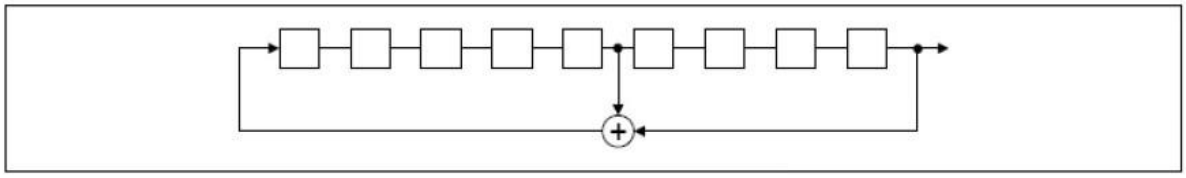
LIMIT

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 RESULTS

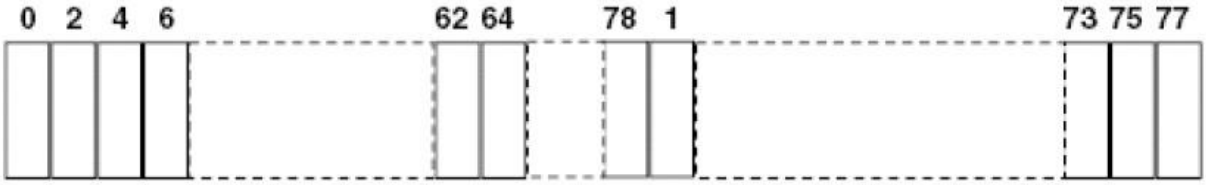
The pseudorandom frequency hopping sequence may be generated in a nice-stage shift register whose 5^{th} and 9^{th} stage outputs are added in a modulo-two addition stage.And the result is fed back to the input of the friststage.The sequence begins with the frist one of 9 consecutive ones,forexample:the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence:29-1=511 bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An explame of pseudorandom frequency hopping sequence as follows:



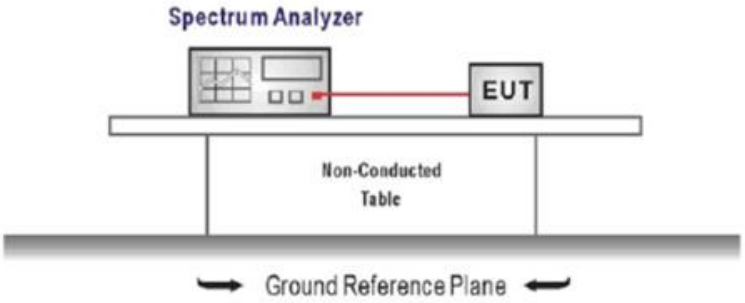
Each frequency used equally one the average by each transmitter.
The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shift frequencies in synchronization with the transmitted signals.

5.11. Conducted Band edge and Spurious Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Emission level measurement

   Set the center frequency and span to encompass frequency range to be measured

   RBW = 100 kHz, VBW ≥ 3 x RBW

   Detector = peak, Sweep time = auto couple, Trace mode = max hold

   Allow trace to fully stabilize

   Use the peak marker function to determine the maximum amplitude level.
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
4. Ensure that the amplitude of all unwanted emission outside of the authorized frequency band excluding restricted frequency bands) are attenuated by at least the minimum requirements specified (at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz). Report the three highest emission relative to the limit.

TEST MODE:

Refer to the clause 4.2

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

TEST DATA

Refer to the appendix report

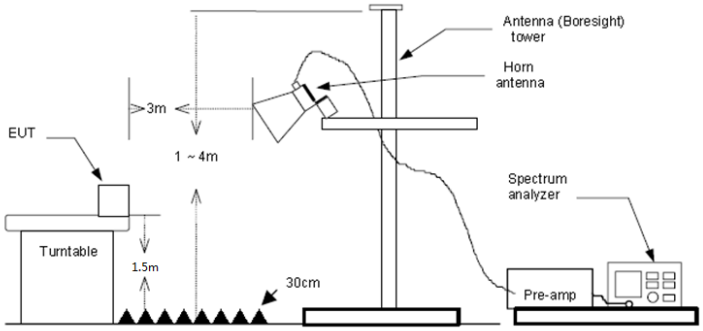
5.12. Radiated Band edge Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 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.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 .
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. Thisis repeated for both horizontal and vertical polarization of the antenna. In order to find themaximum emission, all of the interface cables were manipulated according to ANSI C63.10 on radiated measurement.
5. Use the following spectrum analyzer settings:
   a) Span shall wide enough to fully capture the emission being measured
   b) Set RBW=100kHz for <1GHz, VBW=3*RBW, Sweep time=auto, Detector=peak, Trace=max hold
   c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

      For average measurement: use duty cycle correction factor method (DCCF)

      Averager level = Peak level + DCCF

TEST MODE:

Refer to the clause 4.2

TEST RESULT

☐ **Passed** ☒ **Not Applicable**

5.13. Radiated Spurious Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Frequency	Limit (dBuV/m)	Value
0.009 MHz ~0.49 MHz	2400/F(kHz) @300m	Quasi-peak
0.49 MHz ~ 1.705 MHz	24000/F(kHz) @30m	Quasi-peak
1.705 MHz ~30 MHz	30 @30m	Quasi-peak

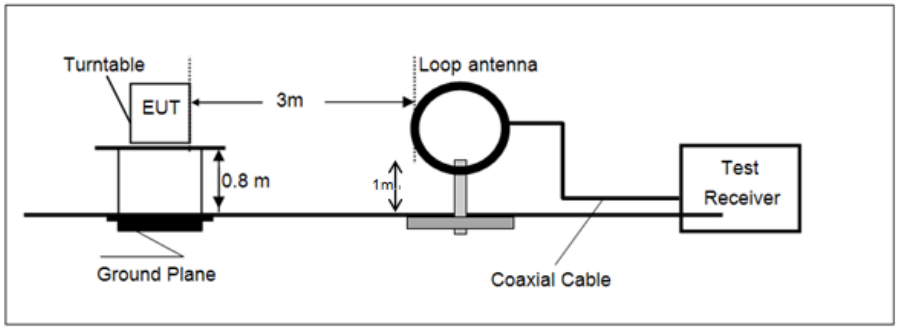
Note: Limit dBuV/m @3m = Limit dBuV/m @300m + 40*log(300/3)= Limit dBuV/m @300m +80,

Limit dBuV/m @3m = Limit dBuV/m @30m +40*log(30/3)= Limit dBuV/m @30m + 40.

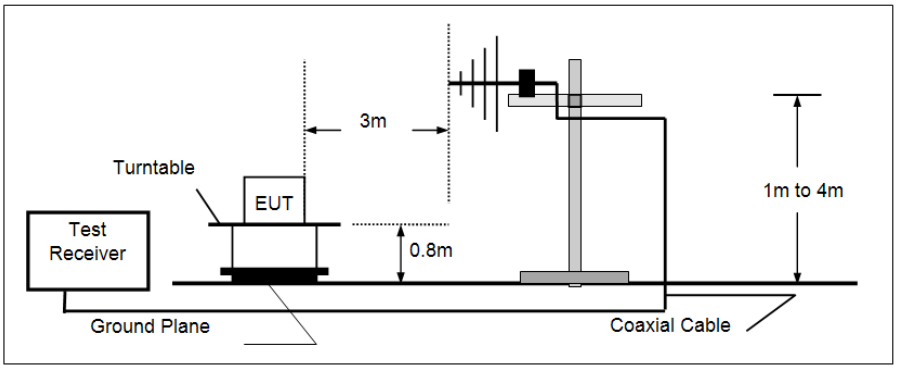
Frequency	Limit (dBuV/m @3m)	Value
30MHz~88MHz	40.00	Quasi-peak
88MHz~216MHz	43.50	Quasi-peak
216MHz~960MHz	46.00	Quasi-peak
960MHz~1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

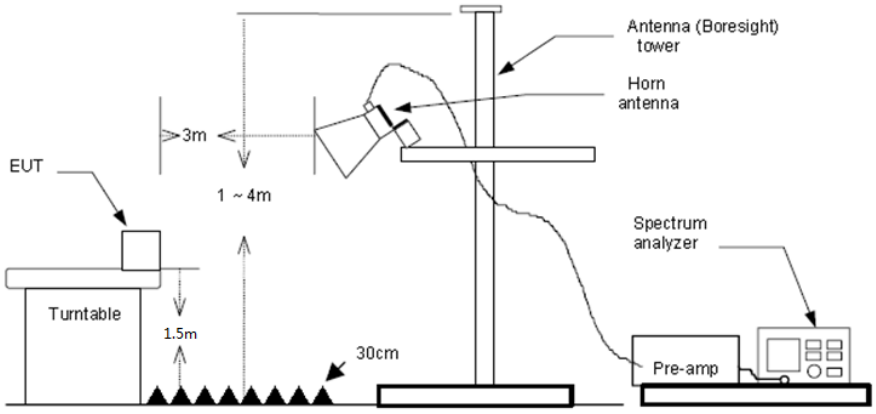
- 9 kHz ~ 30 MHz



- 30 MHz ~ 1 GHz



- Above 1 GHz



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 .
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
   a) Span shall wide enough to fully capture the emission being measured;
   b) Below 1 GHz:

      RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;

      If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
   c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

      For average measurement: use duty cycle correction factor method (DCCF)

      Averager level = Peak level + DCCF

TEST MODE:

Refer to the clause 4.2

TEST RESULT

☐ **Passed** ☒ **Not Applicable**

Note:

1) Level= Reading + Factor/Transd; Factor/Transd =Antenna Factor+ Cable Loss- Preamp Factor
2) Over Limit = Level– Limit
3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m) for above 1GHz.

FOR 9 kHz ~ 30 MHz

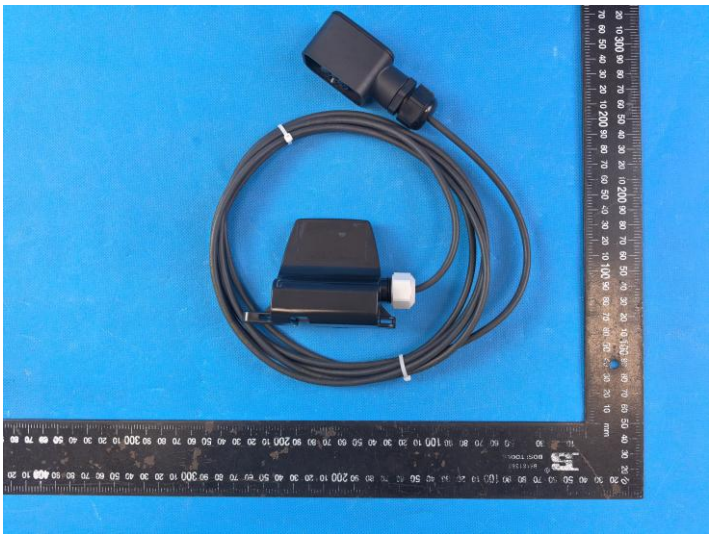
The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.

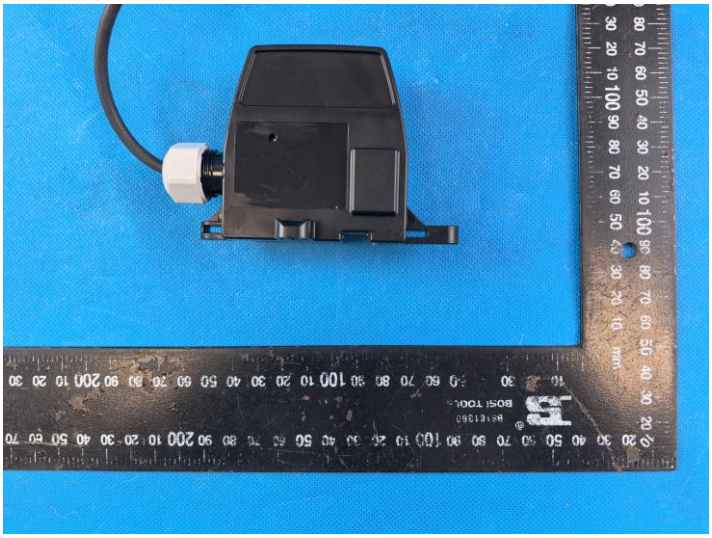
FOR 30 MHz ~ 1000 MHz

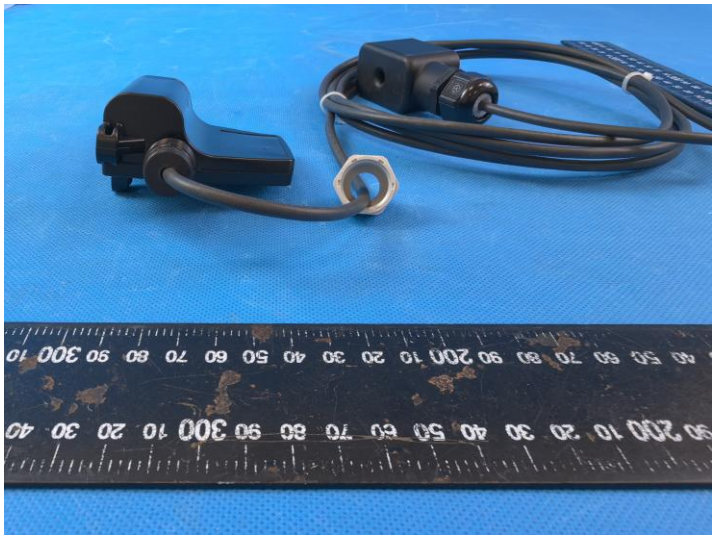
Have pre-scan all test channel, found **CH_L** which it was worst case, so only show the worst case's data on this report.

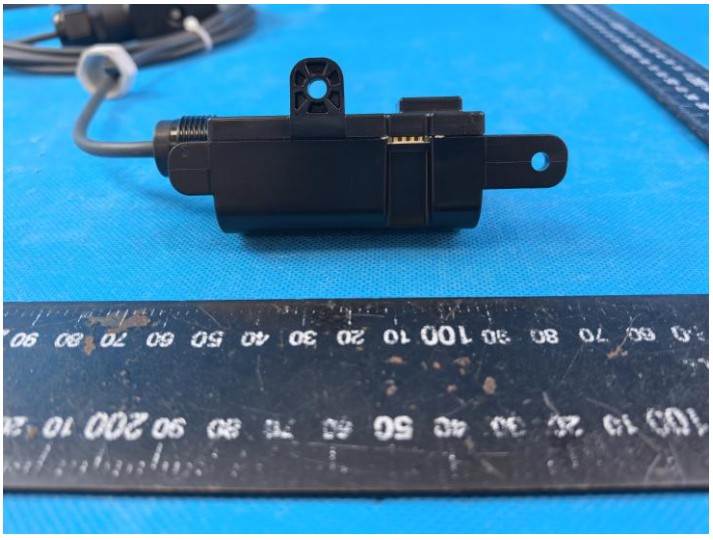
6. EXTERNAL AND INTERNAL PHOTOS

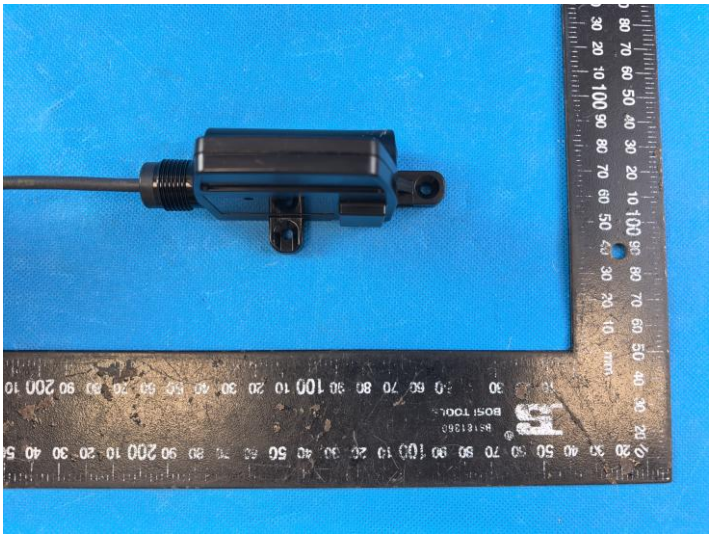
6.1. External Photos

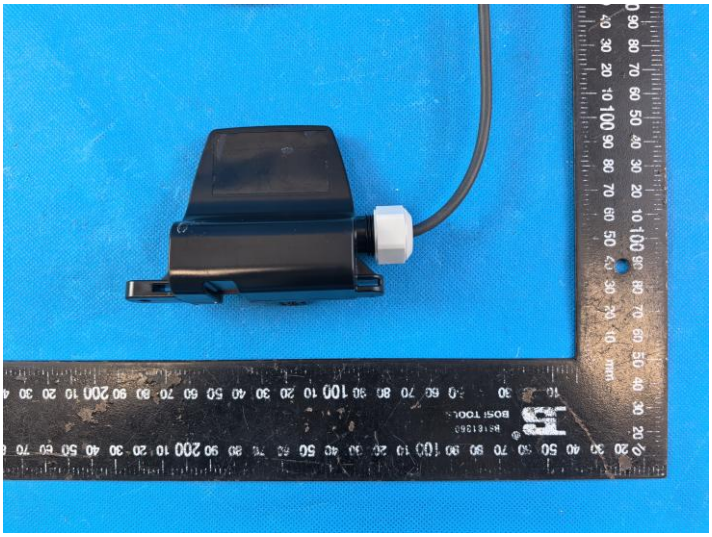




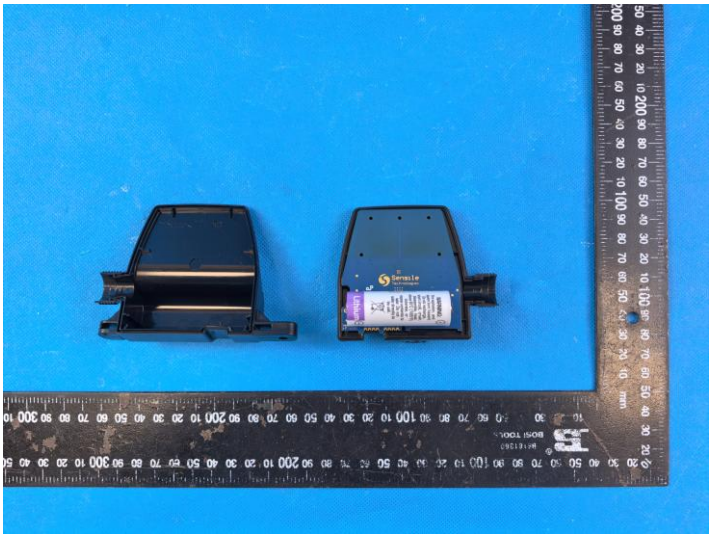


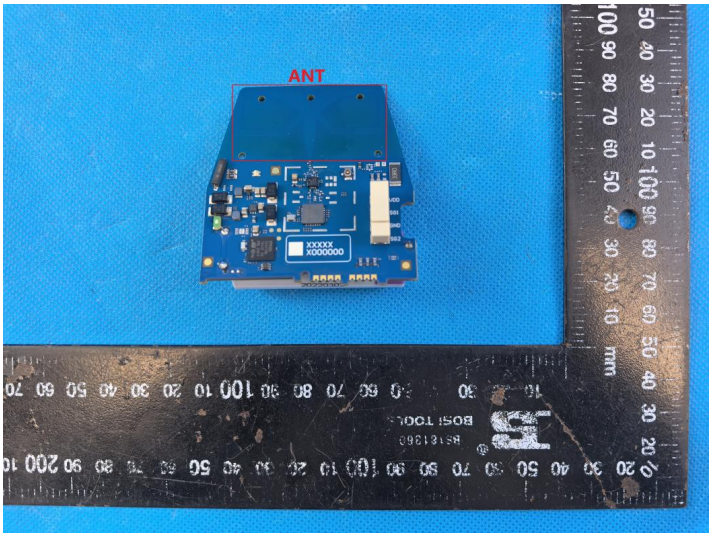


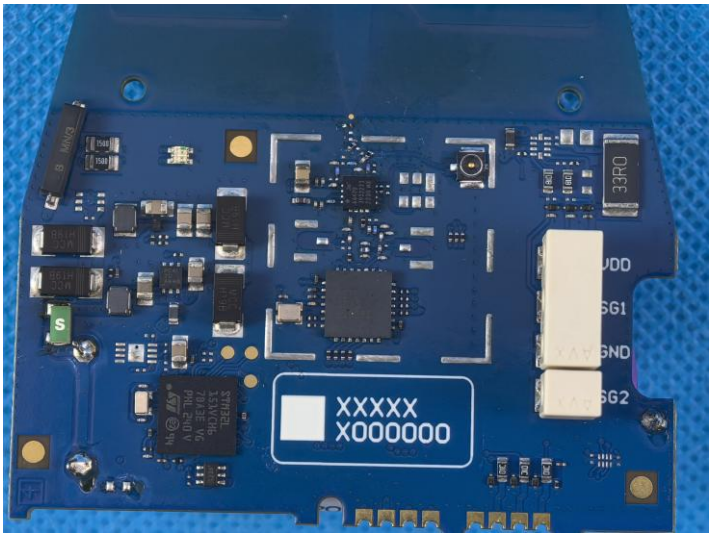




6.2. Internal Photos







7. APPENDIX REPORT

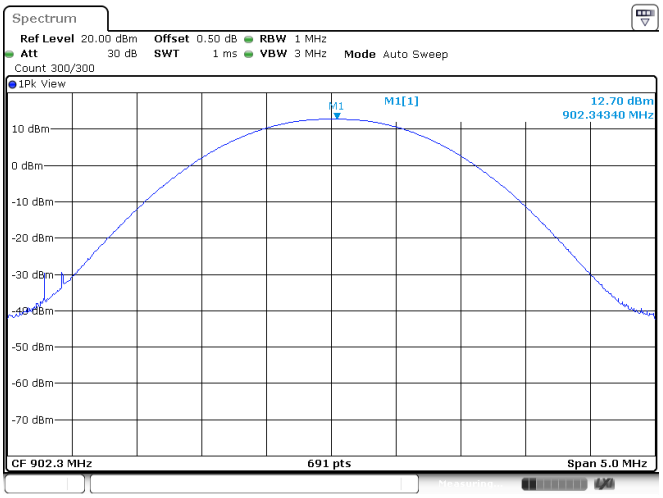
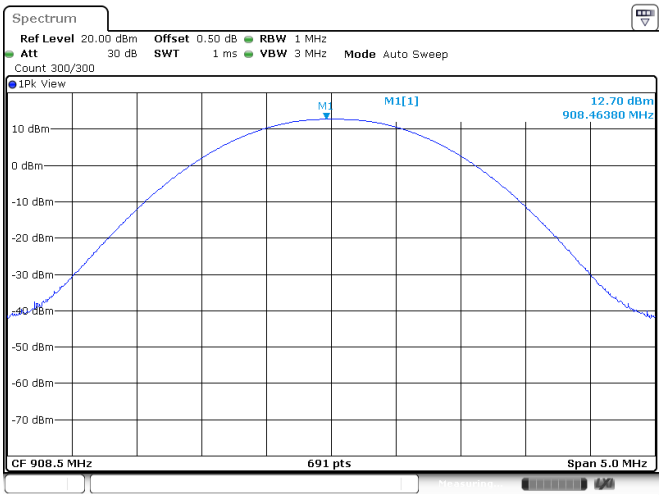
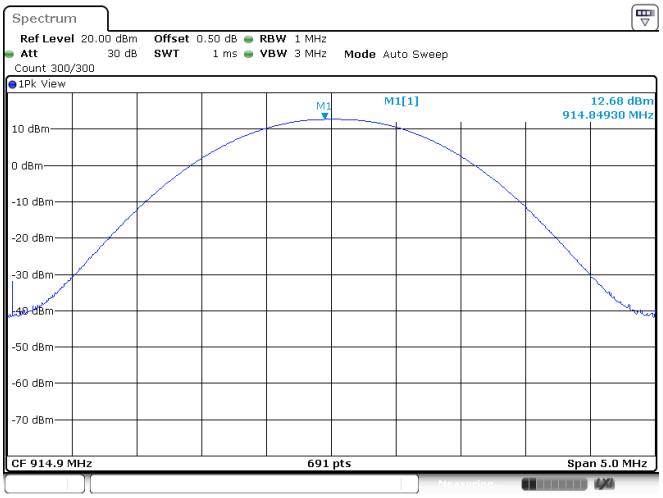
APPENDIX REPORT

Project No.	SHT2409082801W	Radio Specification	LORA
Test sample No.	YPHT24090828001	Model No.	NETRIS ® 3 - *L2*
Start test date	2024-12-16	Finish date	2024-12-17
Temperature	24.5℃	Humidity	50%
Test Engineer	Chenxin Ling	Auditor	Xiaodong Zhao

Appendix clause	Test item	Result
A	Peak Output Power	Pass
B	20 dB Bandwidth	Pass
C	99% Occupied Bandwidth	Pass
D	Carrier Frequencies Separation	Pass
E	Hopping Channel Number	Pass
F	Dwell Time	Pass
G	Duty Cycle Correction Factor (DCCF)	Pass
H	Band edge and Spurious Emissions(coducted)	Pass

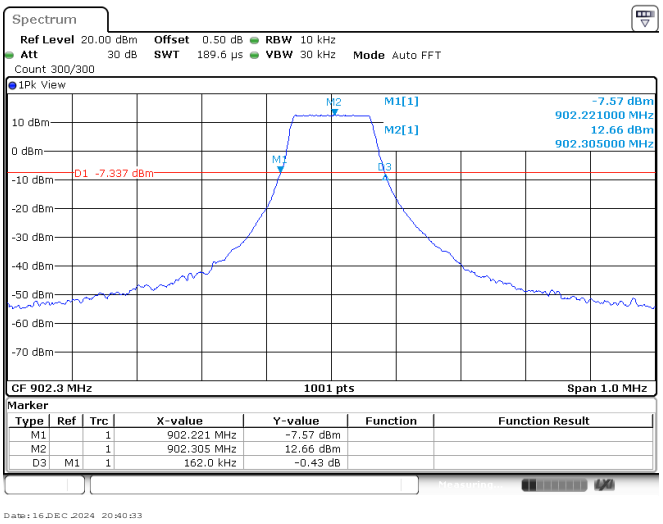
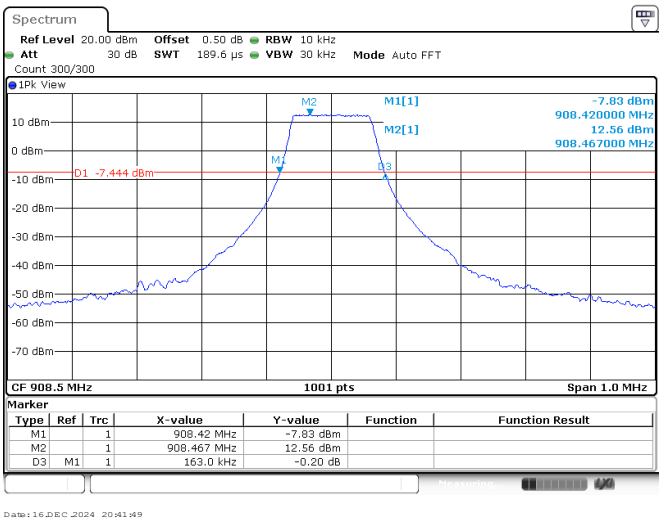
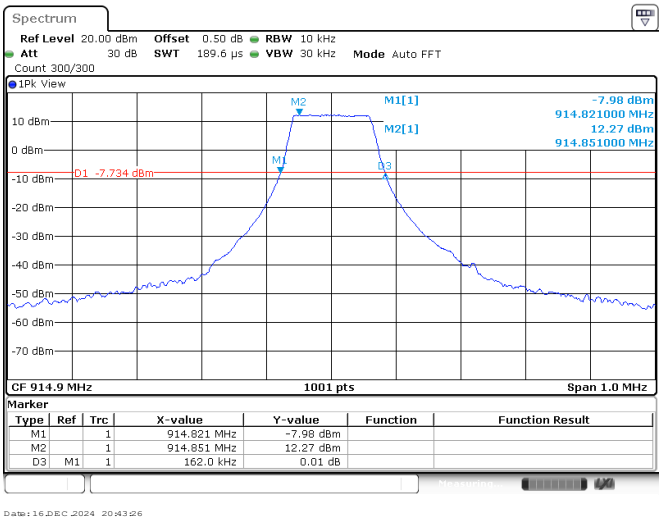
Appendix A：Peak Output Power

Modulation type	Channel	Peak Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
CSS	CH-L	12.70	12.56	≤ 30.00	Pass
	CH-M	12.70	12.57		
	CH-H	12.68	12.52		

Modulation Type:	CSS
CH-L	
CH-M	
CH-H	

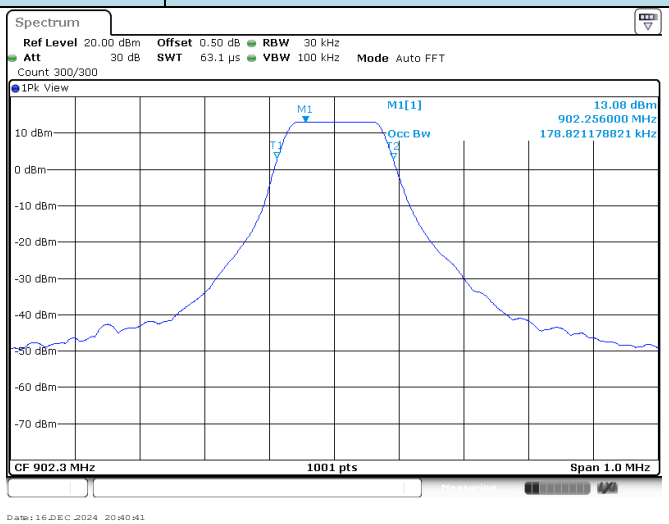
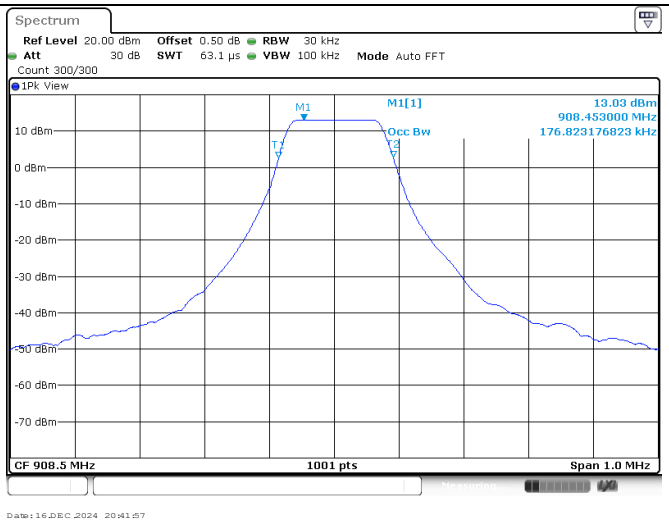
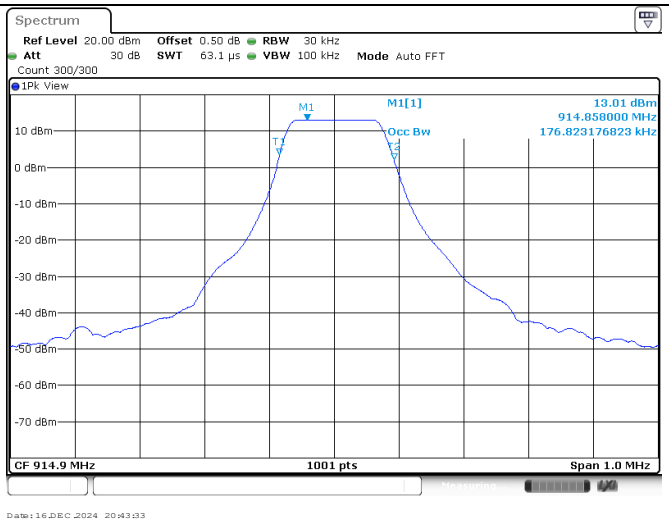
Appendix B : 20 dB Bandwidth

Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
CSS	CH-L	162.00	500	Pass
	CH-M	163.00		
	CH-H	162.00		

Modulation Type:	CSS
CH-L	
CH-M	
CH-H	

Appendix C：99% Occupied Bandwidth

Modulation type	Channel	99% Occupied Bandwidth (kHz)	Limit (MHz)	Result
CSS	CH-L	178.82	-	Pass
	CH-M	176.82		
	CH-H	176.82		

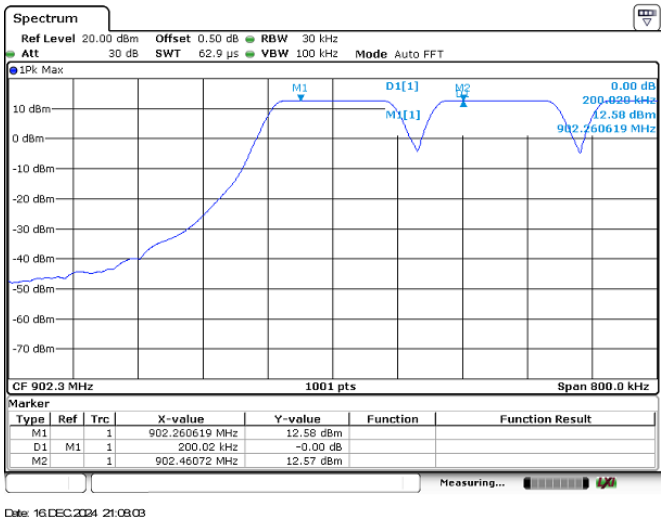
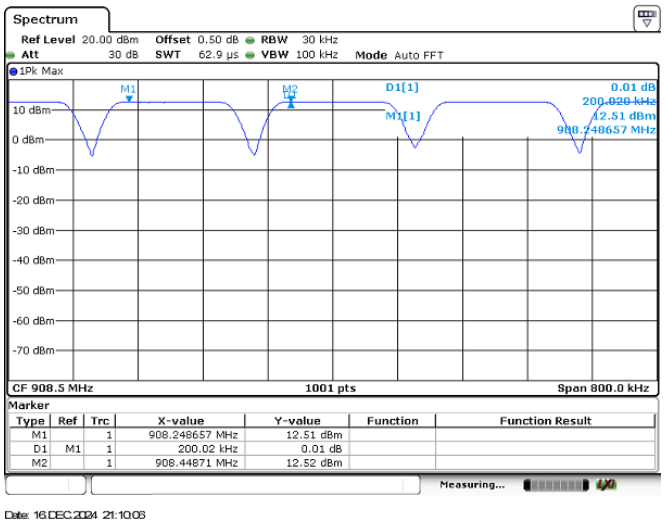
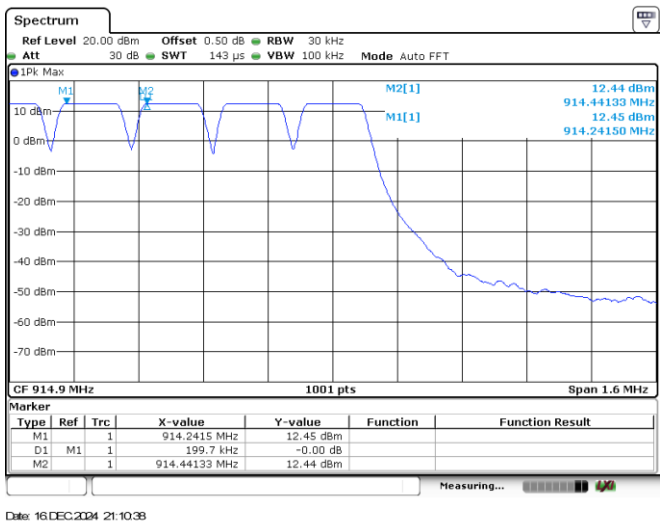
Modulation Type:	CSS
CH-L	
CH-M	
CH-H	

Appendix D：Carrier Frequencies Separation

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
CSS	CH-L	0.2	≥162.00	Pass
	CH-M	0.2	≥162.00	Pass
	CH-H	0.2	≥162.00	Pass

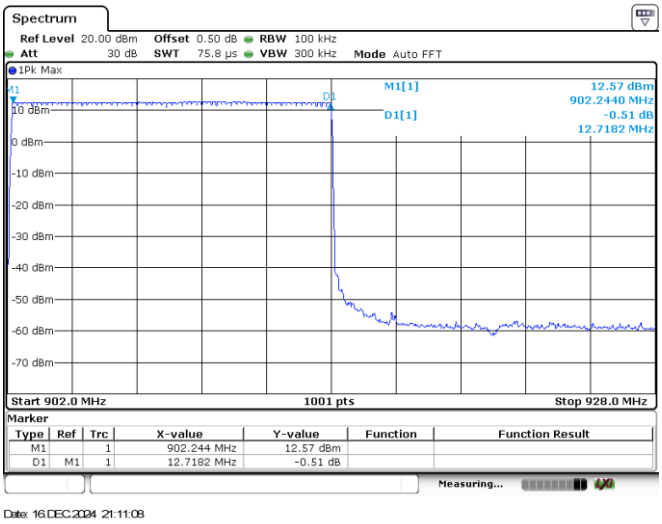
Note:

*: GFSK limit = The maximum 20 dB Bandwidth for CSS modulation on the appendix B.

CH-L	 Spectrum Ref Level 20.00 dBm Offset 0.50 dB RBW 30 kHz Att 30 dB SWT 62.9 µs VBW 100 kHz Mode Auto FFT 1Pk Max M1 D1[1] M2 M1[1] 0.00 dB 200.020 kHz 12.58 dBm 902.260619 MHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 902.3 MHz 1001 pts Span 800.0 kHz Marker Type Ref Trc X-value Y-value Function Function Result M1 1 902.260619 MHz 12.58 dBm D1 M1 1 200.02 kHz -0.00 dB M2 1 902.46072 MHz 12.57 dBm Measuring... Date: 16.DEC.2024 21:08:03
CH-M	 Spectrum Ref Level 20.00 dBm Offset 0.50 dB RBW 30 kHz Att 30 dB SWT 62.9 µs VBW 100 kHz Mode Auto FFT 1Pk Max M1 M2 D1[1] M1[1] 0.01 dB 200.020 kHz 12.51 dBm 908.248657 MHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 908.5 MHz 1001 pts Span 800.0 kHz Marker Type Ref Trc X-value Y-value Function Function Result M1 1 908.248657 MHz 12.51 dBm D1 M1 1 200.02 kHz 0.01 dB M2 1 908.44871 MHz 12.52 dBm Measuring... Date: 16.DEC.2024 21:10:08
CH-H	 Spectrum Ref Level 20.00 dBm Offset 0.50 dB RBW 30 kHz Att 30 dB SWT 143 µs VBW 100 kHz Mode Auto FFT 1Pk Max M1 M2 M2[1] M1[1] 12.44 dBm 914.44133 MHz 12.45 dBm 914.24150 MHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 914.9 MHz 1001 pts Span 1.6 MHz Marker Type Ref Trc X-value Y-value Function Function Result M1 1 914.2415 MHz 12.45 dBm D1 M1 1 199.7 kHz -0.00 dB M2 1 914.44133 MHz 12.44 dBm Measuring... Date: 16.DEC.2024 21:10:38

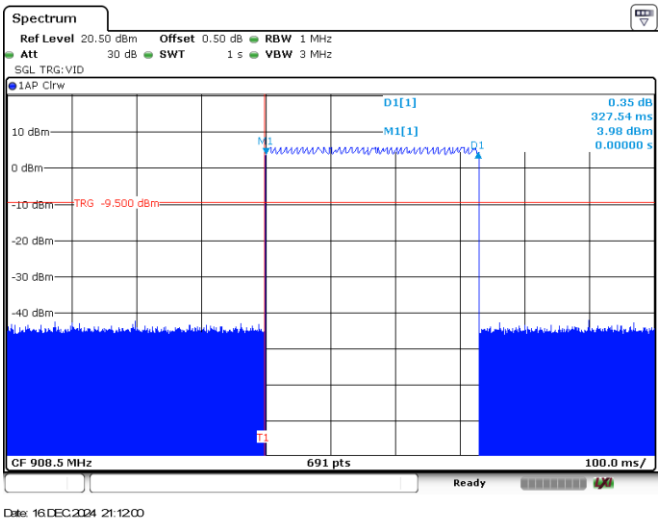
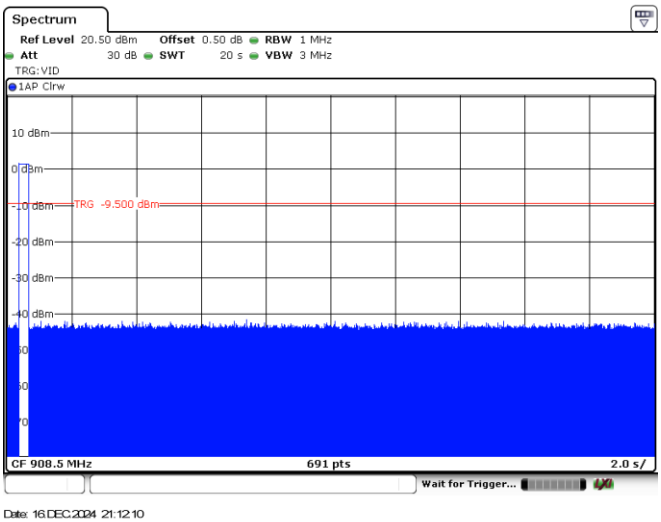
Appendix E：Hopping Channel Number

Modulation type	Channel number	Limit	Result
CSS	64	≥50	Pass

CSS	

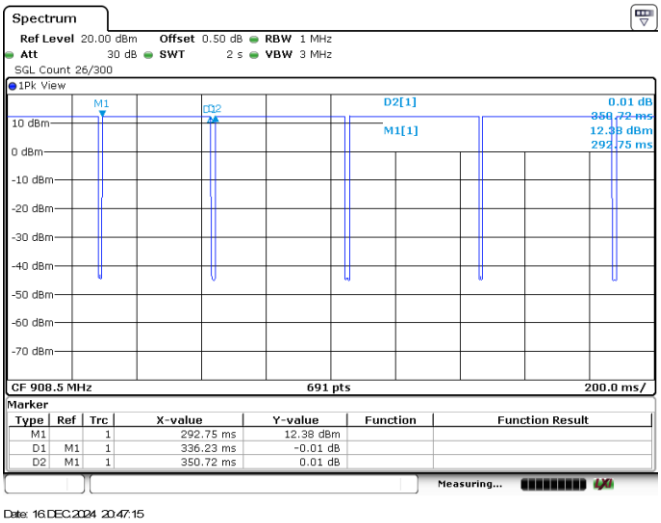
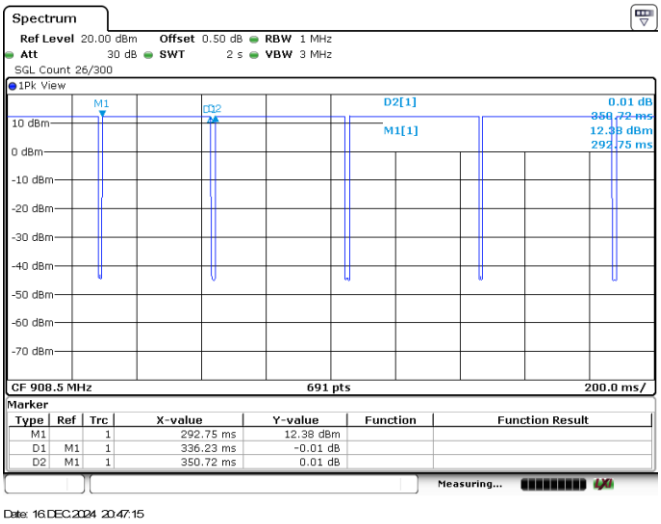
Appendix F：Dwell Time

Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
CSS	CH-M	327.54	1	0.33	≤ 0.40	Pass

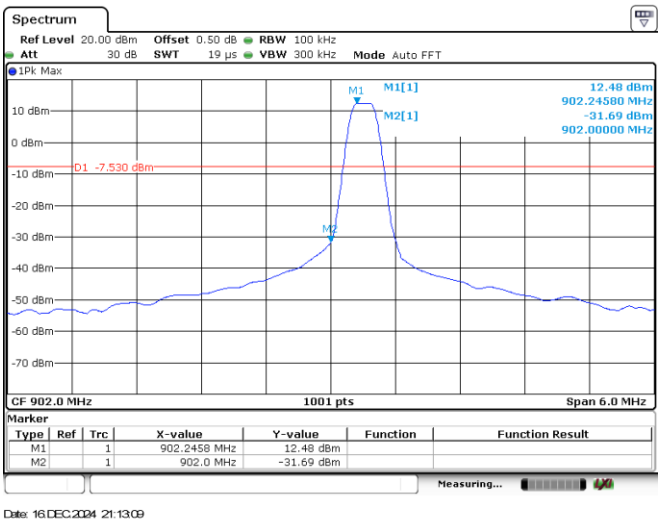
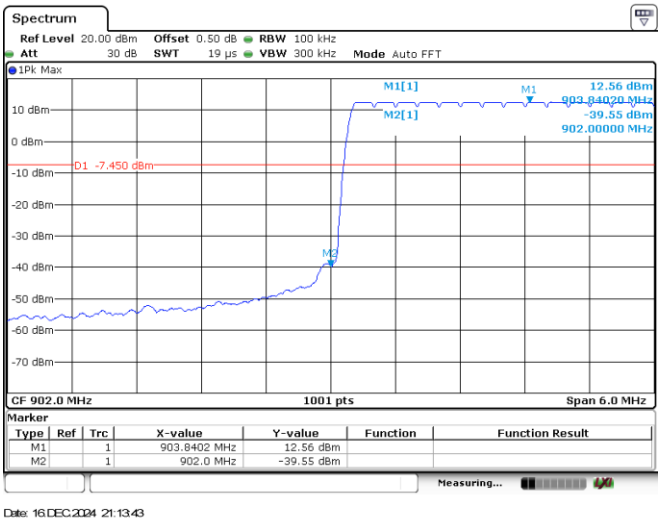
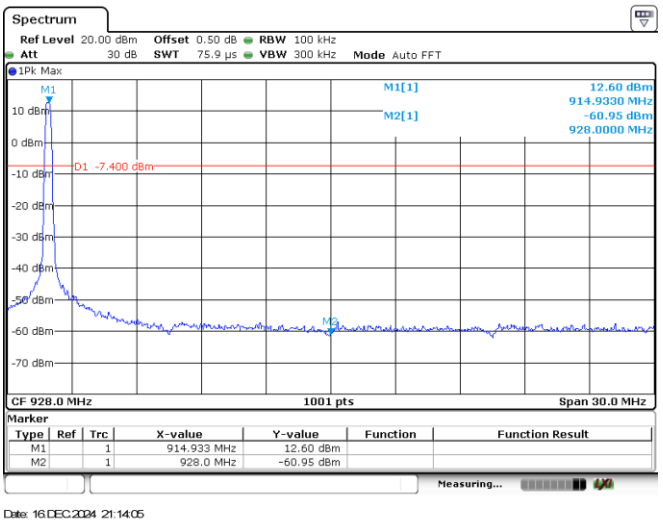
Modulation Type:	**CSS**
CH-M Burst width	
CH-M Burst number	

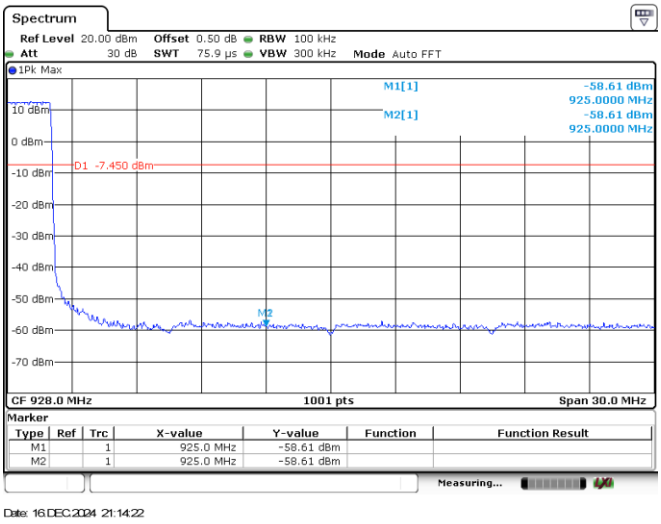
Appendix G：Duty Cycle Correction Factor (DCCF)

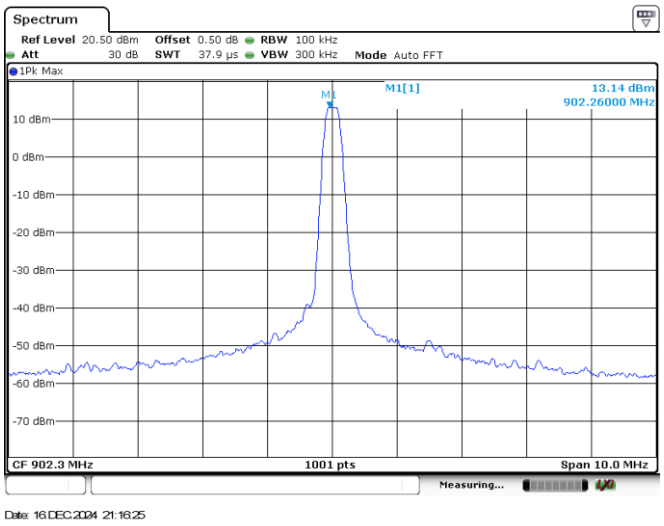
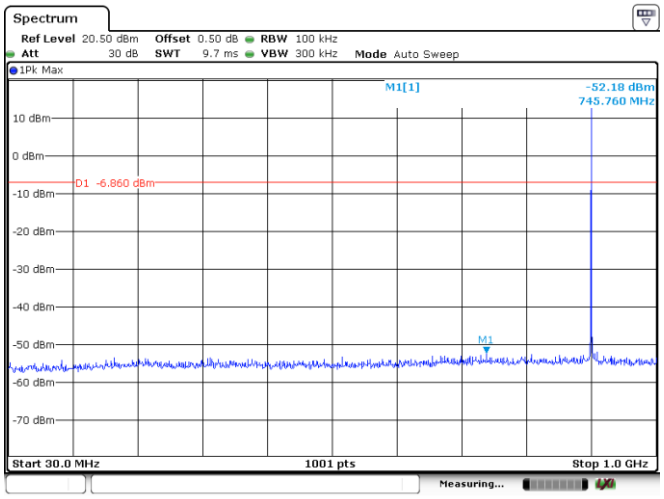
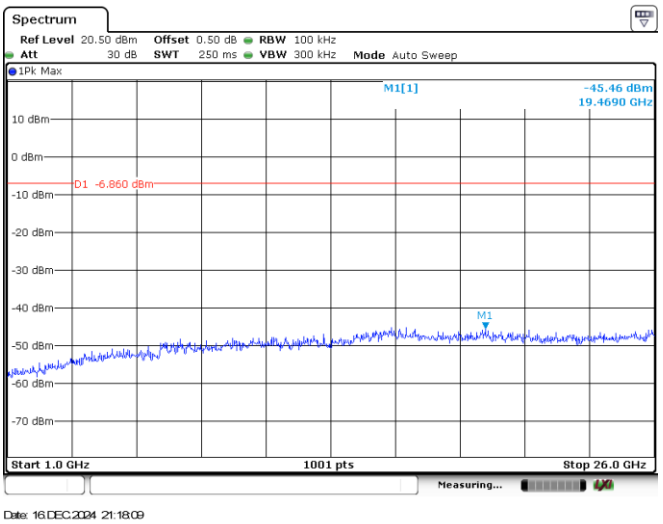
DCCF Calculate Formula					
DCCF=20 * Log(duty cycle) = 20 * Log($T_{on\ time}$ / T_{period})					
Modulation type	Test Frequency（MHz）	$T_{on\ time}$ for single burst [ms]	T_{period} [ms]	Burst Quantity	DCCF [dB]
CSS	908.5	400	2000	4	-13.98

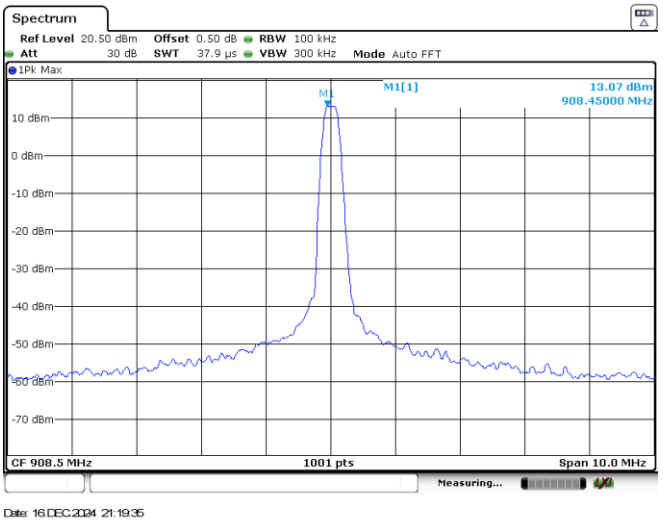
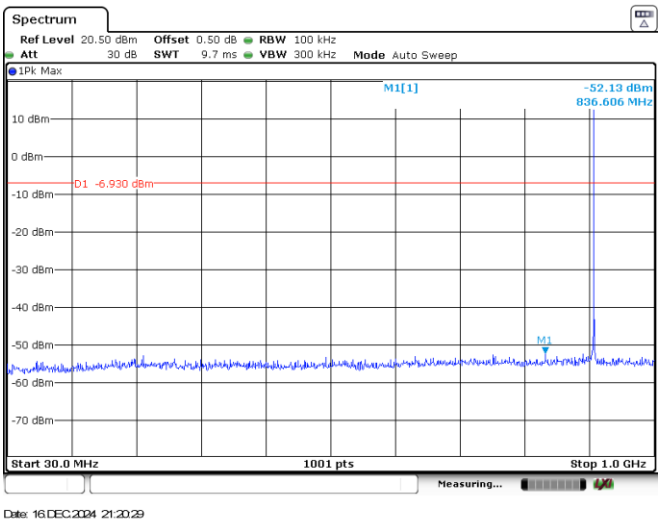
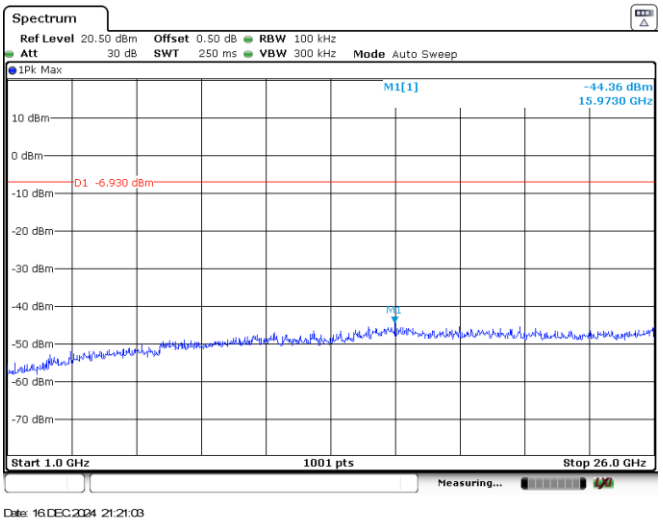
Burst Quantity	
$T_{on\ time}$ for single burst	

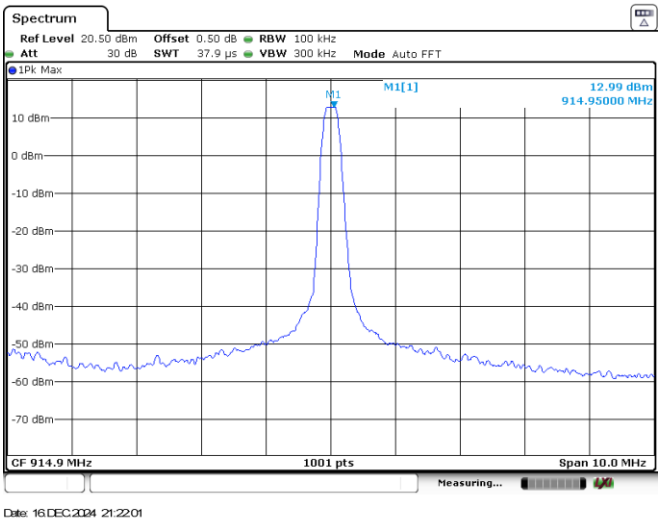
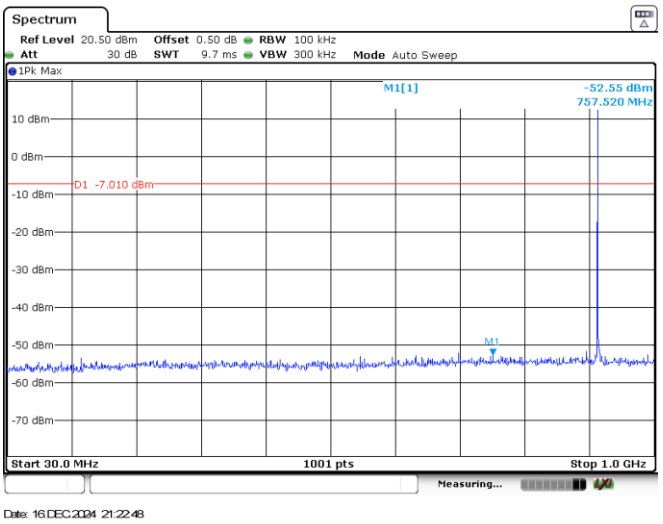
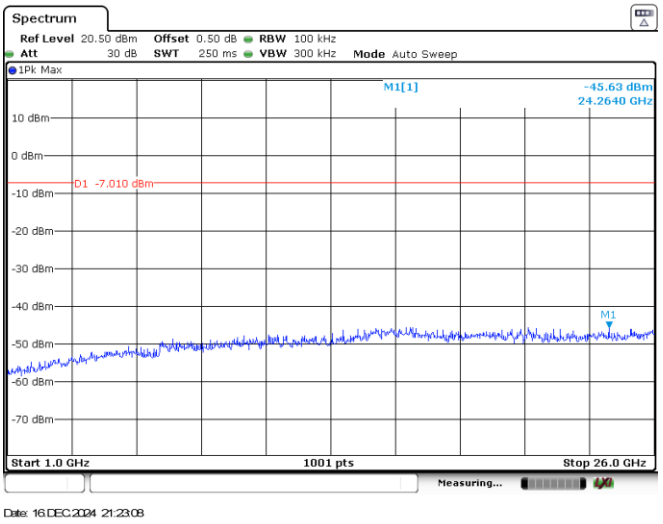
Appendix H：Band edge and Spurious Emissions (conducted)

Test Item:	Band edge	Modulation type:	CSS
CH-L No hopping mode	
CH-L Hopping mode	
CH-H No hopping mode	

CH-H Hopping mode	

Test Item:	Spurious Emission	Modulation type:	CSS
CH-L Reference level			
CH-L 30MHz~1000MHz			
CH-L 1GHz~26GHz			

CH-M Reference level	
CH-M 30MHz~1000MHz	
CH-M 1GHz~26GHz	

CH-H Reference level	
CH-H 30MHz~1000MHz	
CH-H 1GHz~26GHz	

--------End of Report--------