RF TEST REPORT

Product Name: LoRaWAN wireless communication model

Model Name: WSL05-A0

FCC ID: UU3FCWSL05

Issued For : Shenzhen Friendcom Technology Co., Ltd.

3/F, 6 Building, Guangqian Industrial Park, Longzhu Road,Xili Town, Nanshan, Shenzhen, China

Issued By : Shenzhen LGT Test Service Co., Ltd.

Room 205, Building 13, Zone B, Zhenxiong Industrial Park, No.177, Renmin West Road, Jinsha, Kengzi Street, Pingshan District, Shenzhen, Guangdong, China

Report Number:	LGT24A096RF02
Sample Received Date:	Jan. 22, 2024
Date of Test:	Jan. 22, 2024 – Mar. 14, 2024
Date of Issue:	Mar. 14, 2024

TEST REPORT CERTIFICATION

Applicant:	Shenzhen Friendcom Technology Co., Ltd.
Address:	3/F, 6 Building, Guangqian Industrial Park, Longzhu Road,Xili Town, Nanshan, Shenzhen, China
Manufacturer:	Shenzhen Friendcom Technology Co., Ltd.
Address:	3/F, 6 Building, Guangqian Industrial Park, Longzhu Road,Xili Town, Nanshan, Shenzhen, China
Product Name:	LoRaWAN wireless communication model
Trademark:	Friendcom
Model Name:	WSL05-A0
Sample Status:	Normal

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC Part 15.247, Subpart C ANSI C63.10-2013	PASS

Prepared by:

Zane Shan

Zane Shan
Engineer

Approved by:

Vita Li
Technical Director

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Revision History

Rev.	Issue Date	Contents
00	Mar. 14, 2024	Initial Issue

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:
KDB 558074 D01 15.247 Meas Guidance v05r02.

FCC Part 15.247, Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	--
15.247(a)(1)	Hopping Channel Separation	PASS	--
15.247(b)(2)	Output Power	PASS	--
15.209	Radiated Spurious Emission	PASS	--
15.247(d)	Conducted Spurious & Band Edge Emission	PASS	--
15.247(a)(1)(i)	Number of Hopping Frequency	PASS	--
15.247(a)(1)(i)	Dwell Time	PASS	--
15.247(a)(1)(i)	Bandwidth	PASS	--
15.205	Restricted bands of operation	PASS	--
Part 15.247(d)/part 15.209(a)	Band Edge Emission	PASS	--
15.203	Antenna Requirement	PASS	--

NOTE:

(1) 'N/A' denotes test is not applicable in this Test Report.

(2) All tests are according to ANSI C63.10-2013.

1.1 TEST FACTORY

Company Name:	Shenzhen LGT Test Service Co., Ltd.
Address:	Room 205, Building 13, Zone B, Zhenxiong Industrial Park, No.177, Renmin West Road, Jinsha, Kengzi Street, Pingshan District, Shenzhen, Guangdong, China
Accreditation Certificate	A2LA Certificate No.: 6727.01
	FCC Registration No.: 746540
	CAB ID: CN0136

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**, where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately **95** %.

No.	Item	Uncertainty
1	RF output power, conducted	±0.68dB
2	Unwanted Emissions, conducted	±2.988dB
3	All emissions, radiated 9K-30MHz	±2.84dB
4	All emissions, radiated 30M-1GHz	±4.39dB
5	All emissions, radiated 1G-6GHz	±5.10dB
6	All emissions, radiated>6G	±5.48dB
7	Conducted Emission (9KHz-150KHz)	±2.79dB
8	Conducted Emission (150KHz-30MHz)	±2.80dB

Note: The measurement uncertainty is not included in the test result.

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name:	LoRaWAN wireless communication model
Trademark:	Friendcom
Model Name:	WSL05-A0
Series Model:	N/A
Model Difference:	N/A
Channel List:	Please refer to the Note 3.
Frequency:	902.3MHz~927.7MHz
Modulation:	LoRa
Antenna Type:	Rod
Antenna Gain:	4.5dBi
Rating:	Input: DC 2.8~3.7V;Tpy 3.3V
Hardware Version:	N/A
Software Version:	N/A
Connecting I/O Port(s):	Please refer to the Note 1.

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.
2. The antenna information refers to the manufacturer provide report, applicable only to the tested sample identified in the report. Due to the incorrect antenna information, a series of problems such as the accuracy of the test results will be borne by the customer.

3.

Channel List									
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	902.3	26	907.5	52	912.7	78	917.9	104	923.1
1	902.5	27	907.7	53	912.9	79	918.1	105	923.3
2	902.7	28	907.9	54	913.1	80	918.3	106	923.5
3	902.9	29	908.1	55	913.3	81	918.5	107	923.7
4	903.1	30	908.3	56	913.5	82	918.7	108	923.9
5	903.3	31	908.5	57	913.7	83	918.9	109	924.1
6	903.5	32	908.7	58	913.9	84	919.1	110	924.3
7	903.7	33	908.9	59	914.1	85	919.3	111	924.5
8	903.9	34	909.1	60	914.3	86	919.5	112	924.7
9	904.1	35	909.3	61	914.5	87	919.7	113	924.9
10	904.3	36	909.5	62	914.7	88	919.9	114	925.1
11	904.5	37	909.7	63	914.9	89	920.1	115	925.3
12	904.7	38	909.9	64	915.1	90	920.3	116	925.5
13	904.9	39	910.1	65	915.3	91	920.5	117	925.7
14	905.1	40	910.3	66	915.5	92	920.7	118	925.9
15	905.3	41	910.5	67	915.7	93	920.9	119	926.1
16	905.5	42	910.7	68	915.9	94	921.1	120	926.3
17	905.7	43	910.9	69	916.1	95	921.3	121	926.5
18	905.9	44	911.1	70	916.3	96	921.5	122	926.7
19	906.1	45	911.3	71	916.5	97	921.7	123	926.9
20	906.3	46	911.5	72	916.7	98	921.9	124	927.1
21	906.5	47	911.7	73	916.9	99	922.1	125	927.3
22	906.7	48	911.9	74	917.1	100	922.3	126	927.5
23	906.9	49	912.1	75	917.3	101	922.5	127	927.7
24	907.1	50	912.3	76	917.5	102	922.7	/	/
25	907.3	51	912.5	77	917.7	103	922.9	/	/

2.2 DESCRIPTION OF THE TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Worst Mode	Description	Modulation
Mode 1	902.3MHz	LoRa
Mode 2	915.1MHz	LoRa
Mode 3	927.7MHz	LoRa

2.3 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS.

Test software Version	Test program: 902-928MHz	
SuperCom_4.2.0.0	Mode Or Modulation type	Power setting
	LoRa	3

2.4 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Accessories Equipment

Description	Manufacturer	Model	S/N	Rating
USB-A to Micro-USB Cable	N/A	N/A	N/A	1m
Antenna	N/A	N/A	N/A	N/A

Auxiliary Equipment

Description	Manufacturer	Model	S/N	Rating
Laptop	Lenovo	HKF-16	N/A	N/A

Note:

(1) For detachable type I/O cable should be specified the length in cm in『Length』column.
(2) “YES” is means “with core”; “NO” is means “without core”.

2.5 EQUIPMENTS LIST

Conducted Emission					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Cal. Until**
EMI Test Receiver	R&S	ESU8	100372	2023.04.13	2024.04.12
LISN	COM-POWER	LI-115	02032	2023.04.07	2024.04.06
LISN	SCHWARZBECK	NNLK 8122	00160	2023.04.07	2024.04.06
Transient Limiter	CYBERTEK	EM5010A	E2250100049	2023.04.07	2024.04.06
Temperature & Humidity	KTJ	TA218B	N.A	2023.04.24	2024.04.23
Testing Software	EMC-I_V1.4.0.3_SKET				

Radiated Test equipment					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Cal. Until**
EMI Test Receiver	R&S	ESU8	100372	2023.04.13	2024.04.12
Active loop Antenna	ETS	6502	00049544	2022.06.02	2025.06.01
Spectrum Analyzer	Keysight	N9010B	MY60242508	2023.04.10	2024.04.09
Bilog Antenna(30M-1G)	SCHWARZBECK	VULB 9168	2705	2022.06.05	2025.06.04
Horn Antenna(1-18G)	SCHWARZBECK	3115	10SL0060	2022.06.02	2025.06.01
Horn Antenna(18-40G)	A-INFO	LB-180400-KF	J211060273	2022.06.08	2025.06.07
Pre-amplifier(30M-1G)	EMtrace	RP01A	02019	2023.04.07	2024.04.06
Pre-amplifier(1-26.5G)	Agilent	8449B	3008A4722	2023.04.07	2024.04.06
Pre-amplifier(18-40G)	com-mw	LNPA_18-40-01	18050003	2023.04.07	2024.04.06
Wireless Communications Test Set	R&S	CMW 500	137737	2023.04.13	2024.04.12
Temperature & Humidity	KTJ	TA218B	N.A	2023.04.24	2024.04.23
Testing Software	EMC-I_V1.4.0.3_SKET				

Conducted Test equipment					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Cal. Until**
Signal Analyzer	Keysight	N9010B	MY60242508	2023.04.10	2024.04.09
Wireless Communications Test Set	R&S	CMW 500	137737	2023.04.13	2024.04.12
MXG Vector Signal Generator	Keysight	N5182B	MY59100717	2023.04.07	2024.04.06
Power Sensor	MW	MW100-RFCB	MW220324LG-33	2023.04.13	2024.04.12
Temperature & Humidity	KTJ	TA218B	N.A	2023.04.24	2024.04.23
Temperature& Humidity test chamber	AISRY	LX-1000L	171200018	2023.05.10	2024.05.09
Attenuator	eastsheep	90db	N.A	2023.04.10	2024.04.09
Testing Software	MTS8200_ V2.0.0.0_MW				

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table.

FREQUENCY (MHz)	Conducted Emissionlimit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

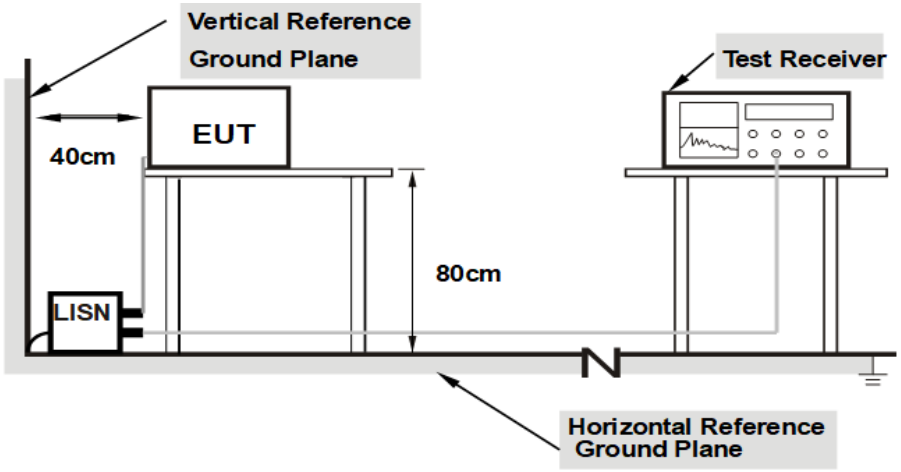
The following table is the setting of the receiver

Receiver Parameters	**Setting**
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.2 TEST PROCEDURE

a. The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments are powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN is at least 80 cm from the nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 TEST SETUP



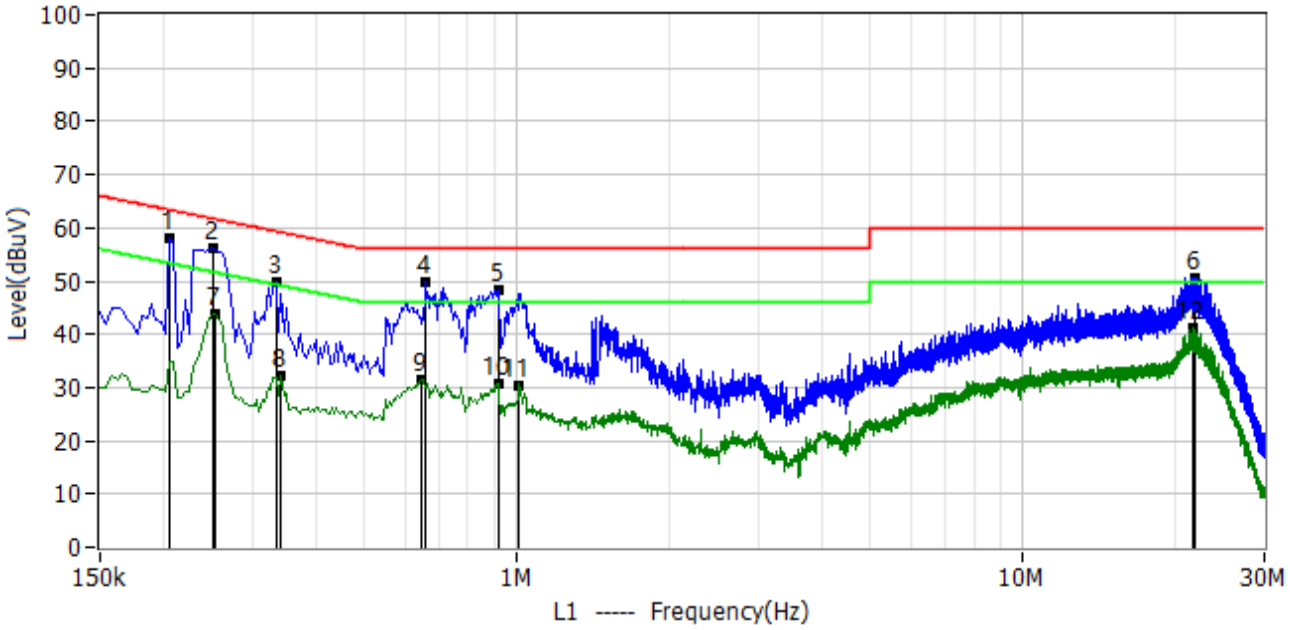
Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support units.

3.1.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

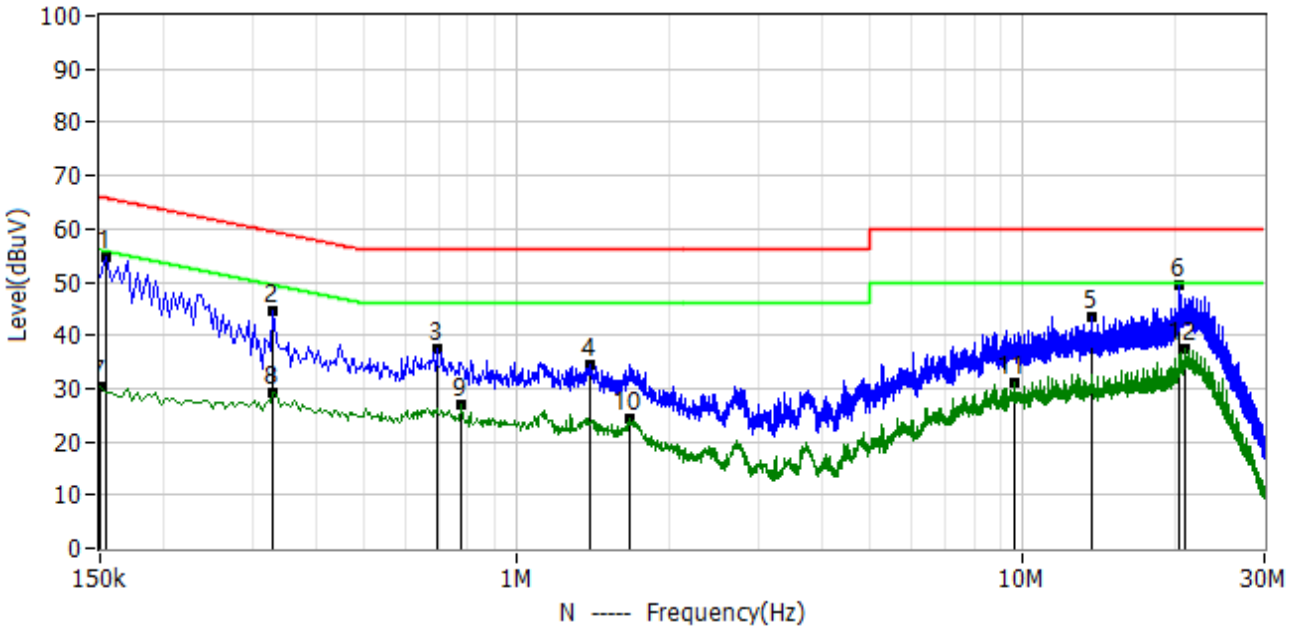
3.1.5 TEST RESULT

Project: LGT24A096	Test Engineer: LiuH
EUT: LoRaWAN wireless communication mode	Temperature: 21℃
M/N: WSL05-A0	Humidity: 48%RH
Test Voltage: DC 3.3V	Test Data: 2024-03-14
Test Mode: TX	
Note:	



No.	Frequency MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Detector	Polar
1*	0.206	47.42	10.49	57.91	63.37	-5.46	QP	L1
2*	0.250	45.53	10.49	56.02	61.76	-5.74	QP	L1
3*	0.334	39.40	10.49	49.89	59.35	-9.46	QP	L1
4*	0.662	39.14	10.50	49.64	56.00	-6.36	QP	L1
5*	0.918	37.95	10.51	48.46	56.00	-7.54	QP	L1
6*	21.902	39.50	11.14	50.64	60.00	-9.36	QP	L1
7*	0.254	33.32	10.49	43.81	51.63	-7.82	AV	L1
8*	0.342	21.56	10.49	32.05	49.15	-17.11	AV	L1
9*	0.646	21.10	10.50	31.60	46.00	-14.40	AV	L1
10*	0.918	20.33	10.51	30.84	46.00	-15.16	AV	L1
11*	1.010	20.00	10.52	30.52	46.00	-15.48	AV	L1
12*	21.654	29.91	11.13	41.04	50.00	-8.96	AV	L1

Project: LGT24A096	Test Engineer: LiuH
EUT: LoRaWAN wireless communication mode	Temperature: 21℃
M/N: WSL05-A0	Humidity: 48%RH
Test Voltage: DC 3.3V	Test Data: 2024-03-14
Test Mode: TX	
Note:	



No.	Frequency MHz	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Margin dB	Detector	Polar
1*	0.154	44.19	10.49	54.68	65.78	-11.10	QP	N
2*	0.330	33.93	10.49	44.42	59.45	-15.03	QP	N
3*	0.694	26.90	10.50	37.40	56.00	-18.60	QP	N
4*	1.398	23.79	10.60	34.39	56.00	-21.61	QP	N
5*	13.682	32.47	11.03	43.50	60.00	-16.50	QP	N
6*	20.438	38.26	11.19	49.45	60.00	-10.55	QP	N
7*	0.150	19.96	10.49	30.45	56.00	-25.55	AV	N
8*	0.330	18.69	10.49	29.18	49.45	-20.27	AV	N
9*	0.778	16.58	10.51	27.09	46.00	-18.91	AV	N
10*	1.674	13.67	10.65	24.32	46.00	-21.68	AV	N
11*	9.638	20.12	10.99	31.11	50.00	-18.89	AV	N
12*	20.846	26.32	11.20	37.52	50.00	-12.48	AV	N

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205 (a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (1GHz-25 GHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RESTRICTED FREQUENCY BANDS

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP/AV
Start Frequency	9 KHz/150KHz (Peak/QP/AV)
Stop Frequency	150KHz/30MHz (Peak/QP/AV)
RB / VB (emission in restricted band)	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz); 200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP
Start Frequency	30 MHz (Peak/QP)
Stop Frequency	1000 MHz (Peak/QP)
RB / VB (emission in restricted band)	120 KHz / 300 KHz

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak
Start Frequency	1000 MHz (Peak/AV)
Stop Frequency	10th carrier hamonic (Peak/AV)
RB / VB (emission in restricted band)	1 MHz / 3 MHz(Peak) 1 MHz/1/T MHz(AVG)

For Restricted band

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	880 to 930 MHz
RB / VB	1 MHz / 3 MHz(Peak) 1 MHz/1/T MHz(AVG)

Receiver Parameter	**Setting**
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

a. The measuring distance at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
b. The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 m anechoic chamber test site. The table was rotated 360 degree to determine the position of the highest radiation.
c. The height of the equipment shall be 0.8 m (above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. Horizontal and vertical polarization of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and QuasiPeak detector mode will be re-measured.
e. If the Peak Mode measured value is compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and no additional QP Mode measurement was performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

   Note:

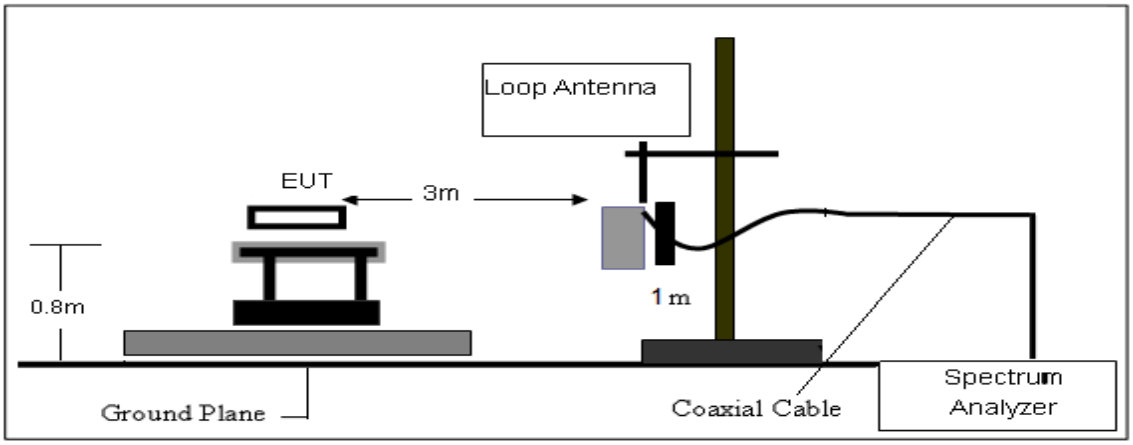
   Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

3.2.3 DEVIATION FROM TEST STANDARD

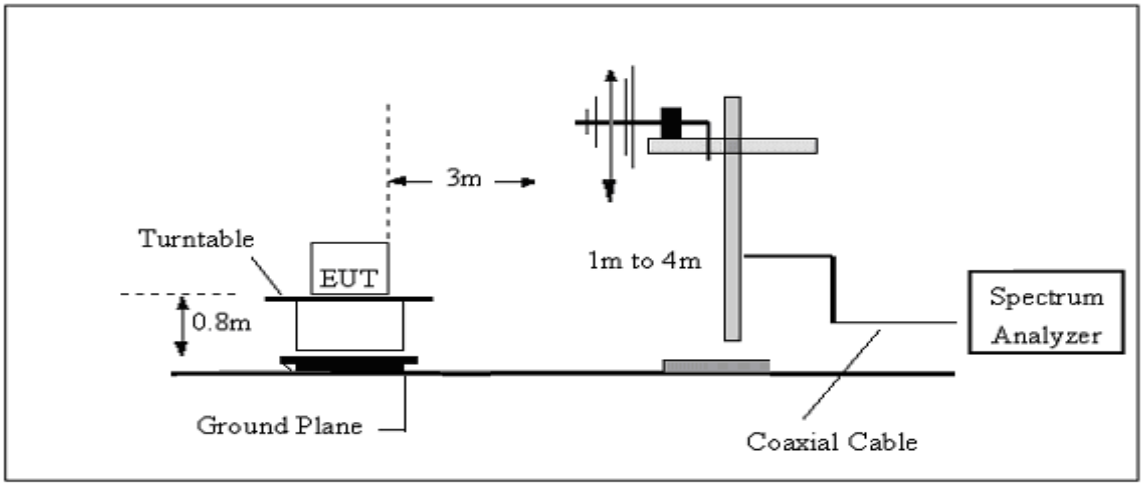
No deviation.

3.2.4 TESTSETUP

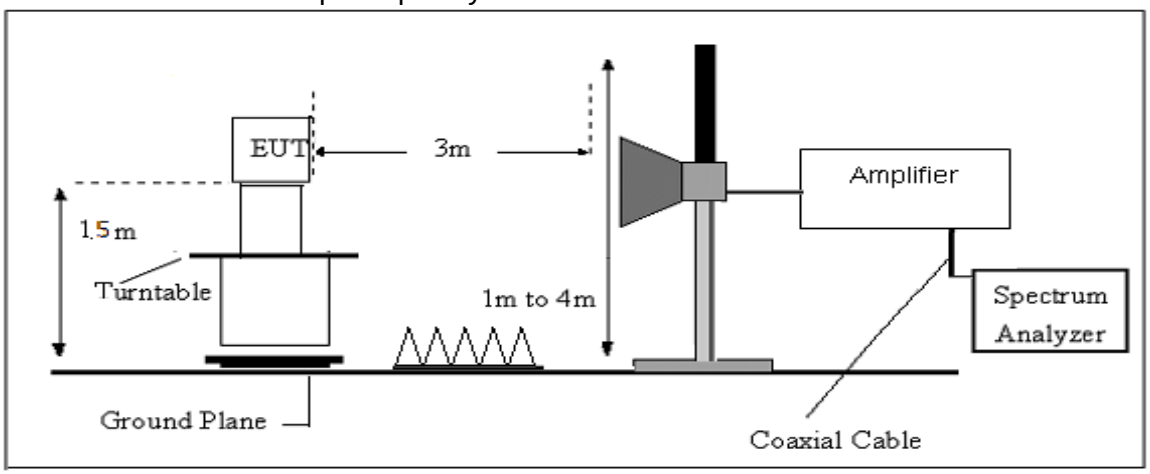
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

Please refer to section 3.1.4 of this report.

3.2.6 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where

FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

For example

Frequency	FS	RA	AF	CL	AG	Factor
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dB)	(dB)	(dB)
300	40	58.1	12.2	1.6	31.9	-18.1

Factor=AF+CL-AG

3.2.7 TEST RESULTS

Results of Radiated Emissions (9 KHz~30MHz)

No.	Frequency	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Remark
1*	-	-	-	-	-	-	-	See Note

Note:

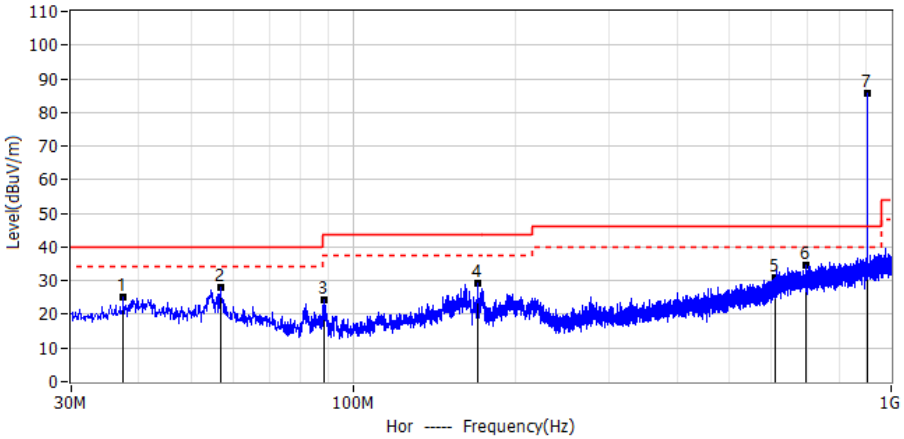
The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

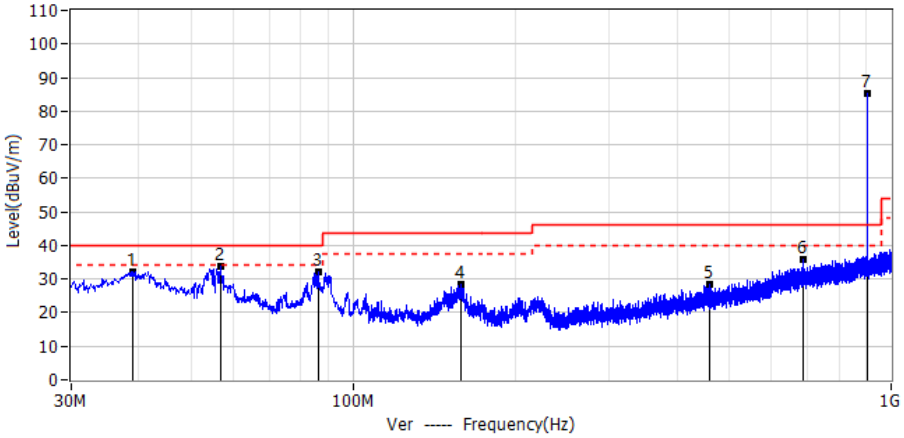
Limit line = specific limits (dBuV) + distance extrapolation factor.

Results of Radiated Emissions (30MHz~1000MHz)

Project: LGT24A096	Test Engineer: Xiangdong Ma
EUT: LoRaWAN wireless communication model	Temperature: 25.4℃
M/N: WSL05-A0	Humidity: 60%RH
Test Voltage: DC 3.3V	Test Data: 2024-02-03
Test Mode: 902.3 TX	
Note:	

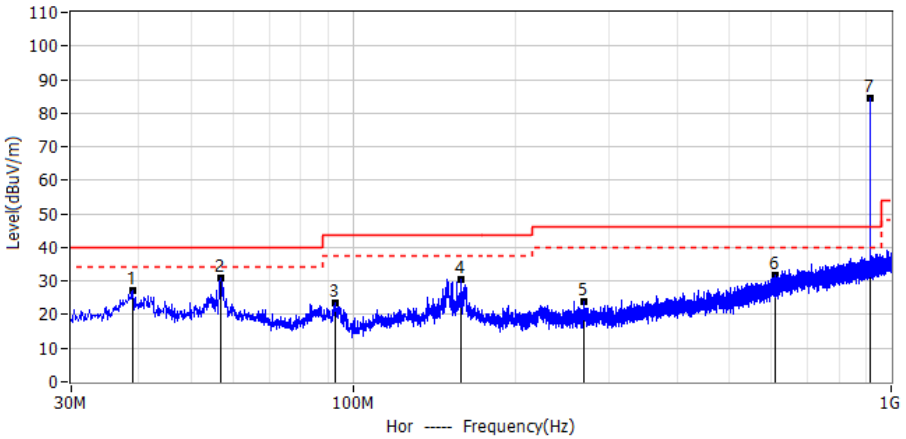


No.	Frequency MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	37.518	6.34	18.96	25.30	40.00	-14.70	QP	Hor
2*	56.796	9.21	18.87	28.08	40.00	-11.92	QP	Hor
3*	88.321	9.10	15.08	24.18	43.50	-19.32	QP	Hor
4*	170.893	9.66	19.70	29.36	43.50	-14.14	QP	Hor
5*	608.484	2.82	28.02	30.84	46.00	-15.16	QP	Hor
6*	694.086	4.74	29.79	34.53	46.00	-11.47	QP	Hor
!7*	902.394	52.39	33.25	85.64	--	--	QP	Hor

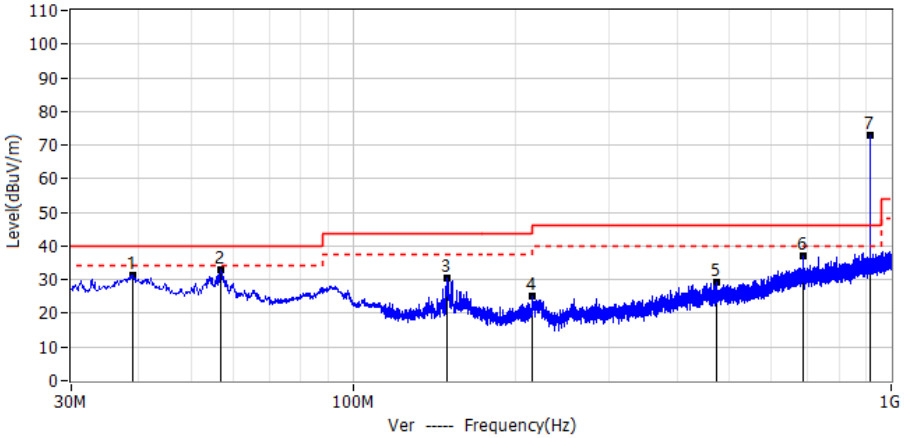


No.	Frequency MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	38.973	12.98	19.21	32.19	40.00	-7.81	QP	Ver
2*	56.918	14.78	18.86	33.64	40.00	-6.36	QP	Ver
3*	86.260	17.20	15.11	32.31	40.00	-7.69	QP	Ver
4*	158.889	8.42	19.86	28.28	43.50	-15.22	QP	Ver
5*	459.710	4.37	24.06	28.43	46.00	-17.57	QP	Ver
6*	687.539	5.99	29.69	35.68	46.00	-10.32	QP	Ver
!7*	902.273	52.15	33.25	85.40	--	--	QP	Ver

Project: LGT24A096	Test Engineer: Xiangdong Ma
EUT: LoRaWAN wireless communication model	Temperature: 25.4℃
M/N: WSL05-A0	Humidity: 60%RH
Test Voltage: DC 3.3V	Test Data: 2024-02-03
Test Mode: 915.1 TX	
Note:	

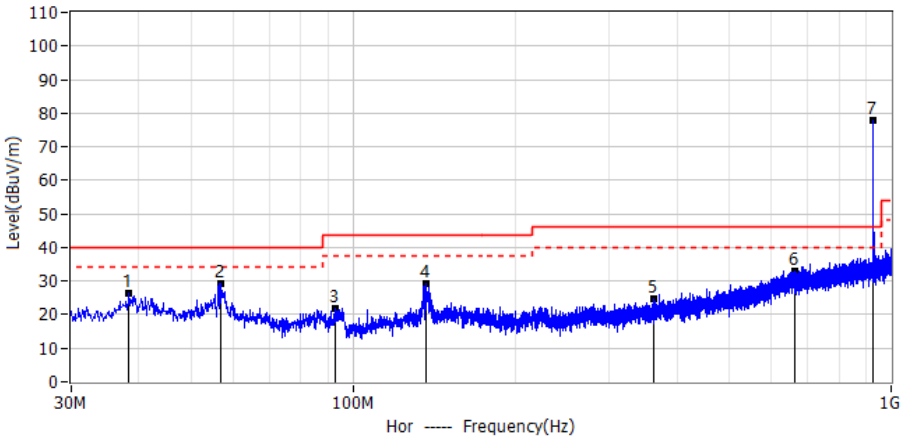


No.	Frequency MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	38.973	8.04	19.21	27.25	40.00	-12.75	QP	Hor
2*	56.918	12.03	18.86	30.89	40.00	-9.11	QP	Hor
3*	92.565	8.33	15.20	23.53	43.50	-19.97	QP	Hor
4*	159.010	10.80	19.85	30.65	43.50	-12.85	QP	Hor
5*	268.499	4.94	19.11	24.05	46.00	-21.95	QP	Hor
6*	607.756	3.86	27.99	31.85	46.00	-14.15	QP	Hor
!7*	915.125	51.33	33.32	84.65	--	--	QP	Hor

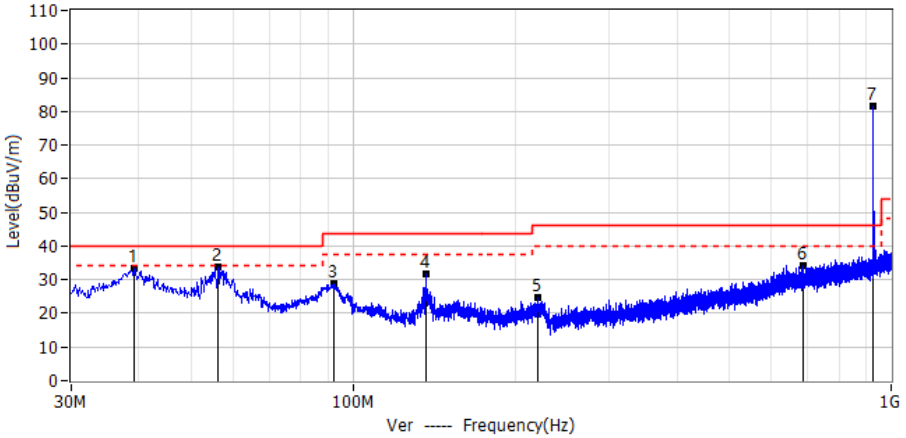


No.	Frequency MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	38.973	12.25	19.21	31.46	40.00	-8.54	QP	Ver
2*	56.918	14.30	18.86	33.16	40.00	-6.84	QP	Ver
3*	149.674	10.65	19.96	30.61	43.50	-12.89	QP	Ver
4*	215.876	8.12	16.94	25.06	43.50	-18.44	QP	Ver
5*	473.654	4.99	24.44	29.43	46.00	-16.57	QP	Ver
6*	687.539	7.32	29.69	37.01	46.00	-8.99	QP	Ver
!7*	915.125	39.45	33.32	72.77	--	--	QP	Ver

Project: LGT24A096	Test Engineer: Xiangdong Ma
EUT: LoRaWAN wireless communication model	Temperature: 25.4℃
M/N: WSL05-A0	Humidity: 60%RH
Test Voltage: DC 3.3V	Test Data: 2024-02-03
Test Mode: 927.7 TX	
Note:	



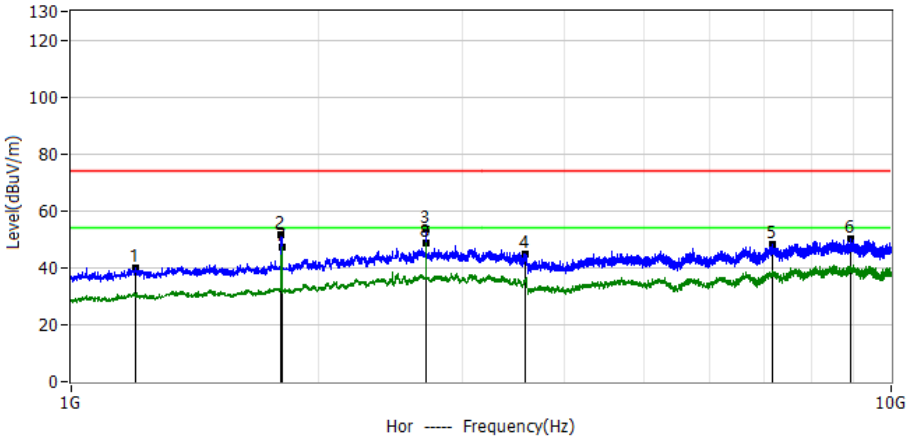
No.	Frequency MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	38.366	7.11	19.11	26.22	40.00	-13.78	QP	Hor
2*	56.918	10.47	18.86	29.33	40.00	-10.67	QP	Hor
3*	93.050	6.81	15.23	22.04	43.50	-21.46	QP	Hor
4*	136.458	10.44	18.85	29.29	43.50	-14.21	QP	Hor
5*	362.710	3.22	21.64	24.86	46.00	-21.14	QP	Hor
6*	663.653	3.56	29.39	32.95	46.00	-13.05	QP	Hor
!7*	927.735	44.35	33.44	77.79	--	--	QP	Hor



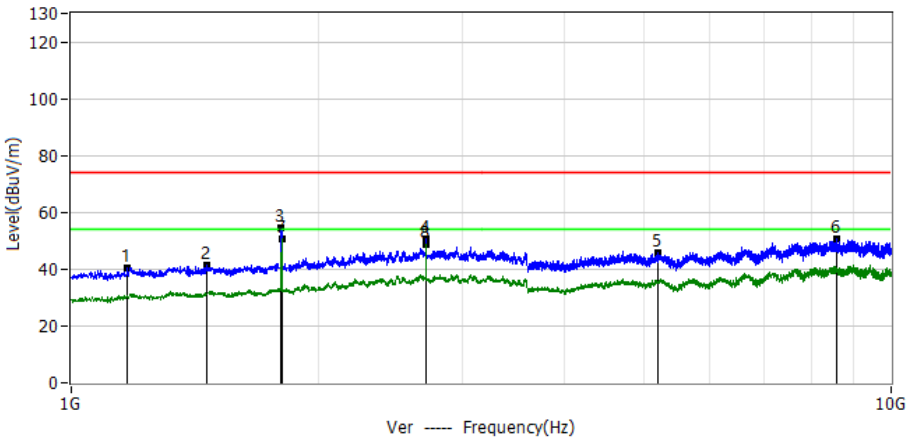
No.	Frequency MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	39.336	13.93	19.27	33.20	40.00	-6.80	QP	Ver
2*	56.311	14.91	18.91	33.82	40.00	-6.18	QP	Ver
3*	92.080	13.52	15.18	28.70	43.50	-14.80	QP	Ver
4*	136.821	12.96	18.87	31.83	43.50	-11.67	QP	Ver
5*	220.363	7.87	16.89	24.76	46.00	-21.24	QP	Ver
6*	687.660	4.69	29.69	34.38	46.00	-11.62	QP	Ver
!7*	927.856	48.18	33.44	81.62	--	--	QP	Ver

Results of Radiated Emissions (Above 1000MHz)

Project: LGT24A096	Test Engineer: Xiangdong Ma
EUT: LoRaWAN wireless communication model	Temperature: 25.4℃
M/N: WSL05-A0	Humidity: 60%RH
Test Voltage: DC 3.3V	Test Data: 2024-02-03
Test Mode: 902.3 TX	
Note:	

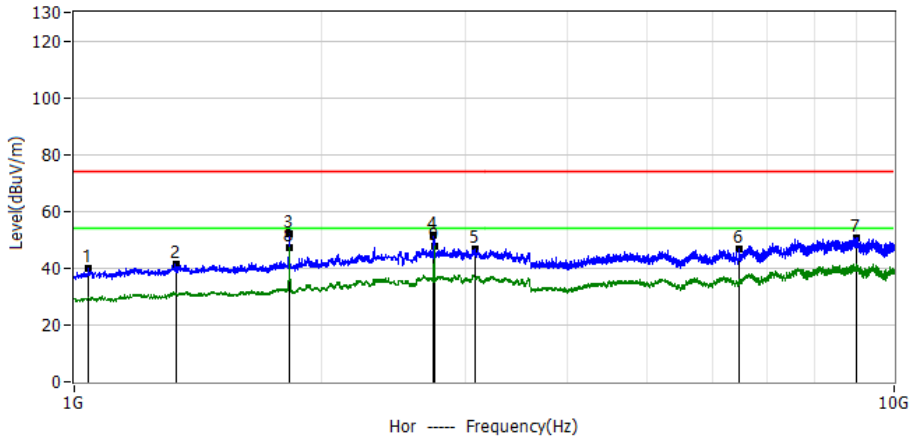


No.	Frequency	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	1.199GHz	63.03	-23.02	40.01	74.00	-33.99	PK	Hor
2*	1.804GHz	69.98	-18.38	51.60	74.00	-22.40	PK	Hor
3*	2.707GHz	63.63	-10.26	53.37	74.00	-20.63	PK	Hor
4*	3.582GHz	53.87	-8.95	44.92	74.00	-29.08	PK	Hor
5*	7.165GHz	54.73	-6.55	48.18	74.00	-25.82	PK	Hor
6*	8.926GHz	53.86	-3.81	50.05	74.00	-23.95	PK	Hor
7*	1.806GHz	65.76	-18.37	47.39	54.00	-6.61	AV	Hor
8*	2.708GHz	58.97	-10.25	48.72	54.00	-5.28	AV	Hor

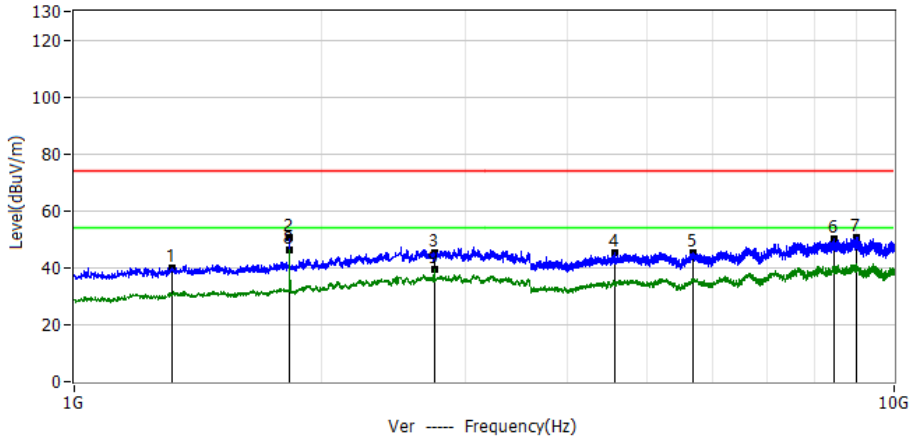


No.	Frequency	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	1.171GHz	63.70	-23.26	40.44	74.00	-33.56	PK	Ver
2*	1.464GHz	62.71	-21.14	41.57	74.00	-32.43	PK	Ver
3*	1.804GHz	72.80	-18.38	54.42	74.00	-19.58	PK	Ver
4*	2.707GHz	60.98	-10.26	50.72	74.00	-23.28	PK	Ver
5*	5.203GHz	53.59	-7.69	45.90	74.00	-28.10	PK	Ver
6*	8.584GHz	54.89	-4.43	50.46	74.00	-23.54	PK	Ver
7*	1.806GHz	69.09	-18.37	50.72	54.00	-3.28	AV	Ver
8*	2.708GHz	58.96	-10.25	48.71	54.00	-5.29	AV	Ver

Project: LGT24A096	Test Engineer: Xiangdong Ma
EUT: LoRaWAN wireless communication model	Temperature: 25.4℃
M/N: WSL05-A0	Humidity: 60%RH
Test Voltage: DC 3.3V	Test Data: 2024-02-03
Test Mode: 915.1 TX	
Note:	

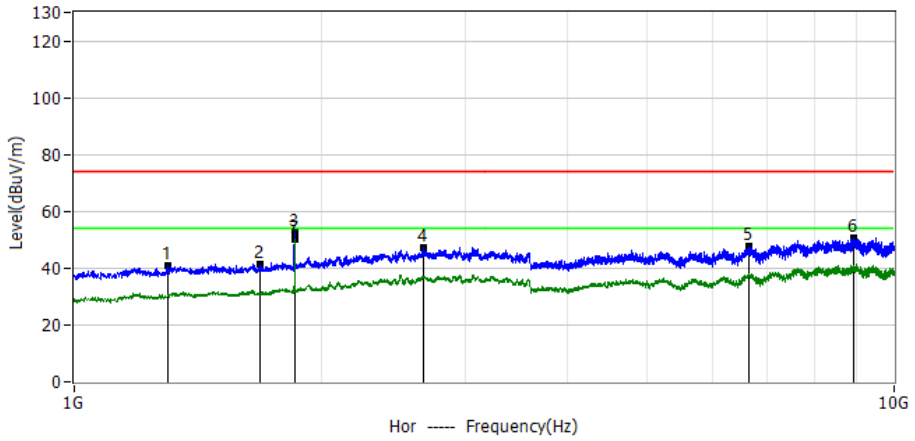


No.	Frequency	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	1.042GHz	64.16	-24.39	39.77	74.00	-34.23	PK	Hor
2*	1.329GHz	63.50	-22.02	41.48	74.00	-32.52	PK	Hor
3*	1.830GHz	70.02	-18.13	51.89	74.00	-22.11	PK	Hor
4*	2.745GHz	61.77	-10.06	51.71	74.00	-22.29	PK	Hor
5*	3.077GHz	55.72	-8.81	46.91	74.00	-27.09	PK	Hor
6*	6.474GHz	54.44	-7.79	46.65	74.00	-27.35	PK	Hor
7*	8.989GHz	54.36	-3.69	50.67	74.00	-23.33	PK	Hor
8*	1.831GHz	65.42	-18.11	47.31	54.00	-6.69	AV	Hor
9*	2.746GHz	57.92	-10.06	47.86	54.00	-6.14	AV	Hor

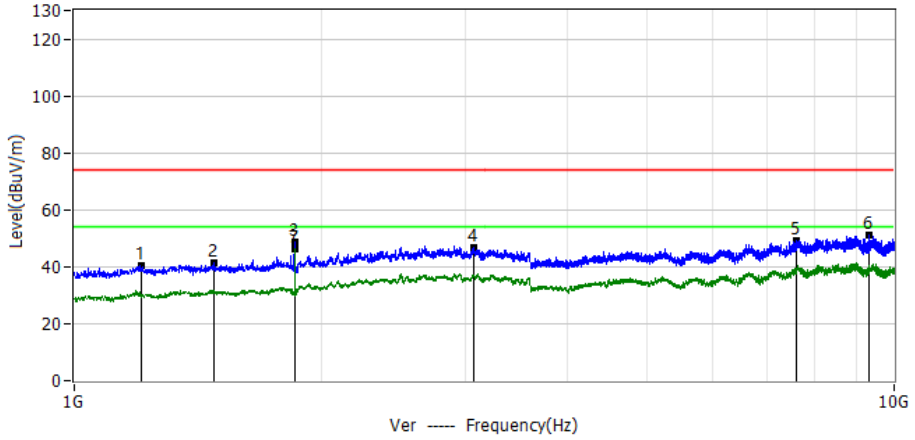


No.	Frequency	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	1.318GHz	62.25	-22.10	40.15	74.00	-33.85	PK	Ver
2*	1.830GHz	68.74	-18.13	50.61	74.00	-23.39	PK	Ver
3*	2.746GHz	55.46	-10.06	45.40	74.00	-28.60	PK	Ver
4*	4.572GHz	51.67	-6.58	45.09	74.00	-28.91	PK	Ver
5*	5.688GHz	54.16	-8.67	45.49	74.00	-28.51	PK	Ver
6*	8.457GHz	54.59	-4.66	49.93	74.00	-24.07	PK	Ver
7*	8.989GHz	54.52	-3.69	50.83	74.00	-23.17	PK	Ver
8*	1.831GHz	64.32	-18.11	46.21	54.00	-7.79	AV	Ver
9*	2.746GHz	49.52	-10.06	39.46	54.00	-14.54	AV	Ver

Project: LGT24A096	Test Engineer: Xiangdong Ma
EUT: LoRaWAN wireless communication model	Temperature: 25.4℃
M/N: WSL05-A0	Humidity: 60%RH
Test Voltage: DC 3.3V	Test Data: 2024-02-03
Test Mode: 927.7 TX	
Note:	



No.	Frequency	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	1.300GHz	63.35	-22.24	41.11	74.00	-32.89	PK	Hor
2*	1.685GHz	60.75	-19.51	41.24	74.00	-32.76	PK	Hor
3*	1.855GHz	70.56	-17.88	52.68	74.00	-21.32	PK	Hor
4*	2.664GHz	57.88	-10.47	47.41	74.00	-26.59	PK	Hor
5*	6.651GHz	55.19	-7.51	47.68	74.00	-26.32	PK	Hor
6*	8.928GHz	54.50	-3.80	50.70	74.00	-23.30	PK	Hor
7*	1.856GHz	68.05	-17.87	50.18	54.00	-3.82	AV	Hor

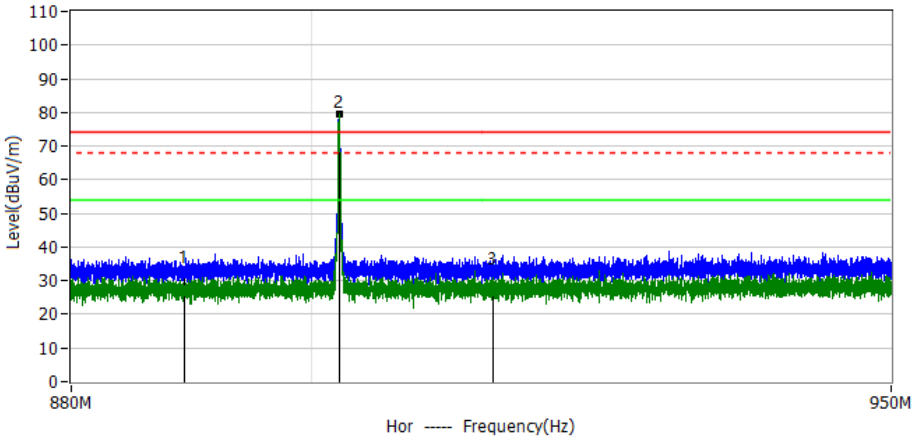


No.	Frequency	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	1.205GHz	63.33	-22.97	40.36	74.00	-33.64	PK	Ver
2*	1.482GHz	62.41	-21.04	41.37	74.00	-32.63	PK	Ver
3*	1.855GHz	66.47	-17.88	48.59	74.00	-25.41	PK	Ver
4*	3.068GHz	55.79	-8.81	46.98	74.00	-27.02	PK	Ver
5*	7.607GHz	54.87	-5.65	49.22	74.00	-24.78	PK	Ver
6*	9.325GHz	55.13	-3.84	51.29	74.00	-22.71	PK	Ver
7*	1.856GHz	64.26	-17.87	46.39	54.00	-7.61	AV	Ver

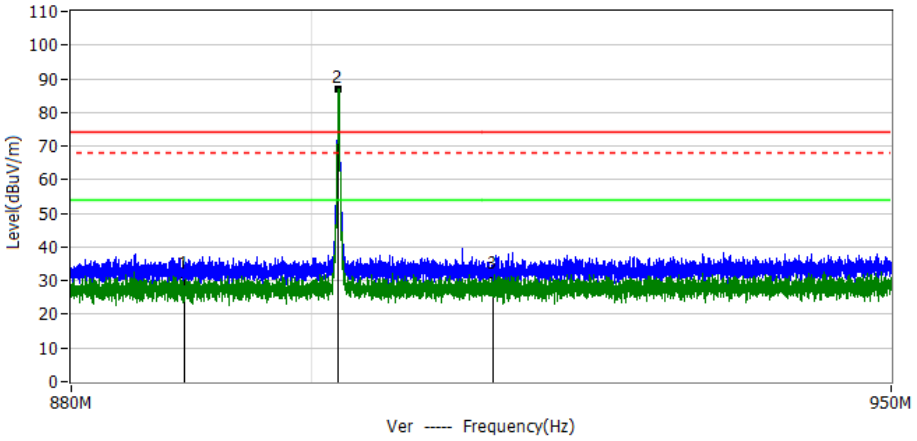
Remark:
In frequency ranges 10~25GHz no any other harmonic emissions detected which are tested to compliance with the limit. No recording in the test report. No any other emissions level which are attenuated less than 20dB below the limit. No recording in the test report.

3.2.8 TEST RESULTS (BAND EDGE REQUIREMENTS)

Project: LGT24A096	Test Engineer: Xiangdong Ma
EUT: LoRaWAN wireless communication model	Temperature: 25.4℃
M/N: WSL05-A0	Humidity: 60%RH
Test Voltage: DC 3.3V	Test Data: 2024-02-03
Test Mode: 902.3 TX	
Note:	

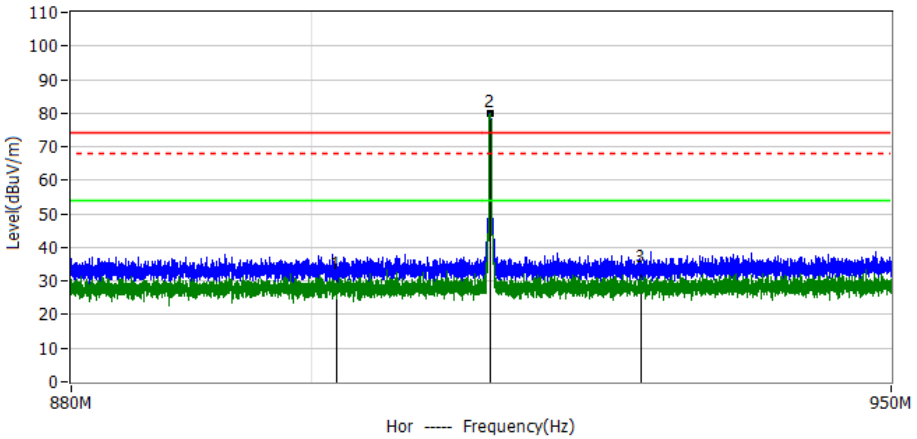


No.	Frequency MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	889.300	0.41	33.09	33.50	74.00	-40.50	PK	Hor
!2*	902.286	46.45	33.25	79.70	--	--	PK	Hor
3*	915.300	-0.22	33.32	33.10	74.00	-40.90	PK	Hor

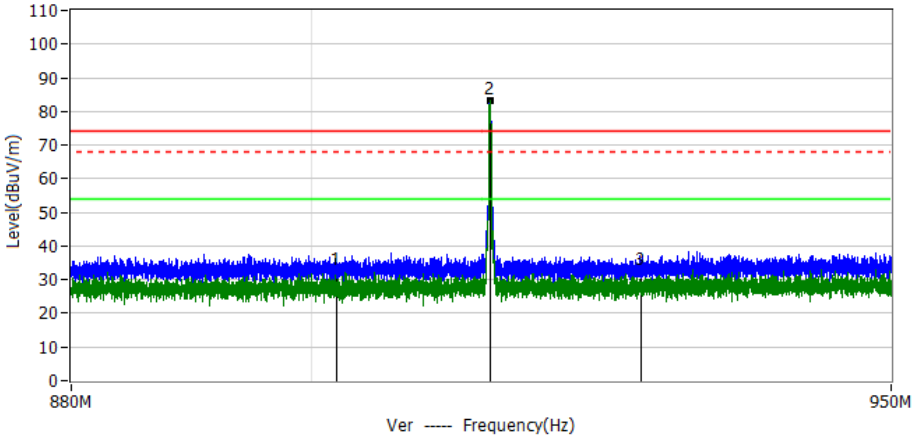


No.	Frequency MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	889.300	-1.39	33.09	31.70	74.00	-42.30	PK	Ver
!2*	902.234	53.57	33.25	86.82	--	--	PK	Ver
3*	915.300	-1.42	33.32	31.90	74.00	-42.10	PK	Ver

Project: LGT24A096	Test Engineer: Xiangdong Ma
EUT: LoRaWAN wireless communication model	Temperature: 25.4℃
M/N: WSL05-A0	Humidity: 60%RH
Test Voltage: DC 3.3V	Test Data: 2024-02-03
Test Mode: 915.1 TX	
Note:	

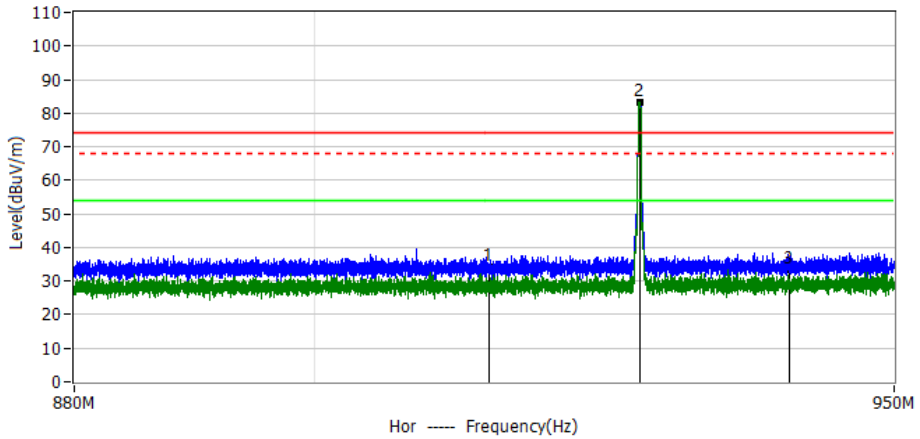


No.	Frequency MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	902.100	-1.45	33.25	31.80	74.00	-42.20	PK	Hor
!2*	915.096	46.48	33.32	79.80	--	--	PK	Hor
3*	928.100	0.25	33.45	33.70	74.00	-40.30	PK	Hor

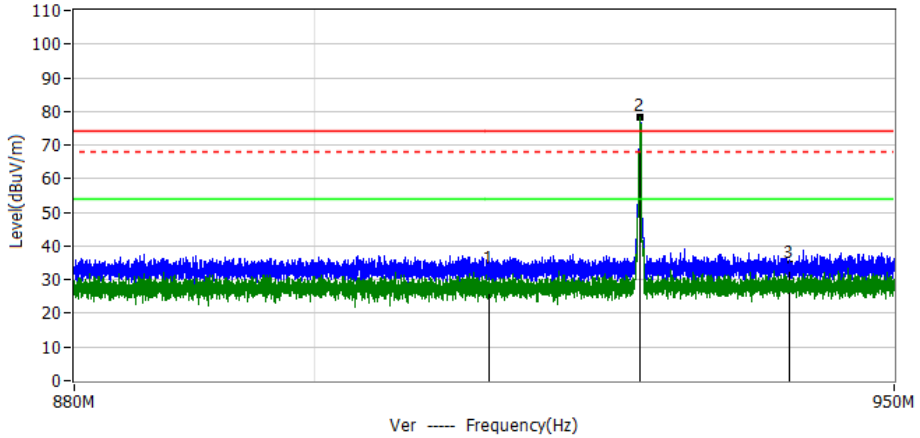


No.	Frequency MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	902.100	-0.65	33.25	32.60	74.00	-41.40	PK	Ver
!2*	915.079	50.06	33.32	83.38	--	--	PK	Ver
3*	928.100	-0.95	33.45	32.50	74.00	-41.50	PK	Ver

Project: LGT24A096	Test Engineer: Xiangdong Ma
EUT: LoRaWAN wireless communication model	Temperature: 25.4℃
M/N: WSL05-A0	Humidity: 60%RH
Test Voltage: DC 3.3V	Test Data: 2024-02-03
Test Mode: 927.7 TX	
Note:	



No.	Frequency MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	914.700	0.98	33.32	34.30	74.00	-39.70	PK	Hor
!2*	927.731	49.75	33.44	83.19	--	--	PK	Hor
3*	940.700	-0.24	33.74	33.50	74.00	-40.50	PK	Hor



No.	Frequency MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Polar
1*	914.700	-0.52	33.32	32.80	74.00	-41.20	PK	Ver
!2*	927.749	44.96	33.44	78.40	--	--	PK	Ver
3*	940.700	0.96	33.74	34.70	74.00	-39.30	PK	Ver

4. CONDUCTED SPURIOUS & BAND EDGE EMISSION

4.1 LIMIT

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

4.2 TEST PROCEDURE

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 886 – 917 MHz Upper Band Edge: 899 – 930 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

For Hopping Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 800 – 903 MHz Upper Band Edge: 914 – 1000 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

4.3 TEST SETUP

The EUT is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. Tune the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, the span is set to be greater than RBW.

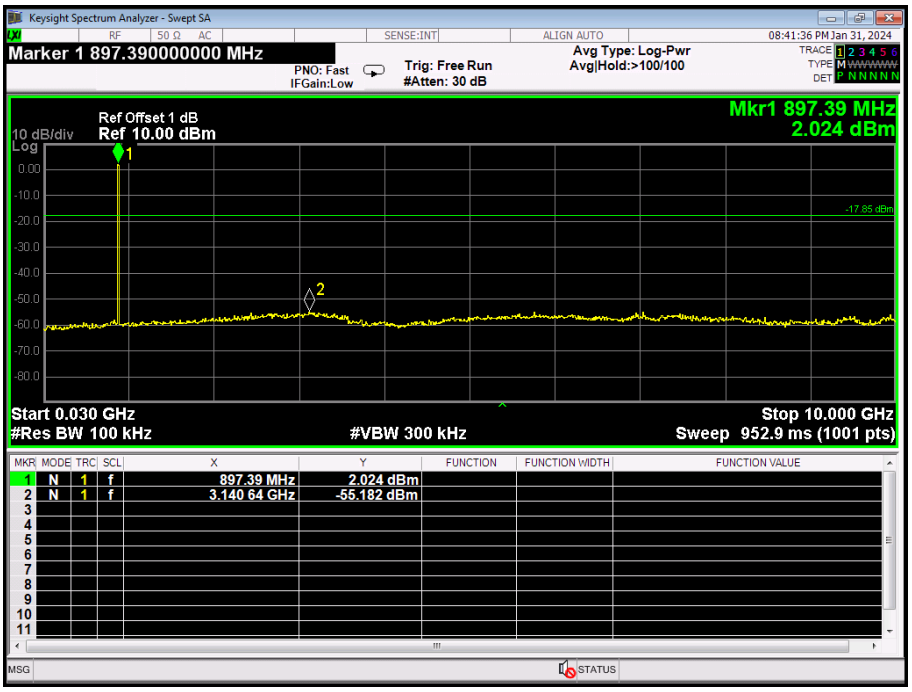
4.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

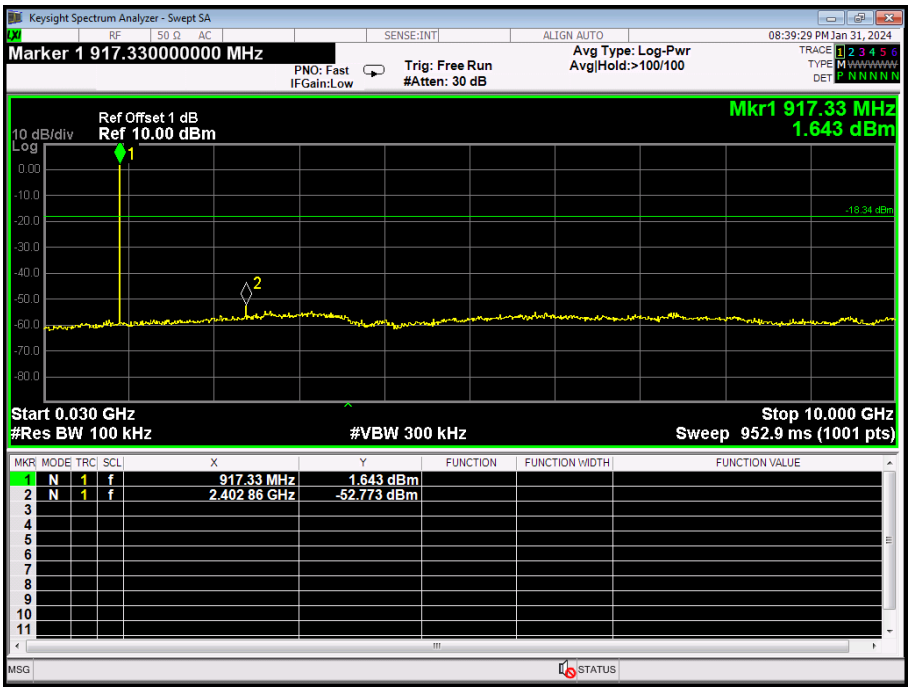
4.5 TEST RESULTS

For Conducted Spurious Emission

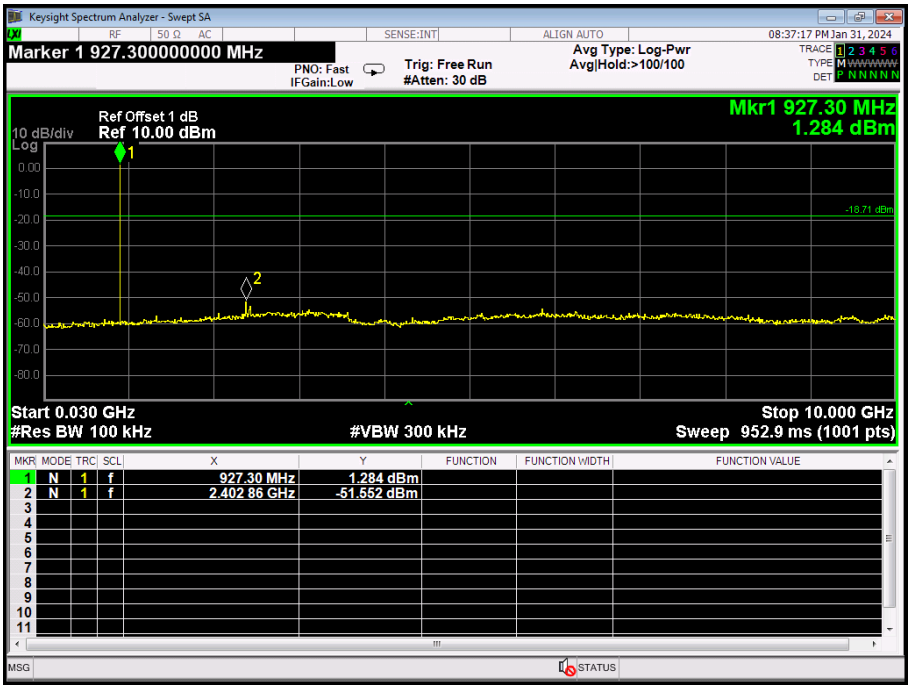
CH 00



CH 64

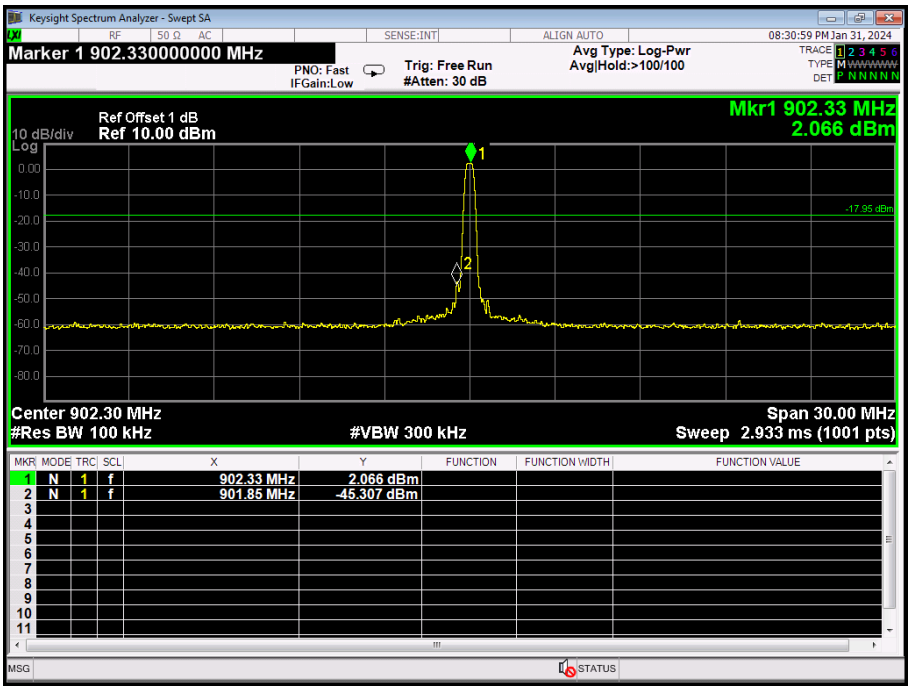


CH 127

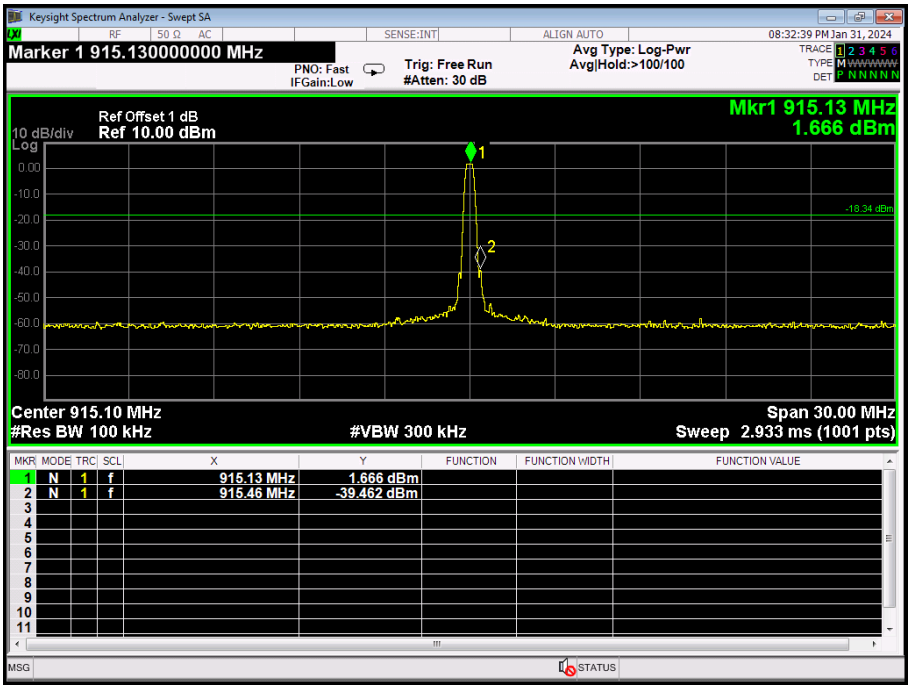

Keysight Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
08:37:17 PM Jan 31, 2024
Marker 1 927.300000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P N N N N N
Ref Offset 1 dB
10 dB/div
Log
Ref 10.00 dBm
Mkr1 927.30 MHz
1.284 dBm
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-18.71 dBm
Start 0.030 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 10.000 GHz
Sweep 952.9 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 927.30 MHz 1.284 dBm
2 N 1 f 2.402 86 GHz -51.552 dBm
MSG
STATUS

For Band edge

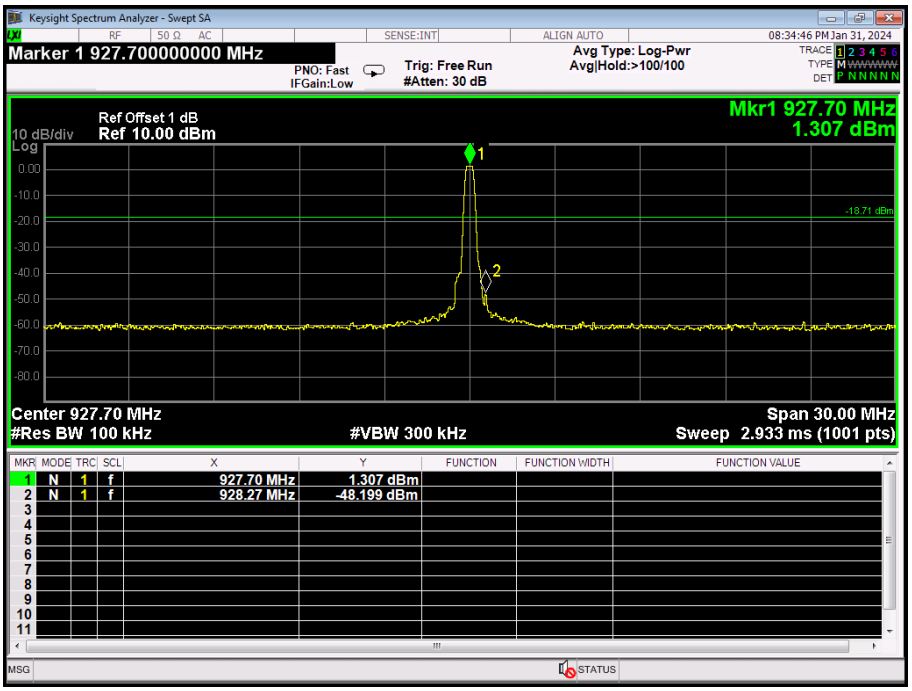
CH 00



CH 64

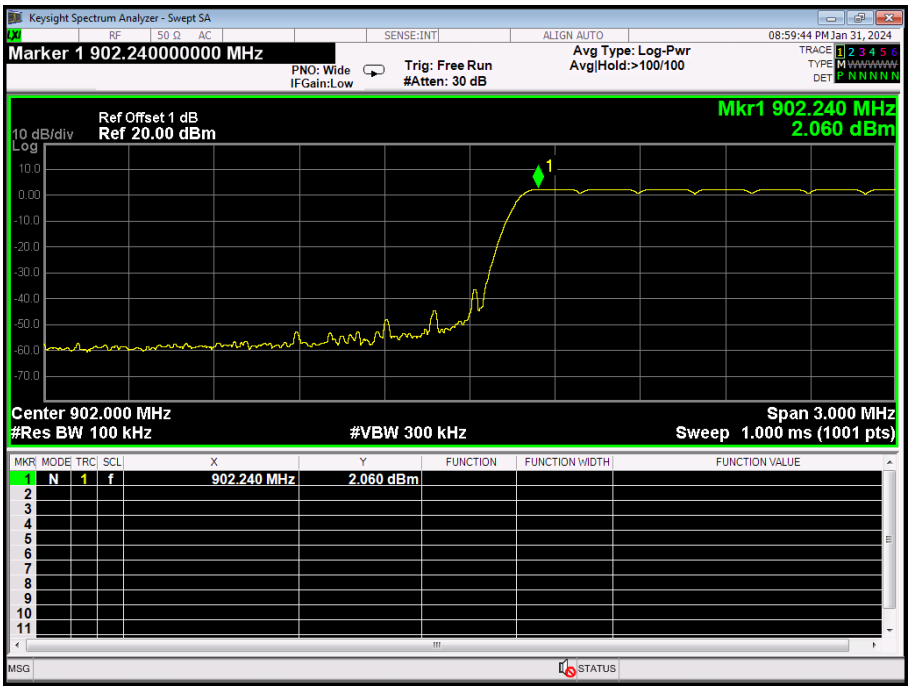


CH 127

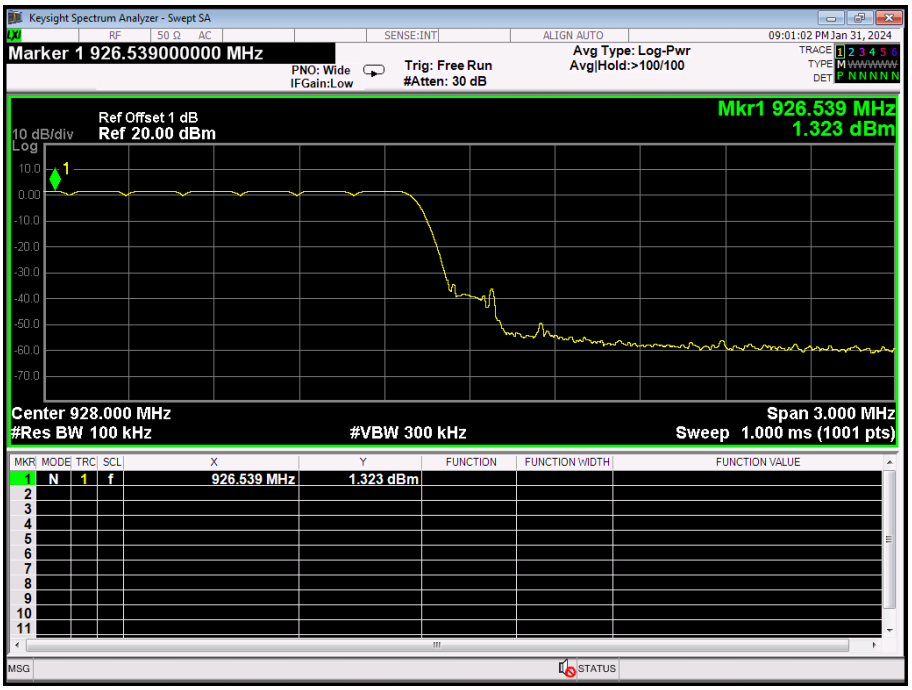

Keysight Spectrum Analyzer - Swept SA
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
08:34:46 PM Jan 31, 2024
Marker 1 927.700000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P N N N N N
Ref Offset 1 dB
10 dB/div
Ref 10.00 dBm
Log
Mkr1 927.70 MHz
1.307 dBm
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-18.71 dBm
Center 927.70 MHz
#Res BW 100 kHz
#VBW 300 kHz
Span 30.00 MHz
Sweep 2.933 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 927.70 MHz 1.307 dBm
2 N 1 f 928.27 MHz -48.199 dBm
3
4
5
6
7
8
9
10
11
MSG
STATUS

Refrence Level for Hopping Band edge

CH 00

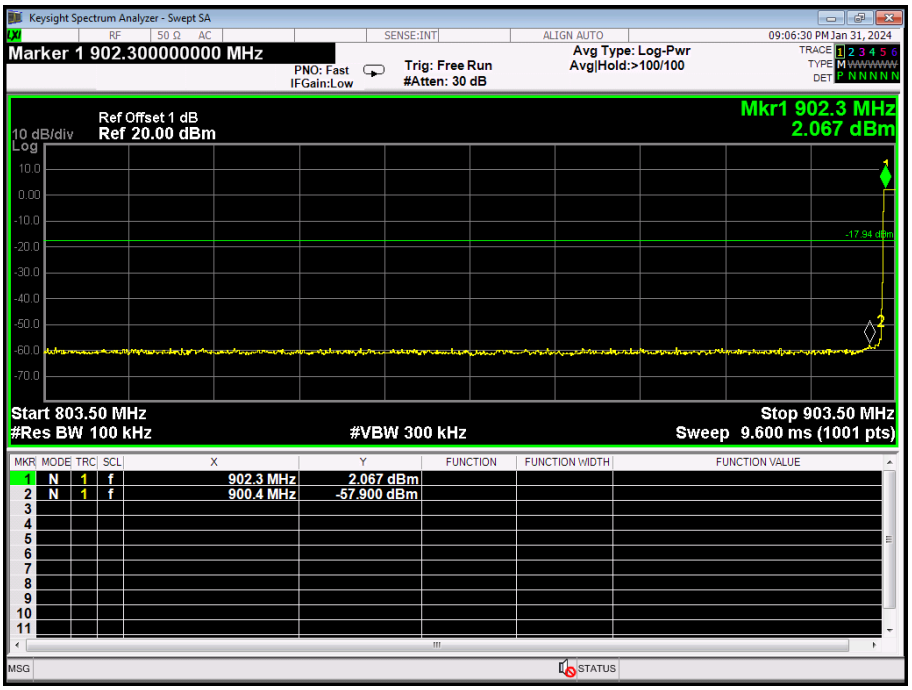


CH 127

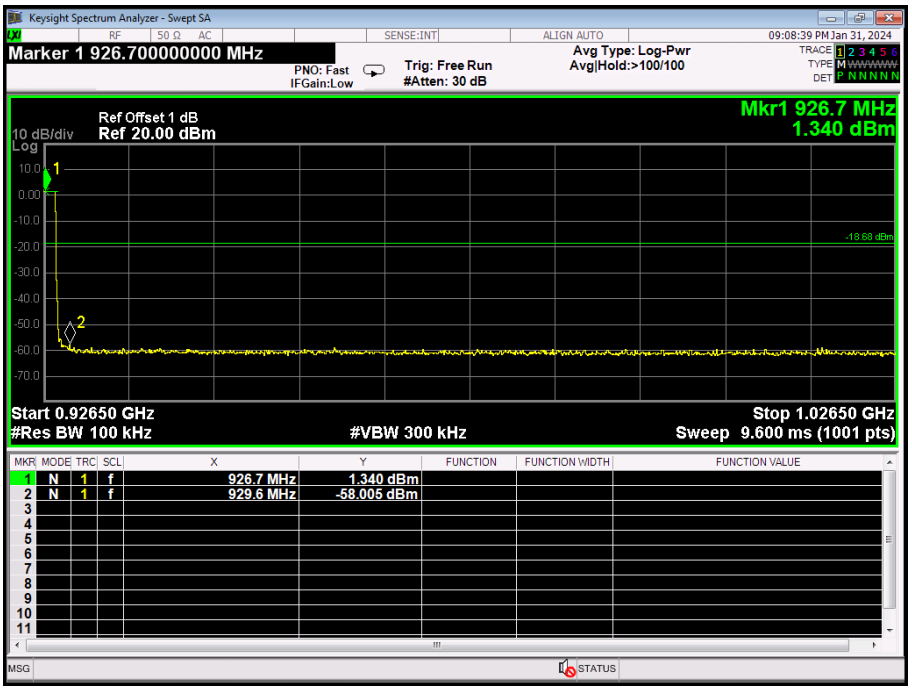


For Hopping Band edge

CH 00



CH 127



5. NUMBER OF HOPPING CHANNEL

5.1 LIMIT

FCC Part 15.247, Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)(i)	Number of Hopping Channel	≥50	902-928	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating FrequencyRange
RB	100KHz
VB	300KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Spectrum Setting: RBW= 100KHz, VBW=300KHz, Sweep time = Auto.

5.3 TEST SETUP

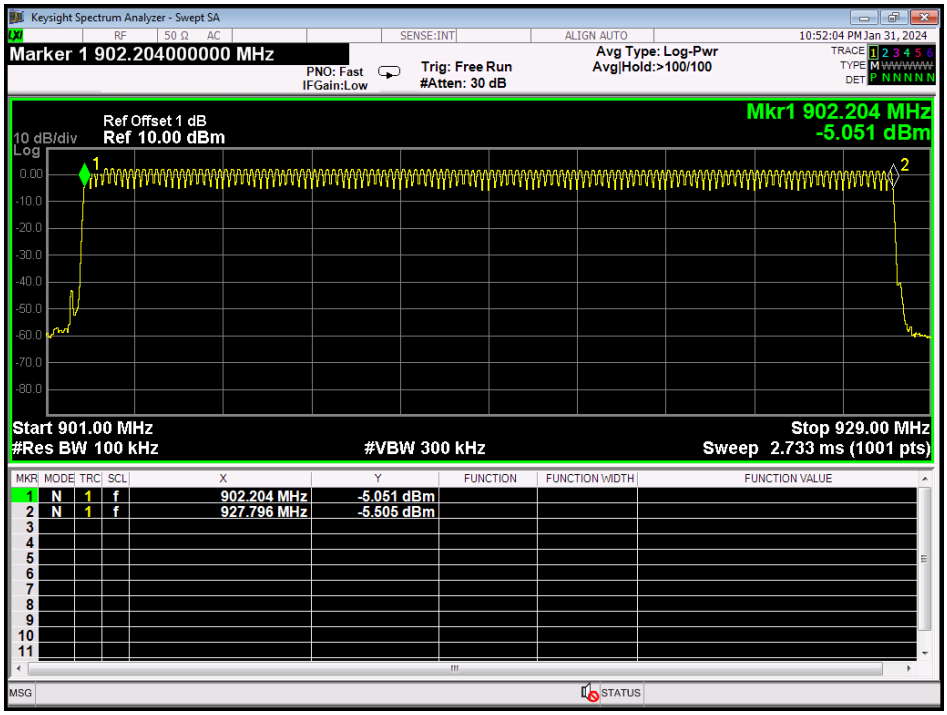
5.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

5.5 TEST RESULTS

Number of Hopping Channel 128

Hopping channel



6. AVERAGE TIME OF OCCUPANCY

6.1 LIMIT

FCC Part 15.247, Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)(i)	Average Time of Occupancy	0.4sec	902-928	PASS

6.2 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyzer.
b. Set RBW =100KHz/VBW =300KHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is 2 second.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.

6.3 TEST SETUP

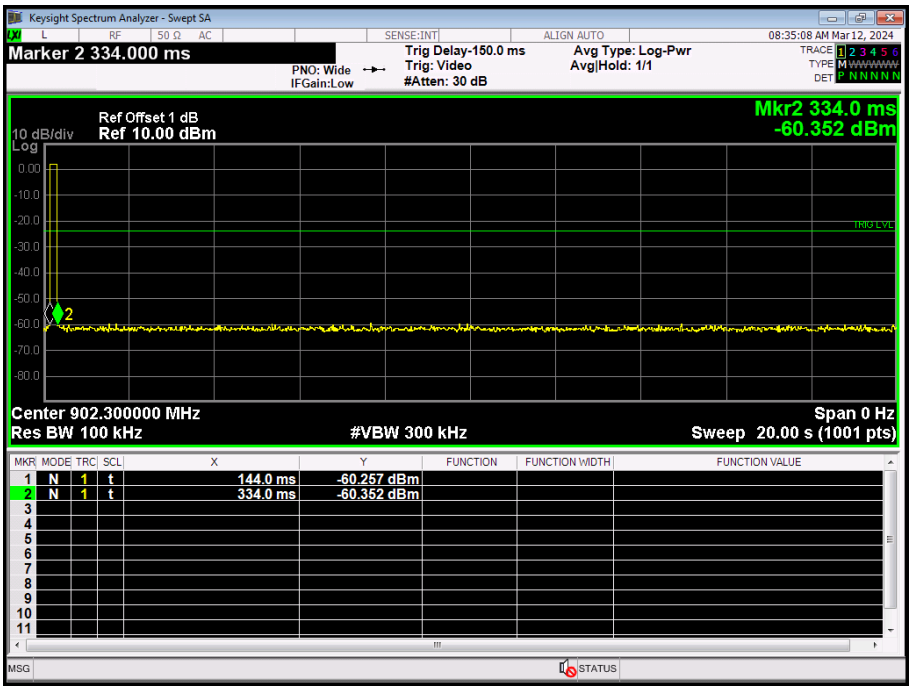
6.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

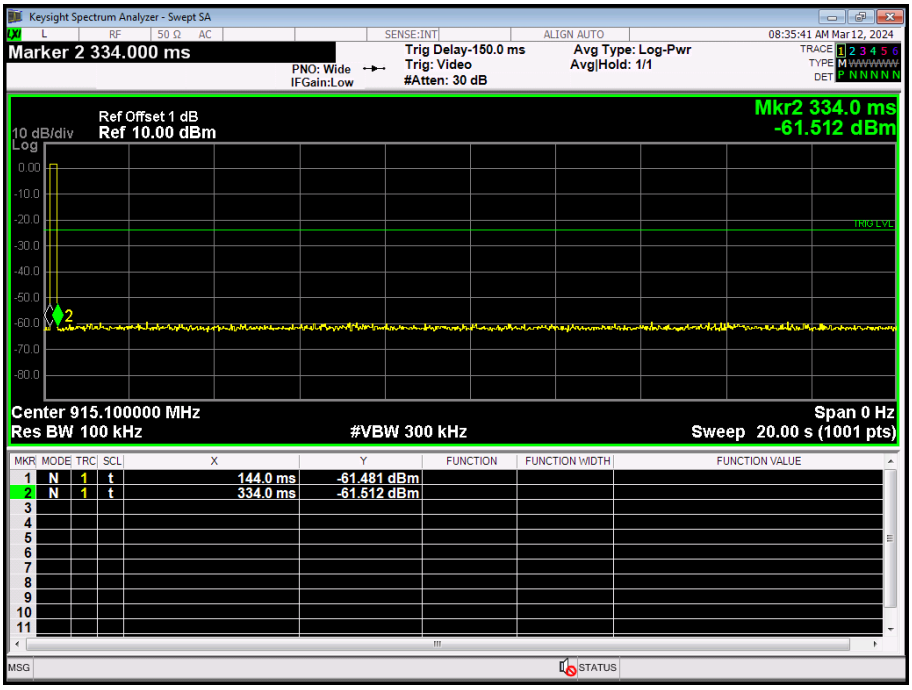
6.5 TEST RESULTS

Frequency (MHz)	T_{On} (s)	Limit (s)	Result
902.30	0.1900	0.4	PASS
915.10	0.1900	0.4	PASS
927.70	0.1900	0.4	PASS

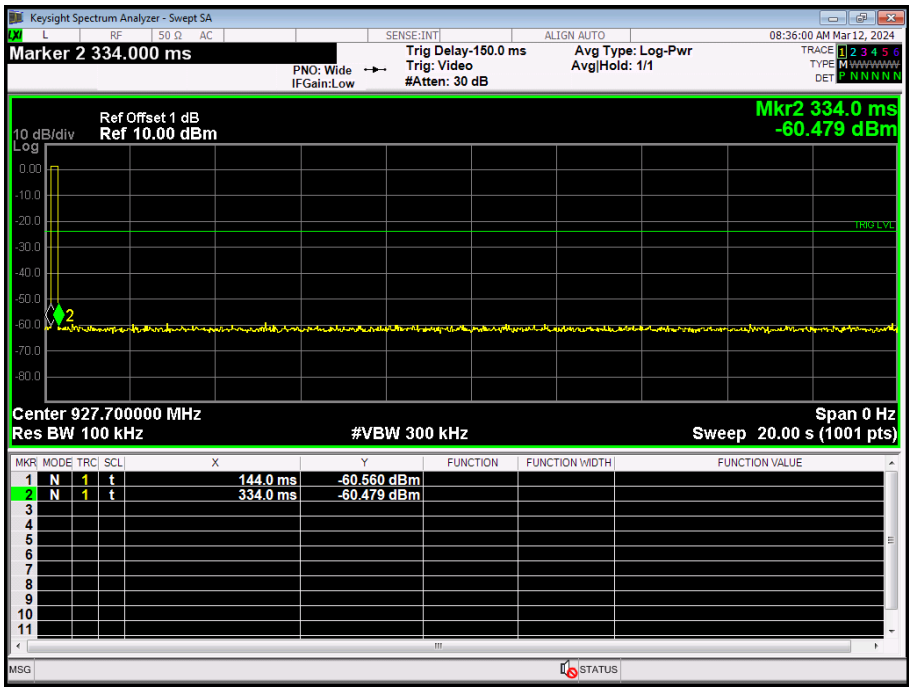
CH00



CH64



CH127


Keysight Spectrum Analyzer - Swept SA
Marker 2 334.000 ms
PNO: Wide
IFGain:Low
Trig Delay-150.0 ms
Trig: Video
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 1/1
08:36:00 AM Mar 12, 2024
Ref Offset 1 dB
10 dB/div
Log
Ref 10.00 dBm
Mkr2 334.0 ms
-60.479 dBm
Center 927.700000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 20.00 s (1001 pts)
1 N 1 t 144.0 ms -60.560 dBm
2 N 1 t 334.0 ms -60.479 dBm

7. HOPPING CHANNEL SEPARATION MEASUREMEN

7.1 LIMIT

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.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> 20 dB Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

7.2 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
c. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement.

7.3 TEST SETUP

7.4 EUT OPERATION CONDITIONS

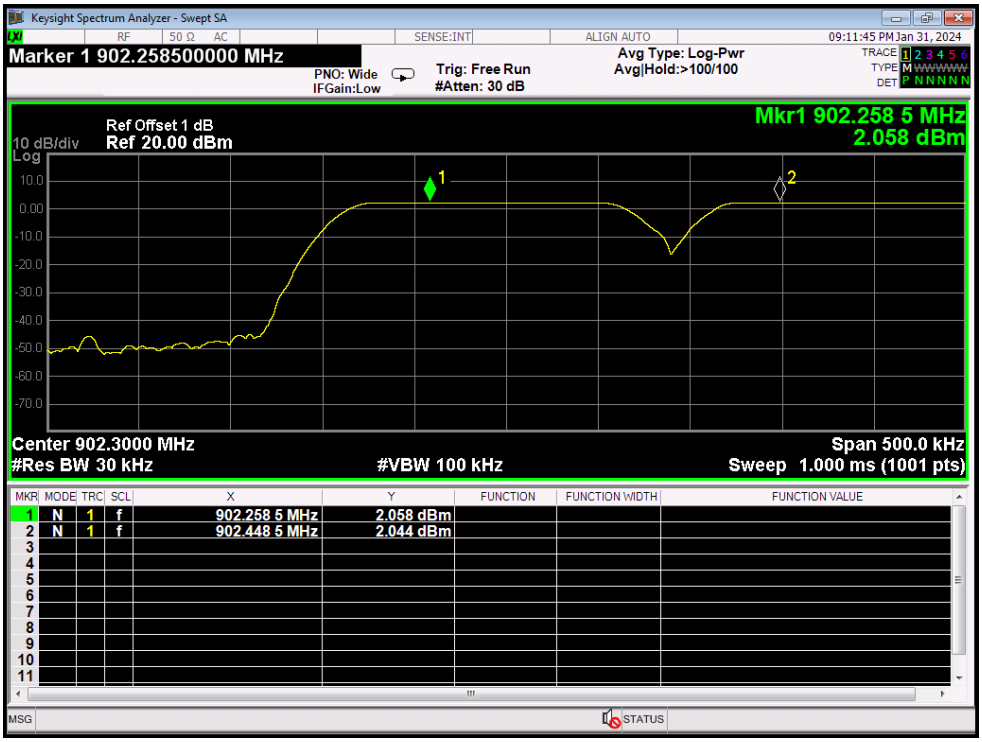
The EUT was programmed to be in continuously transmitting mode.

7.5 TEST RESULTS

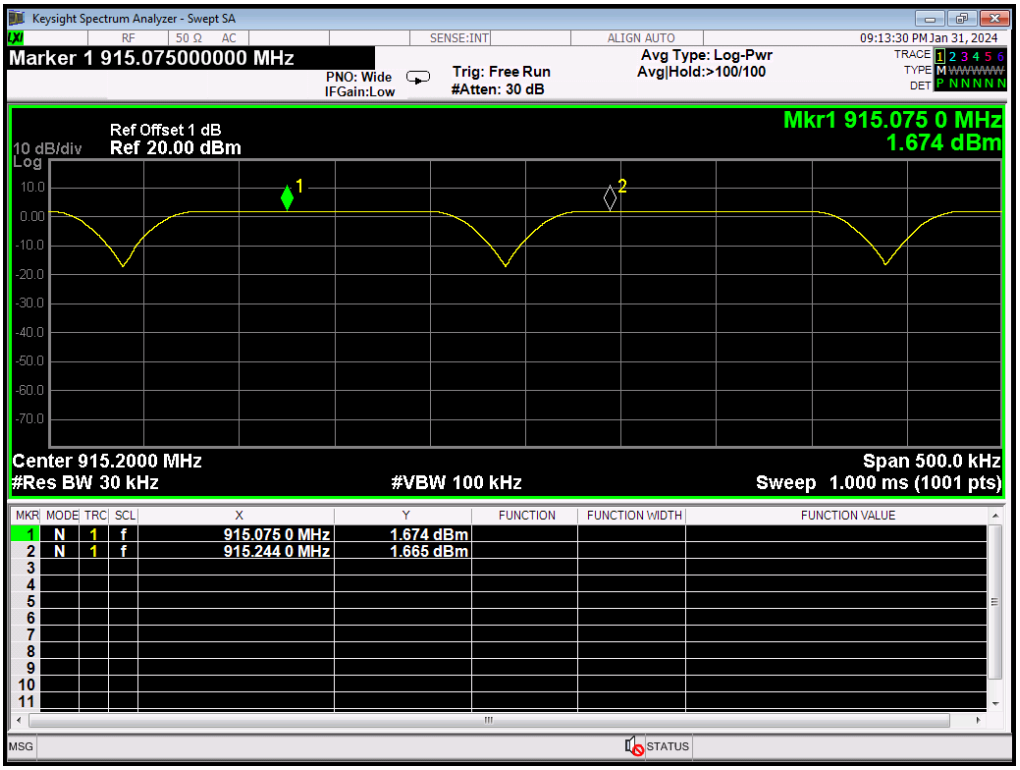
Frequency (MHz)	Mark1 Frequency （MHz）	Mark2 Frequency （MHz）	Channel Separation (MHz)	Limit (KHz)	Result
902.3	902.259	902.449	190.000	134.10	Pass
915.1	915.075	915.244	169.000	135.80	Pass
927.7	927.474	927.636	162.000	138.10	Pass

Ch. Separation Limits: > 20dB bandwidth

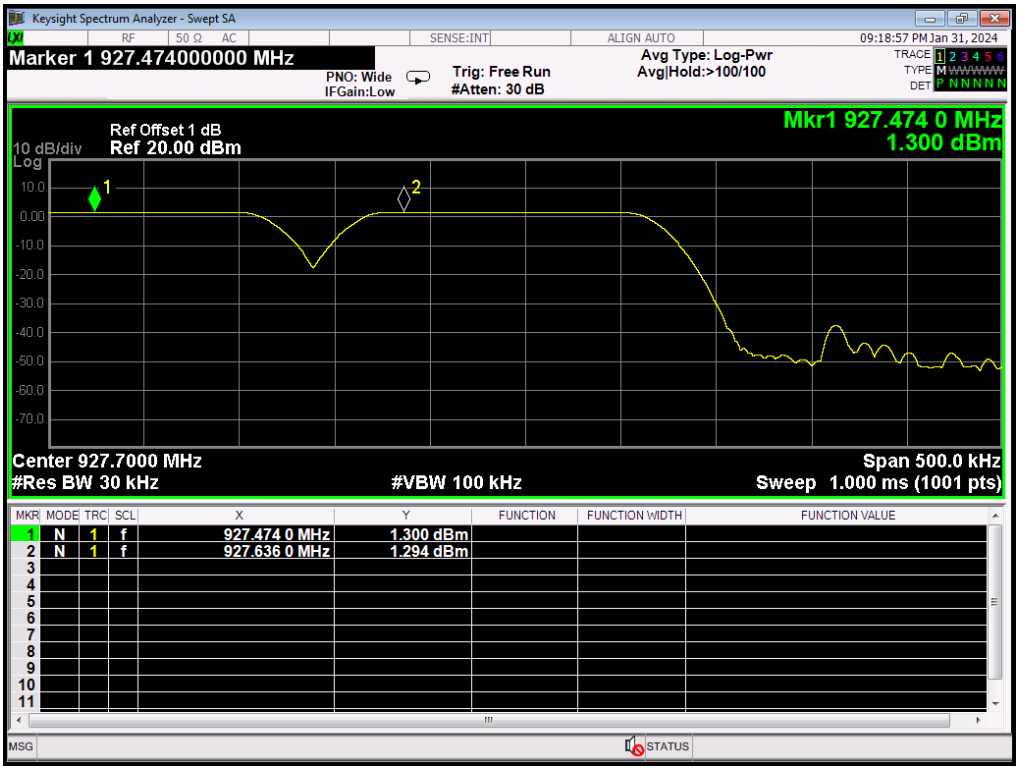
CH00



CH64


Keysight Spectrum Analyzer - Swept SA
Marker 1 915.075000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
09:13:30 PM Jan 31, 2024
Ref Offset 1 dB
10 dB/div
Ref 20.00 dBm
Mkr1 915.075 0 MHz
1.674 dBm
Center 915.2000 MHz
#Res BW 30 kHz
#VBW 100 kHz
Span 500.0 kHz
Sweep 1.000 ms (1001 pts)
1 N 1 f 915.075 0 MHz 1.674 dBm
2 N 1 f 915.244 0 MHz 1.665 dBm

CH127


Keysight Spectrum Analyzer - Swept SA
Marker 1 927.474000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
09:18:57 PM Jan 31, 2024
Ref Offset 1 dB
10 dB/div
Ref 20.00 dBm
Mkr1 927.474 0 MHz
1.300 dBm
Center 927.7000 MHz
#Res BW 30 kHz
#VBW 100 kHz
Span 500.0 kHz
Sweep 1.000 ms (1001 pts)
1 N 1 f 927.474 0 MHz 1.300 dBm
2 N 1 f 927.636 0 MHz 1.294 dBm

8. BANDWIDTH TEST

8.1 LIMIT

FCC Part15.247, Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)(i)	Bandwidth	500KHz	902-928	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 3 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 10 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

8.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Spectrum Setting: RBW= 3KHz, VBW=10KHz, Sweep time = Auto.

8.3 TEST SETUP

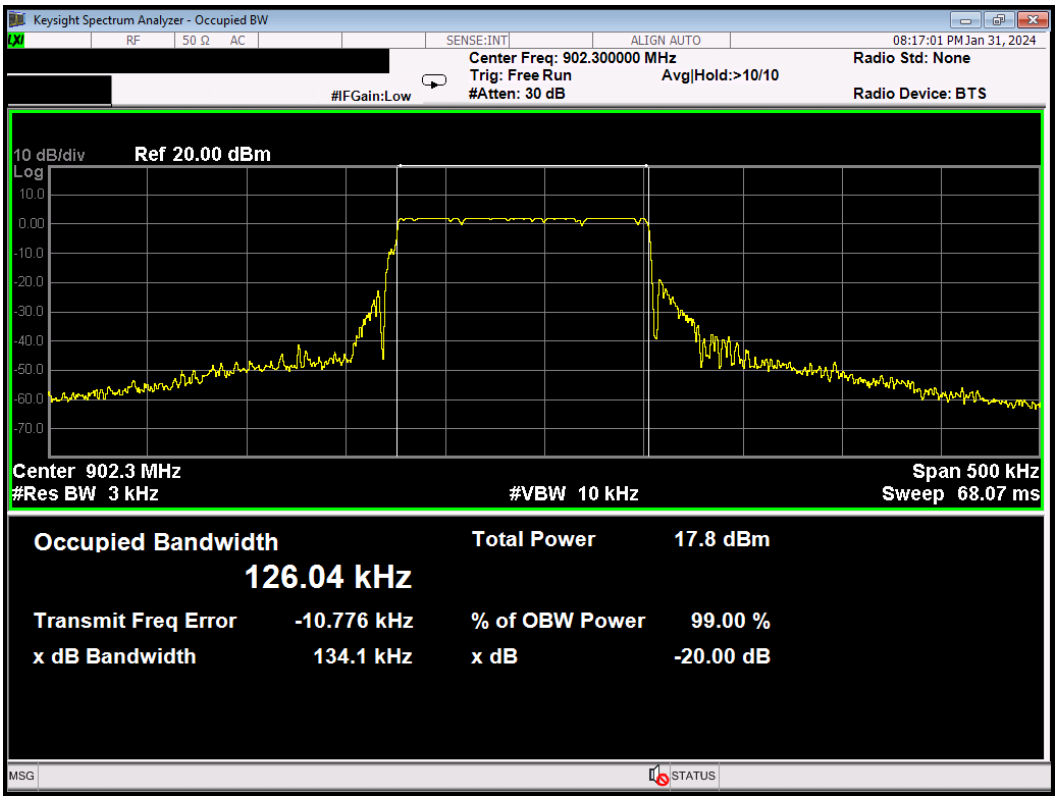
8.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

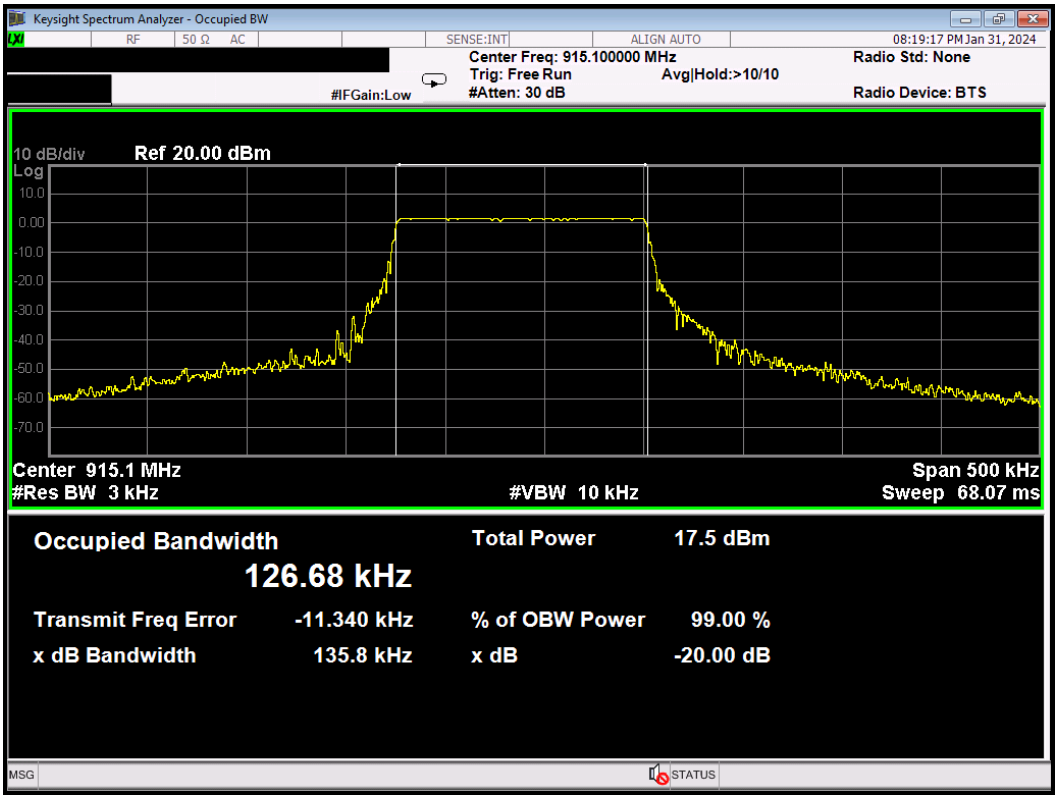
8.5 TEST RESULTS

Frequency (MHz)	-20 dB Bandwidth (KHz)	Limit (KHz)	Result
902.30	134.10	No limit	PASS
915.10	135.80	No limit	PASS
927.70	138.10	No limit	PASS

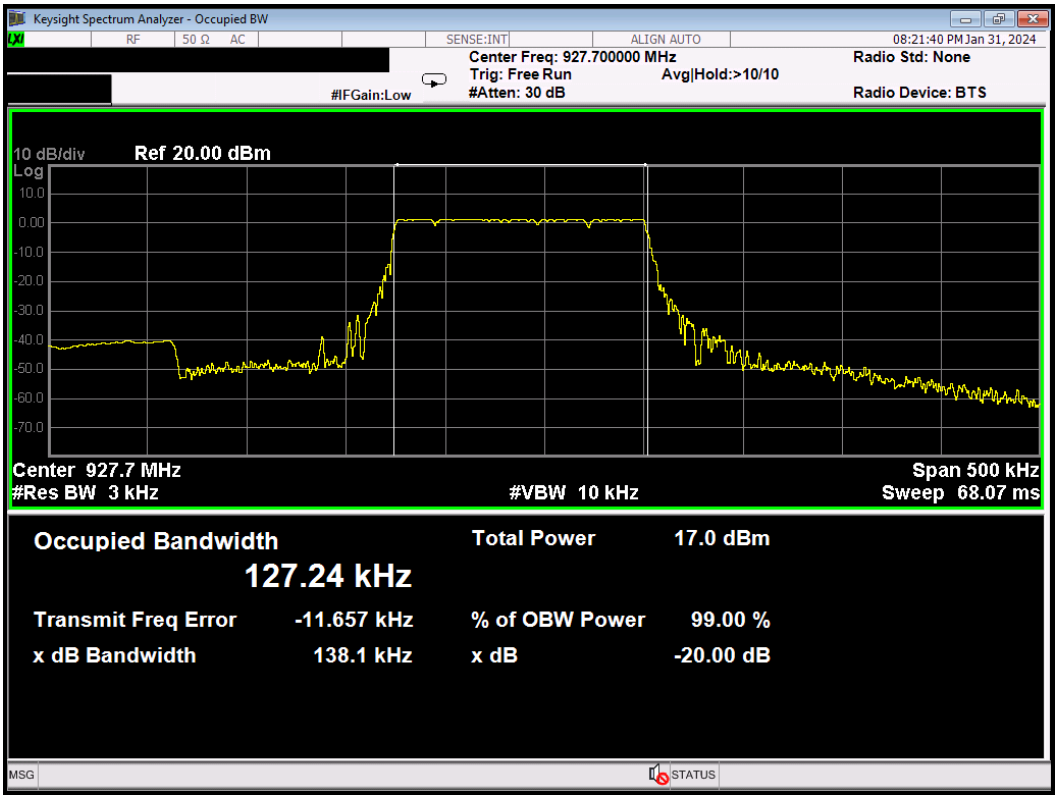
CH00



CH64


Keysight Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
08:19:17 PM Jan 31, 2024
Center Freq: 915.100000 MHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 915.1 MHz
#Res BW 3 kHz
#VBW 10 kHz
Span 500 kHz
Sweep 68.07 ms
Occupied Bandwidth
126.68 kHz
Total Power 17.5 dBm
Transmit Freq Error -11.340 kHz
% of OBW Power 99.00 %
x dB Bandwidth 135.8 kHz
x dB -20.00 dB
MSG
STATUS

CH127


Keysight Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
08:21:40 PM Jan 31, 2024
Center Freq: 927.700000 MHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 927.7 MHz
#Res BW 3 kHz
#VBW 10 kHz
Span 500 kHz
Sweep 68.07 ms
Occupied Bandwidth
127.24 kHz
Total Power 17.0 dBm
Transmit Freq Error -11.657 kHz
% of OBW Power 99.00 %
x dB Bandwidth 138.1 kHz
x dB -20.00 dB
MSG
STATUS

9. OUTPUT POWER TEST

9.1 LIMIT

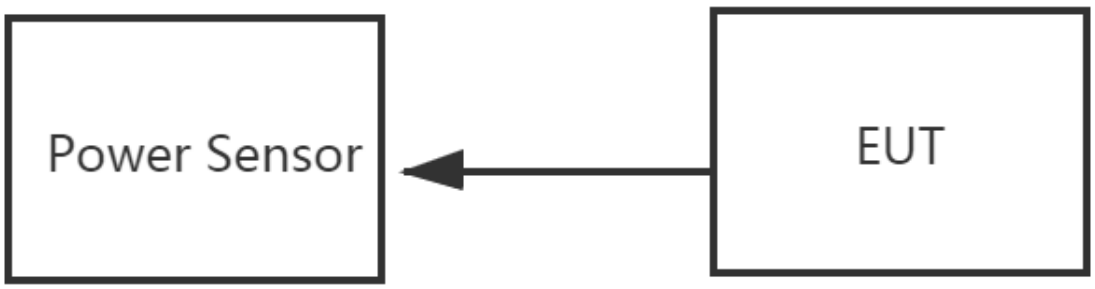
FCC Part 15.247, Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(2)	Output Power	1 W	902-928	PASS

9.2 TEST PROCEDURE

This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test:

a) Use the following spectrum analyzer settings:
1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
2) RBW > 20 dB bandwidth of the emission being measured.
3) VBW ≥ RBW.
4) Sweep: Auto.
5) Detector function: Peak.
6) Trace: Max hold.
b) Allow trace to stabilize.
c) Use the marker-to-peak function to set the marker to the peak of the emission.
d) The indicated level is the peak output power, after any corrections for external attenuators and cables.
e) A plot of the test results and setup description shall be included in the test report.
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.
PKPM1 Peak power meter method:
The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DSS bandwidth and shall use a fast-responding diode detector.

9.3 TEST SETUP



9.4 EUT OPERATION CONDITIONS

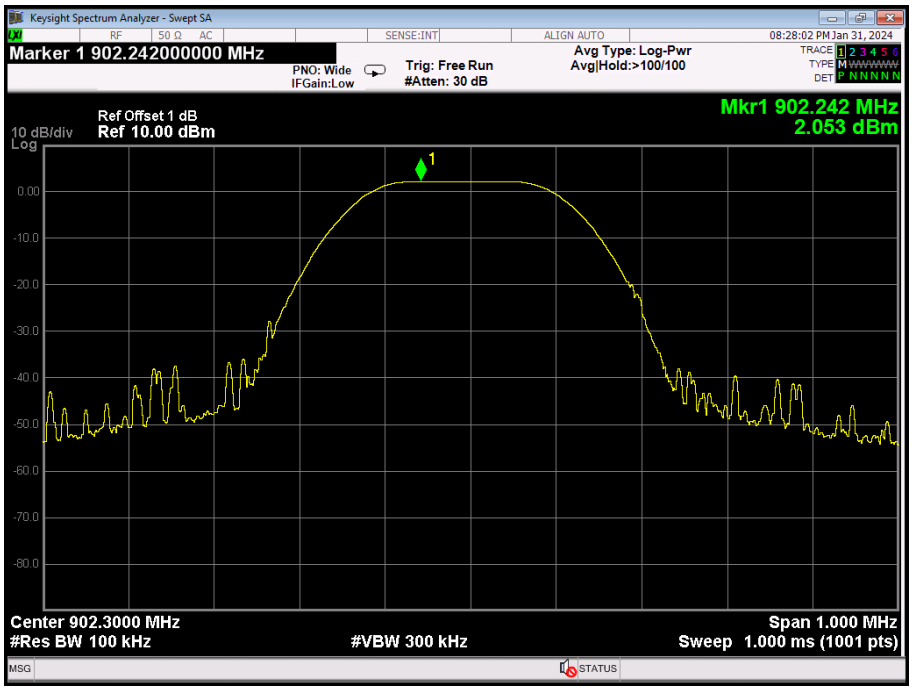
Please refer to section 3.1.4 of this report.

9.5 TEST RESULTS

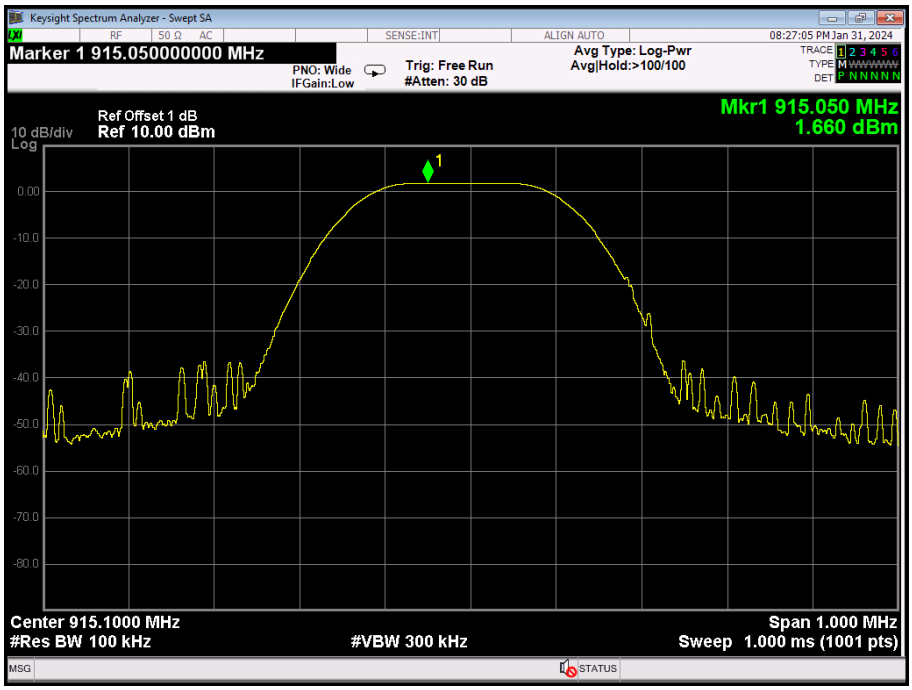
Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)	Limit (dBm)
902.3	2.05	-3.61	30.00
915.1	1.66	-3.71	30.00
927.7	1.29	-3.58	30.00

Refrence Level for Conducted Spurious Emission and Band edge

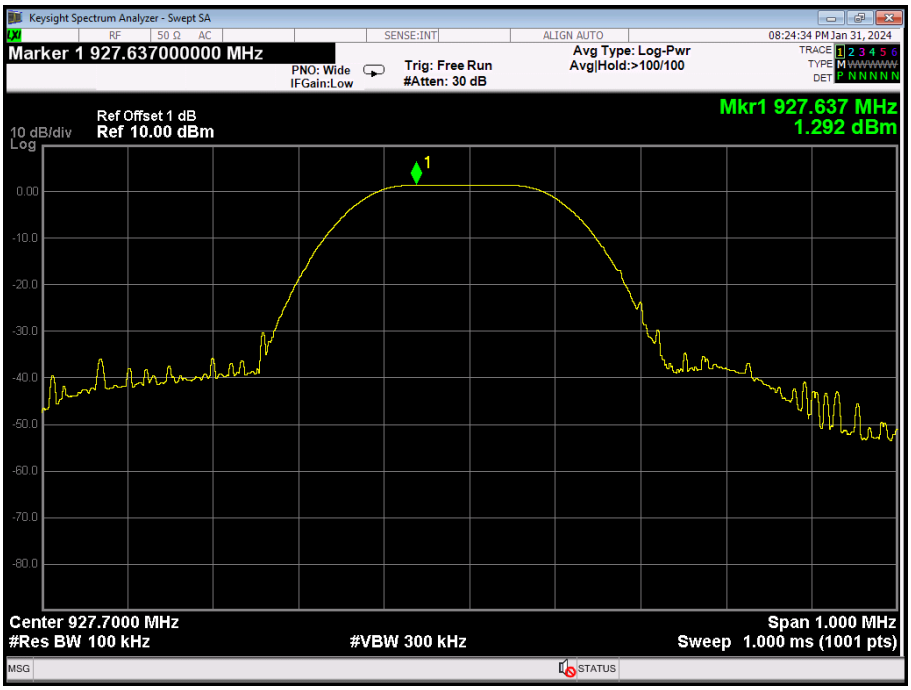
CH 00



CH 64



CH 127


Keysight Spectrum Analyzer - Swept SA
RF
50 Ω
AC
SENSE:INT
ALIGN AUTO
08:24:34 PM Jan 31, 2024
Marker 1 927.637000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P N N N N N
Ref Offset 1 dB
10 dB/div
Log
Ref 10.00 dBm
Mkr1 927.637 MHz
1.292 dBm
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
Center 927.7000 MHz
#Res BW 100 kHz
#VBW 300 kHz
Span 1.000 MHz
Sweep 1.000 ms (1001 pts)
MSG
STATUS

10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, 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.

10.2 EUT ANTENNA

The EUT antenna is Rod Antenna. It comply with the standard requirement.

※※※※※END OF THE REPORT※※※※※