FCC RF Test Report

APPLICANT	:	Amazon.com Services LLC
EQUIPMENT	:	Digital Media Receiver
MODEL NAME	:	CP38RE
FCC ID	:	2A4DH-3877
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DSS) Spread Spectrum Transmitter
TEST DATE(S)	:	Oct. 08, 2023 ~ Feb. 21, 2024

We, Sporton International Inc. (ShenZhen), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (ShenZhen), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED Cert #5145.01

Sporton International Inc. (ShenZhen)

1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055

People's Republic of China

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR353104-01G	Rev. 01	Initial issue of report	Dec. 22, 2023
FR353104-01G	Rev. 02	1. Update the test results of fundamental frequencies 915.2MHz on Page C2 & D6 2. Update the fundamental frequencies mark for 915.2MHz and 927.6MHz on Page C6	Feb. 21, 2024
FR353104-01G	Rev. 03	Remove the related test data for FSK 150kbps&FSK 250kbps	May 31, 2024

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(1)(i)	Number of Channels	15.247(a)(1)(i)	Pass	-
3.2	15.247(a)(1)	Hopping Channel Separation	20dB Bandwidth	Pass	-
3.3	15.247(a)(1)(i)	Dwell Time of Each Channel	15.247(a)(1)(i)	Pass	-
3.4	15.247(a)(1)(i)	20dB Bandwidth	≤ 500 kHz	Pass	-
3.4	-	99% Bandwidth	-	Report Only	-
3.5	15.247(b)(2)	Peak Output Power	15.247(b)(2)	Pass	-
3.6	15.247(d)	Conducted Band Edges	≤ 20dBc	Pass	-
3.7	15.247(d)	Conducted Spurious Emission	≤ 20dBc	Pass	-
3.8	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 14.66 dB at 137.67 MHz
3.9	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 20.30 dB at 0.155 MHz
3.10	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1 General Description

1.1 Applicant

Amazon.com Services LLC
410 Terry Avenue N Seattle, WA 98109-5210 United States

1.2 Product Feature of Equipment Under Test

Product Feature	
Equipment	Digital Media Receiver
Model Name	CP38RE
FCC ID	2A4DH-3877
SN	Conducted: P0B3FD01336406W3 Conduction: G0B3230233840056 Radiation: G0B323023384003Q

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.3 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	902 MHz ~ 928 MHz
Number of Channels / Data Rate	129 chs for 50kbps
Maximum Output Power to Antenna	Data Rate 50kbps : 24.62 dBm (0.2897 W)
99% Occupied Bandwidth	Data Rate 50kbps : 0.085 MHz
Antenna Type / Gain	FPC Inv F Antenna with gain 3.5 dBi
Type of Modulation	FSK

1.4 Modification of EUT

No modifications are made to the EUT during all test items.

1.5 Testing Location

Sporton International Inc. (ShenZhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	TH01-SZ	CN1256	421272

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	CO02-SZ; 03CH03-SZ	CN1256	421272

1.6 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH03-SZ	AUDIX	E3	6.2009-8-24
2.	CO02-SZ	AUDIX	E3	6.2009-8-24al

1.7 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 15 Subpart C §15.247
- FCC KDB 558074 D01 15.247 Meas Guidance v05r02
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
902-928 MHz (50Kbps)	1	902.2	44	910.8	87	919.4
	2	902.4	45	911	88	919.6
	3	902.6	46	911.2	89	919.8
	4	902.8	47	911.4	90	920
	5	903	48	911.6	91	920.2
	6	903.2	49	911.8	92	920.4
	7	903.4	50	912	93	920.6
	8	903.6	51	912.2	94	920.8
	9	903.8	52	912.4	95	921
	10	904	53	912.6	96	921.2
	11	904.2	54	912.8	97	921.4
	12	904.4	55	913	98	921.6
	13	904.6	56	913.2	99	921.8
	14	904.8	57	913.4	100	922
	15	905	58	913.6	101	922.2
	16	905.2	59	913.8	102	922.4
	17	905.4	60	914	103	922.6
	18	905.6	61	914.2	104	922.8
	19	905.8	62	914.4	105	923
	20	906	63	914.6	106	923.2
	21	906.2	64	914.8	107	923.4
	22	906.4	65	915	108	923.6
	23	906.6	66	915.2	109	923.8
	24	906.8	67	915.4	110	924
	25	907	68	915.6	111	924.2
	26	907.2	69	915.8	112	924.4
	27	907.4	70	916	113	924.6
	28	907.6	71	916.2	114	924.8
	29	907.8	72	916.4	115	925
	30	908	73	916.6	116	925.2
	31	908.2	74	916.8	117	925.4
	32	908.4	75	917	118	925.6
	33	908.6	76	917.2	119	925.8
	34	908.8	77	917.4	120	926
	35	909	78	917.6	121	926.2
	36	909.2	79	917.8	122	926.4
	37	909.4	80	918	123	926.6
	38	909.6	81	918.2	124	926.8
	39	909.8	82	918.4	125	927
	40	910	83	918.6	126	927.2
	41	910.2	84	918.8	127	927.4
	42	910.4	85	919	128	927.6
	43	910.6	86	919.2	129	927.8

Note: The above EUT's information was declared by manufacturer.

2.2 Test Mode

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower) For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report,

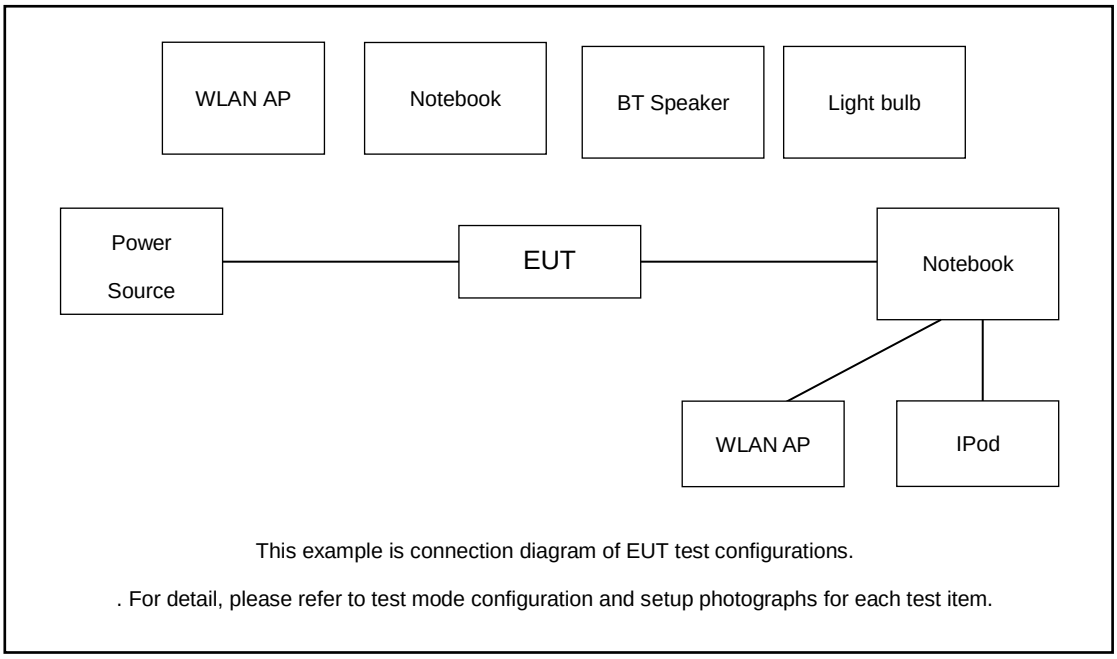
b. AC power line Conducted Emission was tested under maximum output power.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases	
Test Item	**Modulation / Data Rate**
	FSK FHSS / 50kbps
Conducted Test Cases	Low: 902.2 MHz Miid: 915 MHz High: 927.8 MHz
Radiated Test Cases	Low: 902.2 MHz Miid: 915 MHz High: 927.8 MHz
AC Conducted Emission	Mode 1: Lora Tx + Zigbee Link + Bluetooth Link + WLAN(2.4G) Link

2.3 Connection Diagram of Test System

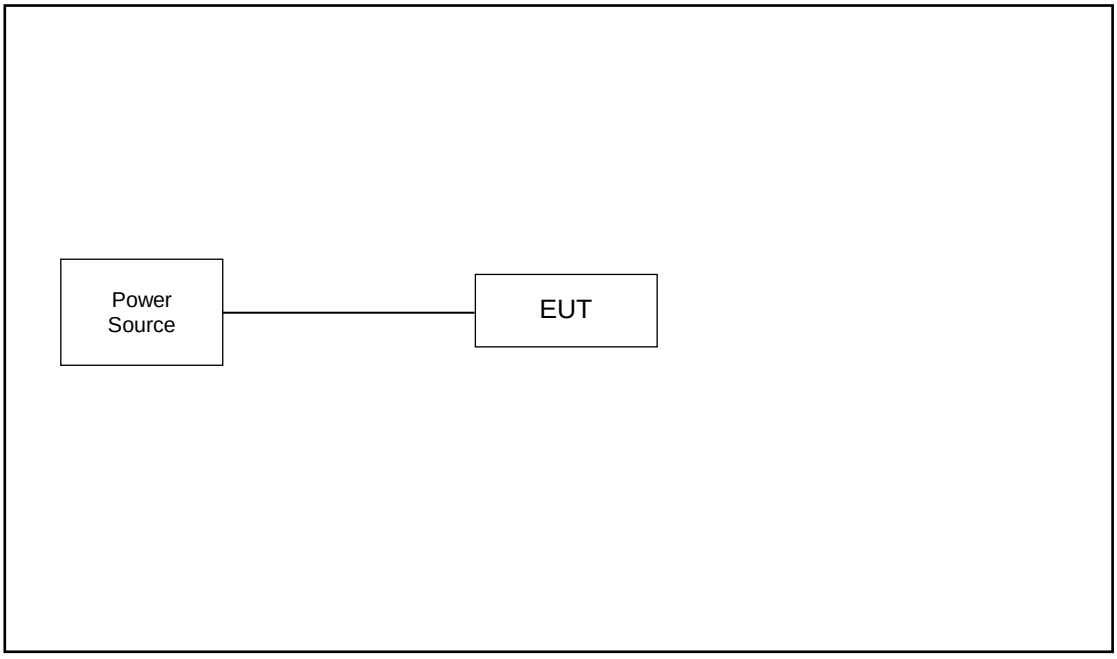
For AC Conducted Emission:



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

For Radiated Emission:



2.4 Support Unit used in test configuration and system

Item	Equipment	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 2.7m with Core
2.	Notebook	Inspiron 15-7570	Fcc DoC	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
3.	BT Speaker	N/A	N/A	N/A	N/A
4.	Light bulb	N/A	N/A	N/A	N/A
5.	IPod	MC525 ZP/A	Fcc DoC	Shielded, 1.0m	N/A

2.5 EUT Operation Test Setup

For FSK FHSS function, the engineering test program was provided and enabled to make EUT continuous transmit.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 0.1 dB and 20dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 0.1 + 20 = 20.1 (dB)

3 Test Result

3.1 Number of Channel Measurement

3.1.1 Limits of Number of Hopping Frequency

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.

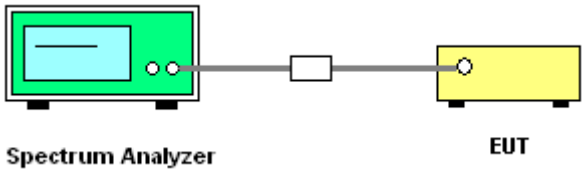
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedure

1. The testing follows ANSI C63.10-2013 clause 7.8.3.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = the frequency band of operation;
   RBW = 50kHz, VBW = 200kHz (for 50kbps);
   Sweep = auto; Detector function = peak; Trace = max hold.
6. The number of hopping frequency used is defined as the number of total channel.
7. Record the measurement data derived from spectrum analyzer.

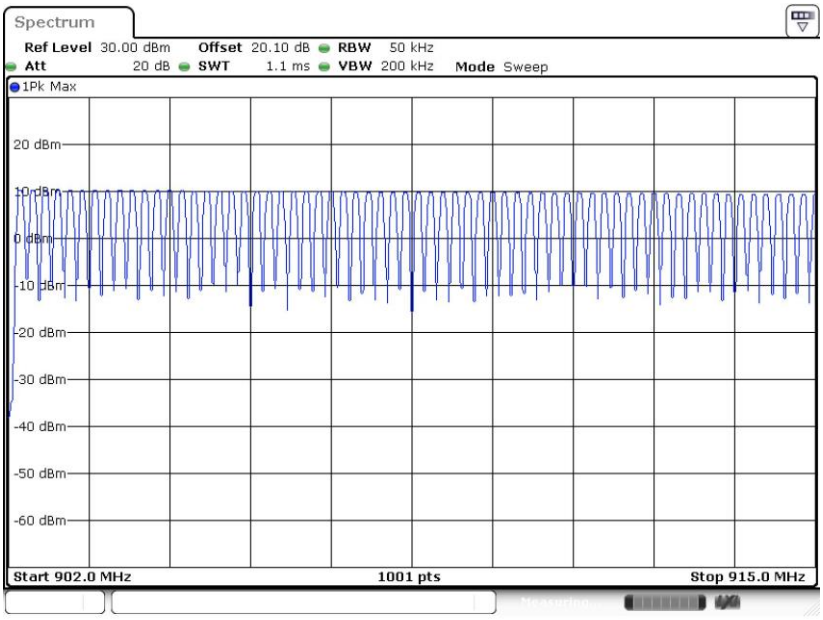
3.1.4 Test Setup



3.1.5 Test Result of Number of Hopping Frequency

Please refer to Appendix A.

Number of Hopping Channel Plot (Data Rate 50kbps)



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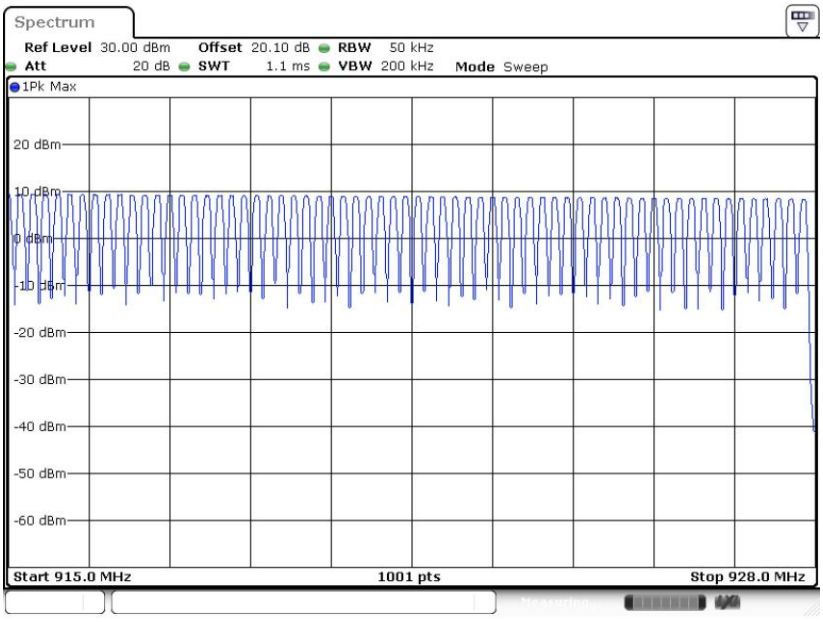

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3.2 Hopping Channel Separation Measurement

3.2.1 Limit of Hopping Channel Separation

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.

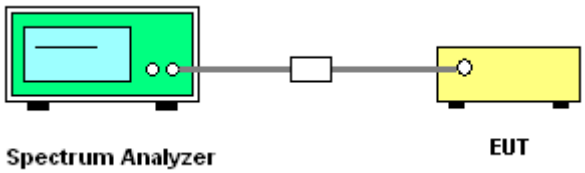
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.2.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels;
   RBW = 50kHz, VBW = 200kHz (for 50kbps);
   Sweep = auto; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

3.2.4 Test Setup

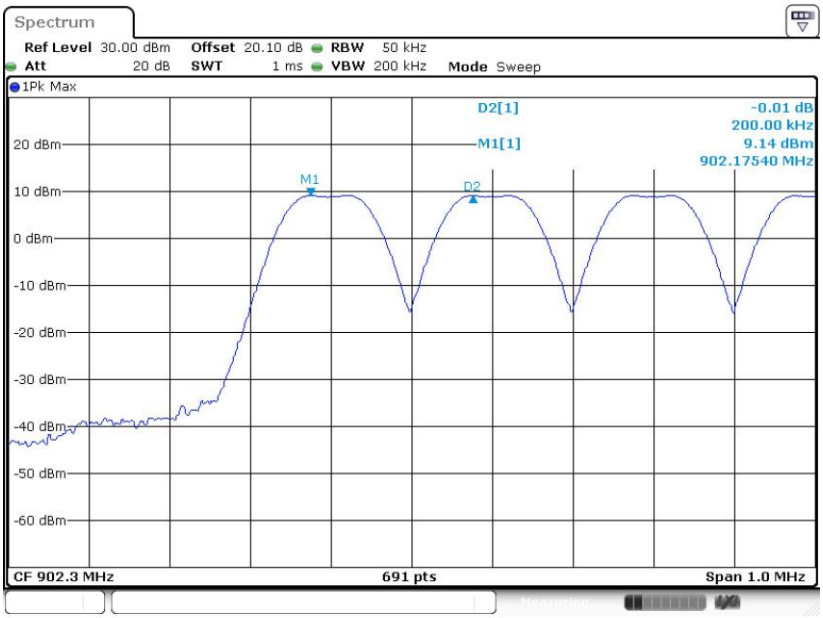


3.2.5 Test Result of Hopping Channel Separation

Please refer to Appendix A.

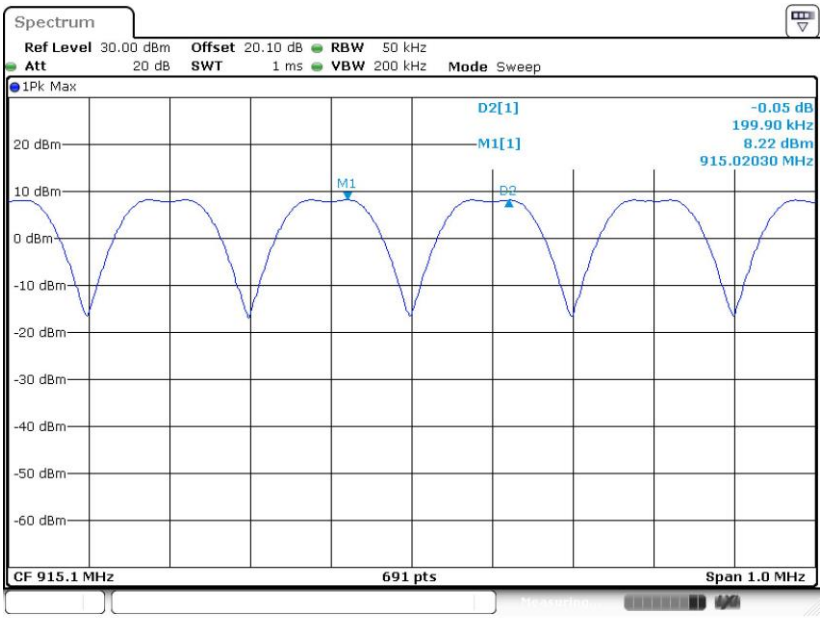
<Data Rate 50kbps>

Channel Separation Plot on Low CH



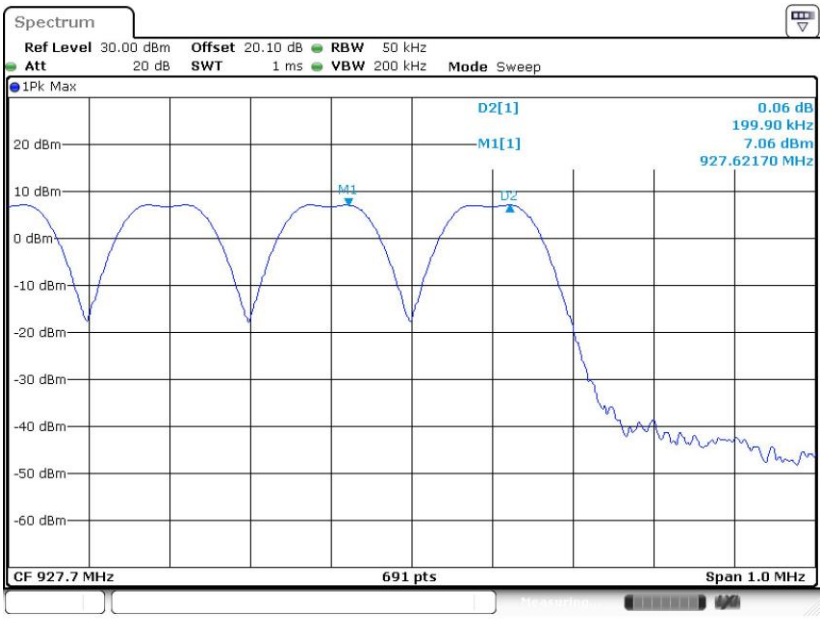
Date: 14.NOV.2023 13:24:32

Channel Separation Plot on Mid CH



Date: 14.NOV.2023 13:27:47

Channel Separation Plot on High CH



3.3 Dwell Time Measurement

3.3.1 Limit of Dwell Time

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.

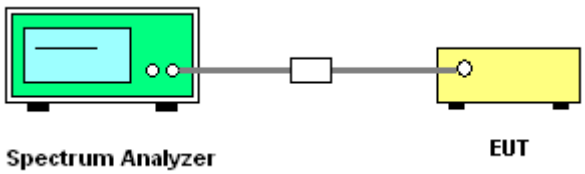
3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.4.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 100 KHz; VBW = 300 KHz; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

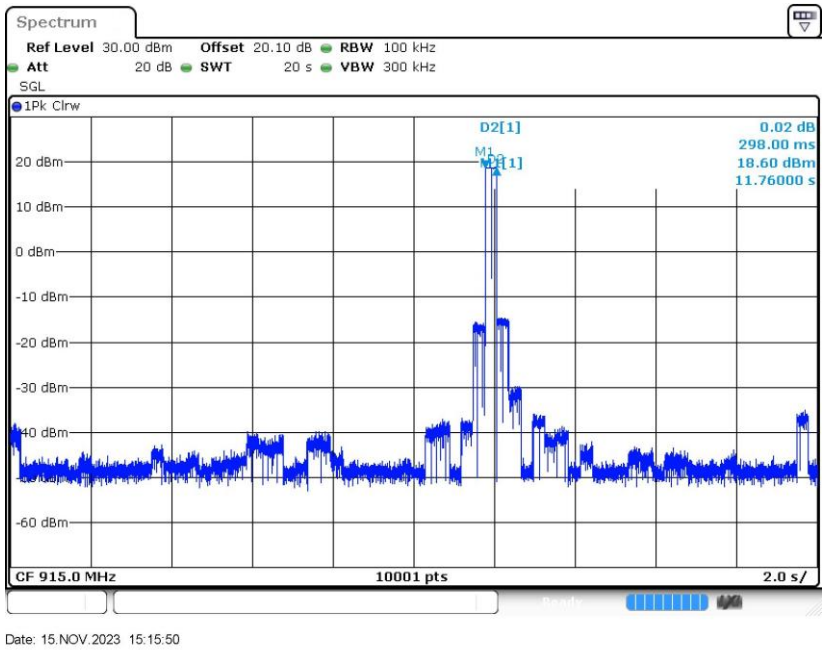
3.3.4 Test Setup



3.3.5 Test Result of Dwell Time

Please refer to Appendix A.

DT on-time and Hops over 20 sec period for Data Rate 50kbps



Remark:

Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time
= 1 (hop) x 298.00 (ms)
= 0.298 (sec)

3.4 20dB and 99% Bandwidth Measurement

3.4.1 Limit of 20dB and 99% Bandwidth

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

3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 6.9.2 and 6.9.3.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.
   Span = approximately 2 to 5 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.
5. Use the following spectrum analyzer settings for 99 % Bandwidth measurement.
   Span = approximately 1.5 to 5 times the 99% bandwidth, centered on a hopping channel;
   RBW ≥ 1% of the 99% bandwidth; VBW ≥ RBW; Sweep = auto; Detector function = sample;
   Trace = max hold.
6. Measure and record the results in the test report.

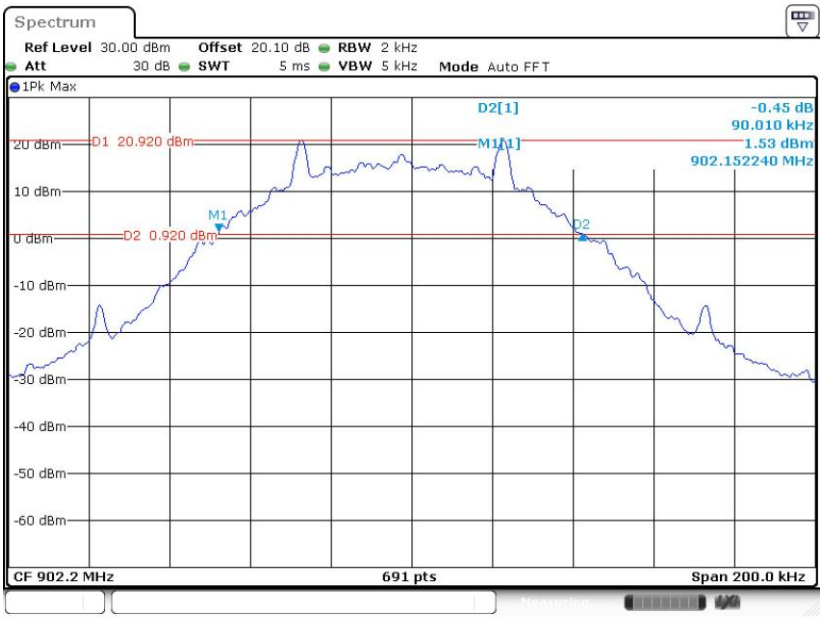
3.4.4 Test Setup

3.4.5 Test Result of 20dB Bandwidth

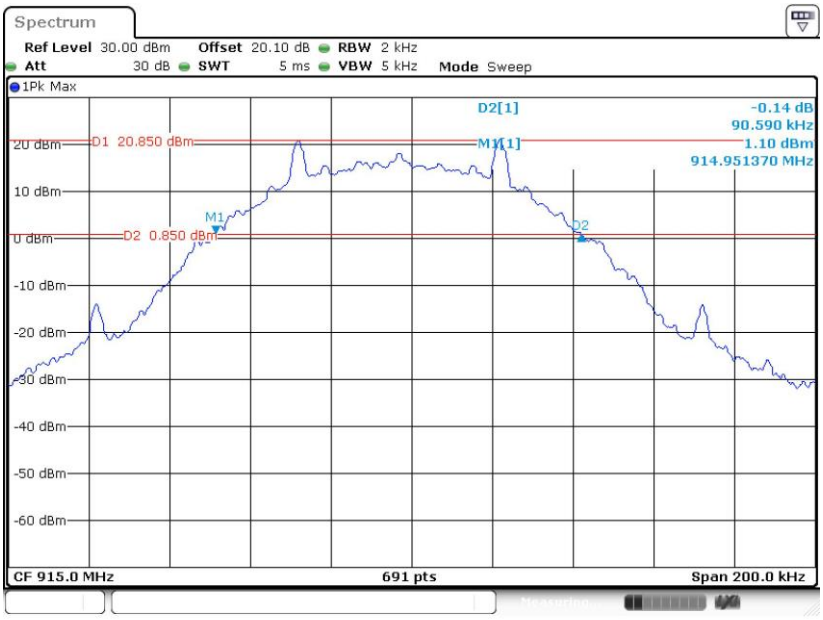
Please refer to Appendix A.

<Data Rate 50kbps>

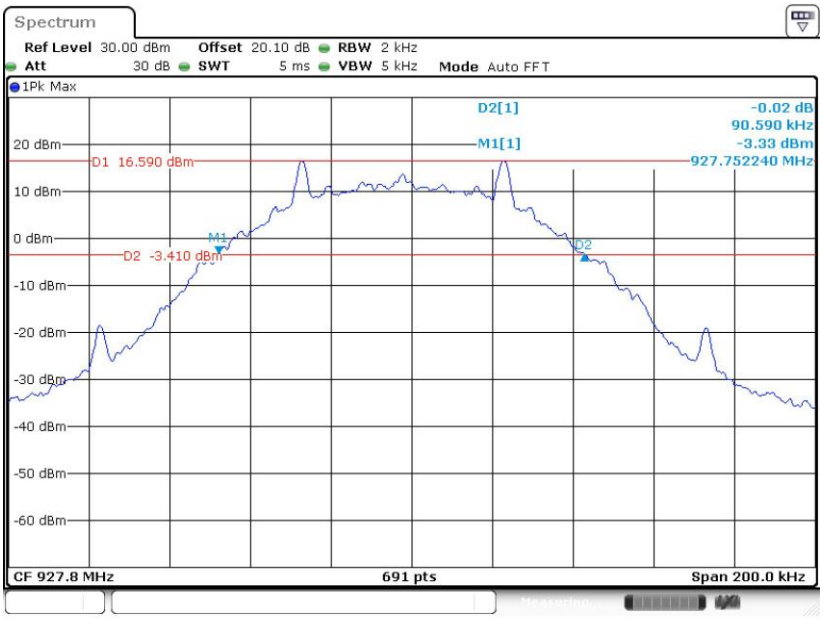
20 dB Bandwidth Plot on Low Channel



20 dB Bandwidth Plot on Mid Channel



20 dB Bandwidth Plot on High Channel



3.4.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

<Data Rate 50kbps>

99% Occupied Bandwidth Plot on Low Channel

99% Occupied Bandwidth Plot on Mid Channel

99% Occupied Bandwidth Plot on High Channel

Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.5 Output Power Measurement

3.5.1 Limit of Output Power

The maximum peak conducted output power of the intentional radiator shall not exceed the following: 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.

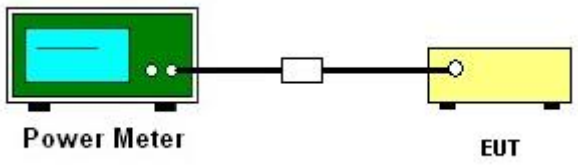
3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.5.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.
5. Measure and record the results in the test report.

3.5.4 Test Setup



3.5.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.6 Conducted Band Edges Measurement

3.6.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

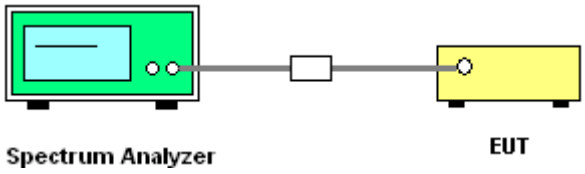
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.6.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 100kHz, VBW = 300kHz. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
4. Enable hopping function of the EUT and then repeat step 2. and 3.
5. Measure and record the results in the test report.

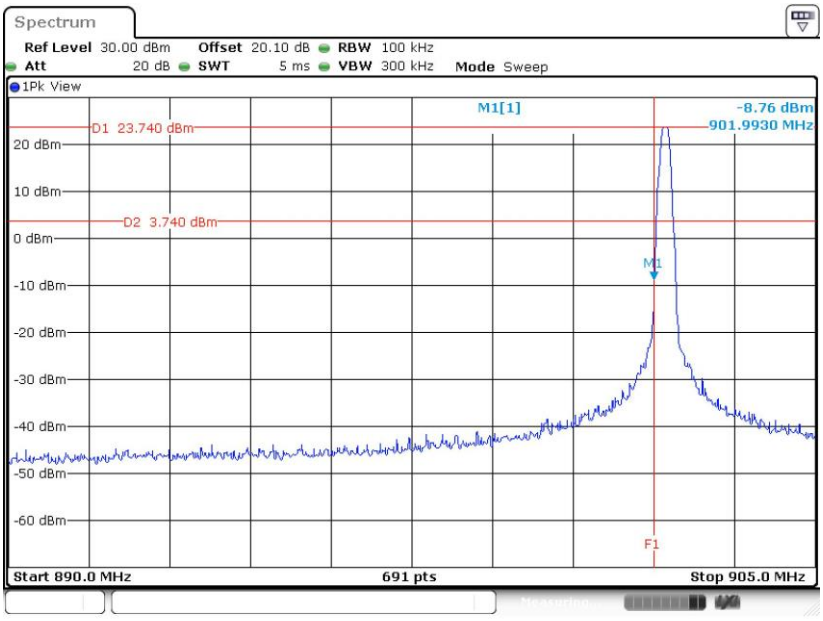
3.6.4 Test Setup



3.6.5 Test Result of Conducted Band Edges

<Data Rate 50kbps>

Low Band Edge Plot



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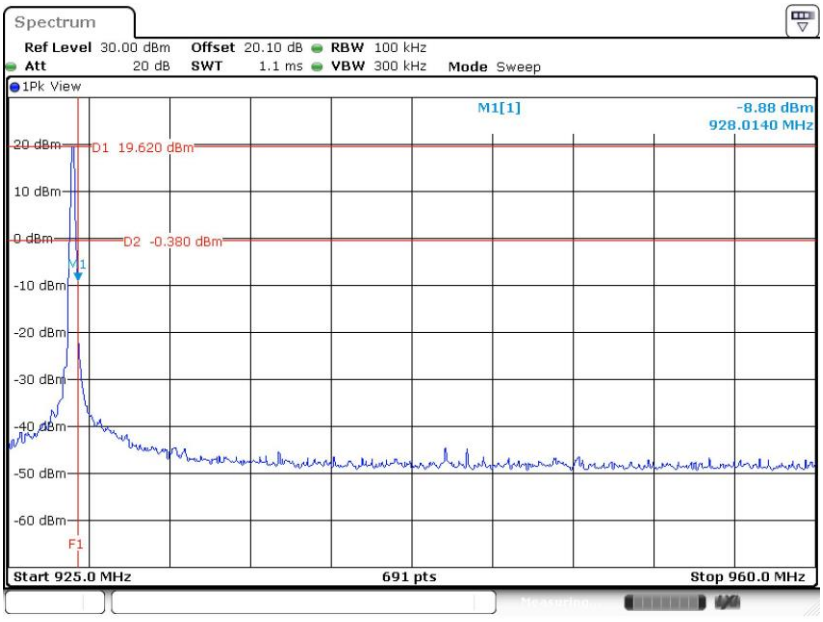
High Band Edge Plot

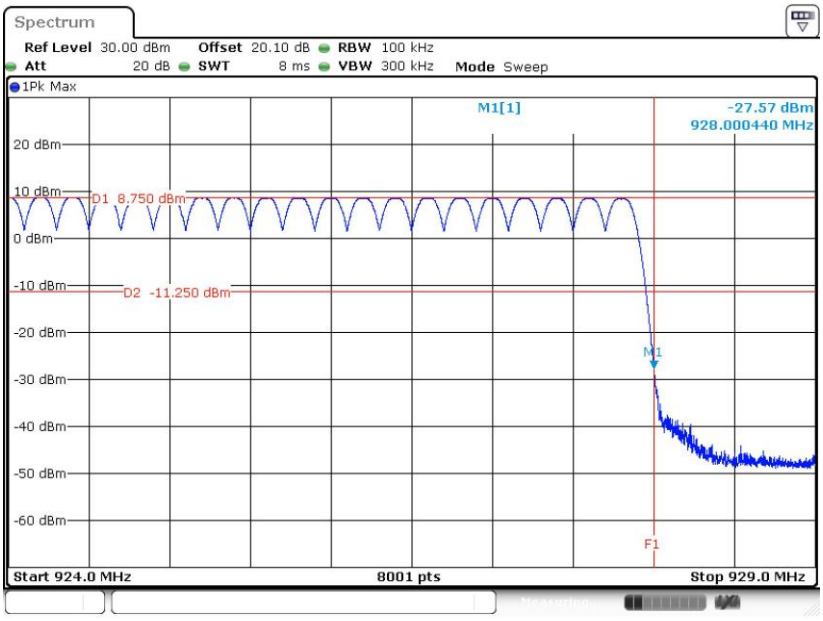


Date: 8.OCT.2023 11:35:54

3.6.6 Test Result of Conducted Hopping Mode Band Edges

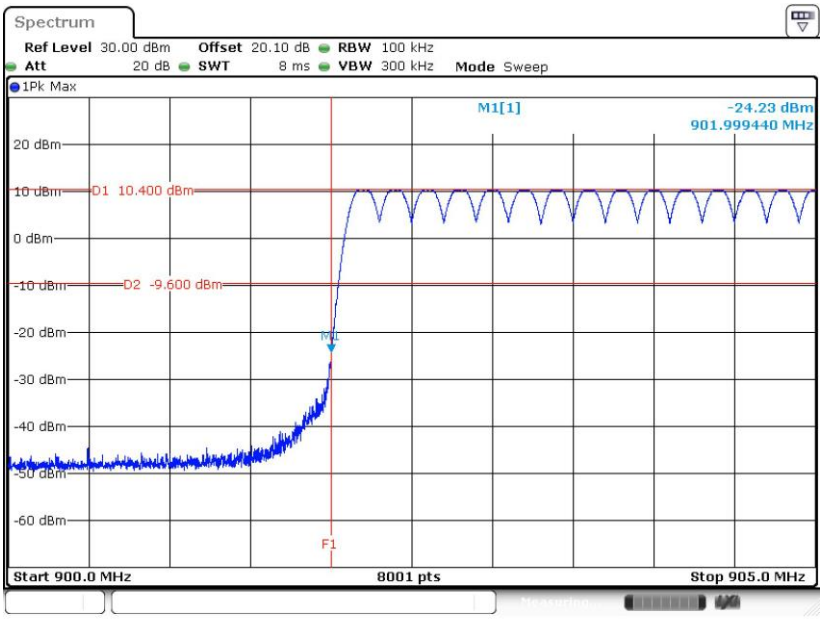
<Data Rate 50kbps>

Hopping Mode Low Band Edge Plot



Date: 8.NOV.2023 20:22:29

Hopping Mode High Band Edge Plot



Date: 8.NOV.2023 20:16:39

3.7 Conducted Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

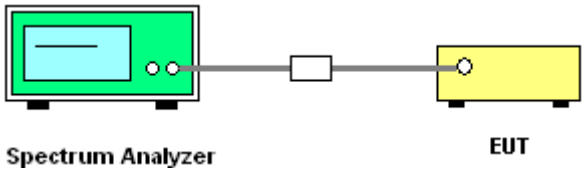
3.7.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.7.3 Test Procedure

1. The testing follows ANSI C63.10-2013 clause 7.8.8.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW = 300kHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

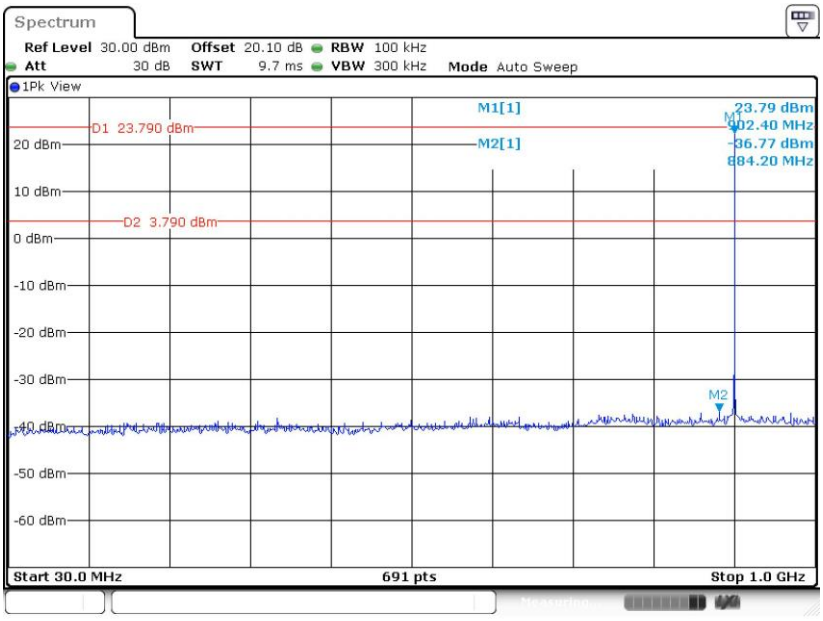
3.7.4 Test Setup



3.7.5 Test Result of Conducted Spurious Emission

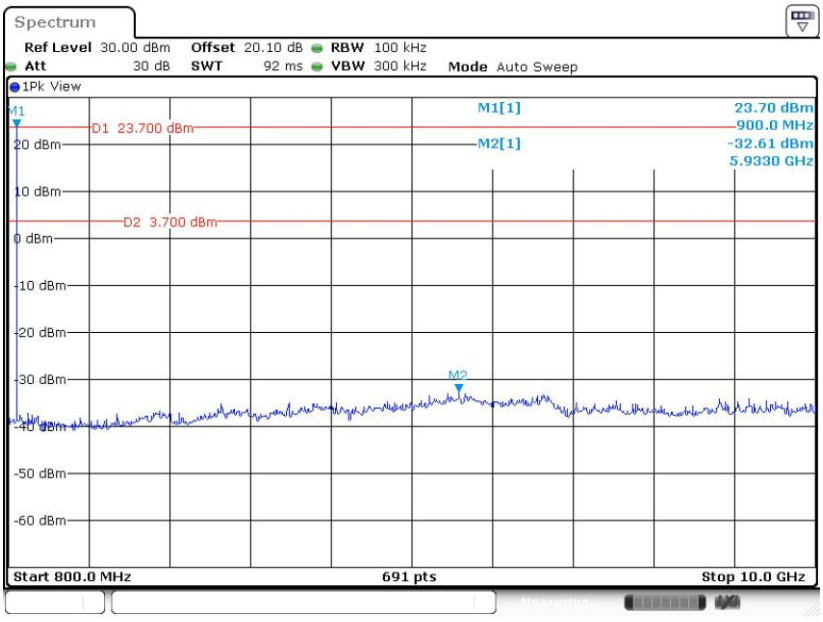
<Data Rate 50kbps>

Low CH CSE Plot



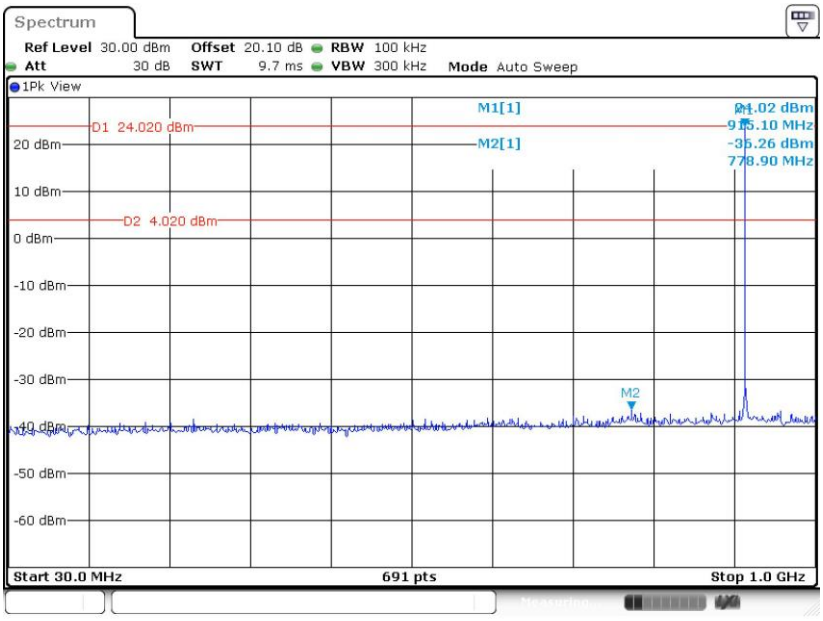
Date: 8.OCT.2023 11:06:39

Low CH CSE Plot



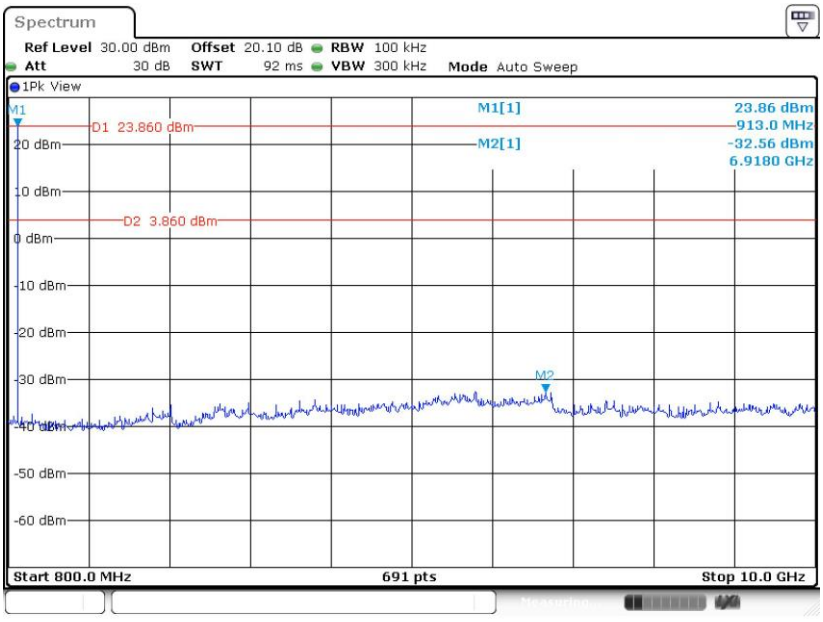
Date: 8.OCT.2023 11:07:10

Mid CH CSE Plot



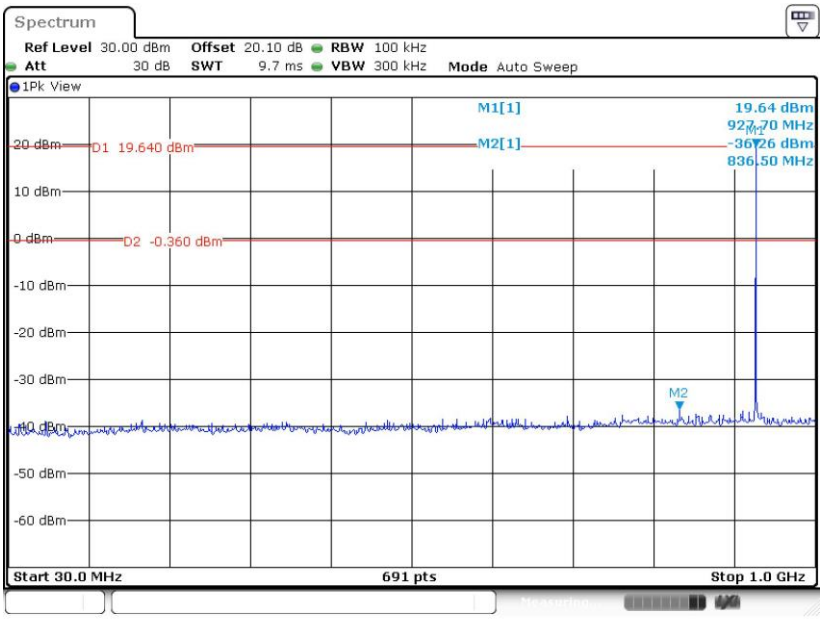
Date: 8.OCT.2023 11:17:51

Mid CH CSE Plot



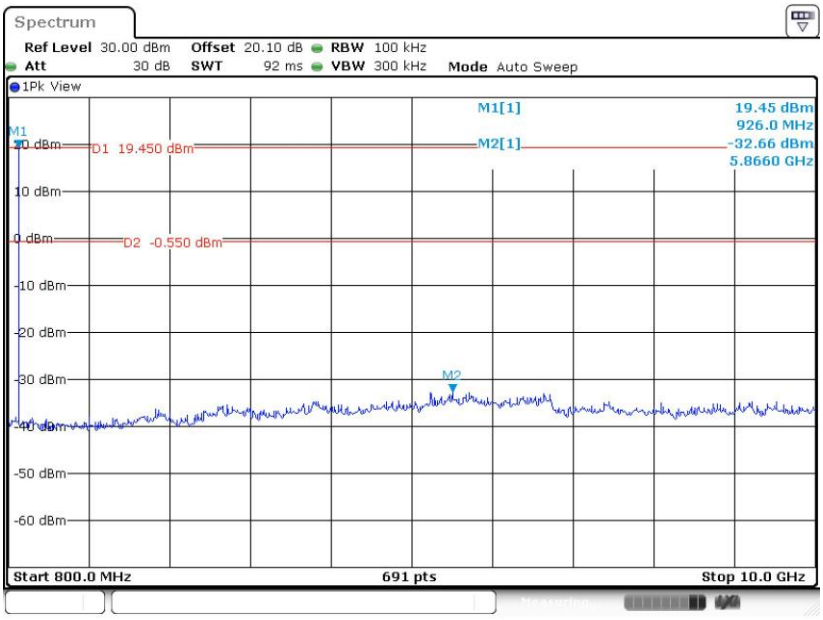
Date: 8.OCT.2023 11:18:21

High CH CSE Plot



Date: 8.OCT.2023 11:36:37

High CH CSE Plot



Date: 8.OCT.2023 11:37:07

3.8 Radiated Band Edges and Spurious Emission Measurement

3.8.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/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

3.8.2 Measuring Instruments

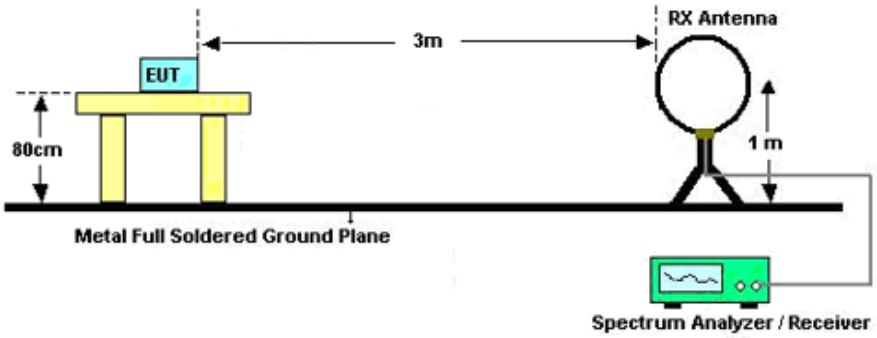
The measuring equipment is listed in the section 4 of this test report.

3.8.3 Test Procedures

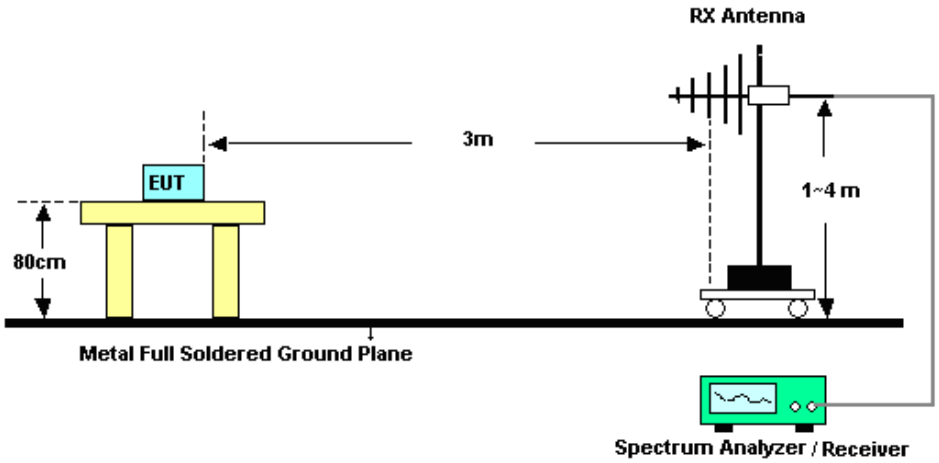
1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. For each suspected emission, 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.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
7. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
8. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.8.4 Test Setup

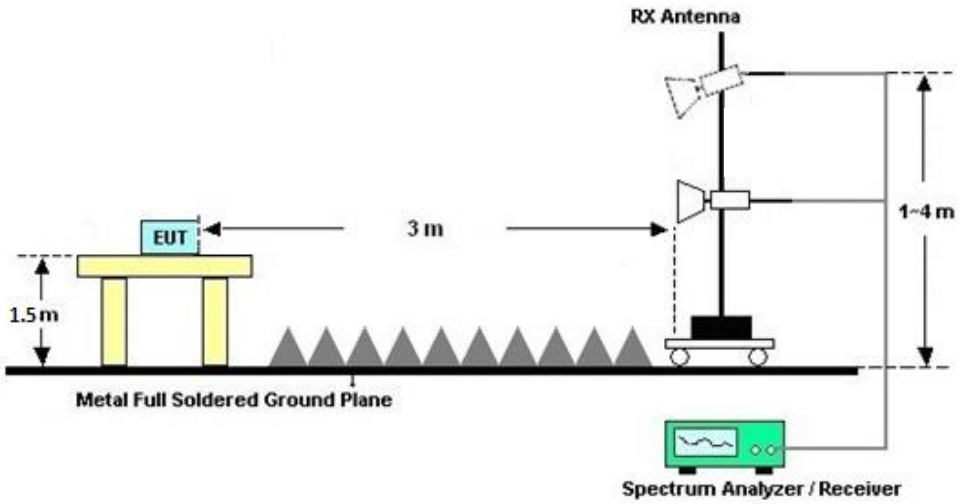
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.8.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.8.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C&D.

3.8.7 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix C&D.

3.8.8 Duty cycle

Mode	Duty Cycle
FSK 50kbps	100%

3.9 AC Conducted Emission Measurement

3.9.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, 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 of emission (MHz)	Conducted limit (dBμV)	
	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.

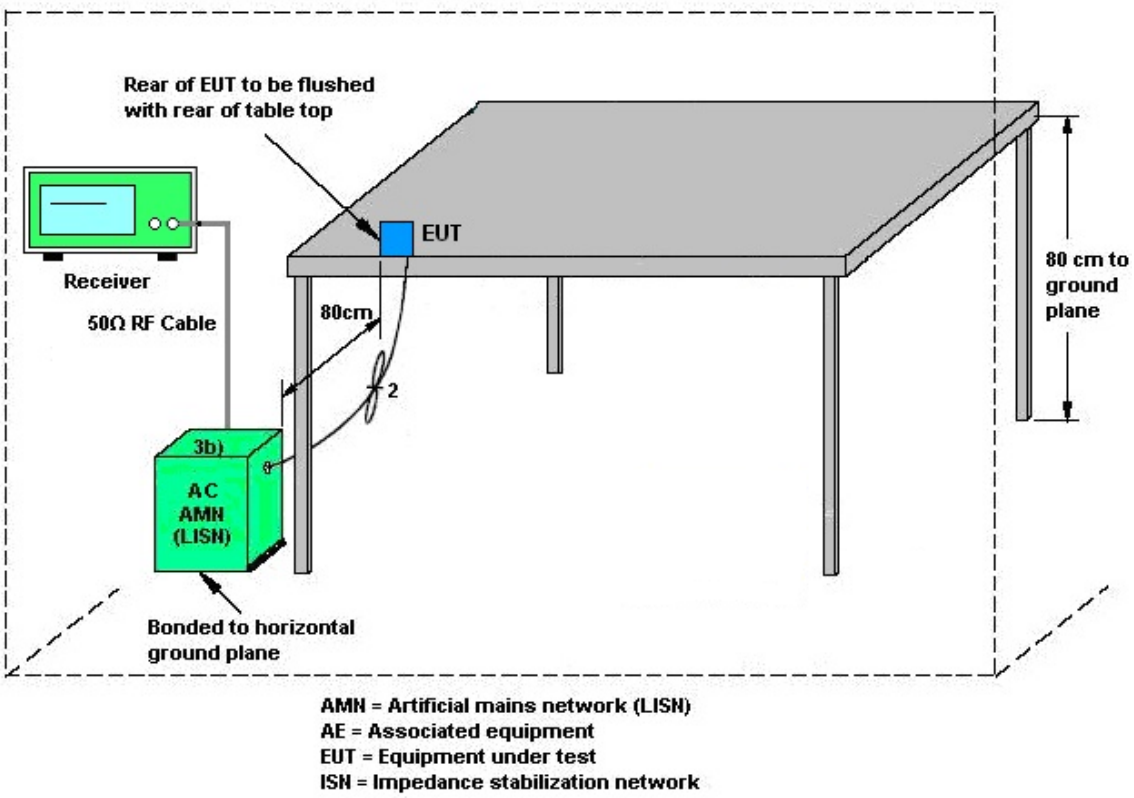
3.9.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.9.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.9.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.9.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.10 Antenna Requirements

3.10.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.10.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.10.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 06, 2023	Oct. 08, 2023~ Nov. 15, 2023	Apr. 05, 2024	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 27, 2022	Oct. 08, 2023~ Nov. 15, 2023	Dec. 26, 2023	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1542004	50MHz Bandwidth	Dec. 27, 2022	Oct. 08, 2023~ Nov. 15, 2023	Dec. 26, 2023	Conducted (TH01-SZ)
Attenuator	MICROWAV	EMVE2214-10	2	30MHz-26.5GHz	Feb. 22, 2023	Oct. 08, 2023~ Nov. 15, 2023	Feb. 22, 2024	Conducted (TH01-SZ)
EMI Test Receiver&SA	KEYSIGHT	N9038A	MY54450083	20Hz~8.4GHz	Apr. 04, 2023	Oct. 10, 2023~ Feb. 21, 2024	Apr. 03, 2024	Radiation (03CH03-SZ)
EXA Spectrum Anaiyzer	KEYSIGHT	N9010A	MY55150246	10Hz~44GHz;	Apr. 04, 2023	Oct. 10, 2023~ Feb. 21, 2024	Apr. 03, 2024	Radiation (03CH03-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jul. 28, 2022	Oct. 10, 2023~ Feb. 21, 2024	Jul. 27, 2024	Radiation (03CH03-SZ)
Bilog Antenna	TeseQ	CBL6112D	35408	30MHz-2GHz	Aug. 20, 2023	Oct. 10, 2023~ Feb. 21, 2024	Aug. 19, 2025	Radiation (03CH03-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1355	1GHz~18GHz	Apr. 08, 2023	Oct. 10, 2023~ Feb. 21, 2024	Apr. 07, 2024	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 07, 2023	Oct. 10, 2023~ Feb. 21, 2024	Jul. 06, 2024	Radiation (03CH03-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 08, 2023	Oct. 10, 2023~ Feb. 21, 2024	Apr. 07, 2024	Radiation (03CH03-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 19, 2022	Oct. 10, 2023~ Feb. 21, 2024	Oct. 18, 2023	Radiation (03CH03-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 18, 2023		Oct. 17, 2024	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 19, 2022	Oct. 10, 2023~ Feb. 21, 2024	Oct. 18, 2023	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 18, 2023		Oct. 17, 2024	Radiation (03CH03-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Dec. 26, 2022	Oct. 10, 2023~ Feb. 21, 2024	Dec. 25, 2023	Radiation (03CH03-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Dec. 25, 2023		Dec. 24, 2024	Radiation (03CH03-SZ)
AC Power Source	Chroma	61601	616010002729	N/A	Nov. 10, 2022	Oct. 10, 2023~ Feb. 21, 2024	Nov. 09, 2023	Radiation (03CH03-SZ)
AC Power Source	Chroma	61601	616010002729	N/A	Nov. 09, 2023		Nov. 08, 2024	Radiation (03CH03-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Oct. 10, 2023~ Feb. 21, 2024	NCR	Radiation (03CH03-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Oct. 10, 2023~ Feb. 21, 2024	NCR	Radiation (03CH03-SZ)
EMI Receiver	R&S	ESR7	102297	9kHz~7GHz;	Jul. 07, 2023	Oct. 31, 2023	Jul. 06, 2024	Conduction (CO02-SZ)
AC LISN	R&S	ENV216	101499	9kHz~30MHz	Jul. 07, 2023	Oct. 31, 2023	Jul. 06, 2024	Conduction (CO02-SZ)
AC Power Source	CHROMA	61601	616010002470	100Vac~250Vac	Nov. 10, 2022	Oct. 31, 2023	Nov. 09, 2023	Conduction (CO02-SZ)

NCR: No Calibration Required.

5 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Spurious Emission & Bandedge	±1.34 dB
Occupied Channel Bandwidth	±0.1%
Conducted Power	±1.34 dB
Frequency	±1.3 Hz

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.7dB

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.9dB

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB

Appendix A. Conducted Test Results

Test Engineer:	Liu Qiu Qiu	**Temperature:**	24~26°C
Test Date:	2023/10/8~2023/11/15	**Relative Humidity:**	50~53%

FSK-FHSS-50Kbps

TEST RESULTS DATA
20dB and 99% Occupied Bandwidth

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	20db BW (MHz)	20db BW Limit (MHz)	99% Bandwidth (MHz)	Hopping Channel Separation Measurement (MHz)	Hopping Channel Separation Measurement Limit (MHz)	Pass/Fail
FSK	50Kbps	1	1	902.2	0.090	0.500	0.085	0.200	0.0900	Pass
FSK	50Kbps	1	65	915	0.091	0.500	0.085	0.200	0.0906	Pass
FSK	50Kbps	1	129	927.8	0.091	0.500	0.085	0.200	0.0906	Pass

TEST RESULTS DATA
Dwell Time

Mod.	Hopping Channel Number Rate	Hops Over Occupancy Time(hops)	Package Transfer Time (msec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
FSK	129	1.00	298.00	0.298	0.4	Pass

TEST RESULTS DATA
Peak Power Table

mode	Freq. (MHz)	NTX	Peak Power (dBm)	Power Limit (dBm)	Test Result	Power Setting
FSK	902.2	1	24.43	30.00	Pass	0
	915	1	**24.62**	30.00	Pass	1
	927.8	1	20.20	30.00	Pass	-4

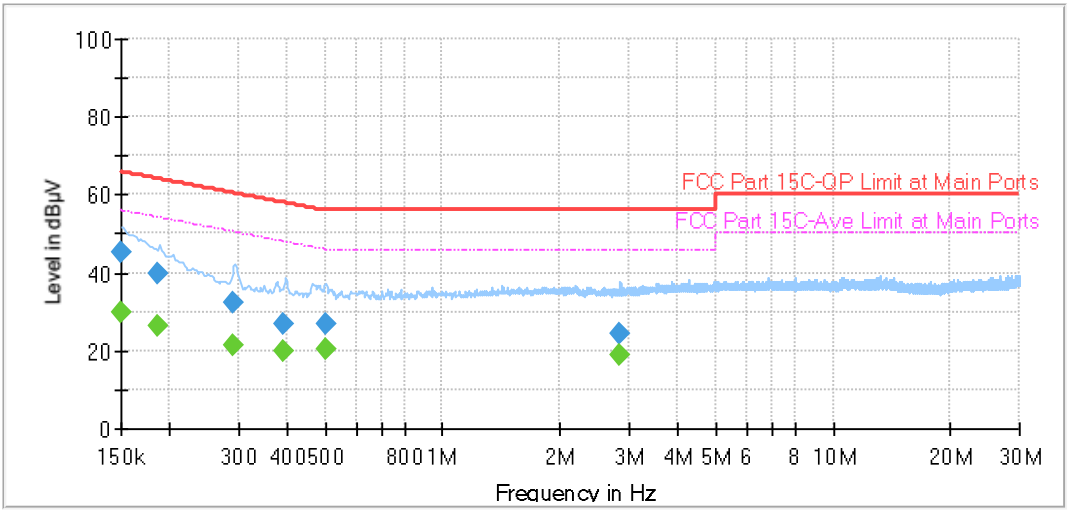
TEST RESULTS DATA
Number of Hopping Frequency

Number of Hopping (Channel)	Limits (Channel)	Pass/Fail
129	> 50	Pass

Appendix B. AC Conducted Emission Test Results

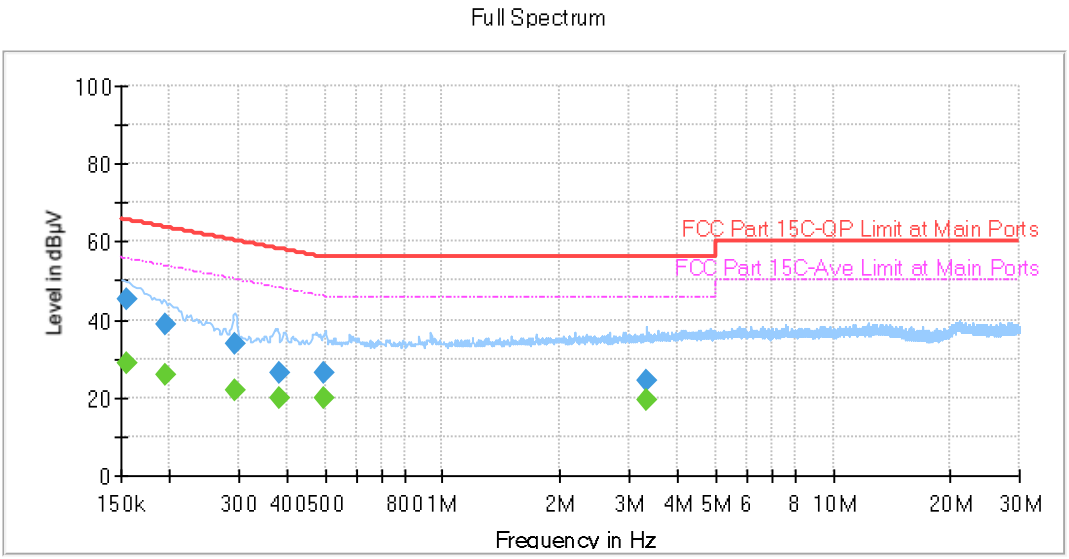
Test Engineer :	Tao Zhang	**Temperature :**	24~25℃
		Relative Humidity :	48~49%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line

Full Spectrum



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.150000	45.44	---	66.00	20.56	L1	OFF	19.7
0.150000	---	29.77	56.00	26.23	L1	OFF	19.7
0.186540	39.90	---	64.19	24.29	L1	OFF	19.7
0.186540	---	26.49	54.19	27.70	L1	OFF	19.7
0.289500	32.28	---	60.54	28.26	L1	OFF	19.7
0.289500	---	21.24	50.54	29.29	L1	OFF	19.7
0.390750	26.64	---	58.05	31.41	L1	OFF	19.7
0.390750	---	19.99	48.05	28.06	L1	OFF	19.7
0.503970	26.94	---	56.00	29.06	L1	OFF	19.7
0.503970	---	20.15	46.00	25.85	L1	OFF	19.7
2.852520	24.33	---	56.00	31.67	L1	OFF	19.8
2.852520	---	19.14	46.00	26.86	L1	OFF	19.8

Test Engineer :	Tao Zhang	**Temperature :**	24~25℃
		Relative Humidity :	48~49%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.155490	45.40	---	65.70	20.30	N	OFF	19.7
0.155490	---	28.65	55.70	27.05	N	OFF	19.7
0.195000	38.80	---	63.82	25.02	N	OFF	19.7
0.195000	---	25.77	53.82	28.05	N	OFF	19.7
0.293010	34.02	---	60.44	26.42	N	OFF	19.7
0.293010	---	21.70	50.44	28.74	N	OFF	19.7
0.381750	26.44	---	58.24	31.80	N	OFF	19.7
0.381750	---	19.96	48.24	28.28	N	OFF	19.7
0.496500	26.61	---	56.06	29.45	N	OFF	19.7
0.496500	---	20.07	46.06	25.99	N	OFF	19.7
3.321330	24.43	---	56.00	31.57	N	OFF	19.8
3.321330	---	19.19	46.00	26.81	N	OFF	19.8

Appendix C. Radiated Spurious Emission

902~928MHz

FSK 50kbps (LF 30Mhz-1Ghz@ 3m)

	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
902.2MHz		136.7	23.47	-20.03	43.5	39.09	17.88	1.23	34.73	-	-	P	H
		259.89	23.87	-22.13	46	39.01	17.87	1.67	34.68	-	-	P	H
	*	902.2	118.37	-	-	120.85	28.67	3.15	34.3	-	-	P	H
		137.67	28.82	-14.68	43.5	44.36	17.96	1.23	34.73	-	-	P	V
		266.68	24.1	-21.9	46	38.98	18.09	1.69	34.66	-	-	P	V
	*	902.2	115.13	-	-	117.61	28.67	3.15	34.3	-	-	P	V
915MHz		137.67	23.71	-19.79	43.5	39.25	17.96	1.23	34.73	-	-	P	H
		255.04	24.14	-21.86	46	39.45	17.72	1.66	34.69	-	-	P	H
	*	915	119	-	-	121.16	28.96	3.18	34.3	-	-	P	H
		137.67	28.44	-15.06	43.5	43.98	17.96	1.23	34.73	-	-	P	V
		281.23	23.5	-22.5	46	37.86	18.54	1.74	34.64	-	-	P	V
	*	915	115.14	-	-	117.3	28.96	3.18	34.3	-	-	P	V
927.8MHz		137.67	23.71	-19.79	43.5	39.25	17.96	1.23	34.73	-	-	P	H
		283.17	24.73	-21.27	46	39.02	18.6	1.75	34.64	-	-	P	H
	*	927.8	117.48	-	-	119.3	29.27	3.21	34.3	-	-	P	H
		137.67	28.84	-14.66	43.5	44.38	17.96	1.23	34.73	-	-	P	V
		281.23	24.72	-21.28	46	39.08	18.54	1.74	34.64	-	-	P	V
	*	927.8	110.89	-	-	112.71	29.27	3.21	34.3	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

FSK 50kbps (Band Edge @ 3m)

	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
902.2MHz		862.26	50.22	-48.15	98.37	51.37	28.76	4.39	34.3	-	-	P	H
	*	902.2	118.37	-	-	119.58	28.67	4.42	34.3	-	-	P	H
		941.8	53.12	-45.25	98.37	53.34	29.58	4.5	34.3	-	-	P	H
		862.26	52.08	-43.05	95.13	53.23	28.76	4.39	34.3	-	-	P	V
	*	902.2	115.13	-	-	116.34	28.67	4.42	34.3	-	-	P	V
		941.8	47.11	-48.02	95.13	47.33	29.58	4.5	34.3	-	-	P	V
915MHz		874.87	54.68	-44.32	99	55.86	28.72	4.4	34.3	-	-	P	H
	*	915	119	-	-	119.89	28.96	4.45	34.3	-	-	P	H
		955.38	55.16	-43.84	99	55.14	29.79	4.52	34.29	-	-	P	H
		874.87	53.6	-41.54	95.14	54.78	28.72	4.4	34.3	-	-	P	V
	*	915	115.14	-	-	116.03	28.96	4.45	34.3	-	-	P	V
		955.38	48.26	-46.88	95.14	48.24	29.79	4.52	34.29	-	-	P	V
927.8MHz		887.48	51.53	-45.95	97.48	52.75	28.67	4.41	34.3	-	-	P	H
	*	927.8	117.48	-	-	118.04	29.27	4.47	34.3	-	-	P	H
		967.99	51.42	-46.06	97.48	51.27	29.86	4.55	34.26	-	-	P	H
		887.48	49.45	-41.44	90.89	50.67	28.67	4.41	34.3	-	-	P	V
	*	927.8	110.89	-	-	111.45	29.27	4.47	34.3	-	-	P	V
		967.99	44.59	-46.3	90.89	44.44	29.86	4.55	34.26	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

FSK 50kbps (Harmonic @ 3m)

	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
902.2MHz		1804.4	36.22	-62.15	98.37	60.57	29.4	4.21	57.96	-	-	P	H
		2706.6	43.64	-30.36	74	64.35	31.6	5.2	57.51	-	-	P	H
		3608.8	40.58	-33.42	74	58.71	32.74	6.19	57.06	-	-	P	H
		1804.4	37.1	-58.03	95.13	61.45	29.4	4.21	57.96	-	-	P	V
		2706.6	45.19	-28.81	74	65.9	31.6	5.2	57.51	-	-	P	V
		3608.8	40.95	-33.05	74	59.08	32.74	6.19	57.06	-	-	P	V
915MHz		1830	35.04	-63.96	99	59.2	29.6	4.21	57.97	-	-	P	H
		2745	36.89	-37.11	74	57.53	31.6	5.24	57.48	-	-	P	H
		3660	40.8	-33.2	74	58.84	32.82	6.18	57.04	-	-	P	H
		1830	35.08	-60.06	95.14	59.24	29.6	4.21	57.97	-	-	P	V
		2745	36.49	-37.51	74	57.13	31.6	5.24	57.48	-	-	P	V
		3660	41.88	-32.12	74	59.92	32.82	6.18	57.04	-	-	P	V
927.8MHz		1855.6	35.82	-61.66	97.48	59.84	29.7	4.25	57.97	-	-	P	H
		2783.4	37.08	-36.92	74	57.58	31.67	5.28	57.45	-	-	P	H
		3711.2	40.49	-33.51	74	58.46	32.89	6.16	57.02	-	-	P	H
		1855.6	37.2	-53.69	90.89	61.22	29.7	4.25	57.97	-	-	P	V
		2783.4	36.9	-37.1	74	57.4	31.67	5.28	57.45	-	-	P	V
		3711.2	40.99	-33.01	74	58.96	32.89	6.16	57.02	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
902.2MHz		136.7	23.47	-20.03	43.5	39.09	17.88	1.23	34.73	-	-	P	H
		259.89	23.87	-22.13	46	39.01	17.87	1.67	34.68	-	-	P	H
	*	902.2	118.37	-	-	120.85	28.67	3.15	34.3	-	-	P	H

1. Level(dBμV/m) = Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 136.7MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 17.88(dB/m) + 1.23(dB) + 39.09(dBμV) – 34.73 (dB)

= 23.47 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 23.47(dBμV/m) – 43.5(dBμV/m)

= -20.03(dB)

Non-Restricted band：

	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
902.2MHz		862.26	50.22	-48.15	98.37	51.37	28.76	4.39	34.3	-	-	P	H
	*	902.2	118.37	----	----	119.58	28.67	4.42	34.3	-	-	P	H

1. Limit Line(dBμV/m) = Fundamental Level(dBμV/m) – 20(dBc)

For Peak Limit @ 862.26MHz:

1. Limit Line(dBμV/m)

= Fundamental Level(dBμV/m) – 20(dBc)

= 118.37(dBμV/m) – 20(dBc)

= 98.37 (dBμV/m)

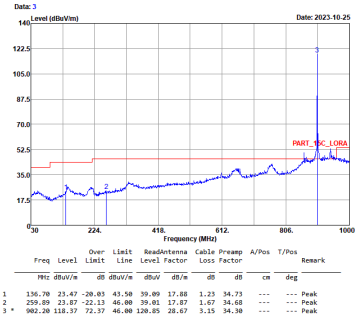
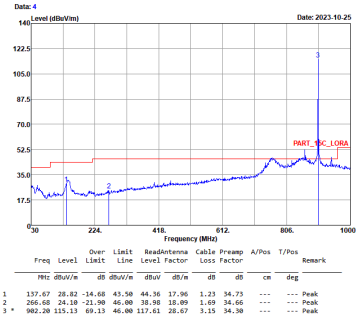
The peak measured complies with the limit line, so test result is “PASS”.

Appendix D. Radiated Spurious Emission Plots

Note symbol

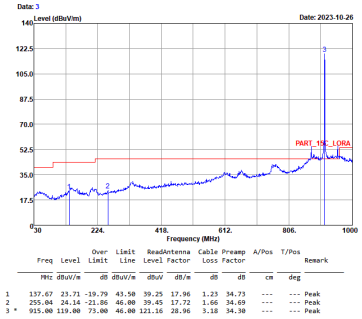
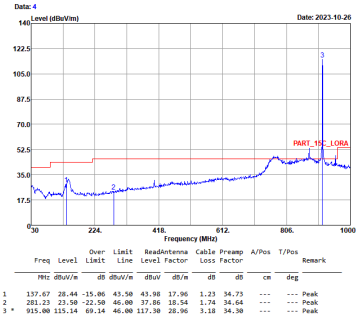
-L	**Low channel location**
-R	**High channel location**

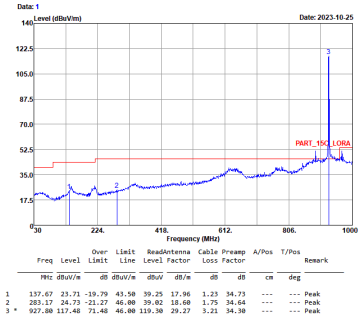
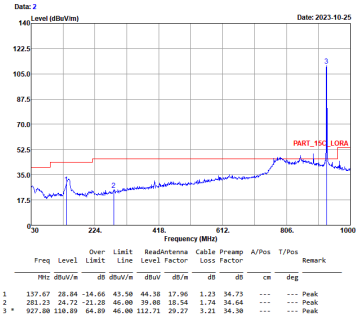
FSK 50Kbps FHSS

LoRa	902.2~927.8 (LF 30Mhz-1Ghz@ 3m)	
ANT	FSK 50Kbps FHSS CH01 902.2	
	Horizontal	Vertical
Peak		

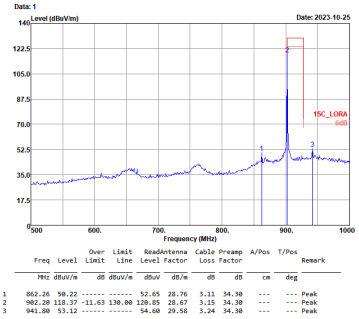
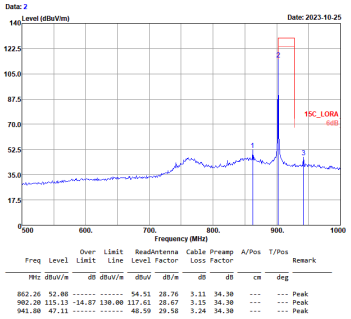
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss Factor	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	136.70	23.47	-20.03	43.50	39.09	17.88	1.23	34.73	---	--- Peak
2	259.89	23.87	-22.13	46.00	39.01	17.87	1.67	34.68	---	--- Peak
3 *	902.20	118.37	72.37	46.00	120.85	28.67	3.15	34.30	---	--- Peak

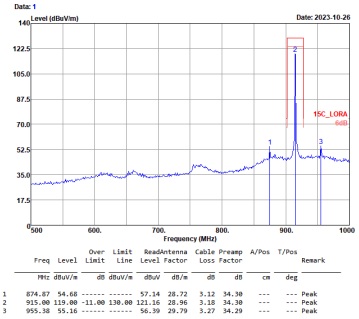
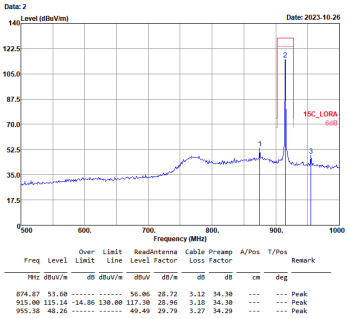
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss Factor	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	137.67	28.82	-14.68	43.50	44.36	17.96	1.23	34.73	---	--- Peak
2	266.68	24.10	-21.90	46.00	38.98	18.09	1.69	34.66	---	--- Peak
3 *	902.20	115.13	69.13	46.00	117.61	28.67	3.15	34.30	---	--- Peak

LoRa	902.2~927.8 (LF 30Mhz-1Ghz@ 3m)	
ANT	FSK 50Kbps FHSS CH65 915	
	Horizontal	Vertical
Peak	 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 137.67 23.71 -19.79 43.50 39.25 17.96 1.23 34.73 --- --- Peak 2 255.04 24.14 -21.86 46.00 39.45 17.72 1.66 34.69 --- --- Peak 3 * 915.00 119.00 73.00 46.00 121.16 28.96 3.18 34.30 --- --- Peak	 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 137.67 28.44 -15.06 43.50 43.98 17.96 1.23 34.73 --- --- Peak 2 281.23 23.50 -22.50 46.00 37.86 18.54 1.74 34.64 --- --- Peak 3 * 915.00 115.14 69.14 46.00 117.30 28.96 3.18 34.30 --- --- Peak

LoRa	902.2~927.8 (LF 30Mhz-1Ghz@ 3m)	
ANT	FSK 50Kbps FHSS CH129 927.8	
	Horizontal	Vertical
Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 137.67 23.71 -19.79 43.50 39.25 17.96 1.23 34.73 --- --- Peak 2 283.17 24.73 -21.27 46.00 39.02 18.60 1.75 34.64 --- --- Peak 3 * 927.80 117.48 71.48 46.00 119.30 29.27 3.21 34.30 --- --- Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 137.67 28.84 -14.66 43.50 44.38 17.96 1.23 34.73 --- --- Peak 2 281.23 24.72 -21.28 46.00 39.08 18.54 1.74 34.64 --- --- Peak 3 * 927.80 110.89 64.89 46.00 112.71 29.27 3.21 34.30 --- --- Peak

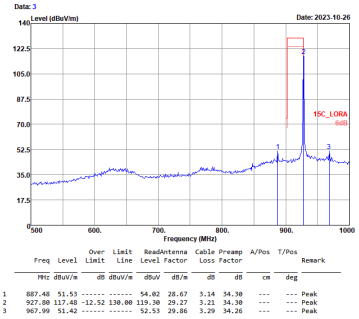
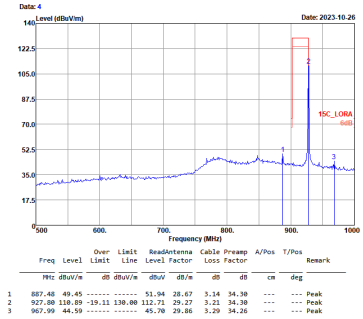
FSK 50Kbps FHSS (Band Edge @ 3m)

LoRa	902.2~927.8 Band Edge @ 3m	
ANT	FSK 50Kbps FHSS CH01 902.2	
	Horizontal	Vertical
Peak	 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 862.26 50.22 ------ ------ 52.65 28.76 3.11 34.30 --- --- Peak 2 902.20 118.37 -11.63 130.00 120.85 28.67 3.15 34.30 --- --- Peak 3 941.80 53.12 ------ ------ 54.60 29.58 3.24 34.30 --- --- Peak	 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 862.26 52.88 ------ ------ 54.51 28.76 3.11 34.30 --- --- Peak 2 902.20 115.13 -14.87 130.00 117.61 28.67 3.15 34.30 --- --- Peak 3 941.80 47.11 ------ ------ 48.59 29.58 3.24 34.30 --- --- Peak

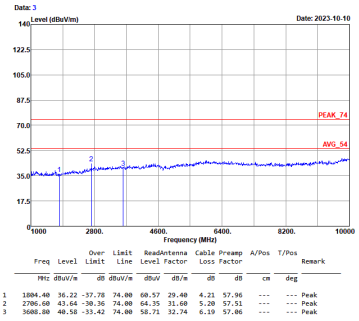
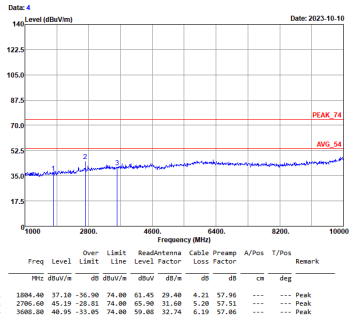
LoRa	902.2~927.8 Band Edge @ 3m	
ANT	FSK 50Kbps FHSS CH65 915	
	Horizontal	Vertical
Peak		

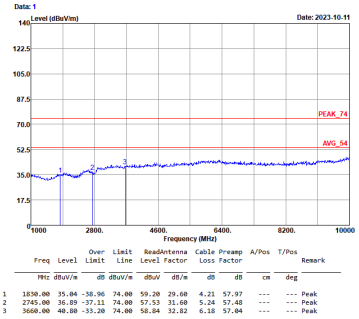
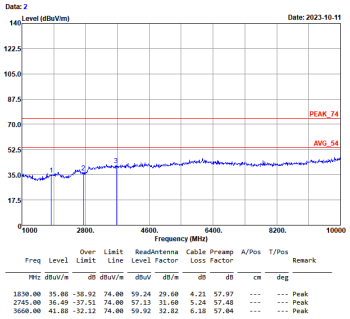
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	874.87	54.68	------	------	57.14	28.72	3.12	34.30	---	---	Peak
2	915.00	119.00	-11.00	130.00	121.16	28.96	3.18	34.30	---	---	Peak
3	955.38	55.16	------	------	56.39	29.79	3.27	34.29	---	---	Peak

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	874.87	53.60	------	------	56.06	28.72	3.12	34.30	---	---	Peak
2	915.00	115.14	-14.86	130.00	117.30	28.96	3.18	34.30	---	---	Peak
3	955.38	48.26	------	------	49.49	29.79	3.27	34.29	---	---	Peak

LoRa	902.2~927.8 Band Edge @ 3m	
ANT	FSK 50Kbps FHSS CH129 927.8	
	Horizontal	Vertical
Peak	 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 887.48 51.53 ------ ------ 54.02 28.67 3.14 34.30 --- --- Peak 2 927.80 117.48 -12.52 130.00 119.30 29.27 3.21 34.30 --- --- Peak 3 967.99 51.42 ------ ------ 52.53 29.86 3.29 34.26 --- --- Peak	 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 887.48 49.45 ------ ------ 51.94 28.67 3.14 34.30 --- --- Peak 2 927.80 110.89 -19.11 130.00 112.71 29.27 3.21 34.30 --- --- Peak 3 967.99 44.59 ------ ------ 45.70 29.86 3.29 34.26 --- --- Peak

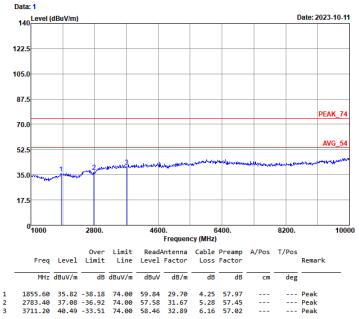
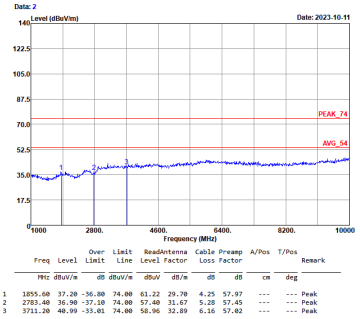
FSK 50Kbps FHSS (Harmonic @ 3m)

LoRa	902.2~927.8 Harmonic @ 3m	
ANT	FSK 50Kbps FHSS CH01 902.2	
	Horizontal	Vertical
Peak		

LoRa	902.2~927.8 Harmonic @ 3m	
ANT	FSK 50Kbps FHSS CH65 915	
	Horizontal	Vertical
Peak		

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	1830.00	35.04	-38.96	74.00	59.20	29.60	4.21	57.97	---	--- Peak
2	2745.00	36.89	-37.11	74.00	57.53	31.60	5.24	57.48	---	--- Peak
3	3660.00	40.80	-33.20	74.00	58.84	32.82	6.18	57.04	---	--- Peak

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	1830.00	35.88	-38.92	74.00	59.24	29.60	4.21	57.97	---	--- Peak
2	2745.00	36.49	-37.51	74.00	57.13	31.60	5.24	57.48	---	--- Peak
3	3660.00	41.88	-32.12	74.00	59.92	32.82	6.18	57.04	---	--- Peak

LoRa	902.2~927.8 Harmonic @ 3m	
ANT	FSK 50Kbps FHSS CH129 927.8	
	Horizontal	Vertical
Peak	 Freq Level Over Limit Limit ReadAntenna Level Cable Factor Preamp Loss Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1855.60 35.82 -38.18 74.00 59.84 29.70 4.25 57.97 --- --- Peak 2 2783.40 37.08 -36.92 74.00 57.58 31.67 5.28 57.45 --- --- Peak 3 3711.20 40.49 -33.51 74.00 58.46 32.89 6.16 57.02 --- --- Peak	 Freq Level Over Limit Limit ReadAntenna Level Cable Factor Preamp Loss Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1855.60 37.20 -36.80 74.00 61.22 29.70 4.25 57.97 --- --- Peak 2 2783.40 36.90 -37.10 74.00 57.40 31.67 5.28 57.45 --- --- Peak 3 3711.20 40.99 -33.01 74.00 58.96 32.89 6.16 57.02 --- --- Peak