FCC RADIO TEST REPORT

FCC ID	:	**P4Q-TG2A001**
Equipment	:	**Internet Gateway**
Brand Name	:	**Amazon, AWS, SKF,**
Model Name	:	**TG2A001,** **TG2A001YYYY (Y= 10 characters, Y can be 0-9, a-z, A-Z, "-", "_" or blank for marketing purpose and no impact safety related critical components and constructions.)**
Applicant	:	**Mitac Digital Technology Corp.** **4F., NO. 1, R&D ROAD 2, HSINCHU SCIENCE PARK, HSINCHU 30076, TAIWAN, R.O.C.**
Standard	:	**FCC Part 15 Subpart C §15.247**

The product was received on Jun. 26, 2024 and testing was performed from Jul. 05, 2024 to Aug. 03, 2024. We, Sporton International Inc. Wensan Laboratory, 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 from Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory
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History of this test report

Report No.	Version	Description	Issued Date
FR430401G	01	Initial issue of report	Nov. 29, 2024
FR430401G	02	Revise appendix A, Section 3.2, 3.3 and 3.4 This report is an updated version, replacing the report issued on Nov. 29, 2024.	Dec. 17, 2024
FR430401G	03	Revise Product Feature of Equipment Under Test This report is an updated version, replacing the report issued on Dec. 17, 2024.	Dec. 25, 2024

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(a)(1)	Number of Channels	Pass	-
3.2	15.247(a)(1)	Hopping Channel Separation	Pass	-
3.3	15.247(a)(1)	Dwell Time of Each Channel	Pass	-
3.4	15.247(a)(1)	20dB Bandwidth	Pass	-
3.4	2.1049	99% Occupied Bandwidth	Reporting only	-
3.5	15.247(b)(2)	Peak Output Power	Pass	-
3.6	15.247(d)	Conducted Band Edges	Pass	-
3.7	15.247(d)	Conducted Spurious Emission	Pass	-
3.8	15.247(d)	Radiated Spurious Emission	Pass	6.08 dB under the limit at 30.81 MHz
3.9	15.207	AC Conducted Emission	Pass	22.12 dB under the limit at 2.43 MHz
3.10	15.203 & 15.247(b)	Antenna Requirement	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.

Reviewed by: Sheng Kuo
Report Producer: Ming Chen

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature
General Specs Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ac/ax, Wi-Fi 5GHz 802.11a/n/ac/ax, and Sub 1GHz. **Antenna Type** WLAN: PIFA Antenna Bluetooth: PIFA Antenna Sub 1G: PIFA Antenna

Antenna information		
902.2 MHz ~ 927.8 MHz	Peak Gain (dBi)	0.72

SKU List					
SKU	**Variant num**	**Wifi/BT**	**BLE**	**Sub GHz**	**Sound**
1	1	x	x	x	x
2	2	x	x	x	-
3	3	x	x	-	x
4	4	x	x	-	-
5	5	x	-	x	x
6	6	x	-	x	-
7	7	-	-	x	x
8	8	-	-	x	-

Remark:

1. The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.
2. The RF related hardware (including WLAN, Bluetooth, Sub 1Ghz module, and Sound) of all models are identical. The RF feature differences are controlled by the embedded software.

1.2 Modification of EUT

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

1.3 Testing Location

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	CO05-HY (TAF Code: 1190)
Remark	The AC Conducted Emission test item subcontracted to Sporton International Inc. EMC & Wireless Communications Laboratory.

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	Sporton International Inc. Wensan Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	TH05-HY, 03CH16-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW1190 and TW3786

1.4 Applicable Standards

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

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 15.247 Meas Guidance v05r02
- FCC KDB 414788 D01 Radiated Test Site v01r01
- 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.
3. The TAF code is not including all the FCC KDB listed without accreditation.

2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
902 – 928 MHz	1	902.2	28	907.6	55	913.0	82	918.4	109	923.8
	2	902.4	29	907.8	56	913.2	83	918.6	110	924.0
	3	902.6	30	908.0	57	913.4	84	918.8	111	924.2
	4	902.8	31	908.2	58	913.6	85	919.0	112	924.4
	5	903.0	32	908.4	59	913.8	86	919.2	113	924.6
	6	903.2	33	908.6	60	914.0	87	919.4	114	924.8
	7	903.4	34	908.8	61	914.2	88	919.6	115	925.0
	8	903.6	35	909.0	62	914.4	89	919.8	116	925.2
	9	903.8	36	909.2	63	914.6	90	920.0	117	925.4
	10	904.0	37	909.4	64	914.8	91	920.2	118	925.6
	11	904.2	38	909.6	65	915.0	92	920.4	119	925.8
	12	904.4	39	909.8	66	915.2	93	920.6	120	926.0
	13	904.6	40	910.0	67	915.4	94	920.8	121	926.2
	14	904.8	41	910.2	68	915.6	95	921.0	122	926.4
	15	905.0	42	910.4	69	915.8	96	921.2	123	926.6
	16	905.2	43	910.6	70	916.0	97	921.4	124	926.8
	17	905.4	44	910.8	71	916.2	98	921.6	125	927.0
	18	905.6	45	911.0	72	916.4	99	921.8	126	927.2
	19	905.8	46	911.2	73	916.6	100	922.0	127	927.4
	20	906.0	47	911.4	74	916.8	101	922.2	128	927.6
	21	906.2	48	911.6	75	917.0	102	922.4	129	927.8
	22	906.4	49	911.8	76	917.2	103	922.6	-	-
	23	906.6	50	912.0	77	917.4	104	922.8	-	-
	24	906.8	51	912.2	78	917.6	105	923.0	-	-
	25	907.0	52	912.4	79	917.8	106	923.2	-	-
	26	907.2	53	912.6	80	918.0	107	923.4	-	-
	27	907.4	54	912.8	81	918.2	108	923.6	-	-

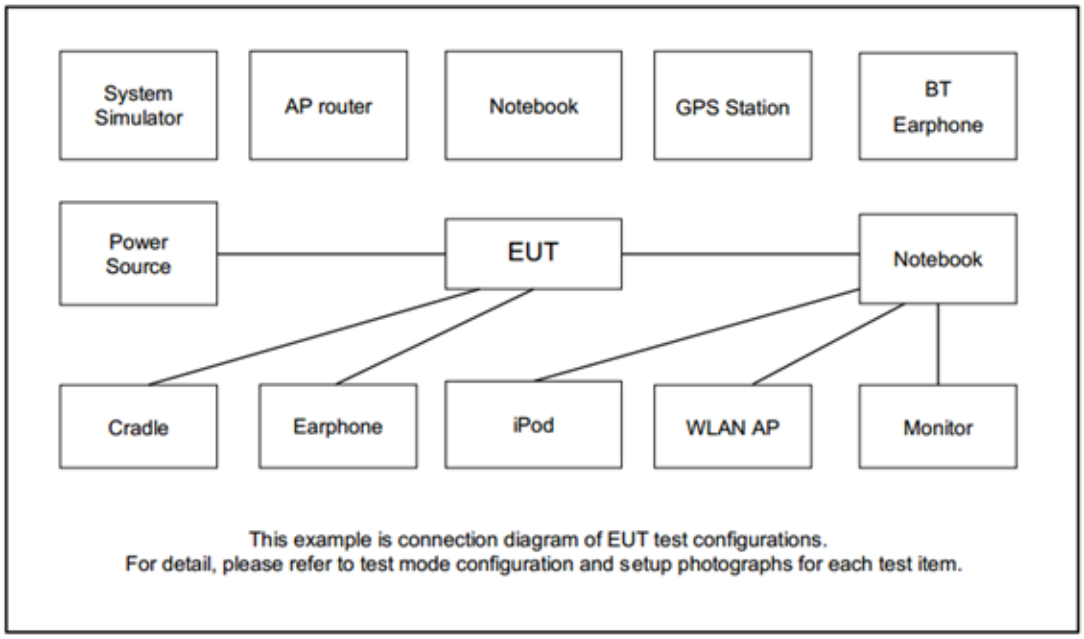
2.2 Test Mode

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, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and only the worst case emissions were reported in this report.

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

Summary table of Test Cases	
Test Item	**Sub-1GHz**
Conducted Test Cases	Mode 1: CH01 Tx_902.2 MHz Mode 2: CH65 Tx _915 MHz Mode 3: CH129 Tx _927.8 MHz
Conducted Test Cases	Mode 1: CH01 Tx_902.2 MHz Mode 2: CH65 Tx _915 MHz Mode 3: CH129 Tx _927.8 MHz
AC Conducted Emission	Mode 1: Sub-1GHz TX + Adapter + LAN Load for SKU 1 (G)
Remark: For Radiated Test Cases, the tests were performed with SKU 1 (E).	

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Mobile Phone	SAMSUNG	SM-A730F/DS	A3LSMA730F	N/A	N/A
2.	Notebook	Lenovo	L570	FCC DoC	Shielded, 0.3 m	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

2.5 EUT Operation Test Setup

The RF test items, utility “Putty 0.70” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

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 0.8 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).
= 0.8 + 10 = 10.8 (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; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies.

3.1.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.1.3 Test Procedure

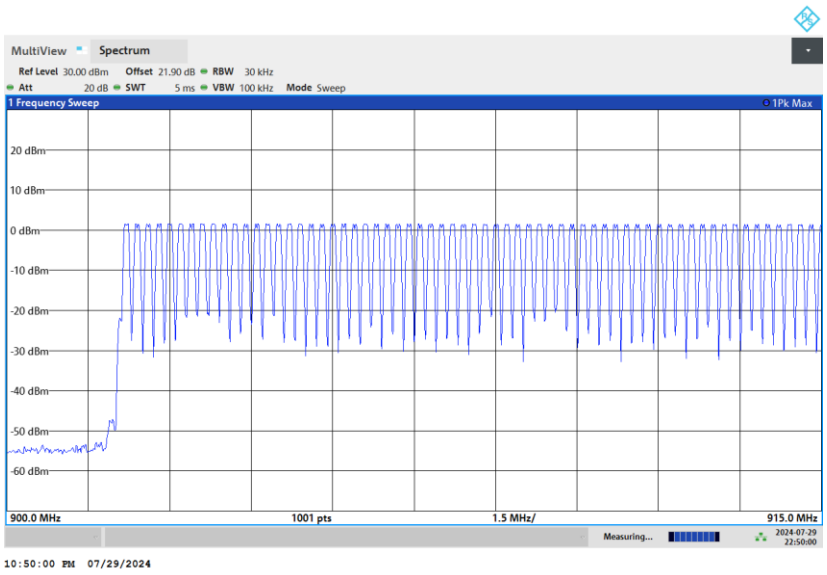
1. The testing follows ANSI C63.10-2013 clause 7.8.3.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = the frequency band of operation; RBW = 30 kHz; VBW ≥ RBW; 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 on Channel 01 - 129



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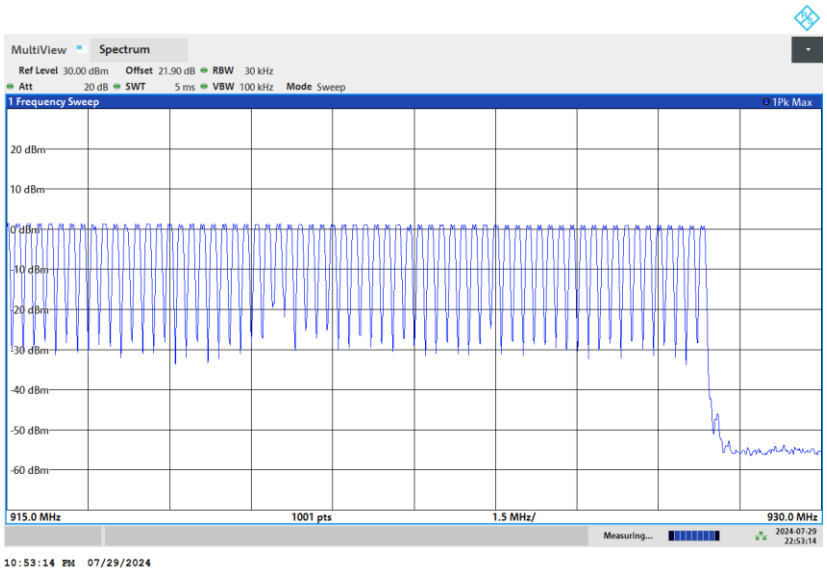

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3.2 Hopping Channel Separation Measurement

3.2.1 Limit of Hopping Channel Separation

Frequency hopping systems operating in the 902 – 928 MHz band 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.

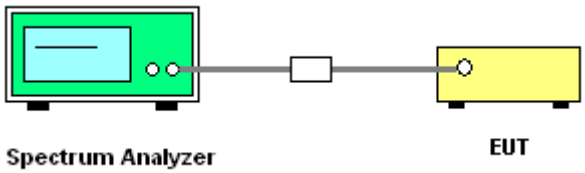
3.2.2 Measuring Instruments

Please refer to the measuring equipment list in 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 = 30kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

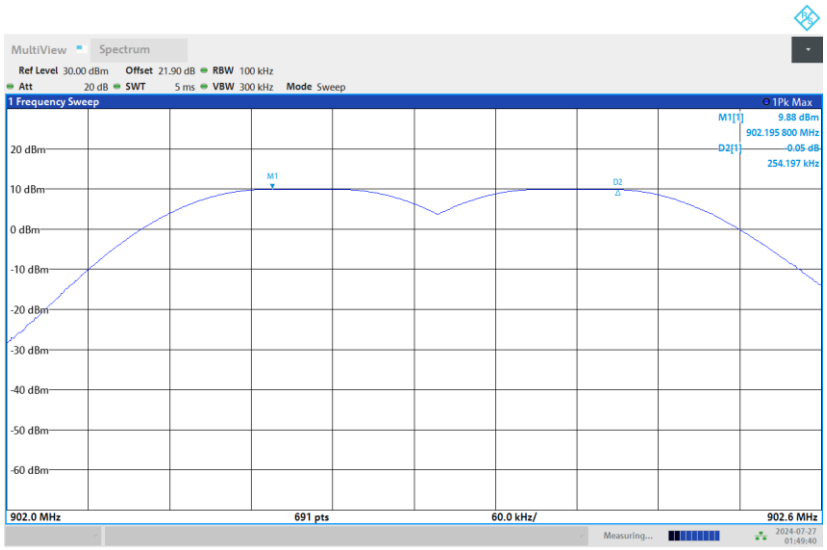
3.2.4 Test Setup



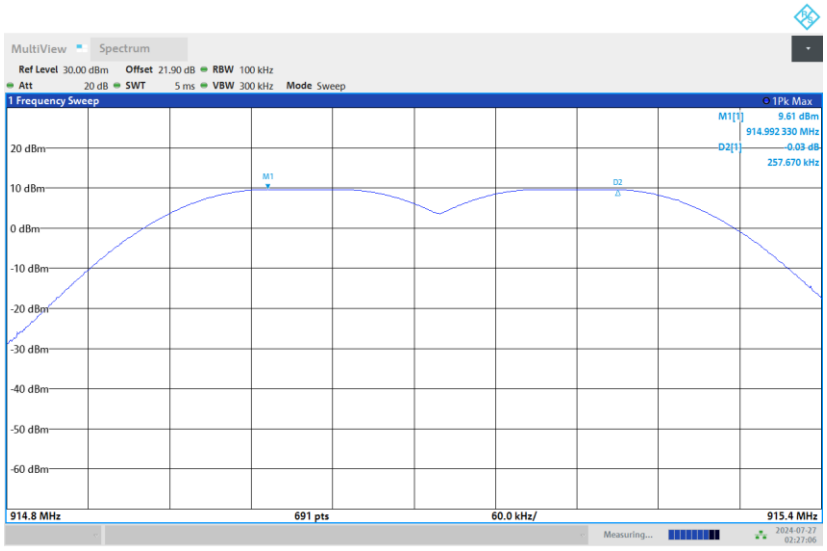
3.2.5 Test Result of Hopping Channel Separation

Please refer to Appendix A.

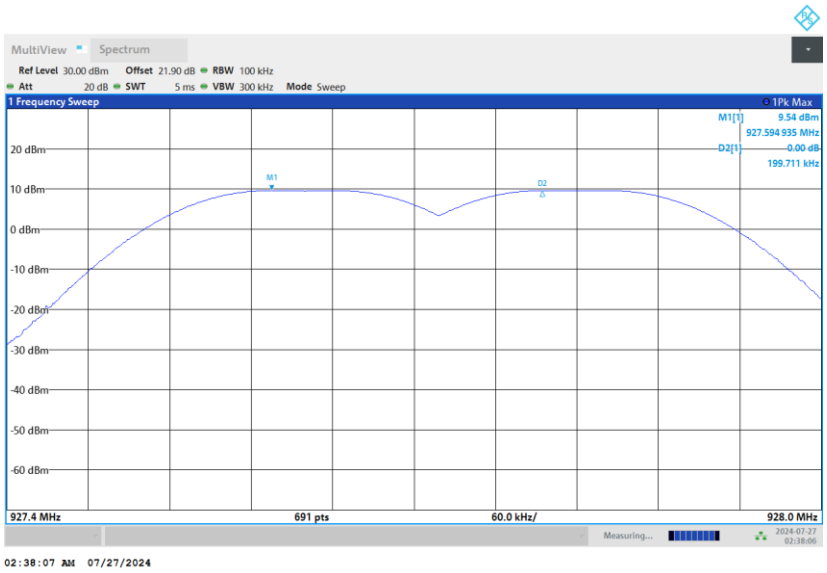
Channel Separation Plot on Channel 01



Channel Separation Plot on Channel 65



Channel Separation Plot on Channel 129



3.3 Dwell Time Measurement

3.3.1 Limit of Dwell Time

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 20 seconds multiplied by the number of hopping channels employed.

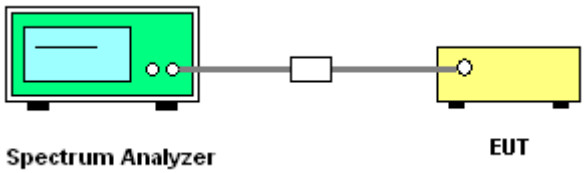
3.3.2 Measuring Instruments

Please refer to the measuring equipment list in 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 ≥ RBW; 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.

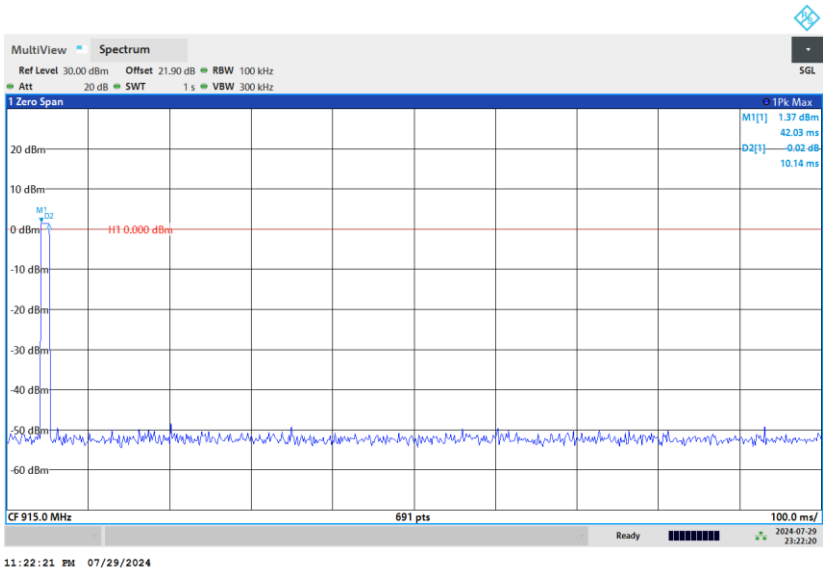
3.3.4 Test Setup



3.3.5 Test Result of Dwell Time

Please refer to Appendix A.

Package Transfer Time Plot



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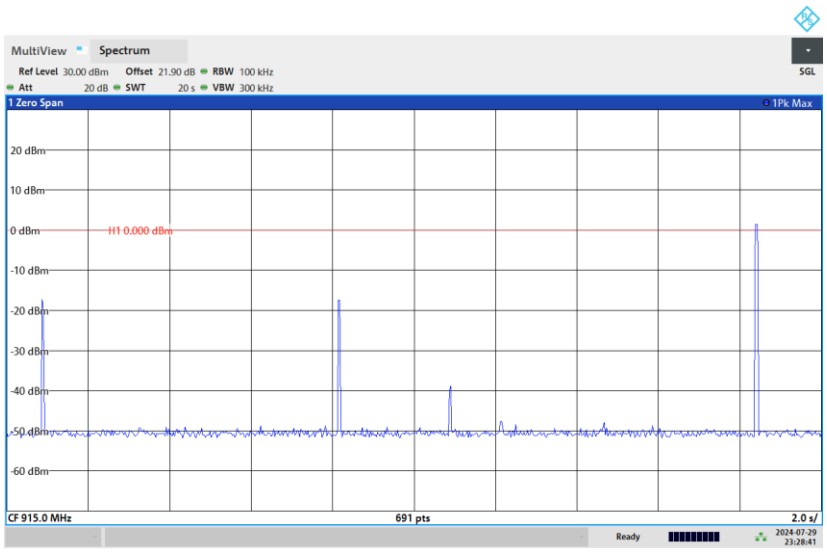

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3.4 20dB and 99% Bandwidth Measurement

3.4.1 Limit of 20dB and 99% Bandwidth

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

99% Bandwidth is reporting only.

3.4.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.4.3 Test Procedures

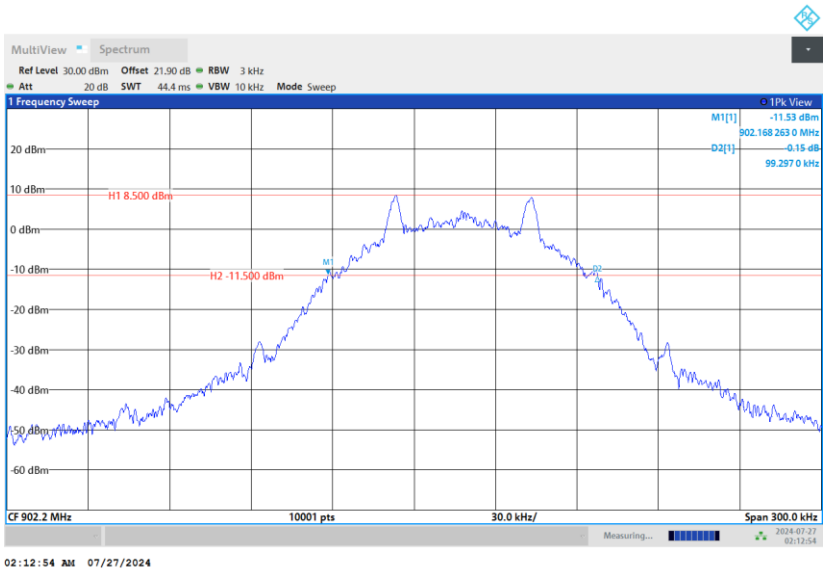
1. The testing follows ANSI C63.10-2013 clause 6.9.2 and 6.9.3.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. 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 ≥ 1-5% of the 99% bandwidth; VBW ≥ 3 * RBW; Sweep = auto; Detector function = peak;
   Trace = max hold.
6. Measure and record the results in the test report.

3.4.4 Test Setup

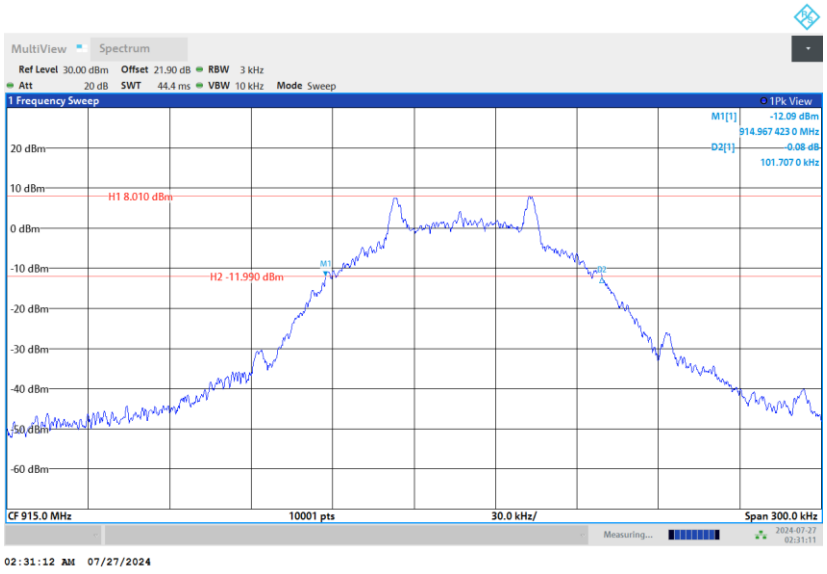
3.4.5 Test Result of 20dB Bandwidth

Please refer to Appendix A.

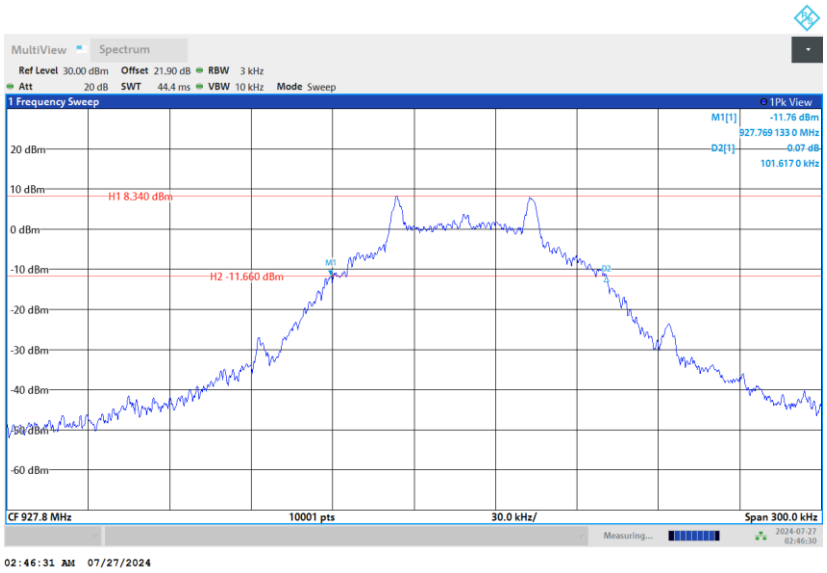
20 dB Bandwidth Plot on Channel 01



20 dB Bandwidth Plot on Channel 65



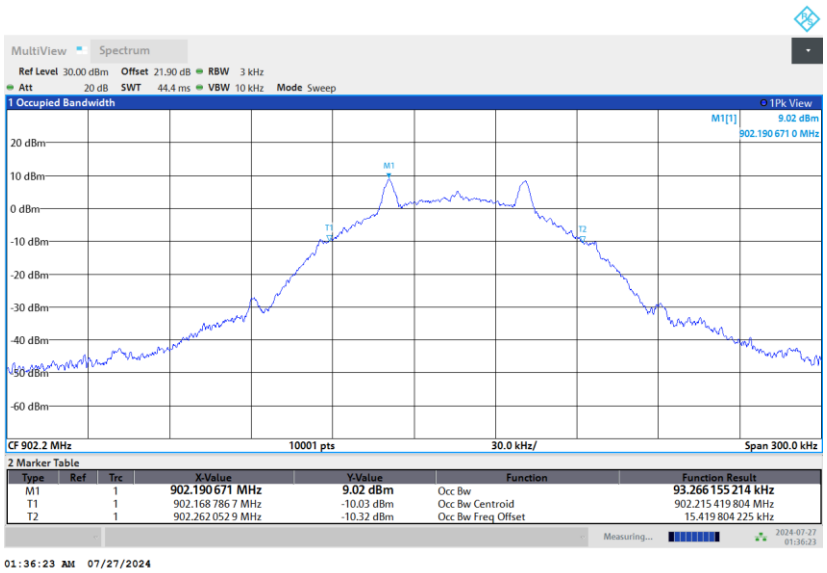
20 dB Bandwidth Plot on Channel 129



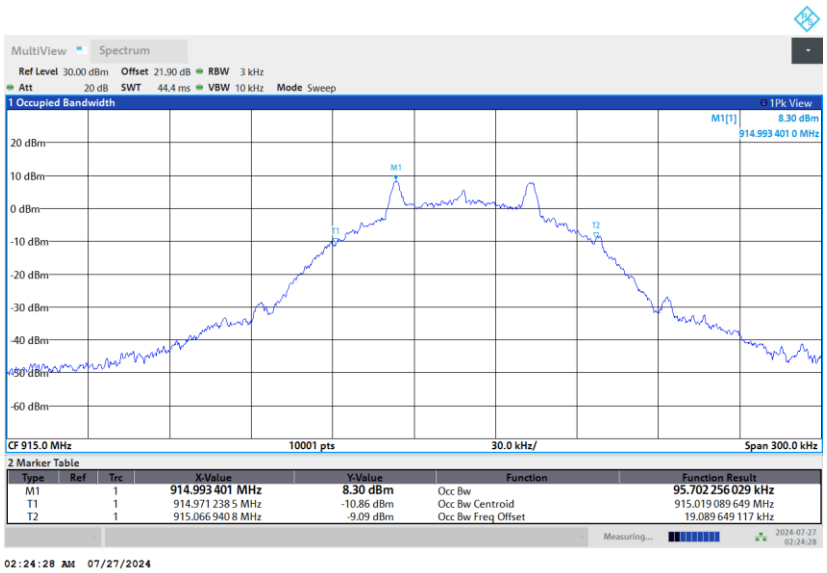
3.4.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

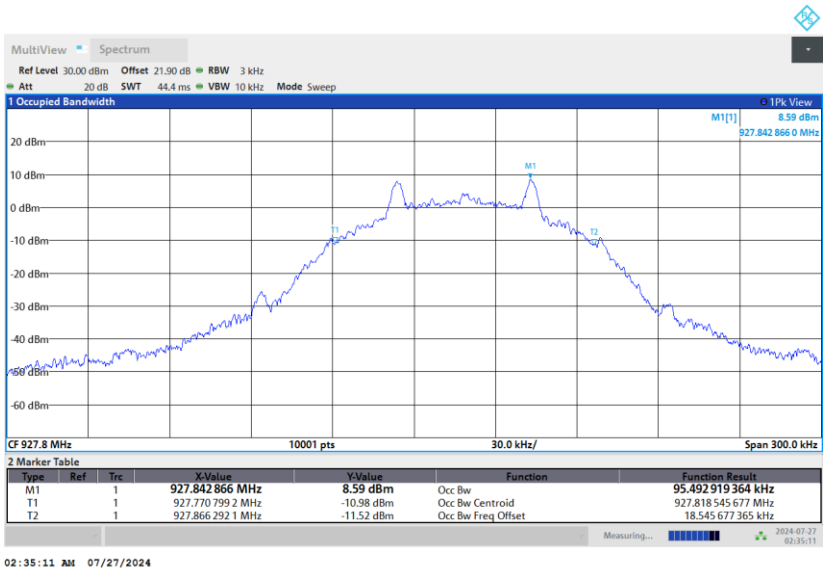
99% Occupied Bandwidth Plot on Channel 01



99% Occupied Bandwidth Plot on Channel 65



99% Occupied Bandwidth Plot on Channel 129



3.5 Output Power Measurement

3.5.1 Limit of Output Power

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.

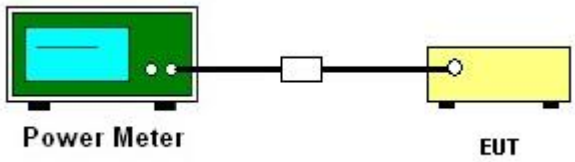
3.5.2 Measuring Instruments

Please refer to the measuring equipment list in 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.

3.5.6 Test Result of Average Output Power (Reporting Only)

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.

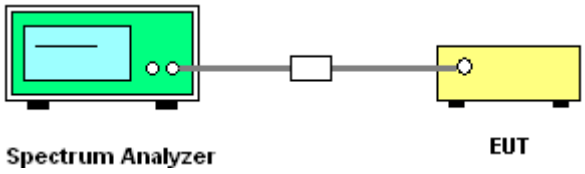
3.6.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.6.3 Test Procedures

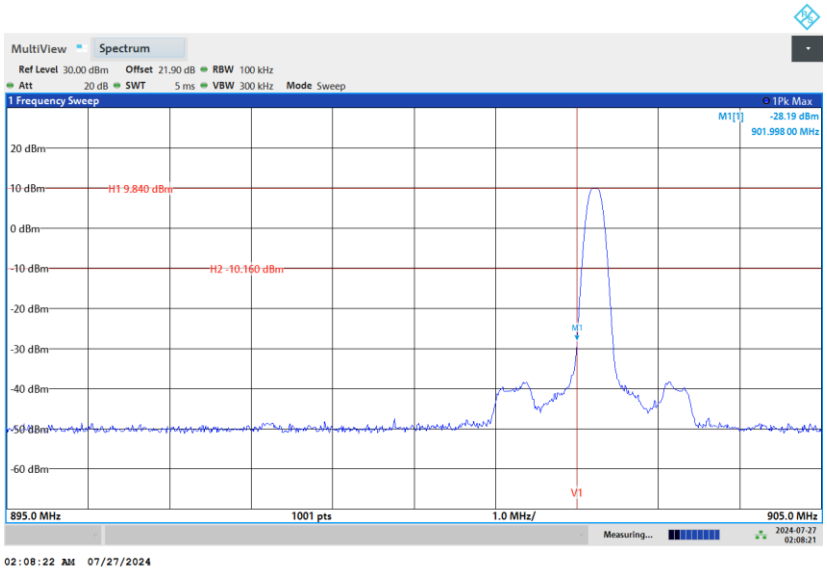
1. The testing follows ANSI C63.10-2013 clause 7.8.6.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 100kHz, VBW = 300kHz. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. 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



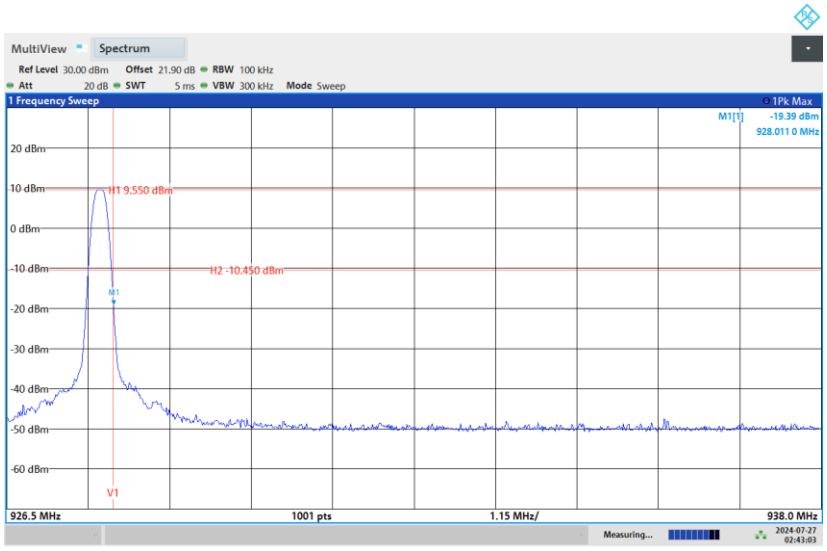
3.6.5 Test Result of Conducted Band Edges

Low Band Edge Plot on Channel 01



02:08:22 AM 07/27/2024

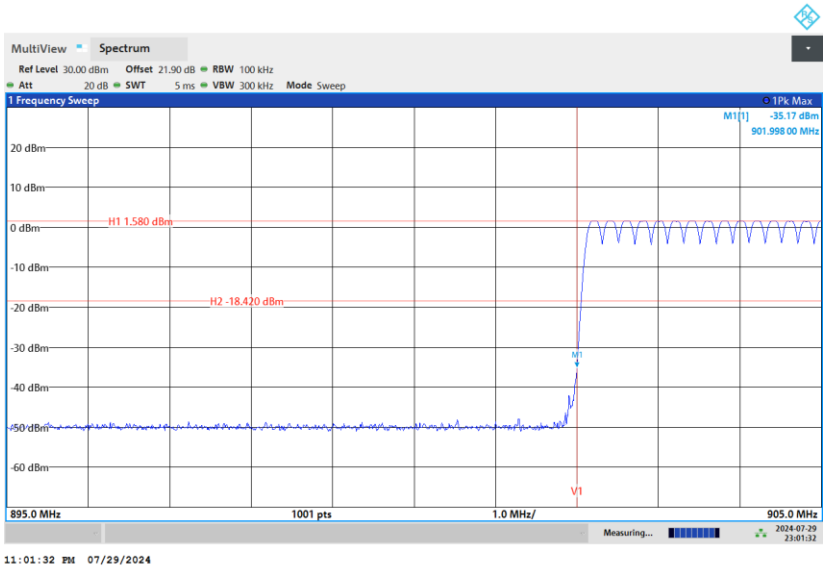
High Band Edge Plot on Channel 129



02:43:04 AM 07/27/2024

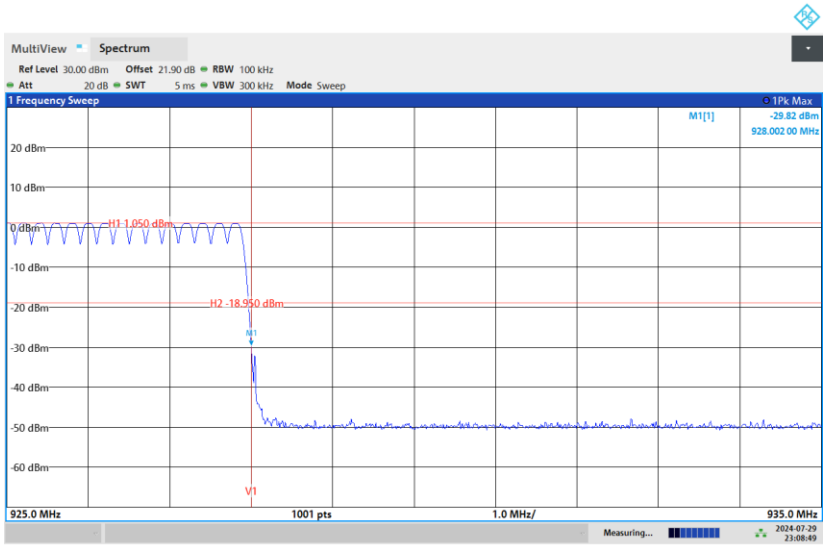
3.6.6 Test Result of Conducted Hopping Mode Band Edges

Hopping Mode Low Band Edge Plot



11:01:32 PM 07/29/2024

Hopping Mode High Band Edge Plot



11:08:49 PM 07/29/2024

3.7 Conducted Spurious Emission Measurement

3.7.1 Limit of Conducted Spurious Emission

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.

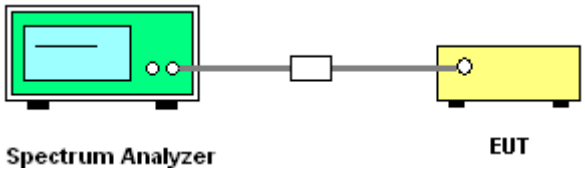
3.7.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.7.3 Test Procedure

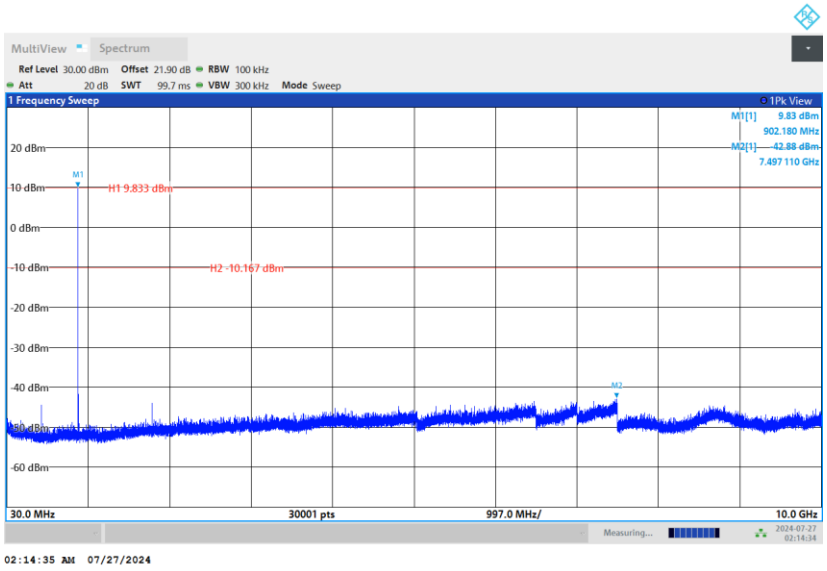
1. The testing follows ANSI C63.10-2013 clause 7.8.8.
2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
3. Set the maximum power setting and enable the EUT to transmit continuously.
4. Set RBW = 100 kHz, VBW = 300 kHz, scan up through 10th harmonic. All harmonics / spurious 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



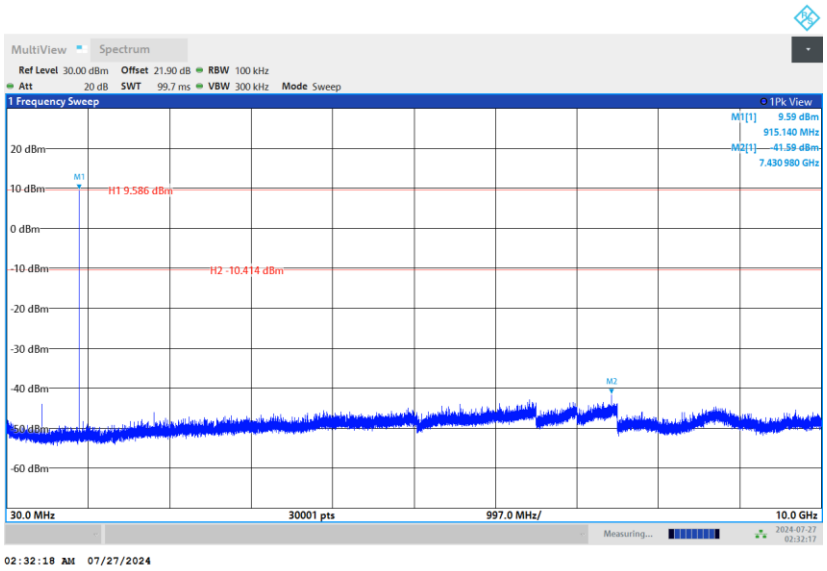
3.7.5 Test Result of Conducted Spurious Emission

CSE Plot on Channel 01



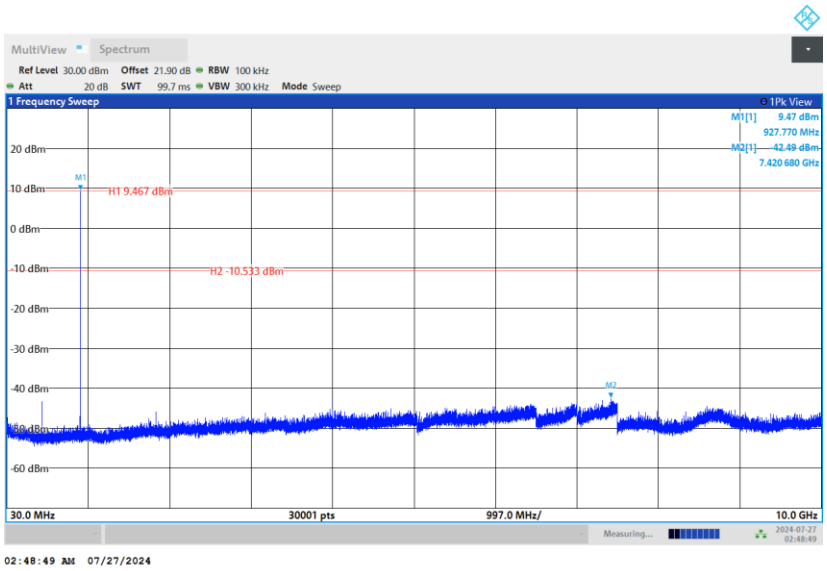
02:14:35 AM 07/27/2024

CSE Plot on Channel 65



02:32:18 AM 07/27/2024

CSE Plot on Channel 129



3.8 Radiated Spurious Emission Measurement

3.8.1 Limit of Radiated 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

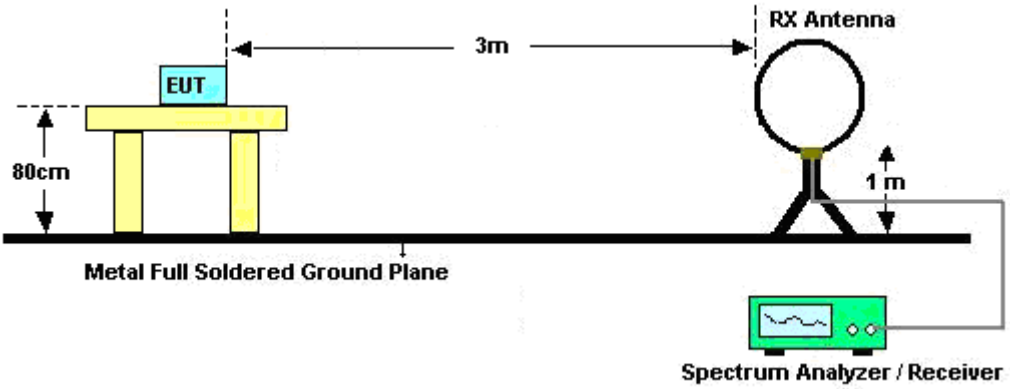
Please refer to the measuring equipment list in this test report.

3.8.3 Test Procedures

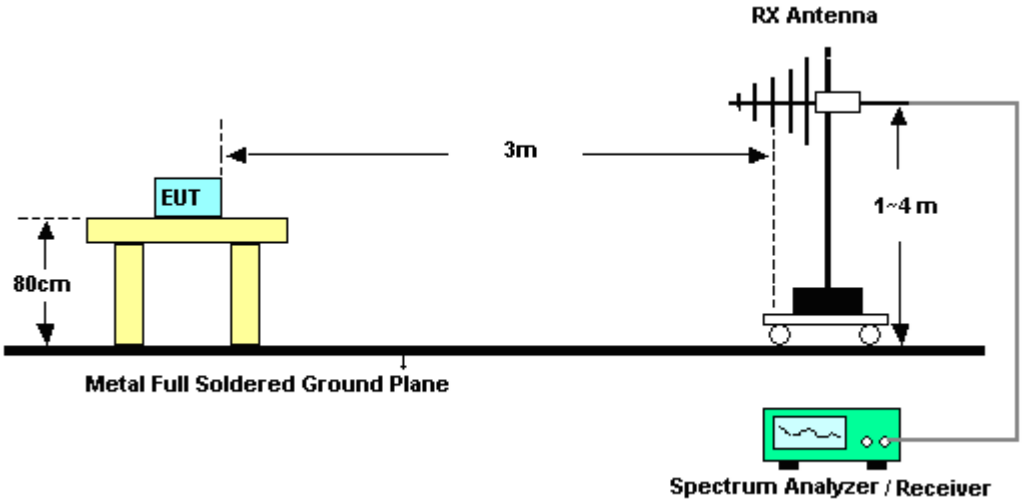
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements
2. The EUT is arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT is placed on a turntable with 0.8 meter for frequency below 1 GHz and 1.5 meter for frequency above 1 GHz respectively above ground.
4. The EUT is set 3 meters away from the receiving antenna, which is mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. Radiated testing below 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading. When there is no suspected emission found and the emission level is with at least 6 dB margin against QP limit line, the position is marked as "-".
7. Radiated testing above 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading for scanning all frequencies. When there is no suspected emission found and the harmonic emission level is with at least 6 dB margin against average limit line, the position is marked as "-".
8. 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; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW = 3 MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.8.4 Test Setup

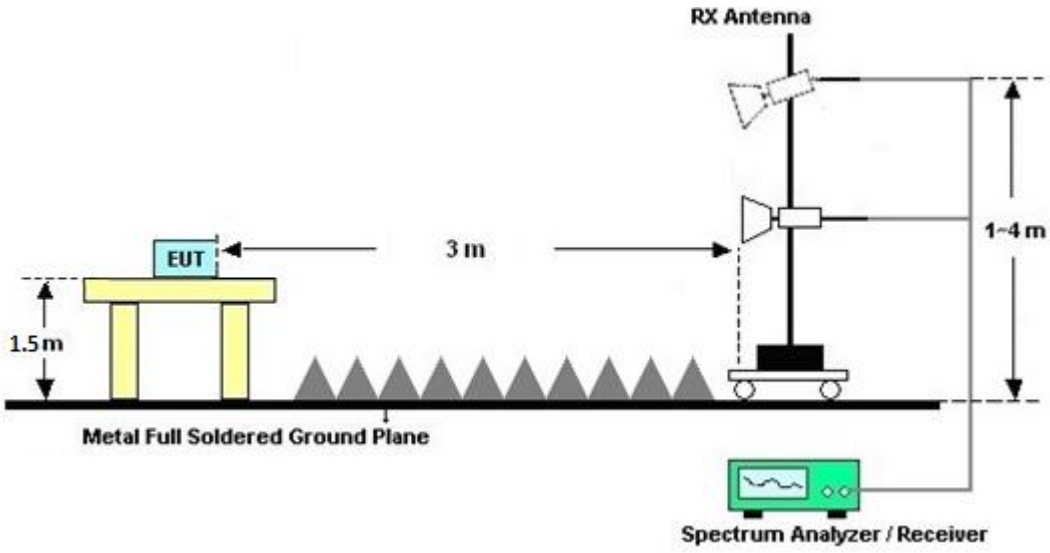
For radiated test below 30MHz



For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



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

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

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result comes out very similar.

3.8.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C and D.

3.8.7 Duty Cycle

Please refer to Appendix E.

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

Please refer to Appendix C and D.

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.

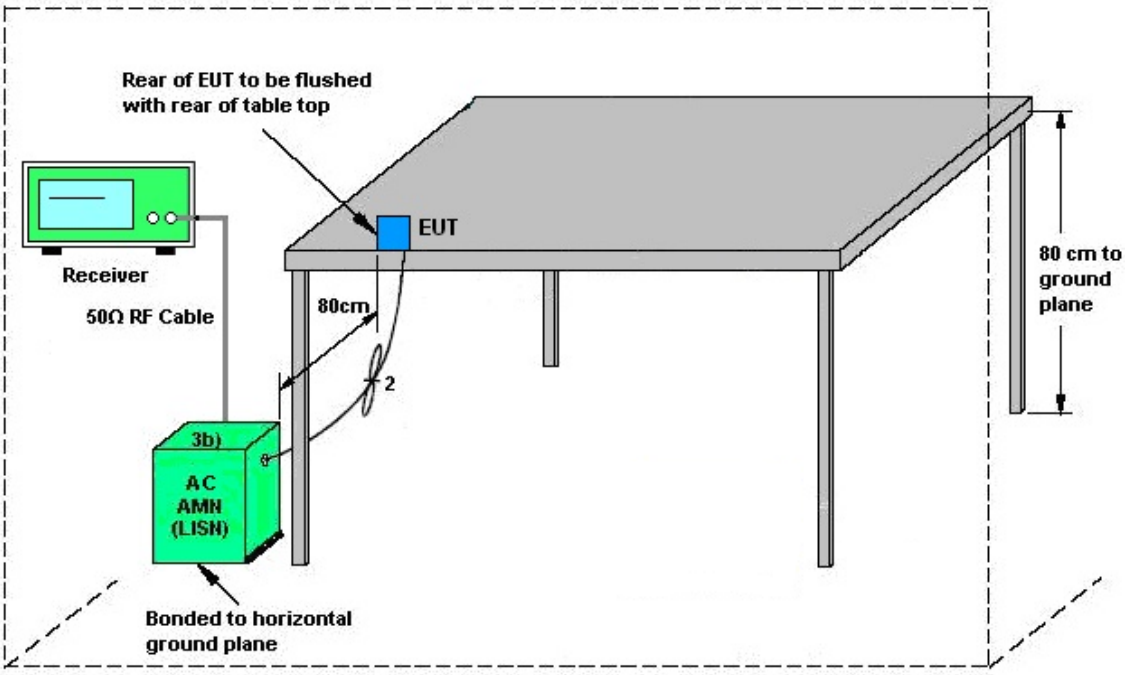
3.9.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.9.3 Test Procedures

9. The EUT is placed 0.4 meter away from the conducting wall of the shielding room, and is kept at least 80 centimeters from any other grounded conducting surface.
10. Connect EUT to the power mains through a line impedance stabilization network (LISN).
11. All the support units are connecting to the other LISN.
12. The LISN provides 50 ohm coupling impedance for the measuring instrument.
13. The FCC states that a 50 ohm, 50 microhenry LISN shall be used.
14. Both Line and Neutral shall be tested in order to find out the maximum conducted emission.
15. The frequency range from 150 kHz to 30 MHz is scanned.
16. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

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

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

3.10.2 Antenna Anti-Replacement Construction

Antenna permanently attached.

4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	TECPEL	DTM-303A	TP201996	N/A	Nov. 07, 2023	Jul. 05, 2024~ Jul. 29, 2024	Nov. 06, 2024	Conducted (TH05-HY)
Power Meter	Anritsu	ML2495A	1218006	N/A	Sep. 20, 2023	Jul. 05, 2024~ Jul. 29, 2024	Sep. 19, 2024	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1207363	300MHz~40GHz	Sep. 20, 2023	Jul. 05, 2024~ Jul. 29, 2024	Sep. 19, 2024	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV3044	101466	10HZ~44GHZ	Jan. 24, 2024	Jul. 05, 2024~ Jul. 29, 2024	Jan. 23, 2025	Conducted (TH05-HY)
Switch Control Mainframe	EM Electronics	EMSW18SE	SW200302 (BOX9)	N/A	Mar. 08, 2024	Jul. 05, 2024~ Jul. 29, 2024	Mar. 07, 2025	Conducted (TH05-HY)
Software	Sporton	BTWIFI_Final_version:1.0(2024-04-11)	N/A	Conducted Items	N/A	Jul. 05, 2024~ Jul. 29, 2024	N/A	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jul. 17, 2024	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Dec. 06, 2023	Jul. 17, 2024	Dec. 05, 2024	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Oct. 26, 2023	Jul. 17, 2024	Oct. 25, 2024	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 22, 2023	Jul. 17, 2024	Nov. 21, 2024	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	Jul. 17, 2024	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-F N	00691	N/A	Jul. 28, 2023	Jul. 17, 2024	Jul. 27, 2024	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 28, 2023	Jul. 17, 2024	Dec. 27, 2024	Conduction (CO05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Sep. 12, 2023	Jul. 17, 2024~ Aug. 03, 2024	Sep. 11, 2024	Radiation (03CH16-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA9170	00993	18GHz-40GHz	Nov. 24, 2023	Jul. 17, 2024~ Aug. 03, 2024	Nov. 23, 2024	Radiation (03CH16-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY57290111	3Hz~26.5GHz	Dec. 04, 2023	Jul. 17, 2024~ Aug. 03, 2024	Dec. 03, 2024	Radiation (03CH16-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00802N1D01N-06	47020 & 06	30MHz to 1GHz	Oct. 07, 2023	Jul. 17, 2024~ Aug. 03, 2024	Oct. 06, 2024	Radiation (03CH16-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1522	1G~18GHz	Mar. 28, 2024	Jul. 17, 2024~ Aug. 03, 2024	Mar. 27, 2025	Radiation (03CH16-HY)
Amplifier	SONOMA	310N	371607	9kHz~1GHz	Jul. 02, 2024	Jul. 17, 2024~ Aug. 03, 2024	Jul. 01, 2025	Radiation (03CH16-HY)
Preamplifier	Keysight	83017A	MY53270264	1GHz~26.5GHz	Dec. 07, 2023	Jul. 17, 2024~ Aug. 03, 2024	Dec. 06, 2024	Radiation (03CH16-HY)
Preamplifier	EMEC	EM1G18G	060812	1GHz~18GHz	Dec. 25, 2023	Jul. 17, 2024~ Aug. 03, 2024	Dec. 24, 2024	Radiation (03CH16-HY)
Preamplifier	EMEC	EM18G40G	060872	18GHz~40GHz	Sep. 06, 2023	Jul. 17, 2024~ Aug. 03, 2024	Sep. 05, 2024	Radiation (03CH16-HY)
Filter	Wainwright	WLK4-1000-1530-8000-40SS	SN17	1.53GHz Low Pass Filter	Jan. 15, 2024	Jul. 17, 2024~ Aug. 03, 2024	Jan. 14, 2025	Radiation (03CH16-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60ST	SN3	3GHz High Pass Filter	Jun. 28, 2024	Jul. 17, 2024~ Aug. 03, 2024	Jun. 27, 2025	Radiation (03CH16-HY)
Filter	Wainwright	WHKX8-5872.5-6750-18000-40ST	SN27	6.75GHz High Pass Filter	Nov. 13, 2023	Jul. 17, 2024~ Aug. 03, 2024	Nov. 12, 2024	Radiation (03CH16-HY)

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803951/2	9K~30M	Mar. 06, 2024	Jul. 17, 2024~ Aug. 03, 2024	Mar. 05, 2025	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102/SUCOFLEX 104	EC-A5-300-5 757,805935/4 ,802434/4	30MHz~18GHz	Aug. 08, 2023	Jul. 17, 2024~ Aug. 03, 2024	Aug. 07, 2024	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	804011/2,804 012/2	18-40GHz	Jan. 02, 2024	Jul. 17, 2024~ Aug. 03, 2024	Jan. 01, 2025	Radiation (03CH16-HY)
Software	Audix	E3 230621 V9	RK-002393	N/A	N/A	Jul. 17, 2024~ Aug. 03, 2024	N/A	Radiation (03CH16-HY)
Controller	ChainTek	3000-1	N/A	Control Turn table & Ant Mast	N/A	Jul. 17, 2024~ Aug. 03, 2024	N/A	Radiation (03CH16-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Jul. 17, 2024~ Aug. 03, 2024	N/A	Radiation (03CH16-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Jul. 17, 2024~ Aug. 03, 2024	N/A	Radiation (03CH16-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.5 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	6.5 dB

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 6000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.5 dB

Uncertainty of Radiated Emission Measurement (6000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.5 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.5 dB

Uncertainty of 99% Occupied Bandwidth

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	0.002 MHz

Uncertainty of Maximum Conducted Output Power

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	0.8 dB

Uncertainty of Conducted Spurious Emission

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.5 dB

Uncertainty of Conducted Band Edges

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	0.92 dB

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Shiming Liu	Temperature:	23~25	°C
Test Date:	2024/7/5~2024/7/29	Relative Humidity:	54~58	%

TEST RESULTS DATA
20dB and 99% Occupied Bandwidth and Hopping Channel Separation

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	20db BW (MHz)	99% Bandwidth (MHz)	Hopping Channel Separation Measurement (MHz)	Hopping Channel Separation Measurement Limit (MHz)	Pass/Fail
FSK	50Kbps	1	1	902.2	0.099	0.093	0.254	0.0993	Pass
FSK	50Kbps	1	65	915	0.102	0.096	0.258	0.1017	Pass
FSK	50Kbps	1	129	927.8	0.102	0.095	0.200	0.1016	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	10.14	0.01	0.4	Pass

TEST RESULTS DATA
Peak Power Table

Mod.	CH.	NTX	Peak Power (dBm)	Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Test Result
FSK	1	1	**10.40**	30.00	0.72	11.12	36.00	Pass
	65	1	10.12	30.00	0.72	10.84	36.00	Pass
	129	1	10.07	30.00	0.72	10.79	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

Mod.	CH.	NTX	Average Power (dBm)	Duty Factor (dB)
FSK	1	1	**10.15**	0.00
	65	1	9.84	0.00
	129	1	9.80	0.00

TEST RESULTS DATA
Number of Hopping Frequency

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

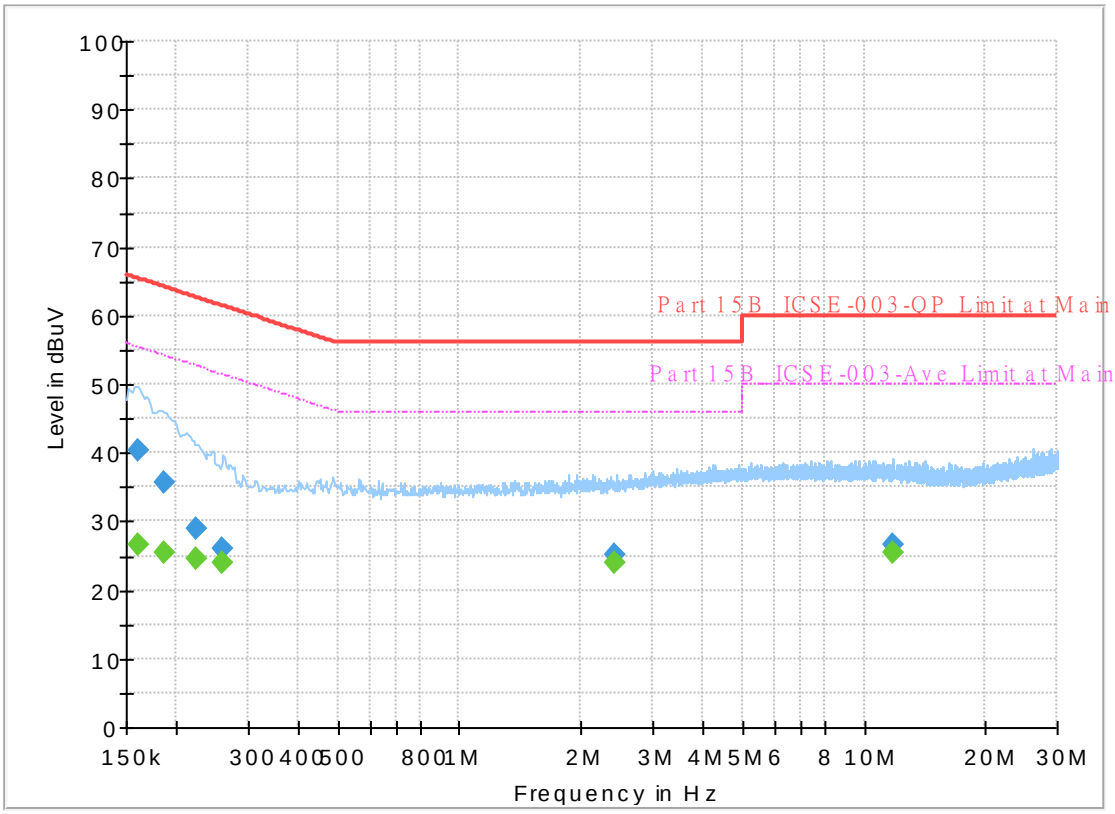
Appendix B. AC Conducted Emission Test Results

Test Engineer :	Calvin Wang	**Temperature :**	23~26℃
		Relative Humidity :	45~55%

EUT Information

Report NO :	430401
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Line

Full Spectrum



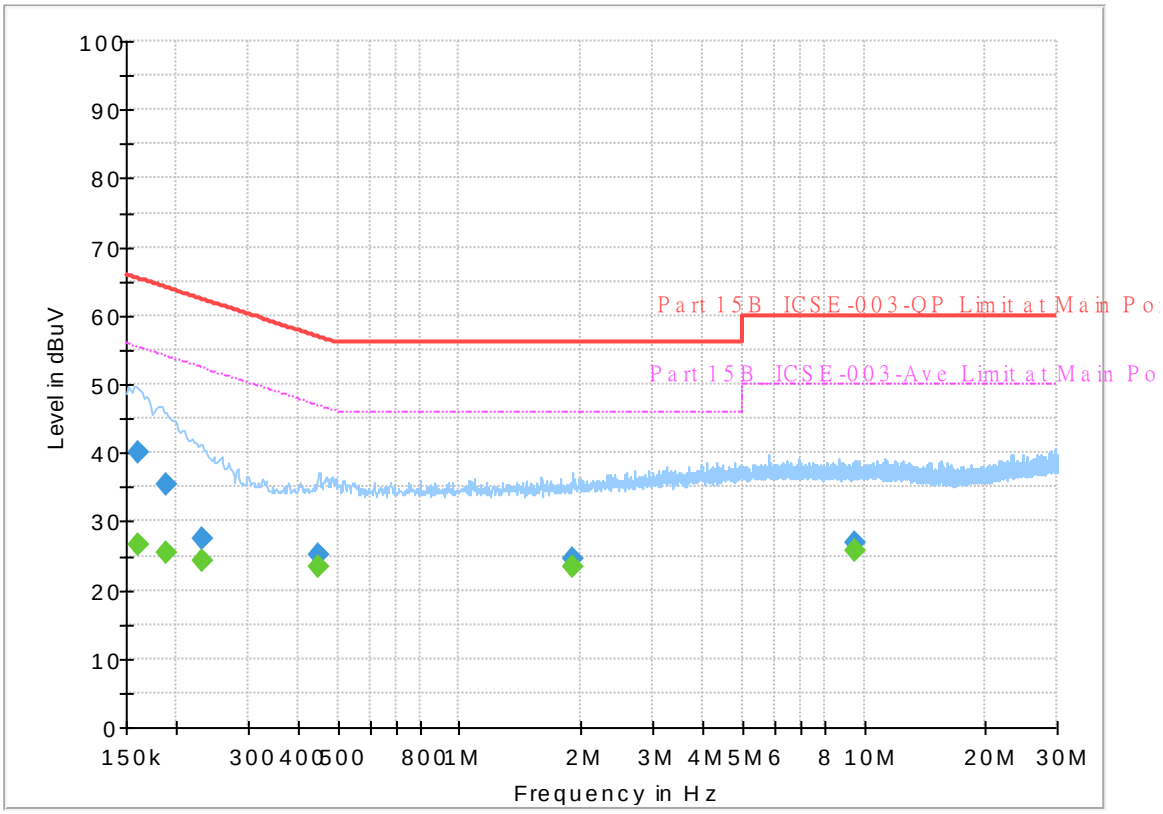
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.161250	---	26.75	55.40	28.65	L1	OFF	19.8
0.161250	40.22	---	65.40	25.18	L1	OFF	19.8
0.186000	---	25.42	54.21	28.79	L1	OFF	19.8
0.186000	35.62	---	64.21	28.59	L1	OFF	19.8
0.224250	---	24.42	52.66	28.24	L1	OFF	19.8
0.224250	28.80	---	62.66	33.86	L1	OFF	19.8
0.260250	---	23.97	51.42	27.45	L1	OFF	19.8
0.260250	26.03	---	61.42	35.39	L1	OFF	19.8
2.429250	---	23.88	46.00	22.12	L1	OFF	19.9
2.429250	25.10	---	56.00	30.90	L1	OFF	19.9
11.823000	---	25.48	50.00	24.52	L1	OFF	20.4
11.823000	26.66	---	60.00	33.34	L1	OFF	20.4

EUT Information

Report NO :	430401
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Neutral

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.161250	---	26.73	55.40	28.67	N	OFF	19.8
0.161250	40.05	---	65.40	25.35	N	OFF	19.8
0.188250	---	25.30	54.11	28.81	N	OFF	19.8
0.188250	35.45	---	64.11	28.66	N	OFF	19.8
0.231000	---	24.21	52.41	28.20	N	OFF	19.8
0.231000	27.36	---	62.41	35.05	N	OFF	19.8
0.449250	---	23.46	46.89	23.43	N	OFF	19.8
0.449250	25.16	---	56.89	31.73	N	OFF	19.8
1.898250	---	23.53	46.00	22.47	N	OFF	19.9
1.898250	24.62	---	56.00	31.38	N	OFF	19.9
9.525750	---	25.64	50.00	24.36	N	OFF	20.3
9.525750	26.97	---	60.00	33.03	N	OFF	20.3

Appendix C. Radiated Spurious Emission Test Data

Test Engineer :	Bill Chang, Gary Guo and Steven Wu	**Temperature :**	18.2~20.2°C
		Relative Humidity :	54.2~56.1%

Sub 1GHz

(30MHz ~ 1GHz)

Sub 1GHz	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		31.62	31.3	-8.7	40	29.49	23.79	0.73	32.6	-	-	P	H
		98.31	34.26	-9.24	43.5	39.65	15.79	1.39	32.48	-	-	P	H
		219.27	31.04	-14.96	46	36.24	15.35	2.07	32.53	-	-	P	H
	#	451.2	51.48	5.48	46	47.9	23.07	3.08	32.55	182	322	P	H
		565.3	37.15	-8.85	46	30.7	26.04	3.41	33.04	-	-	P	H
	#	806.1	44.97	-1.03	46	35.02	27.91	4.18	32.21	214	0	P	H
	*	902.2	102.87	-	-	91.56	29.01	4.43	32.25	282	358	P	H
													H
													H
													H
													H
CH 01													H
902.2MHz		30.54	33.44	-6.56	40	31.29	24.15	0.71	32.61	-	-	P	V
		183.36	31.9	-11.6	43.5	37.35	15	1.85	32.26	-	-	P	V
		292.17	31.34	-14.66	46	31.94	19.12	2.47	32.2	-	-	P	V
	#	451.2	48.17	2.17	46	44.59	23.07	3.08	32.55	112	60	P	V
	#	806.1	47.34	1.34	46	37.39	27.91	4.18	32.21	110	30	P	V
	*	902.2	110.28	-	-	98.97	29.01	4.43	32.25	100	171	P	V
	#	950.3	49.12	3.12	46	35.36	30.75	4.55	31.75	100	176	P	V
													V
													V
													V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against limit line.
3. Non restricted band limit is radio frequency level down 20dB.
4. "#" Unwanted signals belong to the non-restricted band and meets the requirements of 15.247(d).

(1GHz ~ 10GHz)

Sub 1GHz	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path 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)
		1804.4	41.22	-32.78	74	77.07	25	6.65	67.97	215	302	P	H
		2706.6	38.24	-35.76	74	69.02	28.17	7.98	67.26	-	-	P	H
													H
													H
													H
													H
													H
CH 01													H
902.2MHz		1804.4	43.74	-30.26	74	79.59	25	6.65	67.97	214	160	P	V
		2706.6	38.16	-35.84	74	68.94	28.17	7.98	67.26	-	-	P	V
													V
													V
													V
													V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.
3. Non restricted band limit is radio frequency level down 20dB.

Sub 1GHz

(30MHz ~ 1GHz)

Sub 1GHz	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		30.27	31.18	-8.82	40	28.92	24.28	0.7	32.62	-	-	P	H
		98.58	34.48	-9.02	43.5	39.84	15.81	1.39	32.47	-	-	P	H
		296.22	30.45	-15.55	46	30.95	19.18	2.49	32.18	-	-	P	H
	#	457.5	52.85	6.85	46	49.17	23.2	3.09	32.59	176	317	P	H
		600.3	39.8	-6.2	46	33.48	25.58	3.57	32.89	-	-	P	H
	#	818.7	44.93	-1.07	46	34.86	27.99	4.2	32.2	211	171	P	H
	*	915	103.05	-	-	91.09	29.46	4.46	32.11	112	33	P	H
													H
													H
													H
													H
CH 65													H
915MHz		30.81	33.92	-6.08	40	31.89	24.03	0.71	32.61	-	-	P	V
		183.36	31.46	-12.04	43.5	36.91	15	1.85	32.26	-	-	P	V
		221.7	31.29	-14.71	46	36.28	15.53	2.09	32.52	-	-	P	V
	#	457.5	48.63	2.63	46	44.95	23.2	3.09	32.59	114	59	P	V
	#	818.7	47.28	1.28	46	37.21	27.99	4.2	32.2	110	28	P	V
	#	867	46.51	0.51	46	35.19	29.06	4.31	32.21	100	189	P	V
	*	915	110.24	-	-	98.28	29.46	4.46	32.11	100	175	P	V
													V
													V
													V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against limit line.
3. Non restricted band limit is radio frequency level down 20dB.
4. "#" Unwanted signals belong to the non-restricted band and meets the requirements of 15.247(d).

(1GHz ~ 10GHz)

Sub 1GHz	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path 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)
		1009	44.87	-29.13	74	81.92	24.8	4.73	68.77	101	329	P	H
		1009	40.74	-13.26	54	77.79	24.8	4.73	68.77	101	329	A	H
		1830	42.52	-31.48	74	78.21	25.1	6.7	67.95	317	144	P	H
		2745	37.28	-36.72	74	68.07	28.05	8.04	67.21	-	-	P	H
													H
													H
													H
CH 65													H
915MHz		1009	49.42	-24.58	74	86.47	24.8	4.73	68.77	269	183	P	V
		1009	47.22	-6.78	54	84.27	24.8	4.73	68.77	269	183	A	V
		1830	44.76	-29.24	74	80.45	25.1	6.7	67.95	100	101	P	V
		2745	38.7	-35.3	74	69.49	28.05	8.04	67.21	-	-	P	V
													V
													V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.
3. Non restricted band limit is radio frequency level down 20dB.

Sub 1GHz

(30MHz ~ 1GHz)

Sub 1GHz	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		32.16	31.37	-8.63	40	29.75	23.6	0.73	32.6	-	-	P	H
		98.31	33.9	-9.6	43.5	39.29	15.79	1.39	32.48	-	-	P	H
		221.16	31.52	-14.48	46	36.55	15.5	2.08	32.52	-	-	P	H
	#	463.8	52.81	6.81	46	49.06	23.31	3.09	32.63	165	323	P	H
		599.6	38.64	-7.36	46	32.32	25.58	3.57	32.89	-	-	P	H
	#	832	45.49	-0.51	46	34.79	28.57	4.23	32.19	204	163	P	H
	*	927.8	104.22	-	-	91.66	29.88	4.49	31.98	110	33	P	H
													H
													H
													H
													H
CH 129													H
927.8MHz		30.27	33.74	-6.26	40	31.48	24.28	0.7	32.62	-	-	P	V
		98.31	30.63	-12.87	43.5	36.02	15.79	1.39	32.48	-	-	P	V
		221.97	30.65	-15.35	46	35.62	15.55	2.09	32.52	-	-	P	V
	#	463.8	47.25	1.25	46	43.5	23.31	3.09	32.63	114	58	P	V
	#	832	47.69	1.69	46	36.99	28.57	4.23	32.19	108	30	P	V
	#	879.6	46.74	0.74	46	35.55	28.92	4.35	32.23	100	246	P	V
	*	927.8	109.91	-	-	97.35	29.88	4.49	31.98	100	175	P	V
													V
													V
													V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against limit line.
3. Non restricted band limit is radio frequency level down 20dB.
4. "#" Unwanted signals belong to the non-restricted band and meets the requirements of 15.247(d).

(1GHz ~ 10GHz)

Sub 1GHz	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path 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)
		1027	43.99	-30.01	74	80.97	24.9	4.78	68.75	328	311	P	H
		1027	38.84	-15.16	54	75.82	24.9	4.78	68.75	328	311	A	H
		1855.6	46.45	-27.55	74	81.98	25.21	6.75	67.94	266	138	P	H
		2783.4	44.33	-29.67	74	74.73	28.33	8.1	67.17	175	169	P	H
		2783.4	39.44	-14.56	54	69.84	28.33	8.1	67.17	175	169	A	H
													H
													H
CH 129													H
927.8MHz		1027	48.64	-25.36	74	85.62	24.9	4.78	68.75	196	186	P	V
		1027	45.74	-8.26	54	82.72	24.9	4.78	68.75	196	186	A	V
		1855.6	48.86	-25.14	74	84.39	25.21	6.75	67.94	105	184	P	V
		2783.4	45.66	-28.34	74	76.06	28.33	8.1	67.17	227	149	P	V
		2783.4	41.39	-12.61	54	71.79	28.33	8.1	67.17	227	149	A	V
													V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.
3. Non restricted band limit is radio frequency level down 20dB.

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:

BLE	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH 00 2402MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =

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

3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is "PASS".

Appendix D. Radiated Spurious Emission Plots

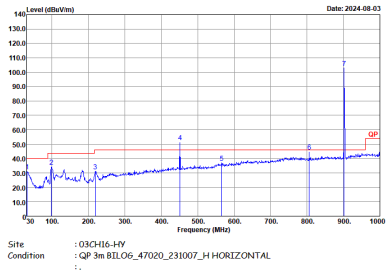
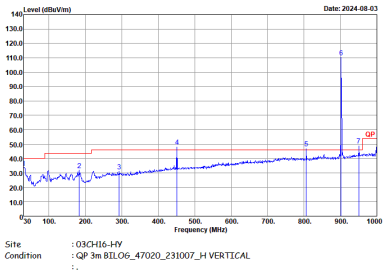
Test Engineer :	Bill Chang, Gary Guo and Steven Wu	**Temperature :**	18.2~20.2°C
		Relative Humidity :	54.2~56.1%

Note symbol

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

Sub 1GHz

(30 MHz ~ 1GHz @ 3m)

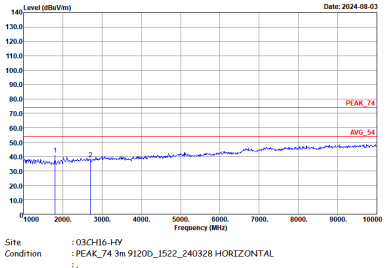
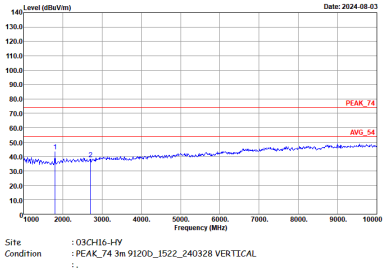
	CH01 902.2MHz	
	Horizontal	Vertical
QP / Peak		

Remark:

1. In the horizontal diagram, #4 & #6 unwanted signals fall within the unrestricted band and meet the requirements of 15.247(d).
2. In the vertical diagram, #4 & #6 &7 unwanted signals fall within the unrestricted band and meet the requirements of 15.247(d).

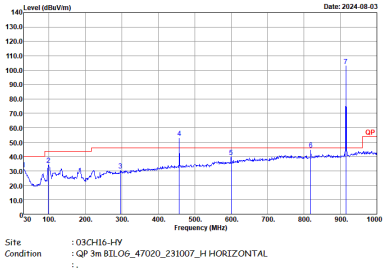
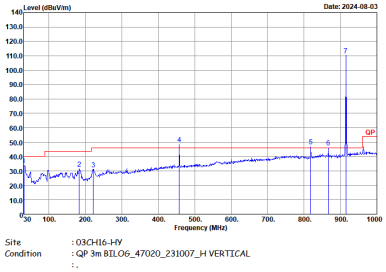
Sub 1GHz

(1GHz ~ 10GHz @ 3m)

	CH01 902.2MHz	
	Horizontal	Vertical
Peak Avg.		

Sub 1GHz

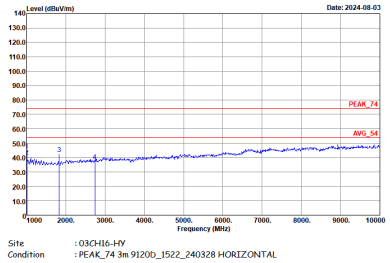
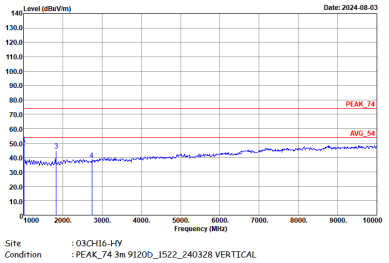
(30 MHz ~ 1 GHz @ 3m)

	CH65 915MHz	
	Horizontal	Vertical
QP / Peak		

Remark: In the horizontal & vertical diagram, #4 & #5 & #6 unwanted signals fall within the unrestricted band and meet the requirements of 15.247(d).

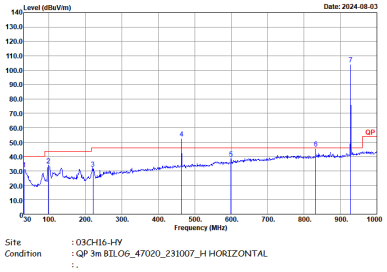
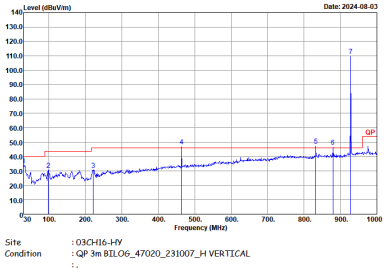
Sub 1GHz

(1 GHz ~ 10GHz @ 3m)

	CH65 915MHz	
	Horizontal	Vertical
Peak Avg.		

Sub 1GHz

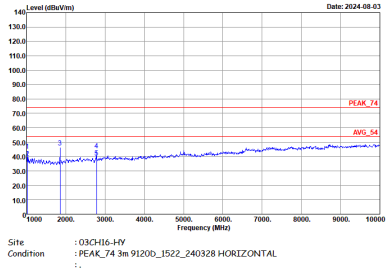
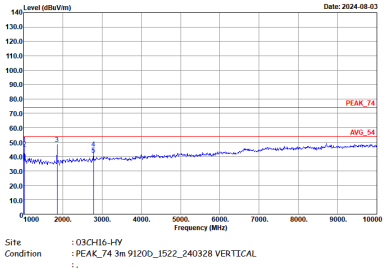
(30 MHz ~ 1GHz @ 3m)

	CH129 927.8MHz	
	Horizontal	Vertical
QP / Peak		

Remark: In the horizontal & vertical diagram, #4 & #5 & #6 unwanted signals fall within the unrestricted band and meet the requirements of 15.247(d).

Sub 1GHz

(1GHz ~ 10 GHz @ 3m)

	CH129 927.8MHz	
	Horizontal	Vertical
Peak Avg.		

Appendix E. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
Sub 1 GHz	100.00	-	-	10Hz

Sub 1 GHz