

TEST REPORT

FCC 802.11ah Test for WHM200A
Certification

APPLICANT
SJIT Co.,Ltd

REPORT NO.
HCT-RF-2401-FC001-R2

DATE OF ISSUE
January 31, 2024

Tested by
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Applicant**SJIT Co.,Ltd**

54-11, Dongtanhana 1-gil, Hwaseong-si, Gyeonggi-do, Republic of Korea

**Eut Type
Model Name**

WIFI Halow Module

WHM200A

FCC ID

2BEK7WHM200A

Average Output Power

23.15 dBm

FCC Classification

Digital Transmission System(DTS)

FCC Rule Part(s)

Part 15.247

Location of Test

☒ Permanent Testing Lab ☐ On Site Testing

(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea)

REVISION HISTORY

The revision history for this test report is shown in table.

| Revision No. | Date of Issue | Description |
|--------------|------------------|---|
| 0 | January 23, 2024 | Initial Release |
| 1 | January 25, 2024 | Page 8, Revised antenna requirements (1) Page 12, Revised ANSI section |
| 2 | January 31, 2024 | Page 32, Added note. |

Notice

Content

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated.

The test results have only been applied with the test methods required by the standard(s).

When confirmation of authenticity of this test report is required, please contact www.hct.co.kr

The above Test Report is not related to the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme) / A2LA(American Association for Laboratory Accreditation)(4114.01), which signed the ILAC-MRA.

CONTENTS

| | |
|---|----|
| 1. EUT DESCRIPTION | 5 |
| 2. TEST METHODOLOGY | 6 |
| EUT CONFIGURATION | 6 |
| EUT EXERCISE | 6 |
| GENERAL TEST PROCEDURES | 6 |
| DESCRIPTION OF TEST MODES | 7 |
| 3. INSTRUMENT CALIBRATION | 7 |
| 4. FACILITIES AND ACCREDITATIONS | 7 |
| FACILITIES | 7 |
| EQUIPMENT | 7 |
| 5. ANTENNA REQUIREMENTS | 8 |
| 6. MEASUREMENT UNCERTAINTY | 8 |
| 7. DESCRIPTION OF TESTS | 9 |
| 8. SUMMARY TEST OF RESULTS | 24 |
| 9. TEST RESULT | 25 |
| 9.1 DUTY CYCLE | 25 |
| 9.2 6 dB BANDWIDTH | 27 |
| 9.3 OUTPUT POWER | 29 |
| 9.4 POWER SPECTRAL DENSITY | 30 |
| 9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS | 32 |
| 9.6 RADIATED SPURIOUS EMISSIONS | 35 |
| 9.7 POWERLINE CONDUCTED EMISSIONS | 43 |
| 10. LIST OF TEST EQUIPMENT | 44 |
| 11. ANNEX A_ TEST SETUP PHOTO | 46 |

1. EUT DESCRIPTION

| | |
|-----------------------|--|
| Model | WHM200A |
| Additional Model | - |
| EUT Type | WIFI Halow Module |
| Power Supply | DC 3.30 V |
| Frequency Range | 1M Bandwidth : 903.5 MHz – 926.5 MHz 2M Bandwidth : 905 MHz – 925 MHz 4M Bandwidth : 906 MHz – 922 MHz |
| Max. RF Output Power | Peak Power: 24.58 dBm Average Power: 23.15 dBm |
| Modulation Type | OFDM |
| Number of Channels | 1M Bandwidth : 24 Channels 2M Bandwidth : 11 Channels 4M Bandwidth : 5 Channels |
| Antenna Specification | Antenna type: Pattern Antenna Peak Gain : 3.03 dBi |
| Date(s) of Tests | December 26, 2023 ~ January 23, 2024 |
| EUT serial numbers | Radiated : WHM200A01 Conducted : WHM200A03 |

2. TEST METHODOLOGY

FCC KDB 558074 D01 15.247 Meas Guidance v05r02 dated April 02, 2019 entitled “guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices and the measurement procedure described in ANSI C63.10 (Version : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’.

EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1 GHz. Above 1 GHz with 1.5 m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.6.5 of ANSI C63.10. (Version: 2013)

DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

3. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

4. FACILITIES AND ACCREDITATIONS

FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.

The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

Detailed description of test facility was submitted to the Commission and accepted dated March 31, 2022 (CAB identifier: KR0032).

EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5. ANTENNA REQUIREMENTS

According to FCC 47 CFR § 15.203

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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.”

- (1) This device is using Trace Antenna design
- (2) The E.U.T Complies with the requirement of § 15.203

6. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95 % level of confidence.

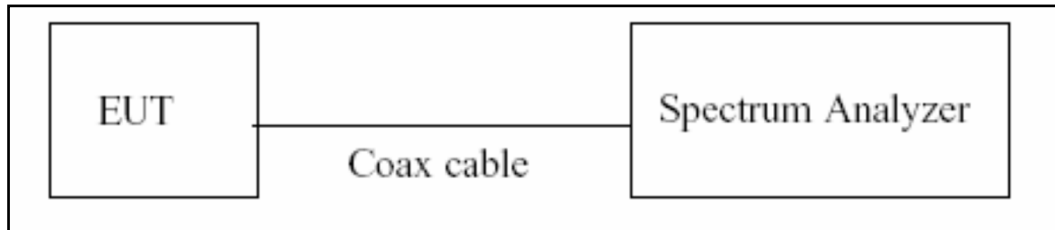
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

| Parameter | Expanded Uncertainty (dB) |
|--|---|
| Conducted Disturbance (150 kHz ~ 30 MHz) | 1.90 (Confidence level about 95 %, $k=2$) |
| Radiated Disturbance (9 kHz ~ 30 MHz) | 4.14 (Confidence level about 95 %, $k=2$) |
| Radiated Disturbance (30 MHz ~ 1 GHz) | 5.82 (Confidence level about 95 %, $k=2$) |
| Radiated Disturbance (1 GHz ~ 18 GHz) | 5.74 (Confidence level about 95 %, $k=2$) |
| Radiated Disturbance (18 GHz ~ 40 GHz) | 5.76 (Confidence level about 95 %, $k=2$) |
| Radiated Disturbance (Above 40 GHz) | 5.52 (Confidence level about 95 %, $k=2$) |

7. DESCRIPTION OF TESTS

7.1. Duty Cycle

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to the zero-span measurement method, 6.0)b) in KDB 558074 v05r02.

The largest available value of RBW is 8 MHz and VBW is 50 MHz.

The zero-span method of measuring duty cycle shall not be used if $T \leq 6.25$ microseconds. ($50/6.25 = 8$)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are $> 50/T$.

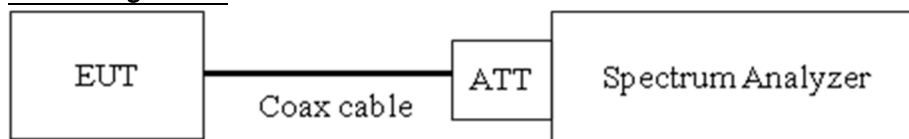
1. Set the center frequency of the instrument to the center frequency of the transmission.
2. RBW = 8 MHz (Set RBW \geq OBW if possible; otherwise, set RBW to the largest available value.)
3. VBW = 8 MHz (\geq RBW)
4. SPAN = 0 Hz
5. Detector = Peak
6. Number of points in sweep > 100
7. Trace mode = Clear write
8. Measure T_{total} and T_{on}
9. Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor = $10\log(1/\text{Duty Cycle})$

7.2. 6 dB Bandwidth

Limit

The minimum permissible 6 dB bandwidth is 500 kHz.

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to (Procedure 11.8.1 in ANSI 63.10-2013)

- 1) RBW = 100 kHz
- 2) VBW $\geq 3 \times$ RBW
- 3) Detector = Peak
- 4) Trace mode = Max hold
- 5) Sweep = auto couple
- 6) Allow the trace to stabilize
- 7) We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

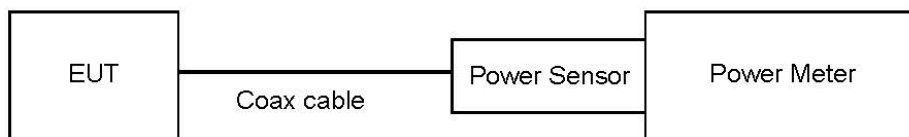
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

7.3. Output Power

Limit

The maximum permissible conducted output power is 1 Watt.

Test Configuration



Test Procedure

The transmitter output is connected to the Power Meter.

- Peak Power (Procedure 11.9.1.3 in ANSI 63.10-2013)
: Measure the peak power of the transmitter.
- Average Power (Procedure 11.9.2.3 in ANSI 63.10-2013)
 - 1) Measure the duty cycle.
 - 2) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
 - 3) Add $10 \log (1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Sample Calculation

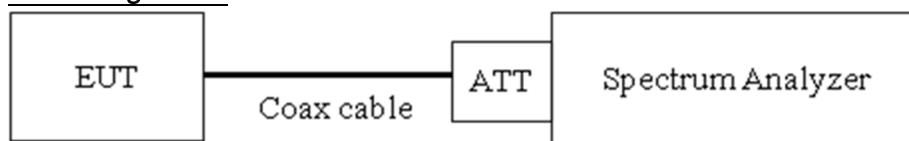
- Conducted Output Power(Peak) = Measured Value + ATT loss + Cable loss
- Conducted Output Power(Average) = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

7.4. Power Spectral Density

Limit

The transmitter power density average over 1-second interval shall not be greater than 8 dBm in any 3 kHz BW.

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure 8.4 in KDB 558074 v05r02, Procedure 11.10 in ANSI 63.10-2013.

The spectrum analyzer is set to :

- 1) Set analyzer center frequency to DTS channel center frequency.
- 2) Span = 1.5 times the DTS channel bandwidth.
- 3) $RBW = 3 \text{ kHz} \leq RBW \leq 100 \text{ kHz}$.
- 4) $VBW \geq 3 \times RBW$.
- 5) Sweep = auto couple
- 6) Detector = power averaging (rms) or sample detector (when rms not available).
- 7) Ensure that the number of measurement points in the sweep $\geq [2 \times \text{span} / RBW]$.
- 8) Employ trace averaging (rms) mode over a minimum of 100 traces
- 9) Use the peak marker function to determine the maximum amplitude level.
- 10) Use the peak marker function to determine the maximum amplitude level within the RBW.
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
- 11) if then duty factor shall be added to adjust the result if the duty cycle is less than 98 %

Sample Calculation

- Power Spectral Density = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

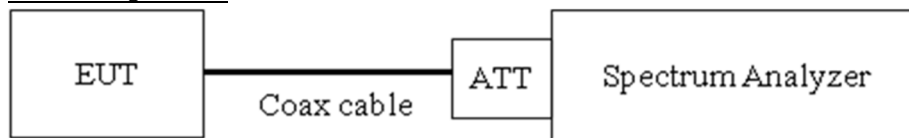
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

Limit

The maximum conducted (Average) output power was used to demonstrate compliance, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least relative to the maximum in-band peak PSD level in 100 kHz.

[Conducted > 30 dBc]

Test Configuration



Test Procedure

The transmitter output is connected to the spectrum analyzer.

(Procedure 11.11 in ANSI 63.10-2013)

- 1) RBW = 100 kHz
- 2) VBW $\geq 3 \times$ RBW
- 3) Set span to encompass the spectrum to be examined
- 4) Detector = Peak
- 5) Trace Mode = Max hold
- 6) Sweep time = auto couple
- 7) Ensure that the number of measurement points $\geq 2 \times$ Span/RBW
- 8) Allow trace to fully stabilize.
- 9) Use peak marker function to determine the maximum amplitude level.

Measurements are made over the 30 MHz to 10 times the operating frequency range(10 GHz) with the transmitter set to the lowest, middle, and highest channels.

Factors for frequency

| Freq(MHz) | Factor(dB) |
|-----------|------------|
| 30 | 20.10 |
| 100 | 20.15 |
| 200 | 20.19 |
| 300 | 20.24 |
| 400 | 20.30 |
| 500 | 20.30 |
| 600 | 20.31 |
| 700 | 20.32 |
| 800 | 20.33 |
| 900 | 20.35 |
| 902 | 20.35 |
| 928 | 20.35 |
| 1 000 | 20.40 |
| 2 000 | 20.65 |
| 2 400 | 20.74 |
| 2 500 | 20.74 |
| 3 000 | 20.89 |
| 4 000 | 21.13 |
| 5 000 | 21.65 |
| 5 700 | 21.74 |
| 5 800 | 21.74 |
| 6 000 | 21.83 |
| 7 000 | 21.96 |
| 8 000 | 21.96 |
| 9 000 | 22.04 |
| 10 000 | 22.14 |
| 11 000 | 22.23 |
| 12 000 | 22.32 |
| 13 000 | 22.33 |
| 14 000 | 22.36 |
| 15 000 | 22.46 |
| 16 000 | 22.54 |
| 17 000 | 22.75 |
| 18 000 | 22.88 |
| 19 000 | 22.80 |
| 20 000 | 22.47 |
| 21 000 | 22.60 |
| 22 000 | 22.59 |
| 23 000 | 22.60 |
| 24 000 | 22.61 |
| 25 000 | 22.71 |

Note :

1. 902 ~ 928 MHz is fundamental frequency range.
2. Factor = Cable loss + Attenuator

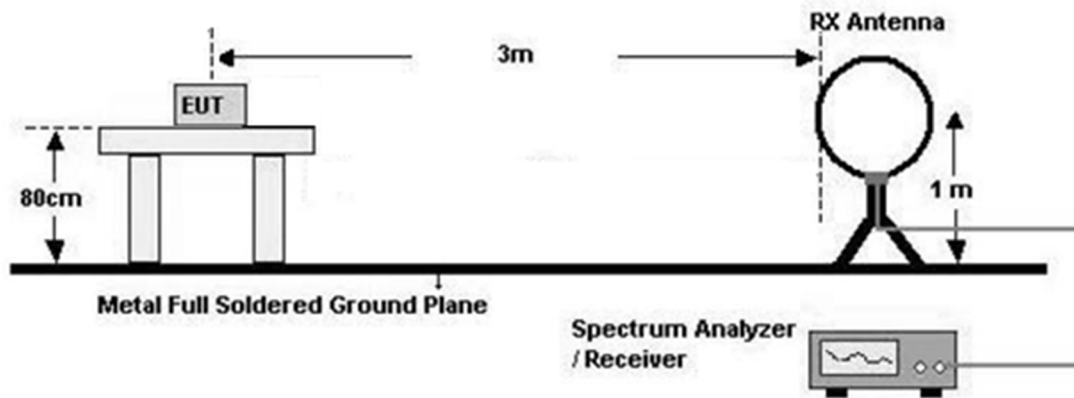
7.6. Radiated Test

Limit

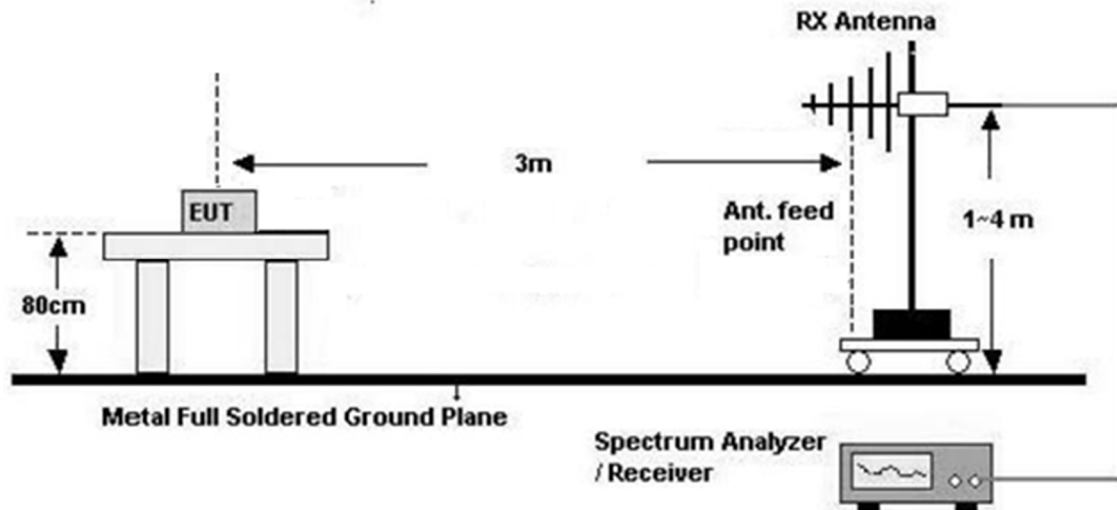
| Frequency (MHz) | Field Strength ($\mu\text{V/m}$) | Measurement Distance (m) |
|-----------------|------------------------------------|--------------------------|
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

Test Configuration

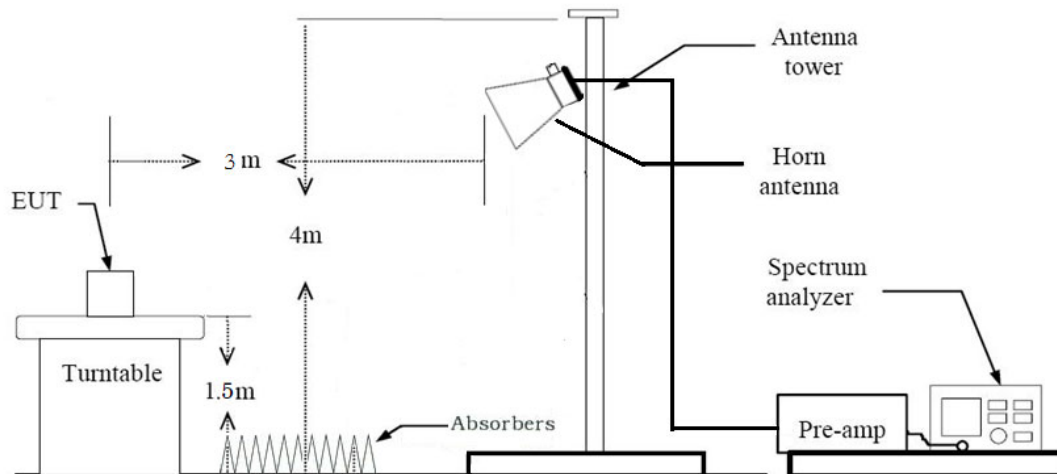
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3 m from the EUT
3. The EUT is placed on a turntable, which is 0.8 m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) = $40\log(3\text{ m}/300\text{ m}) = -80\text{ dB}$
Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = $40\log(3\text{ m}/30\text{ m}) = -40\text{ dB}$
Measurement Distance : 3 m
8. Spectrum Setting
 - Frequency Range = 9 kHz ~ 30 MHz
 - Detector = Peak
 - Trace = Max hold
 - RBW = 9 kHz
 - VBW $\geq 3 \times$ RBW
9. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Test Procedure of Radiated spurious emissions(Below 1 GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8 m above ground plane.
3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1 m to 4 m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Peak
 - Trace = Max hold
 - RBW = 100 kHz
 - VBW $\geq 3 \times$ RBW
 - (2) Measurement Type(Quasi-peak):
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Quasi-Peak
 - RBW = 120 kHz
- ※In general, (1) is used mainly
7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Spectrum Setting (Method 8.6 in KDB 558074 v05r02, Procedure 11.12 in ANSI 63.10-2013)

(1) Measurement Type(Peak):

- Measured Frequency Range : 1 GHz – 10th Harmonics
- Detector = Peak
- Trace = Max hold
- RBW = 1 MHz
- VBW \geq 3 x RBW

(2) Measurement Type(Average): Duty cycle \geq 98 %

- Measured Frequency Range : 1 GHz – 10th Harmonics
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW \geq 3 x RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).

(3) Measurement Type(Average): Duty cycle < 98 %, duty cycle variations are less than ± 2 %

- Measured Frequency Range : 1 GHz – 10th Harmonics
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW \geq 3 x RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).
- Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.
- Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.

8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

9. Distance extrapolation factor = $20\log$ (test distance / specific distance) (dB)

10. Total(Measurement Type : Peak)

= Peak Measured Value

Total(Measurement Type : Average)

= Average Measured Value + Duty Cycle Factor

- We apply to the offset in range 1 GHz - 18 GHz

- The offset = Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F) - Amp.Gain(A.G)

7.7. AC Power line Conducted Emissions

Limit

For an intentional radiator 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, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

| Frequency Range (MHz) | Limits (dB μ V) | |
|-----------------------|-------------------------|-------------------------|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 66 to 56 ^(a) | 56 to 46 ^(a) |
| 0.50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

^(a)Decreases with the logarithm of the frequency.

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Annex A for the actual connections between EUT and support equipment.

Test Procedure

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors : Quasi Peak and Average Detector.
5. The EUT is the device operating below 30 MHz.
 - For unterminated the Antenna, the AC line conducted tests are performed with the antenna connected
 - For terminated the Antenna, the AC line conducted tests are performed with a dummy load connected to the EUT antenna output terminal.

Sample Calculation

Quasi-peak(Final Result) = Measured Value + Correction Factor

7.8. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
 - Mode : Stand alone
2. EUT Axis
 - Radiated Spurious Emissions : Y
3. All data rate of operation were investigated and the test results are worst case of each mode.
 - Supported datarate
 - 1 M Bandwidth : MCS 10, MCS 0 ~ MCS 7, 2 M / 4 M Bandwidth : MCS 0 ~ MCS 7
 - Worst case datarate
 - 1 M Bandwidth : MCS 10, 2M / 4 M Bandwidth : MCS 0
4. Test was performed with continuous Tx. ($D \geq 98 \%$)
5. All Bandwidth of operation were investigated and the test results are worst case of each mode.
 - 1 M Bandwidth, 2M / 4 M Bandwidth
 - Worst case : 1 M Bandwidth
6. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
 - Position : Horizontal, Vertical, Parallel to the ground plane

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
 - Mode : Stand alone

Conducted test

1. All data rate of operation were investigated and the test results are worst case of each mode.
 - Supported datarate
 - 1M Bandwidth : MCS 10, MCS 0 ~ MCS 7, 2M/4M Bandwidth : MCS 0 ~ MCS 7
 - Worst case datarate
 - 1M Bandwidth : MCS 10, 2M/4M Bandwidth : MCS 0
2. Test was performed with continuous Tx. ($D \geq 98 \%$)

8. SUMMARY TEST OF RESULTS

| Test Description | FCC Part Section(s) | Test Limit | Test Condition | Test Result |
|--------------------------------------|-----------------------------------|----------------------|----------------|-------------|
| 6 dB Bandwidth | § 15.247(a)(2) | > 500 kHz | Conducted | PASS |
| Conducted Maximum Output Power | § 15.247(b)(3) | < 1 Watt | | PASS |
| Power Spectral Density | § 15.247(e) | < 8 dBm / 3 kHz Band | | PASS |
| Band Edge (Out of Band Emissions) | § 15.247(d) | Conducted > 30 dBc | | PASS |
| AC Power line Conducted Emissions | § 15.207 | cf. Section 7.7 | | PASS |
| Radiated Spurious Emissions | § 15.247(d), 15.205, 15.209 | cf. Section 7.6 | Radiated | PASS |
| Radiated Restricted Band Edge | § 15.247(d), 15.205, 15.209 | cf. Section 7.6 | | PASS |

9. TEST RESULT

9.1 DUTY CYCLE

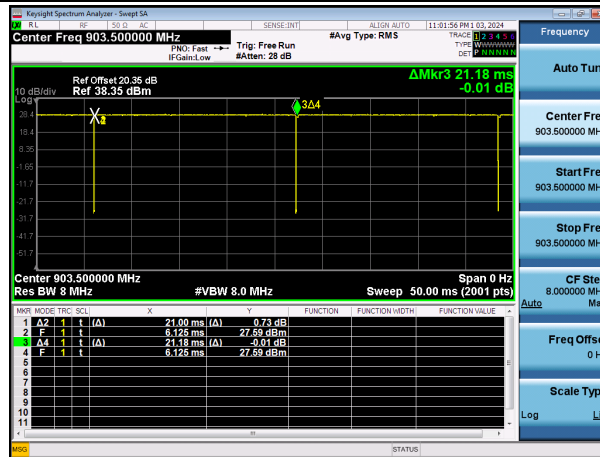
| Bandwidth | Data rate | T _{on} (ms) | T _{total} (ms) | Duty Cycle | Duty Cycle Factor (dB) |
|-----------|-----------|-------------------------|----------------------------|------------|---------------------------|
| 1 M | MCS 10 | 21.000 | 21.180 | 0.992 | 0.037 |
| | MCS 0 | 21.010 | 21.160 | 0.993 | 0.031 |
| | MCS 1 | 21.000 | 21.180 | 0.992 | 0.037 |
| | MCS 2 | 21.000 | 21.160 | 0.992 | 0.033 |
| | MCS 3 | 21.010 | 21.180 | 0.992 | 0.035 |
| | MCS 4 | 21.000 | 21.180 | 0.992 | 0.037 |
| | MCS 5 | 21.010 | 21.160 | 0.993 | 0.031 |
| | MCS 6 | 21.000 | 21.180 | 0.992 | 0.037 |
| | MCS 7 | 21.020 | 21.180 | 0.992 | 0.033 |
| 2 M | MCS 0 | 20.680 | 20.850 | 0.992 | 0.036 |
| | MCS 1 | 20.680 | 20.880 | 0.990 | 0.042 |
| | MCS 2 | 20.690 | 20.850 | 0.992 | 0.033 |
| | MCS 3 | 20.670 | 20.860 | 0.991 | 0.040 |
| | MCS 4 | 20.680 | 20.850 | 0.992 | 0.036 |
| | MCS 5 | 20.680 | 20.850 | 0.992 | 0.036 |
| | MCS 6 | 20.690 | 20.860 | 0.992 | 0.036 |
| | MCS 7 | 20.680 | 20.860 | 0.991 | 0.038 |
| 4 M | MCS 0 | 20.680 | 20.930 | 0.988 | 0.052 |
| | MCS 1 | 20.680 | 20.920 | 0.989 | 0.050 |
| | MCS 2 | 20.670 | 20.920 | 0.988 | 0.052 |
| | MCS 3 | 20.680 | 20.930 | 0.988 | 0.052 |
| | MCS 4 | 20.690 | 20.920 | 0.989 | 0.048 |
| | MCS 5 | 20.680 | 20.930 | 0.988 | 0.052 |
| | MCS 6 | 20.690 | 20.920 | 0.989 | 0.048 |
| | MCS 7 | 20.680 | 20.920 | 0.989 | 0.050 |

Note:

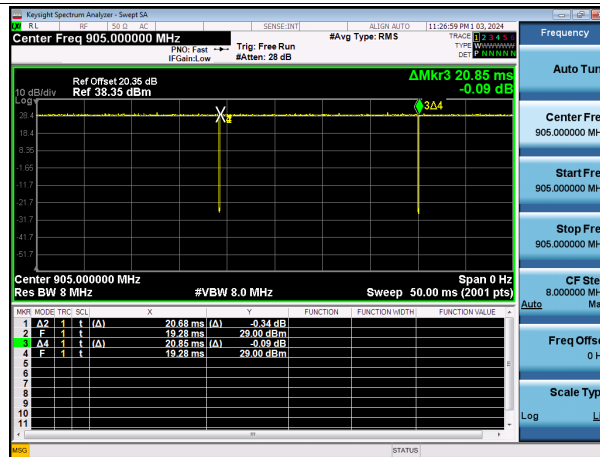
In order to simplify the report, attached plots were only the lowest data rate.

Test Plots

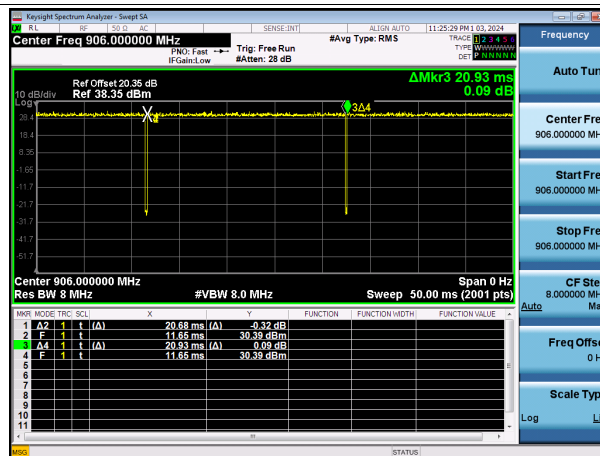
1 M Bandwidth (MCS 10)



2 M Bandwidth (MCS 0)



4 M Bandwidth (MCS 0)



9.2 6 dB BANDWIDTH

| Bandwidth | Frequency [MHz] | 6 dB Bandwidth [kHz] | Minimum Bandwidth [MHz] |
|-----------|--------------------|-------------------------|----------------------------|
| 1 M | 903.5 | 871.0 | > 0.5 |
| | 915.5 | 865.3 | > 0.5 |
| | 926.5 | 866.2 | > 0.5 |
| 2 M | 905.0 | 1.792 | > 0.5 |
| | 915.0 | 1.786 | > 0.5 |
| | 925.0 | 1.791 | > 0.5 |
| 4 M | 906.0 | 3.633 | > 0.5 |
| | 914.0 | 3.637 | > 0.5 |
| | 922.0 | 3.638 | > 0.5 |

Note:

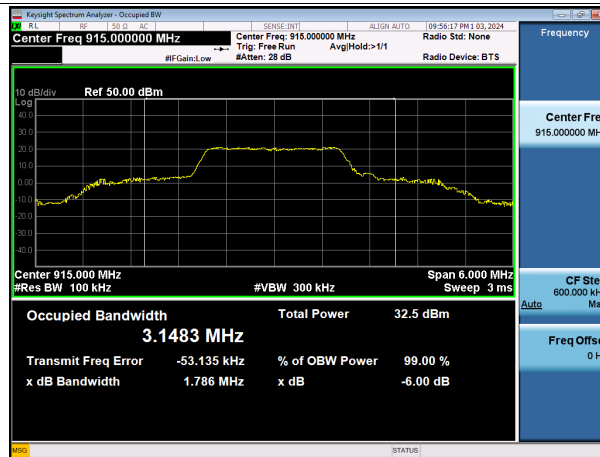
In order to simplify the report, attached plots were only the most narrow 6 dB BW channel.

Test Plots

1 M Bandwidth_903.5 MHz



2 M Bandwidth_915.0 MHz



4 M Bandwidth_906.0 MHz



9.3 OUTPUT POWER

Peak Power

| Bandwidth | Frequency [MHz] | Peak Power(dBm) | Limit (dBm) |
|-----------|-----------------|-----------------|-------------|
| 1 M | 903.5 | 24.50 | 30 |
| | 915.5 | 24.58 | |
| | 926.5 | 24.53 | |
| 2 M | 905.0 | 24.51 | |
| | 915.0 | 24.56 | |
| | 925.0 | 24.55 | |
| 4 M | 906.0 | 22.70 | |
| | 914.0 | 24.56 | |
| | 922.0 | 24.29 | |

Average Power

| Bandwidth | Frequency [MHz] | Max. Avg Ouput Power (dBm) | | | Limit (dBm) |
|-----------|-----------------|----------------------------|------------------------|-------------------|-------------|
| | | Measured Power [dBm] | Duty Cycle Factor [dB] | Total Power [dBm] | |
| 1 M | 903.5 | 23.13 | 0.00 | 23.13 | 30 |
| | 915.5 | 23.15 | 0.00 | 23.15 | |
| | 926.5 | 22.98 | 0.00 | 22.98 | |
| 2 M | 905.0 | 23.04 | 0.00 | 23.04 | |
| | 915.0 | 22.99 | 0.00 | 22.99 | |
| | 925.0 | 22.89 | 0.00 | 22.89 | |
| 4 M | 906.0 | 21.13 | 0.00 | 21.13 | |
| | 914.0 | 23.01 | 0.00 | 23.01 | |
| | 922.0 | 22.85 | 0.00 | 22.85 | |

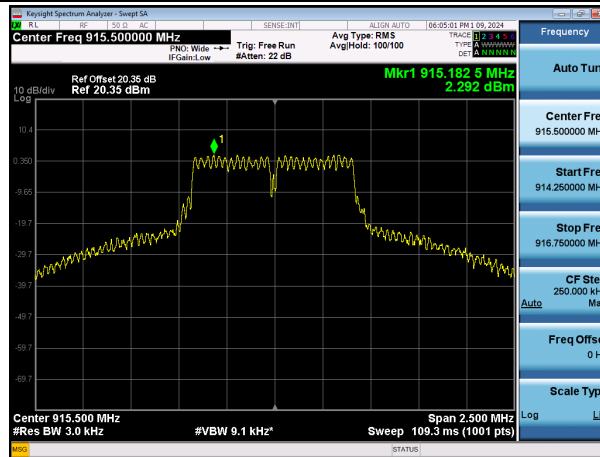
9.4 POWER SPECTRAL DENSITY

| Bandwidth | Frequency [MHz] | Max. Power Spectral Density | | | Limit (dBm/3kHz) |
|-----------|--------------------|-----------------------------|---------------------------|--------------------------|---------------------|
| | | Measured PSD (dBm/3 kHz) | Duty Cycle Factor [dB] | Total PSD (dBm/3 kHz) | |
| 1 M | 903.5 | 2.201 | 0.00 | 2.201 | 8 |
| | 915.5 | 2.292 | 0.00 | 2.292 | |
| | 926.5 | 2.173 | 0.00 | 2.173 | |
| 2 M | 905.0 | -1.362 | 0.00 | -1.362 | |
| | 915.0 | -1.322 | 0.00 | -1.322 | |
| | 925.0 | -1.403 | 0.00 | -1.403 | |
| 4 M | 906.0 | -7.089 | 0.00 | -7.089 | |
| | 914.0 | -4.296 | 0.00 | -4.296 | |
| | 922.0 | -4.452 | 0.00 | -4.452 | |

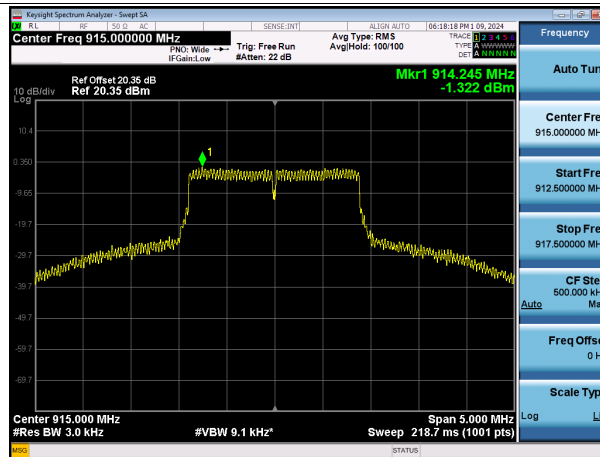
Note : In order to simplify the report, attached plots were only the worst case PSD channel.

Test Plots

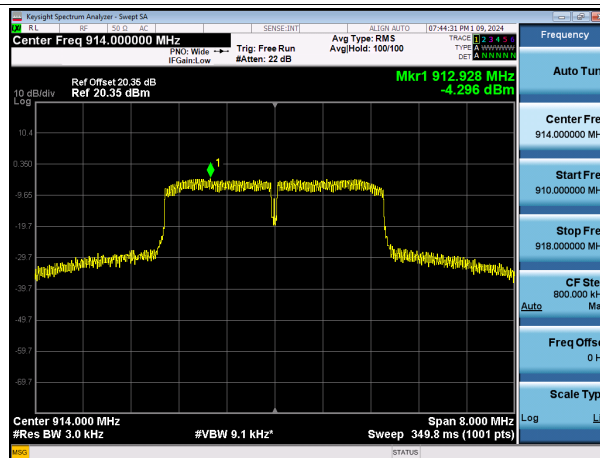
1 M Bandwidth_915.5 MHz



2 M Bandwidth_915.0 MHz



4 M Bandwidth_914.0 MHz



9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

[BAND EDGE]

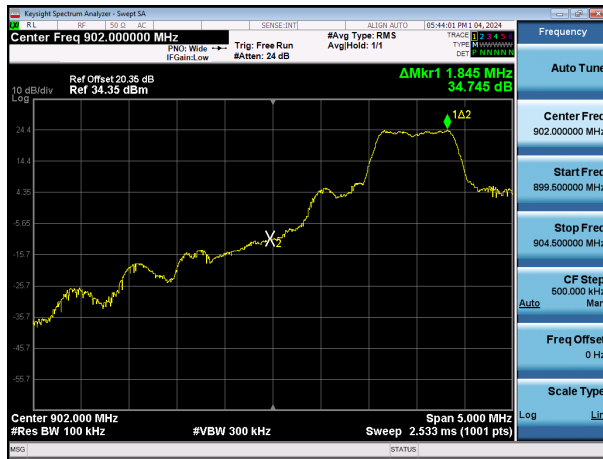
| Bandwidth | Frequency [MHz] | Band Edge Position | Test Result | | |
|-----------|--------------------|-----------------------|---------------------------|----------------|-------------|
| | | | Measured Level (dB) | Limit (dBc) | Pass / Fail |
| 1 M | 903.5 | Lower | 34.745 | 30 | Pass |
| | 926.5 | Upper | 31.068 | | |
| 2 M | 905.0 | Lower | 32.468 | | |
| | 925.0 | Upper | 32.231 | | |
| 4 M | 906.0 | Lower | 30.686 | | |
| | 922.0 | Upper | 35.467 | | |

Note :

At the 910 MHz of 4 MHz Bandwidth, The conducted bandedge measurement result at maximum power is sufficiently low compared to the limit.

Test Plots(Band Edge)

1 M Bandwidth _903.5 MHz



1 M Bandwidth _926.5 MHz



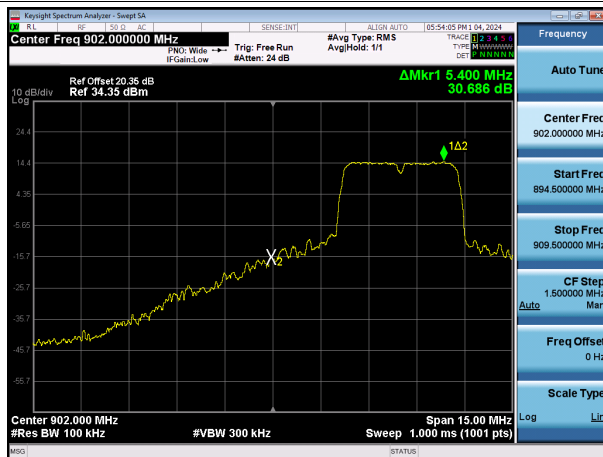
1 M Bandwidth _905.0 MHz



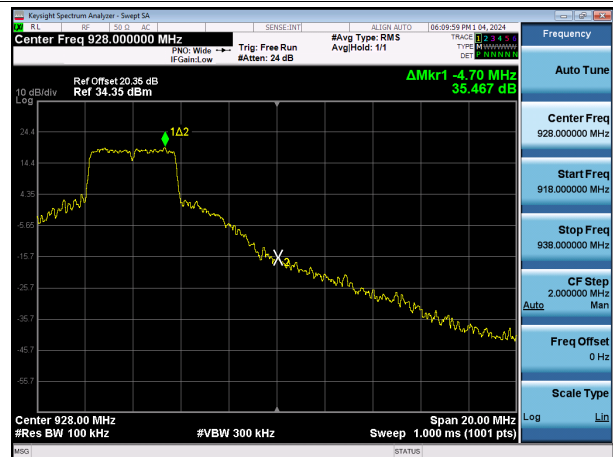
2 M Bandwidth _925.0 MHz



4 M Bandwidth _906.0 MHz



4 M Bandwidth _922.0 MHz

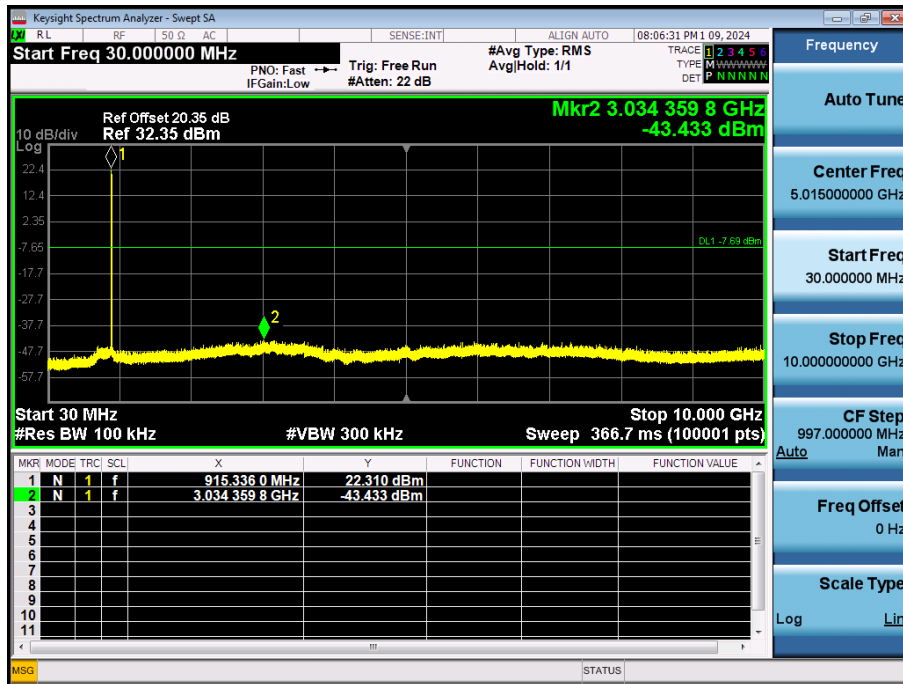


Test Plots(Conducted Spurious Emission)

In order to simplify the report, attached plots were only the worst case channel and data rate.

- Worst case : 1 M Bandwidth_915.5 MHz

Spurious Emission (30 MHz – 10 GHz)



Note:

Limit : -7.69 dBm

9.6 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30 MHz

| Frequency | Measured Level | Ant. factor | Cable loss | Ant. POL | Total | Limit | Margin |
|-------------------------|----------------|-------------|------------|----------|----------|----------|--------|
| [MHz] | [dBμV/m] | [dB/m] | [dB] | [H/V] | [dBμV/m] | [dBμV/m] | [dB] |
| No Critical peaks found | | | | | | | |

Note:

1. The Measured Level of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
2. Distance extrapolation factor = $40\log(\text{specific distance} / \text{test distance})$ (dB)
3. Limit line = specific Limits (dBμV) + Distance extrapolation factor

Frequency Range : Below 1 GHz

| Frequency | Measured Level | Ant. factor | Cable loss | Ant. POL | Total | Limit | Margin |
|-------------------------|----------------|-------------|------------|----------|----------|----------|--------|
| [MHz] | [dBμV/m] | [dB/m] | [dB] | [H/V] | [dBμV/m] | [dBμV/m] | [dB] |
| No Critical peaks found | | | | | | | |

Note:

1. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.

Frequency Range : Above 1 GHz

1 M Bandwidth_ 903.5 MHz

| Frequency | Measured Value | ANT. POL | Total | Limit | Margin | Detect |
|-----------|----------------|----------|----------|----------|--------|--------|
| [MHz] | [dBμV] | [H/V] | [dBμV/m] | [dBμV/m] | [dB] | |
| 2 710.50 | 51.11 | H | 51.11 | 73.98 | 22.87 | PK |
| 2 710.50 | 38.58 | H | 38.58 | 53.98 | 15.40 | AV |
| 3 614.00 | 51.12 | H | 51.12 | 73.98 | 22.86 | PK |
| 3 614.00 | 40.47 | H | 40.47 | 53.98 | 13.51 | AV |
| 4 517.50 | 56.75 | H | 56.75 | 73.98 | 17.23 | PK |
| 4 517.50 | 43.71 | H | 43.71 | 53.98 | 10.27 | AV |
| 5 421.00 | 65.33 | H | 65.33 | 73.98 | 8.65 | PK |
| 5 421.00 | 50.00 | H | 50.00 | 53.98 | 3.98 | AV |
| 8 131.50 | 57.94 | H | 57.94 | 73.98 | 16.04 | PK |
| 8 131.50 | 44.28 | H | 44.28 | 53.98 | 9.70 | AV |
| 9 035.00 | 61.36 | H | 61.36 | 73.98 | 12.62 | PK |
| 9 035.00 | 43.65 | H | 43.65 | 53.98 | 10.33 | AV |

Note :

1. Non Restricted Band refer to Conducted Spurious emission test result (30 dBc)

| Frequency | Measured Value | ANT. POL | Total | Limit | Margin | Detect |
|-----------|----------------|----------|----------|----------|--------|--------|
| [MHz] | [dBμV] | [H/V] | [dBμV/m] | [dBμV/m] | [dB] | |
| 2 710.50 | 54.22 | V | 54.22 | 73.98 | 19.76 | PK |
| 2 710.50 | 40.51 | V | 40.51 | 53.98 | 13.47 | AV |
| 3 614.00 | 54.57 | V | 54.57 | 73.98 | 19.41 | PK |
| 3 614.00 | 43.93 | V | 43.93 | 53.98 | 10.05 | AV |
| 4 517.50 | 55.72 | V | 55.72 | 73.98 | 18.26 | PK |
| 4 517.50 | 43.49 | V | 43.49 | 53.98 | 10.49 | AV |
| 5 421.00 | 58.47 | V | 58.47 | 73.98 | 15.51 | PK |
| 5 421.00 | 44.80 | V | 44.80 | 53.98 | 9.18 | AV |
| 8 131.50 | 59.01 | V | 59.01 | 73.98 | 14.97 | PK |
| 8 131.50 | 45.37 | V | 45.37 | 53.98 | 8.61 | AV |
| 9 035.00 | 62.57 | V | 62.57 | 73.98 | 11.41 | PK |
| 9 035.00 | 43.32 | V | 43.32 | 53.98 | 10.66 | AV |

Note :

1. Non Restricted Band refer to Conducted Spurious emission test result (30 dBc)

1 M Bandwidth_ 915.5 MHz

| Frequency | Measured Value | ANT. POL | Total | Limit | Margin | Detect |
|-----------|----------------|----------|----------|----------|--------|--------|
| [MHz] | [dBμV] | [H/V] | [dBμV/m] | [dBμV/m] | [dB] | |
| 2 746.50 | 53.90 | H | 53.90 | 73.98 | 20.08 | PK |
| 2 746.50 | 40.95 | H | 40.95 | 53.98 | 13.03 | AV |
| 3 662.00 | 56.30 | H | 56.30 | 73.98 | 17.68 | PK |
| 3 662.00 | 44.53 | H | 44.53 | 53.98 | 9.45 | AV |
| 4 577.50 | 56.54 | H | 56.54 | 73.98 | 17.44 | PK |
| 4 577.50 | 45.81 | H | 45.81 | 53.98 | 8.17 | AV |
| 7 324.00 | 69.97 | H | 69.97 | 73.98 | 4.01 | PK |
| 7 324.00 | 50.05 | H | 50.05 | 53.98 | 3.93 | AV |

Note :

1. Non Restricted Band refer to Conducted Spurious emission test result (30 dBc)

| Frequency | Measured Value | ANT. POL | Total | Limit | Margin | Detect |
|-----------|----------------|----------|----------|----------|--------|--------|
| [MHz] | [dBμV] | [H/V] | [dBμV/m] | [dBμV/m] | [dB] | |
| 2 746.50 | 53.46 | V | 53.46 | 73.98 | 20.52 | PK |
| 2 746.50 | 41.27 | V | 41.27 | 53.98 | 12.71 | AV |
| 3 662.00 | 54.58 | V | 54.58 | 73.98 | 19.40 | PK |
| 3 662.00 | 42.91 | V | 42.91 | 53.98 | 11.07 | AV |
| 7 324.00 | 69.77 | V | 69.77 | 73.98 | 4.21 | PK |
| 7 324.00 | 49.84 | V | 49.84 | 53.98 | 4.14 | AV |
| 8 239.50 | 57.60 | V | 57.60 | 73.98 | 16.38 | PK |
| 8 239.50 | 43.91 | V | 43.91 | 53.98 | 10.07 | AV |
| 9 155.00 | 65.38 | V | 65.38 | 73.98 | 8.60 | PK |
| 9 155.00 | 49.78 | V | 49.78 | 53.98 | 4.20 | AV |

Note :

1. Non Restricted Band refer to Conducted Spurious emission test result (30 dBc)

1 M Bandwidth_ 926.5 MHz

| Frequency | Measured Value | ANT. POL | Total | Limit | Margin | Detect |
|-----------|----------------|----------|----------|----------|--------|--------|
| [MHz] | [dBμV] | [H/V] | [dBμV/m] | [dBμV/m] | [dB] | |
| 2 779.50 | 54.55 | H | 54.55 | 73.98 | 19.43 | PK |
| 2 779.50 | 42.17 | H | 42.17 | 53.98 | 11.81 | AV |
| 4 632.50 | 54.26 | H | 54.26 | 73.98 | 19.72 | PK |
| 4 632.50 | 43.67 | H | 43.67 | 53.98 | 10.31 | AV |
| 7 412.00 | 70.92 | H | 70.92 | 73.98 | 3.06 | PK |
| 7 412.00 | 50.76 | H | 50.76 | 53.98 | 3.22 | AV |
| 8 338.50 | 59.95 | H | 59.95 | 73.98 | 14.03 | PK |
| 8 338.50 | 44.49 | H | 44.49 | 53.98 | 9.49 | AV |

Note :

1. Non Restricted Band refer to Conducted Spurious emission test result (30 dBc)

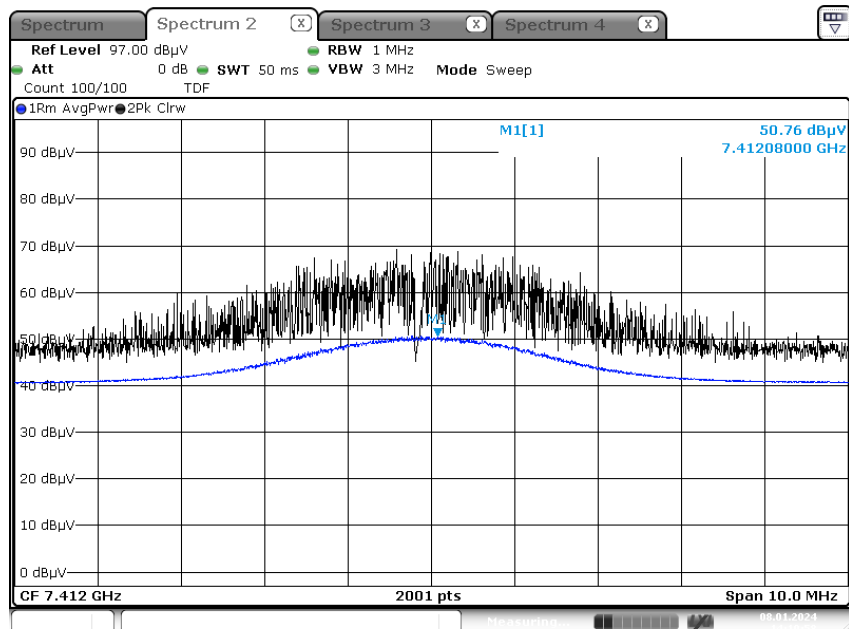
| Frequency | Measured Value | ANT. POL | Total | Limit | Margin | Detect |
|-----------|----------------|----------|----------|----------|--------|--------|
| [MHz] | [dBμV] | [H/V] | [dBμV/m] | [dBμV/m] | [dB] | |
| 2 779.50 | 55.56 | V | 55.56 | 73.98 | 18.42 | PK |
| 2 779.50 | 43.47 | V | 43.47 | 53.98 | 10.51 | AV |
| 3 706.00 | 59.03 | V | 59.03 | 73.98 | 14.95 | PK |
| 3 706.00 | 46.91 | V | 46.91 | 53.98 | 7.07 | AV |
| 4 632.50 | 53.56 | V | 53.56 | 73.98 | 20.42 | PK |
| 4 632.50 | 42.27 | V | 42.27 | 53.98 | 11.71 | AV |
| 7 412.00 | 70.57 | V | 70.57 | 73.98 | 3.41 | PK |
| 7 412.00 | 49.58 | V | 49.58 | 53.98 | 4.40 | AV |
| 8 338.50 | 58.90 | V | 58.90 | 73.98 | 15.08 | PK |
| 8 338.50 | 41.12 | V | 41.12 | 53.98 | 12.86 | AV |

Note :

1. Non Restricted Band refer to Conducted Spurious emission test result (30 dBc)

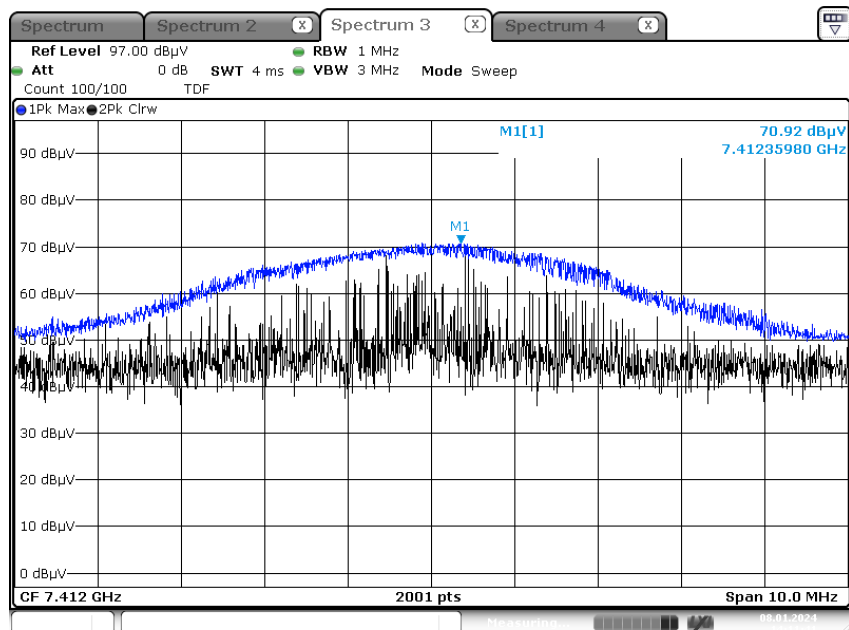
Test Plots (Worst case : Y-H)

Radiated Spurious Emissions plot – Average Result (926.5 MHz 8th Harmonic)



Date: 8.JAN.2024 14:10:58

Radiated Spurious Emissions plot – Peak Result (926.5 MHz 8th Harmonic)



Date: 8.JAN.2024 14:11:41

Note:

Plots of worst case are only reported.

9.7 POWERLINE CONDUCTED EMISSIONS

Test

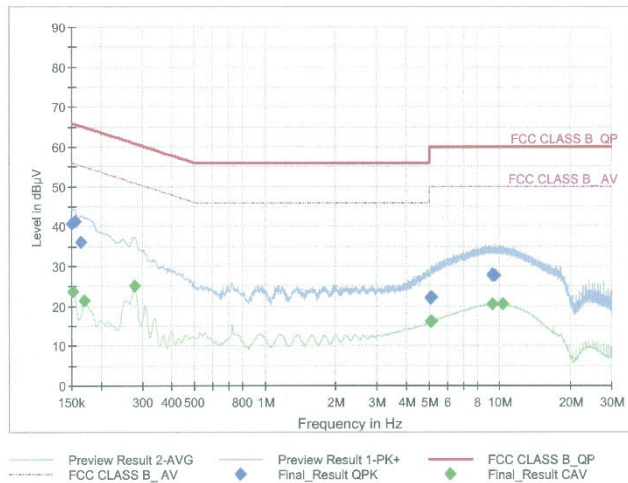
1 / 1

Test Report

Common Information

EUT : WHM200A
Operating Conditions : 802.11ah Mode
Comment :

Full Spectrum



Final Result QPK

| Frequency (MHz) | QuasiPeak (dBμV) | Limit (dBμV) | Margin (dB) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|--------------|-------------|-----------------|------|------------|
| 0.1500 | 40.81 | 66.00 | 25.19 | 9.000 | N | 9.6 |
| 0.1545 | 41.22 | 65.75 | 24.54 | 9.000 | N | 9.6 |
| 0.1635 | 36.19 | 65.28 | 29.10 | 9.000 | N | 9.6 |
| 5.0900 | 22.16 | 60.00 | 37.84 | 9.000 | L1 | 9.8 |
| 5.0990 | 21.96 | 60.00 | 38.04 | 9.000 | L1 | 9.8 |
| 5.1035 | 22.26 | 60.00 | 37.74 | 9.000 | L1 | 9.8 |
| 9.3110 | 27.66 | 60.00 | 32.34 | 9.000 | L1 | 10.0 |
| 9.3583 | 27.84 | 60.00 | 32.16 | 9.000 | L1 | 10.0 |
| 9.5000 | 27.79 | 60.00 | 32.21 | 9.000 | L1 | 10.0 |

Final Result CAV

| Frequency (MHz) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|-----------------|--------------|-------------|-----------------|------|------------|
| 0.1523 | 23.65 | 55.88 | 32.23 | 9.000 | L1 | 9.6 |
| 0.1703 | 21.30 | 54.95 | 33.65 | 9.000 | L1 | 9.6 |
| 0.2783 | 25.23 | 50.87 | 25.63 | 9.000 | L1 | 9.6 |
| 5.0968 | 16.05 | 50.00 | 33.95 | 9.000 | L1 | 9.8 |
| 5.1148 | 16.13 | 50.00 | 33.87 | 9.000 | L1 | 9.8 |
| 5.1418 | 16.08 | 50.00 | 33.92 | 9.000 | L1 | 9.8 |
| 9.2998 | 20.49 | 50.00 | 29.51 | 9.000 | L1 | 10.0 |
| 9.3110 | 20.49 | 50.00 | 29.51 | 9.000 | L1 | 10.0 |
| 10.3460 | 20.39 | 50.00 | 29.61 | 9.000 | L1 | 10.1 |

2024-01-16

오전 9:03:38

10. LIST OF TEST EQUIPMENT

Conducted Test

| Equipment | Model | Manufacturer | Serial No. | Due to Calibration | Calibration Interval |
|--|-----------|-----------------|------------|--------------------|----------------------|
| LISN | ENV216 | Rohde & Schwarz | 102245 | 08/02/2024 | Annual |
| EMI Test Receiver | ESR | Rohde & Schwarz | 101910 | 05/26/2024 | Annual |
| Temperature Chamber | SU-642 | ESPEC | 93008124 | 02/22/2024 | Annual |
| Signal Analyzer | N9030A | Keysight | MY55410508 | 09/04/2024 | Annual |
| Power Meter | N1911A | Agilent | MY45100523 | 03/06/2024 | Annual |
| Power Sensor | N1921A | Agilent | MY57820067 | 03/06/2024 | Annual |
| Directional Coupler | 87300B | Agilent | 3116A03621 | 10/30/2024 | Annual |
| Power Splitter | 11667B | Hewlett Packard | 10545 | 02/06/2024 | Annual |
| DC Power Supply | E3632A | Agilent | KR75305528 | 01/02/2025 | Annual |
| Attenuator(10 dB)(DC-26.5 GHz) | 8493C-010 | Agilent | 08285 | 06/02/2024 | Annual |
| Attenuator(20 dB) | 18N-20dB | Rohde & Schwarz | 8 | 03/08/2024 | Annual |
| Software | EMC32 | Rohde & Schwarz | N/A | N/A | N/A |
| FCC WLAN&BT&BLE Conducted Test Software v3.0 | N/A | HCT CO., LTD. | N/A | N/A | N/A |
| Bluetooth Tester | CBT | Rohde & Schwarz | 100808 | 02/16/2024 | Annual |

Note:

- Equipment listed above that calibrated during the testing period was set for test after the calibration.
- Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

Radiated Test

| Equipment | Model | Manufacturer | Serial No. | Due to Calibration | Calibration Interval |
|-------------------------------------|------------------------------------|------------------------|-------------|--------------------|----------------------|
| Controller(Antenna mast) | CO3000 | Innco system | CO3000-4p | N/A | N/A |
| Antenna Position Tower | MA4640/800-XP-EP | Innco system | S3AM | 08/03/2025 | Biennial |
| Controller | EM2090 | Emco | 060520 | N/A | N/A |
| Turn Table | N/A | Ets | N/A | N/A | N/A |
| Loop Antenna | FMZB 1513 | Rohde & Schwarz | 1513-333 | 03/17/2024 | Biennial |
| Hybrid Antenna | VULB 9168 | Schwarzbeck | 9168-0895 | 08/16/2024 | Biennial |
| Horn Antenna | BBHA 9120D | Schwarzbeck | 9120D-1191 | 11/07/2025 | Biennial |
| Horn Antenna(15 GHz ~ 40 GHz) | BBHA9170 | Schwarzbeck | BBHA9170124 | 03/28/2025 | Biennial |
| Amp & Filter Bank Switch Controller | FBSM-01A | TNM system | 0 | N/A | N/A |
| Band Reject Filter | WRCJV2400/2483.5-2370/2520-60/12SS | Wainwright Instruments | 2 | 01/02/2025 | Annual |
| Band Reject Filter | WRCJV12-4900-5100-5900-6100-50SS | Wainwright Instruments | 5 | 06/12/2024 | Annual |
| Band Reject Filter | WRCJV12-4900-5100-5900-6100-50SS | Wainwright Instruments | 6 | 06/12/2024 | Annual |
| Band Reject Filter | WRCJV5100/5850-40/50-8EEK | Wainwright Instruments | 1 | 02/09/2024 | Annual |
| RF Switching System | FBSR-03A (3G HPF+LNA) | T&M SYSTEM | S3L1 | 11/17/2024 | Annual |
| RF Switching System | FBSR-03A (10dB ATT+LNA) | T&M SYSTEM | S3L2 | 11/17/2024 | Annual |
| RF Switching System | FBSR-03A (7G HPF+LNA) | T&M SYSTEM | S3L3 | 11/17/2024 | Annual |
| RF Switching System | FBSR-03A (3dB ATT+LNA) | T&M SYSTEM | S3L4 | 11/17/2024 | Annual |
| Power Amplifier | CBL18265035 | CERNEX | 22966 | 11/17/2024 | Annual |
| Power Amplifier | CBL26405040 | CERNEX | 25956 | 03/02/2024 | Annual |
| Bluetooth Tester | TC-3000C | TESCOM | 3000C000175 | 03/28/2024 | Annual |
| Spectrum Analyzer | FSVA40 (10 Hz ~ 40 GHz) | Rohde & Schwarz | 101502 | 03/17/2024 | Annual |
| Spectrum Analyzer | FSV40 (10 Hz ~ 40 GHz) | Rohde & Schwarz | 100900 | 12/06/2024 | Annual |

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
3. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5(Version : 2017).

11. ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

| No. | Description |
|-----|---------------------|
| 1 | HCT-RF-2401-FC001-P |