

TEST REPORT

FCC/ISED NFC Test for RI21A
Certification

APPLICANT
Panasonic Corporation of North America

REPORT NO.
HCT-RF-2112-FI008-R1

DATE OF ISSUE
April 18, 2022

Tested by
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|---|---|
| <h1 style="margin: 0;">TEST REPORT</h1> <p style="margin: 0;">FCC/ISED NFC Test for RI21A</p> | <p>REPORT NO. HCT-RF-2112-FI008-R1</p> <p>DATE OF ISSUE April 18, 2022</p> <p>Additional model -</p> |
|---|---|

| | |
|---------------------------------|--|
| Applicant | Panasonic Corporation of North America Two Riverfront Plaza, 9th Floor, Newark, NJ 07102-5490, USA |
| Eut Type Model Name | RFID Module RI21A |
| FCC ID IC | ACJ9TGRI21A 216H-CFRI21A |
| RF Output Field Strength | 3.01 dB μ V/m @30 m |
| Frequency of Operation | 13.56 MHz |
| Modulation type | ASK |
| FCC Classification | Low Power Communication Device Transmitter (DXX) |
| FCC Rule Part(s) | FCC Part 15.225 Subpart C |
| IC Rule Part(s) | RSS-210 Issue 10 (December 2019), RSS-Gen Issue 5_Amendment 1 (March 2019) |

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test results were applied only to the test methods required by the standard.

REVISION HISTORY

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

| Revision No. | Date of Issue | Description |
|--------------|-------------------|------------------------------|
| 0 | December 20, 2021 | Initial Release |
| 1 | April 18, 2022 | Page 5, Revised Power Supply |

Engineering Statement:

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. 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.

If this report is required to confirmation of authenticity, please contact to www.hct.co.kr

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1. EUT DESCRIPTION

| | |
|--|---|
| Model | RI21A |
| Additional model | - |
| EUT Type | RFID Module |
| Power Supply | 15.6 V(AC adaptor) |
| Frequency Range | 13.56 MHz |
| Transmit Power | 3.01 dB μ V/m @30 m |
| Modulation Type | ASK |
| Antenna type | Loop Antenna |
| Date(s) of Tests | December 10, 2021 ~ December 20, 2021 |
| PMN (Product Marketing Number) | RI21A |
| HVIN (Hardware Version Identification Number) | RI21A |
| FVIN (Firmware Version Identification Number) | N/A |
| HMN (Host Marketing Name) | FZ-40 |
| EUT serial numbers | Radiated: S0P-21-01923 Conducted: S0P-21-01923 |

2. TEST METHODOLOGY

The measurement procedure described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) is used in the measurement of the test device.

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 15.225 under the FCC Rules Part 15 Subpart C. / RSS-210 Issue 10 (December 2019)

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. 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, 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 April 02, 2018 (Registration Number: 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) The antennas of this E.U.T are permanently attached.
- (2) The E.U.T Complies with the requirement of § 15.203

According to RSS-Gen(Issue 5) Section 6.8:

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

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) | 1.82 (Confidence level about 95 %, k=2) |
| Radiated Disturbance (9 kHz ~ 30 MHz) | 3.40 (Confidence level about 95 %, k=2) |
| Radiated Disturbance (30 MHz ~ 1 GHz) | 4.80 (Confidence level about 95 %, k=2) |
| Radiated Disturbance (1 GHz ~ 18 GHz) | 5.70 (Confidence level about 95 %, k=2) |
| Radiated Disturbance (18 GHz ~ 40 GHz) | 5.05 (Confidence level about 95 %, k=2) |

7. DESCRIPTION OF TESTS

7.1. Radiated Test

Limit (Operation within the band 13.110 MHz – 14.010 MHz)

| Frequency (MHz) | Field Strength (uV/m) | Measurement Distance (m) |
|--|-----------------------|--------------------------|
| 13.553 – 13.567 | 15,848 | 30 |
| 13.410 ≤ f ≤ 13.553 13.567 ≤ f ≤ 13.710 | 334 | 30 |
| 13.110 ≤ f ≤ 13.410 13.710 ≤ f ≤ 14.010 | 106 | 30 |

Note:

1. 15,848 uV/m = 84.0 dBuV/m
2. 334 uV/m = 50.47 dBuV/m
3. 106 uV/m = 40.51 dBuV/m

Limit (Radiated Spurious Emissions)

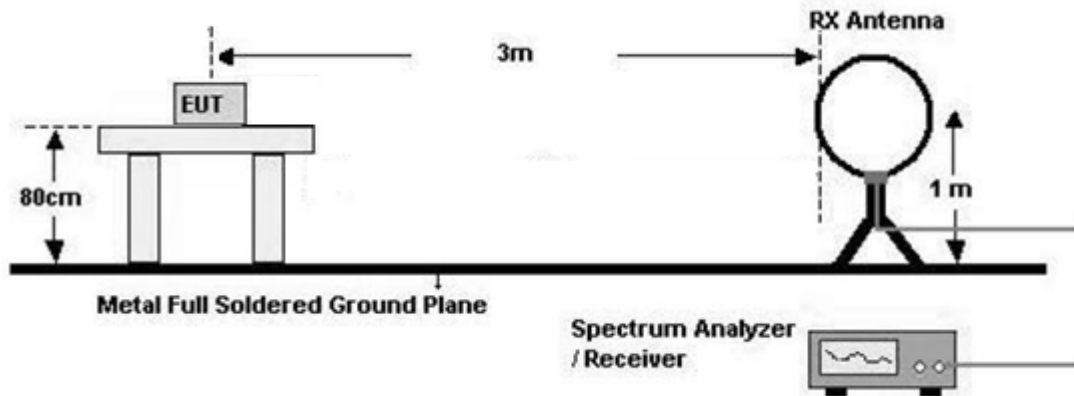
| Frequency (MHz) | Field Strength (uV/m) | Measurement Distance (m) |
|-----------------|-----------------------|--------------------------|
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30 | 30 | 30 |
| 30-88 | *100 | 3 |
| 88-216 | *150 | 3 |
| 216-960 | *200 | 3 |
| Above 960 | 500 | 3 |

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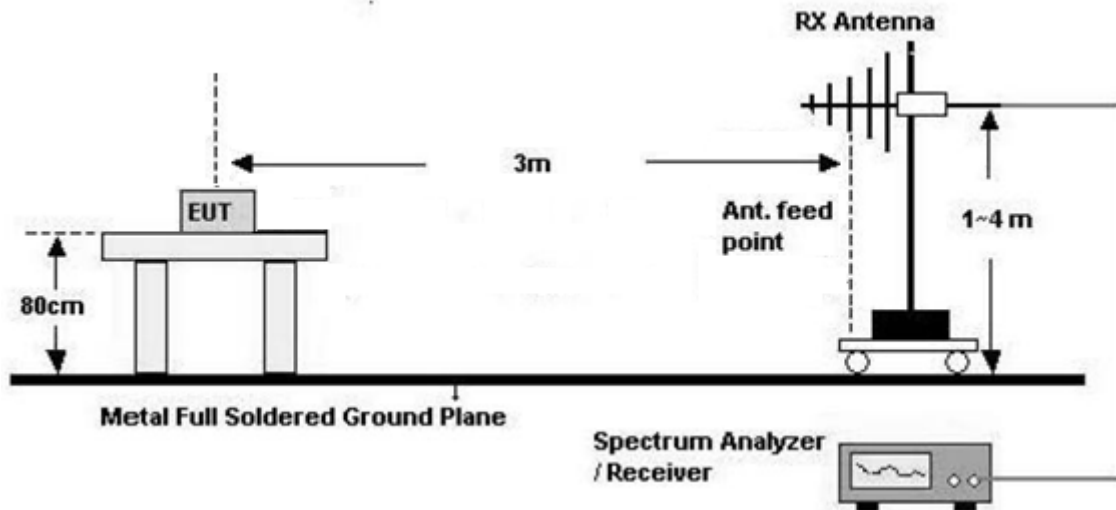
Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

Test Configuration

Below 30 MHz



30 MHz - 1 GHz



Test Procedure of inband

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 = $40\log(3\text{ m}/30\text{ m}) = -40\text{ dB}$

Measurement Distance : 3 m (Below 30 MHz)

7. Spectrum Setting

- Detector = Peak

- Trace = Maxhold

- RBW = 9 kHz

- VBW \geq 3 x RBW

8. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

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 = Maxhold
 - RBW = 9 kHz
 - VBW $\geq 3 \times$ RBW
9. Total = Reading 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.

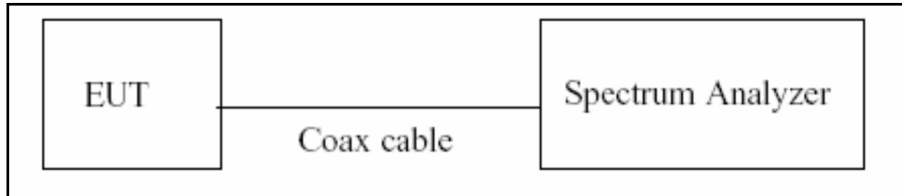
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Test Procedure of Radiated spurious emissions(Above 30 MHz)

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 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1m 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
 - Frequency Range = 30 MHz ~ 1 GHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 100 kHz
 - VBW \geq 3 x RBW
7. Total = Reading 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.

7.2. 20 dB Bandwidth

Test Configuration



Test Procedure

The 20 dB bandwidth was measured by using a spectrum analyzer.

(Procedure 6.9.2 in ANSI 63.10-2013)

- 1) RBW = 1 %~5 % of the OBW
- 2) VBW = approximately three times RBW
- 3) Span = between two times and five times the OBW
- 4) Detector = Peak
- 5) Trace mode = Max hold
- 6) Allow the trace to stabilize

Note :

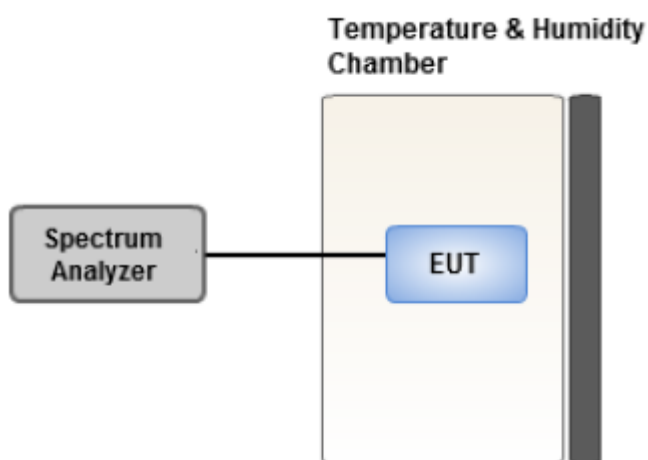
We tested Occupied Bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.

7.3. Frequency Stability

Limit

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency.

Test Configuration



Test Procedure.

For battery operated equipment, the equipment tests shall be performed using a new battery.

- 1) Turn the EUT OFF and place it inside the environmental temperature chamber.
For devices that have oscillator heaters, energize only the heater circuit.
- 2) Set the temperature control on the chamber to the highest specified in the regulatory requirements
for the type of device and allow the oscillator heater and the chamber temperature to stabilize.
- 3) While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.
- 4) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency.

Note:

- 1) Temperature:
The temperature is varied from $-20\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ using an environmental chamber.
- 2) Primary Supply Voltage :
The primary supply voltage is varied from 85 % to 115 % of the nominal value for non hand-



carried battery and AC powered equipment.

For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

7.4. 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) = Reading Value + Correction Factor

7.5. Receiver Spurious Emissions

Limit

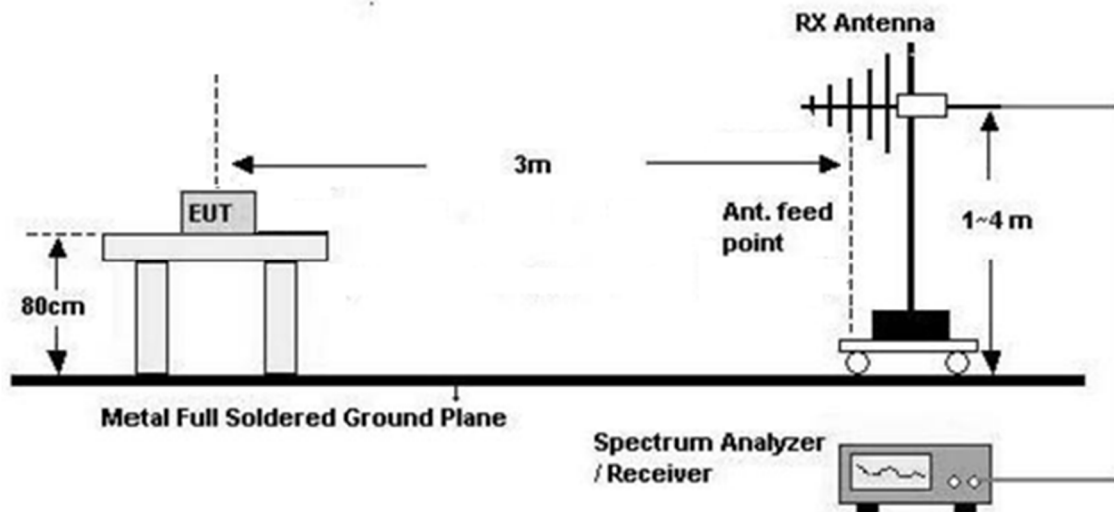
| Frequency (MHz) | Field Strength (uV/m) | Measurement Distance (m) |
|-----------------|-----------------------|--------------------------|
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

Note:

Measurements for compliance with the limits in table may be performed at distances other than 3 metres.

Test Configuration

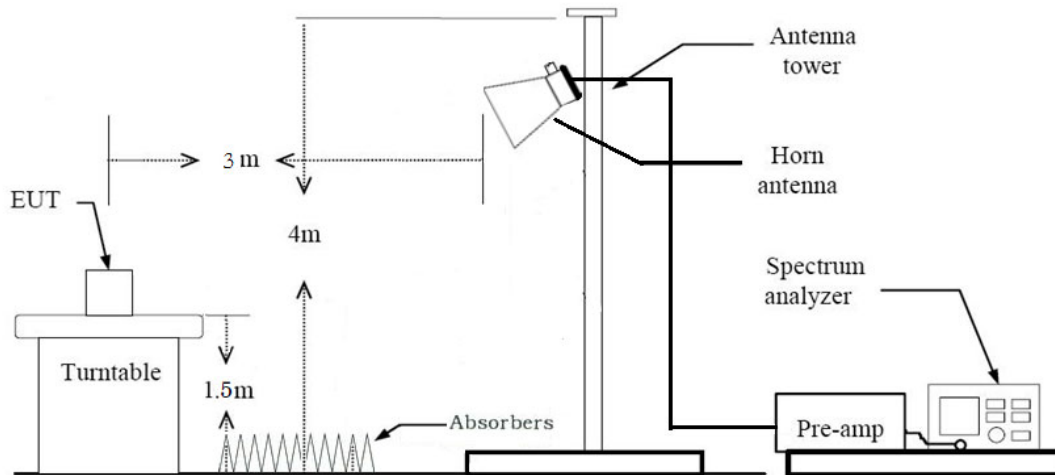
30 MHz - 1 GHz



Test Procedure of Receiver Spurious Emissions (Below 1GHz)

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 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m 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 = Maxhold
 - RBW = 100 kHz
 - VBW \geq 3 x RBW
 - (2) Measurement Type(Quasi-peak):
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Quasi-Peak
 - RBW = 120 kHz
7. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)

Above 1 GHz



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 1m to 4m 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. The unit was tested with its standard battery.
8. Spectrum Setting

(1) Measurement Type(Peak):

- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 1 MHz
- VBW \geq 3 x RBW

(2) Measurement Type(Average):

- We performed using a reduced video BW method was done with the analyzer in linear mode

- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 1 MHz
- VBW $\geq 1/\tau$ Hz, where τ = pulse width in seconds

The actual setting value of VBW = 1 kHz

9. 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.

10. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

11. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F)

7.6. 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 + Laptop
 - Worstcase : Stand alone + Laptop
2. EUT Axis : Y
3. All type and bitrate were investigated and the worst case results are reported.
 - Worst case : Type A, 106 kbps
4. All mode of without tag and with tag were investigated and the worst case configuration results are reported.
 - Worstcase : Without Tag
5. All position of loop antenna were investigated and the worst case configuration results are reported.
 - Position : Horizontal, Vertical, Parallel to the ground plane
 - Worstcase : Horizontal

AC Power line Conducted Emissions

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

20 dB Bandwidth & Frequency Stability

1. All type and bitrate were investigated and the worst case results are reported.
 - Worst case : Type A, 106 kbps

8. TEST SUMMARY

FCC Part

| Regulation | Requirement | Result |
|-----------------|---|--------|
| Part 15.225 (a) | Radiated Electric Field Emissions (13.553 MHz to 13.567 MHz) | Pass |
| Part 15.225 (b) | Radiated Electric Field Emissions ($13.410 \leq f \leq 13.553$, $13.567 \leq f \leq 13.710$) | Pass |
| Part 15.225 (c) | Radiated Electric Field Emissions ($13.110 \leq f \leq 13.410$, $13.710 \leq f \leq 14.010$) | Pass |
| Part 15.209 | Radiated Electric Field Emissions (9 kHz to 30 MHz) | Pass |
| Part 15.209 | Radiated Electric Field Emissions (30 MHz to 1 GHz) | Pass |
| Part 15.225 (e) | Frequency Stability | Pass |
| Part 15.207 | AC power conducted emissions (150 kHz to 30 MHz) | Pass |
| Part 15.215 (c) | 20 dB Bandwidth | Pass |

ISED Part

| Test Description | ISED Part Section(s) | Test Result |
|---|----------------------------|-------------|
| Radiated Electric Field Emissions (13.553MHz to 13.567MHz) | RSS-210, annex B.6(a)(i) | Pass |
| Radiated Electric Field Emissions ($13.410 \leq f \leq 13.553$, $13.567 \leq f \leq 13.710$) | RSS-210, annex B.6(a)(ii) | Pass |
| Radiated Electric Field Emissions ($13.110 \leq f \leq 13.410$, $13.710 \leq f \leq 14.010$) | RSS-210, annex B.6(a)(iii) | Pass |
| Radiated Electric Field Emissions (9kHz to 30MHz) | RSS-GEN, 8.9 | Pass |
| Radiated Electric Field Emissions (30MHz to 1GHz) | RSS-GEN, 8.9 | Pass |
| Frequency Stability | RSS-210, annex B.6(a)(iv) | Pass |
| AC power conducted emissions (150kHz to 30MHz) | RSS-GEN, 8.8 | Pass |
| 20 dB Bandwidth | RSS-GEN, 6.7 | Pass |
| Receiver Spurious Emissions | RSS-GEN, 7 | Pass |

9. TEST RESULT

9.1. Operation within the band 13.110 MHz – 14.010 MHz

Measured Frequency Range :

13.553 MHz-13.567 MHz

| Frequency (MHz) | Read Level (dB μ V/m) @3 m | Ant.Factor +Cable Loss (dB/m) | Distance Correction (dB) | Ant. POL | Total (dB μ V/m) @30 m | Limit (dB μ V/m) @30 m | Margin (dB) |
|-----------------|--------------------------------|-------------------------------|--------------------------|----------|----------------------------|----------------------------|-------------|
| 13.5605 | 22.94 | 20.07 | -40.00 | H | 3.01 | 84.00 | 80.99 |
| 13.5603 | 22.61 | 20.07 | -40.00 | H | 2.68 | 84.00 | 81.32 |

Measured Frequency Range :

13.410 MHz-13.553 MHz and 13.567 MHz-13.710 MHz

| Frequency (MHz) | Read Level (dB μ V/m) @3 m | Ant.Factor +Cable Loss (dB/m) | Distance Correction (dB) | Ant. POL | Total (dB μ V/m) @30 m | Limit (dB μ V/m) @30 m | Margin (dB) |
|-----------------|--------------------------------|-------------------------------|--------------------------|----------|----------------------------|----------------------------|-------------|
| 13.5530 | 17.54 | 20.07 | -40.00 | H | -2.39 | 50.47 | 52.86 |
| 13.5679 | 17.09 | 20.07 | -40.00 | H | -2.84 | 50.47 | 52.31 |

Measured Frequency Range :

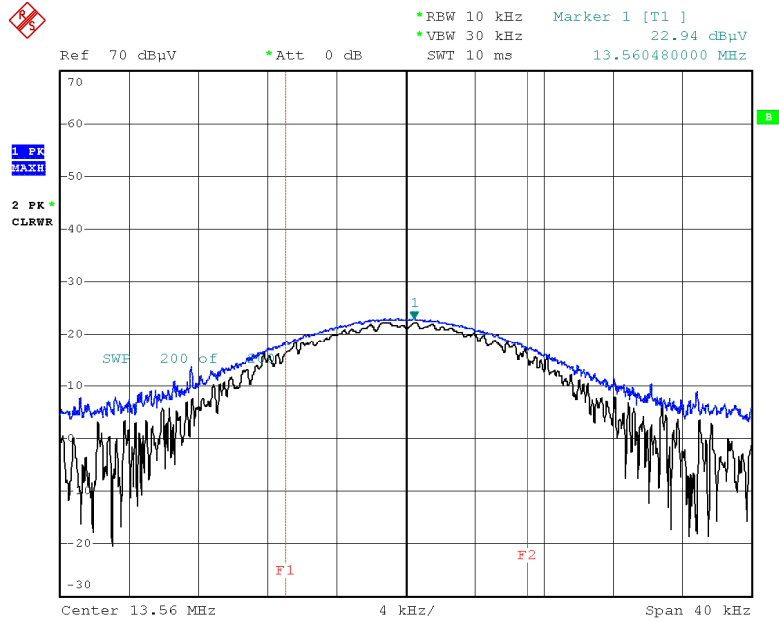
13.110 MHz – 13.410 MHz and 13.710 MHz-14.010 MHz

| Frequency (MHz) | Read Level (dB μ V/m) @3 m | Ant.Factor +Cable Loss (dB/m) | Distance Correction (dB) | Ant. POL | Total (dB μ V/m) @30 m | Limit (dB μ V/m) @30 m | Margin (dB) |
|-----------------|--------------------------------|-------------------------------|--------------------------|----------|----------------------------|----------------------------|-------------|
| 13.2133 | 7.54 | 20.07 | -40.00 | H | -12.39 | 40.51 | 52.90 |
| 13.7817 | 7.48 | 20.07 | -40.00 | H | -12.45 | 40.51 | 52.96 |



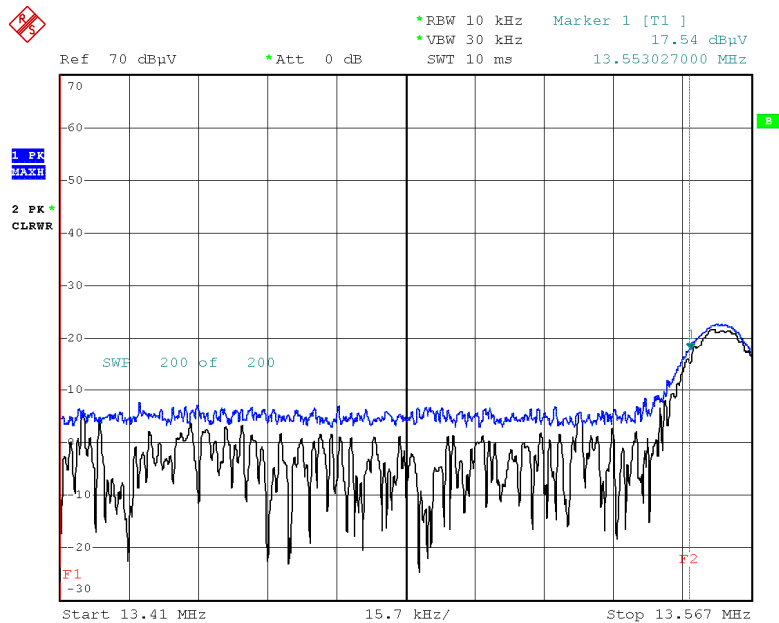
Test Plot

13.553 MHz ~ 13.567 MHz



Date: 14.DEC.2021 15:18:06

13.410 MHz-13.553 MHz



Date: 14.DEC.2021 15:20:27

Note:

Plot of worst case are only reported.

9.2. Radiated Emission 9 kHz – 30 MHz

Measured Frequency Range :

9 kHz - 30 MHz

| Frequency (MHz) | Read Level (dB μ V/m) @3 m | Ant.Factor +Cable Loss (dB/m) | Distance Correction (dB) | Ant. POL | Total (dB μ V/m) @30 m | Limit (dB μ V/m) @30 m | Margin (dB) |
|--------------------|--------------------------------------|-------------------------------------|--------------------------------|-------------|----------------------------------|----------------------------------|----------------|
| 3.1470 | 11.27 | 19.87 | -40.00 | H | -8.86 | 29.54 | 38.40 |
| 15.0813 | 7.92 | 20.07 | -40.00 | V | -12.01 | 29.54 | 41.55 |
| 20.8840 | 8.32 | 20.67 | -40.00 | H | -11.01 | 29.54 | 40.55 |
| 26.5750 | 8.52 | 20.57 | -40.00 | H | -10.91 | 29.54 | 40.45 |

9.3. Radiated Emission 30 MHz – 1000 MHz

Measured Frequency Range :

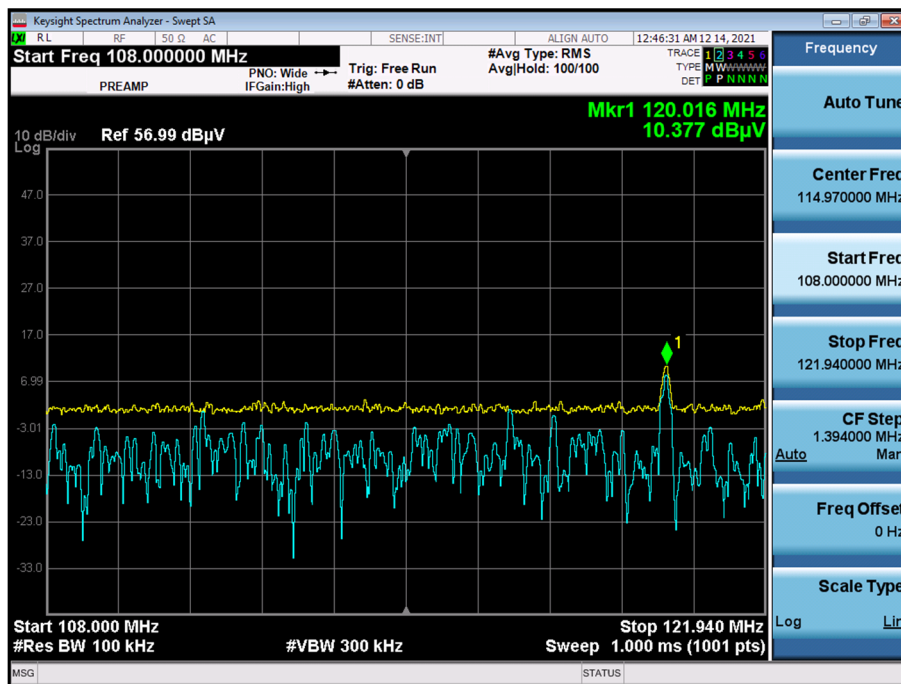
30 MHz - 1000 MHz

| Frequency (MHz) | Read Level (dB μ V/m) @3 m | Ant.Factor (dB/m) | Cable Loss (dB) | Ant. Pol (H/V) | Total (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) |
|-----------------|--------------------------------|-------------------|-----------------|----------------|----------------------|----------------------|-------------|
| 37.1550 | 3.42 | 18.40 | 0.47 | H | 22.29 | 40.00 | 17.71 |
| #37.6275 | 3.72 | 19.30 | 0.55 | H | 23.57 | 40.00 | 16.43 |
| 38.6700 | 3.63 | 19.30 | 0.55 | V | 23.48 | 40.00 | 16.52 |
| 99.7672 | 3.53 | 14.90 | 0.91 | H | 19.34 | 43.50 | 24.16 |
| #120.0160 | 10.38 | 16.90 | 1.01 | H | 28.29 | 43.50 | 15.21 |
| #131.6560 | 3.77 | 17.90 | 1.04 | V | 22.71 | 43.50 | 20.79 |

Note:

1. “#” is the result for restricted band.

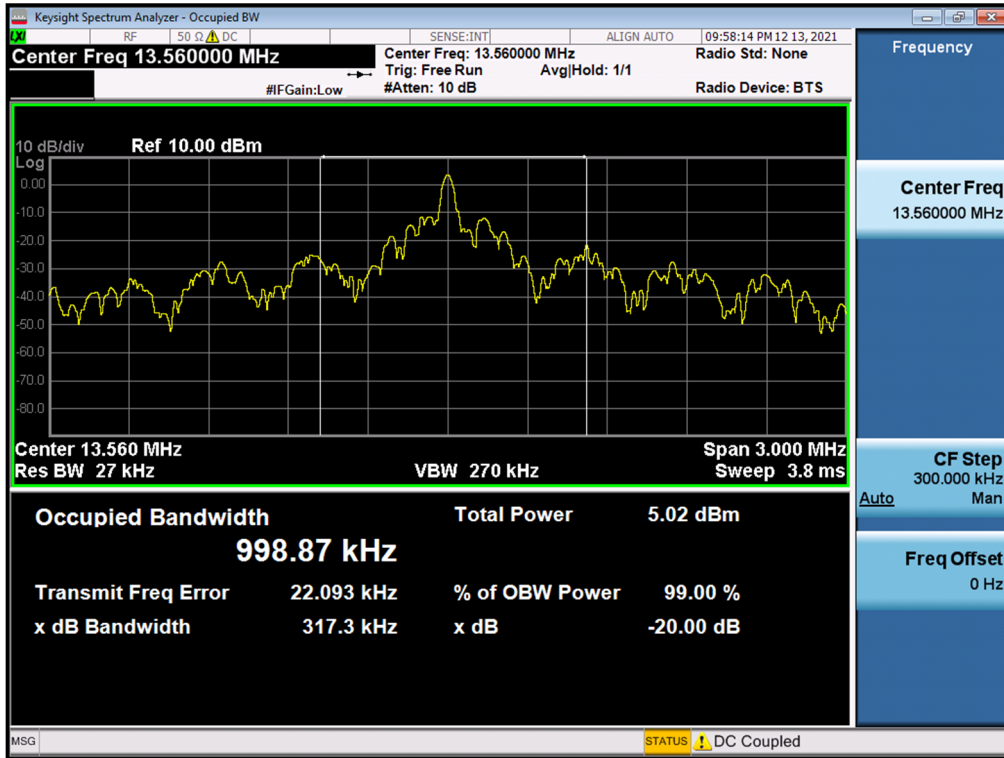
Test Plot



Note:

Plot of worst case are only reported

9.4. 20 dB Bandwidth





9.5. Frequency Stability

Startup

OPERATING FREQUENCY: 13.56 MHz
 REFERENCE VOLTAGE: 15.6 VDC
 DEVIATION LIMIT: ±0.01 % = ±1356 Hz

| Voltage | Power | Temp. | Frequency | Frequency Dev. | Frequency |
|---------|-------|-----------|-----------|----------------|-----------|
| (%) | (VDC) | (°C) | (MHz) | (Hz) | Dev (%) |
| 100% | 15.6 | -20 | 13.560085 | 85 | 0.0006305 |
| 100% | | -10 | 13.560079 | 79 | 0.0005805 |
| 100% | | 0 | 13.560060 | 60 | 0.0004446 |
| 100% | | +10 | 13.560092 | 92 | 0.0006805 |
| 100% | | +20(Ref.) | 13.560074 | 74 | 0.0005444 |
| 100% | | +30 | 13.560024 | 24 | 0.0001746 |
| 100% | | +40 | 13.560023 | 23 | 0.0001717 |
| 100% | | +50 | 13.560098 | 98 | 0.0007195 |
| LOW | | 13.26 | +20 | 13.560073 | 73 |
| HIGH | 17.94 | +20 | 13.560028 | 28 | 0.0002053 |



2 minutes

PERATING FREQUENCY: 13.56 MHz

REFERENCE VOLTAGE: 15.6 VDC

DEVIATION LIMIT: ±0.01 % = ±1356 Hz

| Voltage | Power | Temp. | Frequency | Frequency Dev. | Frequency |
|---------|-------|-----------|-----------|----------------|-----------|
| (%) | (VDC) | (°C) | (MHz) | (Hz) | Dev (%) |
| 100% | 15.6 | -20 | 13.560069 | 69 | 0.0005108 |
| 100% | | -10 | 13.560083 | 83 | 0.0006117 |
| 100% | | 0 | 13.560002 | 2 | 0.0000173 |
| 100% | | +10 | 13.560074 | 74 | 0.0005452 |
| 100% | | +20(Ref.) | 13.560030 | 30 | 0.0002228 |
| 100% | | +30 | 13.560070 | 70 | 0.0005174 |
| 100% | | +40 | 13.560088 | 88 | 0.0006522 |
| 100% | | +50 | 13.560080 | 80 | 0.0005897 |
| LOW | | 13.26 | +20 | 13.560075 | 75 |
| HIGH | 17.94 | +20 | 13.560099 | 99 | 0.0007327 |



5 minutes

PERATING FREQUENCY: 13.56 MHz
 REFERENCE VOLTAGE: 15.6 VDC
 DEVIATION LIMIT: ±0.01 % = ±1356 Hz

| Voltage | Power | Temp. | Frequency | Frequency Dev. | Frequency |
|---------|-------|-----------|-----------|----------------|-----------|
| (%) | (VDC) | (°C) | (MHz) | (Hz) | Dev (%) |
| 100% | 15.6 | -20 | 13.560080 | 80 | 0.0005904 |
| 100% | | -10 | 13.560049 | 49 | 0.0003617 |
| 100% | | 0 | 13.560087 | 87 | 0.0006443 |
| 100% | | +10 | 13.560047 | 47 | 0.0003471 |
| 100% | | +20(Ref.) | 13.560030 | 30 | 0.0002249 |
| 100% | | +30 | 13.560073 | 73 | 0.0005347 |
| 100% | | +40 | 13.560041 | 41 | 0.0002987 |
| 100% | | +50 | 13.560068 | 68 | 0.0004987 |
| LOW | | 13.26 | +20 | 13.560015 | 15 |
| HIGH | 17.94 | +20 | 13.560009 | 9 | 0.0000659 |



10 minutes

PERATING FREQUENCY: 13.56 MHz

REFERENCE VOLTAGE: 15.6 VDC

DEVIATION LIMIT: ±0.01 % = ±1356 Hz

| Voltage | Power | Temp. | Frequency | Frequency Dev. | Frequency |
|---------|-------|-----------|-----------|----------------|-----------|
| (%) | (VDC) | (°C) | (MHz) | (Hz) | Dev (%) |
| 100% | 15.6 | -20 | 13.560048 | 48 | 0.0003560 |
| 100% | | -10 | 13.560089 | 89 | 0.0006561 |
| 100% | | 0 | 13.560061 | 61 | 0.0004511 |
| 100% | | +10 | 13.560090 | 90 | 0.0006673 |
| 100% | | +20(Ref.) | 13.560011 | 11 | 0.0000844 |
| 100% | | +30 | 13.560053 | 53 | 0.0003887 |
| 100% | | +40 | 13.560021 | 21 | 0.0001529 |
| 100% | | +50 | 13.560031 | 31 | 0.0002294 |
| LOW | | 13.26 | +20 | 13.560035 | 35 |
| HIGH | 17.94 | +20 | 13.560017 | 17 | 0.0001265 |



9.6 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

TERM

Test

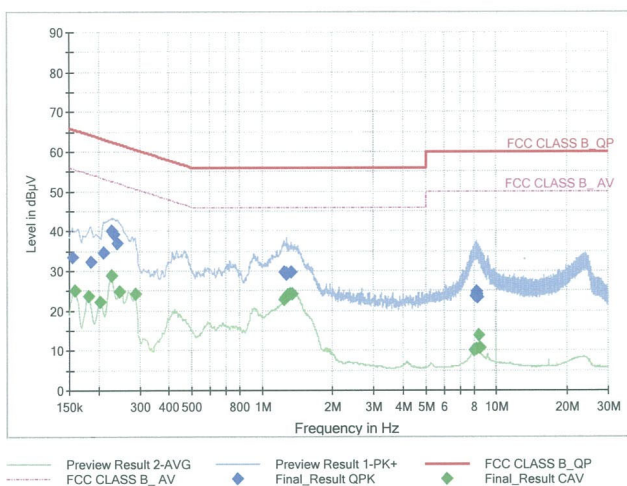
1 / 2

Test Report

Common Information

EUT : RI21A
 Manufacturer : PANASONIC
 Test Site: SHIELD ROOM
 Operating Conditions : NFC_L1_TERM
 Operator Name:
 Comment:

Full Spectrum



Final Result QPK

| Frequency (MHz) | QuasiPeak (dBµV) | Limit (dBµV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------|--------------|-------------|-----------------|------|--------|------------|
| 0.1545 | 33.46 | 65.75 | 32.29 | 9.000 | L1 | OFF | 9.6 |
| 0.1860 | 32.42 | 64.21 | 31.80 | 9.000 | L1 | OFF | 9.6 |
| 0.2108 | 34.52 | 63.18 | 28.66 | 9.000 | L1 | OFF | 9.6 |
| 0.2265 | 39.96 | 62.58 | 22.62 | 9.000 | L1 | OFF | 9.6 |
| 0.2333 | 39.12 | 62.33 | 23.21 | 9.000 | L1 | OFF | 9.6 |
| 0.2400 | 36.93 | 62.10 | 25.17 | 9.000 | L1 | OFF | 9.6 |
| 1.2403 | 29.75 | 56.00 | 26.25 | 9.000 | L1 | OFF | 9.6 |
| 1.2448 | 29.60 | 56.00 | 26.40 | 9.000 | L1 | OFF | 9.6 |
| 1.2515 | 29.37 | 56.00 | 26.63 | 9.000 | L1 | OFF | 9.6 |
| 1.2673 | 29.33 | 56.00 | 26.67 | 9.000 | L1 | OFF | 9.6 |
| 1.2740 | 29.28 | 56.00 | 26.72 | 9.000 | L1 | OFF | 9.6 |
| 1.3348 | 29.62 | 56.00 | 26.38 | 9.000 | L1 | OFF | 9.6 |
| 8.1185 | 23.70 | 60.00 | 36.30 | 9.000 | L1 | OFF | 9.8 |
| 8.1860 | 24.03 | 60.00 | 35.97 | 9.000 | L1 | OFF | 9.8 |
| 8.2018 | 24.84 | 60.00 | 35.16 | 9.000 | L1 | OFF | 9.8 |
| 8.2490 | 24.29 | 60.00 | 35.71 | 9.000 | L1 | OFF | 9.8 |
| 8.3210 | 23.43 | 60.00 | 36.57 | 9.000 | L1 | OFF | 9.8 |
| 8.3345 | 23.35 | 60.00 | 36.65 | 9.000 | L1 | OFF | 9.8 |

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Test

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Final Result_CAV

| Frequency (MHz) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|-----------------|--------------|-------------|-----------------|------|--------|------------|
| 0.1590 | 24.99 | 55.52 | 30.53 | 9.000 | L1 | OFF | 9.6 |
| 0.1815 | 23.58 | 54.42 | 30.84 | 9.000 | L1 | OFF | 9.6 |
| 0.2040 | 22.30 | 53.45 | 31.15 | 9.000 | L1 | OFF | 9.6 |
| 0.2265 | 28.72 | 52.58 | 23.86 | 9.000 | L1 | OFF | 9.6 |
| 0.2468 | 24.92 | 51.87 | 26.95 | 9.000 | L1 | OFF | 9.6 |
| 0.2873 | 24.16 | 50.60 | 26.44 | 9.000 | L1 | OFF | 9.6 |
| 1.2425 | 22.70 | 46.00 | 23.30 | 9.000 | L1 | OFF | 9.6 |
| 1.2538 | 23.24 | 46.00 | 22.76 | 9.000 | L1 | OFF | 9.6 |
| 1.2650 | 23.50 | 46.00 | 22.50 | 9.000 | L1 | OFF | 9.6 |
| 1.2763 | 23.40 | 46.00 | 22.60 | 9.000 | L1 | OFF | 9.6 |
| 1.2898 | 23.81 | 46.00 | 22.19 | 9.000 | L1 | OFF | 9.6 |
| 1.3145 | 24.14 | 46.00 | 21.86 | 9.000 | L1 | OFF | 9.6 |
| 1.3505 | 24.28 | 46.00 | 21.72 | 9.000 | L1 | OFF | 9.6 |
| 8.0533 | 10.01 | 50.00 | 39.99 | 9.000 | L1 | OFF | 9.8 |
| 8.0690 | 9.97 | 50.00 | 40.03 | 9.000 | L1 | OFF | 9.8 |
| 8.2513 | 10.51 | 50.00 | 39.49 | 9.000 | L1 | OFF | 9.8 |
| 8.3840 | 13.73 | 50.00 | 36.27 | 9.000 | L1 | OFF | 9.8 |
| 8.4695 | 10.64 | 50.00 | 39.37 | 9.000 | L1 | OFF | 9.8 |

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UNTERM

Test

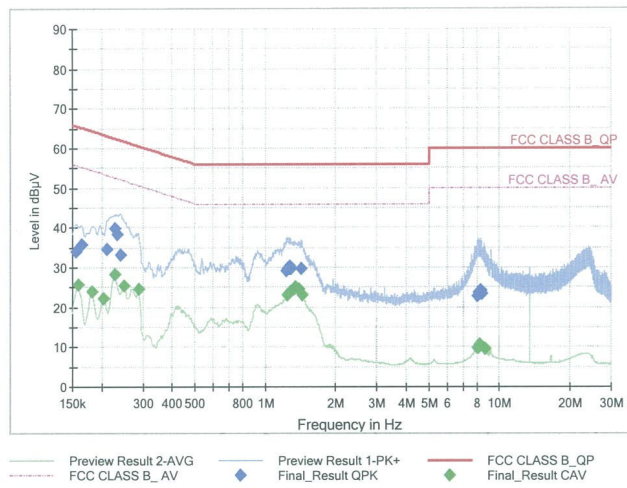
1 / 2

Test Report

Common Information

EUT : RI21A
 Manufacturer : PANASONIC
 Test Site: SHIELD ROOM
 Operating Conditions : NFC_L1_UNTERM
 Operator Name:
 Comment:

Full Spectrum



Final Result QPK

| Frequency (MHz) | QuasiPeak (dBµV) | Limit (dBµV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------|--------------|-------------|-----------------|------|--------|------------|
| 0.1545 | 34.10 | 65.75 | 31.65 | 9.000 | L1 | OFF | 9.6 |
| 0.1635 | 35.72 | 65.28 | 29.57 | 9.000 | L1 | OFF | 9.6 |
| 0.2108 | 34.76 | 63.18 | 28.42 | 9.000 | L1 | OFF | 9.6 |
| 0.2265 | 39.77 | 62.58 | 22.81 | 9.000 | L1 | OFF | 9.6 |
| 0.2333 | 38.43 | 62.33 | 23.90 | 9.000 | L1 | OFF | 9.6 |
| 0.2400 | 33.13 | 62.10 | 28.97 | 9.000 | L1 | OFF | 9.6 |
| 1.2290 | 29.03 | 56.00 | 26.97 | 9.000 | L1 | OFF | 9.6 |
| 1.2493 | 29.57 | 56.00 | 26.43 | 9.000 | L1 | OFF | 9.6 |
| 1.2650 | 30.19 | 56.00 | 25.81 | 9.000 | L1 | OFF | 9.6 |
| 1.2763 | 29.68 | 56.00 | 26.32 | 9.000 | L1 | OFF | 9.6 |
| 1.2875 | 29.68 | 56.00 | 26.33 | 9.000 | L1 | OFF | 9.6 |
| 1.4203 | 29.76 | 56.00 | 26.24 | 9.000 | L1 | OFF | 9.6 |
| 8.0398 | 22.88 | 60.00 | 37.12 | 9.000 | L1 | OFF | 9.8 |
| 8.1703 | 23.14 | 60.00 | 36.86 | 9.000 | L1 | OFF | 9.8 |
| 8.1815 | 23.60 | 60.00 | 36.40 | 9.000 | L1 | OFF | 9.8 |
| 8.3030 | 23.80 | 60.00 | 36.20 | 9.000 | L1 | OFF | 9.8 |
| 8.3165 | 24.35 | 60.00 | 35.65 | 9.000 | L1 | OFF | 9.8 |
| 8.4358 | 23.38 | 60.00 | 36.62 | 9.000 | L1 | OFF | 9.8 |

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Test

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Final Result_CAV

| Frequency (MHz) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|-----------------|--------------|-------------|-----------------|------|--------|------------|
| 0.1590 | 25.62 | 55.52 | 29.90 | 9.000 | L1 | OFF | 9.6 |
| 0.1815 | 23.95 | 54.42 | 30.47 | 9.000 | L1 | OFF | 9.6 |
| 0.2040 | 22.13 | 53.45 | 31.31 | 9.000 | L1 | OFF | 9.6 |
| 0.2265 | 28.28 | 52.58 | 24.30 | 9.000 | L1 | OFF | 9.6 |
| 0.2490 | 25.32 | 51.79 | 26.47 | 9.000 | L1 | OFF | 9.6 |
| 0.2873 | 24.46 | 50.60 | 26.15 | 9.000 | L1 | OFF | 9.6 |
| 1.2425 | 23.18 | 46.00 | 22.82 | 9.000 | L1 | OFF | 9.6 |
| 1.2650 | 23.76 | 46.00 | 22.24 | 9.000 | L1 | OFF | 9.6 |
| 1.2898 | 24.02 | 46.00 | 21.98 | 9.000 | L1 | OFF | 9.6 |
| 1.3258 | 24.43 | 46.00 | 21.57 | 9.000 | L1 | OFF | 9.6 |
| 1.3505 | 24.96 | 46.00 | 21.04 | 9.000 | L1 | OFF | 9.6 |
| 1.3865 | 24.46 | 46.00 | 21.54 | 9.000 | L1 | OFF | 9.6 |
| 1.4428 | 23.17 | 46.00 | 22.83 | 9.000 | L1 | OFF | 9.6 |
| 8.0645 | 9.95 | 50.00 | 40.05 | 9.000 | L1 | OFF | 9.8 |
| 8.1748 | 9.80 | 50.00 | 40.20 | 9.000 | L1 | OFF | 9.8 |
| 8.1838 | 10.72 | 50.00 | 39.28 | 9.000 | L1 | OFF | 9.8 |
| 8.3165 | 10.28 | 50.00 | 39.72 | 9.000 | L1 | OFF | 9.8 |
| 8.6990 | 9.38 | 50.00 | 40.62 | 9.000 | L1 | OFF | 9.8 |

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Conducted Emissions (Line 2)

TERM

Test

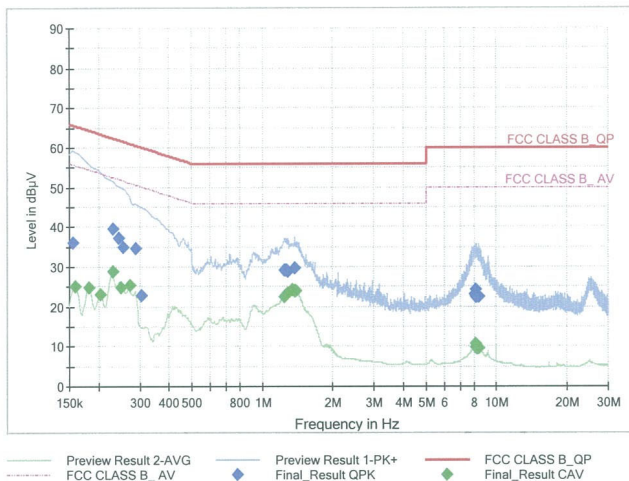
1 / 2

Test Report

Common Information

EUT : RI21A
 Manufacturer : PANASONIC
 Test Site: SHIELD ROOM
 Operating Conditions : NFC_N_TERM
 Operator Name:
 Comment:

Full Spectrum



Final Result QPK

| Frequency (MHz) | QuasiPeak (dBµV) | Limit (dBµV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------|--------------|-------------|-----------------|------|--------|------------|
| 0.1545 | 35.95 | 65.75 | 29.80 | 9.000 | N | OFF | 9.6 |
| 0.2310 | 39.42 | 62.41 | 22.99 | 9.000 | N | OFF | 9.6 |
| 0.2445 | 37.19 | 61.94 | 24.75 | 9.000 | N | OFF | 9.6 |
| 0.2535 | 34.99 | 61.64 | 26.65 | 9.000 | N | OFF | 9.6 |
| 0.2873 | 34.64 | 60.60 | 25.96 | 9.000 | N | OFF | 9.6 |
| 0.3053 | 22.74 | 60.10 | 37.36 | 9.000 | N | OFF | 9.6 |
| 1.2425 | 29.22 | 56.00 | 26.78 | 9.000 | N | OFF | 9.6 |
| 1.2470 | 29.28 | 56.00 | 26.72 | 9.000 | N | OFF | 9.6 |
| 1.2583 | 29.25 | 56.00 | 26.75 | 9.000 | N | OFF | 9.6 |
| 1.2673 | 29.22 | 56.00 | 26.78 | 9.000 | N | OFF | 9.6 |
| 1.2875 | 28.84 | 56.00 | 27.16 | 9.000 | N | OFF | 9.6 |
| 1.3730 | 29.67 | 56.00 | 26.33 | 9.000 | N | OFF | 9.6 |
| 8.0780 | 23.11 | 60.00 | 36.89 | 9.000 | N | OFF | 9.8 |
| 8.1073 | 24.23 | 60.00 | 35.77 | 9.000 | N | OFF | 9.8 |
| 8.1433 | 22.42 | 60.00 | 37.58 | 9.000 | N | OFF | 9.8 |
| 8.2130 | 22.77 | 60.00 | 37.23 | 9.000 | N | OFF | 9.8 |
| 8.2423 | 22.53 | 60.00 | 37.47 | 9.000 | N | OFF | 9.8 |
| 8.3728 | 22.45 | 60.00 | 37.55 | 9.000 | N | OFF | 9.8 |

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Test

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Final Result_CAV

| Frequency (MHz) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|-----------------|--------------|-------------|-----------------|------|--------|------------|
| 0.1590 | 25.22 | 55.52 | 30.30 | 9.000 | N | OFF | 9.6 |
| 0.1815 | 24.92 | 54.42 | 29.50 | 9.000 | N | OFF | 9.6 |
| 0.2040 | 23.06 | 53.45 | 30.38 | 9.000 | N | OFF | 9.6 |
| 0.2288 | 28.84 | 52.50 | 23.66 | 9.000 | N | OFF | 9.6 |
| 0.2490 | 24.78 | 51.79 | 27.01 | 9.000 | N | OFF | 9.6 |
| 0.2715 | 25.39 | 51.07 | 25.68 | 9.000 | N | OFF | 9.6 |
| 1.2425 | 22.56 | 46.00 | 23.44 | 9.000 | N | OFF | 9.6 |
| 1.2538 | 22.74 | 46.00 | 23.26 | 9.000 | N | OFF | 9.6 |
| 1.2650 | 23.12 | 46.00 | 22.88 | 9.000 | N | OFF | 9.6 |
| 1.2898 | 23.41 | 46.00 | 22.59 | 9.000 | N | OFF | 9.6 |
| 1.3505 | 24.22 | 46.00 | 21.78 | 9.000 | N | OFF | 9.6 |
| 1.3730 | 24.05 | 46.00 | 21.95 | 9.000 | N | OFF | 9.6 |
| 1.3865 | 23.96 | 46.00 | 22.04 | 9.000 | N | OFF | 9.6 |
| 8.1095 | 10.61 | 50.00 | 39.39 | 9.000 | N | OFF | 9.8 |
| 8.1185 | 9.95 | 50.00 | 40.05 | 9.000 | N | OFF | 9.8 |
| 8.2513 | 9.61 | 50.00 | 40.39 | 9.000 | N | OFF | 9.8 |
| 8.3323 | 9.53 | 50.00 | 40.47 | 9.000 | N | OFF | 9.8 |
| 8.3773 | 9.53 | 50.00 | 40.47 | 9.000 | N | OFF | 9.8 |

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UNTERM

Test

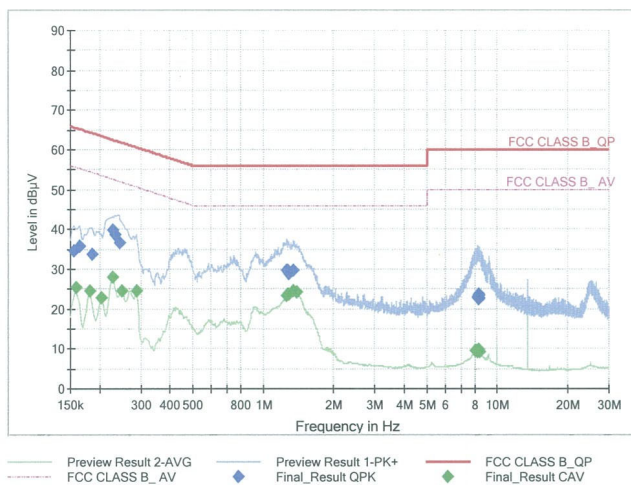
1 / 2

Test Report

Common Information

EUT : RI21A
 Manufacturer : PANASONIC
 Test Site: SHIELD ROOM
 Operating Conditions : NFC_N_UNTERM
 Operator Name:
 Comment:

Full Spectrum



Final Result QPK

| Frequency (MHz) | QuasiPeak (dBµV) | Limit (dBµV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------|--------------|-------------|-----------------|------|--------|------------|
| 0.1545 | 34.58 | 65.75 | 31.18 | 9.000 | N | OFF | 9.6 |
| 0.1635 | 35.87 | 65.28 | 29.42 | 9.000 | N | OFF | 9.6 |
| 0.1860 | 33.65 | 64.21 | 30.57 | 9.000 | N | OFF | 9.6 |
| 0.2265 | 39.87 | 62.58 | 22.71 | 9.000 | N | OFF | 9.6 |
| 0.2333 | 38.80 | 62.33 | 23.54 | 9.000 | N | OFF | 9.6 |
| 0.2423 | 36.59 | 62.02 | 25.43 | 9.000 | N | OFF | 9.6 |
| 1.2538 | 29.83 | 56.00 | 26.17 | 9.000 | N | OFF | 9.6 |
| 1.2673 | 29.64 | 56.00 | 26.36 | 9.000 | N | OFF | 9.6 |
| 1.2763 | 29.39 | 56.00 | 26.61 | 9.000 | N | OFF | 9.6 |
| 1.2808 | 28.94 | 56.00 | 27.06 | 9.000 | N | OFF | 9.6 |
| 1.2898 | 29.24 | 56.00 | 26.76 | 9.000 | N | OFF | 9.6 |
| 1.3483 | 29.67 | 56.00 | 26.33 | 9.000 | N | OFF | 9.6 |
| 8.1905 | 22.86 | 60.00 | 37.14 | 9.000 | N | OFF | 9.8 |
| 8.1995 | 23.10 | 60.00 | 36.90 | 9.000 | N | OFF | 9.8 |
| 8.2918 | 22.89 | 60.00 | 37.11 | 9.000 | N | OFF | 9.8 |
| 8.3233 | 23.40 | 60.00 | 36.60 | 9.000 | N | OFF | 9.8 |
| 8.3278 | 22.49 | 60.00 | 37.51 | 9.000 | N | OFF | 9.8 |
| 8.3345 | 23.65 | 60.00 | 36.35 | 9.000 | N | OFF | 9.8 |

2021-12-16

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Test

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Final Result CAV

| Frequency (MHz) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|-----------------|--------------|-------------|-----------------|------|--------|------------|
| 0.1590 | 25.32 | 55.52 | 30.20 | 9.000 | N | OFF | 9.6 |
| 0.1815 | 24.57 | 54.42 | 29.85 | 9.000 | N | OFF | 9.6 |
| 0.2040 | 22.87 | 53.45 | 30.58 | 9.000 | N | OFF | 9.6 |
| 0.2265 | 28.09 | 52.58 | 24.48 | 9.000 | N | OFF | 9.6 |
| 0.2490 | 24.51 | 51.79 | 27.28 | 9.000 | N | OFF | 9.6 |
| 0.2873 | 24.43 | 50.60 | 26.17 | 9.000 | N | OFF | 9.6 |
| 1.2538 | 23.27 | 46.00 | 22.73 | 9.000 | N | OFF | 9.6 |
| 1.2650 | 23.59 | 46.00 | 22.42 | 9.000 | N | OFF | 9.6 |
| 1.2785 | 23.56 | 46.00 | 22.44 | 9.000 | N | OFF | 9.6 |
| 1.2898 | 23.70 | 46.00 | 22.30 | 9.000 | N | OFF | 9.6 |
| 1.3505 | 24.46 | 46.00 | 21.54 | 9.000 | N | OFF | 9.6 |
| 1.3978 | 24.17 | 46.00 | 21.83 | 9.000 | N | OFF | 9.6 |
| 8.0645 | 9.54 | 50.00 | 40.46 | 9.000 | N | OFF | 9.8 |
| 8.1545 | 9.51 | 50.00 | 40.49 | 9.000 | N | OFF | 9.8 |
| 8.1950 | 9.14 | 50.00 | 40.86 | 9.000 | N | OFF | 9.8 |
| 8.2918 | 9.92 | 50.00 | 40.08 | 9.000 | N | OFF | 9.8 |
| 8.3233 | 9.91 | 50.00 | 40.09 | 9.000 | N | OFF | 9.8 |
| 8.4223 | 9.34 | 50.00 | 40.66 | 9.000 | N | OFF | 9.8 |

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10. LIST OF TEST EQUIPMENT

Conducted Test

| Equipment | Model | Manufacturer | Serial No. | Due to Calibration | Calibration Interval |
|--|--|-----------------|------------|--------------------|----------------------|
| LISN | ENV216 | Rohde & Schwarz | 102245 | 08/23/2022 | Annual |
| Test Receiver | ESCI | Rohde & Schwarz | 100033 | 06/15/2022 | Annual |
| Temperature Chamber | SU-642 | ESPACE | 0093008124 | 03/15/2022 | Annual |
| Signal Analyzer | N9020A | Agilent | MY47380318 | 01/28/2022 | Annual |
| Signal Analyzer | N9030A | Agilent | MY49431210 | 01/11/2022 | Annual |
| Power Meter | N1911A | Agilent | MY45100523 | 04/08/2022 | Annual |
| Power Sensor | N1921A | Agilent | MY57820067 | 04/08/2022 | Annual |
| Directional Coupler | 87300B | Agilent | 3116A03621 | 11/02/2022 | Annual |
| Power Splitter | 11667B | Hewlett Packard | 05001 | 05/20/2022 | Annual |
| DC Power Supply | E3632A | Hewlett Packard | KR75303960 | 06/10/2022 | Annual |
| Attenuator (10 dB) | 5910-N-50-010 | H+S | 00801 | 10/29/2022 | Annual |
| Software | EMC32 | Rohde & Schwarz | N/A | N/A | N/A |
| FCC WLAN&BT&BLE Conducted Test Software v3.0 | FCC WLAN&BT&BLE Conducted Test Software v3.0 | HCT CO., LTD. | N/A | N/A | N/A |
| Bluetooth Tester | CBT | Rohde & Schwarz | 100422 | 05/04/2022 | 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.

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 | N/A | N/A | N/A |
| Controller | 2090 | Emco | 060520 | N/A | N/A |
| Turn Table | Turn Table | Ets | N/A | N/A | N/A |
| Loop Antenna | Loop Antenna | Rohde & Schwarz | 1513-333 | 03/19/2022 | Biennial |
| Hybrid Antenna | VULB 9168 | Schwarzbeck | 9168-0895 | 09/04/2022 | Biennial |
| Horn Antenna | BBHA 9120D | Schwarzbeck | 9120D-1191 | 11/18/2023 | Biennial |
| Horn Antenna (15 GHz ~ 40 GHz) | BBHA9170 | Schwarzbeck | BBHA9170541 | 11/16/2023 | Biennial |
| Spectrum Analyzer | FSP (9 kHz ~ 30 GHz) | Rohde & Schwarz | 836650/016 | 09/13/2022 | Annual |
| Spectrum Analyzer | FSV40-N | Rohde & Schwarz | 101068-SZ | 09/15/2022 | Annual |
| Band Reject Filter | WRCJV2400/2483.5-2370/2520-60/12SS | Wainwright Instruments | 2 | 01/06/2022 | Annual |
| Band Reject Filter | WRCJV5100/5850-40/50-8EEK | Wainwright Instruments | 1 | 02/08/2022 | Annual |
| Attenuator (10 dB) | CBLU1183540B-01 | CERNEX | N/A | 12/23/2021 | Annual |
| 56-10 | 56-10 | WEINSCHHEL | | | |
| Broadband Low Noise Amplifier | CBL06185030 | CERNEX | N/A | 12/23/2021 | Annual |
| Attenuator (3 dB) | 18B-03 | Api tech. | | | |
| High Pass Filter | WHKX10-2700-3000-18000-40SS | Wainwright Instruments | N/A | 12/23/2021 | Annual |
| High Pass Filter | WHKX8-6090-7000-18000-40SS | Wainwright Instruments | N/A | 12/23/2021 | Annual |
| Thru | COAXIAL ATTENUATOR | T&M SYSTEM | N/A | 12/23/2021 | Annual |
| Power Amplifier | CBL18265035 | CERNEX | 22966 | 12/02/2022 | Annual |
| Power Amplifier | CBL26405040 | CERNEX | 25956 | 03/23/2022 | Annual |
| Bluetooth Tester | TC-3000C | TESCOM | 3000C000276 | 03/09/2022 | 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-2112-FI008-P |