# TEST REPORT

| | |
|---|---|
| Applicant Name : | YEALINK (XIAMEN ) NETWORK TECHNOLOGY CO., LTD. |
| Address : | FCC: 309, 3rd Floor, No.16, Yun Ding North Road, Huli District, Xiamen City, Fujian, China<br>ISEDC: 309, 3rd Floor, No.16, Yun Ding North Road, Huli District Xiamen City Fujian 361008 China (Peoples Republic Of) |
| Report Number : | SZNS220428-17357E-RFAA1 |
| FCC ID: | T2C-YL43455 |
| IC: | 10741A-YL43455 |

**Test Standard (s)**

FCC PART 15.247; RSS-GEN ISSUE 5, FEBRUARY 2021 AMENDMENT 2; RSS-247, ISSUE 2, FEBRUARY 2017

**Sample Description**

| | |
|---|---|
| Product Type: | Wi-Fi+BT Module |
| Model No.: | YL43455 |
| Multiple Model(s) No.: | N/A |
| Trade Mark: | Yealink |
| Date Received: | 2022/04/28 |
| Report Date: | 2022/06/14 |

| Test Result: | Pass* |
|---|---|

* In the configuration tested, the EUT complied with the standards above.

**Prepared and Checked By:**

Black Ding

EMC Engineer

**Approved By:**

Robert Li

EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★ ".

Shenzhen Accurate Technology Co., Ltd. is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.

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# GENERAL INFORMATION

## Product Description for Equipment under Test (EUT)

| | |
|---|---|
| HVIN | YL43455 |
| FVIN | 0.0.2.0 |
| Frequency Range | Bluetooth: 2402~2480MHz |
| Transmit Peak Power | 7.71dBm |
| Modulation Technique | Bluetooth: GFSK, π/4-DQPSK, 8DPSK |
| Antenna Specification* | 3.0dBi (It is provided by the manufacturer) |
| Voltage Range | DC 3.3V |
| Sample number | SZNS220428-17357E-RF-S1 for (Assigned by ATC) |
| Sample/EUT Status | Good condition |

## Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions rules and RSS-247, Issue 2, February 2017, RSS-GEN Issue 5, Feb. 2021Amendment 2 of the Innovation, Science and Economic Development Canada rules.

This a Class II permissive change of the device, the differences between the original device and the current device are as follows:

(1) Adding a kind of antenna.

Based on above differences listed, the modifications will impact the test item of "RF Exposure Evaluation", "Antenna Requirement", "AC Line Conducted Emissions", "Radiated Emissions" and "Peak Output Power Measurement", so in this report, we will updated those items and related photos, the other test data and photos please refer to the original report.

## Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and RSS-247, Issue 2, February 2017, RSS-GEN Issue 5, Feb. 2021Amendment 2 of the Innovation, Science and Economic Development Canada rules.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

## Measurement Uncertainty

| Parameter | | Uncertainty |
|---|---|---|
| Occupied Channel Bandwidth | | 5% |
| RF Frequency | | $0.082*10^{-7}$ |
| RF output power, conducted | | 0.73dB |
| Unwanted Emission, conducted | | 1.6dB |
| AC Power Lines Conducted Emissions | | 2.72dB |
| Emissions, Radiated | 9kHz - 30MHz | 2.66dB |
| | 30MHz - 1GHz | 4.28dB |
| | 1GHz - 18GHz | 4.98dB |
| | 18GHz - 26.5GHz | 5.06dB |
| | 26.5GHz- 40GHz | 4.72dB |
| Temperature | | 1℃ |
| Humidity | | 6% |
| Supply voltages | | 0.4% |

*Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.*

## Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189.

Accredited by American Association for Laboratory Accreditation (A2LA). The Certificate Number is 4297.01

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0016. The Registration Number is 5077A.

# SYSTEM TEST CONFIGURATION

## Description of Test Configuration

The system was configured for testing in an engineering mode.

## EUT Exercise Software

"AuthenticTool"* exercise software was used and the power level is defult*. The software and power level was provided by the applicant.

## Special Accessories

No special accessory.

## Equipment Modifications

No modification was made to the EUT tested.

## Support Equipment List and Details

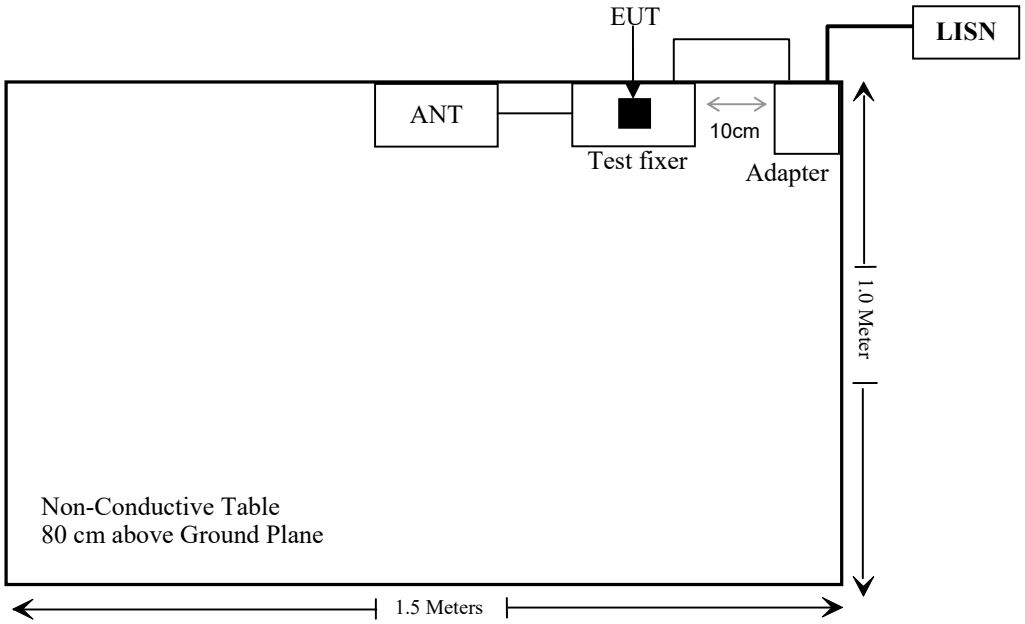
| Manufacturer | Description | Model | Serial Number |
|---|---|---|---|
| YEALINK | Test fixer | Unknown | Unknown |
| YEALINK | Adapter | YLPS480700C | Unknown |

## External I/O Cable

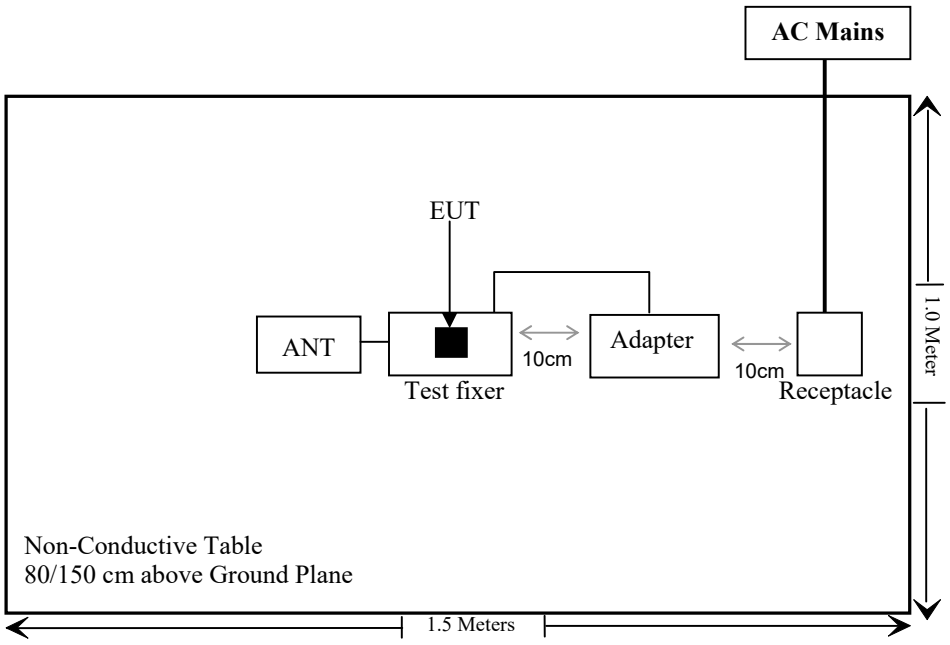
| Cable Description | Length (m) | From Port | To |
|---|---|---|---|
| Un-shielding Un-Detachable DC Cable | 2.0 | Adapter | Test fixer |
| Un-shielding Detachable AC Cable | 1.5 | LISN | Adapter |

## Block Diagram of Test Setup

For conducted emission




For Radiated Emissions:



# SUMMARY OF TEST RESULTS

| Rules | Description of Test | Result |
|---|---|---|
| §15.247 (i) &§1.1307 (b) (3) | RF Exposure Evaluation | Compliant |
| RSS-102 § 2.5.2 | Exemption Limits For Routine Evaluation-RF Exposure Evaluation | Compliant |
| FCC §15.203<br>RSS-Gen §6.8 | Antenna Requirement | Compliant |
| FCC §15.207(a)<br>RSS-Gen §8.8 | AC Line Conducted Emissions | Compliant |
| FCC §15.205, §15.209, §15.247(d)<br>RSS-247 § 5.5, RSS-GEN § 8.10 | Radiated Emissions | Compliant |
| FCC §15.247(a)(1)<br>RSS-247 § 5.1(a), RSS-GEN § 6.7 | 20 dB Emission Bandwidth & 99% Occupied Bandwidth | Compliant* |
| FCC §15.247(a)(1)<br>RSS-247 § 5.1 (b) | Channel Separation Test | Compliant* |
| FCC §15.247(a)(1)(iii)<br>RSS-247 § 5.1 (d) | Time of Occupancy (Dwell Time) | Compliant* |
| FCC §15.247(a)(1)(iii)<br>RSS-247 § 5.1 (d) | Quantity of hopping channel Test | Compliant* |
| FCC §15.247(b)(1)<br>RSS-247 § 5.1(b) &§ 5.4(b) | Peak Output Power Measurement | Compliant |
| FCC §15.247(d)<br>RSS-247 § 5.5 | Band edges | Compliant* |

Compliant*: please refer to the original report CR21100090-00A ,which tested and granted by the China Certification ICT Co., Ltd (Dongguan).

# TEST EQUIPMENT LIST

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Conducted emission test | | | | | |
| Rohde& Schwarz | EMI Test Receiver | ESCI | 100784 | 2021/12/13 | 2022/12/12 |
| Rohde & Schwarz | L.I.S.N. | ENV216 | 101314 | 2021/12/13 | 2022/12/12 |
| Anritsu Corp | 50 Coaxial Switch | MP59B | 6100237248 | 2021/12/13 | 2022/12/12 |
| Unknown | RF Coaxial Cable | No.17 | N0350 | 2021/12/14 | 2022/12/13 |
| Conducted Emission Test Software: e3 19821b (V9) | | | | | |
| Radiated emission | | | | | |
| Rohde& Schwarz | Test Receiver | ESR | 102725 | 2021/12/13 | 2022/12/12 |
| Rohde&Schwarz | Spectrum Analyzer | FSV40 | 101949 | 2021/12/13 | 2022/12/12 |
| SONOMA INSTRUMENT | Amplifier | 310 N | 186131 | 2021/11/09 | 2022/11/08 |
| A.H. Systems, inc. | Preamplifier | PAM-0118P | 135 | 2021/11/09 | 2022/11/08 |
| Quinstar | Amplifier | QLW-18405536-J0 | 15964001002 | 2021/11/11 | 2022/11/10 |
| Schwarzbeck | Bilog Antenna | VULB9163 | 9163-323 | 2021/07/06 | 2024/07/05 |
| Schwarzbeck | Horn Antenna | BBHA9120D | 9120D-1067 | 2020/01/05 | 2023/01/04 |
| Schwarzbeck | HORN ANTENNA | BBHA9170 | 9170-359 | 2020/01/05 | 2023/01/04 |
| Radiated Emission Test Software: e3 19821b (V9) | | | | | |
| Unknown | RF Coaxial Cable | No.10 | N050 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.11 | N1000 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.12 | N040 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.13 | N300 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.14 | N800 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.15 | N600 | 2021/12/14 | 2022/12/13 |
| Unknown | RF Coaxial Cable | No.16 | N650 | 2021/12/14 | 2022/12/13 |
| Wainwright | High Pass Filter | WHKX3.6/18 G-10SS | 5 | 2021/12/14 | 2022/12/13 |

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| RF Conducted Test | | | | | |
| Tonscend | RF Control Unit | JS0806-2 | 19G8060182 | 2021/10/26 | 2022/10/25 |
| WEINSCHEL | 10dB Attenuator | 5324 | AU 3842 | 2021/12/14 | 2022/12/13 |

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

# FCC §15.247 (i) &§1.1307 (b) (3) - RF EXPOSURE EVALUATION

## Applicable Standard

According to subpart 15.247 (i) and §1.1307(b) (3), systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

According to KDB 447498 D04 Interim General RF Exposure Guidance

SAR-Based Exemption:

SAR-based thresholds are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum timeaveraged power or maximum time-averaged ERP, whichever is greater.

Per § 1.1307(b)(3)(i)(B), for single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold $P_{th}$ (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). $P_{th}$ is given by:

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

$d$ = the separation distance (cm);

## Result

| Mode | Frequency (MHz) | $P_{th}$ | | Maximum tune-up conducted power | Maximum ERP | Exemption |
|---|---|---|---|---|---|---|
| | | (mW) | (dBm) | (dBm) | (dBm) | |
| Bluetooth | 2402-2480 | 3060 | 34.86 | 8.0 | 8.85 | Compliant |

Note: 1. The tune up conducted power was declared by the applicant.
2. The antenna gain is 3dBi(0.85dBd), so the ERP was used for evaluation

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

**Result: Compliant.**

# RSS-102 § 2.5.2 –EXEMPTION LIMITS FOR ROUTINE EVALUATION-RF EXPOSURE EVALUATION

## Applicable Standard

According to RSS-102 § (2.5.2):

**2.5.2 Exemption Limits for Routine Evaluation — RF Exposure Evaluation**

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz[6] and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $22.48/f^{0.5}$ W (adjusted for tune-up tolerance), where $f$ is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2}\ f^{0.6834}$ W (adjusted for tune-up tolerance), where $f$ is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

## Calculated Data:

**For worst case:**

The maximum tune-up conducted output power is 8.0dBm.

And the maximum antenna gain is 3dBi.

So the maximum tune-up EIRP is 11.0dBm=0.013W<2.68W.

f = 2402 MHz:

The limit is $1.31\times10^{-2}\times2402^{0.6834}$=2.68W

So the RF Exposure evaluation can be exempted.

# FCC §15.203 & RSS-GEN §6.8 – ANTENNA REQUIREMENT

## Applicable Standard

According to FCC § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

According to FCC § 15.203, 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.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.
Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

## Antenna Connector Construction

The EUT has one FPC antenna arrangement which was permanently attached and the maximum antenna gain is 3.0dBi, fulfill the requirement of this section. Please refer to the EUT photos.

| Antenna Type | Antenna Gain | Impedance | Frequency Range |
|---|---|---|---|
| FPC | 3.0 dBi | 50 Ω | 2.4~2.5GHz |

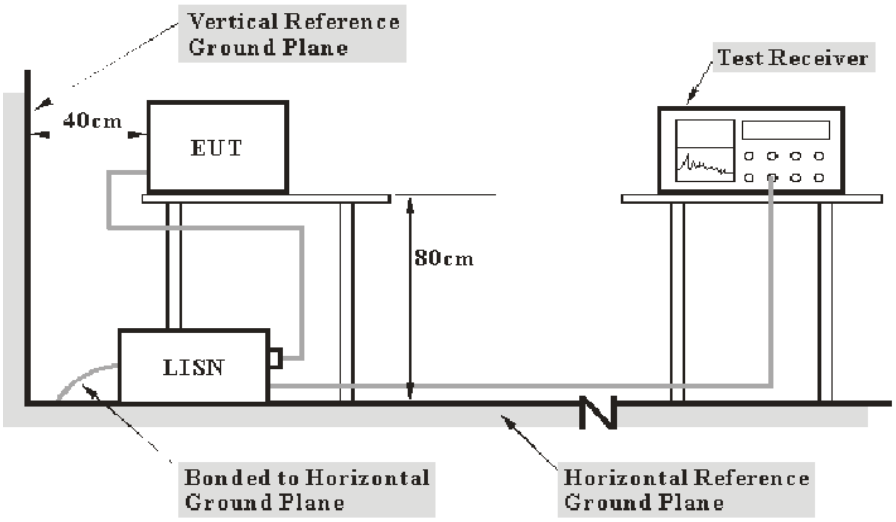
**Result:** Compliance

# FCC §15.207 (a) & RSS-GEN § 8.8 – AC LINE CONDUCTED EMISSIONS

## Applicable Standard

FCC §15.207(a), RSS-GEN § 8.8

## EUT Setup




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

The measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207 & RSS-Gen.

The spacing between the peripherals was 10 cm.

## EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

| Frequency Range | IF B/W |
|---|---|
| 150 kHz – 30 MHz | 9 kHz |

## Test Procedure

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

## Corrected Factor & Margin Calculation

The Transd factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

Factor = LISN VDF + Cable Loss

The "**Over limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over limit of -7 dB means the emission is 7 dB below the limit. The equation for calculation is as follows:

Over Limit = Level – Limit
Level = Read Level + Factor

## Test Data

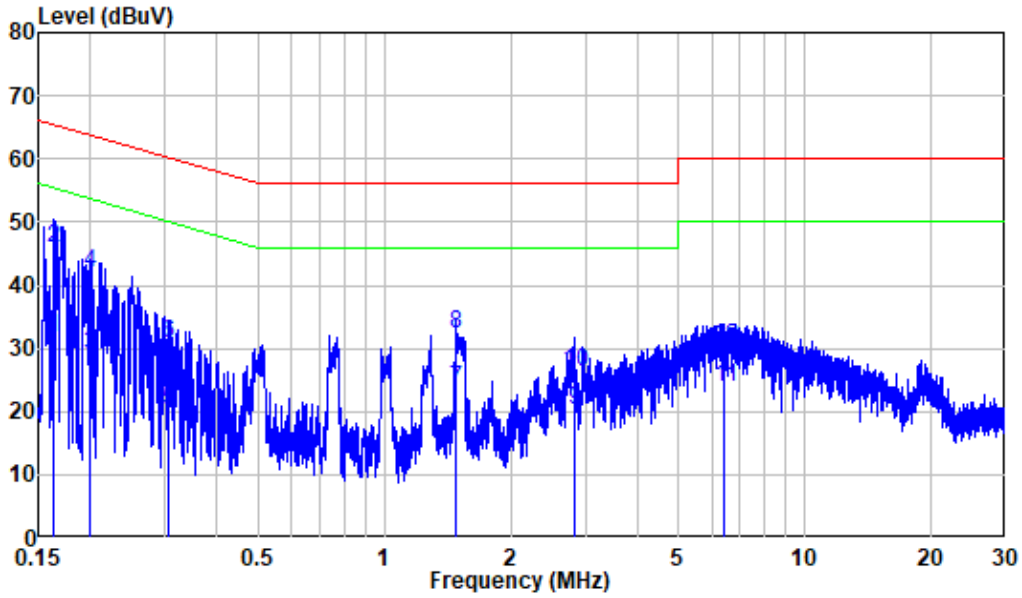
### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 23 ℃ |
| **Relative Humidity:** | 52 % |
| **ATM Pressure:** | 101.0 kPa |

*The testing was performed by Jason Liu on 2022-06-06.*

*EUT operation mode: Transmitting*(*the worst case is 8DPSK Mode, middle channel*)

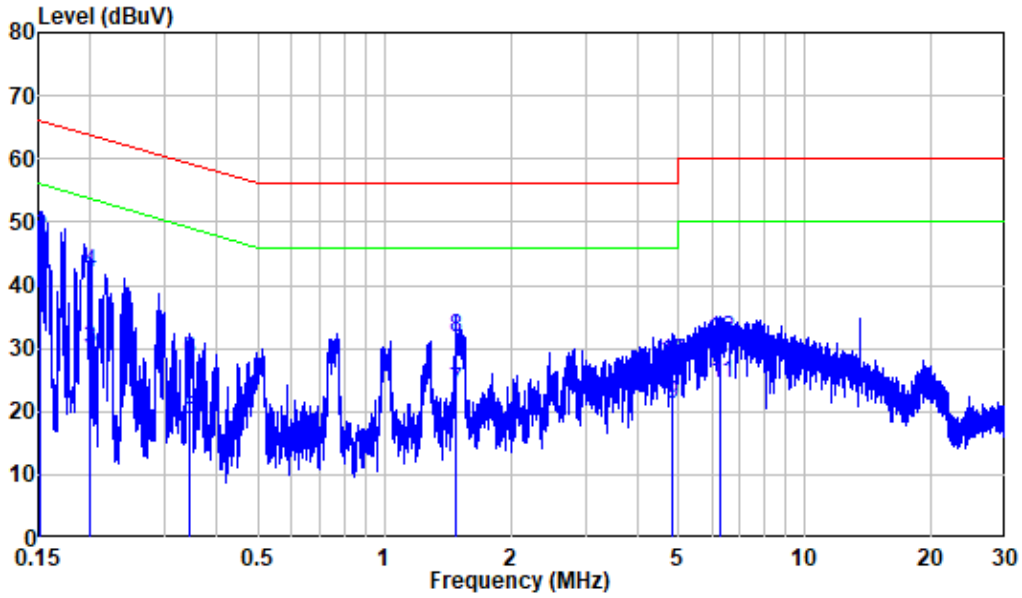
**AC 120V/60 Hz, Line**




Site : Shielding Room
Condition: Line
Mode : BT
Model : YL43455
Power : AC 120V 60Hz

| | Freq | Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dB | dBuV | dBuV | dBuV | dB | |
| 1 | 0.164 | 9.80 | 21.98 | 31.78 | 55.27 | -23.49 | Average |
| 2 | 0.164 | 9.80 | 35.94 | 45.74 | 65.27 | -19.53 | QP |
| 3 | 0.200 | 9.80 | 19.04 | 28.84 | 53.61 | -24.77 | Average |
| 4 | 0.200 | 9.80 | 32.08 | 41.88 | 63.61 | -21.73 | QP |
| 5 | 0.308 | 9.80 | 10.29 | 20.09 | 50.03 | -29.94 | Average |
| 6 | 0.308 | 9.80 | 21.08 | 30.88 | 60.03 | -29.15 | QP |
| 7 | 1.478 | 9.81 | 13.62 | 23.43 | 46.00 | -22.57 | Average |
| 8 | 1.478 | 9.81 | 22.36 | 32.17 | 56.00 | -23.83 | QP |
| 9 | 2.839 | 9.83 | 10.35 | 20.18 | 46.00 | -25.82 | Average |
| 10 | 2.839 | 9.83 | 16.40 | 26.23 | 56.00 | -29.77 | QP |
| 11 | 6.428 | 9.86 | 14.00 | 23.86 | 50.00 | -26.14 | Average |
| 12 | 6.428 | 9.86 | 20.45 | 30.31 | 60.00 | -29.69 | QP |

**AC 120V/60 Hz, Neutral**




Site : Shielding Room
Condition: Neutral
Mode : BT
Model : YL43455
Power : AC 120V 60Hz

| | Freq | Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dB | dBuV | dBuV | dBuV | dB | |
| 1 | 0.151 | 9.80 | 26.92 | 36.72 | 55.92 | -19.20 | Average |
| 2 | 0.151 | 9.80 | 37.45 | 47.25 | 65.92 | -18.67 | QP |
| 3 | 0.200 | 9.80 | 20.10 | 29.90 | 53.61 | -23.71 | Average |
| 4 | 0.200 | 9.80 | 32.15 | 41.95 | 63.61 | -21.66 | QP |
| 5 | 0.344 | 9.80 | 8.83 | 18.63 | 49.11 | -30.48 | Average |
| 6 | 0.344 | 9.80 | 18.15 | 27.95 | 59.11 | -31.16 | QP |
| 7 | 1.474 | 9.81 | 13.33 | 23.14 | 46.00 | -22.86 | Average |
| 8 | 1.474 | 9.81 | 21.95 | 31.76 | 56.00 | -24.24 | QP |
| 9 | 4.832 | 9.88 | 11.14 | 21.02 | 46.00 | -24.98 | Average |
| 10 | 4.832 | 9.88 | 17.89 | 27.77 | 56.00 | -28.23 | QP |
| 11 | 6.302 | 9.94 | 14.56 | 24.50 | 50.00 | -25.50 | Average |
| 12 | 6.302 | 9.94 | 21.38 | 31.32 | 60.00 | -28.68 | QP |

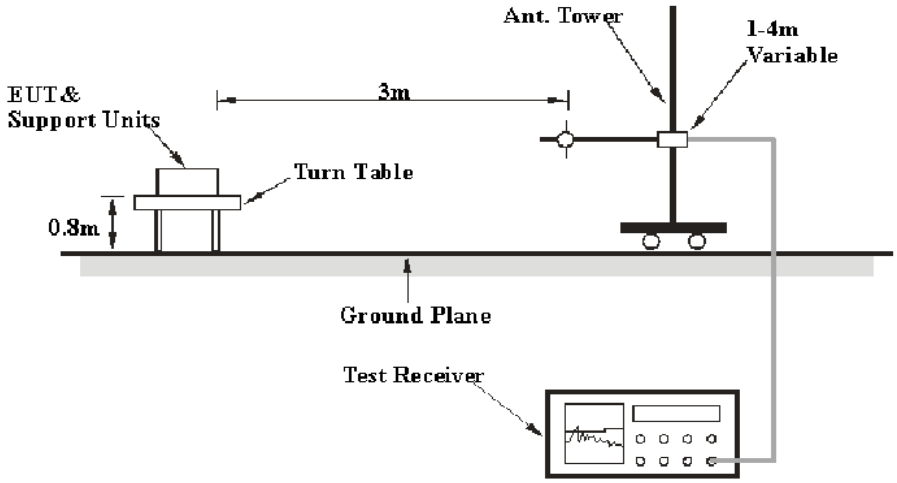
# FCC §15.209, §15.205 & §15.247(d) & RSS-247§ 5.5 - SPURIOUS EMISSIONS

## Applicable Standard

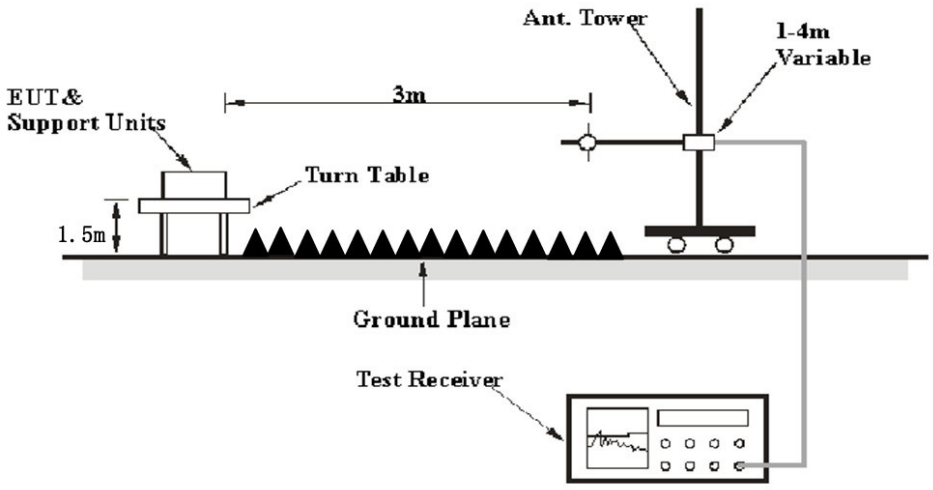
FCC §15.205; §15.209; §15.247(d); RSS-247§ 5.5; RSS-GEN § 8.10

## EUT Setup

**Below 1 GHz:**




**Above 1GHz:**




The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013 & RSS-Gen. The specification used was the FCC 15.209, and FCC 15.247/RSS-247 limits.

## EMI Test Receiver & Spectrum Analyzer Setup

The EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

| Frequency Range | RBW | Video B/W | IF B/W | Measurement |
|---|---|---|---|---|
| 30 MHz – 1000 MHz | 100 kHz | 300 kHz | 120 kHz | QP |
| Above 1 GHz | 1 MHz | 3 MHz | / | PK |
| | 1 MHz | 10 Hz | / | Average |

## Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in Quasi-peak detection mode for frequency range of 30 MHz -1 GHz and peak and Average detection modes for frequencies above 1 GHz.

## Factor & Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

Over Limit/Margin = Level / Corrected Amplitude – Limit
Level / Corrected Amplitude = Read Level + Factor

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 29 ℃ |
| **Relative Humidity:** | 63% |
| **ATM Pressure:** | 101.0 kPa |

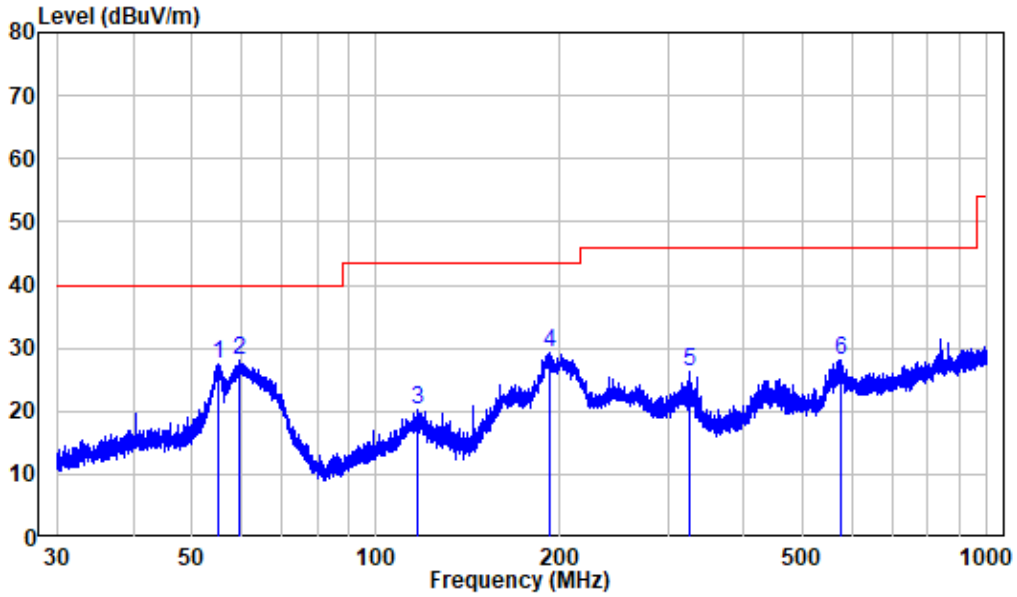
*The testing was performed by Levrl Li on 2022-06-01 for below 1GHz and Jeff Jiang on 2022-06-07 for above 1GHz.*

*EUT operation mode: Transmitting(Pre-scan in the X,Y and Z axes of orientation, the worst case X-axis of orientation was recorded)*

**Below 1GHz:** (*the worst case is 8DPSK Mode, Middle channel*)

*Note: When the test result of peak was less than the limit of QP more than 6dB, just peak value were recorded.*

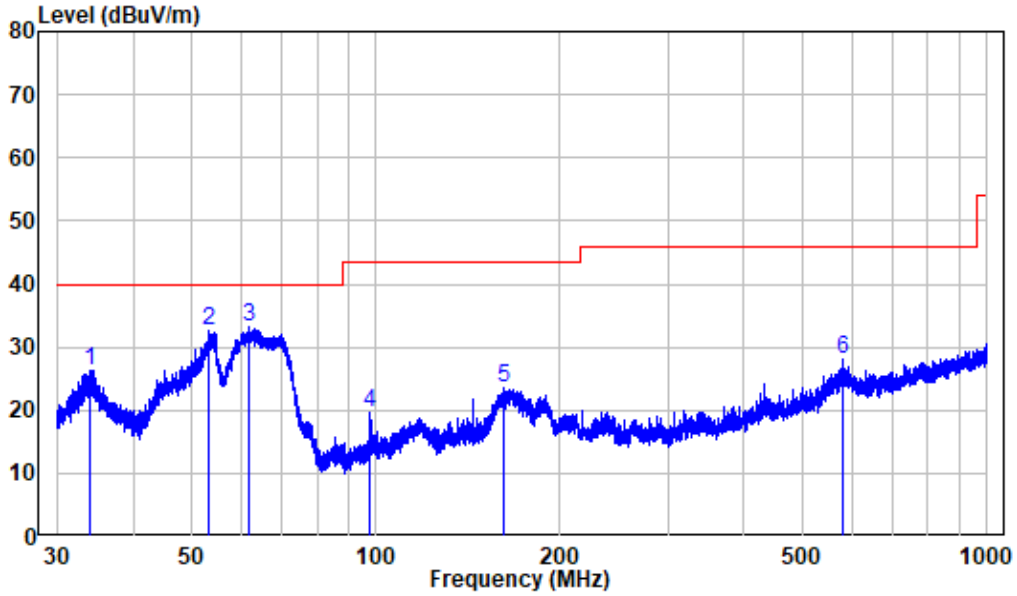
Horizontal




Site : chamber
Condition: 3m HORIZONTAL
Job No. : SZNS220428-17357E-RFA1
Test Mode: BT

| | Freq | Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dB/m | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 55.027 | -10.28 | 37.87 | 27.59 | 40.00 | -12.41 | Peak |
| 2 | 59.859 | -10.57 | 38.66 | 28.09 | 40.00 | -11.91 | Peak |
| 3 | 116.847 | -12.95 | 33.13 | 20.18 | 43.50 | -23.32 | Peak |
| 4 | 192.166 | -11.26 | 40.57 | 29.31 | 43.50 | -14.19 | Peak |
| 5 | 325.168 | -8.26 | 34.52 | 26.26 | 46.00 | -19.74 | Peak |
| 6 | 575.130 | -3.79 | 32.01 | 28.22 | 46.00 | -17.78 | Peak |

Vertical




Site : chamber
Condition: 3m VERTICAL
Job No. : SZNS220428-17357E-RFA1
Test Mode: BT

| | Freq | Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dB/m | dBuV | dBuV/m | dBuV/m | dB | |
| 1 | 33.977 | -11.85 | 38.19 | 26.34 | 40.00 | -13.66 | Peak |
| 2 | 53.178 | -10.20 | 42.87 | 32.67 | 40.00 | -7.33 | Peak |
| 3 | 62.077 | -11.47 | 44.59 | 33.12 | 40.00 | -6.88 | Peak |
| 4 | 97.841 | -12.26 | 31.99 | 19.73 | 43.50 | -23.77 | Peak |
| 5 | 162.255 | -14.29 | 37.73 | 23.44 | 43.50 | -20.06 | Peak |
| 6 | 581.467 | -3.25 | 31.45 | 28.20 | 46.00 | -17.80 | Peak |

## Above 1GHz: (worst case for 8DPSK)

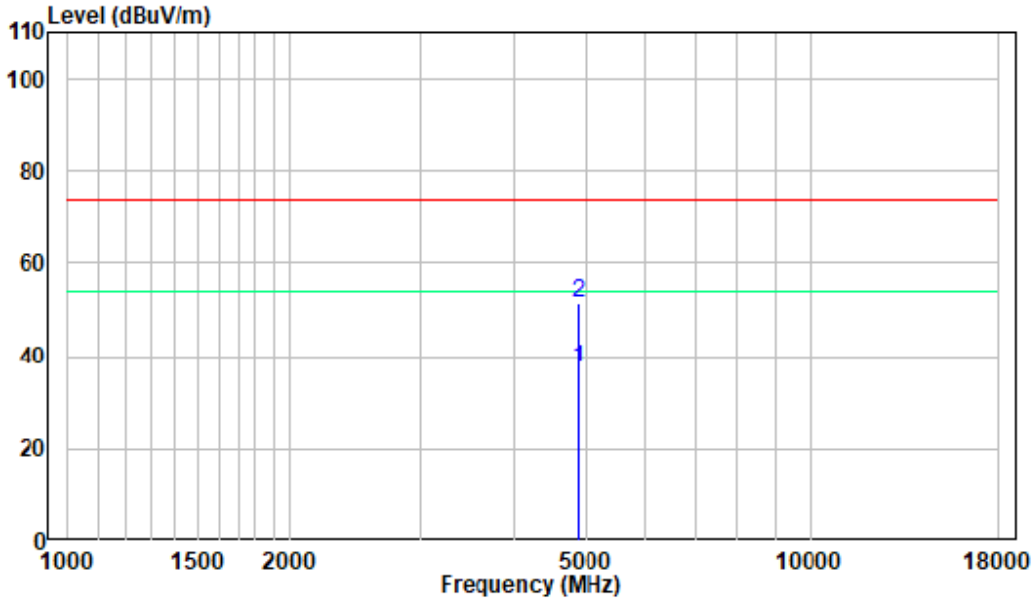
| Frequency (MHz) | Receiver | | Turntable Angle Degree | Rx Antenna | | Factor (dB/m) | Absolute Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| | Reading (dBuV) | PK/AV | | Height (m) | Polar (H/V) | | | | |
| Low Channel | | | | | | | | | |
| 2310 | 68.15 | PK | 103 | 2.1 | H | -7.24 | 60.91 | 74 | -13.09 |
| 2310 | 53.63 | AV | 103 | 2.1 | H | -7.24 | 46.39 | 54 | -7.61 |
| 2310 | 68.07 | PK | 257 | 1.5 | V | -7.24 | 60.83 | 74 | -13.17 |
| 2310 | 53.54 | AV | 257 | 1.5 | V | -7.24 | 46.30 | 54 | -7.70 |
| 2390 | 69.21 | PK | 324 | 2 | H | -7.22 | 61.99 | 74 | -12.01 |
| 2390 | 54.33 | AV | 324 | 2 | H | -7.22 | 47.11 | 54 | -6.89 |
| 2390 | 69.07 | PK | 230 | 2.3 | V | -7.22 | 61.85 | 74 | -12.15 |
| 2390 | 54.24 | AV | 230 | 2.3 | V | -7.22 | 47.02 | 54 | -6.98 |
| 4804 | 54.66 | PK | 35 | 1.6 | H | -3.51 | 51.15 | 74 | -22.85 |
| 4804 | 54.33 | PK | 20 | 2.4 | V | -3.51 | 50.82 | 74 | -23.18 |
| Middle Channel | | | | | | | | | |
| 4882 | 54.81 | PK | 121 | 1.8 | H | -3.37 | 51.44 | 74 | -22.56 |
| 4882 | 54.30 | PK | 52 | 2.3 | V | -3.37 | 50.93 | 74 | -23.07 |
| High Channel | | | | | | | | | |
| 2483.5 | 69.78 | PK | 252 | 1 | H | -7.2 | 62.58 | 74 | -11.42 |
| 2483.5 | 55.11 | AV | 252 | 1 | H | -7.2 | 47.91 | 54 | -6.09 |
| 2483.5 | 69.69 | PK | 167 | 1.4 | V | -7.2 | 62.49 | 74 | -11.51 |
| 2483.5 | 55.02 | AV | 167 | 1.4 | V | -7.2 | 47.82 | 54 | -6.18 |
| 2500 | 68.95 | PK | 13 | 1.6 | H | -7.18 | 61.77 | 74 | -12.23 |
| 2500 | 54.54 | AV | 13 | 1.6 | H | -7.18 | 47.36 | 54 | -6.64 |
| 2500 | 68.83 | PK | 98 | 2 | V | -7.18 | 61.65 | 74 | -12.35 |
| 2500 | 54.46 | AV | 98 | 2 | V | -7.18 | 47.28 | 54 | -6.72 |
| 4960 | 54.33 | PK | 199 | 1.1 | H | -3.01 | 51.32 | 74 | -22.68 |
| 4960 | 53.86 | PK | 346 | 2.1 | V | -3.01 | 50.85 | 74 | -23.15 |

Note:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Corrected. Amplitude - Limit
The other spurious emission which is 20dB to the limit or in the noise floor was not recorded.
When the test result of peak was less than the limit of average, just peak value were recorded.

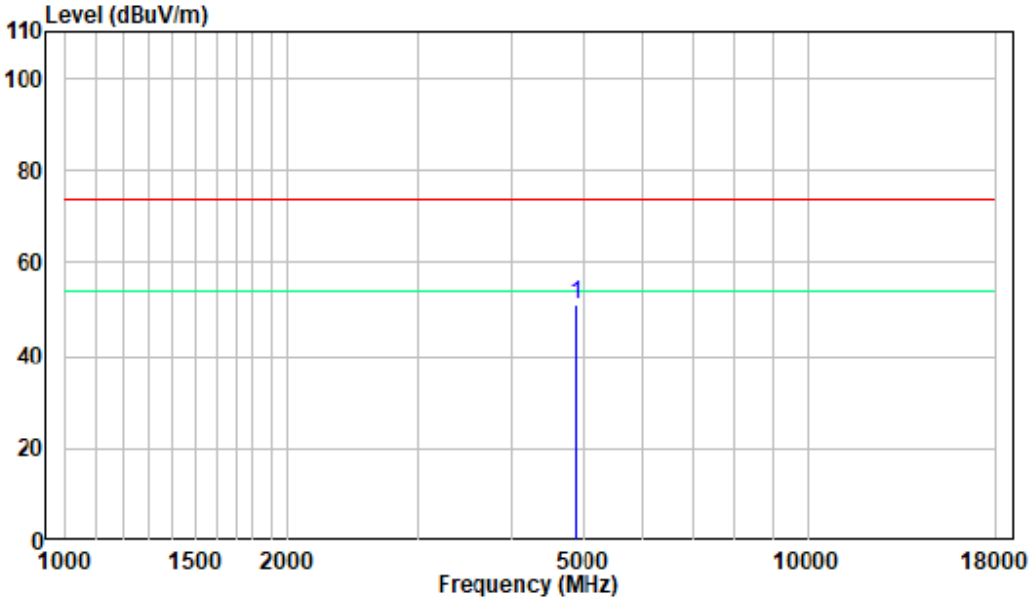
**1 GHz - 18 GHz:** (Pre-Scan plots)

Middle channel

Horizontal



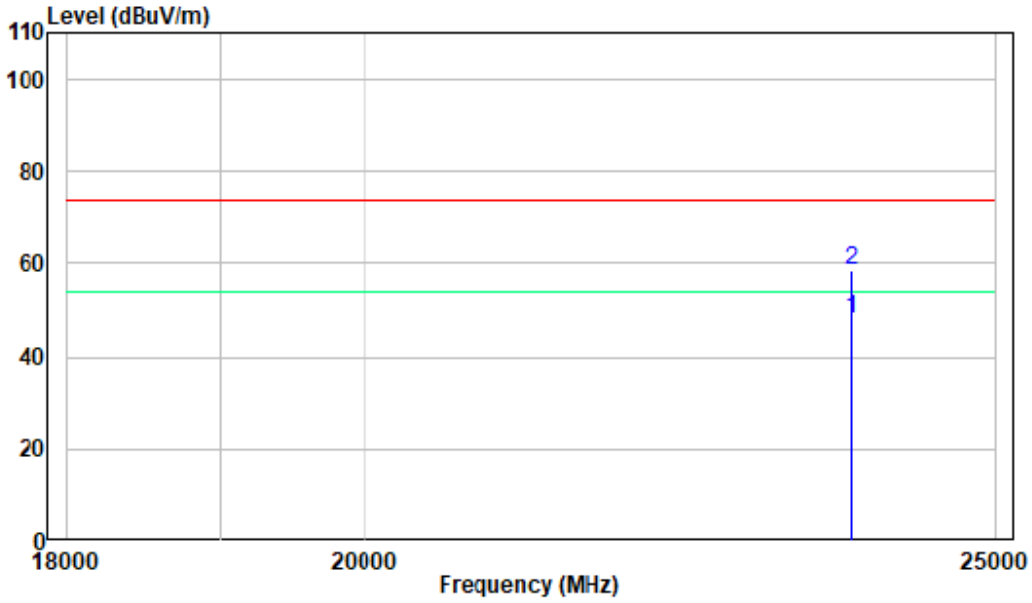

Vertical



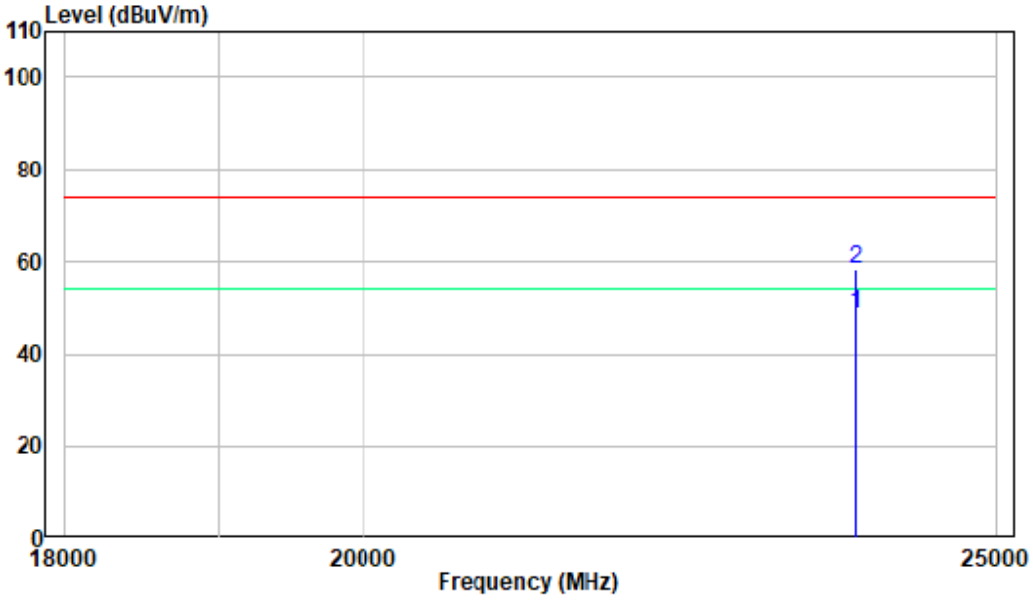
**18-25GHz:** (Pre-Scan plots)

High channel

Horizontal




Vertical



# FCC §15.247(b) (1) & RSS-247§ 5.1(b) &§ 5.4(b) - PEAK OUTPUT POWER MEASUREMENT

## Applicable Standard

According to FCC §15.247(b) (1):

For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

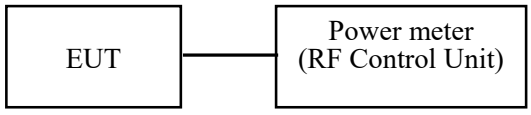
According to RSS-247§ 5.1(b) &§ 5.4(b):

For frequency hopping systems (FHSs) operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W if the hopset uses 75 or more hopping channels; the maximum peak conducted output power shall not exceed 0.125 W if the hopset uses less than 75 hopping channels. The e.i.r.p. shall not exceed 4 W (see Section 5.4(e) for exceptions).

Frequency hopping systems (FHSs) shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the -20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, FHSs operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two thirds of the -20 dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125 W.

## Test Procedure

1. Place the EUT on a bench and set in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.




## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 26.3 ℃ |
| **Relative Humidity:** | 58 % |
| **ATM Pressure:** | 101.0 kPa |

*The testing was performed by Andy Yu on 2022-05-09.*

*EUT operation mode: Transmitting*

Test Result: Compliant.

| Test Mode | Antenna | Channel | Result[dBm] | Limit[dBm] | Verdict |
|---|---|---|---|---|---|
| DH1 | Ant1 | 2402 | 7.71 | ≤20.97 | PASS |
| | | 2441 | 7.67 | ≤20.97 | PASS |
| | | 2480 | 7.43 | ≤20.97 | PASS |
| 2DH1 | Ant1 | 2402 | 6.58 | ≤20.97 | PASS |
| | | 2441 | 6.31 | ≤20.97 | PASS |
| | | 2480 | 6.25 | ≤20.97 | PASS |
| 3DH1 | Ant1 | 2402 | 6.55 | ≤20.97 | PASS |
| | | 2441 | 6.53 | ≤20.97 | PASS |
| | | 2480 | 6.29 | ≤20.97 | PASS |
| Note: antenna gain=3dBi, the maximum EIRP=10.71dBm<36dBm | | | | | |

******* END OF REPORT *******