# RF TEST REPORT

| | |
|---|---|
| **Applicant** | Emerson White-Rodgers |
| **FCC ID** | 2A4JN-ST765470 |
| **Product** | Sensi Touch 2 |
| **Brand** | Sensi |
| **Model** | 1F96U-42WFB; 1F96U-42WF; ST76; ST76W; ST76U; ST76WU; 1F96U-42WFBC; 1F96U-42WFC; ST76C; ST76WC |
| **Report No.** | R2211A1116-R1V2 |
| **Issue Date** | January 6, 2023 |

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15C (2022)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

*Prepared by: Xu Ying* *Approved by: Xu Kai*


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| Version | Revision description | Issue Date |
|---|---|---|
| Rev.0 | Initial issue of report. | January 4, 2023 |
| Rev.1 | Update description. | January 4, 2023 |
| Rev.2 | Update information. | January 6, 2023 |
| Note: This revised report (Report No.: R2211A1116-R1V2) supersedes and replaces the previously issued report (Report No.: R2211A1116-R1V1). Please discard or destroy the previously issued report and dispose of it accordingly. | | |

# Summary of Measurement Results

| Number | Test Case | Clause in FCC rules | Verdict |
|---|---|---|---|
| 1 | Frequency Hopping System | 15.247 (g), (h) | PASS |
| 2 | Output Power | 15.247(b) (2) | PASS |
| 3 | Occupied Bandwidth (20dB) | 15.247 (a) (1) (i) | PASS |
| 4 | Frequency Separation | 15.247 (a) (1) (i) | PASS |
| 5 | Time of Occupancy (Dwell Time) | 15.247 (a) (1) (i) | PASS |
| 6 | Band Edge Compliance | 15.247(d) | PASS |
| 7 | Number of Hopping Frequency | 15.247 (a) (1) (i) | PASS |
| 8 | Spurious RF Conducted Emissions | 15.247(d) | PASS |
| 9 | Unwanted Emissions | 15.247(d) | PASS |
| 10 | Conducted Emissions | 15.207 | PASS |
| Date of Testing: December 3, 2022 ~ December 16, 2022<br>Date of Sample Received: November 29, 2022 | | | |
| Note: PASS: The EUT complies with the essential requirements in the standard.<br>FAIL: The EUT does not comply with the essential requirements in the standard.<br>All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. | | | |

# 1 Test Laboratory

## 1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA Technology (Shanghai) Co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

## 1.2. Test facility

**FCC (Designation number: CN1179, Test Firm Registration Number: 446626)**

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform measurements.

**A2LA (Certificate Number: 3857.01)**

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform measurement.

## 1.3 Testing Location

| | |
|---|---|
| Company: | TA Technology (Shanghai) Co., Ltd. |
| Address: | Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China |
| City: | Shanghai |
| Post code: | 201201 |
| Country: | P. R. China |
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| Fax: | +86-021-50791141/2/3-8000 |
| Website: | http://www.ta-shanghai.com |
| E-mail: | xukai@ta-shanghai.com |

# 2 General Description of Equipment under Test

## 2.1 Applicant and Manufacturer Information

| | |
|---|---|
| **Applicant** | Emerson White-Rodgers |
| **Applicant address** | 8100 West Florissant Ave St. Louis, United States of America |
| **Manufacturer** | Emerson White-Rodgers |
| **Manufacturer address** | 8100 West Florissant Ave St. Louis, United States of America |

## 2.2 General information

| **EUT Description** | |
|---|---|
| Model | 1F96U-42WFB; 1F96U-42WF; ST76; ST76W; ST76U; ST76WU; 1F96U-42WFBC; 1F96U-42WFC; ST76C; ST76WC |
| SN | LSR305240-62 |
| Hardware Version | 0059-5470 REV.C |
| Software Version | 0170-1640v01_02.hex |
| Power Supply | External power supply |
| Antenna Type | PCB Antenna |
| Antenna Connector | A permanently attached antenna (meet with the standard FCC Part 15.203 requirement) |
| Antenna Gain | 0.41 dBi |
| Test Mode(s) | Model 900MHz |
| Modulation Type | FSK2 |
| Total Channel Number | 67 |
| Channel Space | 380 kHz |
| Max. Output Power | 14.36 dBm |
| Operating Frequency Range(s) | 902 ~ 928MHz |
| Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.<br>2. The main test model is ST76 in this report. | |

| Model Difference Table | | | | |
|---|---|---|---|---|
| **Model Number** | **Description** | **Color** | **Channel** | **Instructions** |
| 1F96U-42WFB | Sensi Touch 2 | Black | Pro | English |
| 1F96U-42WF | Sensi Touch 2 | White | Pro | English |
| ST76 | Sensi Touch 2 | Black | Retail | English |
| ST76W | Sensi Touch 2 | White | Retail | English |
| ST76U | Sensi Touch 2 | Black | Utility | English |
| ST76WU | Sensi Touch 2 | White | Utility | English |
| 1F96U-42WFBC | Sensi Touch 2 | Black | Pro | French / English |
| 1F96U-42WFC | Sensi Touch 2 | White | Pro | French / English |
| ST76C | Sensi Touch 2 | Black | Retail | French / English |
| ST76WC | Sensi Touch 2 | White | Retail | French / English |
| Note: The customer declares that the models have the same PCB assembly, the only difference is color, package and sale channels. | | | | |

# 3 Applied Standards

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

**Test standards:**

**FCC CFR47 Part 15C (2022) Radio Frequency Devices**

**ANSI C63.10-2013**

**Reference standard:**

**KDB 558074 D01 15.247 Meas Guidance v05r02**

## 3.1 Test Configuration

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

# 4 Information about the FHSS characteristics

## 4.1 Frequency Hopping System Requirement

Standard requirement:
(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.
(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hop sets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

# 5 Test Case Results

## 5.1 Output Power

**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Methods of Measurement**

During the process of the testing, The EUT was connected to the spectrum analyzer and 915MHz band test set via a power splitter with a known loss. The EUT is controlled by the 915MHz band test set to ensure max power transmission with proper modulation. The peak detector is used. RBW is set to 2 MHz; VBW is set to 6 MHz. These measurements have been tested at following channels: 0, 33 and 66.

**Test Setup**


**Limits**

Rule Part 15.247 (b) (2) specifies that " For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels."

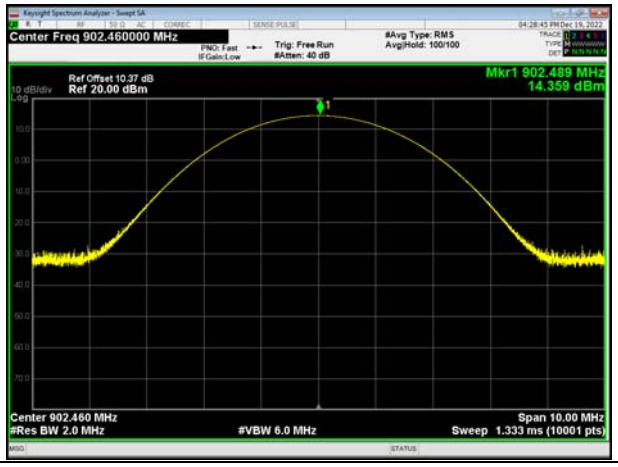
**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k$ = 2, $U$=0.44 dB.

## Test Results

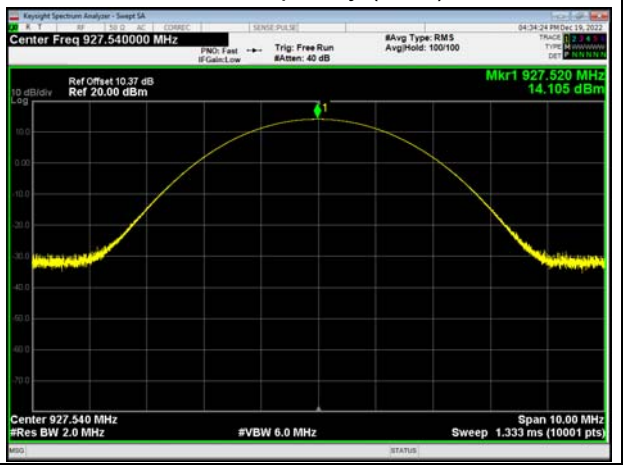
| Test Mode | Channel | Frequency (MHz) | Peak Output Power (dBm) | Limit (dBm) | Conclusion |
|---|---|---|---|---|---|
| Model 900MHz | 0 | 902.46 | 14.360 | 30 | PASS |
| | 33 | 915 | 14.180 | 30 | PASS |
| | 66 | 927.54 | 14.110 | 30 | PASS |

CH0, Carrier frequency (MHz): 902.46




Ch33, Carrier frequency (MHz): 915


Ch66, Carrier frequency (MHz): 927.54



## 5.2 Occupied Bandwidth (20dB)

**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Method of Measurement**

The EUT was connected to the spectrum analyzer and Model 900MHz test set via a power splitter with a known loss. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 30kHz and VBW is set to 100kHz on spectrum analyzer. -20dB occupied bandwidths are recorded.

**Test Setup**


**Limits**

No specific occupied bandwidth requirements in part 15.247(a) (1) (i).

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

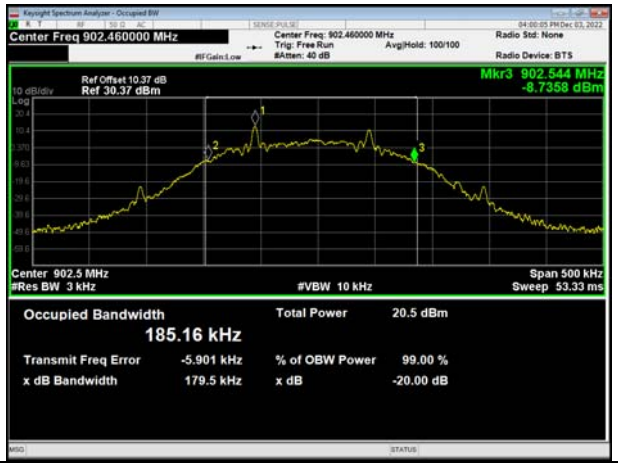
**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k$ = 2, $U$=936 Hz.

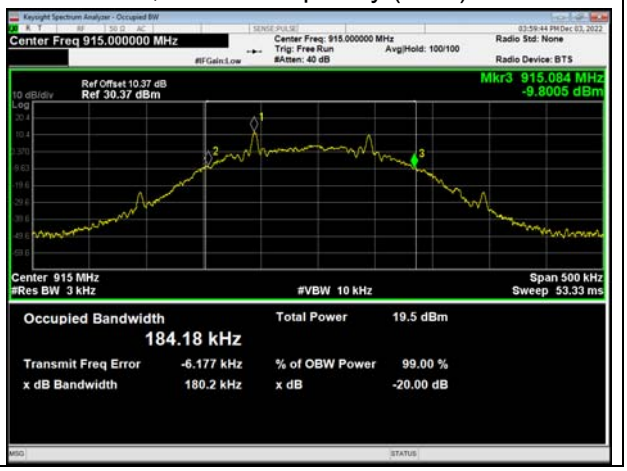
## Test Results

| Test Mode | Channel | Frequency (MHz) | 99% bandwidth(MHz) | 20dB Bandwidth(MHz) |
|---|---|---|---|---|
| Model 900MHz | 0 | 902.46 | 0.185 | 0.179 |
| | 33 | 915 | 0.184 | 0.180 |
| | 66 | 927.54 | 0.184 | 0.180 |

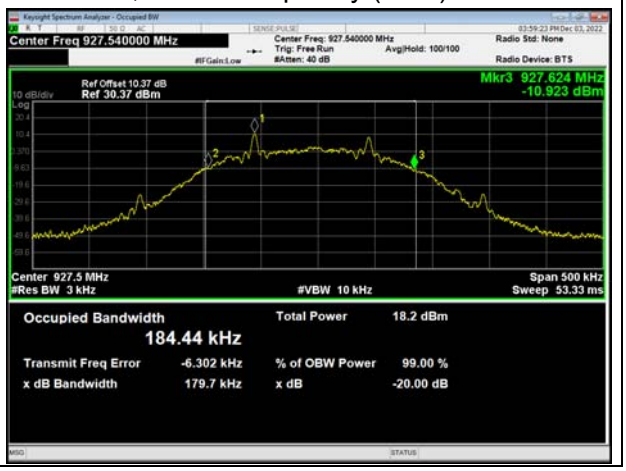
CH0, Carrier frequency (MHz): 902.46




CH33, Carrier frequency (MHz): 915




CH66, Carrier frequency (MHz): 927.54



## 5.3 Frequency Separation

**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Method of Measurement**

The EUT was connected to the spectrum analyzer and Model 900MHz test set via a power splitter with a known loss. RBW is set to 30 kHz and VBW is set to 100 kHz on spectrum analyzer. Set EUT on Hopping on mode.

**Test setup**


**Limits**

Rule Part 15.247(a)(1) (i) specifies that “For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz. ”

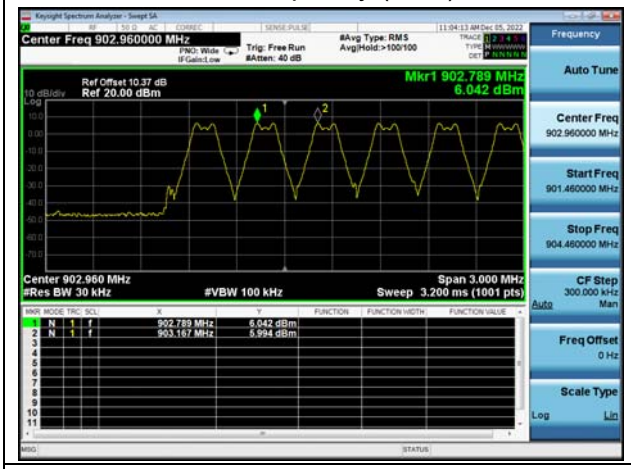
**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k$ = 2, $U$=936 Hz.

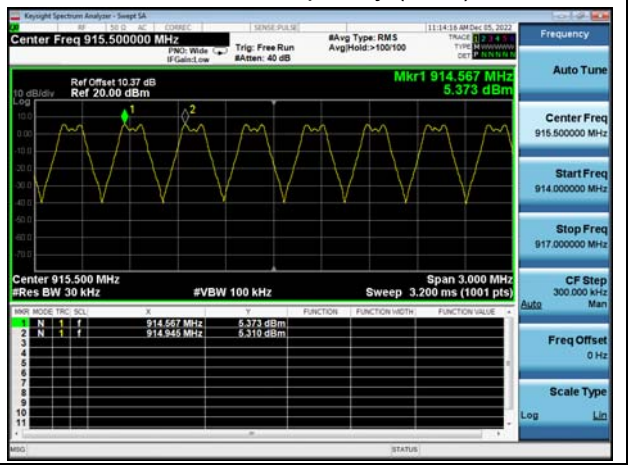
**Test Results:**

| Test Mode | Carrier frequency (MHz) | Carrier frequency separation(MHz) | Limit (MHz) | Conclusion |
|---|---|---|---|---|
| Model 900MHz | 902.46 | 0.378 | 0.179 | PASS |
| | 915 | 0.378 | 0.180 | PASS |
| | 927.54 | 0.378 | 0.180 | PASS |
| Note: The limit is 20 dB bandwidth. | | | | |

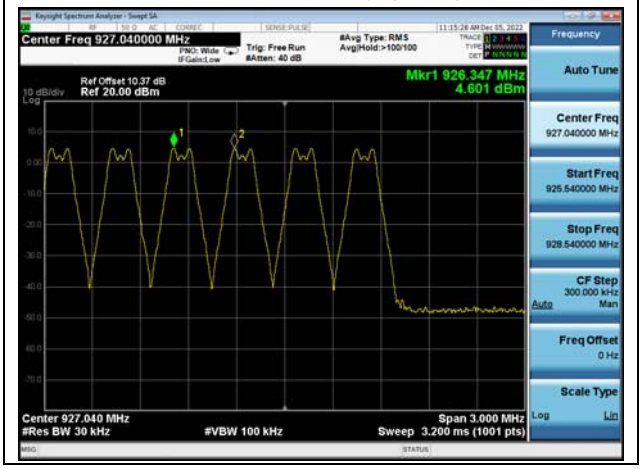
CH0, Carrier frequency (MHz): 902.46




CH33, Carrier frequency (MHz): 915




CH66, Carrier frequency (MHz): 927.54



## 5.4 Time of Occupancy (Dwell Time)

**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Methods of Measurement**

The EUT was connected to the spectrum analyzer and Model 900MHz test set via a power splitter with a known loss. RBW 100 KHz, VBW 300 KHz. The dwell time is calculated by:
Dwell time = Average Transmit Time/ Channel (ms)*Number of Hops in 20s

**Test Setup**


**Limits**

Rule Part15.247(a) (1) (i) specifies that " For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period."

| | |
|---|---|
| Dwell time | ≤ 400ms |

**Measurement Uncertainty**

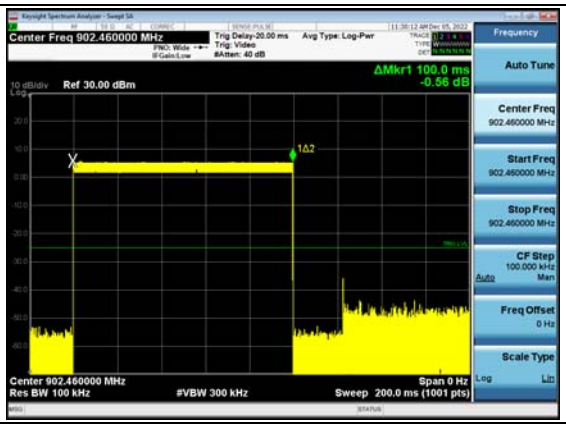
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k$ = 2.

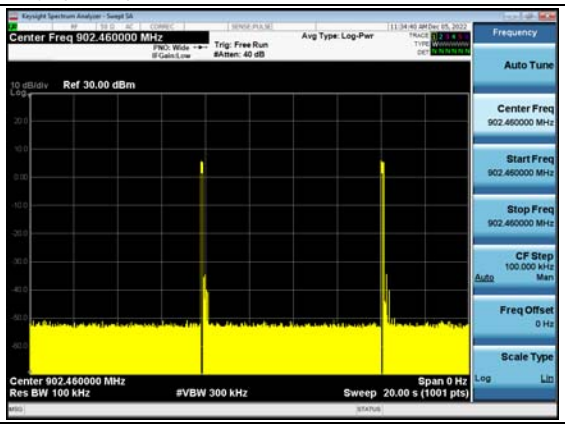
| Requirements | Uncertainty |
|---|---|
| Dwell Time | $U$=0.70ms |

**Test Results:**

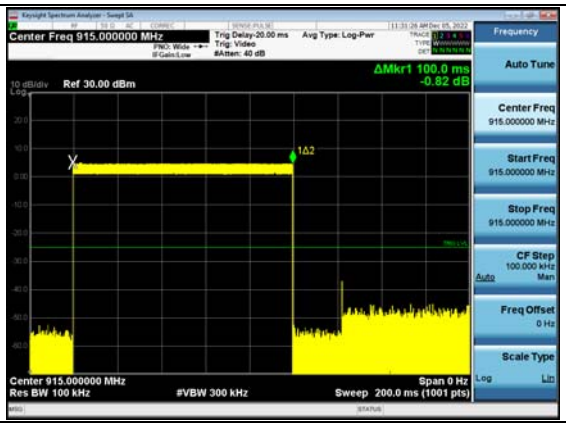
| Test Mode | Channel | Average Transmit Time/ Channel (ms) | Number of Hops in 20s | Dwell time (ms) | Limit (ms) | Conclusion |
|---|---|---|---|---|---|---|
| Model 900MHz | 0 | 100 | 2 | 200 | 400 | PASS |
| | 33 | 100 | 2 | 200 | 400 | PASS |
| | 66 | 100 | 2 | 200 | 400 | PASS |
| Note: Dwell time = time slot length * hop rate * 0.4s | | | | | | |

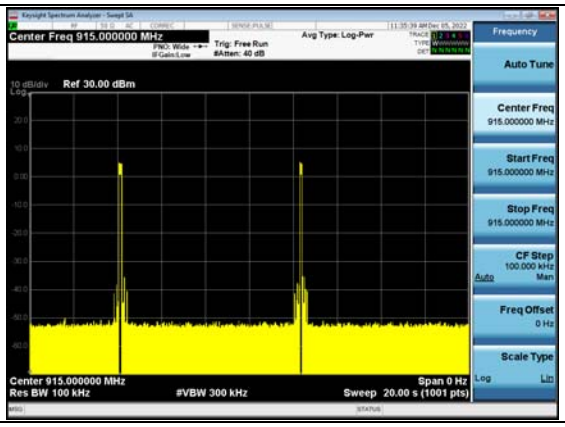
CH0, Carrier frequency (MHz): 902.46



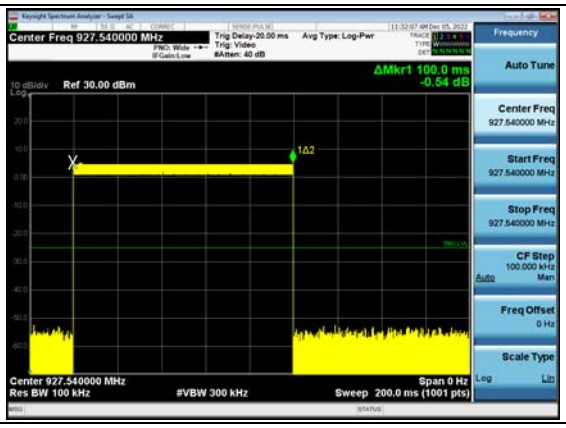



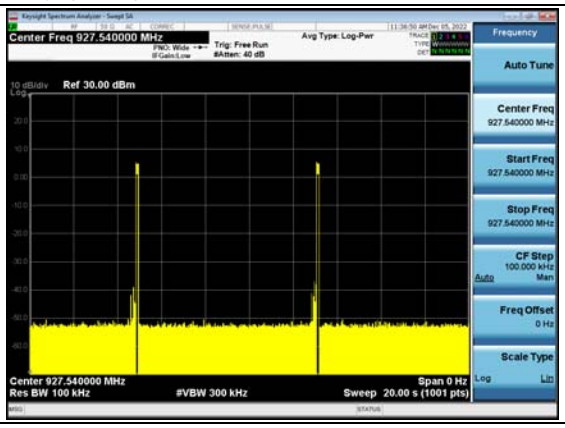

CH33, Carrier frequency (MHz): 915




CH66, Carrier frequency (MHz): 927.54



## 5.5 Band Edge Compliance

**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Method of Measurement**

The EUT was connected to the spectrum analyzer and Model 900MHz test set via a power splitter with a known loss. The lowest and highest channels were measured. The peak detector is used. RBW is set to 100 kHz and VBW is set to 300 kHz on spectrum analyzer. EUT test for Hopping On mode and Hopping Off mode.

**Test Setup**


**Limits**

Rule Part 15.247(d) specifies that “In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.”

**Measurement Uncertainty**

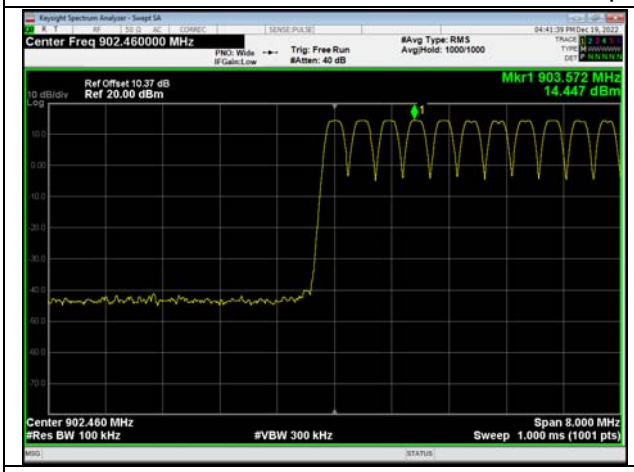
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k$ = 1.96.

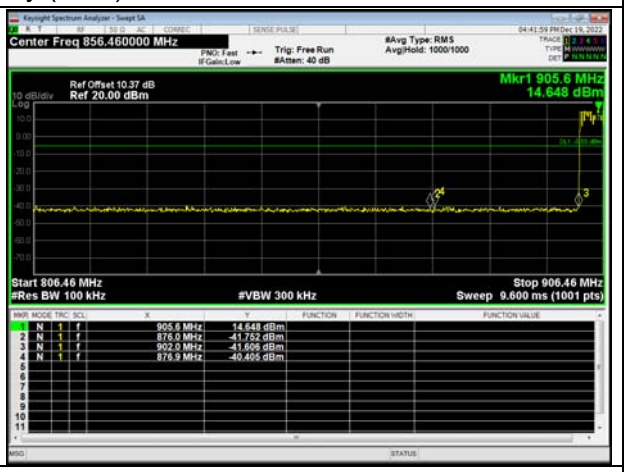
| Frequency | Uncertainty |
|---|---|
| 2GHz-3GHz | 1.407 dB |

## Test Results

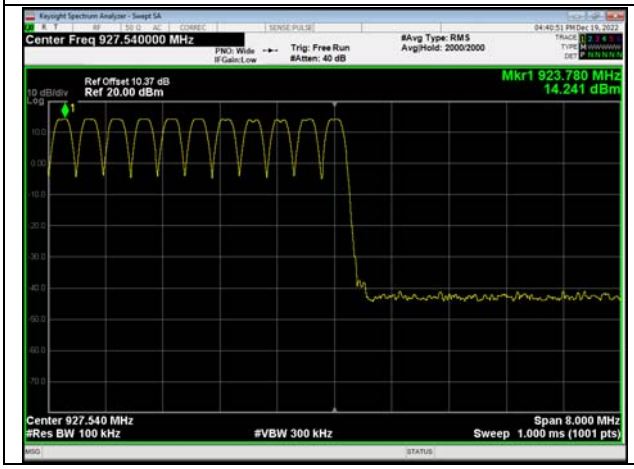
## Hopping On

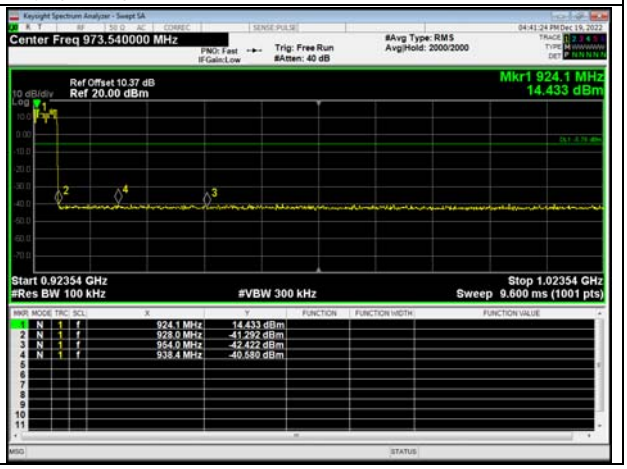
CH0, Carrier frequency (MHz): 902.46



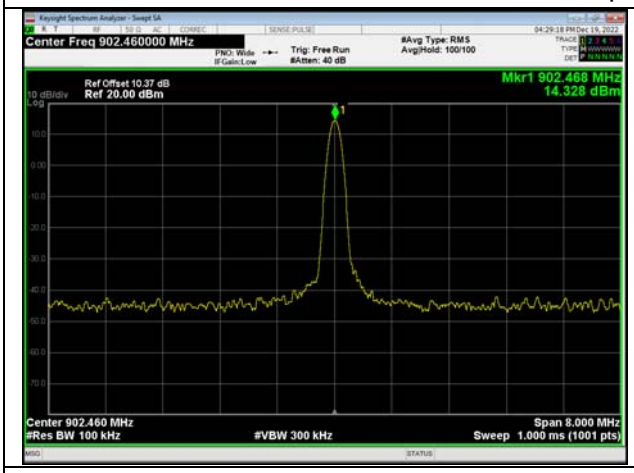

CH66, Carrier frequency (MHz): 927.54

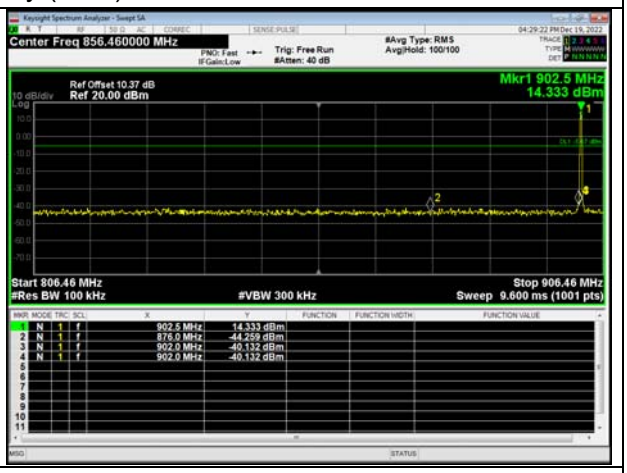


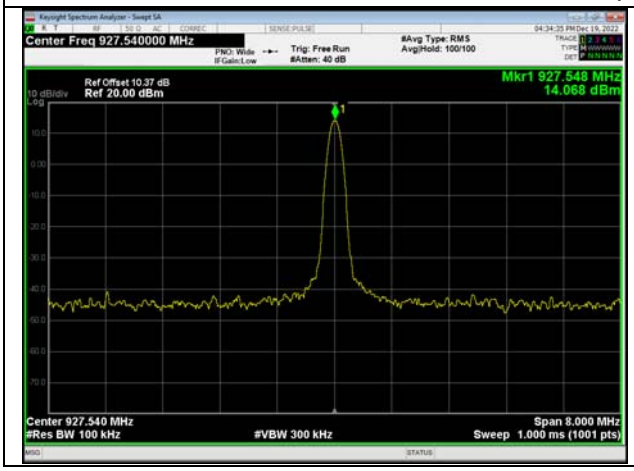
## Hopping Off

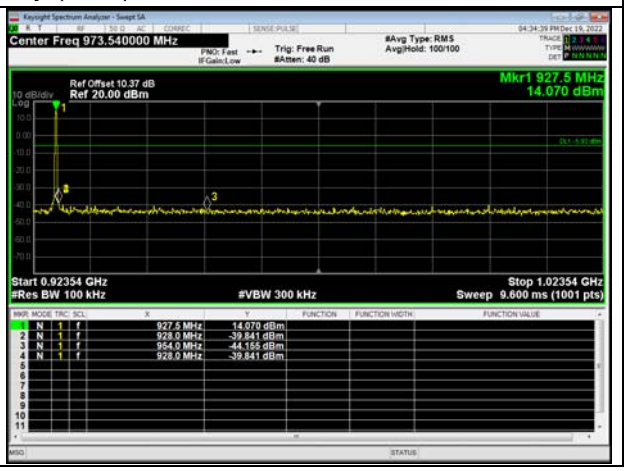
CH0, Carrier frequency (MHz): 902.46




CH66, Carrier frequency (MHz): 927.54



## 5.6 Number of hopping Frequency

**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Method of Measurement**

The EUT was connected to the spectrum analyzer and Model 900MHz test set via a power splitter with a known loss. RBW is set to 100kHz and VBW is set to 300kHz on spectrum analyzer. Set EUT on Hopping on mode.

**Test setup**


**Limits**

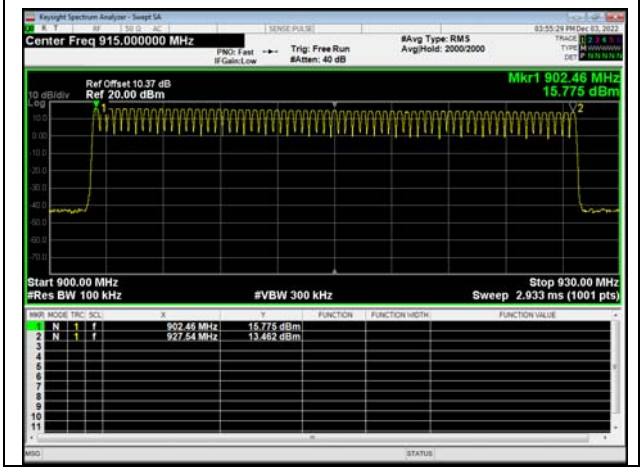
Rule Part 15.247(a) (1) (i)
For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

| Frequency Band | 20 dB Bandwidth of the hopping channel | Hopping Number |
|---|---|---|
| 902 ~ 928 | ⩽250 kHz | ⩾50 channels |
| | ⩾250 kHz | ⩾25 channels |

**Test Results:**

| Channel | Range (MHz) | Number of hopping channels | Limits | conclusion |
|---|---|---|---|---|
| Middle Channel | 902 ~ 928 | 67 | ⩾50 channels | PASS |

902 ~ 928MHz



## 5.7 Spurious RF Conducted Emissions

**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Method of Measurement**

The EUT was connected to the spectrum analyzer and Model 900MHz test set via a power splitter with a known loss. The spectrum analyzer scans from 30MHz to the 10th harmonic of the carrier. The peak detector is used. Set RBW 100kHz and VBW 300 kHz, Sweep is set to ATUO.
The test is in transmitting mode.

**Test setup**


**Limits**

Rule Part 15.247(d) pacifies that “In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.”

| Test Mode | Carrier frequency (MHz) | Reference value (dBm) | Limit |
|---|---|---|---|
| Model 900MHz | 902.46 | 14.33 | -5.67 |
| | 915 | 14.20 | -5.80 |
| | 927.54 | 14.06 | -5.94 |

**Measurement Uncertainty**

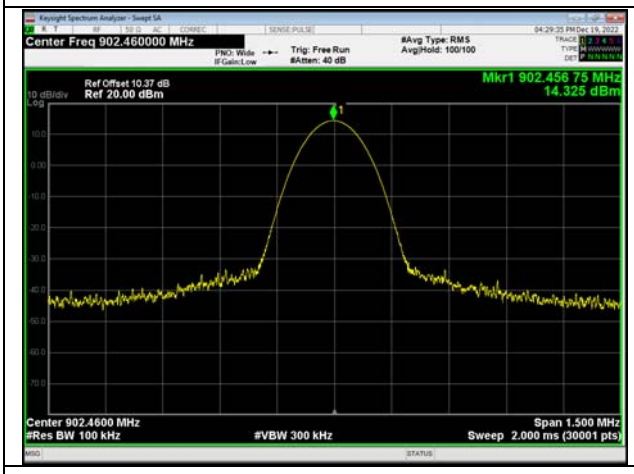
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k$ = 1.96.

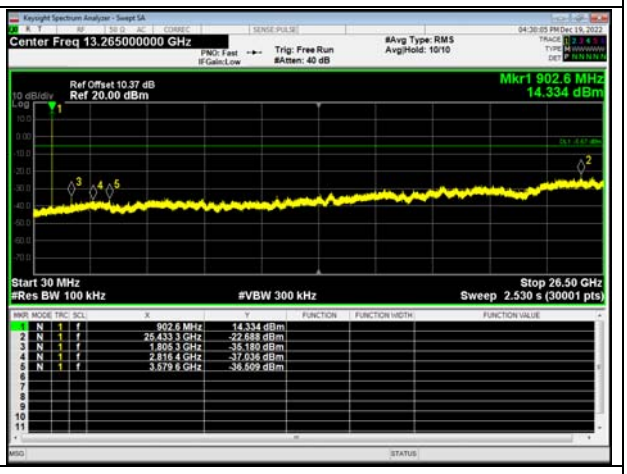
| Frequency | Uncertainty |
|---|---|
| 100kHz-2GHz | 0.684 dB |
| 2GHz-26GHz | 1.407 dB |

**Test Results:**

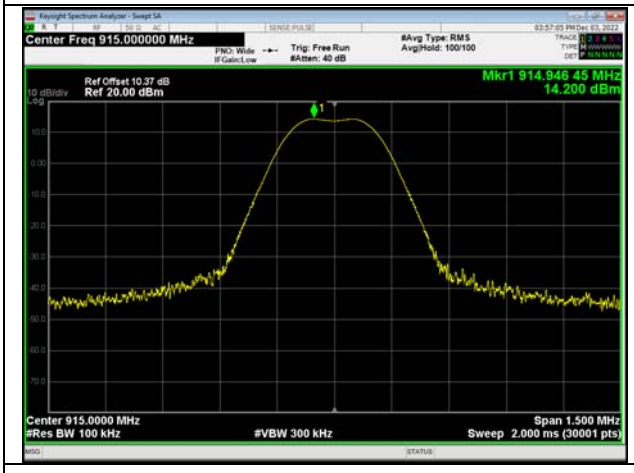
**The signal beyond the limit is carrier.**

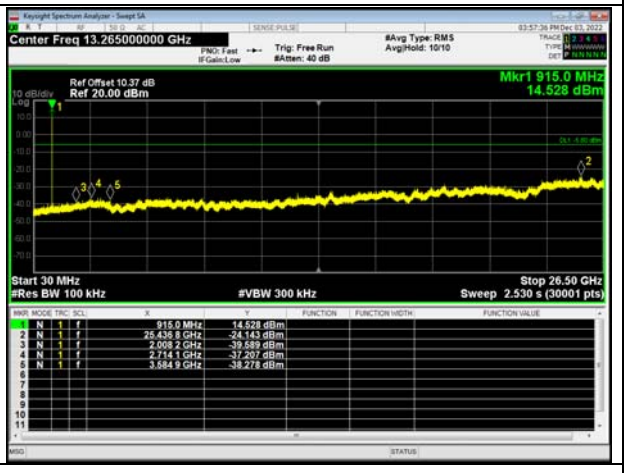
CH0 30MHz to 26.5GHz



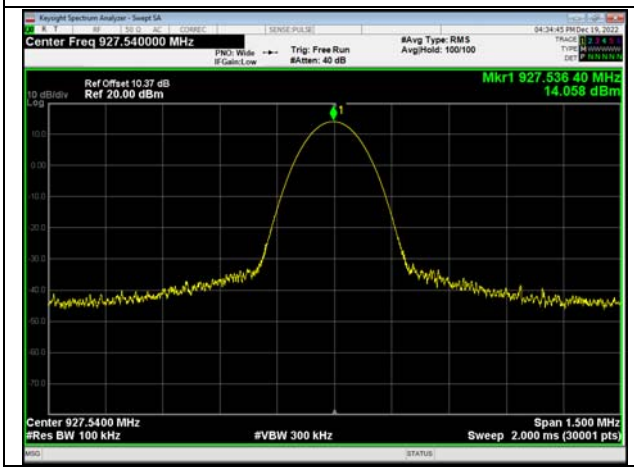



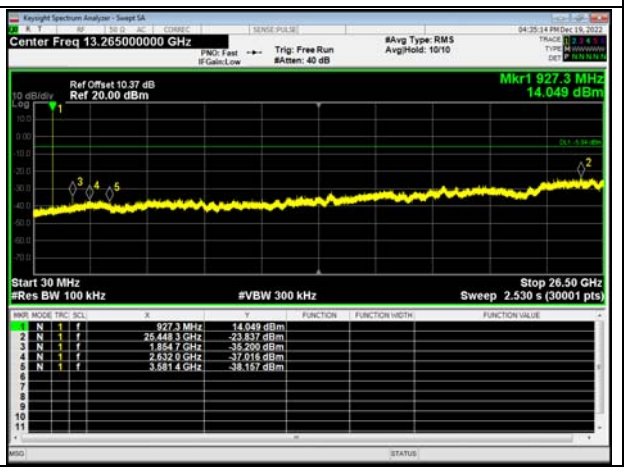

CH33 30MHz to 26.5GHz




CH66 30MHz to 26.5GHz



## 5.8 Unwanted Emission

**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Method of Measurement**

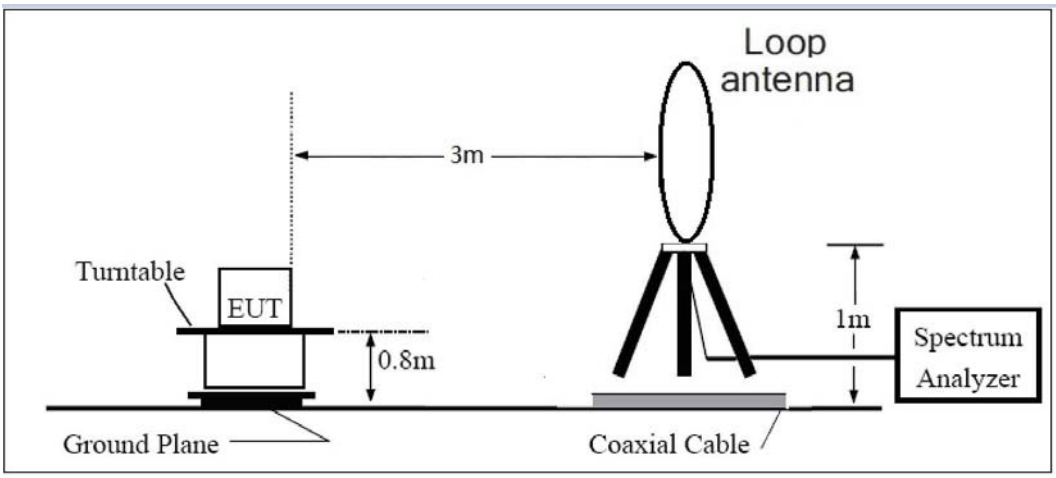
The test set-up was made in accordance to the general provisions of ANSI C63.10. The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration.
Sweep the whole frequency band through the range from 9 kHz to the 10th harmonic of the carrier, and the emissions less than 20 dB below the permissible value are reported.
During the test, below 30MHz, the center of the loop shall be 1 meters; above 30MHz, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.
Set the spectrum analyzer in the following:
9kHz~150 kHz
RBW=200Hz, VBW=1kHz/ Sweep=AUTO
150 kHz~30MHz
RBW=9KHz, VBW=30KHz,/ Sweep=AUTO
Below 1GHz
RBW=100kHz / VBW=300kHz / Sweep=AUTO
Above 1GHz
(a) PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO
(b) AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO
detector; The measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
The dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from 20log(dwell time/100 ms), in an effort to demonstrate compliance with the 15.209 limit.
If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak- average correction factor, derived form the appropriate duty cycle calculation.
This setting method can refer to **KDB 558074 D01.**

This mode was measured in the following mode: EUT with cradle and EUT without cradle. The worst emission was found in EUT with cradle mode and the worst case was recorded.

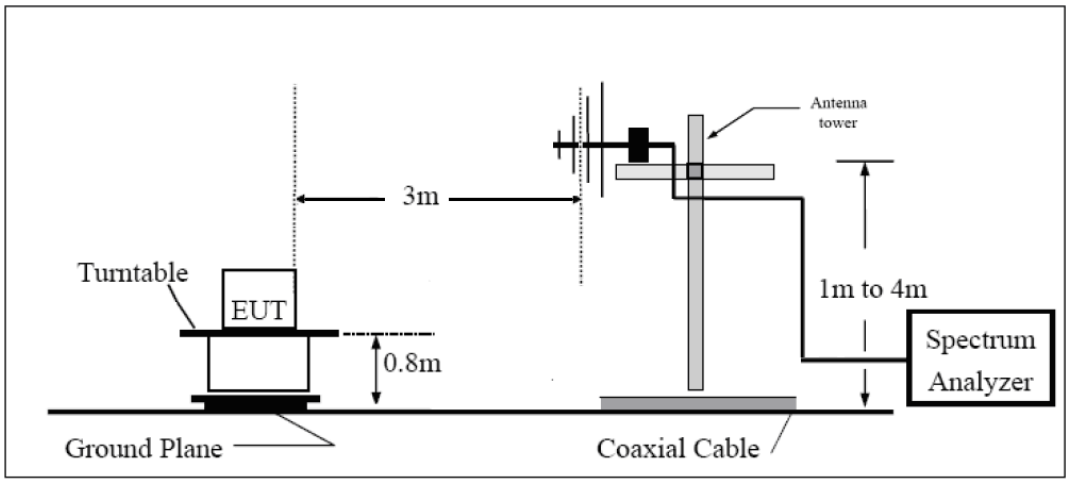
The test is in transmitting mode.

## Test setup

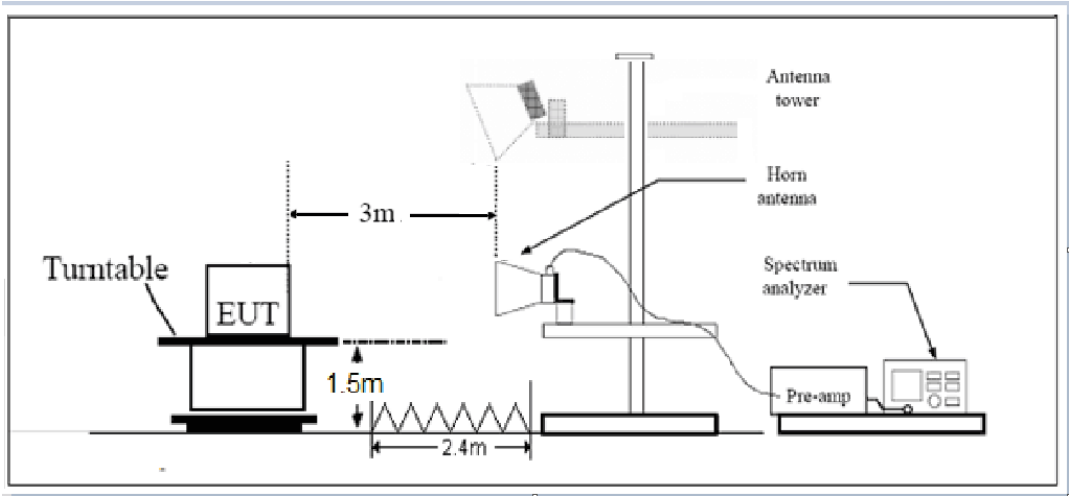
### 9kHz~ 30MHz




### 30MHz~ 1GHz




### Above 1GHz



**Limits**

Rule Part 15.247(d) specifies that “In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).”

Limit in restricted band

| Frequency of emission (MHz) | Field strength(uV/m) | Field strength(dBuV/m) |
|---|---|---|
| 0.009–0.490 | 2400/F(kHz) | / |
| 0.490–1.705 | 24000/F(kHz) | / |
| 1.705–30.0 | 30 | / |
| 30-88 | 100 | 40 |
| 88-216 | 150 | 43.5 |
| 216-960 | 200 | 46 |
| Above960 | 500 | 54 |

§15.35(b)

There is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

Peak Limit=74dBuV/m

Average Limit=54dBuV/m

Spurious Radiated Emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090-0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.15 |
| [1] 0.495-0.505 | 16.69475-16.69525 | 608-614 | 5.35-5.46 |
| 2.1735-2.1905 | 16.80425-16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 25.5-25.67 | 1300-1427 | 8.025-8.5 |
| 4.17725-4.17775 | 37.5-38.25 | 1435-1626.5 | 9.0-9.2 |
| 4.20725-4.20775 | 73-74.6 | 1645.5-1646.5 | 9.3-9.5 |
| 6.215-6.218 | 74.8-75.2 | 1660-1710 | 10.6-12.7 |
| 6.26775-6.26825 | 108-121.94 | 1718.8-1722.2 | 13.25-13.4 |
| 6.31175-6.31225 | 123-138 | 2200-2300 | 14.47-14.5 |
| 8.291-8.294 | 149.9-150.05 | 2310-2390 | 15.35-16.2 |
| 8.362-8.366 | 156.52475-156.52525 | 2483.5-2500 | 17.7-21.4 |
| 8.37625-8.38675 | 156.7-156.9 | 2690-2900 | 22.01-23.12 |
| 8.41425-8.41475 | 162.0125-167.17 | 3260-3267 | 23.6-24.0 |
| 12.29-12.293 | 167.72-173.2 | 3332-3339 | 31.2-31.8 |
| 12.51975-12.52025 | 240-285 | 3345.8-3358 | 36.43-36.5 |
| 12.57675-12.57725 | 322-335.4 | 3600-4400 | ([2]) |
| 13.36-13.41 | | | |

**Measurement Uncertainty**

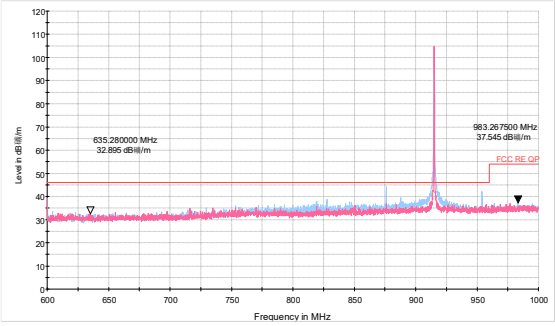
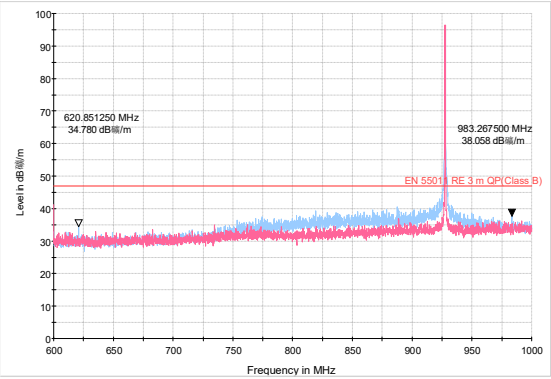
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor *k* = 1.96.

| Frequency | Uncertainty |
|---|---|
| 9KHz-30MHz | 3.55 dB |
| 30MHz-200MHz | 4.17 dB |
| 200MHz-1GHz | 4.84 dB |
| 1-18GHz | 4.35 dB |

**Test Results:**

**The signal beyond the limit is carrier.**

A font ( Level in dBµV/m ) in the test plot =(level in dBµV/m)

| 915MHz: Peak + Average | 927.54MHz: Peak + Average |
|---|---|
|  |  |

**Result of RE**

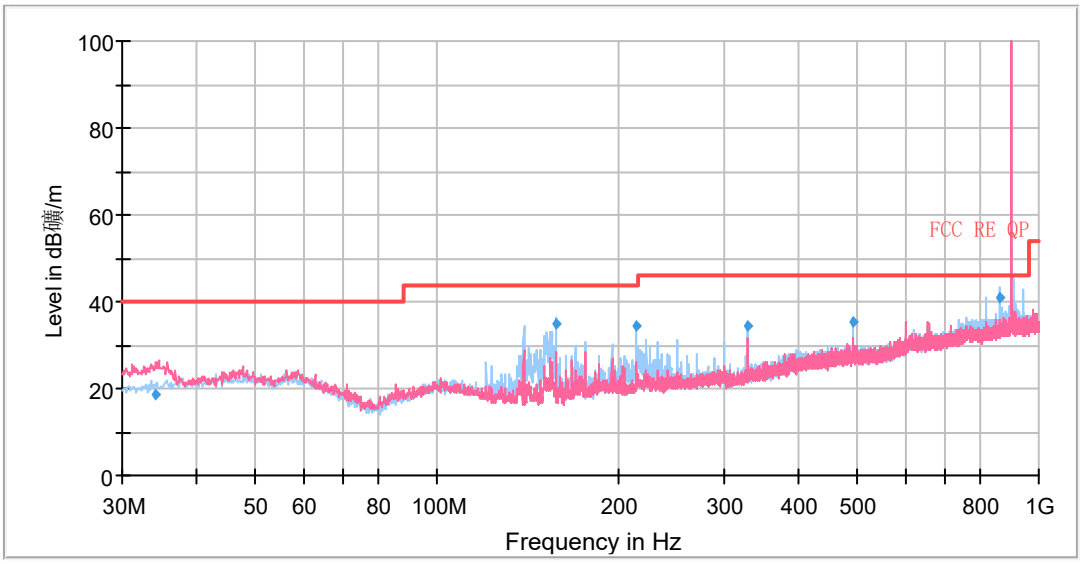
**Test result**

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the Emissions in the frequency band 9kHz-30MHz are more than 20dB below the limit are not reported.

The following graphs display the maximum values of horizontal and vertical by software.
For above 1GHz, Blue trace uses the peak detection, Green trace uses the average detection.

A symbol ( dB礦/m ) in the test plot below means (dBμV/m)

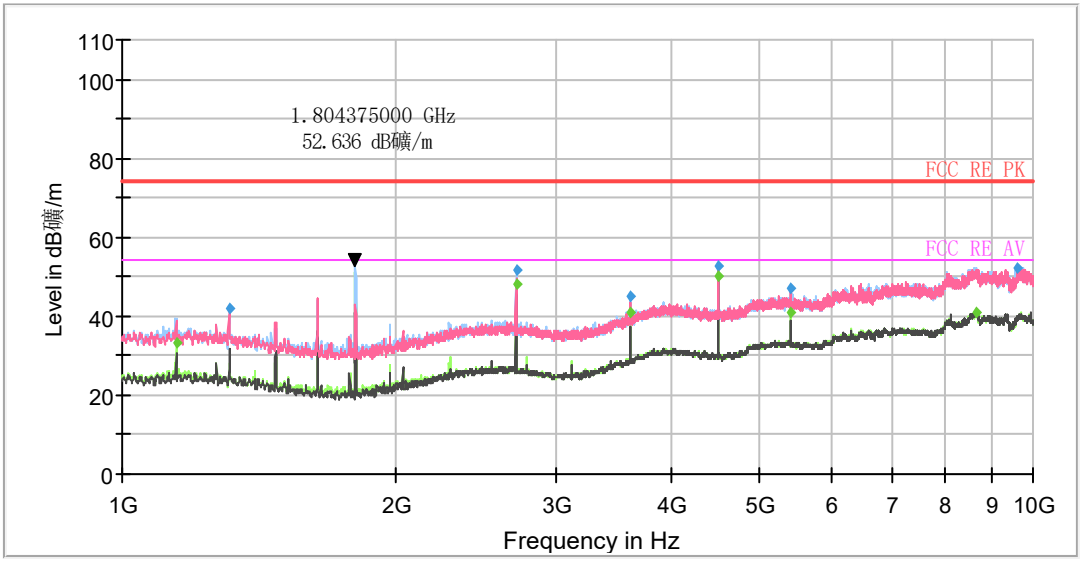
**902.46MHz**




Radiates Emission from 30MHz to 1GHz
Note: The signal beyond the limit is carrier.

| Frequency (MHz) | Quasi-Peak (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Height (cm) | Polarization | Azimuth (deg) | Correct Factor (dB) |
|---|---|---|---|---|---|---|---|
| 34.13 | 18.38 | 40.00 | 21.62 | 107.0 | V | 202.00 | 14 |
| 158.08 | 34.83 | 43.50 | 8.67 | 205.0 | H | 44.00 | 11 |
| 213.90 | 34.51 | 43.50 | 8.99 | 175.0 | H | 210.00 | 13 |
| 327.71 | 34.51 | 46.00 | 11.49 | 100.0 | H | 28.00 | 17 |
| 491.56 | 35.49 | 46.00 | 10.51 | 197.0 | H | 0.00 | 21 |
| 863.39 | 41.00 | 46.00 | 5.00 | 109.0 | H | 185.00 | 26 |

**Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)**
**2. Margin = Limit – Quasi-Peak**

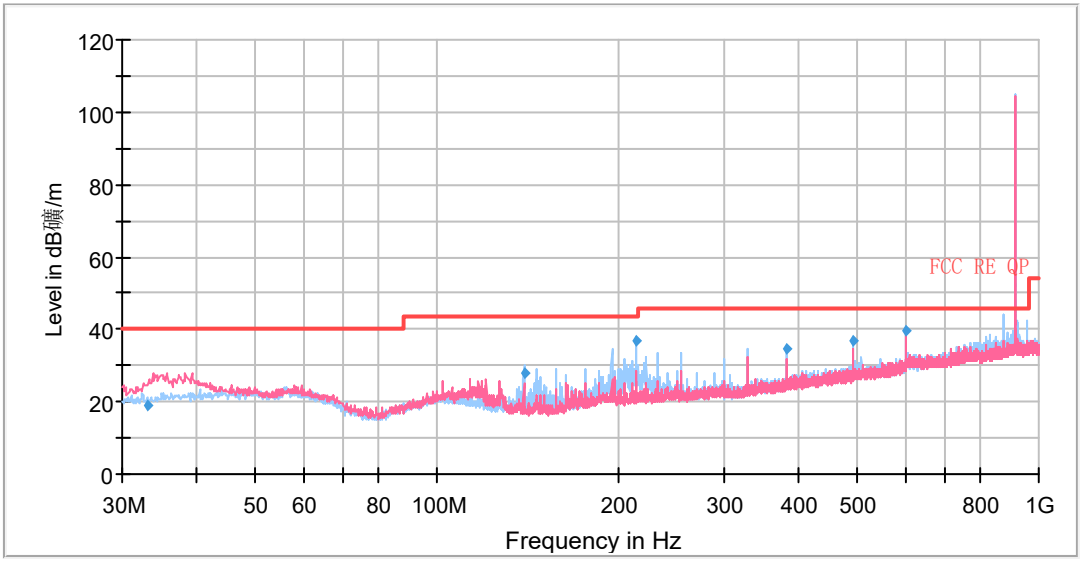



Radiates Emission from 1GHz to 10GHz

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|---|
| 1146.25 | --- | 33.22 | 54.00 | 20.78 | 500.00 | 100.0 | H | 18.00 | -19 |
| 1310.50 | 41.83 | --- | 74.00 | 32.17 | 500.00 | 100.0 | V | 104.00 | -17 |
| 2706.63 | --- | 47.85 | 54.00 | 6.15 | 500.00 | 100.0 | H | 320.00 | -14 |
| 2706.63 | 51.46 | --- | 74.00 | 22.54 | 500.00 | 100.0 | H | 320.00 | -14 |
| 3610.00 | 45.17 | --- | 74.00 | 28.83 | 500.00 | 100.0 | H | 49.00 | -12 |
| 3610.00 | --- | 40.91 | 54.00 | 13.09 | 500.00 | 100.0 | H | 49.00 | -12 |
| 4512.25 | 52.69 | --- | 74.00 | 21.31 | 500.00 | 200.0 | V | 10.00 | -9 |
| 4512.25 | --- | 50.30 | 54.00 | 3.70 | 500.00 | 200.0 | V | 10.00 | -9 |
| 5414.50 | --- | 40.99 | 54.00 | 13.01 | 500.00 | 100.0 | H | 2.00 | -6 |
| 5415.63 | 46.97 | --- | 74.00 | 27.03 | 500.00 | 100.0 | H | 13.00 | -6 |
| 8651.13 | --- | 40.87 | 54.00 | 13.13 | 500.00 | 200.0 | H | 0.00 | 1 |
| 9619.75 | 52.04 | --- | 74.00 | 21.96 | 500.00 | 200.0 | V | 247.00 | 2 |

**Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)**

**915MHz**



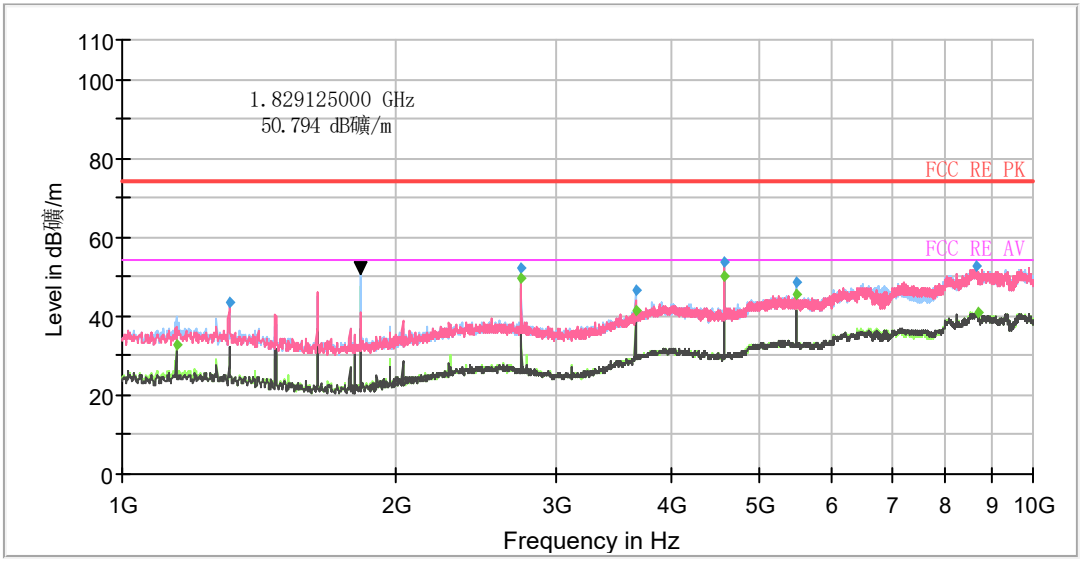

Radiates Emission from 30MHz to 1GHz

Note: The signal beyond the limit is carrier.

| Frequency (MHz) | Quasi-Peak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Polarization | Azimuth (deg) | Correct Factor (dB) |
|---|---|---|---|---|---|---|---|
| 33.16 | 19.21 | 40.00 | 20.79 | 103.0 | V | 152.00 | 14 |
| 139.49 | 28.14 | 43.50 | 15.36 | 175.0 | H | 12.00 | 10 |
| 213.90 | 36.91 | 43.50 | 6.59 | 123.0 | H | 2.00 | 13 |
| 381.18 | 34.80 | 46.00 | 11.20 | 100.0 | H | 135.00 | 18 |
| 491.56 | 36.77 | 46.00 | 9.23 | 198.0 | H | 318.00 | 21 |
| 600.00 | 39.79 | 46.00 | 6.21 | 123.0 | H | 41.00 | 23 |

**Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)**

**2. Margin = Limit – Quasi-Peak**

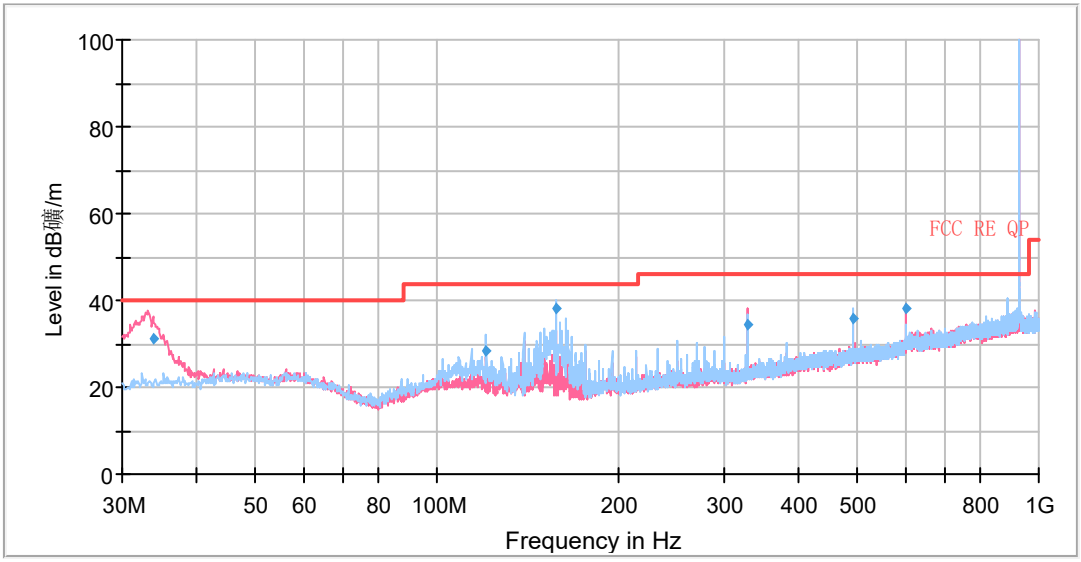



Radiates Emission from 1GHz to 10GHz

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|---|
| 1146.25 | --- | 32.88 | 54.00 | 21.12 | 500.00 | 100.0 | H | 1.00 | -19 |
| 1310.50 | 43.65 | --- | 74.00 | 30.35 | 500.00 | 100.0 | V | 100.00 | -17 |
| 2744.88 | --- | 49.59 | 54.00 | 4.41 | 500.00 | 100.0 | H | 320.00 | -14 |
| 2744.88 | 52.00 | --- | 74.00 | 22.00 | 500.00 | 100.0 | H | 320.00 | -14 |
| 3659.50 | --- | 41.44 | 54.00 | 12.56 | 500.00 | 100.0 | H | 62.00 | -12 |
| 3659.50 | 46.36 | --- | 74.00 | 27.64 | 500.00 | 100.0 | H | 62.00 | -12 |
| 4575.25 | 53.49 | --- | 74.00 | 20.51 | 500.00 | 100.0 | H | 52.00 | -9 |
| 4575.25 | --- | 49.91 | 54.00 | 4.09 | 500.00 | 100.0 | H | 52.00 | -9 |
| 5489.88 | 48.79 | --- | 74.00 | 25.21 | 500.00 | 200.0 | H | 33.00 | -6 |
| 5489.88 | --- | 45.57 | 54.00 | 8.43 | 500.00 | 200.0 | H | 33.00 | -6 |
| 8680.38 | 52.62 | --- | 74.00 | 21.38 | 500.00 | 100.0 | H | 338.00 | 1 |
| 8688.25 | --- | 40.86 | 54.00 | 13.14 | 500.00 | 100.0 | V | 74.00 | 1 |

**Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)**

**927.54MHz**



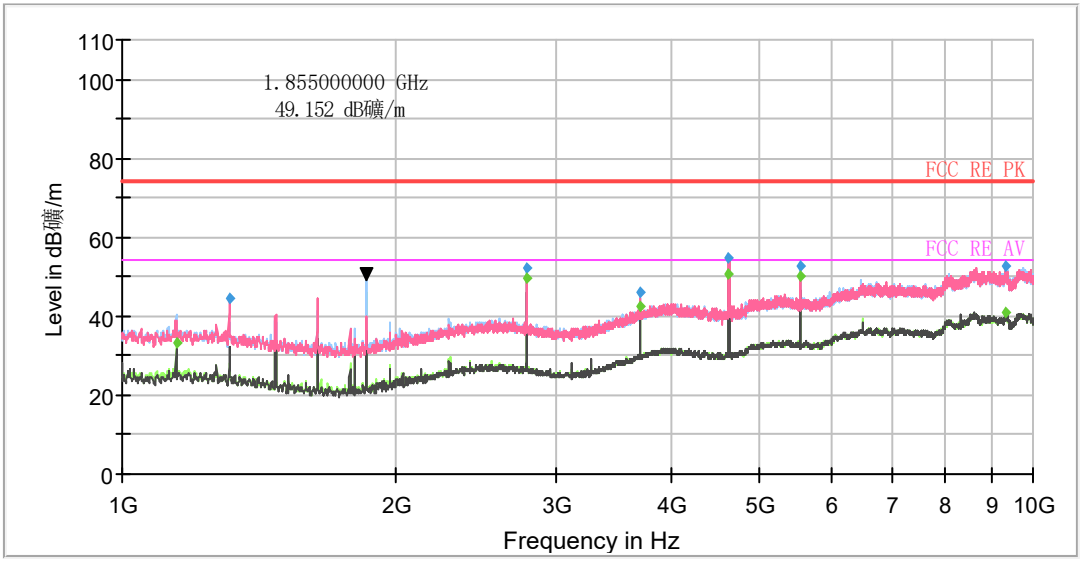

Radiates Emission from 30MHz to 1GHz

Note: The signal beyond the limit is carrier.

| Frequency (MHz) | Quasi-Peak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Polarization | Azimuth (deg) | Correct Factor (dB) |
|---|---|---|---|---|---|---|---|
| 33.75 | 31.24 | 40.00 | 8.76 | 101.0 | V | 116.00 | 14 |
| 120.90 | 28.55 | 43.50 | 14.95 | 222.0 | H | 52.00 | 12 |
| 158.08 | 38.07 | 43.50 | 5.43 | 207.0 | H | 236.00 | 11 |
| 327.71 | 34.24 | 46.00 | 11.76 | 179.0 | V | 153.00 | 17 |
| 491.56 | 35.78 | 46.00 | 10.22 | 199.0 | H | 264.00 | 21 |
| 600.00 | 37.99 | 46.00 | 8.01 | 106.0 | V | 82.00 | 23 |

**Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)**

**2. Margin = Limit – Quasi-Peak**




Radiates Emission from 1GHz to 10GHz

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|---|---|---|---|---|---|---|---|---|---|
| 1146.25 | --- | 33.24 | 54.00 | 20.76 | 500.00 | 100.0 | H | 6.00 | -19 |
| 1310.50 | 44.32 | --- | 74.00 | 29.68 | 500.00 | 200.0 | V | 358.00 | -17 |
| 2782.00 | --- | 49.56 | 54.00 | 4.44 | 500.00 | 100.0 | H | 320.00 | -13 |
| 2782.00 | 52.30 | --- | 74.00 | 21.70 | 500.00 | 100.0 | H | 320.00 | -13 |
| 3710.13 | --- | 42.47 | 54.00 | 11.53 | 500.00 | 100.0 | H | 59.00 | -12 |
| 3710.13 | 46.23 | --- | 74.00 | 27.77 | 500.00 | 100.0 | H | 59.00 | -12 |
| 4637.13 | 54.68 | --- | 74.00 | 19.32 | 500.00 | 200.0 | V | 62.00 | -8 |
| 4637.13 | --- | 50.79 | 54.00 | 3.21 | 500.00 | 200.0 | V | 62.00 | -8 |
| 5565.25 | 52.86 | --- | 74.00 | 21.14 | 500.00 | 200.0 | H | 32.00 | -6 |
| 5565.25 | --- | 49.99 | 54.00 | 4.01 | 500.00 | 200.0 | H | 32.00 | -6 |
| 9331.75 | 52.66 | --- | 74.00 | 21.34 | 500.00 | 100.0 | V | 358.00 | 1 |
| 9339.63 | --- | 40.75 | 54.00 | 13.25 | 500.00 | 100.0 | H | 235.00 | 1 |

**Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)**
**2. Margin = Limit –MAX Peak/ Average**

## 5.9 Conducted Emission

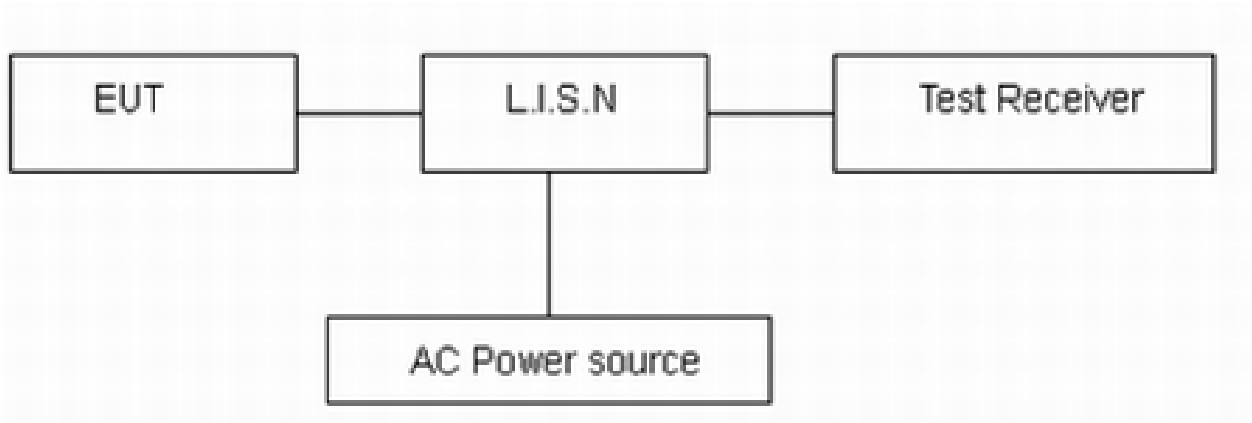
**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Methods of Measurement**

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.10. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz.The measurement result should include both L line and N line.
The test is in transmitting mode.

**Test Setup**




Note: AC Power source is used to 120V/60Hz.

**Limits**

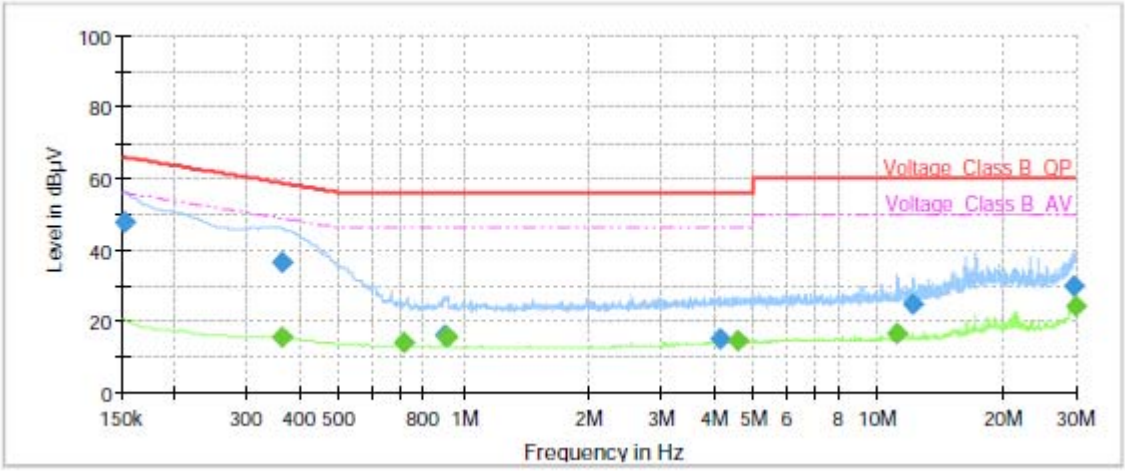
| Frequency (MHz) | Conducted Limits(dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 - 0.5 | 66 to 56 * | 56 to 46* |
| 0.5 - 5 | 56 | 46 |
| 5 - 30 | 60 | 50 |
| *: Decreases with the logarithm of the frequency. | | |

**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k$ = 1.96, $U$=2.69 dB.

**Test Results:**

Following plots, Blue trace uses the peak detection, Green trace uses the average detection. During the test, the Conducted Emission was performed in all modes with all channels, 927.54MHz are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

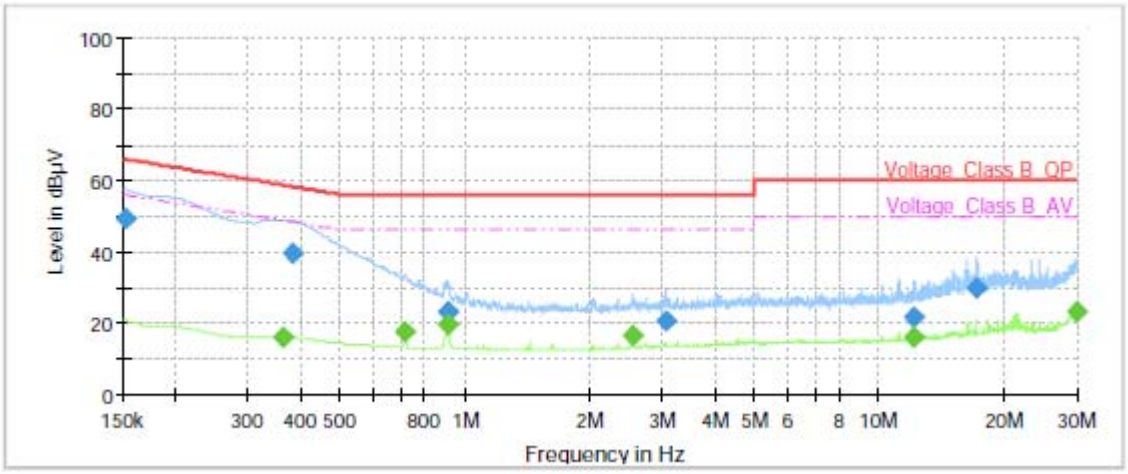



| Frequency (MHz) | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 0.152250 | 47.75 | --- | 65.88 | 18.13 | 1000.0 | 9.000 | L1 | ON | 20.9 |
| 0.361500 | --- | 15.25 | 48.69 | 33.45 | 1000.0 | 9.000 | L1 | ON | 20.8 |
| 0.363750 | 36.52 | --- | 58.64 | 22.13 | 1000.0 | 9.000 | L1 | ON | 20.8 |
| 0.717000 | --- | 13.80 | 46.00 | 32.20 | 1000.0 | 9.000 | L1 | ON | 20.4 |
| 0.897000 | 15.85 | --- | 56.00 | 40.15 | 1000.0 | 9.000 | L1 | ON | 20.0 |
| 0.912750 | --- | 15.48 | 46.00 | 30.52 | 1000.0 | 9.000 | L1 | ON | 20.0 |
| 4.159500 | 14.79 | --- | 56.00 | 41.21 | 1000.0 | 9.000 | L1 | ON | 19.2 |
| 4.560000 | --- | 14.31 | 46.00 | 31.69 | 1000.0 | 9.000 | L1 | ON | 19.2 |
| 11.157000 | --- | 16.66 | 50.00 | 33.34 | 1000.0 | 9.000 | L1 | ON | 19.3 |
| 12.171750 | 24.51 | --- | 60.00 | 35.49 | 1000.0 | 9.000 | L1 | ON | 19.3 |
| 29.663250 | 29.63 | --- | 60.00 | 30.37 | 1000.0 | 9.000 | L1 | ON | 20.1 |
| 30.000000 | --- | 24.11 | 50.00 | 25.89 | 1000.0 | 9.000 | L1 | ON | 20.1 |

**Remark: Correct factor=cable loss + LISN factor**

L line

Conducted Emission from 150 KHz to 30 MHz




| Frequency (MHz) | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 0.152250 | 49.32 | --- | 65.88 | 16.56 | 1000.0 | 9.000 | N | ON | 20.9 |
| 0.361500 | --- | 16.08 | 48.69 | 32.61 | 1000.0 | 9.000 | N | ON | 20.9 |
| 0.384000 | 39.66 | --- | 58.19 | 18.53 | 1000.0 | 9.000 | N | ON | 20.8 |
| 0.717000 | --- | 17.32 | 46.00 | 28.68 | 1000.0 | 9.000 | N | ON | 20.4 |
| 0.910500 | 23.26 | --- | 56.00 | 32.74 | 1000.0 | 9.000 | N | ON | 20.1 |
| 0.912750 | --- | 19.66 | 46.00 | 26.34 | 1000.0 | 9.000 | N | ON | 20.1 |
| 2.544000 | --- | 16.19 | 46.00 | 29.81 | 1000.0 | 9.000 | N | ON | 19.3 |
| 3.045750 | 20.41 | --- | 56.00 | 35.59 | 1000.0 | 9.000 | N | ON | 19.3 |
| 12.180750 | 21.31 | --- | 60.00 | 38.69 | 1000.0 | 9.000 | N | ON | 19.4 |
| 12.180750 | --- | 15.89 | 50.00 | 34.11 | 1000.0 | 9.000 | N | ON | 19.4 |
| 17.254500 | 29.78 | --- | 60.00 | 30.22 | 1000.0 | 9.000 | N | ON | 19.6 |
| 29.980500 | --- | 22.82 | 50.00 | 27.18 | 1000.0 | 9.000 | N | ON | 20.3 |

**Remark: Correct factor=cable loss + LISN factor**

N line

Conducted Emission from 150 KHz to 30 MHz

# 6 Main Test Instruments

| Name | Manufacturer | Type | Serial Number | Calibration Date | Expiration Date |
|---|---|---|---|---|---|
| Power Sensor | R&S | OSP-B157W8 | 100924 | 2021-12-12 | 2022-12-11 |
| | | | | 2022-12-10 | 2023-12-09 |
| Spectrum Analyzer | KEYSIGHT | N9020A | MY54420163 | 2021-12-12 | 2022-12-11 |
| | | | | 2022-12-10 | 2023-12-09 |
| Artificial main network | R&S | ENV216 | 102191 | 2020-12-13 | 2022-12-12 |
| | | | | 2022-12-13 | 2024-12-09 |
| EMI Test Receiver | R&S | ESR | 101667 | 2022-05-25 | 2023-05-24 |
| Software | R&S | EMC32 | 10.35.10 | / | / |
| EMI Test Receiver | R&S | ESCI3 | 100948 | 2022-05-25 | 2023-05-24 |
| Spectrum Analyzer | R&S | FSV40 | 101186 | 2022-05-14 | 2023-05-13 |
| Spectrum Analyzer | R&S | FSV40 | 101298 | 2022-05-14 | 2023-05-13 |
| Loop Antenna | SCHWARZBECK | FMZB1519 | 1519-047 | 2020-04-02 | 2023-04-01 |
| TRILOG Broadband Antenna | SCHWARZBECK | VULB 9163 | 01111 | 2022-10-25 | 2025-10-24 |
| Horn Antenna | Schwarzbeck | BBHA 9120D | 430 | 2021-07-26 | 2024-07-25 |
| Software | R&S | EMC32 | 9.26.0 | / | / |

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

# ANNEX A: The EUT Appearance

**The EUT Appearance are submitted separately.**

# ANNEX B: Test Setup Photos

**The Test Setup Photos are submitted separately.**