REPORT No.: SZ17100117W02

# TEST REPORT

| | | |
|---|---|---|
| **APPLICANT** | : | Revol Inc. |
| **PRODUCT NAME** | : | Smartwallet |
| **MODEL NAME** | : | rcw01001 |
| **BRAND NAME** | : | Cashew |
| **FCC ID** | : | 2AOL6-RCW01001 |
| **STANDARD(S)** | : | 47 CFR Part 15 Subpart C |
| **TEST DATE** | : | 2017-12-29 to 2018-01-22 |
| **ISSUE DATE** | : | 2018-10-10 |

Tested by: Li Jingzong (Test Engineer)

Approved by: Peng Huarui ( Supervisor )

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MORLAB

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| Change History | | |
|---|---|---|
| **Issue** | **Date** | **Reason for change** |
| 1.0 | 2018-10-10 | First edition |
| | | |

# 1. Technical Information

**Note:** Provide by applicant.

## 1.1. Applicant and Manufacturer Information

| | |
|---|---|
| **Applicant:** | Revol Inc. |
| **Applicant Address:** | 111, North Market Street, Suite 300, San Jose, California 95113, United States of America |
| **Manufacturer:** | NOA Labs Ltd. |
| **Manufacturer Address:** | 709 Bldg C HuangDu GuangChang Building YiTian Road, Futian District, Shenzhen, 518000, GuangDong, China |

## 1.2. Equipment Under Test (EUT) Description

| | |
|---|---|
| **Product Name:** | Smartwallet |
| **Serial No:** | (N/A, marked #1 by test site) |
| **Hardware Version:** | N/A |
| **Software Version:** | N/A |
| **Modulation Type:** | GFSK |
| **Operating Frequency Range:** | The frequency range used is 2402MHz - 2480MHz (40 channels, at intervals of 2MHz); |
| **Bluetooth Version:** | Bluetooth 4.0 LE |
| **Antenna Type:** | PCB Antenna |
| **Antenna Gain:** | -0.77 dBi |

**Note 1:** The EUT contains Bluetooth Module operating at 2.4GHz ISM band; the frequencies is F(MHz)=2402+2*n (0<=n<=39). The lowest, middle, highest channel numbers of the Bluetooth Module used and tested in this report are separately 0 (2402MHz), 19 (2440MHz) and 39 (2480MHz).

**Note 2:** The EUT connected to the serial port of the computer with a serial communication cable, we use the dedicated software to control the EUT continuous transmission.

**Note 3:** For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

## 1.3. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (Bluetooth, 2.4GHz ISM band radiators) for the EUT FCC ID Certification:

| No | Identity | Document Title |
|---|---|---|
| 1 | 47 CFR Part 15 (10-1-15 Edition) | Radio Frequency Devices |

Test detailed items/section required by FCC rules and results are as below:

| No. | Section | Description | Test Date | Test Engineer | Result |
|---|---|---|---|---|---|
| 1 | 15.203 | Antenna Requirement | N/A | N/A | PASS |
| 2 | 15.247(b) | Peak Output Power | Jan 16, 2018 | Li Jingzong | PASS |
| 3 | 15.247(a) | Bandwidth | Jan 16, 2018 | Li Jingzong | PASS |
| 4 | 15.247(d) | Conducted Spurious Emission and Band Edge | Jan 16, 2018 | Li Jingzong | PASS |
| 5 | 15.247(e) | Power spectral density (PSD) | Jan 16, 2018 | Li Jingzong | PASS |
| 6 | 15.247(d) | Restricted Frequency Bands | Dec 29, 2017 | Peng Shiqing | PASS |
| 7 | 15.207 | Conducted Emission | Jan 22, 2018 | Peng Shiqing | PASS |
| 8 | 15.209, 15.247(d) | Radiated Emission | Jan 02, 2018 | Peng Shiqing | PASS |
| **Note 1:** The tests were performed according to the method of measurements prescribed in ANSIC63.10-2013 and KDB558074 D01 v04 (04/05/2017). | | | | | |

## 1.4. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

| | |
|---|---|
| Temperature (°C): | 15 - 35 |
| Relative Humidity (%): | 30 -60 |
| Atmospheric Pressure (kPa): | 86-106 |

# 2. 47 CFR Part 15C Requirements

## 2.1. Antenna requirement

### 2.1.1. 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.

### 2.1.2. Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

## 2.2. Peak Output Power

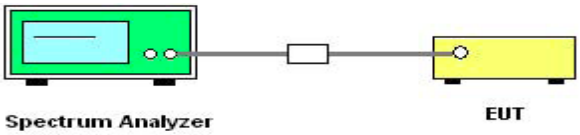
### 2.2.1. Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed 1 Watt.

### 2.2.2. Test Description

The measured output power was calculated by the reading of the spectrum analyzer and calibration.

**A. Test Setup:**




The EUT (Equipment under the test) is coupled to the Spectrum analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in Spectrum analyzer.

**B. Equipments List:**

Please reference ANNEX A (1.5).

### 2.2.3. Test procedure

The measured output power was calculated by the reading of the spectrum analyzer and calibration. Following is the test procedure for Peak Output Power test on the spectrum analyzer:

a) Set analyzer center frequency to channel center frequency.

b)Set the RBW to1MHz

c) Set VBW to 3MHz

d) Set span to 3MHz

e) Sweep time to auto couple.

f) Detector = peak.

g) Trace mode = max hold.

h) Allow trace to fully stabilize.

i) Use peak marker function to determine the peak amplitude level.

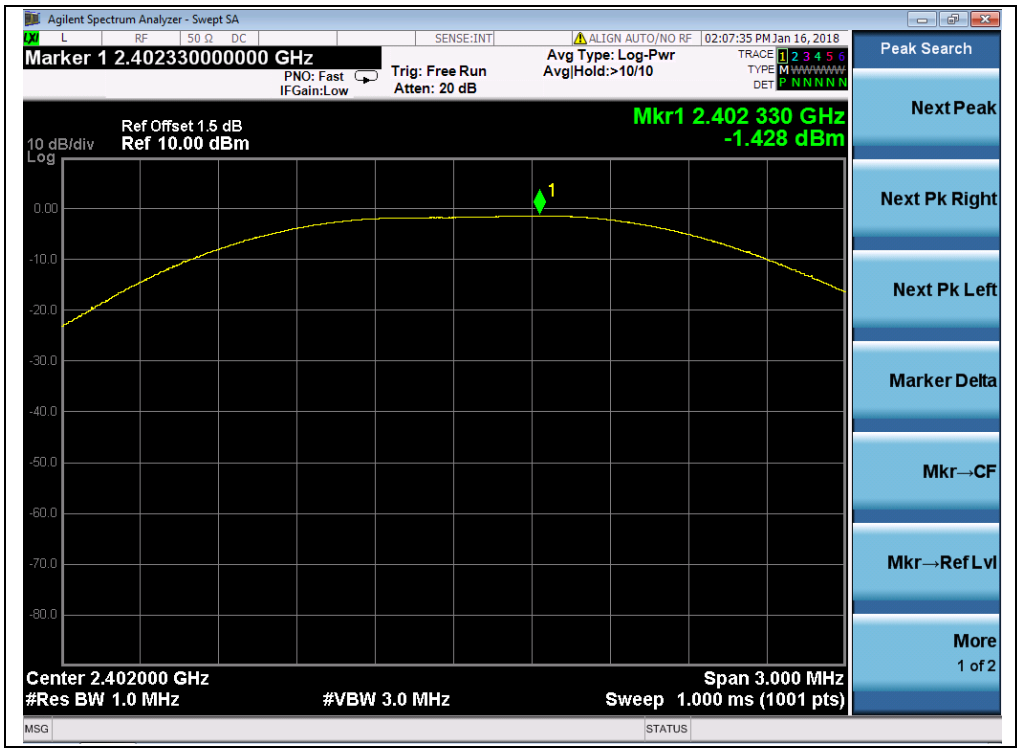
### 2.2.4. Test Result

The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

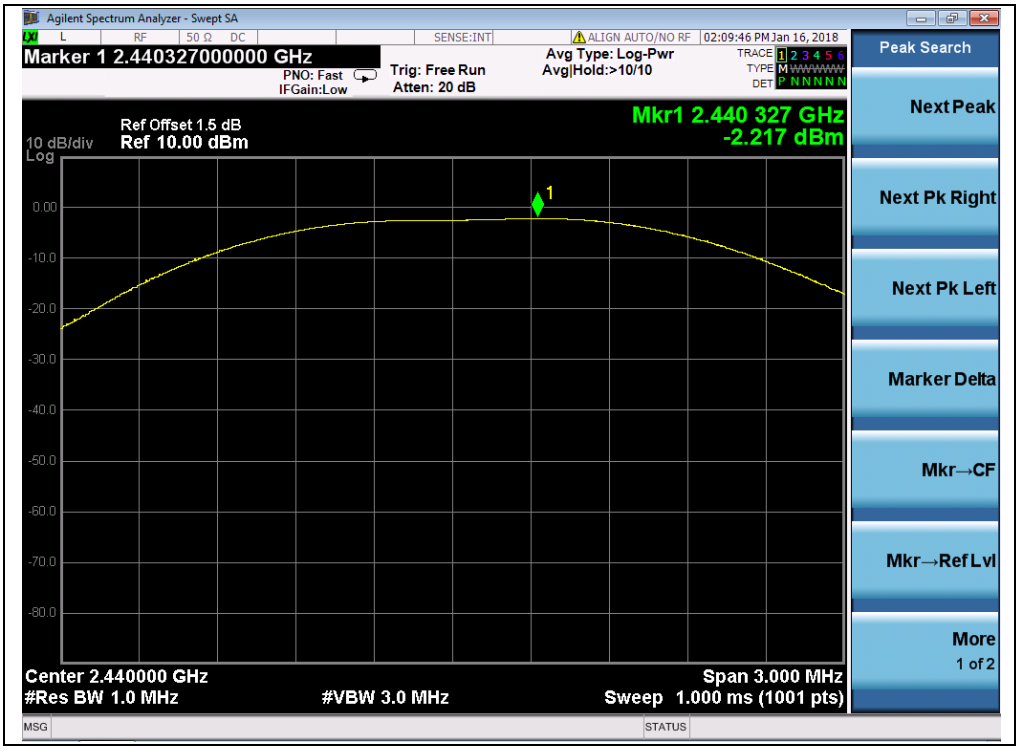
**A. Test Verdict:**

| Channel | Frequency (MHz) | Measured Output Peak Power | | Limit | | Verdict |
|---|---|---|---|---|---|---|
| | | dBm | W | dBm | W | |
| 0 | 2402 | -1.43 | 0.001 | 30 | 1 | PASS |
| 19 | 2440 | -2.22 | 0.001 | | | PASS |
| 39 | 2480 | -3.09 | 0.001 | | | PASS |

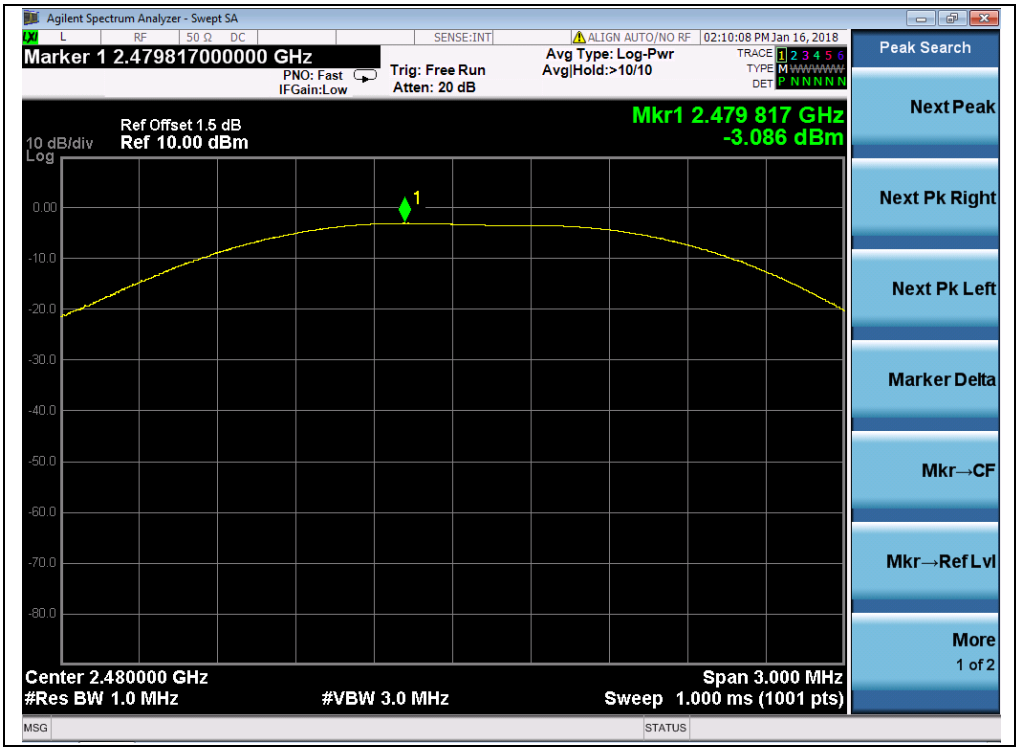
## B. Test Plots:




(Channel 0, 2402MHz)




(Channel 19, 2440MHz)




(Channel 39, 2480MHz)

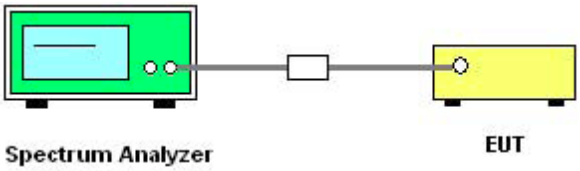
## 2.3. 6dB Bandwidth

### 2.3.1. Requirement

According to FCC section 15.247(a) (2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 2.3.2. Test Description

**A. Test Set:**




The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

**B. Equipments List:**

Please reference ANNEX A(1.5).

### 2.3.3. Test procedure

The steps for the first option are as follows:
（1）Set analyzer center frequency to channel center frequency.
a) Set RBW = 100 kHz.
b) Set the VBW=300 kHz.
c) Detector = peak.
d) Trace mode = max hold.
e) Sweep = auto couple
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

（2）The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., RBW = 100 kHz,VBW ≥ 3 × RBW, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥6 dB.

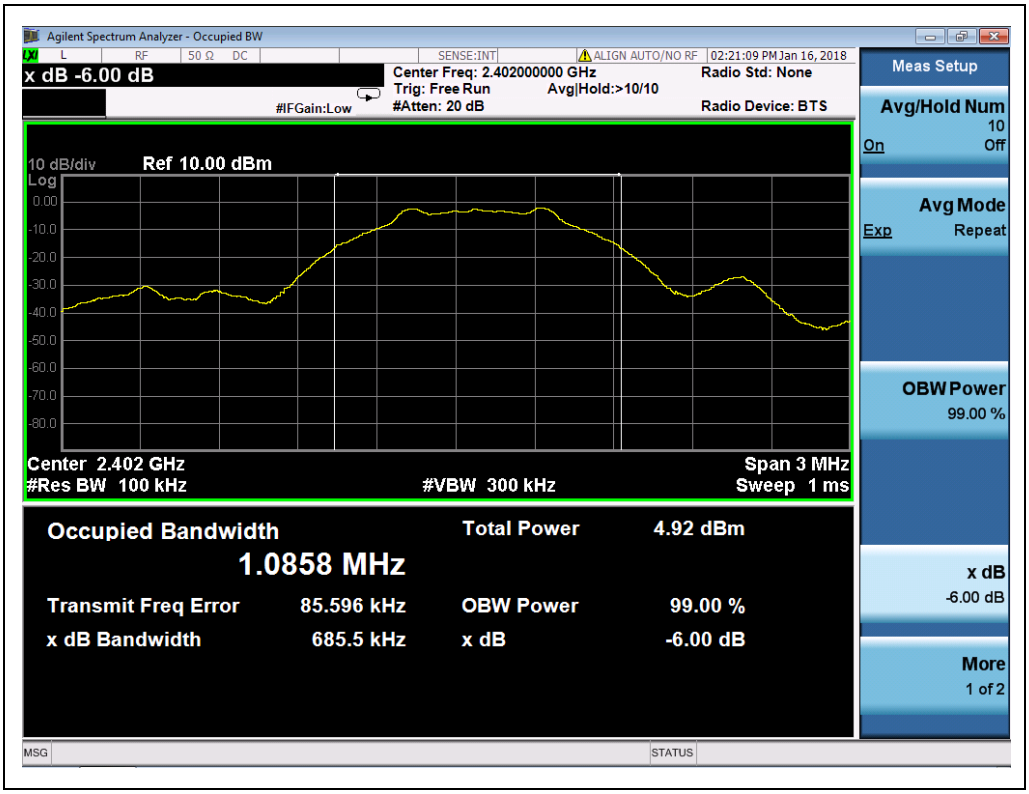
### 2.3.4. Test Result

The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the module.

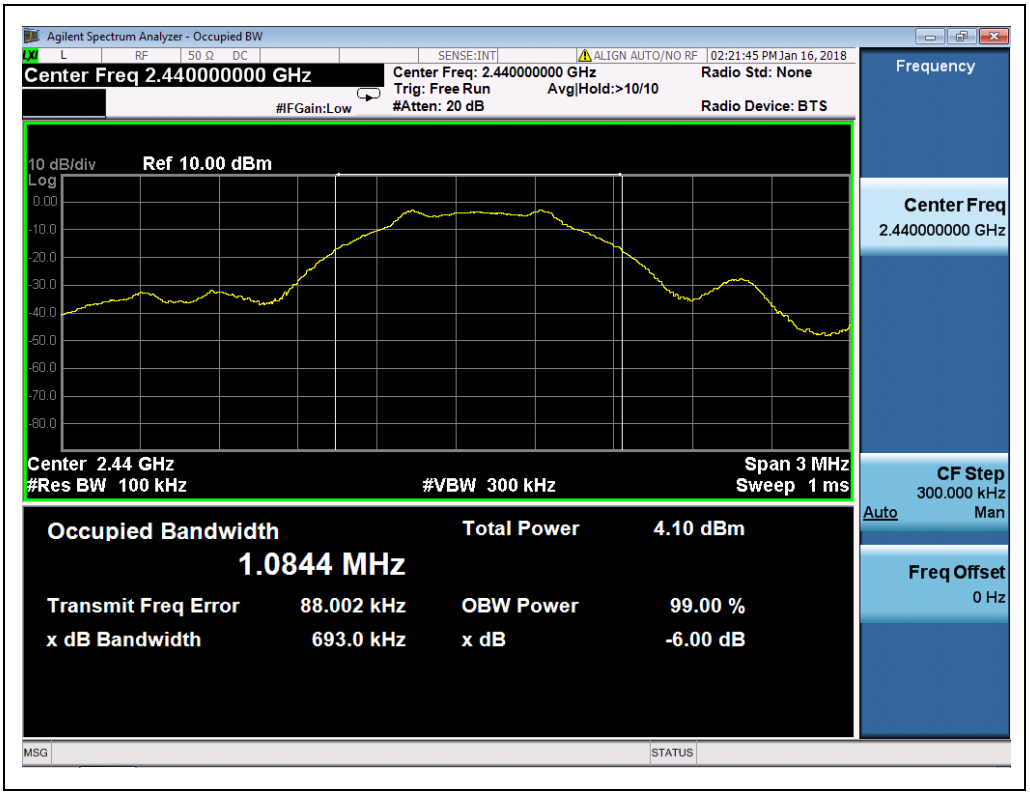
**A. Test Verdict:**

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Limits(kHz) | Result |
|---|---|---|---|---|
| 0 | 2402 | 0.6855 | ≥500 | PASS |
| 19 | 2440 | 0.6930 | ≥500 | PASS |
| 39 | 2480 | 0.6683 | ≥500 | PASS |

**B. Test Plots:**




(Channel 0, 2402MHz)




(Channel 19, 2440 MHz)

(Channel 39, 2480MHz)

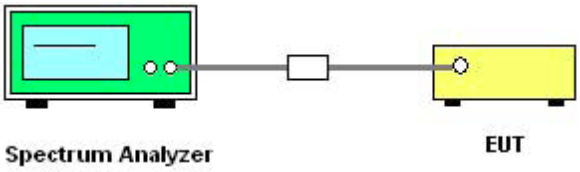
## 2.4. Conducted Spurious Emissions and Band Edge

### 2.4.1. Requirement

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

### 2.4.2. Test Description

**A. Test Set:**




The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

**B. Equipments List:**

Please reference ANNEX A (1.5).

### 2.4.3. Test Result

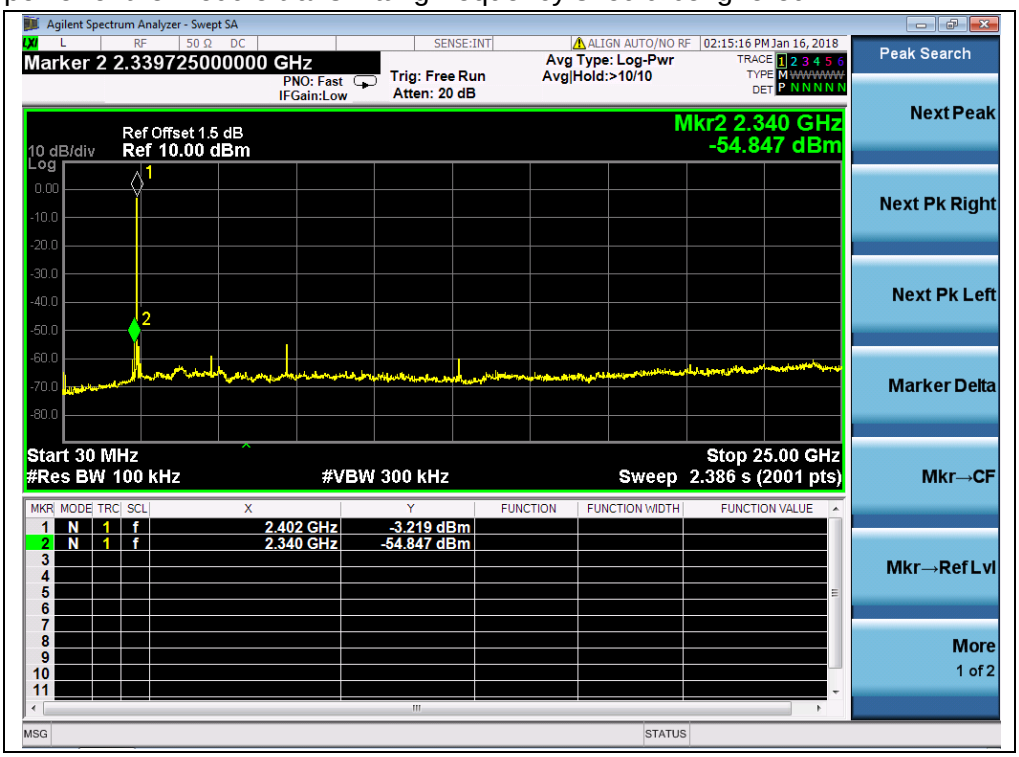
The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

**A. Test Verdict:**

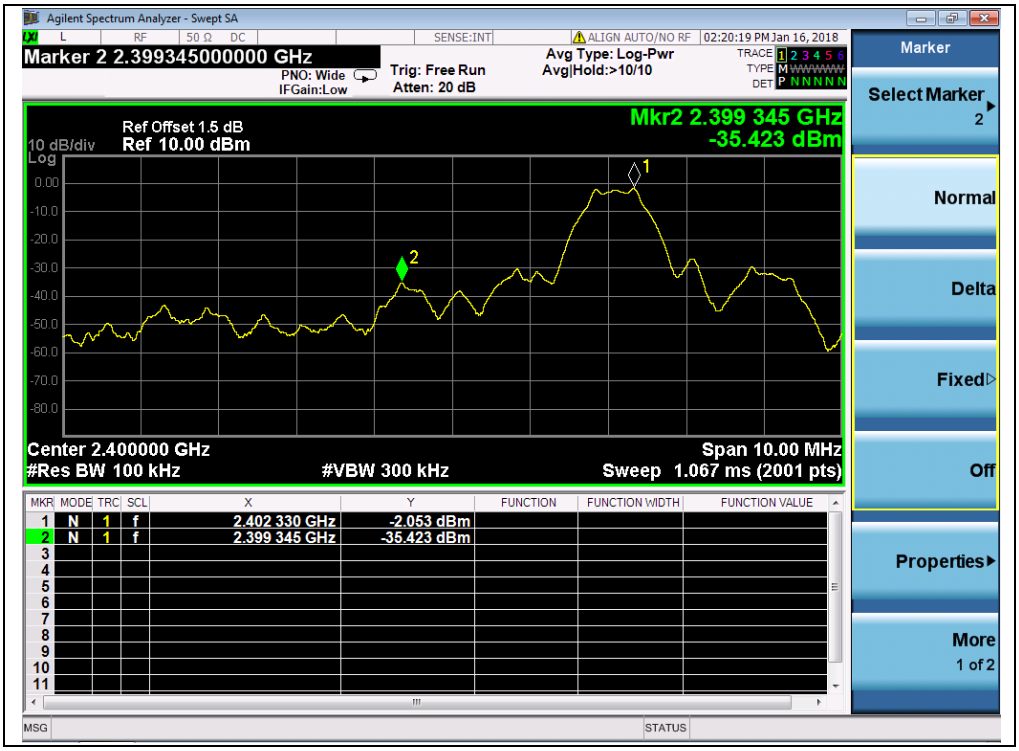
| Channel | Frequency (MHz) | Measured Max. Out of Band Emission (dBm) | Limit (dBm) | | Verdict |
|---|---|---|---|---|---|
| | | | Carrier Level | Calculated -20dBc Limit | |
| 0 | 2402 | -54.85 | -3.22 | -23.22 | PASS |
| 19 | 2440 | -54.77 | -2.42 | -22.42 | PASS |
| 39 | 2480 | -54.42 | -4.88 | -24.88 | PASS |

## B. Test Plots:

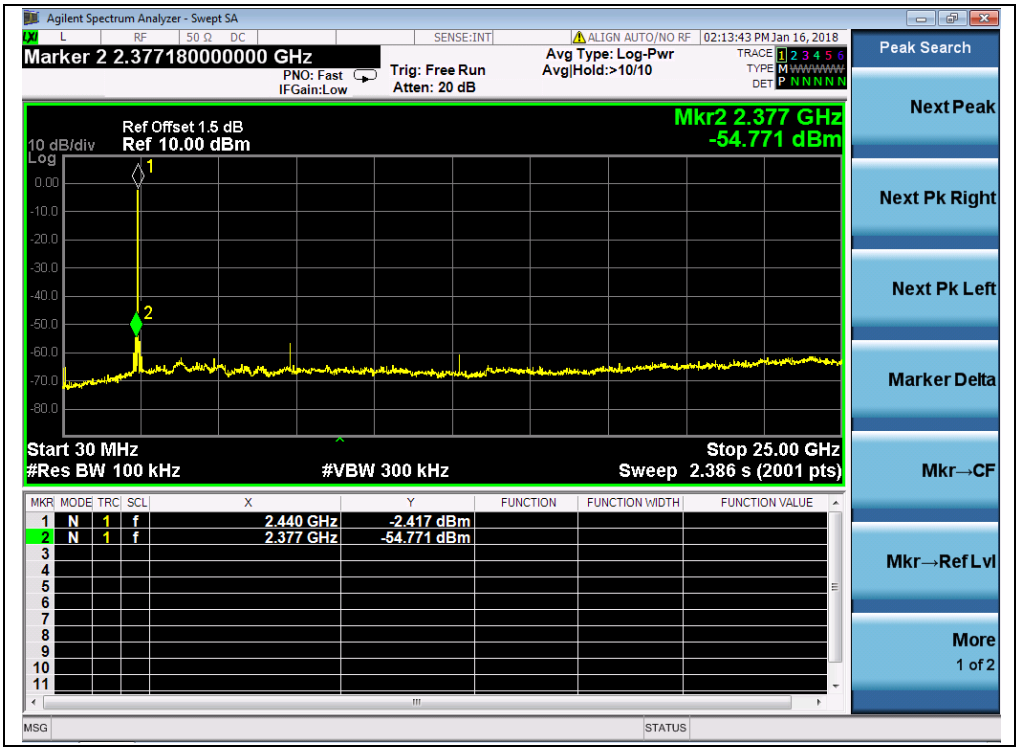
**Note:** the power of the Module transmitting frequency should be ignored.



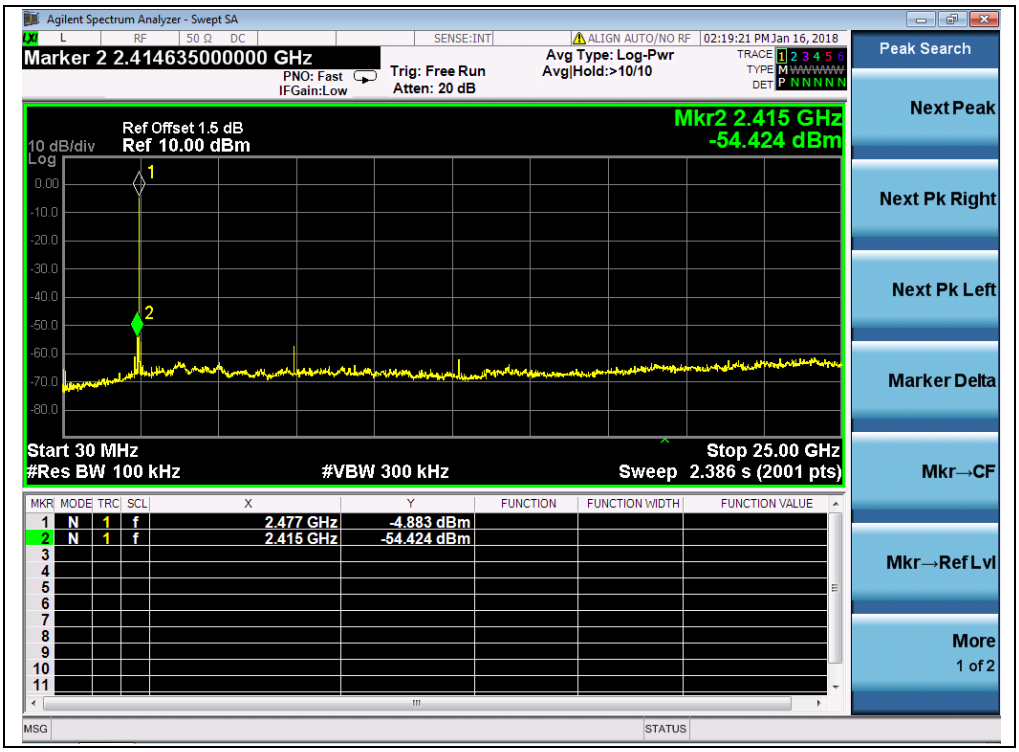

(Channel = 0, 30MHz to 25GHz)



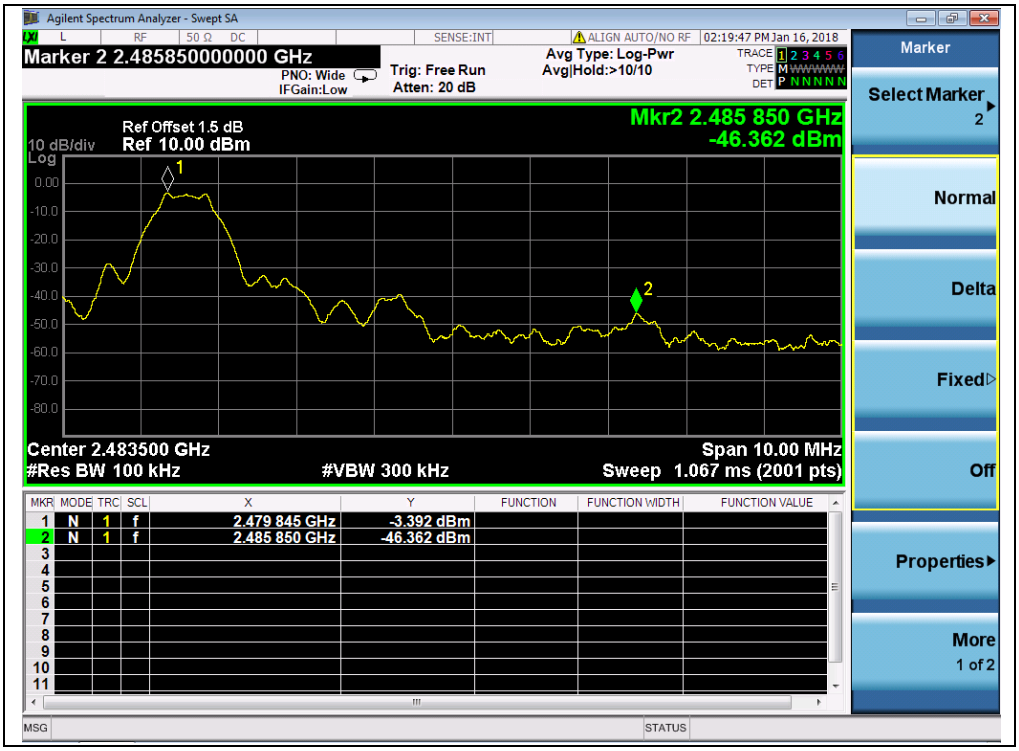

(Band Edge, Channel = 0)




(Channel = 19, 30MHz to 25GHz)




(Channel = 39, 30MHz to 25GHz)




(Band Edge, Channel = 39)

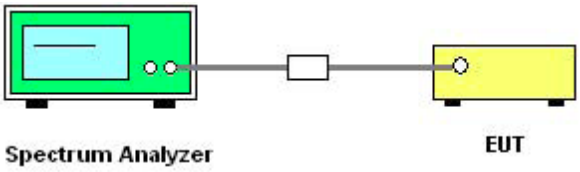
# 2.5. Power spectral density (PSD)

## 2.5.1. Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

## 2.5.2. Test Description

### A. Test Set:




The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

### B. Equipments List:

Please reference ANNEX A (1.5).

## 2.5.3. Test procedure

The measured power spectral density was calculated by the reading of the spectrum analyzer and calibration. Following is the test procedure for PSD test:

a) Set analyzer center frequency to channel center frequency.
b) Set the span to 1.5 times DTS
c) Set the RBW to 3 kHz
d) Set the VBW to 10 kHz
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.

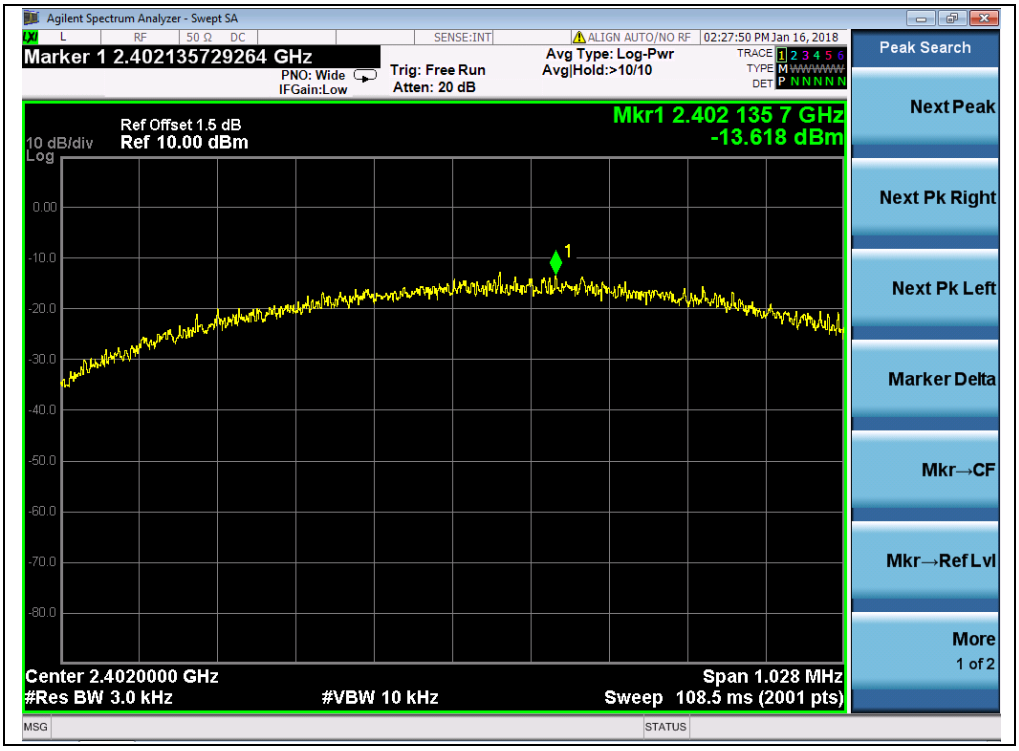
### 2.5.4. Test Result

The lowest, middle and highest channels are tested.

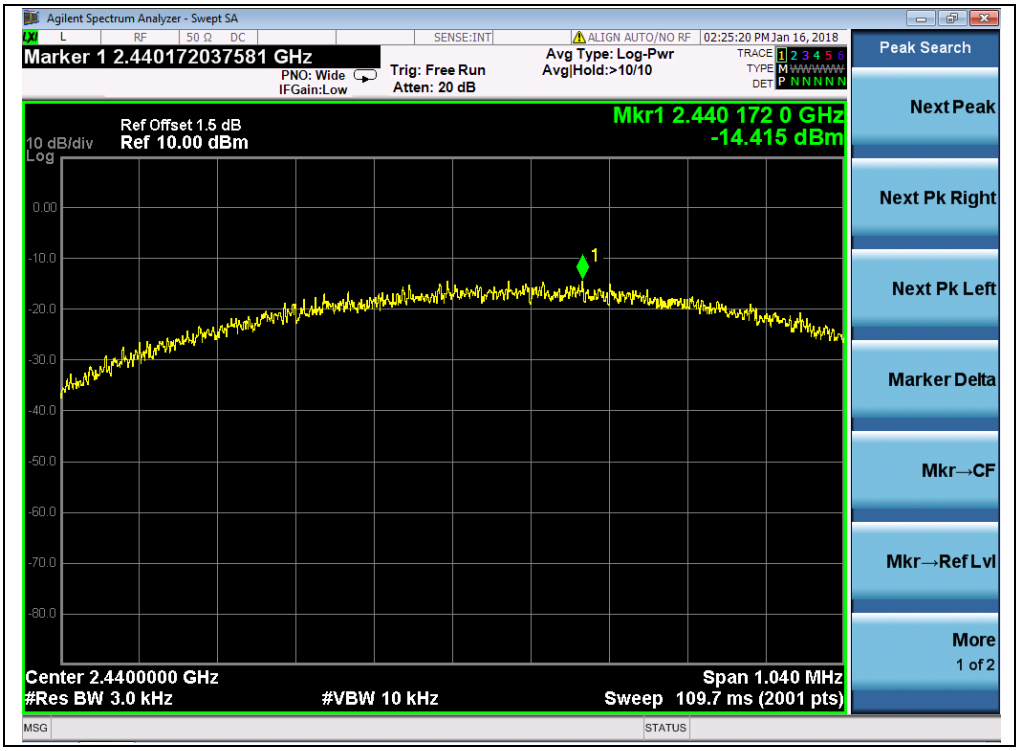
**A. Test Verdict:**

| Spectral power density (dBm/3kHz) | | | | |
|---|---|---|---|---|
| Channel | Frequency (MHz) | Measured PSD (dBm/3kHz) | Limit (dBm/3kHz) | Verdict |
| 0 | 2402 | -13.62 | 8 | PASS |
| 19 | 2440 | -14.52 | 8 | PASS |
| 39 | 2480 | -15.39 | 8 | PASS |
| Measurement uncertainty: ±1.3dB | | | | |

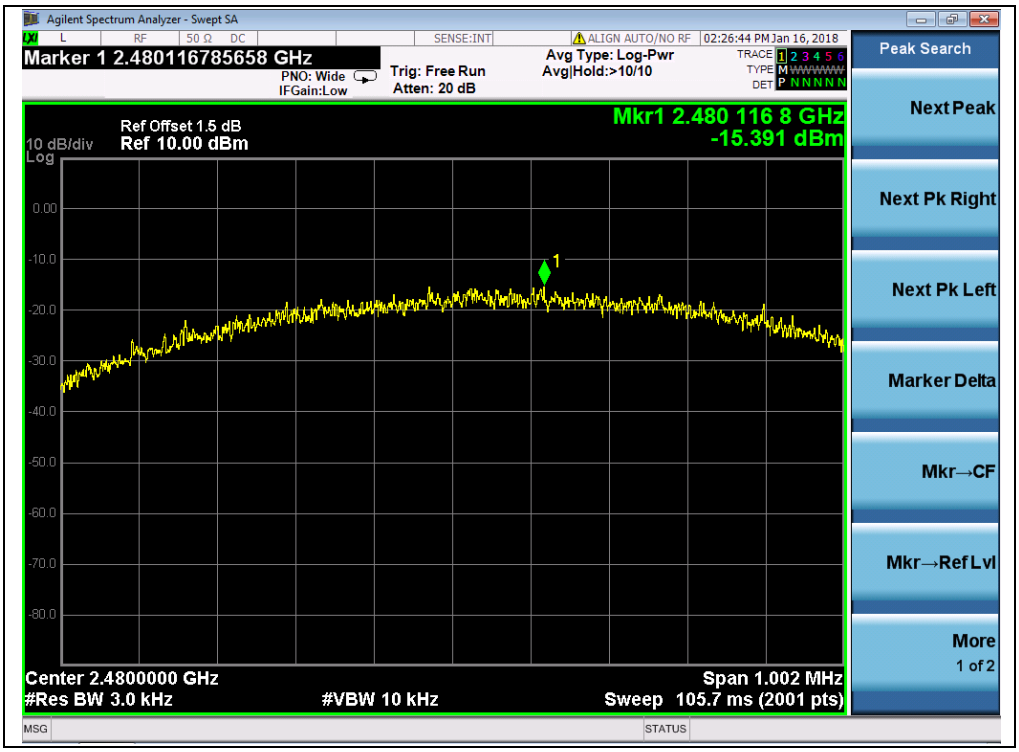
**B. Test Plots:**




(Channel = 0, 2402MHz)




(Channel = 19, 2440MHz)




(Channel = 39, 2480MHz)

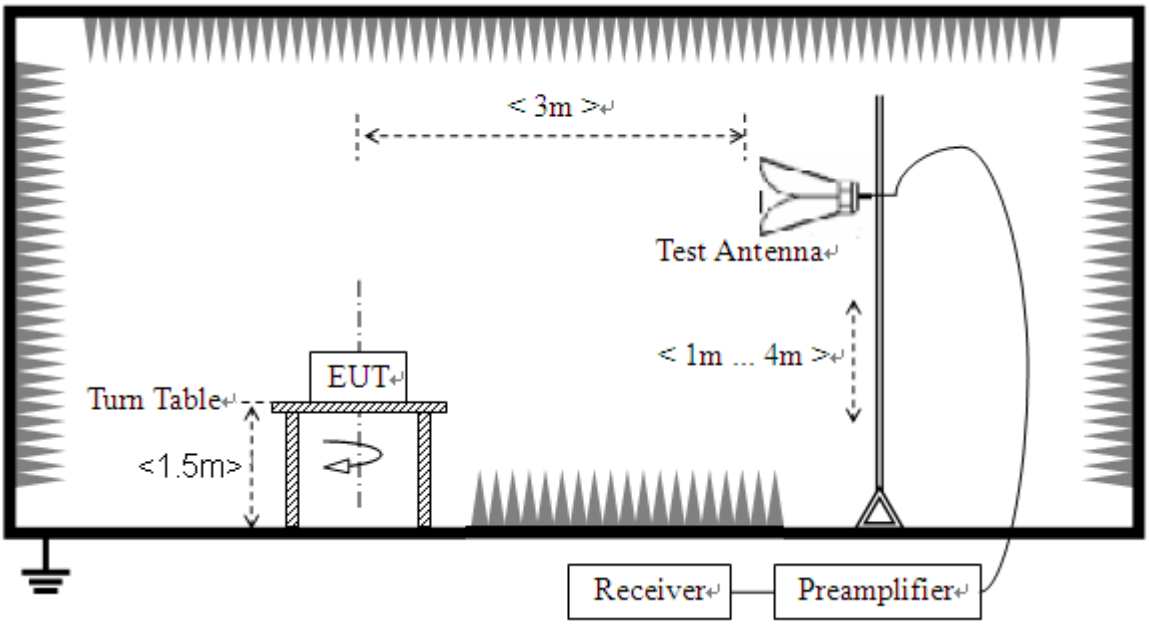
## 2.6. Restricted Frequency Bands

### 2.6.1. Requirement

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, 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).

### 2.6.2. Test Description

**A. Test Setup**




The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

**B. Equipments List:**

Please reference ANNEX A(1.5).

### 2.6.3. Test Result

The lowest and highest channels are tested to verify the Restricted Frequency Bands.

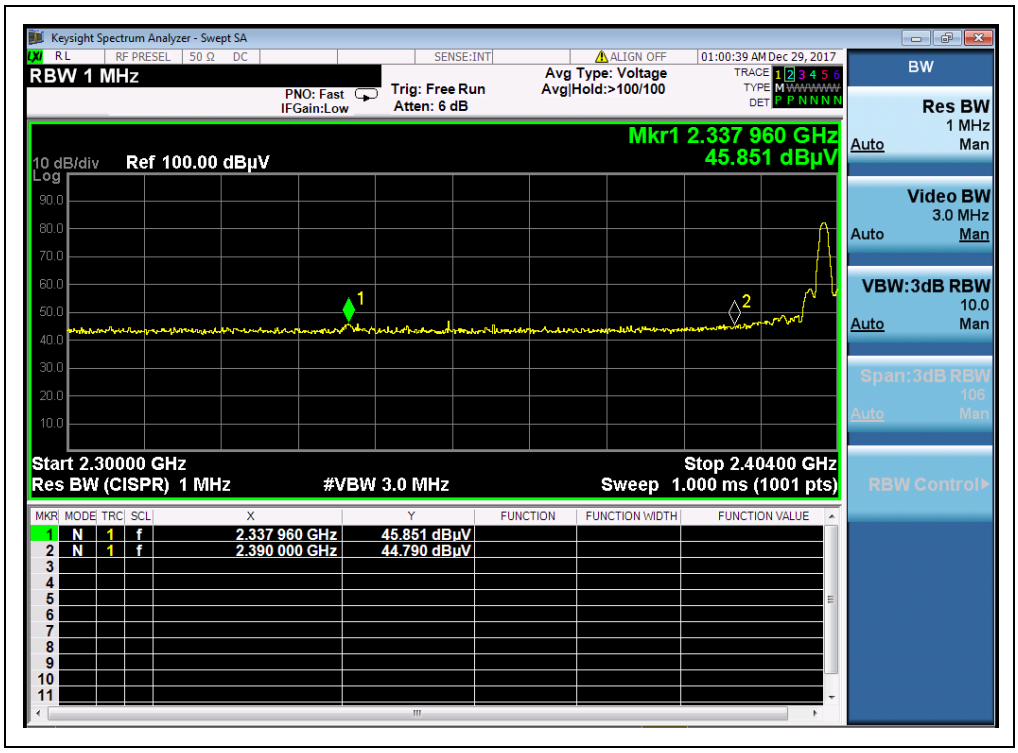
The measurement results are obtained as below:
E [dBμV/m] $=U_R + A_T + A_{Factor}$ [dB]; $A_T = L_{Cable\ loss}$ [dB]-$G_{preamp}$ [dB]
$A_T$: Total correction Factor except Antenna
$U_R$: Receiver Reading
$G_{preamp}$: Preamplifier Gain
$A_{Factor}$: Antenna Factor at 3m

Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

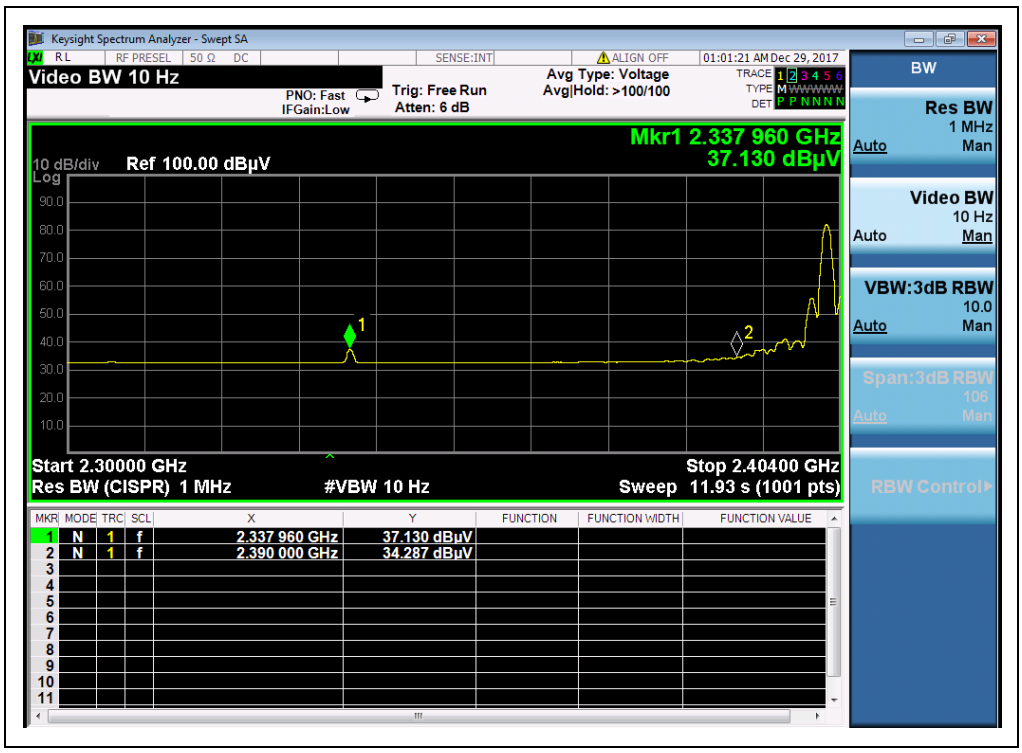
**A. Test Verdict:**

| Channel | Frequency (MHz) | Detector PK/ AV | Receiver Reading $U_R$ (dBuV) | $A_T$ (dB) | $A_{Factor}$ (dB@3m) | Max. Emission E (dBμV/m) | Limit (dBμV/m) | Verdict |
|---|---|---|---|---|---|---|---|---|
| 0 | 2337.96 | PK | 45.85 | -33.63 | 32.56 | 44.78 | 74 | PASS |
| 0 | 2337.96 | AV | 37.13 | -33.63 | 32.56 | 36.06 | 54 | PASS |
| 39 | 2483.50 | PK | 50.21 | -33.18 | 32.5 | 49.53 | 74 | PASS |
| 39 | 2483.50 | AV | 36.16 | -33.18 | 32.5 | 35.48 | 54 | PASS |

## B. Test Plots:




(Channel = 0, PEAK)




(Channel = 0, AVG)

(Channel = 39, PEAK)

(Channel = 39, AVG)

# 2.7. Conducted Emission

## 2.7.1. Requirement

According to FCC section 15.207, 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 within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

| Frequency range (MHz) | Conducted Limit (dBμV) | |
|---|---|---|
| | Quai-peak | Average |
| 0.15 - 0.50 | 66 to 56 | 56 to 46 |
| 0.50 - 5 | 56 | 46 |
| 5 - 30 | 60 | 50 |

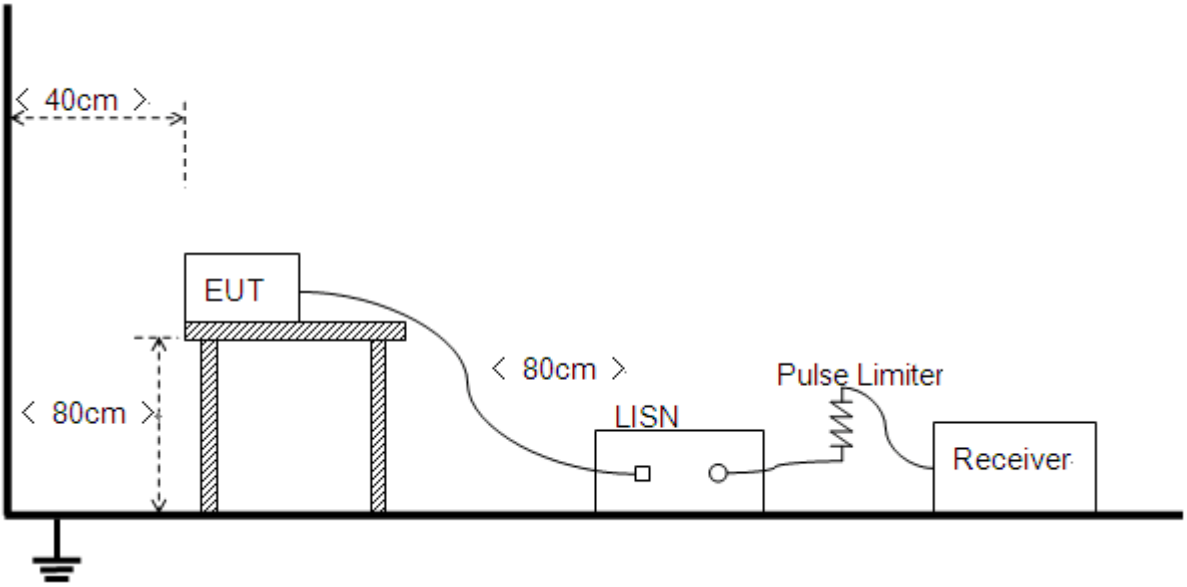
NOTE:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

## 2.7.2. Test Description

### A. Test Setup:




The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

**B. Equipments List:**

Please reference ANNEX A(1.5).

### 2.7.3. Test Result

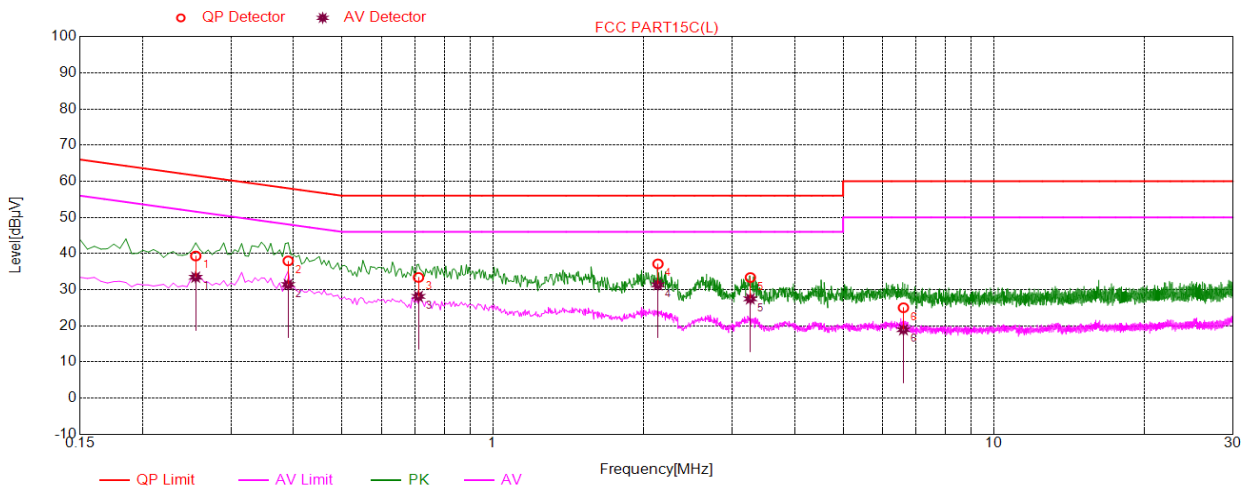
The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

**A. Test setup:**

The EUT configuration of the emission tests is EUT + Link.

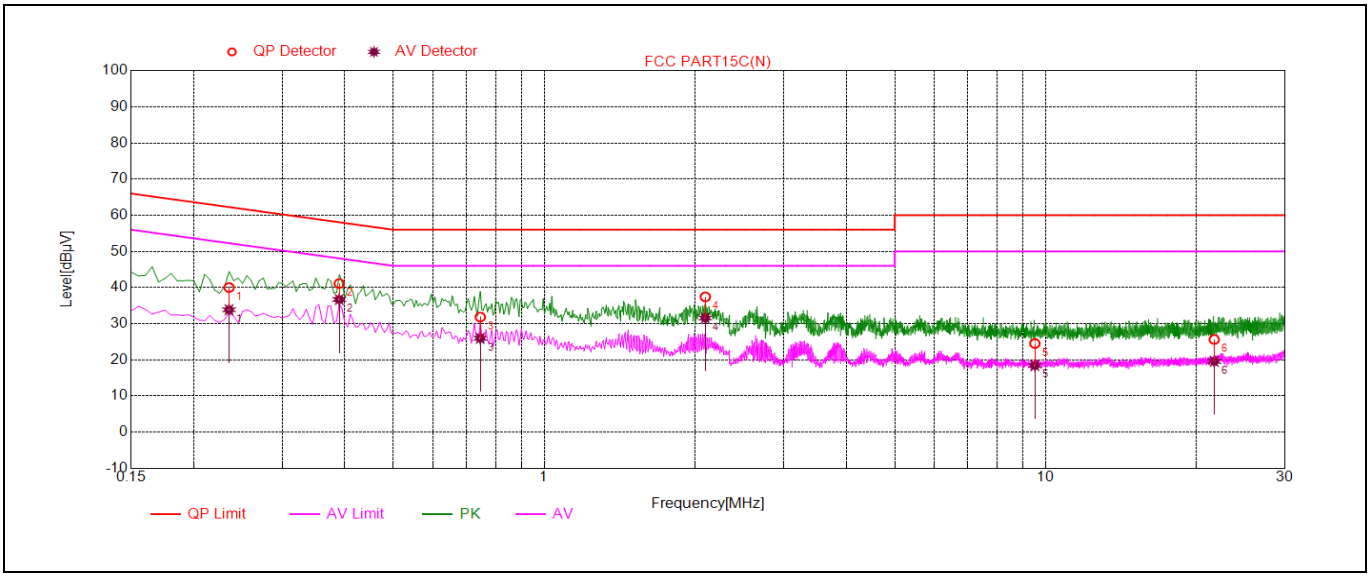
**Note:** The test voltage is AC 120V/60Hz.

**B. Test Plots:**




(Plot A: L Phase)

| NO. | Fre. (MHz) | Emission Level (dBµV) | | Limit (dBµV) | | Power-line | Verdict |
|---|---|---|---|---|---|---|---|
| | | Quai-peak | Average | Quai-peak | Average | | |
| 1 | 0.26 | 39.32 | 33.44 | 61.59 | 51.59 | Line | PASS |
| 2 | 0.39 | 37.96 | 31.40 | 58.06 | 48.06 | | PASS |
| 3 | 0.71 | 33.39 | 28.12 | 56.00 | 46.00 | | PASS |
| 4 | 2.14 | 37.14 | 31.34 | 56.00 | 46.00 | | PASS |
| 5 | 3.26 | 33.36 | 27.46 | 56.00 | 46.00 | | PASS |
| 6 | 6.60 | 25.00 | 18.90 | 60.00 | 50.00 | | PASS |




(Plot B: N Phase)

| NO. | Fre. (MHz) | Emission Level (dBµV) | | Limit (dBµV) | | Power-line | Verdict |
|---|---|---|---|---|---|---|---|
| | | Quai-peak | Average | Quai-peak | Average | | |
| 1 | 0.23 | 40.00 | 33.84 | 62.27 | 52.27 | Neutral | PASS |
| 2 | 0.39 | 41.11 | 36.69 | 58.07 | 48.07 | | PASS |
| 3 | 0.74 | 31.83 | 25.95 | 56.00 | 46.00 | | PASS |
| 4 | 2.09 | 37.41 | 31.57 | 56.00 | 46.00 | | PASS |
| 5 | 9.52 | 24.50 | 18.41 | 60.00 | 50.00 | | PASS |
| 6 | 21.69 | 25.64 | 19.55 | 60.00 | 50.00 | | PASS |

## 2.8. Radiated Emission

### 2.8.1. Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (μV/m) | Measurement Distance (m) |
|---|---|---|
| 0.009 - 0.490 | 2400/F(kHz) | 300 |
| 0.490 - 1.705 | 24000/F(kHz) | 30 |
| 1.705 - 30.0 | 30 | 30 |
| 30 - 88 | 100 | 3 |
| 88 - 216 | 150 | 3 |
| 216 - 960 | 200 | 3 |
| Above 960 | 500 | 3 |

Note:

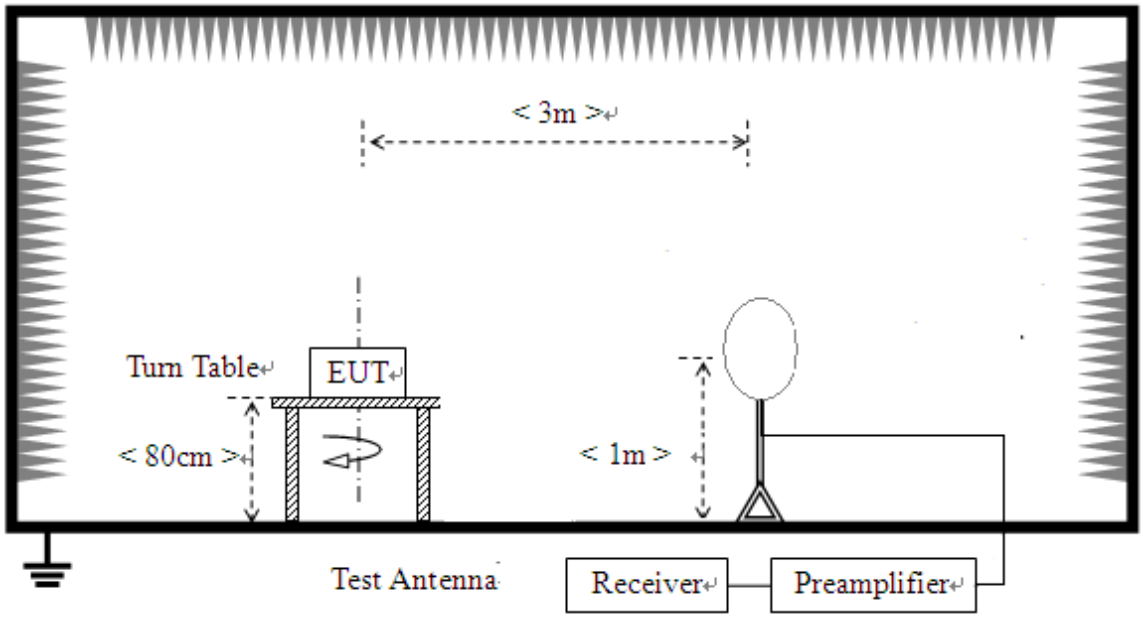
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

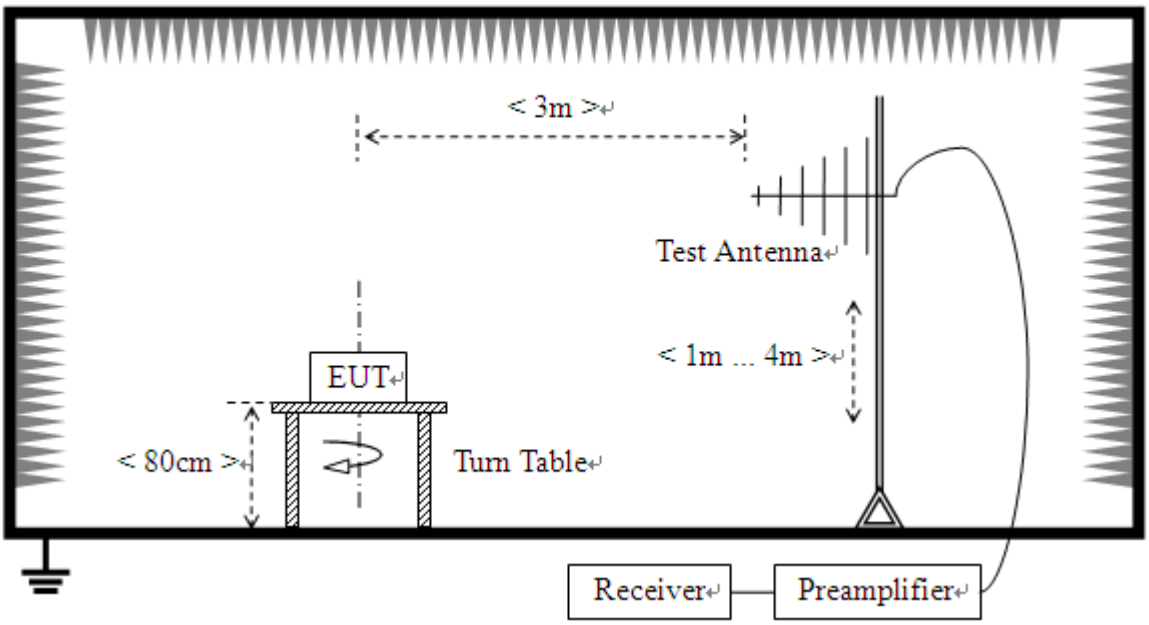
### 2.8.2. Test Description

**A. Test Setup:**

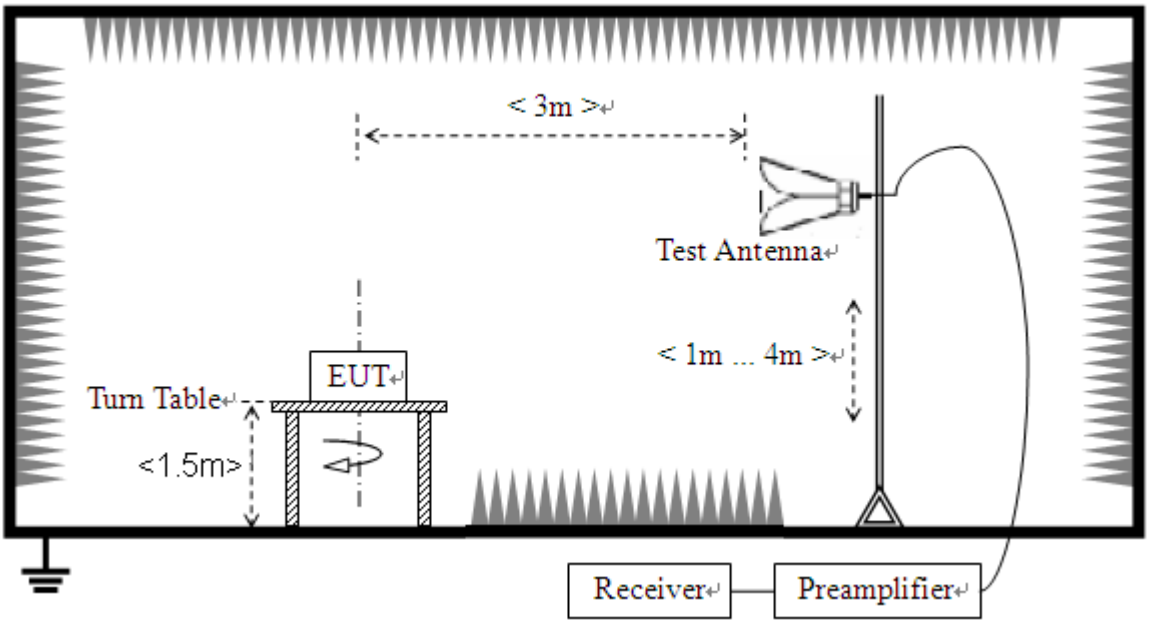
1) For radiated emissions from 9kHz to 30MHz




2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz




The RF absorbing material used on the reference ground plane and on the turntable have a maximum height (thickness) of 30 cm (12 in) and have a minimum-rated attenuation of 20 dB at all frequencies from 1 GHz to 18 GHz. Test site have a minimum area of the ground plane covered with RF absorbing material as specified in Figure 6 of ANSI C63.4: 2014.

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.10:2013. For radiated emissions below or equal to 1GHz, The EUT was set-up on insulator 80cm above the Ground Plane, For radiated emissions above 1GHz, The EUT was set-up on insulator 150cm above the Ground Plane. The set-up and test methods were according to ANSI C63.10:2013.

The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

(a) In the frequency range of 9kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.

(b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Place the test antenna at 3m away from area of the EUT, while keeping the test antenna aimed at the source of emissions at each frequency of significant

emissions, with polarization oriented for maximum response. The test antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final test antenna elevation shall be that which maximizes the emissions. The test antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. The emission levels at both horizontal and vertical polarizations should be tested.

**B. Equipments List:**

Please reference ANNEX A(1.5).

### 2.8.3. Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:

$E$ [dBμV/m] $=U_R + A_T + A_{Factor}$ [dB]; $A_T = L_{Cable\ loss}$ [dB]$-G_{preamp}$ [dB]

$A_T$: Total correction Factor except Antenna

$U_R$: Receiver Reading

$G_{preamp}$: Preamplifier Gain

$A_{Factor}$: Antenna Factor at 3m

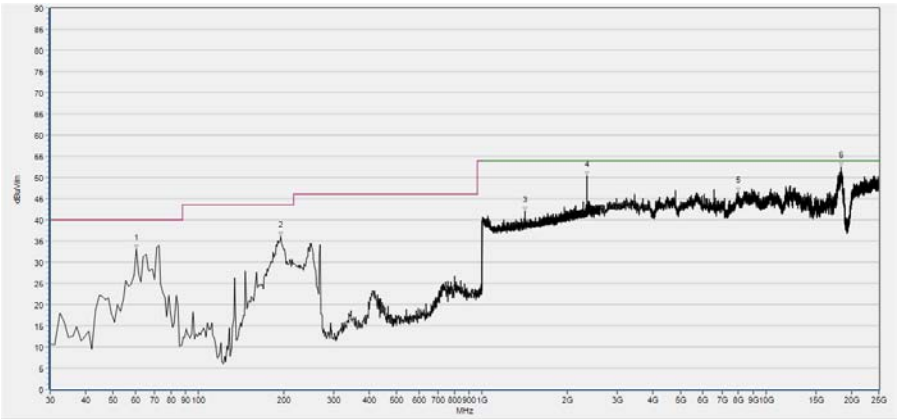
During the test, the total correction Factor $A_T$ and $A_{Factor}$ were built in test software.

**Note:** All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

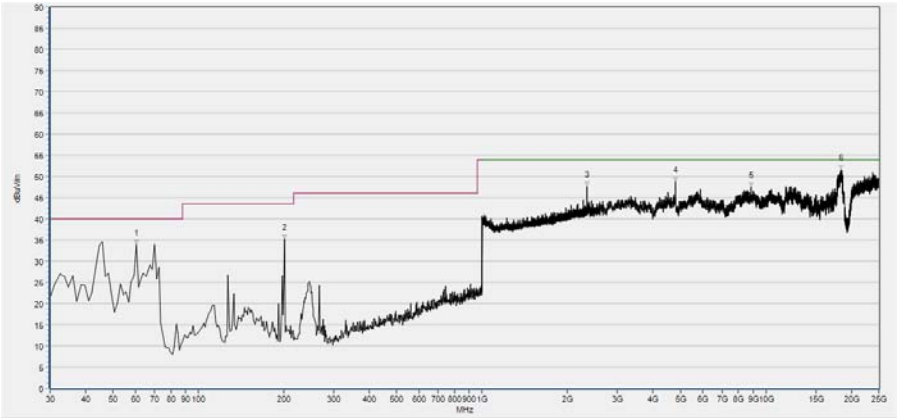
## A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 0



| Fre. (MHz) | Pk (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 60.350 | 36.11 | N/A | N/A | N/A | 40.00 | N/A | Horizontal | PASS |
| 195.106 | 49.06 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 1412.325 | 41.95 | N/A | N/A | 74.0 | N/A | 54.00 | Horizontal | PASS |
| 2338.000 | 50.07 | N/A | N/A | 74.0 | N/A | 54.00 | Horizontal | PASS |
| 7997.345 | 46.56 | N/A | N/A | 74.0 | N/A | 54.00 | Horizontal | PASS |
| 18364.321 | 52.50 | N/A | N/A | 74.0 | N/A | 54.00 | Horizontal | PASS |

(Antenna Horizontal, 30MHz to 25GHz)



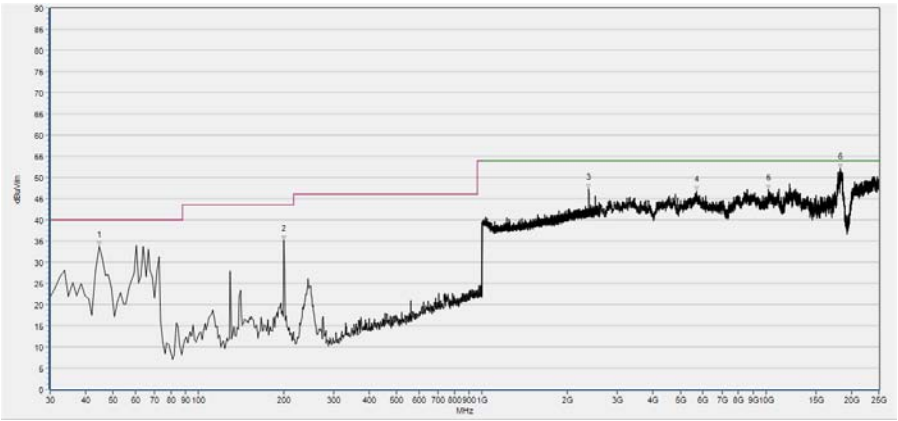
| Fre. (MHz) | Pk (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 60.350 | 36.50 | N/A | N/A | N/A | 40.00 | N/A | Vertical | PASS |
| 201.176 | 35.20 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 2337.495 | 47.65 | N/A | N/A | 74.0 | N/A | 54.0 | Vertical | PASS |
| 4803.746 | 48.78 | N/A | N/A | 74.0 | N/A | 54.0 | Vertical | PASS |
| 8864.994 | 47.45 | N/A | N/A | 74.0 | N/A | 54.0 | Vertical | PASS |
| 18368.394 | 51.65 | N/A | N/A | 74.0 | N/A | 54.0 | Vertical | PASS |

(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 19

| Fre. (MHz) | Pk (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 63.992 | 30.47 | N/A | N/A | N/A | 40.00 | N/A | Horizontal | PASS |
| 130.763 | 32.12 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 267.947 | 29.90 | N/A | N/A | N/A | 46.00 | N/A | Horizontal | PASS |
| 3272.122 | 45.23 | N/A | N/A | 74.0 | N/A | 54.00 | Horizontal | PASS |
| 8449.500 | 46.87 | N/A | N/A | 74.0 | N/A | 54.00 | Horizontal | PASS |
| 17989.562 | 50.62 | N/A | N/A | 74.0 | N/A | 54.00 | Horizontal | PASS |

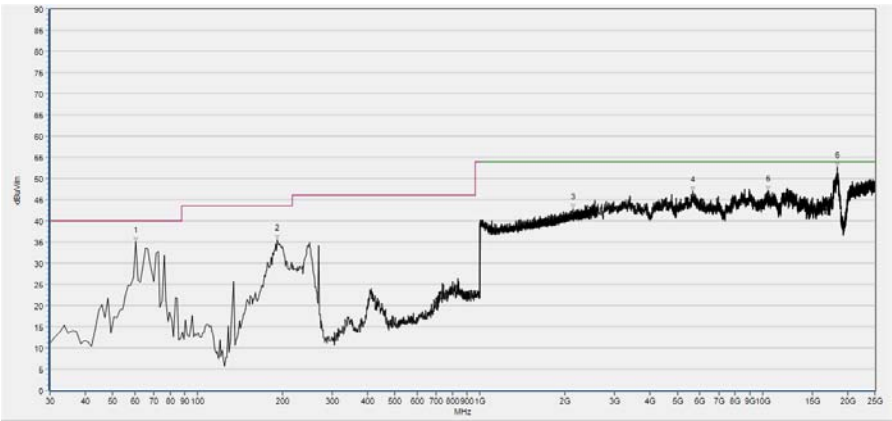
(Antenna Horizontal, 30MHz to 25GHz)



| Fre. (MHz) | Pk (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 44.568 | 33.67 | N/A | N/A | N/A | 40.00 | N/A | Vertical | PASS |
| 199.962 | 35.13 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 2375.910 | 47.26 | N/A | N/A | 74.0 | N/A | 54.00 | Vertical | PASS |
| 5691.762 | 46.73 | N/A | N/A | 74.0 | N/A | 54.00 | Vertical | PASS |
| 10213.312 | 47.06 | N/A | N/A | 74.0 | N/A | 54.00 | Vertical | PASS |
| 18282.851 | 52.20 | N/A | N/A | 74.0 | N/A | 54.00 | Vertical | PASS |

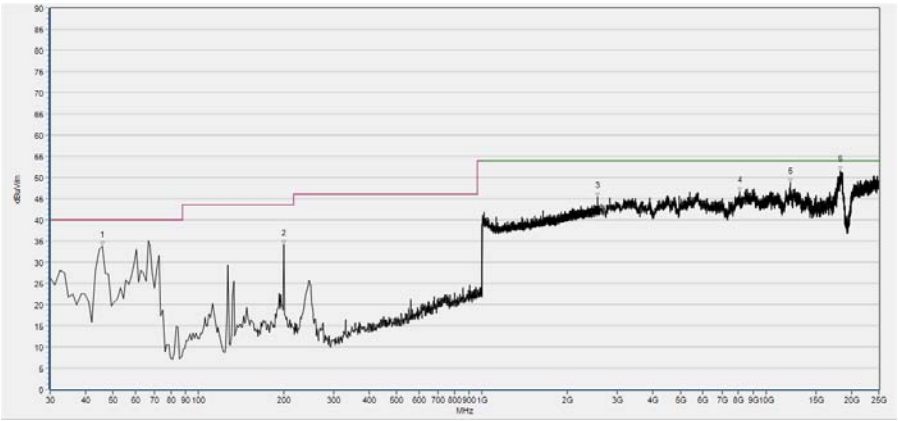
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 39



| Fre. (MHz) | Pk (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 60.350 | 35.04 | N/A | N/A | N/A | 40.00 | N/A | Horizontal | PASS |
| 191.464 | 35.51 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 2131.973 | 42.86 | N/A | N/A | 74.0 | N/A | 54.0 | Horizontal | PASS |
| 5663.248 | 46.97 | N/A | N/A | 74.0 | N/A | 54.0 | Horizontal | PASS |
| 10469.940 | 47.19 | N/A | N/A | 74.0 | N/A | 54.0 | Horizontal | PASS |
| 18437.643 | 52.65 | N/A | N/A | 74.0 | N/A | 54.0 | Horizontal | PASS |

(Antenna Horizontal, 30MHz to 25GHz)



| Fre. (MHz) | Pk (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 45.782 | 33.71 | N/A | N/A | N/A | 40.00 | N/A | Vertical | PASS |
| 199.962 | 34.13 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 2543.657 | 45.41 | N/A | N/A | 74.0 | N/A | 54.0 | Vertical | PASS |
| 8062.520 | 46.61 | N/A | N/A | 74.0 | N/A | 54.0 | Vertical | PASS |
| 12164.503 | 48.68 | N/A | N/A | 74.0 | N/A | 54.0 | Vertical | PASS |
| 18290.998 | 51.69 | N/A | N/A | 74.0 | N/A | 54.0 | Vertical | PASS |

(Antenna Vertical, 30MHz to 25GHz)

# Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

| Test items | Uncertainty |
|---|---|
| Peak Output Power | ±2.22dB |
| Power spectral density (PSD) | ±2.22dB |
| Bandwidth | ±5% |
| Conducted Spurious Emission | ±2.77 dB |
| Restricted Frequency Bands | ±5% |
| Radiated Emission | ±2.95dB |
| Conducted Emission | ±2.44dB |

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

# Annex B Testing Laboratory Information

## 1. Identification of the Responsible Testing Laboratory

| | |
|---|---|
| **Company Name:** | Shenzhen Morlab Communications Technology Co., Ltd. |
| **Department:** | Morlab Laboratory |
| **Address:** | FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China |
| **Responsible Test Lab Manager:** | Mr. Su Feng |
| **Telephone:** | +86 755 36698555 |
| **Facsimile:** | +86 755 36698525 |

## 2. Identification of the Responsible Testing Location

| | |
|---|---|
| **Name:** | Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory |
| **Address:** | FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China |

## 3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.

## 4. Test Equipments Utilized

### 4.1 Conducted Test Equipments

| Equipment Name | Serial No. | Type | Manufacturer | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Power Splitter | NW521 | 1506A | Weinschel | 2017.05.24 | 2018.05.23 |
| Attenuator 1 | (N/A.) | 10dB | Resnet | 2017.05.24 | 2018.05.23 |
| Attenuator 2 | (N/A.) | 3dB | Resnet | 2017.05.24 | 2018.05.23 |
| EXA Signal Analzyer | MY53470836 | N9010A | Agilent | 2017.12.03 | 2018.12.02 |
| RF cable (30MHz-26GHz) | CB01 | RF01 | Morlab | N/A | N/A |
| Coaxial cable | CB02 | RF02 | Morlab | N/A | N/A |
| SMA connector | CN01 | RF03 | HUBER-SUHNER | N/A | N/A |

### 4.2 Conducted Emission Test Equipments

| Equipment Name | Serial No. | Type | Manufacturer | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Receiver | MY56400093 | N9038A | KEYSIGHT | 2017.07.13 | 2018.07.12 |
| LISN | 812744 | NSLK 8127 | Schwarzbeck | 2017.05.17 | 2018.05.16 |
| Pulse Limiter (20dB) | 9391 | VTSD 9561-D | Schwarzbeck | 2017.05.17 | 2018.05.16 |
| Coaxial cable(BNC) (30MHz-26GHz) | CB01 | EMC01 | Morlab | N/A | N/A |

### 4.3Auxiliary Test Equipment

| Equipment Name | Model No. | Brand Name | Manufacturer | Cal.Date | Cal. Due |
|---|---|---|---|---|---|
| Computer | T430i | Think Pad | Lenovo | N/A | N/A |

### 4.4 Radiated Test Equipments

| Equipment Name | Serial No. | Type | Manufacturer | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Receiver | MY54130016 | N9038A | Agilent | 2017.05.17 | 2018.05.16 |
| Test Antenna - Bi-Log | 9163-519 | VULB 9163 | Schwarzbeck | 2017.05.14 | 2018.05.13 |
| Test Antenna - Horn | 9170C-531 | BBHA9170 | Schwarzbeck | 2017.09.13 | 2018.09.12 |
| Test Antenna - Loop | 1519-022 | FMZB1519 | Schwarzbeck | 2017.03.07 | 2018.03.06 |
| Test Antenna - Horn | 01774 | BBHA 9120D | Schwarzbeck | 2017.09.13 | 2018.09.12 |
| Coaxial cable (N male) (9KHz-30MHz) | CB04 | EMC04 | Morlab | N/A | N/A |
| Coaxial cable (N male) (30MHz-26GHz) | CB02 | EMC02 | Morlab | N/A | N/A |
| Coaxial cable (N male) (30MHz-26GHz) | CB03 | EMC03 | Morlab | N/A | N/A |
| 1-18GHz pre-Amplifier | MA02 | TS-PR18 | Rohde& Schwarz | 2017.05.17 | 2018.05.16 |
| 18-26.5GHz pre-Amplifier | MA03 | TS-PR18 | Rohde& Schwarz | 2017.05.17 | 2018.05.16 |
| Anechoic Chamber | N/A | 9m*6m*6m | CRT | 2017.11.19 | 2020.11.18 |

END OF REPORT