Report No.SH16110074E02

# FCC EMC TEST REPORT

*Issued to*

**Shanghai Sunly Technology Co., Ltd.**

*For*

**Alpha CAM Drone**

| | | |
|---|---|---|
| Model Name | : | SUNLY17A |
| Trade Name | : | SUNLYTECH |
| Brand Name | : | Alpha CAM |
| Standard | : | 47 CFR Part 15 Subpart B |
| FCC ID | : | 2AKX4-SUNLY17A |
| Test date | : | Jan. 20, 2017 to Feb. 6, 2017 |
| Issue date | : | Feb. 10, 2017 |

*By*

**Shanghai Skylabs Co., Ltd.**

*Tested by* Huang Yun *Approved by* Gin Leng *Review by* Xiao dong Wei

# DIRECTORY

**Change History**

| Issue | Date | Reason for change |
|---|---|---|
| 1.0 | Feb. 10, 2017 | First edition |
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| | | |
| | | |
| | | |
| | | |

# 1. General Information

## 1.1 Applicant

**Shanghai Sunly Technology Co., Ltd.**
D1106.D-1108.Minggu Science&Technology Park,No.7001 Zhongchun Rd.,Shanghai,China

## 1.2 Manufacturer

**Shanghai Sunly Technology Co., Ltd.**
D1106.D-1108.Minggu Science&Technology Park,No.7001 Zhongchun Rd.,Shanghai,China

## 1.3 Description of EUT

| | |
|---|---|
| EUT Name..... : | Alpha CAM Drone |
| Model Name..... : | SUNLY17A |
| Brand Name..... : | Alpha CAM |
| Trade Name ..... : | SUNLYTECH |
| Hardware Version..... : | V1.05 |
| Software Version ..... : | V1.0.5 |
| Modulation Type ..... : | OFDM (802.11g/n/a) |
| Frequency Range..... : | 2.412GHz - 2.462GHz<br>5.725 GHz -5.850GHz |
| Channel Number..... : | Refer to tables below |

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

2.4GHz Band Frequency Channel

| **g: Ch No.** | **n20: Ch No.** | **n40: Ch No.** | **Center Frequency（MHz）** |
|---|---|---|---|
| 1 | 1 | | 2412 |
| 2 | 2 | | 2417 |
| 3 | 3 | 3 | 2422 |
| 4 | 4 | 4 | 2427 |
| 5 | 5 | 5 | 2432 |
| 6 | 6 | 6 | 2437 |
| 7 | 7 | 7 | 2442 |
| 8 | 8 | 8 | 2447 |
| 9 | 9 | 9 | 2452 |
| 10 | 10 | | 2457 |
| 11 | 11 | | 2462 |
| 11 Channels | 11 Channels | 7 Channels | |

5.8GHz Band Frequency Channel

| a20: Ch No. | Center Frequency （MHz） |
|---|---|
| 149 | 5745 |
| | 5755 |
| 153 | 5765 |
| 157 | 5785 |
| | 5795 |
| 161 | 5805 |
| 165 | 5825 |
| 5 Channels | |

# 2. Facilities and Accreditations

## 2.1 Test Facility

ShanghaiSkylabs Co., Ltd. ( Skylabs Laboratory) is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. FCC listed: 196218, IC listed: 21609.
The accreditation certificate number is L6644. A 9*6*6(m) fully anechoic chamber was used for the radiated spurious emissions test.

## 2.2 Environmental Conditions

Ambient temperature: 15~35°C
Relative humidity: 30~60%
Atmosphere pressure: 86-106kPa

## 2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.
Uncertainty of Conducted Emission: ±1.76dB
Uncertainty of Radiated Emission:±3.16dB

## 2.4 List of Equipments Used

| Description | Manufacturer | Model | Serial No. | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| 3m Semi-anechoic Chamber | czchengyu | 9m*6m*6m | SAR | 2016.04.11 | 3years |
| Shielding Room | CHENGYU | 5m×4m×3m | CR | 2016.04.11 | 3years |
| EMI Test Receiver | R&S | ESCI7 | 100787 | 2017.01.28 | 1year |
| Broadband Trilog Antenna | Schwarzbeck | VULB 9163 | 9163-561 | 2016.07.25 | 2year |
| Broadband Horn Antenna | Schwarzbeck | BBHA 9120 D | 9120D-1033 | 2015.07.25 | 2year |
| Dual-line V-network | TESTQ | NNB 51 | 33285 | 2017.01.28 | 1year |
| Power Supplier | NF | ES2000S | 9087735 | 2016.10.17 | 1year |

*NOTE:*
*Equipments listed above have been calibrated and are in the period of validation.*

## 2.5 Accessories

| NO. | Product | Brand | Model | Serial No. | Remark |
|---|---|---|---|---|---|
| 1 | Laptop PC | Lenovo | X200 | 44C0970 | |
| 2 | Adaptor | Lenovo | 42T4416 | 98N4A0 | |
| 3 | USB Cable | CE－LINK | Type-C | N/A | |

## 2.6 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart B:

| No. | Identity | Document Title |
|---|---|---|
| 1 | 47 CFR Part 15<br>(e-CFR data is current as of February 6, 2017) | Radio Frequency Devices |

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

| No. | Section | Description | Result |
|---|---|---|---|
| 1 | 15.107 | Conducted Emission | PASS |
| 2 | 15.109 | Radiated Emission | PASS |
| 3 | ANSI C63.4-2014 | Radiated Emission | PASS |

# 3. Test Conditions Setting

## 3.1 Test Mode

With testing software which was provided by the applicant and installed on a laptop PC, the equipment under test (EUT) could be set to a continuous transmit mode with a certain modulation scheme and data rate on a certain frequency.
For this test report, all configurations of the EUT were tested in 2.4G and 5.8GHz frequency band which was able to operate according to the specification of 802.11 a/g/n. The table below includes the worst case operation mode during the tests:

| Operation Mode | | Description of the Operation Mode | Modulation | Data Rate |
|---|---|---|---|---|
| 1 | On Air | TX Mode 2412MHz(Channel 1) | 64QAM | 54Mbps |
| 2 | On Ground | TX Mode 5825MHz(Channel 165) + Charger + USB data exchange | OFDM | 54Mbps |

*NOTE:*
*In mode 2, the battery of EUT is at low power level, the Charger is charging the battery in common conditions similar to the way did by USER.*
*Mains supply for Adaptor: 120V, AC 60Hz*
*Only the worst case in certain test is recorded separately in following sections.*

# 4. Emission Tests

## 4.1 Conducted Emission Measurement

### 4.1.1 Limits of Conducted Emission:

According to FCC section 15.107, 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).

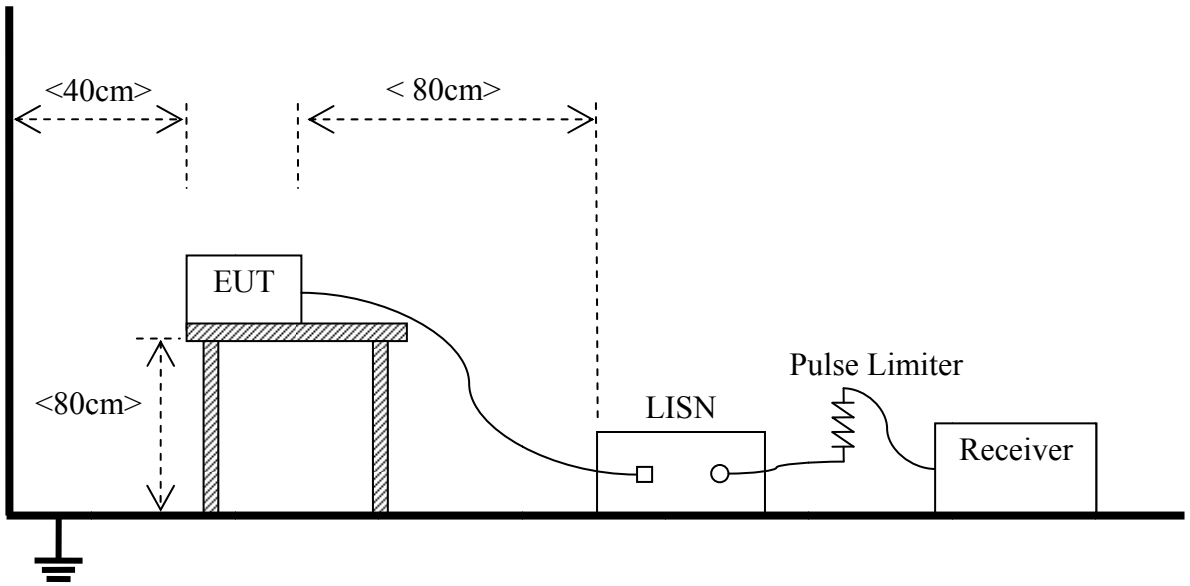
| Frequency (MHz) | CLASS B (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 - 0.5 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 56 | 46 |
| 5.0 - 30.0 | 60 | 50 |

*NOTE:*
*(1) The lower limit shall apply at the band edges.*
*(2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.*

### 4.1.2 Test Procedure

The EUT and support equipment, if needed, were set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane, which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
EUT connected to Class B Computer/Laptop via USB data cable and data exchange mode. The Computer/Laptop installed by US power 120V/60Hz, through a Line Impedance Stabilization Network (LISN), which was supplied power source and was grounded to the ground plane.
The test program of the EUT was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
The Receiver scanned from 150KHz to 30MHz for emissions in each of the test modes.
During the above scans, the emissions were maximized by cable manipulation.
The test mode(s) described in Item 3.1 were scanned during the preliminary test.
After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.
The worst configuration of EUT and cable of the above highest emission level were recorded for reference of the final test.

### 4.1.3 Test Setup



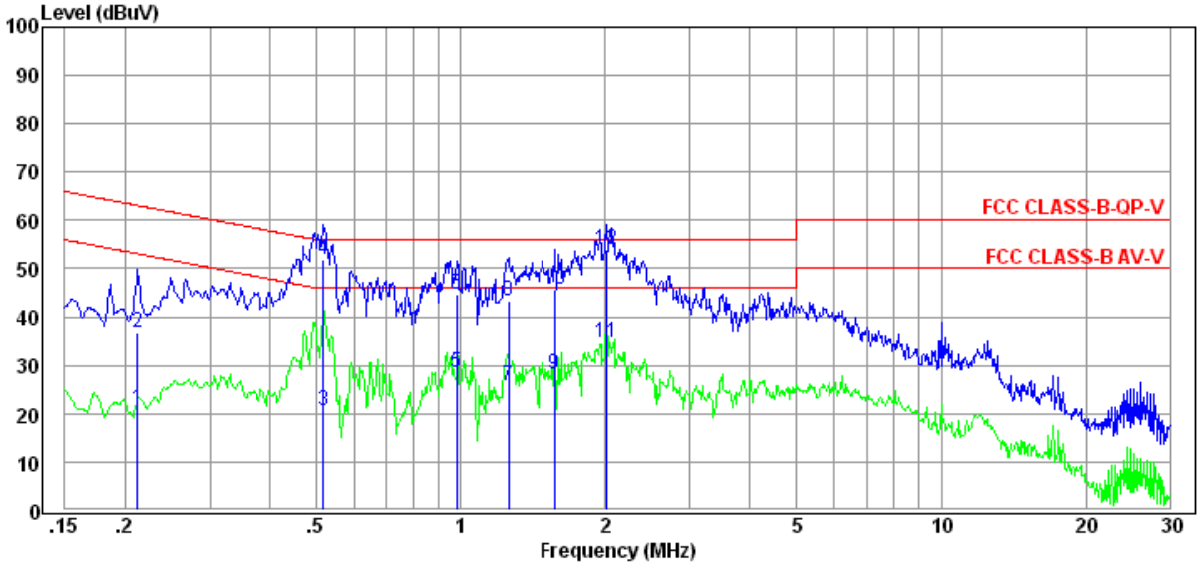

### 4.1.4 Test Result

Test Verdict Recorded for Mode 2:

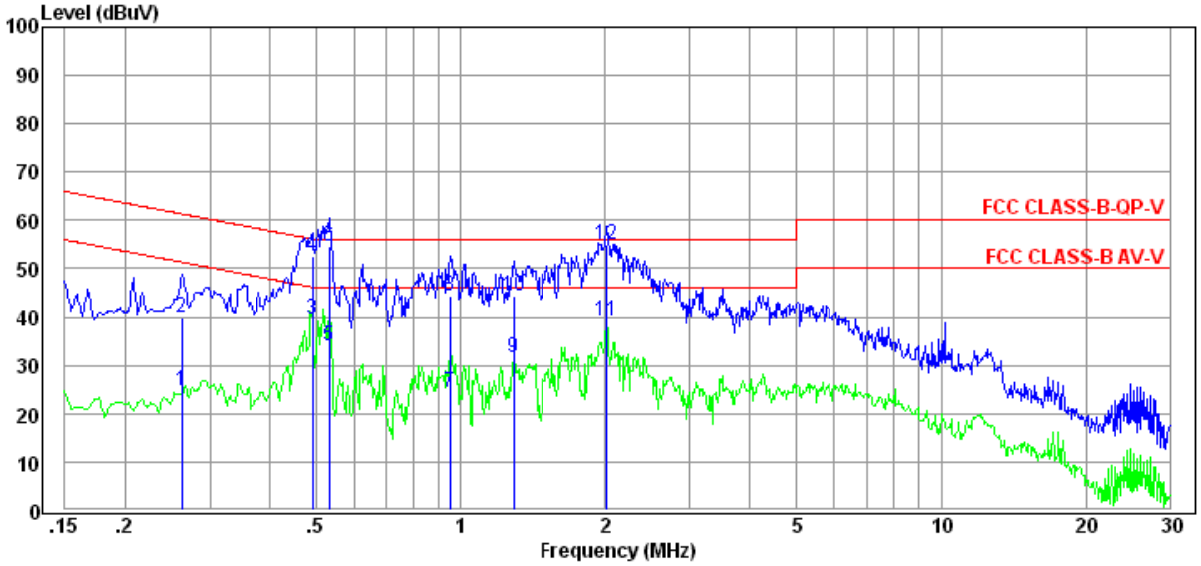
| Frequency (MHz) | Level (dBμV) | Limit Line (dBμV) | Margin (dB) | Phase line | Detector |
|---|---|---|---|---|---|
| 0.21 | 20.92 | 53.10 | 32.18 | L | Average |
| 0.21 | 36.80 | 63.10 | 26.30 | L | QP |
| 0.52 | 20.79 | 46.00 | 25.21 | L | Average |
| 0.52 | 52.04 | 56.00 | 3.96 | L | QP |
| 0.98 | 28.62 | 46.00 | 17.38 | L | Average |
| 0.98 | 44.83 | 56.00 | 11.17 | L | QP |
| 1.26 | 25.67 | 46.00 | 20.33 | L | Average |
| 1.26 | 43.33 | 56.00 | 12.67 | L | QP |
| 1.57 | 28.32 | 46.00 | 17.68 | L | Average |
| 1.57 | 45.75 | 56.00 | 10.25 | L | QP |
| 2.01 | 34.83 | 46.00 | 11.17 | L | Average |
| 2.01 | 54.10 | 56.00 | 1.90 | L | QP |
| 0.26 | 24.76 | 51.34 | 26.58 | N | Average |
| 0.26 | 39.77 | 61.34 | 21.57 | N | QP |
| 0.49 | 39.60 | 46.14 | 6.54 | N | Average |
| 0.49 | 52.45 | 56.14 | 3.69 | N | QP |
| 0.53 | 34.13 | 46.00 | 11.87 | N | Average |
| 0.53 | 54.49 | 56.00 | 1.51 | N | QP |

| Frequency (MHz) | Level (dBμV) | Limit Line (dBμV) | Margin (dB) | Phase line | Detector |
|---|---|---|---|---|---|
| 0.95 | 24.52 | 46.00 | 21.48 | N | Average |
| 0.95 | 44.20 | 56.00 | 11.80 | N | QP |
| 1.29 | 31.64 | 46.00 | 14.36 | N | Average |
| 1.29 | 44.29 | 56.00 | 11.71 | N | QP |
| 2.01 | 39.15 | 46.00 | 6.85 | N | Average |
| 2.01 | 54.91 | 56.00 | 1.09 | N | QP |

### 4.1.5 Test Plot




L Line




N Line

### 4.1.6 Conclusion: Pass

## 4.2 Radiated Emission Measurement

### 4.2.1 Limits of Radiated Emission

According to FCC section 15.109, the field strength of radiated emissions from unintentional radiators at a certain distance shall not exceed the following values:

| Frequency (MHz) | Field Strength CLASS B (at 3m) | |
|---|---|---|
| | μV/m | dBμV/m |
| 30 - 88 | 100 | 40.0 |
| 88 - 216 | 150 | 43.5 |
| 216 - 960 | 200 | 46.0 |
| Above 960 | 500 | 54.0 |

*NOTE:*
*(1) Field Strength (dBμV/m) = 20*log[Field Strength (μV/m)].*
*(2) In the emission tables above, the tighter limit applies at the band edges.*

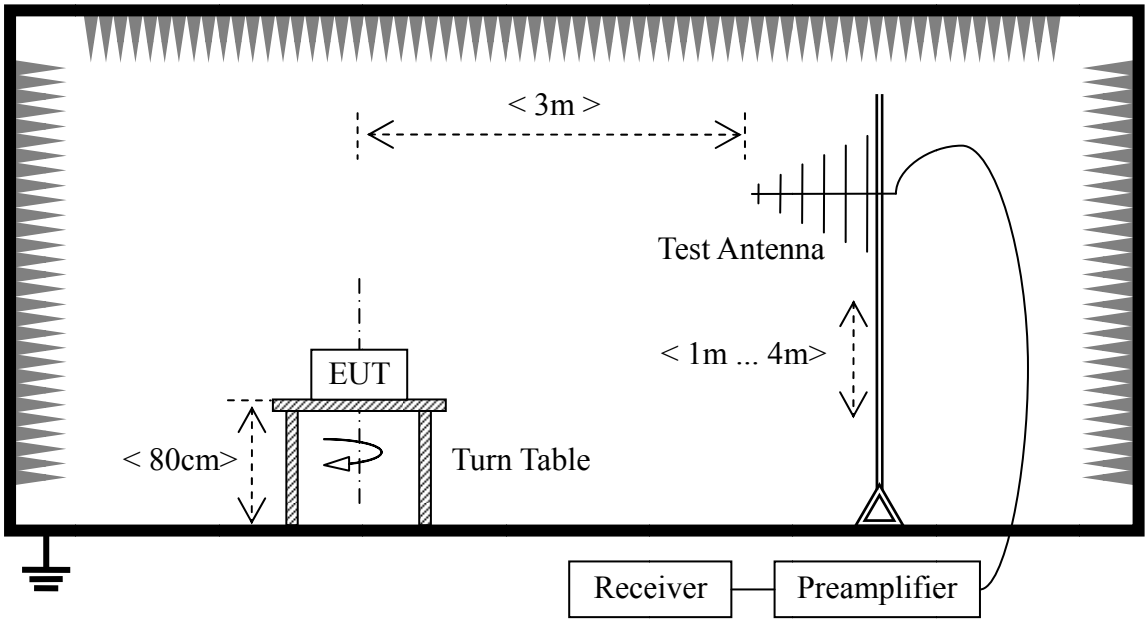
Frequency range of radiated measurements (For unintentional radiators)

| **Highest frequency generated or used in the device or on which the device operates or tunes (MHz)** | **Upper frequency of measurement range (MHz)** |
|---|---|
| Below 1.705 | 30. |
| 1.705-108 | 1000. |
| 108-500 | 2000. |
| 500-1000 | 5000. |
| Above 1000 | 5th harmonic of the highest frequency or 40 GHz, whichever is lower. |

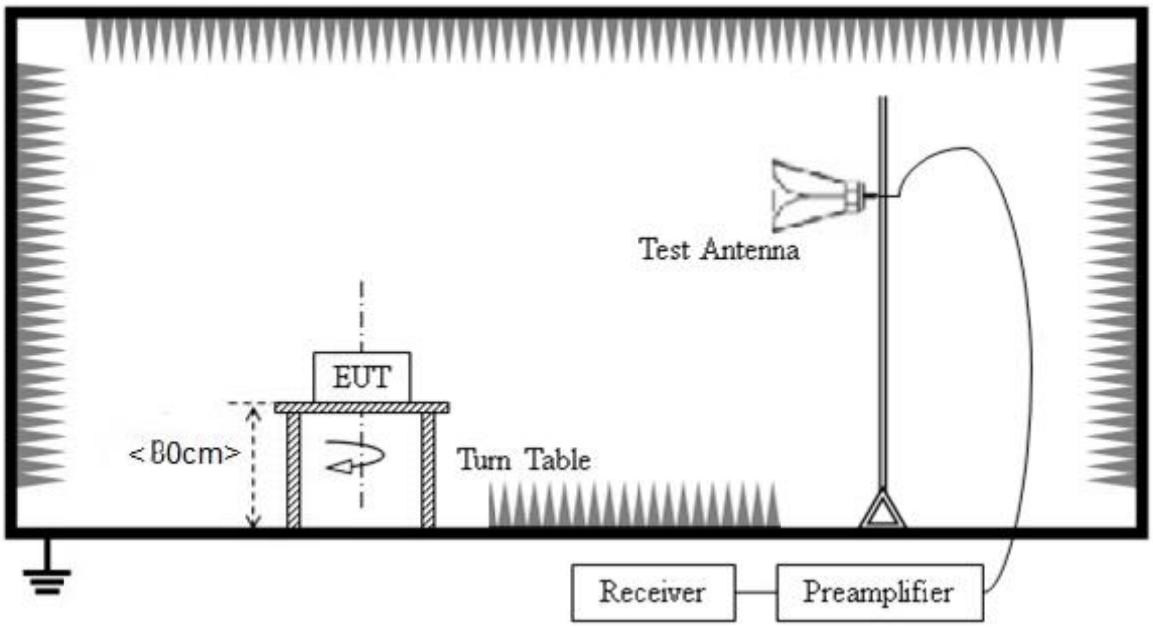
### 4.2.2 Test Procedure

The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
Support equipment, if needed, was placed as per ANSI C63.4.
All I/O cables were positioned to simulate typical usage as per ANSI C63.4.
The EUT received AC power source from the outlet socket under the turntable. All support equipment power received from another socket under the turntable.
The antenna was placed at 3 or 10 meter away from the EUT as stated in ANSI C63.4. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
The Analyzer / Receiver quickly scanned from 30MHz to 40GHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
The test mode(s) described in Item 3.1 were scanned during the preliminary test:
After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.
The worst configuration of EUT and cable of the above highest emission level were recorded for reference of the final test

### 4.2.3 Test Setup




Radiated Emissions 30-1000MHz




Radiated Emissions above 1000MHz

## 4.2.4 Test Result

Test Verdict Recorded for Mode 1 (30MHz~1GHz and above 1GHz):

| No. | Frequency (MHz) | Emission Level (dBμV/m) | | Quasi-Peak Limit (dBμV/m) | Margin (dB) | Detector | Result |
|---|---|---|---|---|---|---|---|
| | | Result （dBμV） | Antenna Polarization | | | | |
| 1 | 59.86 | 24.71 | V | 40.00 | 15.29 | QP | PASS |
| 2 | 67.68 | 20.66 | V | 40.00 | 19.34 | QP | PASS |
| 3 | 81.21 | 19.11 | V | 40.00 | 20.89 | QP | PASS |
| 4 | 95.43 | 21.63 | V | 40.00 | 18.37 | QP | PASS |
| 5 | 451.14 | 30.67 | V | 47.00 | 16.33 | QP | PASS |
| 6 | 649.66 | 32.32 | V | 47.00 | 14.68 | QP | PASS |
| 7 | 1882.29 | 43.66 | V | 70.00 | 26.34 | Peak | PASS |
| 8 | 2288.26 | 32.36 | V | 50.00 | 17.64 | Average | PASS |
| 9 | 2414.63 | 77.15 | V | 50.00 | -27.15 | Average | PASS |
| 10 | 2414.63 | 80.39 | V | 70.00 | -10.39 | Peak | PASS |
| 11 | 3216.29 | 34.01 | V | 54.00 | 19.99 | Average | PASS |
| 12 | 3216.29 | 48.30 | V | 74.00 | 25.7 | Peak | PASS |
| 13 | 4821.88 | 52.87 | V | 54.00 | 1.13 | Average | PASS |
| 14 | 4821.88 | 66.14 | V | 74.00 | 7.86 | Peak | PASS |
| 15 | 47.99 | 20.56 | H | 40.00 | 19.44 | QP | PASS |
| 16 | 104.17 | 20.05 | H | 40.00 | 19.95 | QP | PASS |
| 17 | 180.65 | 21.62 | H | 40.00 | 18.38 | QP | PASS |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 18 | 235.82 | 25.69 | H | 47.00 | 21.31 | QP | PASS |
| 19 | 400.43 | 34.02 | H | 47.00 | 12.98 | QP | PASS |
| 20 | 649.66 | 34.42 | H | 47.00 | 12.58 | QP | PASS |
| 21 | 2288.26 | 33.22 | H | 50.00 | 16.78 | Average | PASS |
| 22 | 2288.26 | 45.50 | H | 70.00 | 24.5 | Peak | PASS |
| 23 | 2414.63 | 80.42 | H | 70.00 | -10.42 | Peak | PASS |
| 24 | 2418.96 | 77.47 | H | 50.00 | -27.47 | Average | PASS |
| 25 | 3216.29 | 35.22 | H | 54.00 | 18.78 | Average | PASS |
| 26 | 3216.29 | 49.83 | H | 74.00 | 24.17 | Peak | PASS |
| 27 | 4830.53 | 53.82 | H | 54.00 | 0.18 | Average | PASS |
| 28 | 4830.53 | 72.20 | H | 74.00 | 1.8 | Peak | PASS |

Note: the frequency above 6 GHz is identified as floor noise, the record is ignored.

### 4.2.5 Conclusion: Pass

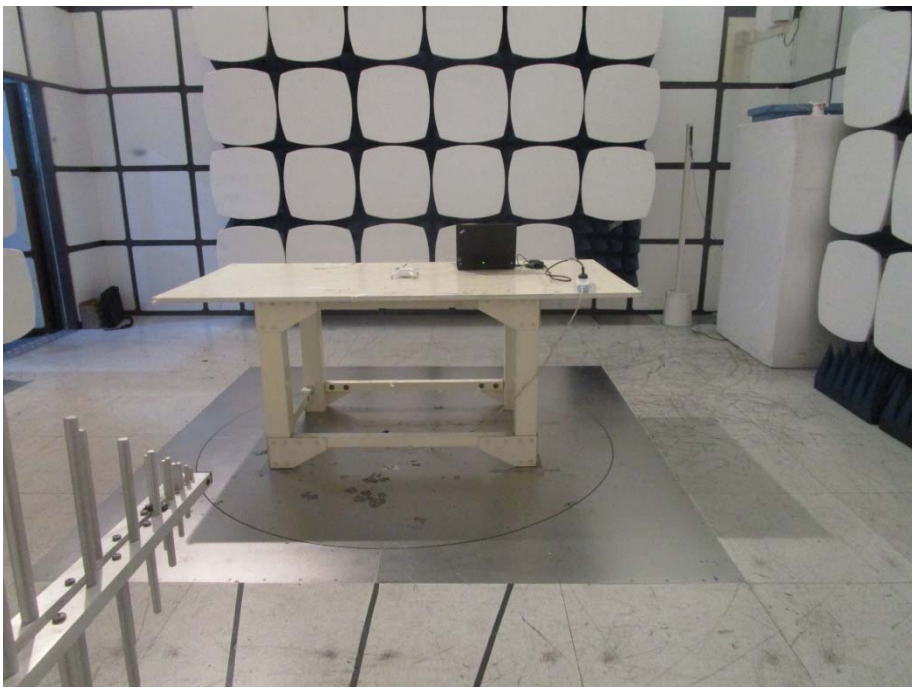
# Annex A Photos of the EUT

# Annex B Photos of Test Setup

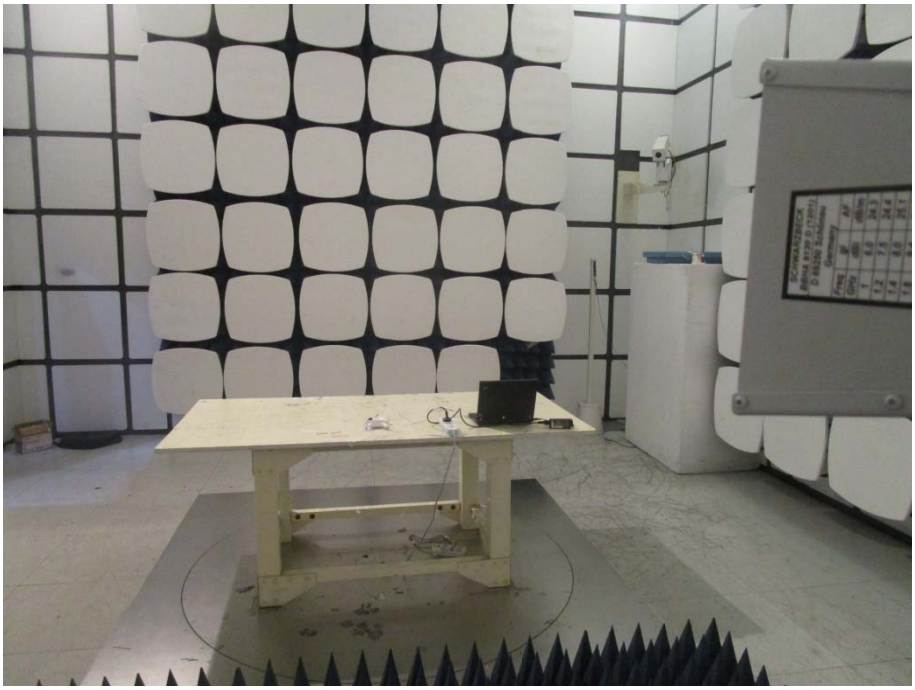
1. Conducted Emission

150k~30MHz

2. Radiated Emission



30M~1GHz



above 1GHz

** END OF REPORT **