

TEST REPORT

Product Name : PilotPano Panoramic Camera
Brand Mark : Labpano
Model No. : PIP221
Extension Model : PIP221+
Report Number : BLA-EMC-202207-A1505
FCC ID : 2ARZ2 -PIP221
Date of Sample Receipt : 2022/8/1
Date of Test : 2022/8/1 to 2022/9/5
Date of Issue : 2022/9/5
Test Standard : 47 CFR Part 15, Subpart E 15.407
Test Result : Pass

Prepared for:

Shenzhen Pisoftware Technology Co., Ltd.
C11-B, TCL International E City, 1001 Zhongshanyuan Road, Nanshan District, Shenzhen City, 518057, P.R.China

Prepared by:

BlueAsia of Technical Services(Shenzhen) Co.,Ltd.
Building C, No. 107, Shihuan Road, Shiyuan Sub-District, Baoan District, Shenzhen, Guangdong Province, China
TEL: +86-755-23059481

Compiled by: *Charlie*

Review by:

Sueels

Approved by: *Bluezhong*

Date:

2022/9/5



REPORT REVISE RECORD

| Version No. | Date | Description |
|--------------------|-------------|--------------------|
| 00 | 2022/9/5 | Original |

BlueAsia

TABLE OF CONTENTS

| | | |
|-----------|--|-----------|
| 1 | TEST SUMMARY | 5 |
| 2 | GENERAL INFORMATION | 6 |
| 3 | GENERAL DESCRIPTION OF E.U.T. | 7 |
| 4 | TEST ENVIRONMENT | 8 |
| 5 | TEST MODE | 8 |
| 6 | MEASUREMENT UNCERTAINTY | 8 |
| 7 | DESCRIPTION OF SUPPORT UNIT | 9 |
| 8 | LABORATORY LOCATION | 9 |
| 9 | TEST INSTRUMENTS LIST | 10 |
| 10 | FREQUENCY STABILITY | 15 |
| 10.1 | LIMITS | 15 |
| 10.2 | BLOCK DIAGRAM OF TEST SETUP | 15 |
| 10.3 | TEST DATA | 15 |
| 11 | RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS | 16 |
| 11.1 | LIMITS | 16 |
| 11.2 | BLOCK DIAGRAM OF TEST SETUP | 17 |
| 11.3 | PROCEDURE | 17 |
| 11.4 | TEST DATA | 19 |
| 12 | RADIATED EMISSIONS | 27 |
| 12.1 | BLOCK DIAGRAM OF TEST SETUP | 27 |
| 12.2 | PROCEDURE | 27 |
| 12.3 | TEST DATA | 29 |
| 13 | PEAK POWER SPECTRUM DENSITY | 39 |
| 13.1 | LIMITS | 39 |
| 13.2 | BLOCK DIAGRAM OF TEST SETUP | 39 |
| 13.3 | TEST DATA | 40 |
| 14 | MAXIMUM CONDUCTED OUTPUT POWER | 41 |
| 14.1 | LIMITS | 41 |
| 14.2 | BLOCK DIAGRAM OF TEST SETUP | 42 |
| 14.3 | TEST DATA | 42 |

| | | |
|-----------|--|------------|
| 15 | MINIMUM 6 DB BANDWIDTH (5.725-5.85 GHZ BAND) | 43 |
| 15.1 | LIMITS | 43 |
| 15.2 | BLOCK DIAGRAM OF TEST SETUP | 43 |
| 15.3 | TEST DATA | 43 |
| 16 | 26DB EMISSION BANDWIDTH | 44 |
| 16.1 | BLOCK DIAGRAM OF TEST SETUP | 44 |
| 16.2 | TEST DATA | 44 |
| 17 | 99% BANDWIDTH | 45 |
| 17.1 | BLOCK DIAGRAM OF TEST SETUP | 45 |
| 17.2 | TEST DATA | 45 |
| 18 | DUTY CYCLE | 46 |
| 18.1 | BLOCK DIAGRAM OF TEST SETUP | 46 |
| 18.2 | TEST DATA | 46 |
| 19 | CONDUCTED EMISSIONS AT AC POWER LINE (150KHZ-30MHZ) | 47 |
| 19.1 | LIMITS | 47 |
| 19.2 | BLOCK DIAGRAM OF TEST SETUP | 47 |
| 19.3 | PROCEDURE | 47 |
| 19.4 | TEST DATA | 49 |
| 20 | ANTENNA REQUIREMENT | 51 |
| 20.1 | CONCLUSION | 51 |
| 21 | APPENDIX | 52 |
| 21.1 | MAXIMUM CONDUCTED OUTPUT POWER | 52 |
| 21.2 | -26DB BANDWIDTH | 83 |
| 21.3 | OCCUPIED CHANNEL BANDWIDTH | 99 |
| 21.4 | MAXIMUM POWER SPECTRAL DENSITY LEVEL | 129 |
| 21.5 | BAND EDGE | 160 |
| 21.6 | FREQUENCY STABILITY | 184 |
| 21.7 | CONDUCTED RF SPURIOUS EMISSION | 203 |
| 21.8 | -6DB BANDWIDTH | 233 |
| | APPENDIX A: PHOTOGRAPHS OF TEST SETUP | 248 |
| | APPENDIX B: PHOTOGRAPHS OF EUT | 250 |

1 TEST SUMMARY

| Test item | Test Requirement | Test Method | Class/Severity | Result |
|---|----------------------------------|--------------------------------|--|--------|
| Frequency Stability | 47 CFR Part 15, Subpart E 15.407 | ANSI C63.10 (2013) Section 6.8 | 47 CFR Part 15, Subpart C 15.407 (g) | Pass |
| Radiated Emissions which fall in the restricted bands | 47 CFR Part 15, Subpart E 15.407 | KDB 789033 D02 II G | 47 CFR Part 15, Subpart C 15.209 & 15.407(b) | Pass |
| Radiated Emissions | 47 CFR Part 15, Subpart E 15.407 | KDB 789033 D02 II G | 47 CFR Part 15, Subpart C 15.209 & 15.407(b) | Pass |
| DFS: Channel Closing Transmission Time | 47 CFR Part 15, Subpart E 15.407 | KDB 905462 D02 Section 7.8.3 | KDB 905462 D02 Section 5.1 | N/A |
| DFS: Non-occupancy period | 47 CFR Part 15, Subpart E 15.407 | KDB 905462 D02 Section 7.8.3 | KDB 905462 D02 Section 5.1 | N/A |
| Peak Power spectrum density | 47 CFR Part 15, Subpart E 15.407 | KDB 789033 D02 II F | 47 CFR Part 15, Subpart C 15.407 (a) | Pass |
| Transmitter Power Control | 47 CFR Part 15, Subpart E 15.407 | KDB 789033 D02 II E | 47 CFR Part 15, Subpart C 15.407 (h)(1) | N/A |
| Maximum Conducted output power | 47 CFR Part 15, Subpart E 15.407 | KDB 789033 D02 II E | 47 CFR Part 15, Subpart C 15.407 (a) | Pass |
| Minimum 6 dB bandwidth (5.725-5.85 GHz band) | 47 CFR Part 15, Subpart E 15.407 | KDB 789033 D02 II C 2 | 47 CFR Part 15, Subpart C 15.407 (e) | Pass |
| 26dB Emission bandwidth | 47 CFR Part 15, Subpart E 15.407 | KDB 789033 D02 II C 1 | 47 CFR Part 15, Subpart C 15.407 (a) | Pass |
| 99% Bandwidth | 47 CFR Part 15, Subpart E 15.407 | KDB 789033 II D | N/A | Pass |
| Conducted Emissions at AC Power Line (150kHz-30MHz) | 47 CFR Part 15, Subpart E 15.407 | ANSI C63.10 (2013) Section 6.2 | 47 CFR Part 15, Subpart C 15.207 & 15.407 b(6) | Pass |
| Antenna Requirement | 47 CFR Part 15, Subpart E 15.407 | N/A | 47 CFR Part 15, Subpart C 15.203 | Pass |

Remark:

N/A: not support

2 GENERAL INFORMATION

| | |
|------------------------|---|
| Applicant | Shenzhen Pisoftware Technology Co., Ltd. |
| Address | C11-B, TCL International E City, 1001 Zhongshanyuan Road,,Nanshan District, Shenzhen City, 518057, P.R.China |
| Manufacturer | Shenzhen Pisoftware Technology Co., Ltd. |
| Address | C11-B, TCL International E City, 1001 Zhongshanyuan Road, Nanshan District, Shenzhen City, 518057, P.R.China |
| Factory | SHENZHEN AONI ELECTRONIC CO,LTD |
| Address | 2F、3F、6F、7F、The half laye of 8F、9F,Honghui Industrial Park,2nd Liuxian Road,Xinan street,Baoan District,Shenzhen |
| Product Name | PilotPano Panoramic Camera |
| Test Model No. | PIP221 |
| Extension Model | PIP221+ |
| Remark | All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are model name for commercial purpose. |

3 GENERAL DESCRIPTION OF E.U.T.

| | |
|---|--|
| Hardware Version | N/A |
| Software Version | N/A |
| Operation Frequency: | Band 1 : 5180MHz-5240MHz; Band 4 : 5745MHz-5825MHz |
| Channel numbers: | Band 1: 802.11a/802.11n(HT20)/802.11ac(HT20): 4, 802.11n(HT40)/802.11ac(HT40):2, 802.11ac(HT80): 1 |
| | Band 4: 802.11a/802.11(HT20)/802.11ac(HT20): 5, 802.11n(HT40)/802.11ac(HT40): 2, 802.11ac(HT80): 1 |
| Channel separation: | 802.11a/n/ac(HT20): 20MHz, 802.11n/ac(HT40): 40MHz, 802.11ac(HT80): 80MHz |
| Modulation technology: (IEEE 802.11a/n/ac) | BPSK, QPSK, 16-QAM, 64-QAM, 256QAM |
| Data speed(IEEE 802.11a) | 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps |
| Data speed (IEEE 802.11n/ac): | Up to 866.7Mbps |
| Antenna Type: | External antenna |
| Antenna gain: | Antenna 1:2.32dBi, Antenna 2:2.32dBi(Provided by the applicant) |
| Note: | Antenna number : 2 SISO mode: 802.11a MIMO mode: 802.11n(HT20)/ 802.11n(HT40)/ 802.11ac(HT20)/ 802.11ac(HT40)/ 802.11ac(HT80) Directional gain of MIMO mode: $2.32+10\log_2= 5.33\text{dBi}$ |
| Remark:The Antenna Gain is supplied by the customer.BlueAsia is not responsible for this data | |

4 TEST ENVIRONMENT

| Environment | Temperature | Voltage |
|-------------|-------------|---------|
| Normal | 25°C | DC5V |

5 TEST MODE

| TEST MODE | TEST MODE DESCRIPTION |
|---|--|
| Transmitting mode | Keep the EUT in continuously transmitting mode with modulation. (Duty cycle>98%) |
| Remark: Only the data of the worst mode would be recorded in this report. | |

6 MEASUREMENT UNCERTAINTY

| Parameter | Expanded Uncertainty (Confidence of 95%) |
|--|--|
| Radiated Emission(9kHz-30MHz) | ±4.34dB |
| Radiated Emission(30Mz-1000MHz) | ±4.24dB |
| Radiated Emission(1GHz-18GHz) | ±4.68dB |
| AC Power Line Conducted Emission(150kHz-30MHz) | ±3.45dB |

7 DESCRIPTION OF SUPPORT UNIT

| Device Type | Manufacturer | Model Name | Serial No. | Remark |
|-------------|--------------|------------|------------|--------|
| PC | N/A | N/A | N/A | N/A |

8 LABORATORY LOCATION

All tests were performed at:
BlueAsia of Technical Services(Shenzhen) Co., Ltd.
Building C, No. 107, Shihuan Road, Shiyuan Sub-District, Baoan District, Shenzhen, Guangdong Province,
China
Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673
No tests were sub-contracted.

9 TEST INSTRUMENTS LIST

| Test Equipment Of Frequency Stability | | | | | |
|---------------------------------------|--------------|--------|------------|------------|------------|
| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
| Spectrum | R&S | FSP40 | 100817 | 2021/10/12 | 2022/10/11 |
| Spectrum | Agilent | N9020A | MY49100060 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | N5182A | MY49060650 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | E8257D | MY44320250 | 2021/10/12 | 2022/10/11 |

| Test Equipment Of Radiated Emissions which fall in the restricted bands | | | | | |
|---|--------------|---------------|------------------|------------|------------|
| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
| Chamber | SKET | 966 | N/A | 2020/11/10 | 2023/11/9 |
| Spectrum | R&S | FSP40 | 100817 | 2021/10/12 | 2022/10/11 |
| Receiver | R&S | ESR7 | 101199 | 2021/10/12 | 2022/10/11 |
| broadband Antenna | Schwarzbeck | VULB9168 | 00836 P:00227 | 2020/9/26 | 2022/9/25 |
| Horn Antenna | Schwarzbeck | 9120D | 01892 P:00331 | 2020/9/26 | 2022/9/25 |
| Amplifier | SKET | PA-000318G-45 | N/A | 2021/10/16 | 2022/10/15 |
| EMI software | EZ | EZ-EMC | EEMC-3A1 | N/A | N/A |
| Loop antenna | SCHNARZBECK | FMZB1519B | 00102 | 2020/9/26 | 2022/9/25 |
| Controller | SKET | N/A | N/A | N/A | N/A |
| Coaxial Cable | BlueAsia | BLA-XC-02 | N/A | N/A | N/A |
| Coaxial Cable | BlueAsia | BLA-XC-03 | N/A | N/A | N/A |
| Coaxial Cable | BlueAsia | BLA-XC-01 | N/A | N/A | N/A |

| Test Equipment Of Radiated Emissions | | | | | |
|--------------------------------------|--------------|-------|-----|----------|---------|
| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |

| | | | | | |
|-------------------|-------------|---------------|------------------|------------|------------|
| Chamber | SKET | 966 | N/A | 2020/11/10 | 2023/11/9 |
| Spectrum | R&S | FSP40 | 100817 | 2021/10/12 | 2022/10/11 |
| Receiver | R&S | ESR7 | 101199 | 2021/10/12 | 2022/10/11 |
| broadband Antenna | Schwarzbeck | VULB9168 | 00836 P:00227 | 2020/9/26 | 2022/9/25 |
| Horn Antenna | Schwarzbeck | 9120D | 01892 P:00331 | 2020/9/26 | 2022/9/25 |
| Amplifier | SKET | PA-000318G-45 | N/A | 2021/10/16 | 2022/10/15 |
| EMI software | EZ | EZ-EMC | EEMC-3A1 | N/A | N/A |
| Loop antenna | SCHNARZBECK | FMZB1519B | 00102 | 2020/9/26 | 2022/9/25 |
| Controller | SKET | N/A | N/A | N/A | N/A |
| Coaxial Cable | BlueAsia | BLA-XC-02 | N/A | N/A | N/A |
| Coaxial Cable | BlueAsia | BLA-XC-03 | N/A | N/A | N/A |
| Coaxial Cable | BlueAsia | BLA-XC-01 | N/A | N/A | N/A |

Test Equipment Of DFS: Channel Closing Transmission Time

| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
|------------------|--------------|--------|------------|------------|------------|
| Spectrum | R&S | FSP40 | 100817 | 2021/10/12 | 2022/10/11 |
| Spectrum | Agilent | N9020A | MY49100060 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | N5182A | MY49060650 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | E8257D | MY44320250 | 2021/10/12 | 2022/10/11 |

Test Equipment Of DFS: Non-occupancy period

| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
|-----------|--------------|--------|------------|------------|------------|
| Spectrum | R&S | FSP40 | 100817 | 2021/10/12 | 2022/10/11 |
| Spectrum | Agilent | N9020A | MY49100060 | 2021/10/12 | 2022/10/11 |

| | | | | | |
|------------------|---------|--------|------------|------------|------------|
| Signal Generator | Agilent | N5182A | MY49060650 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | E8257D | MY44320250 | 2021/10/12 | 2022/10/11 |

Test Equipment Of Peak Power spectrum density

| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
|------------------|--------------|--------|------------|------------|------------|
| Spectrum | R&S | FSP40 | 100817 | 2021/10/12 | 2022/10/11 |
| Spectrum | Agilent | N9020A | MY49100060 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | N5182A | MY49060650 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | E8257D | MY44320250 | 2021/10/12 | 2022/10/11 |

Test Equipment Of Transmitter Power Control

| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
|------------------|--------------|--------|------------|------------|------------|
| Spectrum | R&S | FSP40 | 100817 | 2021/10/12 | 2022/10/11 |
| Spectrum | Agilent | N9020A | MY49100060 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | N5182A | MY49060650 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | E8257D | MY44320250 | 2021/10/12 | 2022/10/11 |

Test Equipment Of Maximum Conducted output power

| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
|------------------|--------------|--------|------------|------------|------------|
| Spectrum | R&S | FSP40 | 100817 | 2021/10/12 | 2022/10/11 |
| Spectrum | Agilent | N9020A | MY49100060 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | N5182A | MY49060650 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | E8257D | MY44320250 | 2021/10/12 | 2022/10/11 |

Test Equipment Of Minimum 6 dB bandwidth (5.725-5.85 GHz band)

| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
|------------------|--------------|--------|------------|------------|------------|
| Spectrum | R&S | FSP40 | 100817 | 2021/10/12 | 2022/10/11 |
| Spectrum | Agilent | N9020A | MY49100060 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | N5182A | MY49060650 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | E8257D | MY44320250 | 2021/10/12 | 2022/10/11 |

Test Equipment Of 26dB Emission bandwidth

| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
|------------------|--------------|--------|------------|------------|------------|
| Spectrum | R&S | FSP40 | 100817 | 2021/10/12 | 2022/10/11 |
| Spectrum | Agilent | N9020A | MY49100060 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | N5182A | MY49060650 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | E8257D | MY44320250 | 2021/10/12 | 2022/10/11 |

Test Equipment Of 99% Bandwidth

| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
|------------------|--------------|--------|------------|------------|------------|
| Spectrum | R&S | FSP40 | 100817 | 2021/10/12 | 2022/10/11 |
| Spectrum | Agilent | N9020A | MY49100060 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | N5182A | MY49060650 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | E8257D | MY44320250 | 2021/10/12 | 2022/10/11 |

Test Equipment Of Duty Cycle

| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
|-----------|--------------|--------|------------|------------|------------|
| Spectrum | R&S | FSP40 | 100817 | 2021/10/12 | 2022/10/11 |
| Spectrum | Agilent | N9020A | MY49100060 | 2021/10/12 | 2022/10/11 |

| | | | | | |
|------------------|---------|--------|------------|------------|------------|
| Signal Generator | Agilent | N5182A | MY49060650 | 2021/10/12 | 2022/10/11 |
| Signal Generator | Agilent | E8257D | MY44320250 | 2021/10/12 | 2022/10/11 |

Test Equipment Of Conducted Emissions at AC Power Line (150kHz-30MHz)

| Equipment | Manufacturer | Model | S/N | Cal.Date | Cal.Due |
|--------------|--------------|---------|---------------|------------|------------|
| Shield room | SKET | 833 | N/A | 2020/11/25 | 2023/11/24 |
| Receiver | R&S | ESPI3 | 101082 | 2021/10/12 | 2022/10/11 |
| LISN | R&S | ENV216 | 3560.6550.15 | 2021/10/12 | 2022/10/11 |
| LISN | AT | AT166-2 | AKK1806000003 | 2021/10/12 | 2022/10/11 |
| EMI software | EZ | EZ-EMC | EEMC-3A1 | N/A | N/A |

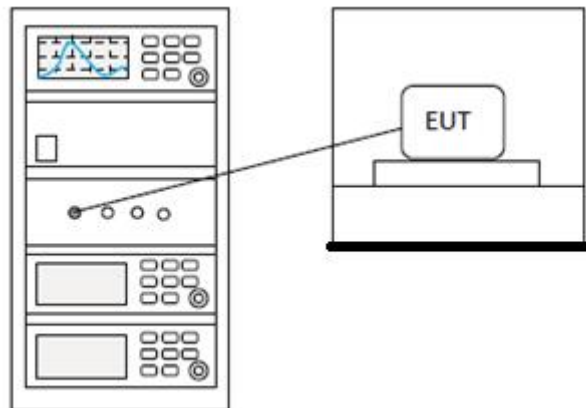
10 FREQUENCY STABILITY

| | |
|-------------------------------|----------------------------------|
| Test Standard | 47 CFR Part 15, Subpart E 15.407 |
| Test Method | ANSI C63.10 (2013) Section 6.8 |
| Test Mode (Pre-Scan) | TX |
| Test Mode (Final Test) | TX |
| Tester | Charlie |
| Temperature | 25°C |
| Humidity | 60% |

10.1 LIMITS

| | |
|---------------|---|
| Limit: | The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 0 degrees to 35 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. |
|---------------|---|

10.2 BLOCK DIAGRAM OF TEST SETUP



10.3 TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details

11 RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS

| | |
|-------------------------------|----------------------------------|
| Test Standard | 47 CFR Part 15, Subpart E 15.407 |
| Test Method | KDB 789033 D02 II G |
| Test Mode (Pre-Scan) | TX |
| Test Mode (Final Test) | TX |
| Tester | Charlie |
| Temperature | 25°C |
| Humidity | 60% |

11.1 LIMITS

| Frequency(MHz) | Field strength(microvolts/meter) | Measurement distance(meters) |
|-----------------------|---|-------------------------------------|
| 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 |

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

11.2 BLOCK DIAGRAM OF TEST SETUP



11.3 PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

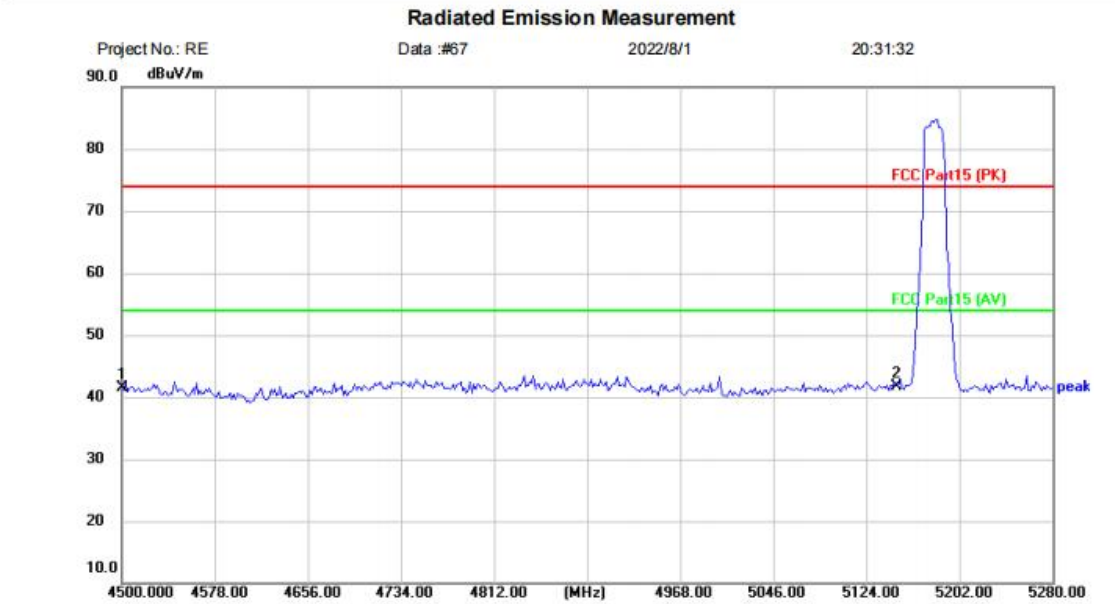
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
 - i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
 - j. Repeat above procedures until all frequencies measured was complete.
- Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

BlueAsia

11.4 TEST DATA

Remark: During the test, pre-scan the 802.11a/n/ac mode, and found the 802.11a mode which it is worse case.

[TestMode: TX band 1 a 5180 channel]; [Polarity: Horizontal]



Site: Polarization: **Horizontal** Temperature: (C)
 Limit: FCC Part15 (PK) Power: Humidity: %RH
 EUT: panoramic camera
 M/N: Pilot pano
 Mode: 5.1 A TX-L
 Note:

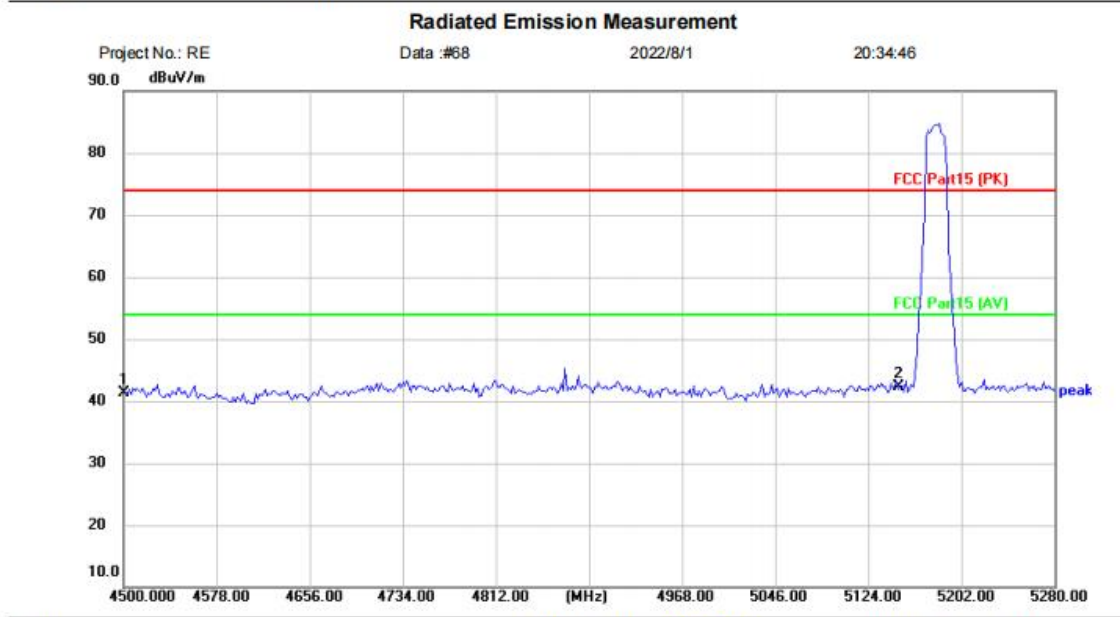
| No. Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB/m | Measurement dBuV/m | Limit dBuV/m | Over dB | Detector | Comment |
|---------|-----------|--------------------|---------------------|--------------------|--------------|---------|----------|---------|
| 1 | 4500.000 | 40.87 | 0.67 | 41.54 | 74.00 | -32.46 | peak | |
| 2 * | 5150.000 | 40.37 | 1.26 | 41.63 | 74.00 | -32.37 | peak | |

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Result: Pass

[TestMode: TX band 1 a 5180 channel]; [Polarity: Vertical]



Site: Polarization: **Vertical** Temperature: (C)

Limit: FCC Part15 (PK) Power: Humidity: %RH

EUT: panoramic camera

M/N: Pilot pano

Mode: 5.1 A TX-L

Note:

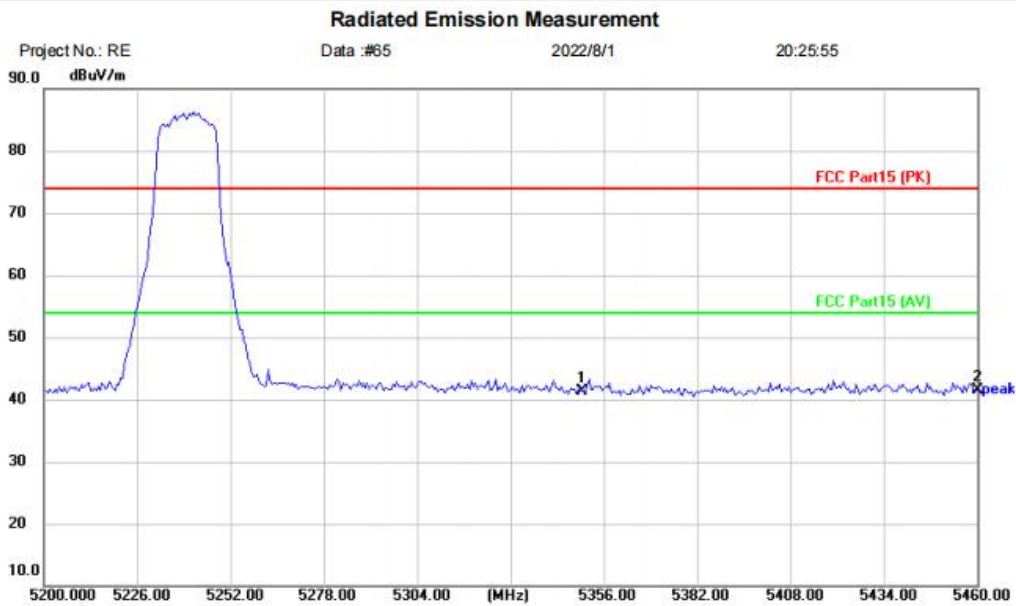
| No. | Mk. | Freq. | Reading Level | Correct Factor | Measurement | Limit | Over | Detector | Comment |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | |
| 1 | | 4500.000 | 40.54 | 0.67 | 41.21 | 74.00 | -32.79 | peak | |
| 2 | * | 5150.000 | 41.02 | 1.26 | 42.28 | 74.00 | -31.72 | peak | |

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Result: Pass

[TestMode: TX band1 a 5240 channel]; [Polarity: Horizontal]



Site Polarization: **Horizontal** Temperature: (C)
 Limit: FCC Part15 (PK) Power: Humidity: %RH
 EUT: panoramic camera
 M/N: Pilot pano
 Mode: 5.1 A TX-H
 Note:

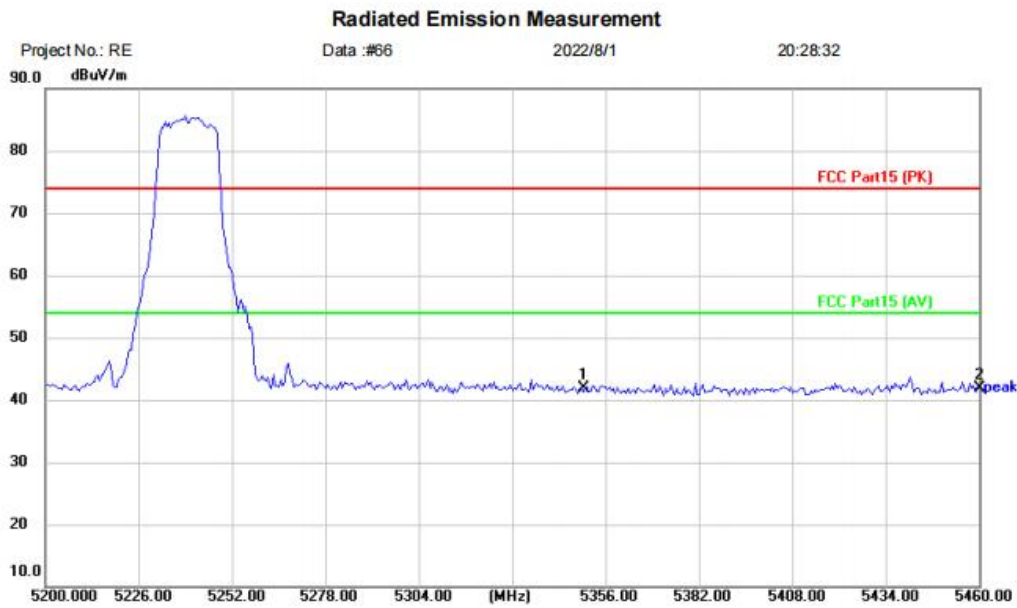
| No. | Mk. | Freq. | Reading Level | Correct Factor | Measurement | Limit | Over | Detector | Comment |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | |
| 1 | | 5350.000 | 39.82 | 1.55 | 41.37 | 74.00 | -32.63 | peak | |
| 2 | * | 5460.000 | 39.79 | 1.78 | 41.57 | 74.00 | -32.43 | peak | |

*:Maximum data x:Over limit !:over margin

<Reference Only

Test Result: Pass

[TestMode: TX band1 a 5240 channel]; [Polarity: Vertical]



| | | |
|------------------------|-------------------------------|------------------|
| Site | Polarization: Vertical | Temperature: (C) |
| Limit: FCC Part15 (PK) | Power: | Humidity: %RH |
| EUT: panoramic camera | | |
| M/N: Pilot pano | | |
| Mode: 5.1 A TX-H | | |
| Note: | | |

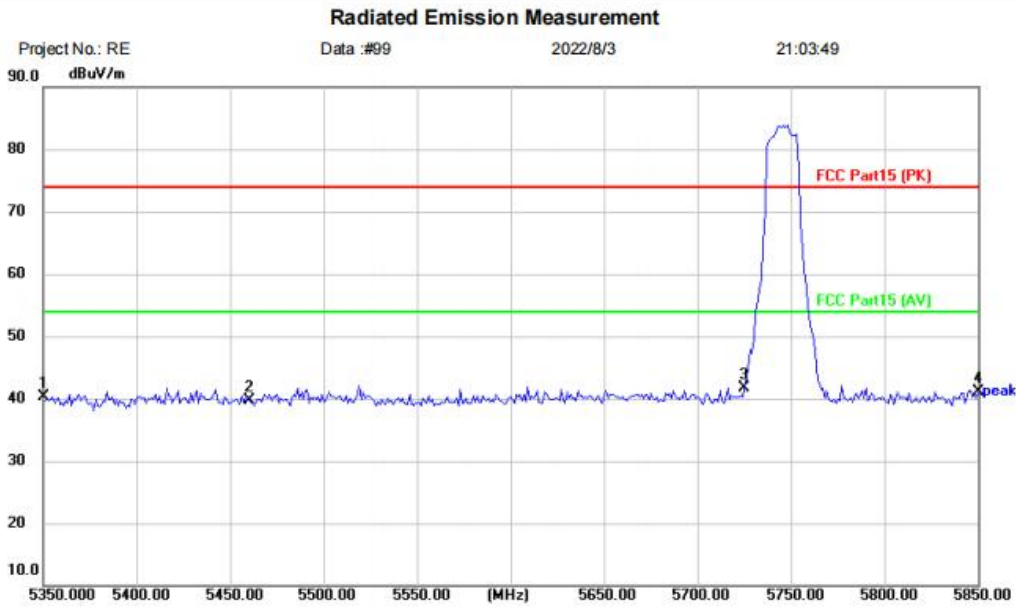
| No. | Mk. | Freq. | Reading Level | Correct Factor | Measurement | Limit | Over | Detector | Comment |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | |
| 1 | * | 5350.000 | 40.45 | 1.55 | 42.00 | 74.00 | -32.00 | peak | |
| 2 | | 5460.000 | 40.16 | 1.78 | 41.94 | 74.00 | -32.06 | peak | |

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Result: Pass

[TestMode: TX band4 a 5745 channel]; [Polarity: Horizontal]



Site: Polarization: **Horizontal** Temperature: (C)
 Limit: FCC Part15 (PK) Power: Humidity: %RH
 EUT: panoramic camera
 M/N: Pilot pano
 Mode: 5.4 A TX-L
 Note:

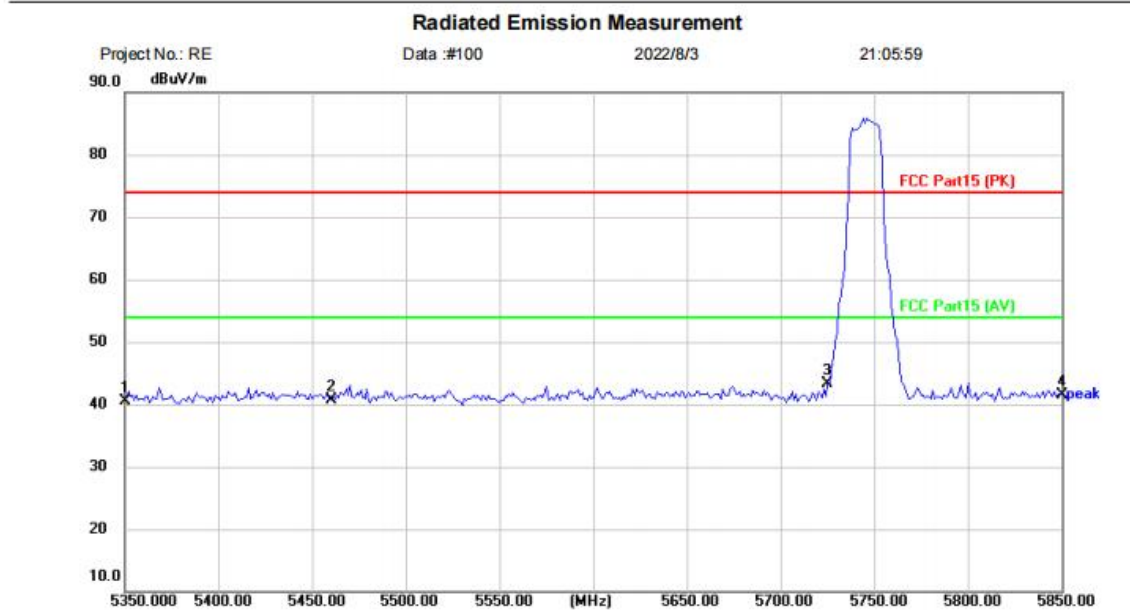
| No. | Mk. | Freq. | Reading Level | Correct Factor | Measurement | Limit | Over | Detector | Comment |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | |
| 1 | | 5350.000 | 38.71 | 1.55 | 40.26 | 74.00 | -33.74 | peak | |
| 2 | | 5460.000 | 38.02 | 1.78 | 39.80 | 74.00 | -34.20 | peak | |
| 3 | * | 5725.000 | 39.82 | 1.80 | 41.62 | 74.00 | -32.38 | peak | |
| 4 | | 5850.000 | 39.36 | 1.78 | 41.14 | 74.00 | -32.86 | peak | |

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Result: Pass

[TestMode: TX band4 a 5745 channel]; [Polarity: Vertical]



Site: Polarization: **Vertical** Temperature: (C)
 Limit: FCC Part15 (PK) Power: Humidity: %RH
 EUT: panoramic camera
 M/N: Pilot pano
 Mode: 5.4 A TX-L
 Note:

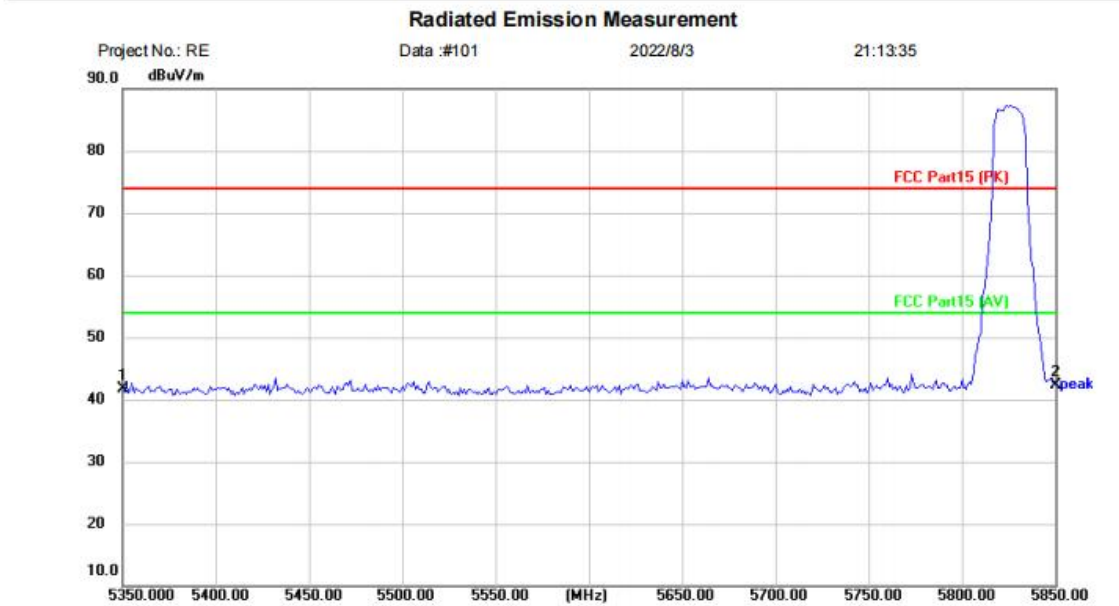
| No. | Mk. | Freq. | Reading Level | Correct Factor | Measurement | Limit | Over | Detector | Comment |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | |
| 1 | | 5350.000 | 38.87 | 1.55 | 40.42 | 74.00 | -33.58 | peak | |
| 2 | | 5460.000 | 38.91 | 1.78 | 40.69 | 74.00 | -33.31 | peak | |
| 3 | * | 5725.000 | 41.45 | 1.80 | 43.25 | 74.00 | -30.75 | peak | |
| 4 | | 5850.000 | 39.71 | 1.78 | 41.49 | 74.00 | -32.51 | peak | |

*:Maximum data x:Over limit !:over margin

<Reference Only

Test Result: Pass

[TestMode: TX band4 a 5825 channel]; [Polarity: Vertical]



Site: Polarization: **Vertical** Temperature: (C)
 Limit: FCC Part15 (PK) Power: Humidity: %RH
 EUT: panoramic camera
 M/N: Pilot pano
 Mode: 5.4 A TX-H
 Note:

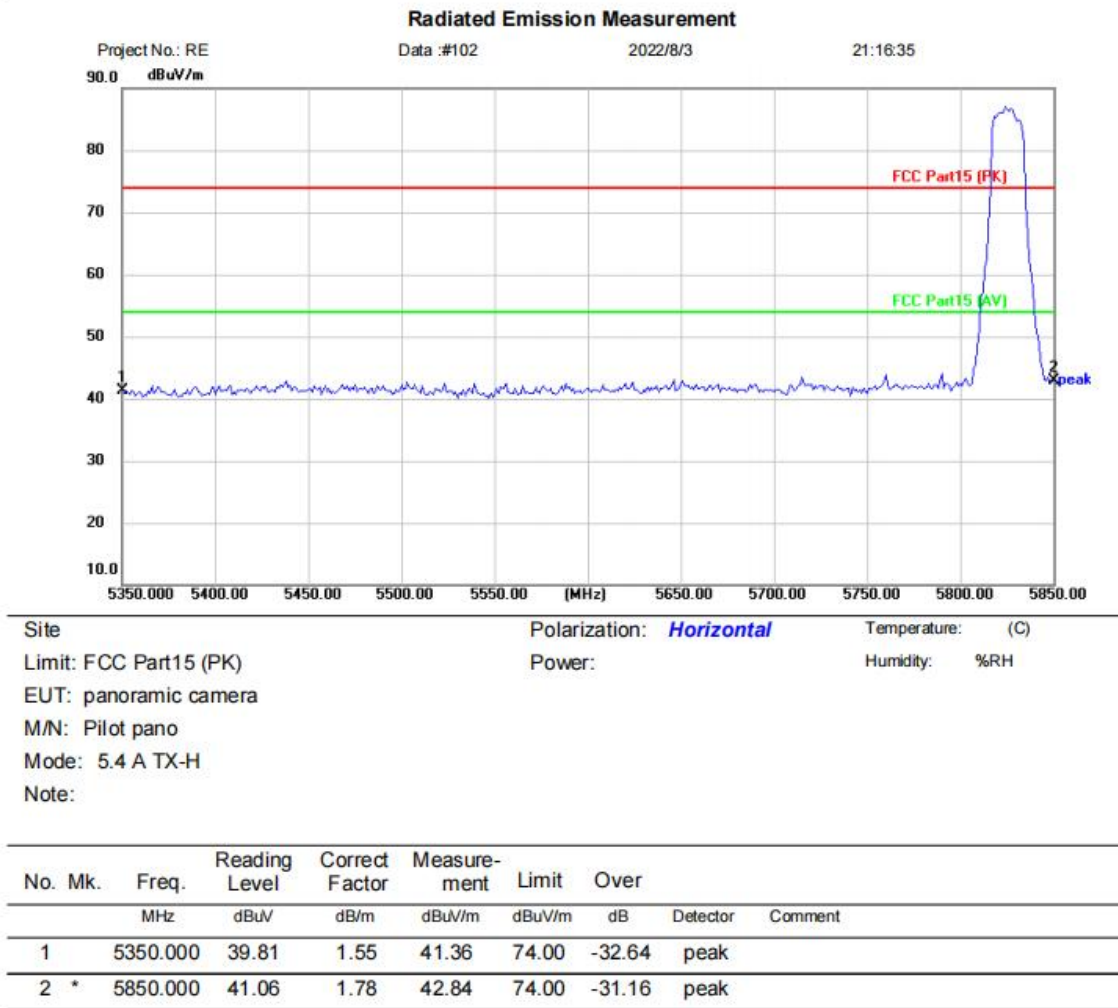
| No. | Mk. | Freq. | Reading Level | Correct Factor | Measurement | Limit | Over | Detector | Comment |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | |
| 1 | | 5350.000 | 40.21 | 1.55 | 41.76 | 74.00 | -32.24 | peak | |
| 2 | * | 5850.000 | 40.52 | 1.78 | 42.30 | 74.00 | -31.70 | peak | |

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Result: Pass

[TestMode: TX band4 a 5825 channel]; [Polarity: Horizontal]



*:Maximum data x:Over limit !:over margin

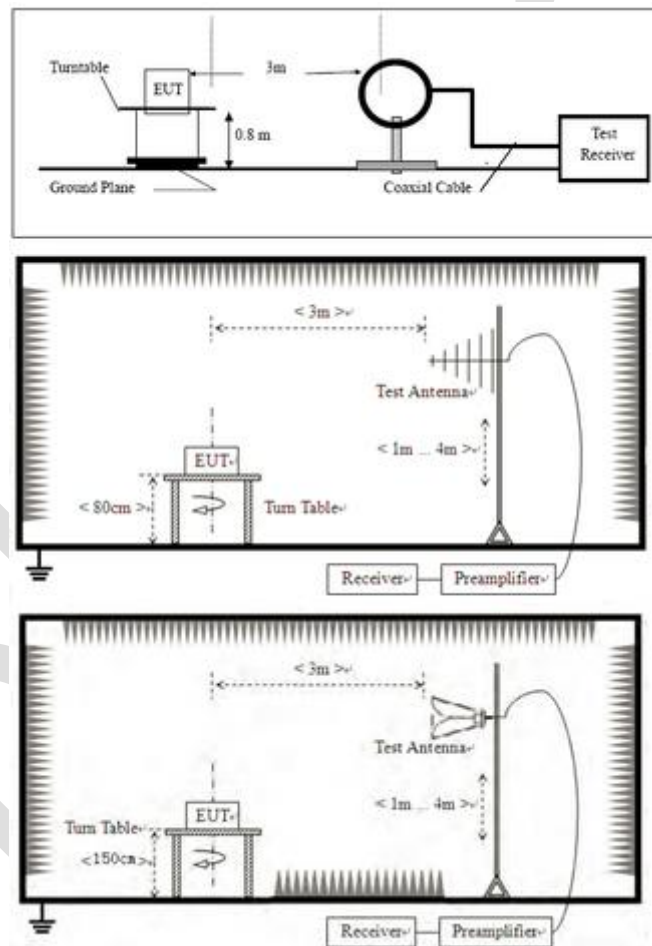
(Reference Only)

Test Result: Pass

12 RADIATED EMISSIONS

| | |
|------------------------|----------------------------------|
| Test Standard | 47 CFR Part 15, Subpart E 15.407 |
| Test Method | KDB 789033 D02 II G |
| Test Mode (Pre-Scan) | TX |
| Test Mode (Final Test) | TX |
| Tester | Charlie |
| Temperature | 25°C |
| Humidity | 60% |

12.1 BLOCK DIAGRAM OF TEST SETUP



12.2 PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the

highest radiation.

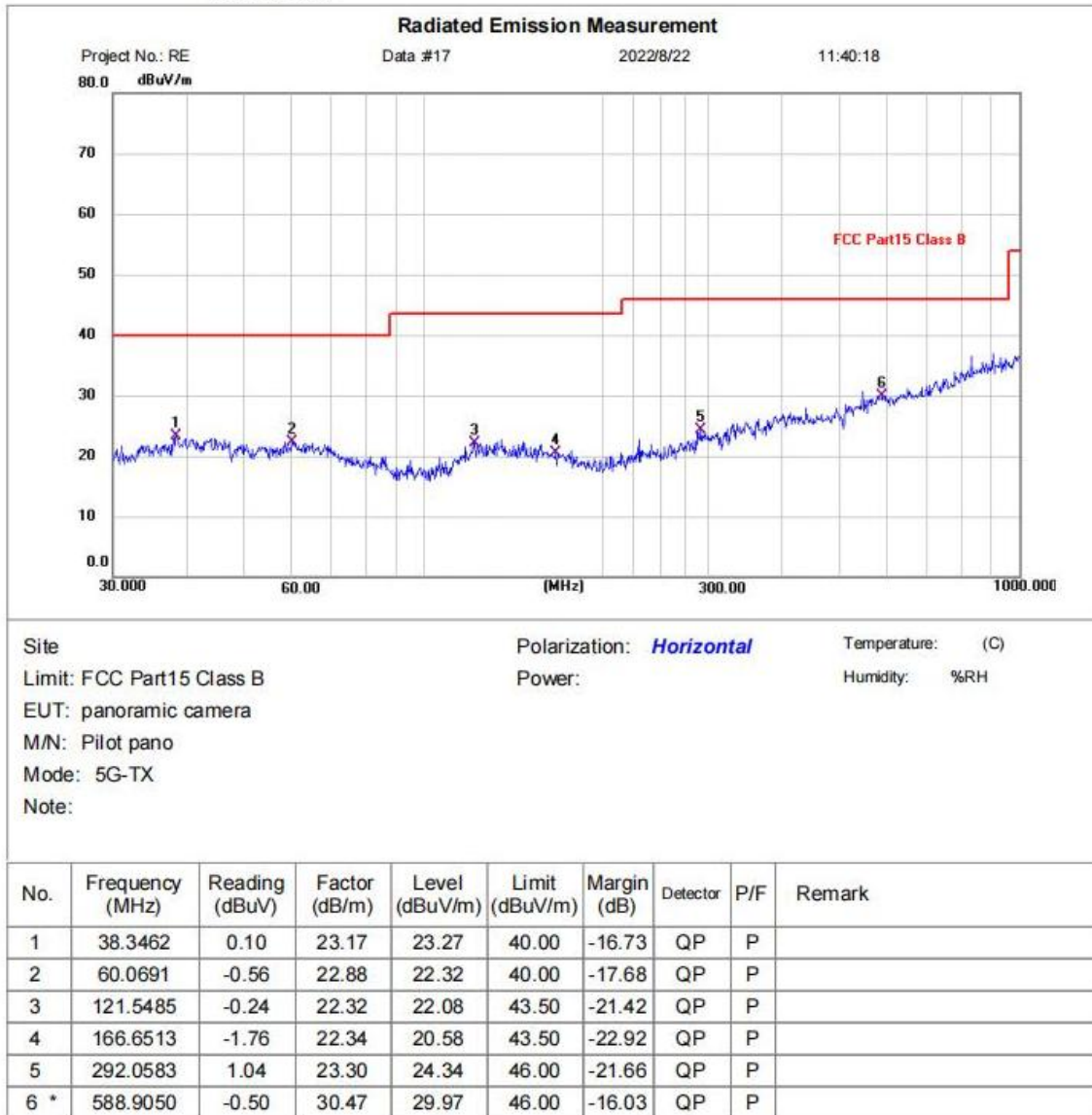
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. For emission below 1GHz, through the pre-scan found the worst case is the lowest channel of 802.11a. Only the worst case is recorded in the report.
3. Scan from 9kHz to 40GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. fundamental frequency is blocked by filter, and only spurious emission is shown.
4. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

12.3 TEST DATA

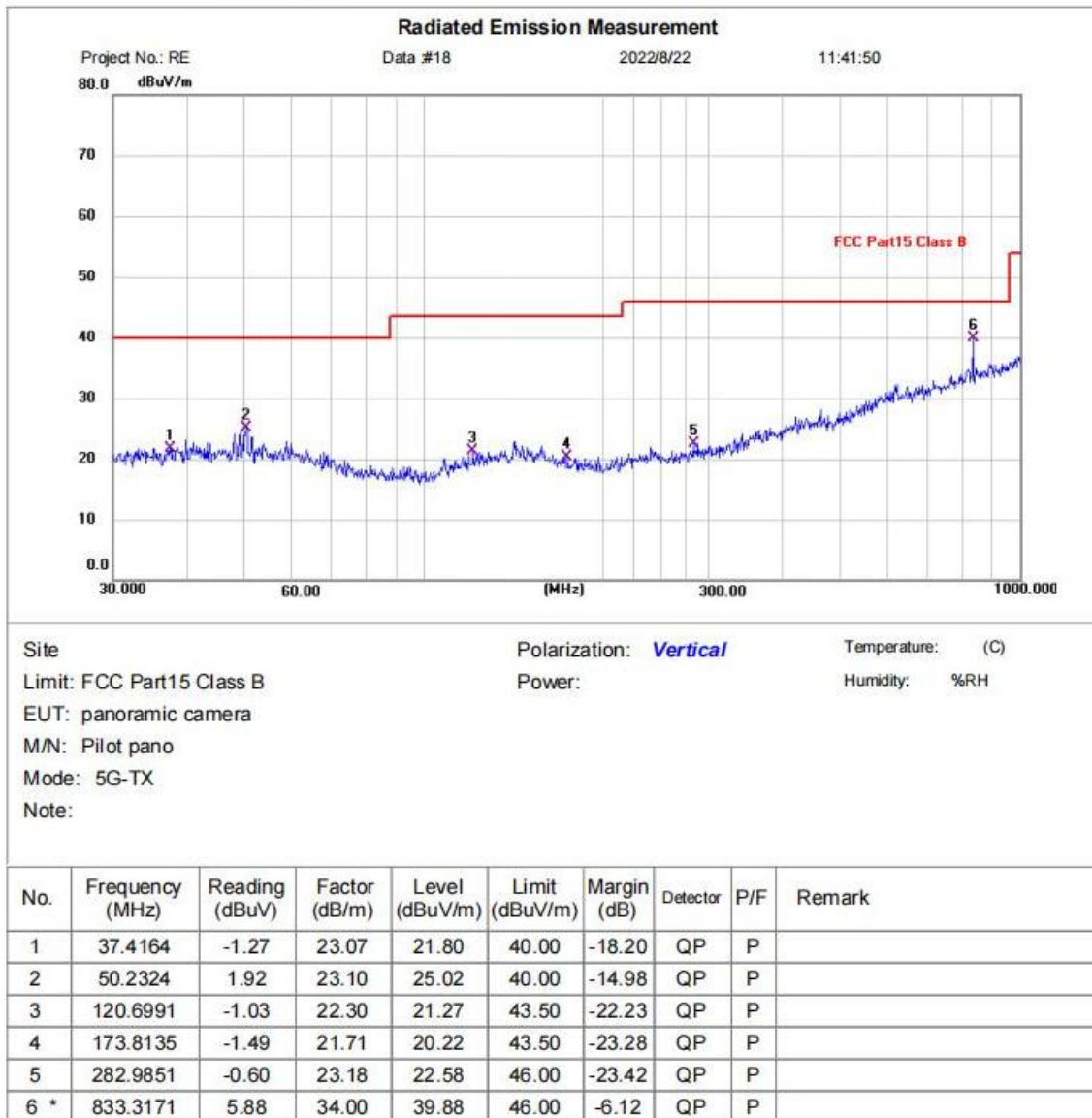
[TestMode: TX band1 below 1G]; [Polarity: Horizontal]



*:Maximum data x:Over limit !:over margin

Test Result: Pass

[TestMode: TX band1 below 1G]; [Polarity: Vertical]

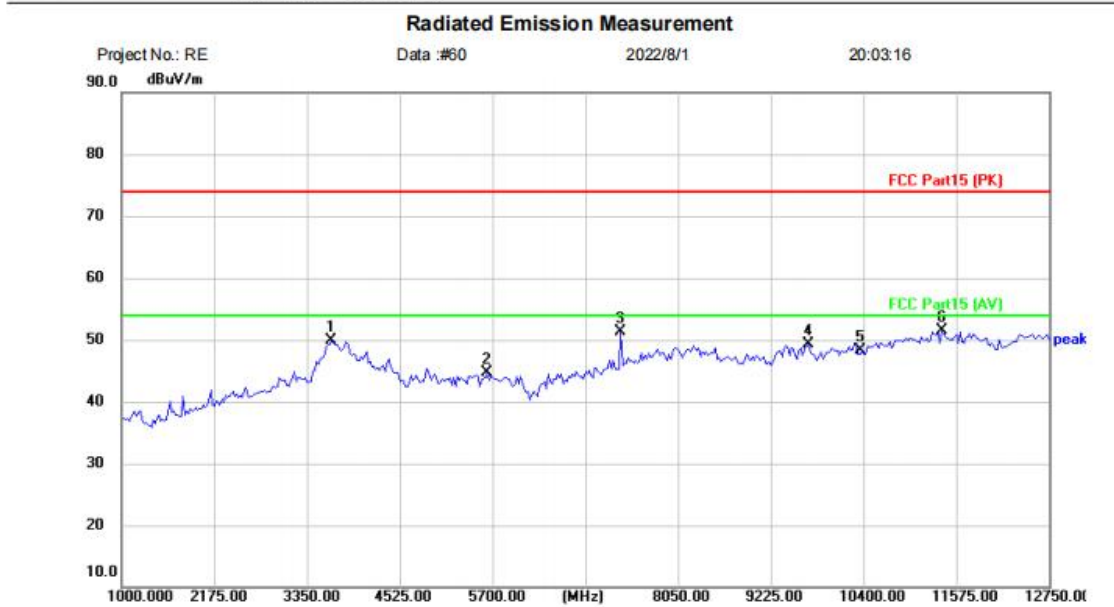


*:Maximum data x:Over limit !:over margin

Test Result: Pass

Remark: During the test, pre-scan the 802.11a/n/ac mode, and found the 802.11a mode which it is worse case.

[TestMode: TX a 5180 channel]; [Polarity: Vertical]



Site: Polarization: **Vertical** Temperature: (C)
 Limit: FCC Part15 (PK) Power: Humidity: %RH
 EUT: panoramic camera
 MN: Pilot pano
 Mode: 5.1 A TX-L
 Note:

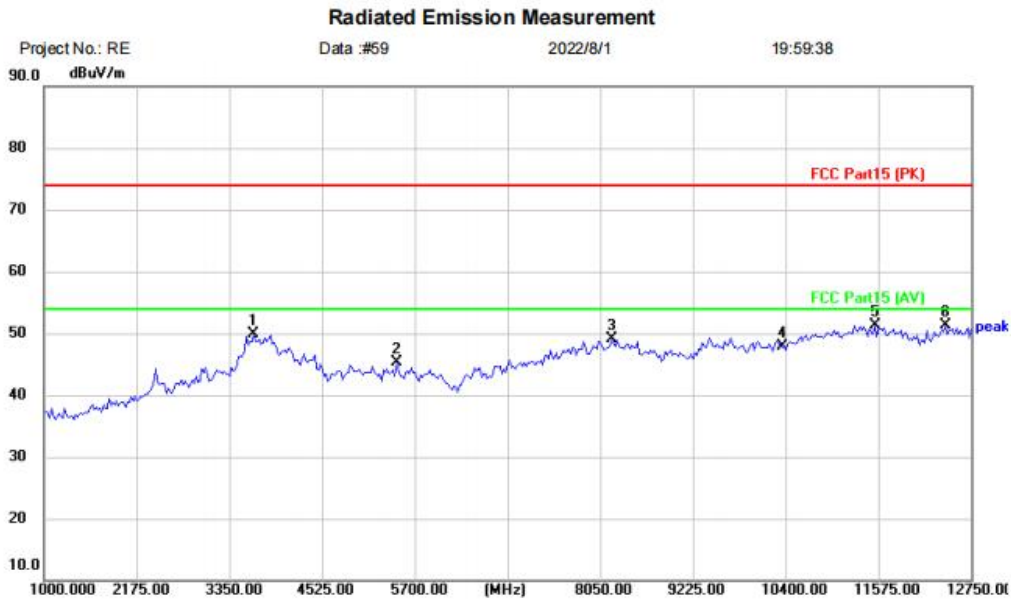
| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB/m | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Detector | Comment |
|-----|-----|--------------|--------------------------|---------------------------|----------------------------|-----------------|------------|----------|---------|
| 1 | | 3655.500 | 42.07 | 7.76 | 49.83 | 74.00 | -24.17 | peak | |
| 2 | | 5629.500 | 40.80 | 3.92 | 44.72 | 74.00 | -29.28 | peak | |
| 3 | | 7321.500 | 44.86 | 6.42 | 51.28 | 74.00 | -22.72 | peak | |
| 4 | | 9695.000 | 39.86 | 9.48 | 49.34 | 74.00 | -24.66 | peak | |
| 5 | | 10360.000 | 37.22 | 11.09 | 48.31 | 74.00 | -25.69 | peak | |
| 6 | * | 11387.000 | 39.71 | 11.78 | 51.49 | 74.00 | -22.51 | peak | |

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Result: Pass

[TestMode: TX a 5180 channel]; [Polarity: Horizontal]



Site: Polarization: **Horizontal** Temperature: (C)
 Limit: FCC Part15 (PK) Power: Humidity: %RH
 EUT: panoramic camera
 M/N: Pilot pano
 Mode: 5.1 A TX-L
 Note:

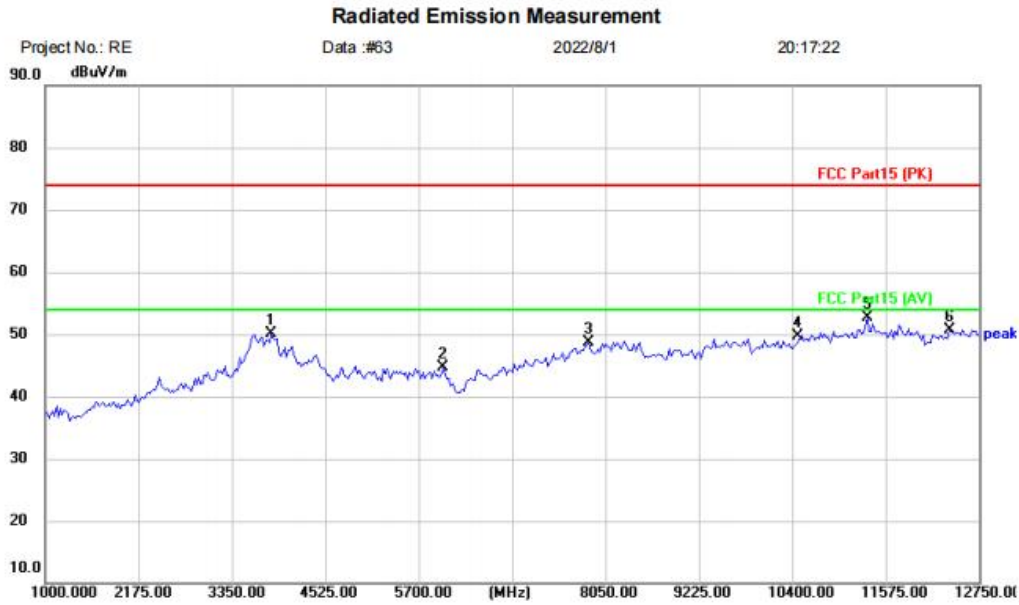
| No. | Mk. | Freq. | Reading Level | Correct Factor | Measurement | Limit | Over | Detector | Comment |
|-----|-----|-----------|---------------|----------------|-------------|--------|--------|----------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | |
| 1 | | 3655.500 | 42.11 | 7.76 | 49.87 | 74.00 | -24.13 | peak | |
| 2 | | 5465.000 | 41.16 | 4.17 | 45.33 | 74.00 | -28.67 | peak | |
| 3 | | 8191.000 | 40.82 | 8.20 | 49.02 | 74.00 | -24.98 | peak | |
| 4 | | 10360.000 | 36.79 | 11.09 | 47.88 | 74.00 | -26.12 | peak | |
| 5 | | 11528.000 | 39.36 | 11.95 | 51.31 | 74.00 | -22.69 | peak | |
| 6 | * | 12421.000 | 39.56 | 11.79 | 51.35 | 74.00 | -22.65 | peak | |

*:Maximum data x:Over limit !:over margin

<Reference Only

Test Result: Pass

[TestMode: TX a 5240 channel]; [Polarity: Vertical]



Site: Polarization: **Vertical** Temperature: (C)
 Limit: FCC Part15 (PK) Power: Humidity: %RH
 EUT: panoramic camera
 M/N: Pilot pano
 Mode: 5.1 A TX-H
 Note:

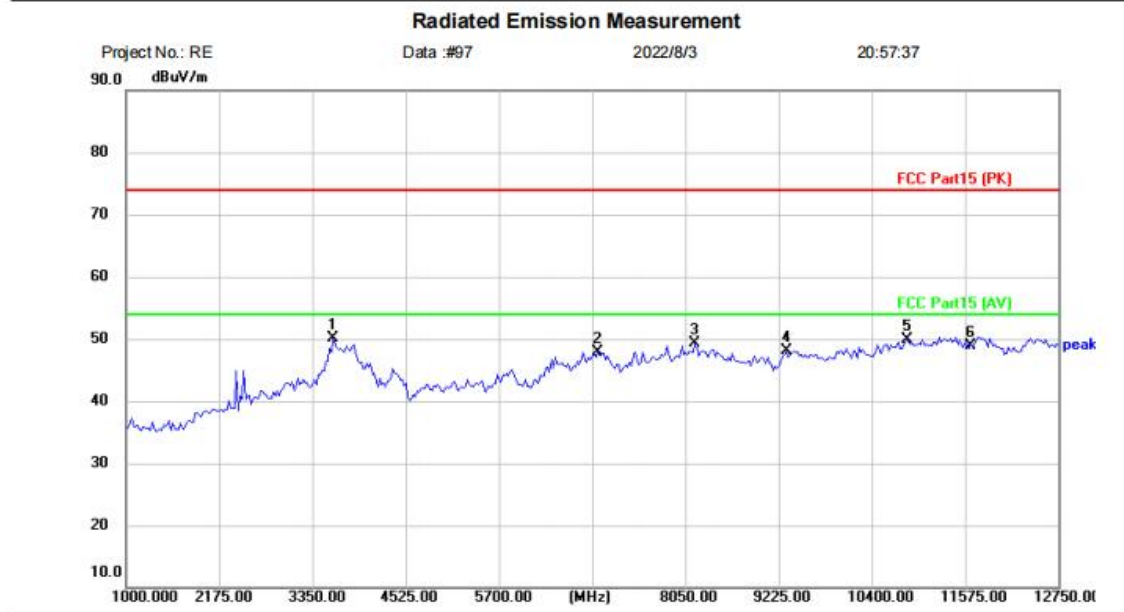
| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB/m | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Detector | Comment |
|-----|-----|--------------|--------------------------|---------------------------|----------------------------|-----------------|------------|----------|---------|
| 1 | | 3843.500 | 42.92 | 7.12 | 50.04 | 74.00 | -23.96 | peak | |
| 2 | | 6005.500 | 43.66 | 0.98 | 44.64 | 74.00 | -29.36 | peak | |
| 3 | | 7838.500 | 40.88 | 7.75 | 48.63 | 74.00 | -25.37 | peak | |
| 4 | | 10480.000 | 38.54 | 11.18 | 49.72 | 74.00 | -24.28 | peak | |
| 5 | * | 11340.000 | 40.82 | 11.85 | 52.67 | 74.00 | -21.33 | peak | |
| 6 | | 12374.000 | 39.03 | 11.72 | 50.75 | 74.00 | -23.25 | peak | |

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Result: Pass

[TestMode: TX a 5825 channel]; [Polarity: Horizontal]



Site: Polarization: **Horizontal** Temperature: (C)
 Limit: FCC Part15 (PK) Power: Humidity: %RH
 EUT: panoramic camera
 M/N: Pilot pano
 Mode: 5.4 A TX-H
 Note:

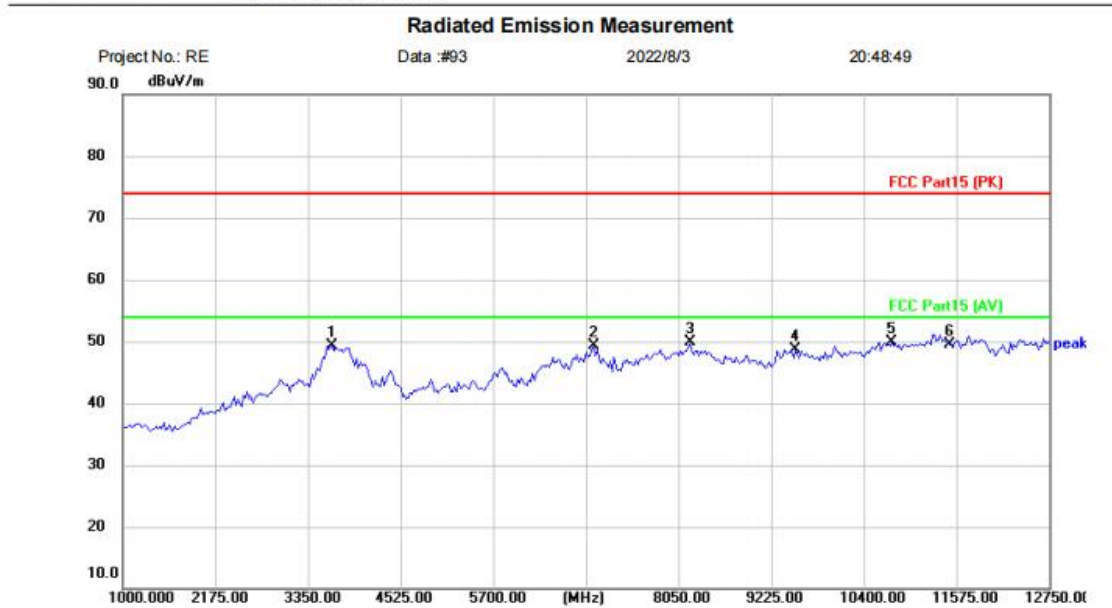
| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB/m | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Detector | Comment |
|-----|-----|--------------|--------------------------|---------------------------|----------------------------|-----------------|------------|----------|---------|
| 1 | * | 3608.500 | 42.57 | 7.53 | 50.10 | 74.00 | -23.90 | peak | |
| 2 | | 6945.500 | 39.96 | 8.02 | 47.98 | 74.00 | -26.02 | peak | |
| 3 | | 8167.500 | 41.16 | 8.17 | 49.33 | 74.00 | -24.67 | peak | |
| 4 | | 9319.000 | 39.42 | 8.72 | 48.14 | 74.00 | -25.86 | peak | |
| 5 | | 10846.500 | 37.99 | 11.84 | 49.83 | 74.00 | -24.17 | peak | |
| 6 | | 11650.000 | 36.88 | 11.93 | 48.81 | 74.00 | -25.19 | peak | |

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Result: Pass

[TestMode: TX a 5745 channel]; [Polarity: Horizontal]



Site: Polarization: **Horizontal** Temperature: (C)
 Limit: FCC Part15 (PK) Power: Humidity: %RH
 EUT: panoramic camera
 M/N: Pilot pano
 Mode: 5.4 A TX-L
 Note:

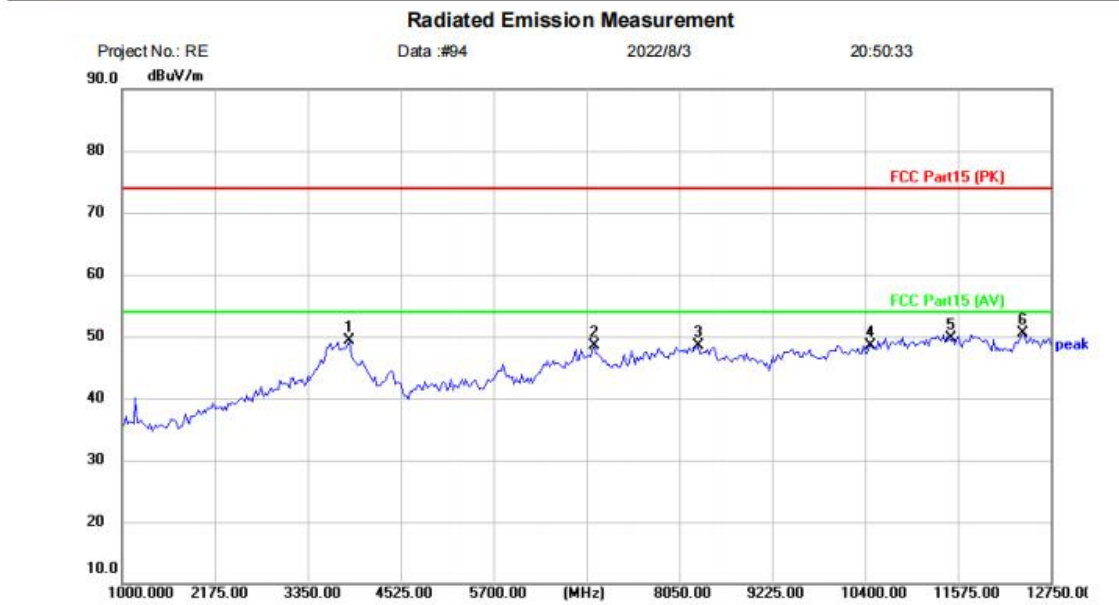
| No. | Mk. | Freq. | Reading Level | Correct Factor | Measurement | Limit | Over | Detector | Comment |
|-----|-----|-----------|---------------|----------------|-------------|--------|--------|----------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | |
| 1 | | 3655.500 | 41.91 | 7.42 | 49.33 | 74.00 | -24.67 | peak | |
| 2 | | 6969.000 | 41.22 | 8.05 | 49.27 | 74.00 | -24.73 | peak | |
| 3 | * | 8191.000 | 41.76 | 8.20 | 49.96 | 74.00 | -24.04 | peak | |
| 4 | | 9530.500 | 39.55 | 9.12 | 48.67 | 74.00 | -25.33 | peak | |
| 5 | | 10752.500 | 38.33 | 11.62 | 49.95 | 74.00 | -24.05 | peak | |
| 6 | | 11490.000 | 37.69 | 11.89 | 49.58 | 74.00 | -24.42 | peak | |

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Result: Pass

[TestMode: TX a 5745 channel]; [Polarity: Vertical]



Project No.: RE Data :#94 2022/8/3 20:50:33

Site: Polarization: **Vertical** Temperature: (C)

Limit: FCC Part15 (PK) Power: Humidity: %RH

EUT: panoramic camera

M/N: Pilot pano

Mode: 5.4 A TX-L

Note:

| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB/m | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Detector | Comment |
|-----|-----|--------------|--------------------------|---------------------------|----------------------------|-----------------|------------|----------|---------|
| 1 | | 3867.000 | 42.88 | 6.39 | 49.27 | 74.00 | -24.73 | peak | |
| 2 | | 6969.000 | 40.49 | 8.05 | 48.54 | 74.00 | -25.46 | peak | |
| 3 | | 8285.000 | 40.27 | 8.24 | 48.51 | 74.00 | -25.49 | peak | |
| 4 | | 10470.500 | 37.32 | 11.18 | 48.50 | 74.00 | -25.50 | peak | |
| 5 | | 11490.000 | 37.75 | 11.89 | 49.64 | 74.00 | -24.36 | peak | |
| 6 | * | 12397.500 | 38.67 | 11.78 | 50.45 | 74.00 | -23.55 | peak | |

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Result: Pass

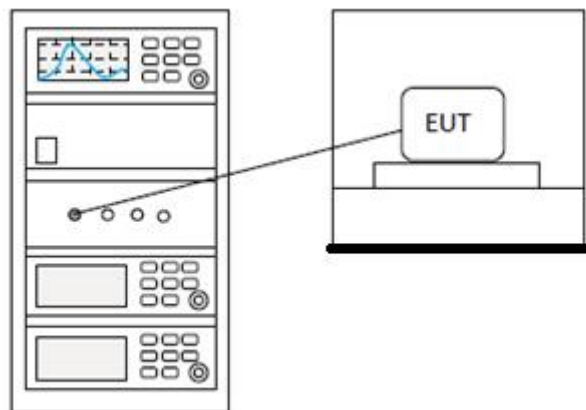
13 PEAK POWER SPECTRUM DENSITY

| | |
|-------------------------------|----------------------------------|
| Test Standard | 47 CFR Part 15, Subpart E 15.407 |
| Test Method | KDB 789033 D02 II F |
| Test Mode (Pre-Scan) | TX |
| Test Mode (Final Test) | TX |
| Tester | Charlie |
| Temperature | 25°C |
| Humidity | 60% |

13.1 LIMITS

| Frequency band(MHz) | Limit |
|---------------------|--|
| 5150-5250 | ≤17dBm in 1MHz for master device |
| | ≤11dBm in 1MHz for client device |
| 5250-5350 | ≤11dBm in 1MHz for client device |
| 5470-5725 | ≤11dBm in 1MHz for client device |
| 5725-5850 | ≤30dBm in 500 kHz |
| Remark: | The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. |

13.2 BLOCK DIAGRAM OF TEST SETUP



13.3 TEST DATA

Pass: Please Refer To Appendix: Appendix1 For Details

BlueAsia