# APPLICATION FOR ELECTROMAGNETIC COMPATIBILITY DIRECTIVE

On Behalf of

## Shenzhen Yide Technology Co., Ltd

## Gaming keyboard

## Model No.: SKY 2040PLUS, SKY 2040, IT-GK03

| | | |
|---|---|---|
| Prepared for | : | Shenzhen Yide Technology Co., Ltd |
| Address | : | 302, 3rd Floor, Building A2, Weifu Industrial Park, No.36 Jianan Road, Zhancheng Community, Fuhai Street, Baoan District, Shenzhen |

| | | |
|---|---|---|
| Prepared By | : | Shenzhen Alpha Product Testing Co., Ltd. |
| Address | : | Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China |

| | | |
|---|---|---|
| Report Number | : | A2404019-C02-R02 |
| Date of Receipt | : | April 15, 2024 |
| Date of Test | : | April 16, 2024 |
| Date of Report | : | April 22, 2024 |
| Version Number | : | V0 |
| **Test Result** | **:** | **Pass** |

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# TEST REPORT DECLARATION

| | | |
|---|---|---|
| Applicant | : | Shenzhen Yide Technology Co., Ltd |
| Address | : | 302, 3rd Floor, Building A2, Weifu Industrial Park, No.36 Jianan Road, Zhancheng Community, Fuhai Street, Baoan District, Shenzhen |
| Manufacturer | : | Shenzhen Yide Technology Co., Ltd |
| Address | : | 302, 3rd Floor, Building A2, Weifu Industrial Park, No.36 Jianan Road, Zhancheng Community, Fuhai Street, Baoan District, Shenzhen |
| EUT Description | : | Gaming keyboard |
| | | (A) Model No. : SKY 2040PLUS, SKY 2040, IT-GK03 |
| | | (B) Trademark : N/A |

Measurement Standard Used:

**J 55032(H29)**

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with the J 55032(H29) requirements.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....: Jerry Yin
Project Engineer

Approved by (name + signature).....: Reak Yang
Project Manager

Date of issue.....: April 22, 2024

# Revision History

| Revision | Issue Date | Revisions | Revised By |
|---|---|---|---|
| V0 | April 22, 2024 | Initial released Issue | Jerry Yin |

# 1. Summary Of Standards And Results

## 1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

| EMISSION | | | |
|---|---|---|---|
| **Description of Test Item** | **Standard** | **Limits** | **Results** |
| Power Line Conducted Emission Test | J 55032(H29) | Annex A.2 | P |
| Radiated Emission Test | J 55032(H29) | Annex A.3 | P |

Note: 1. P is an abbreviation for Pass.

2. F is an abbreviation for Fail.

3. N/A is an abbreviation for Not Applicable.

4. Decision rules for the conclusion of this test report: decision by actual test data without considering measurement uncertainty.

# 2. General Information

## 2.1. Description of Device (EUT)

| | | |
|---|---|---|
| Description | : | Gaming keyboard |
| Model Number | : | SKY 2040PLUS, SKY 2040, IT-GK03 |
| Diff | : | There is no difference except the name of the model. All tests are made with the SKY 2040PLUS model. |
| Test voltage | : | DC 5V From PC |
| EUT Information | : | Input:DC 5V |
| Highest frequency | : | More than 108MHz |
| Software version | : | N/A |
| Hardware version | : | N/A |

## 2.2. Accessories of Device (EUT)

| | | |
|---|---|---|
| Power Source | : | N/A |

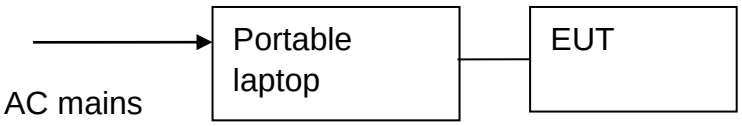
## 2.3. Tested Supporting System Details

| No. | Description | Manufacturer | Model | Serial Number | Certification or DOC |
|---|---|---|---|---|---|
| 1. | Portable laptop | Lenovo | Think Centre M710s-N00 | M905AGT8 | N/A |

## 2.4. Block Diagram of connection between EUT and simulators

**For Test**

For Working Test




| Signal Cable Description of the above Support Units | | | | | |
|---|---|---|---|---|---|
| **No.** | **Port Name** | **Cable** | **Length** | **Shielded (Yes or No)** | **Detachable (Yes or No)** |
| 1 | N/A | N/A | N/A | N/A | N/A |

**EUT: Gaming keyboard**

## 2.5. Test mode Description

| No. | Test Mode | Test Voltage |
|---|---|---|
| Mode 1 | Data transmission | DC 5V From PC |
| Mode 2 | Standby | DC 5V From PC |
| Note: Mode 1 is worst case mode tests, so this report only reflected the worst mode in this part. | | |

## 2.6. Test Facility

Shenzhen Alpha Product Testing Co., Ltd.

Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

## 2.7. Measurement Uncertainty

| Test Item | Uncertainty | $U_{cispr}$ |
|---|---|---|
| Uncertainty for Conduction emission test | 1.63dB | 3.8 dB |
| Uncertainty for Radiation Emission test (<1G) | 3.74 dB (Distance: 3m Polarize: V) | 5.2 dB |
| | 3.76 dB (Distance: 3m Polarize: H) | |
| Uncertainty for Radiation Emission test (>1G) | 3.77 dB (Distance: 3m Polarize: V) | 5.2 dB |
| | 3.80 dB (Distance: 3m Polarize: H) | |
| (95% confidence levels, k=2) | | |

## 2.8. Test Equipment List

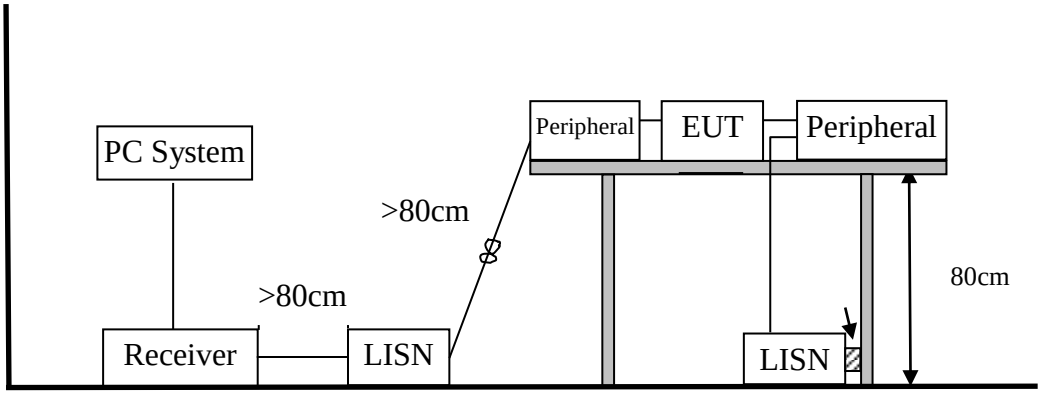
| For Conducted Disturbance At Mains Terminals Test Equipment: | | | | | | |
|---|---|---|---|---|---|---|
| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
| 1. | Test Receiver | Rohde & Schwarz | ESCI | 101165 | 2023.08.16 | 1 Year |
| 2. | L.I.S.N.#1 | Schwarz beck | NSLK8126 | 8126466 | 2023.08.16 | 1 Year |
| 3. | L.I.S.N.#2 | ROHDE&SCHWARZ | ENV216 | 101043 | 2023.08.16 | 1 Year |
| 4. | Pulse Limiter | Schwarz beck | 9516F | 9618 | 2023.08.16 | 1 Year |

| For Frequency Range 30MHz~1GHz Radiated Emission Test Equipment: | | | | | | |
|---|---|---|---|---|---|---|
| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
| 1 | Test Receiver | Rohde&Schwarz | ESR | 1316.3003K03-102082-Wa | 2023.08.16 | 1 Year |
| 3 | Bilog Antenna | Schwarz beck | VULB 9168 | 9168-627 | 2023.08.28 | 2 Year |

| For Frequency Range above 1GHz Radiated Emission Test Equipment: | | | | | | |
|---|---|---|---|---|---|---|
| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
| 1 | Spectrum analyzer | Rohde&Schwarz | FSV40-N | 102137 | 2023.08.16 | 1 Year |
| 2 | Horn Antenna | Schwarz beck | BBHA 9120 D | 2106 | 2023.08.19 | 2 Year |
| 3 | Amplifier | Agilent | 8449B | 3008A02664 | 2023.08.16 | 1 Year |

# 3. Power Line Conducted Emission Test

## 3.1. Block Diagram of Test Setup




## 3.2. Power Line Conducted Emission Test Limits

| Frequency | Maximum RF Line Voltage | |
|---|---|---|
| | Quasi-Peak Level dB(μV) | Average Level dB(μV) |
| 150kHz ~ 500kHz | 66 ~ 56* | 56 ~ 46* |
| 500kHz ~ 5MHz | 56 | 46 |
| 5MHz ~ 30MHz | 60 | 50 |

Notes: 1. Emission level=Read level + LISN factor-Preamp factor + Cable loss

2. * Decreasing linearly with logarithm of frequency.

3. The lower limit shall apply at the transition frequencies.

## 3.3. Configuration of EUT on Test

The following equipment are installed on Power Line Conducted Emission Test to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

## 3.4. Operating Condition of EUT

（1） Setup the EUT as shown as Section 3.2.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode and 15 minutes before taking the test.

## 3.5. Test Procedure

（1） The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#). This provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N.#2). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to J55032 on conducted Emission test.

（2） The frequency range from 150kHz to 30MHz is checked, the bandwidth of test receiver (R&S TEST RECEIVER ESCI) is set at 9kHz.

（3） The frequency range from 30MHz to 1000MHz was pre-scanned with a Peak detector and all final readings of measurement from Test Receiver are Quasi-Peak and Average values.

（4） The test results are reported on Section 3.7.

## 3.6. Conducted Disturbance at Mains Terminals Test Results

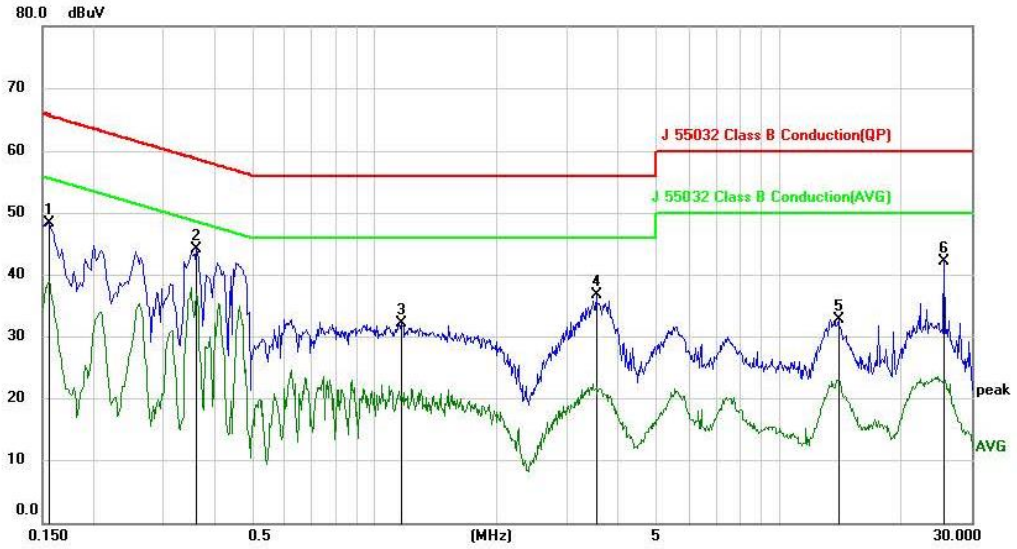
| | | | | | |
|---|---|---|---|---|---|
| EUT | : | Gaming keyboard | Test Date | : | 2024.4.16 |
| M/N | : | SKY 2040PLUS | Temperature | : | 23.5℃ |
| Test Engineer | : | Jerry Yin | Humidity | : | 61% |
| Test Voltage | : | DC 5V From PC | | | |
| Test Mode | : | Data transmission | | | |
| Test Results | : | **PASS** | | | |

Note: 1. The test results are listed in next pages.

2. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector and quasi-peak detector need not be carried out.

3. If the limits for the measurement with the average detector are met when using a receiver with a quasi-peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.

# Polarization: Line

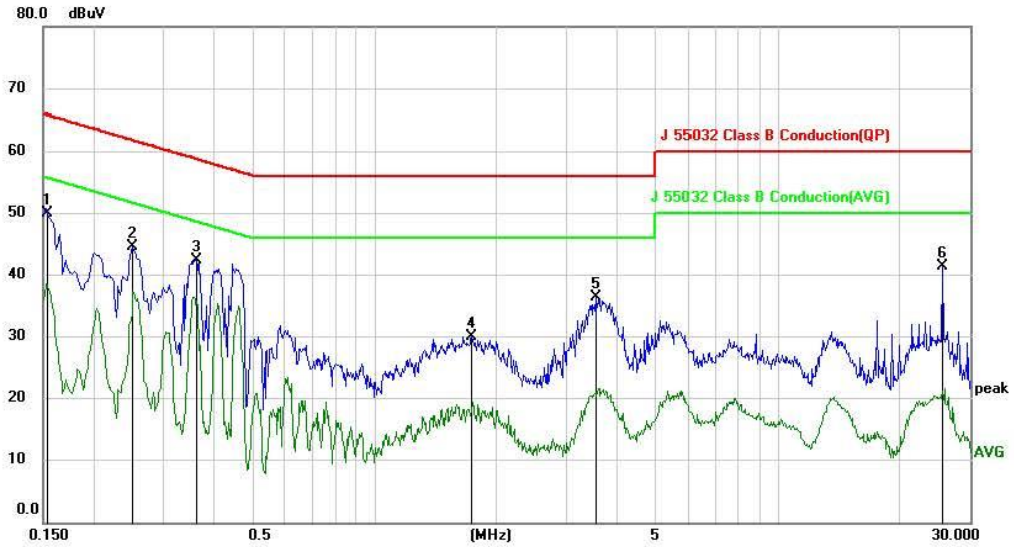



| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1560 | 38.31 | 9.94 | 48.25 | 65.67 | -17.42 | peak | |
| 2 | * | 0.3630 | 34.14 | 9.95 | 44.09 | 58.66 | -14.57 | peak | |
| 3 | | 1.1610 | 22.20 | 9.89 | 32.09 | 56.00 | -23.91 | peak | |
| 4 | | 3.5370 | 26.70 | 9.96 | 36.66 | 56.00 | -19.34 | peak | |
| 5 | | 14.0610 | 22.48 | 10.31 | 32.79 | 60.00 | -27.21 | peak | |
| 6 | | 25.6050 | 31.73 | 10.47 | 42.20 | 60.00 | -17.80 | peak | |

*:Maximum data x:Over limit !:over margin 〈Reference Only

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

# Polarization: Neutral




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | * | 0.1539 | 39.92 | 9.94 | 49.86 | 65.79 | -15.93 | peak | |
| 2 | | 0.2519 | 34.49 | 9.97 | 44.46 | 61.69 | -17.23 | peak | |
| 3 | | 0.3630 | 32.41 | 9.95 | 42.36 | 58.66 | -16.30 | peak | |
| 4 | | 1.7400 | 19.98 | 9.89 | 29.87 | 56.00 | -26.13 | peak | |
| 5 | | 3.5610 | 26.27 | 9.96 | 36.23 | 56.00 | -19.77 | peak | |
| 6 | | 25.6050 | 30.86 | 10.47 | 41.33 | 60.00 | -18.67 | peak | |

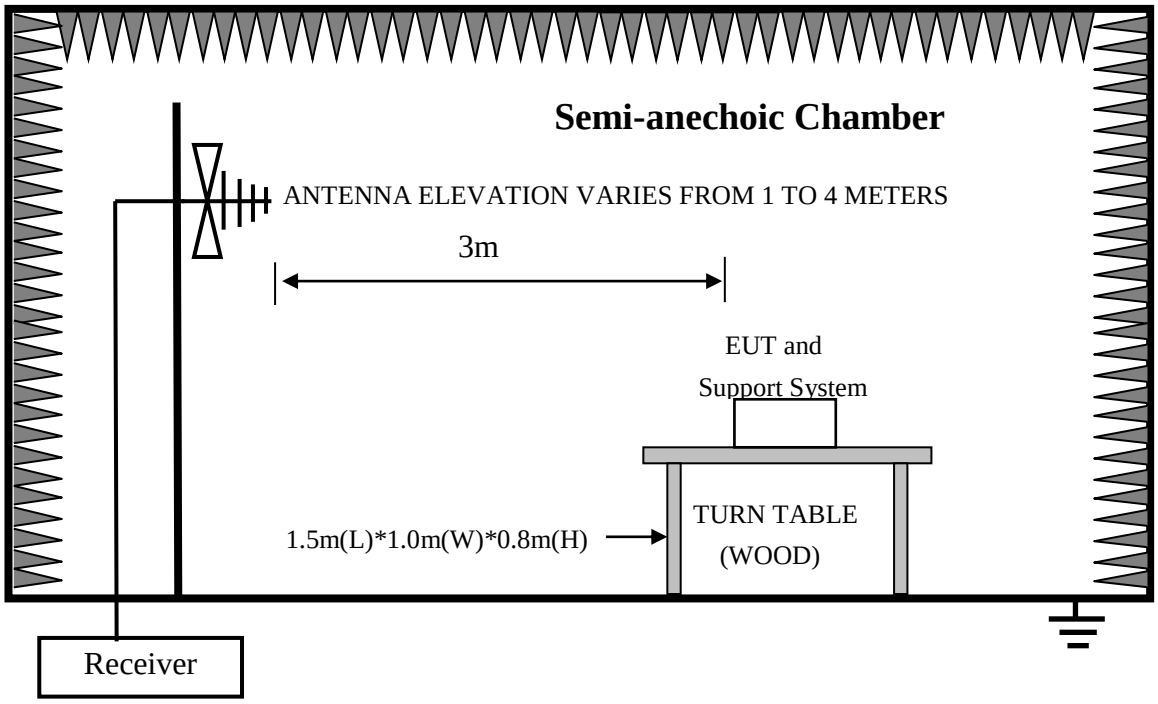
*:Maximum data x:Over limit !:over margin 〈Reference Only

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

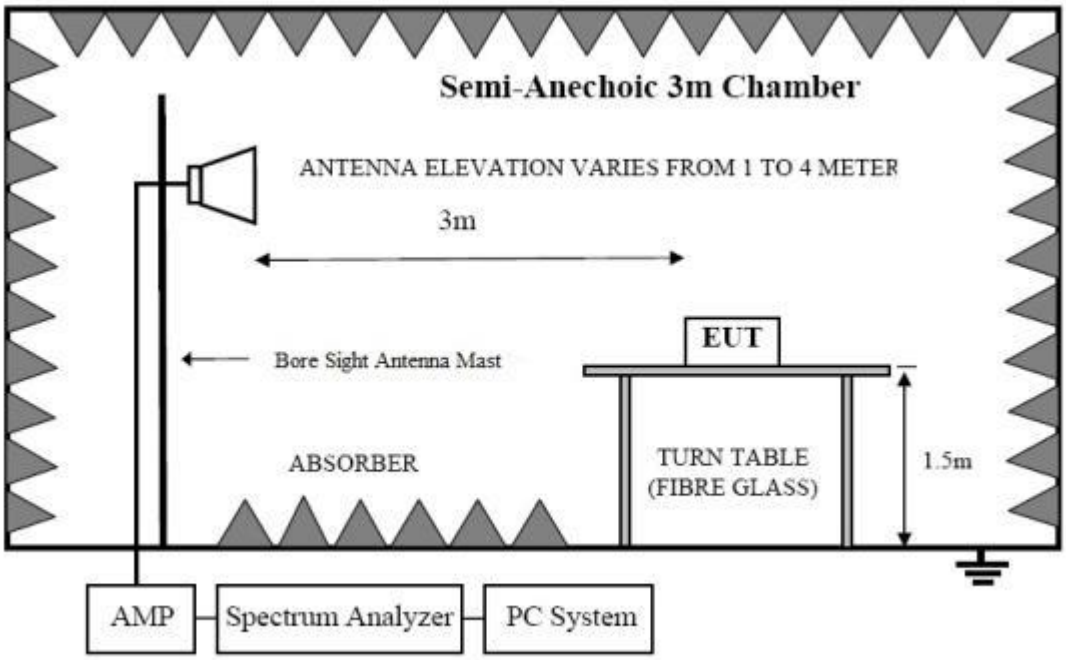
# 4. Radiated Emission Test

## 4.1. Block Diagram of Test Setup

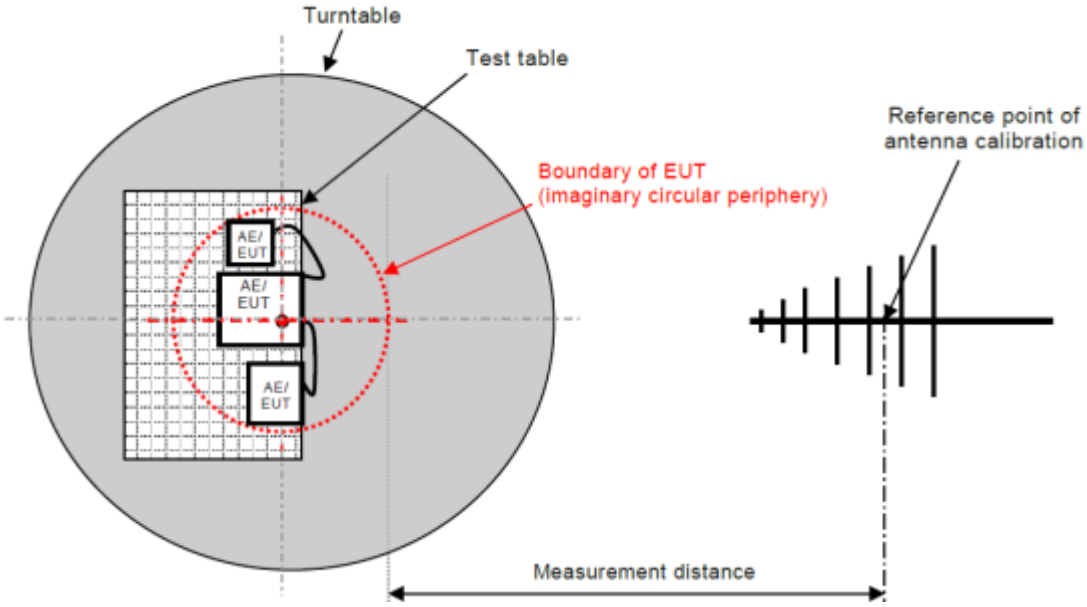
In Semi Anechoic Chamber (3m) Test Setup Diagram for 30MHz~1000MHz




In Semi Anechoic Chamber (3m) Test Setup Diagram for Above 1GHz




For 3m distance description:




## 4.2. Radiated Emission Limit

| Frequency MHz | | | Distance (Meters) | Field Strengths Limits dB(μV)/m |
|---|---|---|---|---|
| 30 | ~ | 230 | 3 | 40 |
| 230 | ~ | 1000 | 3 | 47 |
| 1000 | ~ | 3000 | 3 | 70(Peak) 50(Average) |
| 3000 | ~ | 6000 | 3 | 74(Peak) 54(Average) |

Notes: 1. Emission level = Read level + Antenna Factor - Preamp Factor + Cable Loss

2. The smaller limit shall apply at the cross point between two frequency bands.

3. Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

4. Frequency range of radiated measurements:

| Highest frequency generated or used in the device or on which the device operates or tunes (MHz) | Upper frequency of measurement range (MHz) |
|---|---|
| Below 108 | 1000 |
| 108-500 | 2000 |
| 500-1000 | 5000 |
| Above 1000 | 5th harmonic of the highest frequency or 6 GHz, whichever is lower. |

## 4.3. Configuration of EUT on Test

The following equipment are installed on Radiated Emission Test to meet the commission requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

## 4.4. Operating Condition of EUT

（1） Setup the EUT as shown as Section 4.2.

（2） Turn on the power of all equipment.

（3） Let the EUT work in test mode and 15 minutes before taking the test.

## 4.5. Test Procedure

（1） The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. An antenna was located 3m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to J55022 on Radiated Emission test.

（2） For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement 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 measurement antenna elevation shall be that which maximizes the emissions. The measurement 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.

（3） The frequency range from 30MHz to 1000MHz is checked, the bandwidth of test receiver (R&S TEST RECEIVER ESR) is set at 120kHz.

（4） The frequency range from above 1GHz is checked, the bandwidth of spectrum analyzer (Analyzer Spectrum Analyzer FSV40-N) is set at 1MHz.

（5） The frequency range from 30MHz to 1000MHz was pre-scanned with a peak detector and all final readings of measurement from Test Receiver are Quasi-Peak values, the frequency range from 1GHz to 6GHz was pre-scanned with a peak detector and all final readings of measurement from Spectrum Analyzer are peak and average values checked, all measurement distance is 3m in 3m semi anechoic chamber.

（6） The test results are reported on Section 4.7.

## 4.6. Radiated Disturbance Test Results

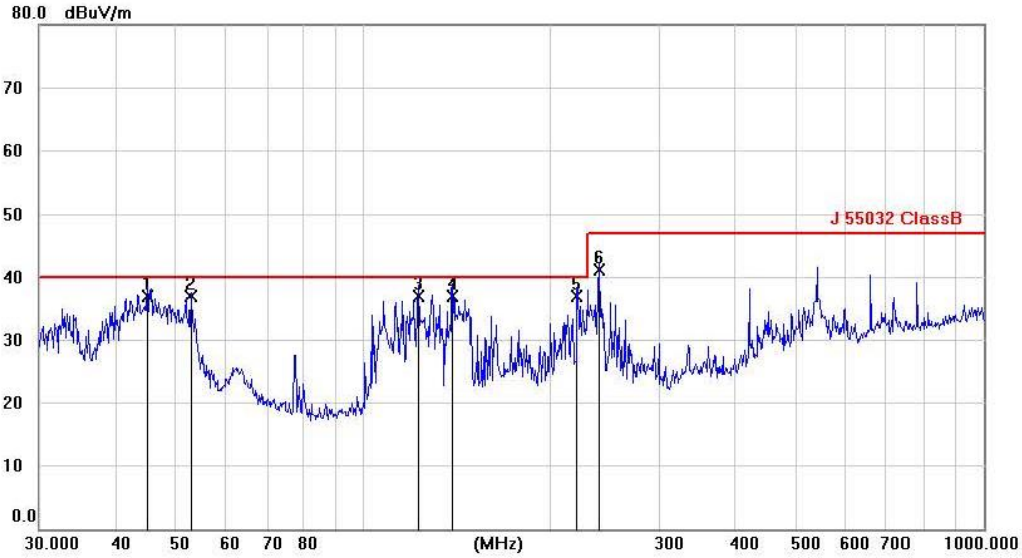
| | | | | | |
|---|---|---|---|---|---|
| Frequency Range | : | **30MHz~1000MHz** | | | |
| EUT | : | Gaming keyboard | Test Date | : | 2024.4.16 |
| M/N | : | SKY 2040PLUS | Temperature | : | 23.5℃ |
| Test Engineer | : | Jerry Yin | Humidity | : | 51% |
| Test Voltage | : | DC 5V From PC | | | |
| Test Mode | : | Data transmission | | | |
| Test Results | : | **PASS** | | | |

Note: 1. The test results are listed in next pages.

2. This mode is worst case mode, so this report only reflected the worst mode.

3. If the limits for the measurement with the quasi-peak detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet limits and the measurement with the quasi-peak detector need not be carried out.

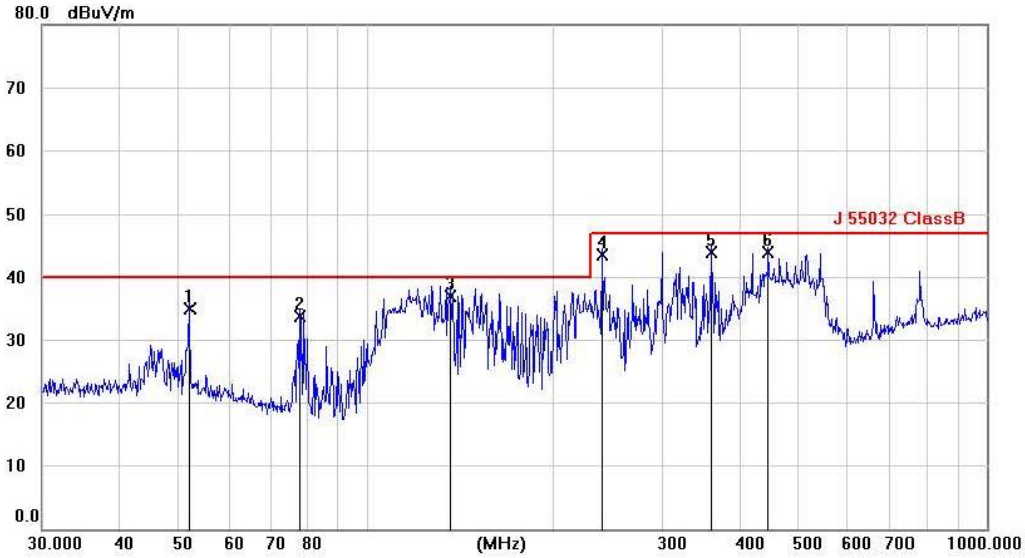
# Antenna polarity: Vorizontal




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | | 44.9950 | 22.77 | 14.10 | 36.87 | 40.00 | -3.13 | QP | | | |
| 2 | | 52.7600 | 23.11 | 13.76 | 36.87 | 40.00 | -3.13 | QP | | | |
| 3 | | 123.1358 | 23.60 | 13.21 | 36.81 | 40.00 | -3.19 | QP | | | |
| 4 | * | 139.7033 | 22.68 | 14.29 | 36.97 | 40.00 | -3.03 | QP | | | |
| 5 | | 220.7718 | 25.10 | 11.78 | 36.88 | 40.00 | -3.12 | QP | | | |
| 6 | | 239.9873 | 28.52 | 12.55 | 41.07 | 47.00 | -5.93 | QP | | | |

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

# Antenna polarity: Hertical




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | | 51.9703 | 21.07 | 13.88 | 34.95 | 40.00 | -5.05 | QP | | | |
| 2 | | 78.4133 | 23.63 | 10.07 | 33.70 | 40.00 | -6.30 | QP | | | |
| 3 | | 137.0352 | 22.77 | 14.10 | 36.87 | 40.00 | -3.13 | QP | | | |
| 4 | | 239.9873 | 31.02 | 12.55 | 43.57 | 47.00 | -3.43 | QP | | | |
| 5 | * | 360.0686 | 28.56 | 15.43 | 43.99 | 47.00 | -3.01 | QP | | | |
| 6 | | 445.9447 | 26.39 | 17.47 | 43.86 | 47.00 | -3.14 | QP | | | |

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

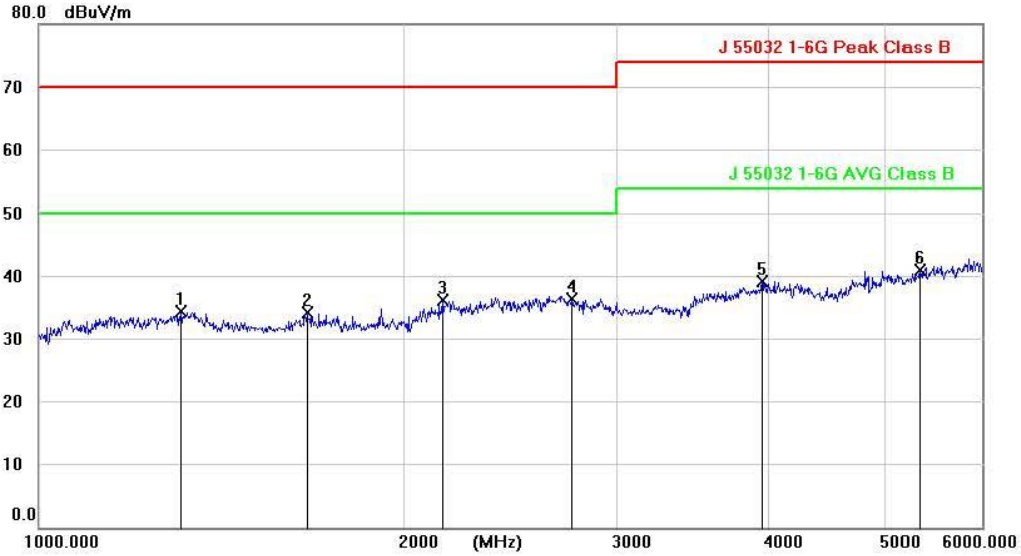
| | | | | | |
|---|---|---|---|---|---|
| Frequency Range | : | **Above 1GHz** | | | |
| EUT | : | Gaming keyboard | Test Date | : | 2024.4.16 |
| M/N | : | SKY 2040PLUS | Temperature | : | 23.5℃ |
| Test Engineer | : | Jerry Yin | Humidity | : | 51% |
| Test Voltage | : | DC 5V From PC | | | |
| Test Mode | : | Data transmission | | | |
| Test Results | : | **PASS** | | | |

Note: 1. The test results are listed in next pages.

2. This mode is worst case mode, so this report only reflected the worst mode.

3. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector and quasi-peak detector need not be carried out.

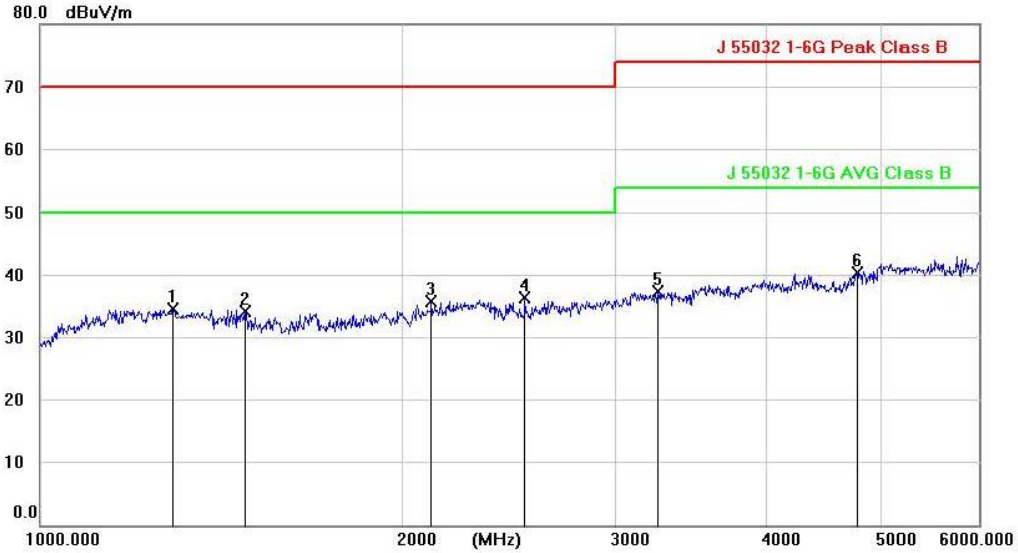
# Antenna polarity: Vorizontal




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | | 1311.867 | 53.61 | -19.37 | 34.24 | 70.00 | -35.76 | peak | | | |
| 2 | | 1666.078 | 53.47 | -19.45 | 34.02 | 70.00 | -35.98 | peak | | | |
| 3 | | 2153.795 | 52.38 | -16.26 | 36.12 | 70.00 | -33.88 | peak | | | |
| 4 | | 2756.486 | 51.36 | -14.98 | 36.38 | 70.00 | -33.62 | peak | | | |
| 5 | | 3955.770 | 50.44 | -11.35 | 39.09 | 74.00 | -34.91 | peak | | | |
| 6 | * | 5333.677 | 47.96 | -7.01 | 40.95 | 74.00 | -33.05 | peak | | | |

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

# Antenna polarity: Hertical

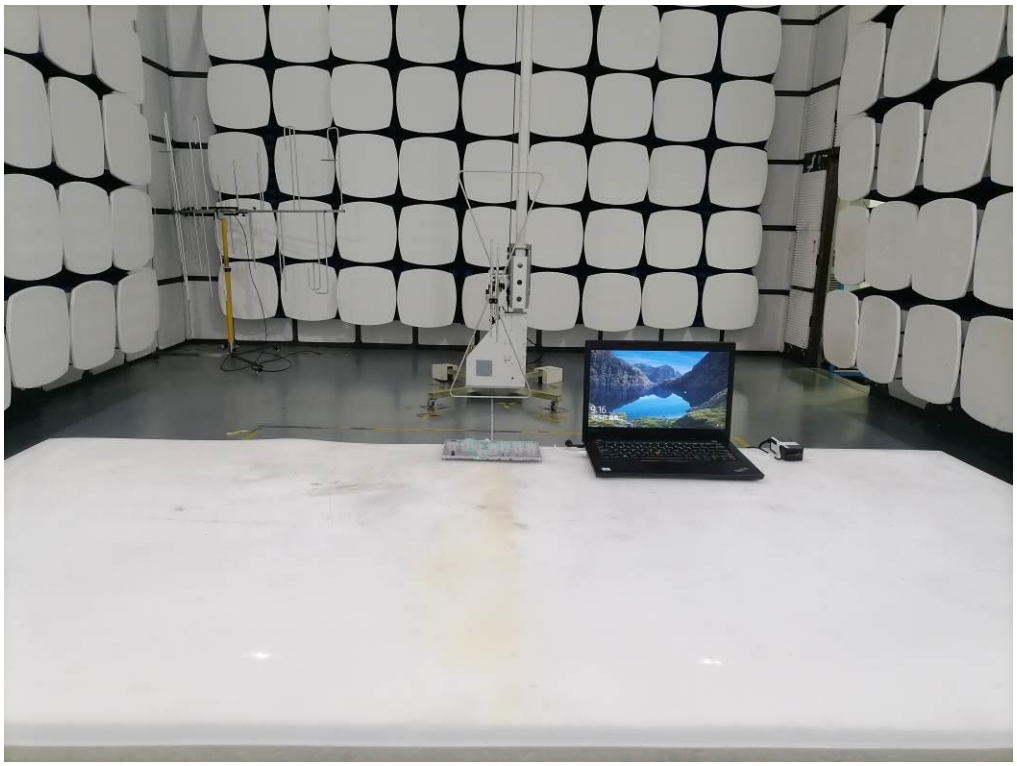



| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | | 1291.576 | 53.91 | -19.46 | 34.45 | 70.00 | -35.55 | peak | | | |
| 2 | | 1479.727 | 53.43 | -19.36 | 34.07 | 70.00 | -35.93 | peak | | | |
| 3 | | 2111.761 | 52.25 | -16.61 | 35.64 | 70.00 | -34.36 | peak | | | |
| 4 | * | 2528.418 | 51.90 | -15.58 | 36.32 | 70.00 | -33.68 | peak | | | |
| 5 | | 3255.129 | 51.44 | -14.08 | 37.36 | 74.00 | -36.64 | peak | | | |
| 6 | | 4765.199 | 48.90 | -8.61 | 40.29 | 74.00 | -33.71 | peak | | | |

Note:1. *:Maximum data; x:Over limit; l:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

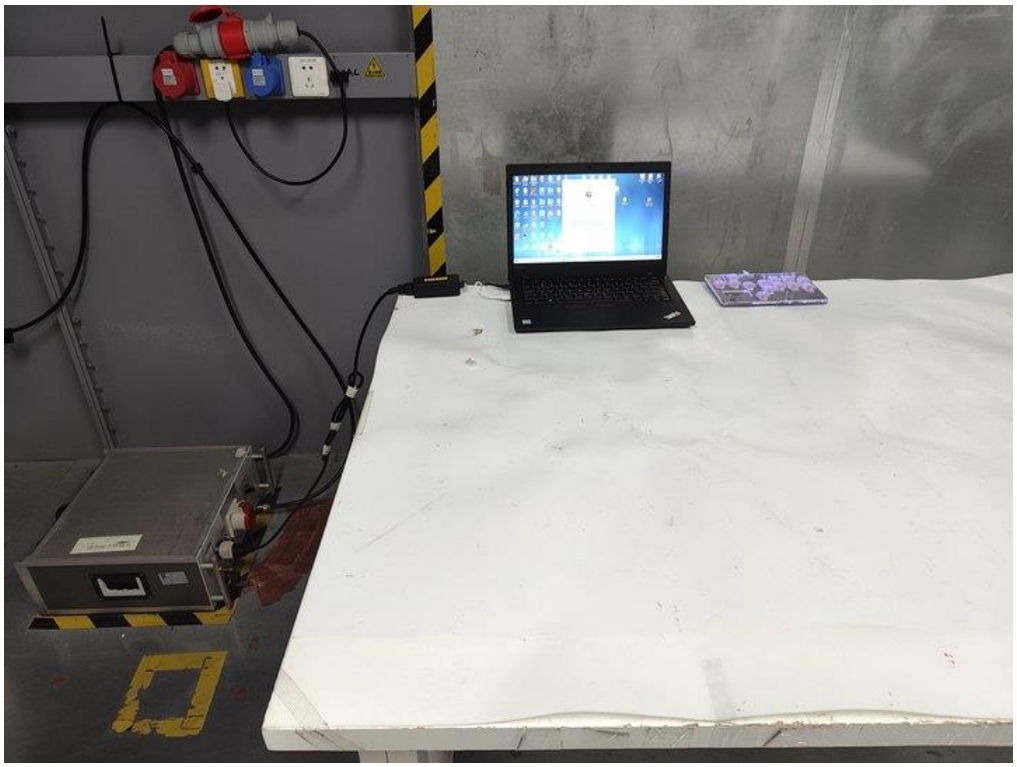
# 5. Photograph

## 5.1. Photos of Radiated Emission Test (In Semi Anechoic Chamber)

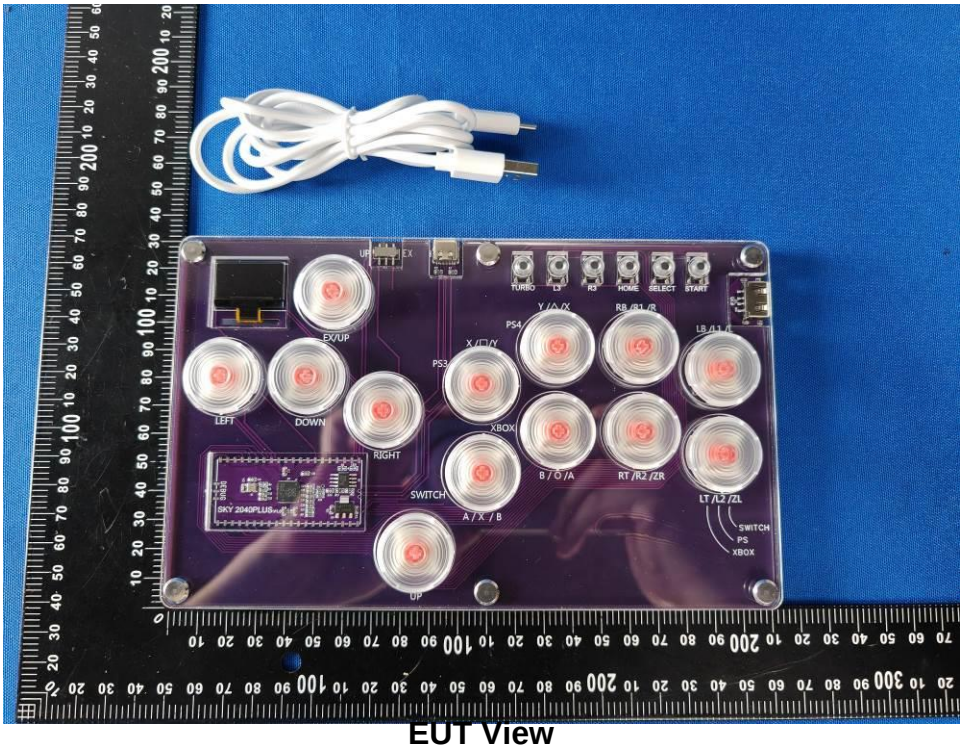


## 5.2. Photos of Radiated Emission Test (Above 1G)

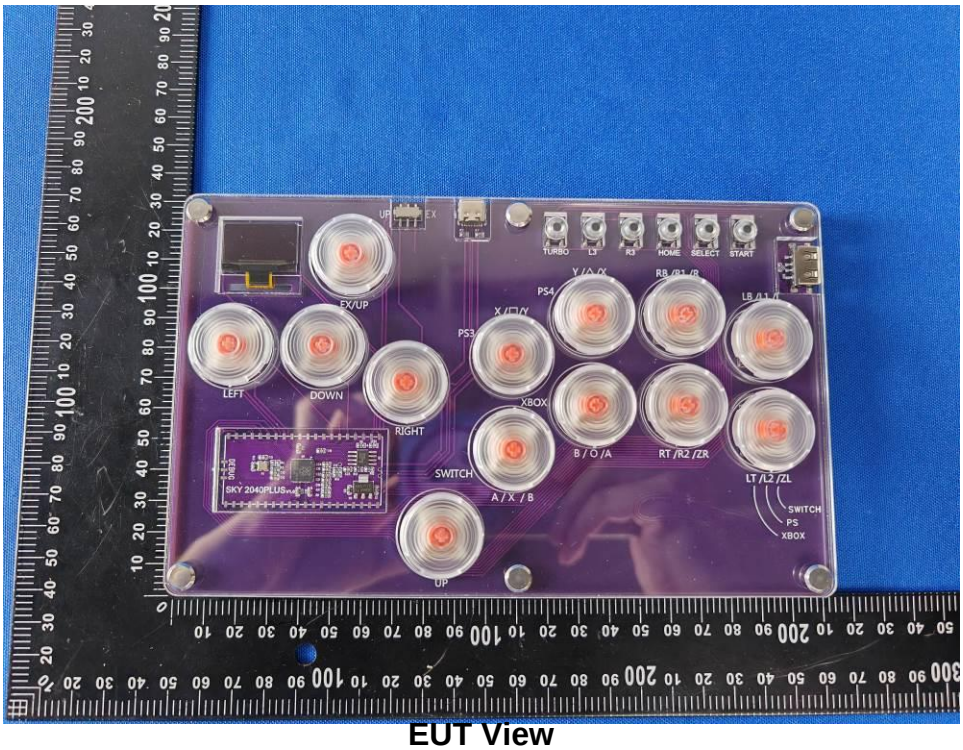
## 5.3. Photo Of Conducted Emissions Test



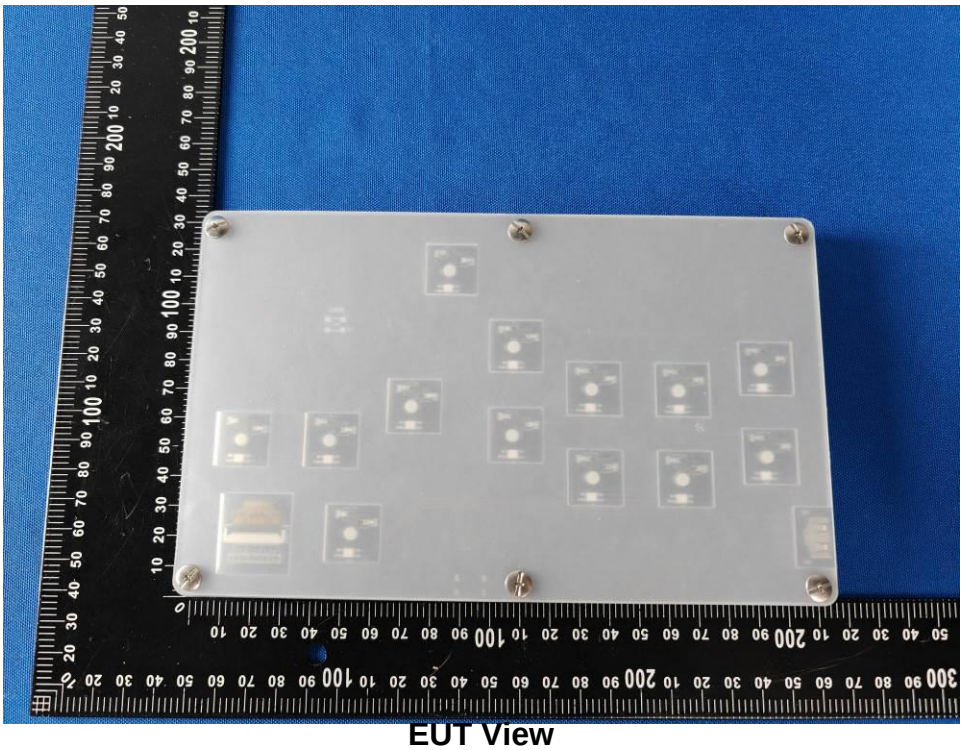
# 6. Photos Of The EUT



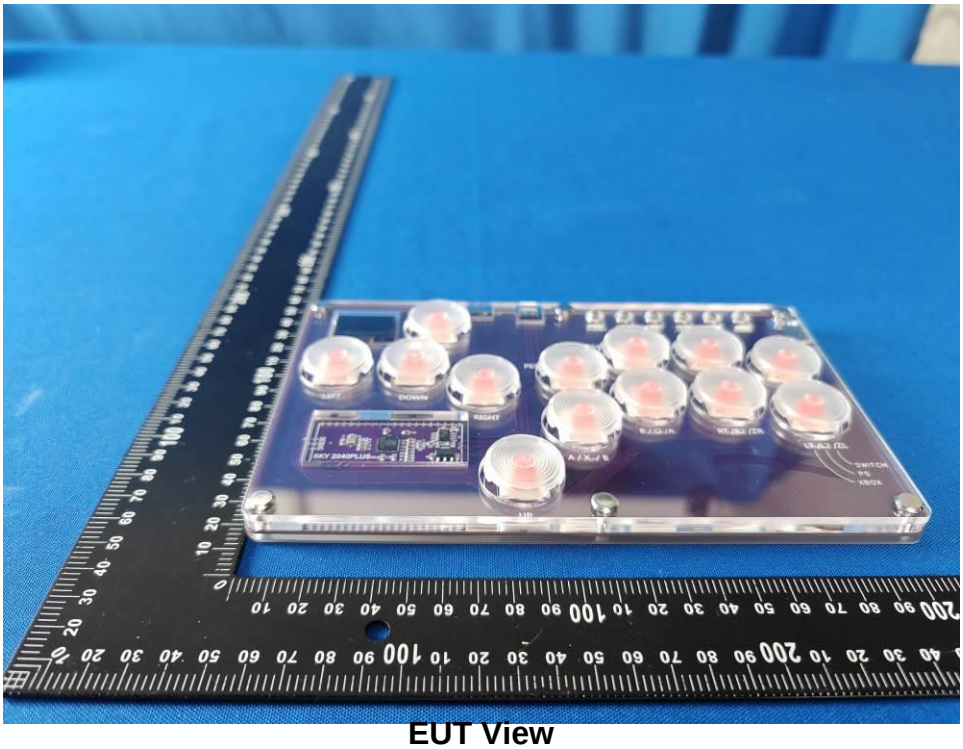

EUT View



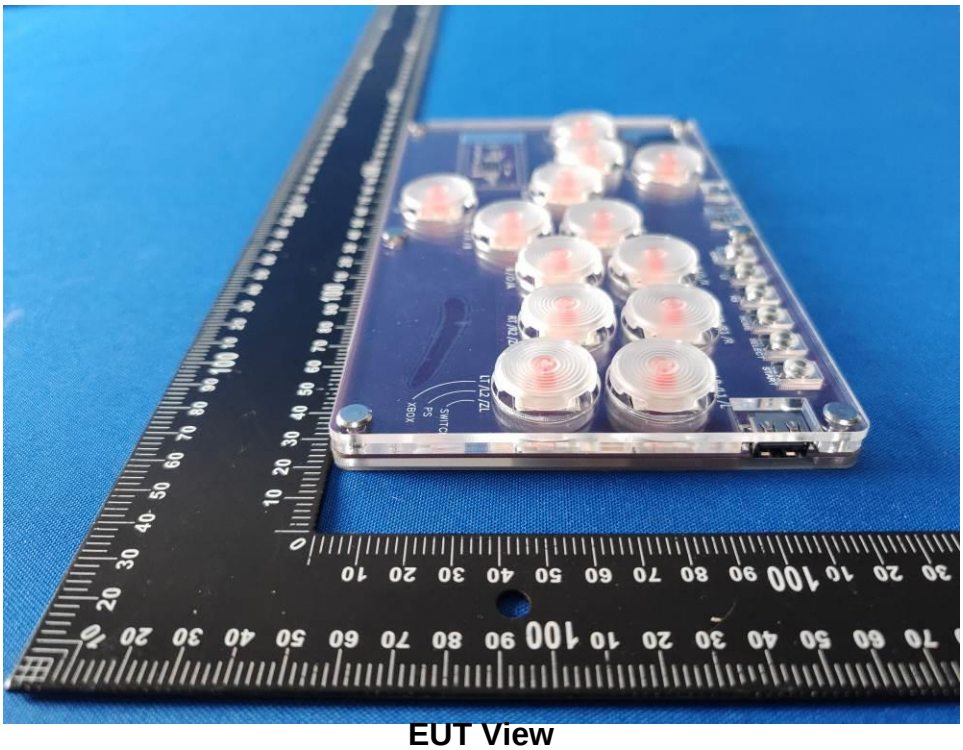

EUT View



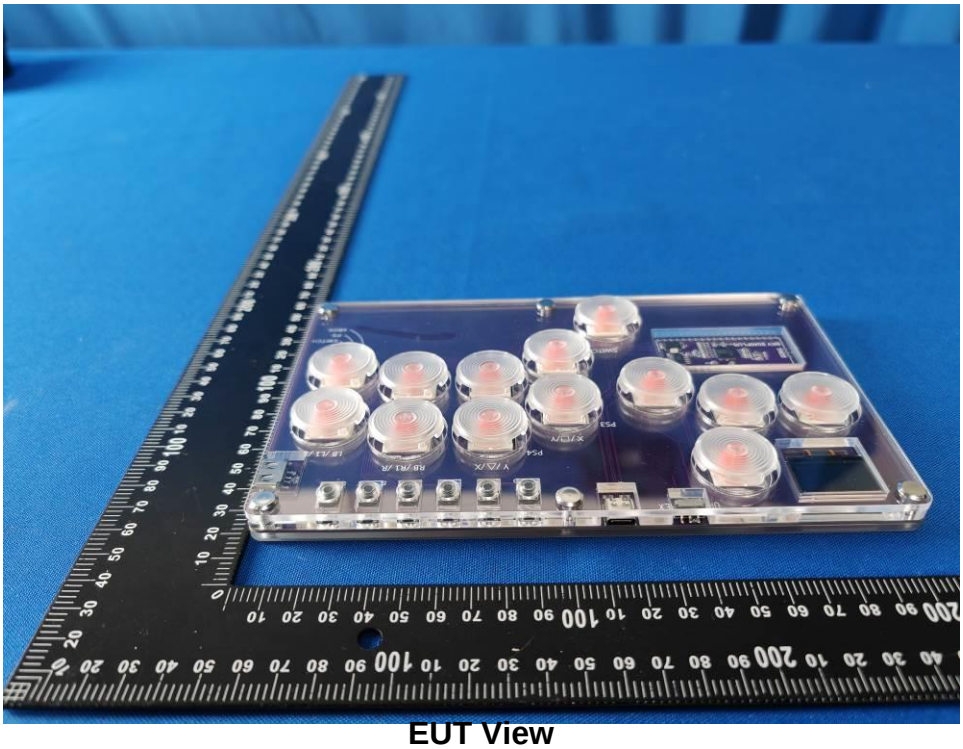
**EUT View**



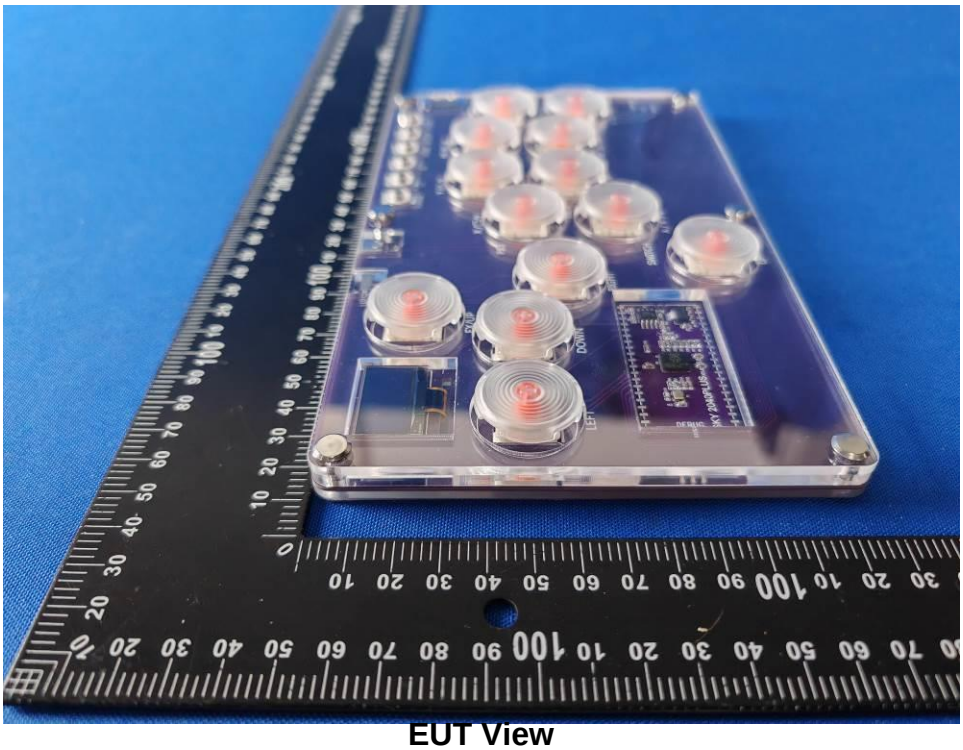
**EUT View**



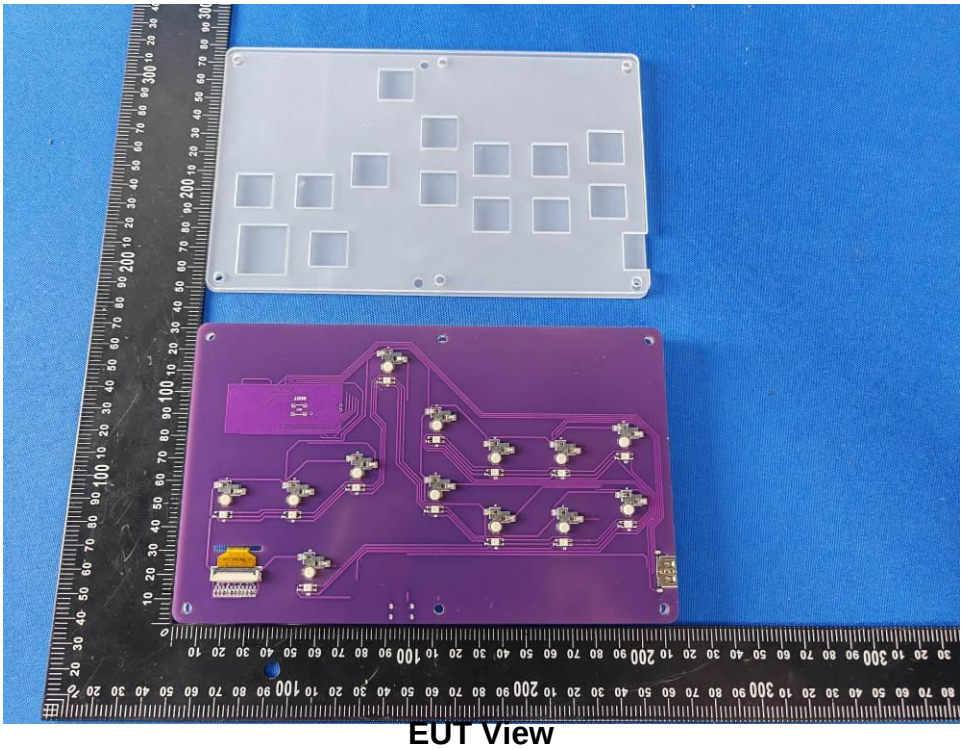
**EUT View**



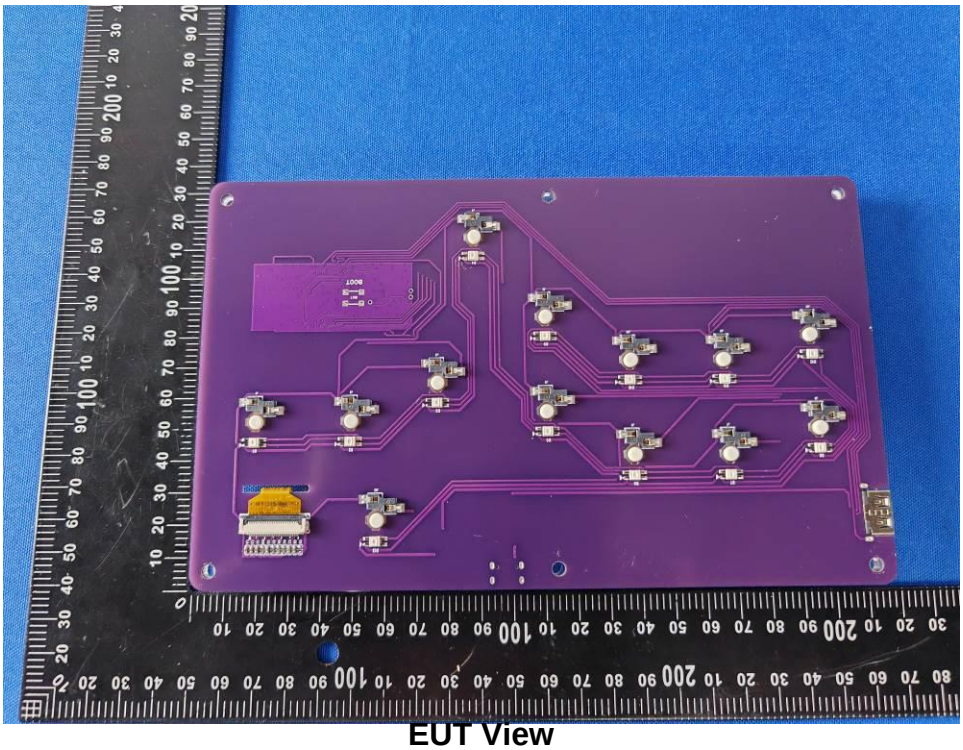
**EUT View**



**EUT View**



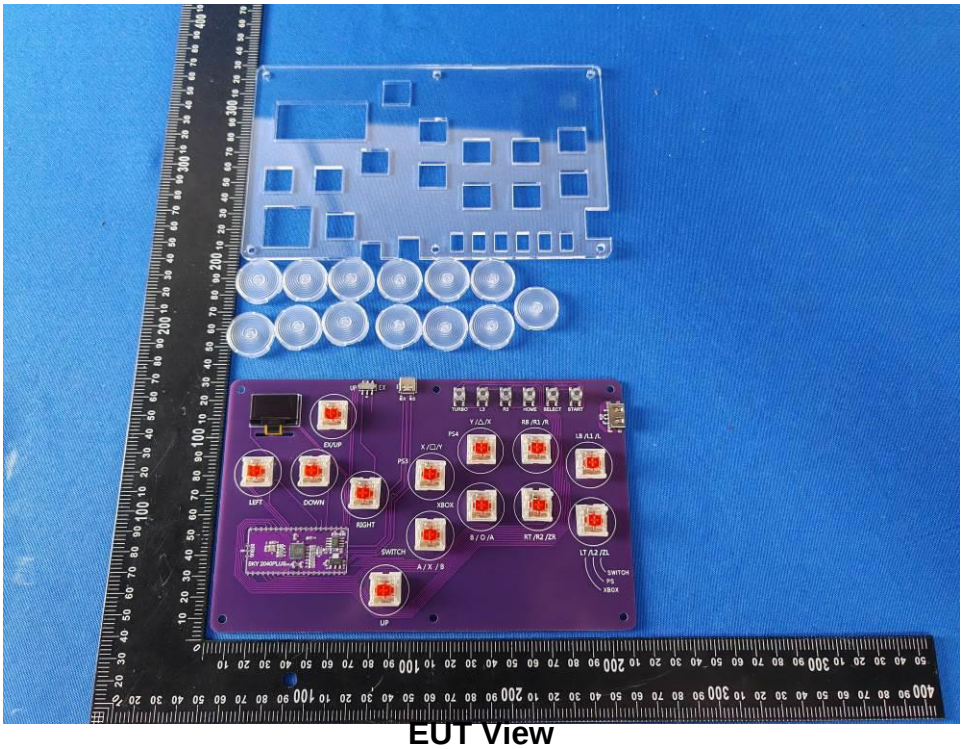
**EUT View**



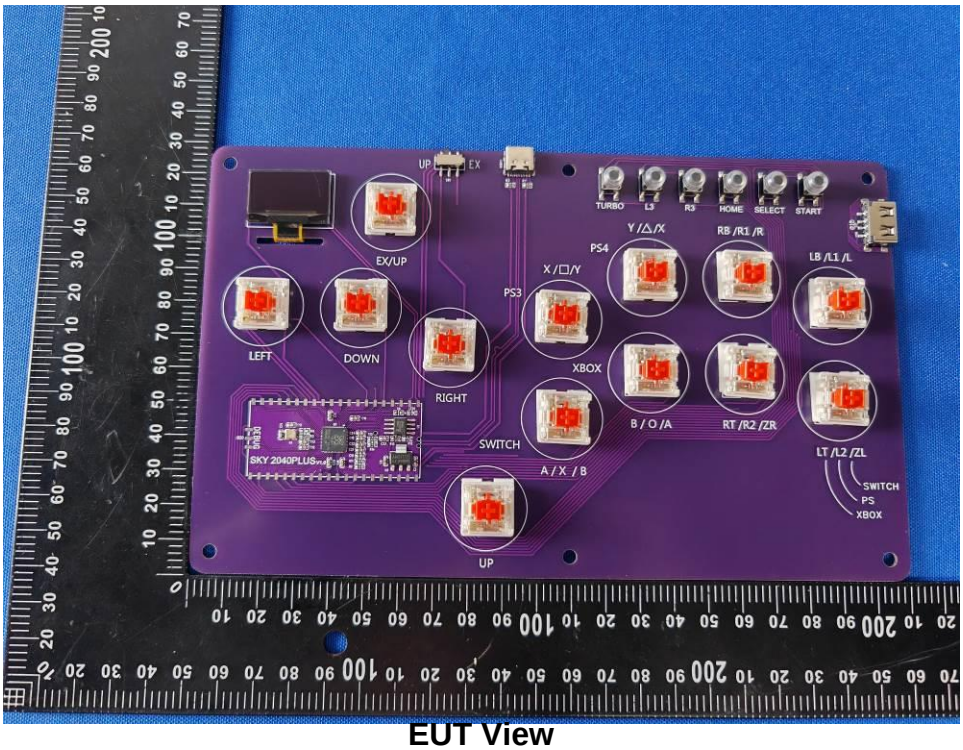
**EUT View**

**EUT View**

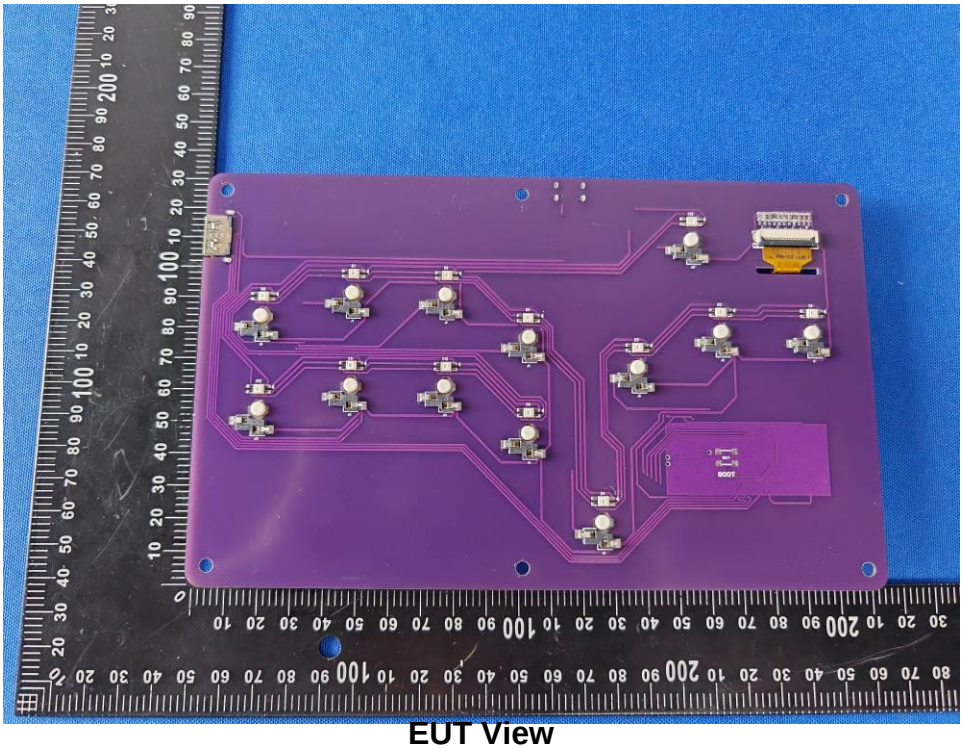

**EUT View**



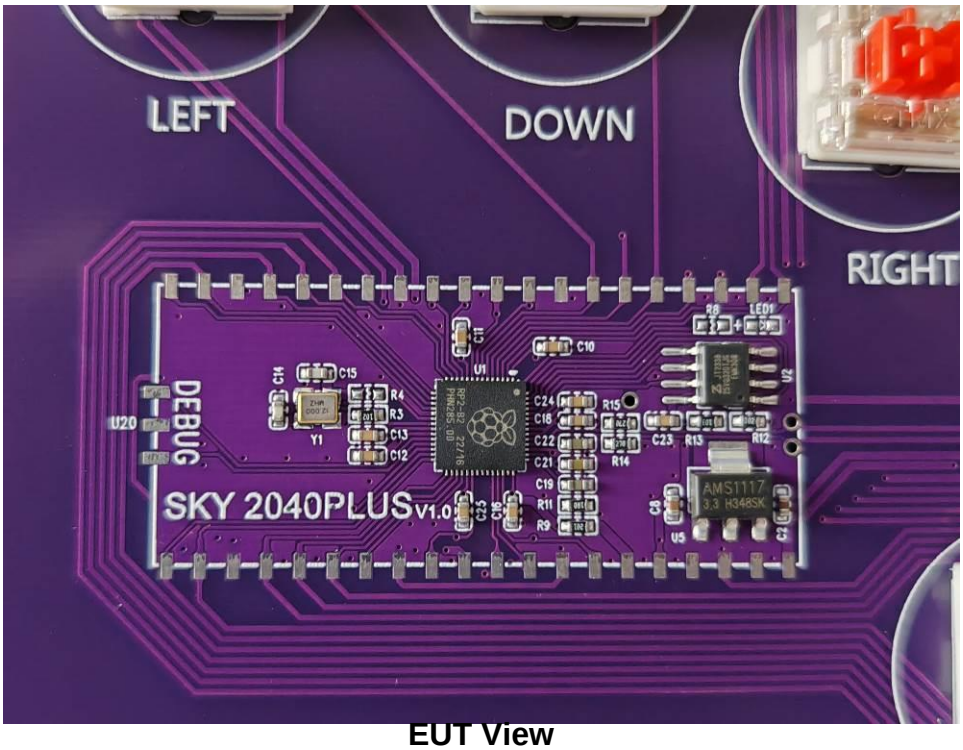

**EUT View**




**EUT View**



**EUT View**




**EUT View**

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