



File reference No.: 2022-03-24

Applicant: Eastern Times Technology Co.,Ltd

Product: 3 MODES MECHANICAL GAMING KEYBOARD

Model No.: K616-RGB, ET-8559, ET-8549, ET-8550, ET-8552, ET-8553,

ET-8560, ET-8641, ET-8643, K616

Trademark: REDRAGON

Test Standards: FCC Part 15.249

Test result:

It is herewith confirmed and found to comply with the

requirements set up by ANSI C63.10 & FCC Part 15 Subpart C,

Paragraph 15.249 regulations for the evaluation of

electromagnetic compatibility

Approved By

Terry Tang

Manager

Dated: March 24, 2022

Results appearing herein relate only to the sample tested The technical reports is issued errors and omissions exempt and is subject to withdrawal at

# SHENZHEN TIMEWAY TESTING LABORATORIES

Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China

Tel (755) 83448688, Fax (755) 83442996, E-Mail:info@timeway-lab.com

Date: 2022-03-24



Page 2 of 39

# **Special Statement:**

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meet with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

## **CNAS-LAB Code: L2292**

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of testing Laboratories.

# FCC-Registration No.: 744189

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 744189.

# Industry Canada (IC) — Registration No.:5205A

The EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 5205A.

# A2LA (Certification Number:5013.01)

The EMC Laboratory has been accredited by the American Association for Laboratory Accreditation (A2LA). Certification Number:5013.01

Date: 2022-03-24



# Test Report Conclusion

$\sim$		
Con	iten1	r

1.0	General Details	4
1.1	Test Lab Details	4
1.2	Applicant Details	4
1.3	Description of EUT	4
1.4	Submitted Sample	4
1.5	Test Duration.	5
1.6	Test Uncertainty	5
1.7	Test By	5
2.0	List of Measurement Equipment	6
3.0	Technical Details	7
3.1	Summary of Test Results	7
3.2	Test Standards	7
4.0	EUT Modification.	7
5.0	Power Line Conducted Emission Test.	8
5.1	Schematics of the Test.	8
5.2	Test Method and Test Procedure	8
5.3	Configuration of the EUT	8
5.4	EUT Operating Condition	9
5.5	Conducted Emission Limit.	9
5.6	Test Result	9
6.0	Radiated Emission test	12
6.1	Test Method and Test Procedure	12
6.2	Configuration of the EUT	13
6.3	EUT Operation Condition.	13
6.4	Radiated Emission Limit	13
6.5	Test Result	15
7.0	Band Edge	23
7.1	Test Method and Test Procedure	23
7.2	Radiated Test Setup.	23
7.3	Configuration of the EUT	23
7.4	EUT Operating Condition.	23
7.5	Band Edge Limit.	23
7.6	Band Edge Test Result.	24
8.0	Antenna Requirement.	28
9.0	20dB bandwidth measurement.	29
10.0	FCC ID Label	32
11.0	Photo of Test Setup and EUT View.	33

The report refers only to the sample tested and does not apply to the bulk.

This report is issued in confidence to the client and it will be strictly treated as such by the SHENZHEN TIMEWAY TESTING LABORATORIES. It may not be reproduced rather in its entirety or in part and it may not be used for adverting. The client to whom the report is issued may, however, show or send it . or a certified copy there of prepared by the SHENZHEN TIMEWAY TESTING LABORATORIES. to his customer. Supplier or others persons directly concerned. SHENZHEN TIMEWAY TESTING LABORATORIES. will not, without the consent of the client enter into any discussion of correspondence with any third party concerning the contents of the report.

In the event of the improper use of the report. The SHENZHEN TIMEWAY TESTING LABORATORIES. reserves the rights to withdraw it and to adopt any other remedies which may be appropriate.

Date: 2022-03-24



#### 1.0 General Details

#### 1.1 Test Lab Details

Name: SHENZHEN TIMEWAY TESTING LABORATORIES.

Address: Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le

Village, Nanshan District, Shenzhen, China

Telephone: (755) 83448688 Fax: (755) 83442996

Site on File with the Federal Communications Commission – United Sates

Registration Number: 744189 For 3m Anechoic Chamber

## 1.2 Applicant Details

Applicant: Eastern Times Technology Co.,Ltd

Address: Building D, Nan An Industrial Area, Youganpu Village, Fenggang Town, Dongguan City,

Guangdong, China.

Telephone: --Fax: --

#### 1.3 Description of EUT

Product: 3 MODES MECHANICAL GAMING KEYBOARD

Manufacturer: Eastern Times Technology Co.,Ltd

Address: Building D, Nan An Industrial Area, Youganpu Village, Fenggang Town,

Dongguan City, Guangdong, China.

Trademark: REDRAGON Model Number: K616-RGB

Additional Model Name ET-8559, ET-8549, ET-8550, ET-8552, ET-8553, ET-8560, ET-8641, ET-8643,

K616

Rating: DC5.0V, 660mA or DC3.7V, 210mA Battery DC3.8V, 1600mAh Li-ion battery

Modulation Type: GFSK

Operation Frequency: 2403-2480MHz

Channel Number: 16

Channel List (Unit: MHz): 2403, 2424, 2441, 2461, 2414, 2435, 2450, 2470, 2409, 2429, 2455, 2475,

2419, 2445, 2465, 2480

Serial No.: RDK616-RGB21070100244

Antenna Designation PCB antenna with gain -1.85dBi Max (Declared by the Manufacturer)

The report refers only to the sample tested and does not apply to the bulk.

This report is issued in confidence to the client and it will be strictly treated as such by the SHENZHEN TIMEWAY TESTING LABORATORIES. It may not be reproduced rather in its entirety or in part and it may not be used for adverting. The client to whom the report is issued may, however, show or send it . or a certified copy there of prepared by the SHENZHEN TIMEWAY TESTING LABORATORIES. to his customer. Supplier or others persons directly concerned. SHENZHEN TIMEWAY TESTING LABORATORIES. will not, without the consent of the client enter into any discussion of correspondence with any third party concerning the contents of the report.

In the event of the improper use of the report. The SHENZHEN TIMEWAY TESTING LABORATORIES. reserves the rights to withdraw it and to adopt any other remedies which may be appropriate.

Report No.: TW2203034-01E Page 5 of 39

Date: 2022-03-24



1.4 Submitted Sample: 1 Sample

1.5 Test Duration

2022-03-03 to 2022-03-24

1.6 Test Uncertainty

Conducted Emissions Uncertainty = 3.6dB

Radiated Emissions below 1GHz Uncertainty =4.7dB

Radiated Emissions above 1GHz Uncertainty =6.0dB

Conducted Power Uncertainty = 6.0dB

Occupied Channel Bandwidth Uncertainty =5%

Conducted Emissions Uncertainty = 3.6dB

Note: The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

1.7 Test Engineer

The sample tested by

Print Name: Andy Xing

Page 6 of 39

Report No.: TW2203034-01E

Date: 2022-03-24



2.0 Test Equipment					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2021-06-18	2022-06-17
LISN	R&S	EZH3-Z5	100294	2021-06-18	2022-06-17
LISN	R&S	EZH3-Z5	100253	2021-06-18	2022-06-17
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2021-06-18	2022-06-17
Loop Antenna	EMCO	6507	00078608	2021-06-18	2024-06-17
Spectrum	R&S	FSIQ26	100292	2021-06-18	2022-06-17
Horn Antenna	A-INFO	LB-180400-KF	J211060660	2021-07-02	2024-07-01
Horn Antenna	R&S	BBHA 9120D	9120D-631	2021-07-02	2024-07-01
Power meter	Anritsu	ML2487A	6K00003613	2021-06-18	2022-06-17
Power sensor	Anritsu	MA2491A	32263	2021-06-18	2022-06-17
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2021-07-02	2024-07-01
9*6*6 Anechoic			N/A	2021-07-02	2022-07-01
EMI Test Receiver	RS	ESVB	826156/011	2021-06-18	2022-06-17
EMI Test Receiver	RS	ESH3	860904/006	2021-06-18	2022-06-17
Spectrum	HP/Agilent	ESA-L1500A	US37451154	2021-06-18	2022-06-17
Spectrum	HP/Agilent	E4407B	MY50441392	2021-06-18	2022-06-17
Spectrum	RS	FSP	1164.4391.38	2022-01-15	2023-01-14
RF Cable	Zhengdi	ZT26-NJ-NJ-8M/FA		2021-06-18	2022-06-17
RF Cable	Zhengdi	7m		2021-06-18	2022-06-17
RF Switch	EM	EMSW18	060391	2021-06-18	2022-06-17
Pre-Amplifier	Schwarebeck	BBV9743	#218	2021-06-18	2022-06-17
Pre-Amplifier	HP/Agilent	8449B	3008A00160	2021-06-18	2022-06-17
LISN	SCHAFFNER	NNB42	00012	2022-01-05	2023-01-04

# 2.2 Automation Test Software

# For Conducted Emission Test

Name	Version
EZ-EMC	Ver.EMC-CON 3A1.1

## For Radiated Emissions

Name	Version
EMI Test Software BL410-EV18.91	V18.905
EMI Test Software BL410-EV18.806 High Frequency	V18.06

The report refers only to the sample tested and does not apply to the bulk.

This report is issued in confidence to the client and it will be strictly treated as such by the SHENZHEN TIMEWAY TESTING LABORATORIES. It may not be reproduced rather in its entirety or in part and it may not be used for adverting. The client to whom the report is issued may, however, show or send it . or a certified copy there of prepared by the SHENZHEN TIMEWAY TESTING LABORATORIES. to his customer. Supplier or others persons directly concerned. SHENZHEN TIMEWAY TESTING LABORATORIES. will not, without the consent of the client enter into any discussion of correspondence with any third party concerning the contents of the report.

In the event of the improper use of the report. The SHENZHEN TIMEWAY TESTING LABORATORIES. reserves the rights to withdraw it and to adopt any other remedies which may be appropriate.

Page 7 of 39

Report No.: TW2203034-01E

Date: 2022-03-24



#### 3.0 Technical Details

# 3.1 Summary of test results

The E	UT has	been	tested	accord	ling to	o the	following	specifications:

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.203	Antenna Requirement	Pass	Complies
FCC Part 15, Paragraph 15.207	Conducted Emission Test	Pass	Complies
FCC Part 15 Subpart C Paragraph 15.249(a) & 15.249(b) Limit	Field Strength of Fundamental	Pass	Complies
FCC Part 15, Paragraph 15.209 and RSS-210	Radiated Emission Test	Pass	Complies
FCC Part 15 Subpart C Paragraph 15.249(d) Limit	Band Edge Test	Pass	Complies

#### 3.2 Test Standards

FCC Part 15 Subpart C, Paragraph 15.249, ANSI C63.4:2014 and ANSI C63.10:2013

#### 4.0 EUT Modification

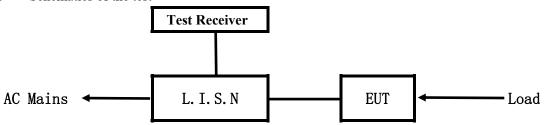
No modification by SHENZHEN TIMEWAY TESTING LABORATORIES

Date: 2022-03-24



#### 5. Power Line Conducted Emission Test

#### 5.1 Schematics of the test

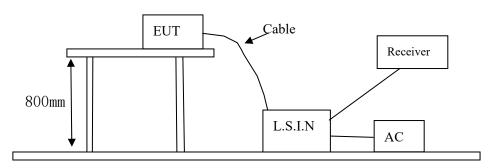


**EUT: Equipment Under Test** 

#### 5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2014. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.4 –2014.

# Block diagram of Test setup



# 5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2014. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

16 channels are provided to the EUT

# A. EUT

Device	Manufacturer	Model	FCC ID
3 MODES MECHANICAL GAMING KEYBOARD	Eastern Times Technology Co.,Ltd	K616-RGB, ET-8559, ET-8549, ET-8550, ET-8552, ET-8553, ET-8560, ET-8641, ET-8643, K616	TUVET-8559

The report refers only to the sample tested and does not apply to the bulk.

This report is issued in confidence to the client and it will be strictly treated as such by the SHENZHEN TIMEWAY TESTING LABORATORIES. It may not be reproduced rather in its entirety or in part and it may not be used for adverting. The client to whom the report is issued may, however, show or send it . or a certified copy there of prepared by the SHENZHEN TIMEWAY TESTING LABORATORIES. to his customer. Supplier or others persons directly concerned. SHENZHEN TIMEWAY TESTING LABORATORIES. will not, without the consent of the client enter into any discussion of correspondence with any third party concerning the contents of the report.

Report No.: TW2203034-01E Page 9 of 39

Date: 2022-03-24



#### B. Internal Device

Device	Manufacturer	Model	FCC ID/DOC
N/A			

## C. Peripherals

Device	Manufacturer	Model	Rating
Power Supply	KEYU	KA23-0502000DEU	Input: 100-240V~, 50/60Hz, 0.35A;
			Output: DC5V, 2A

5.4 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2014

- A Setup the EUT and simulators as shown on follow
- B Enable AF signal and confirm EUT active to normal condition

5.5 Power line conducted Emission Limit according to Paragraph 15.207

6 6 1						
Frequency	Limits (dB $\mu$ V)					
(MHz)	Quasi-peak Level	Average Level				
$0.15 \sim 0.50$	66.0~56.0*	56.0~46.0*				
$0.50 \sim 5.00$	56.0	46.0				
5.00 ~ 30.00	60.0	50.0				

Notes:

- 1. \*Decreasing linearly with logarithm of frequency.
- 2. The tighter limit shall apply at the transition frequencies

#### 5.6 Test Results:

Pass

Date: 2022-03-24



# A: Conducted Emission on Live Terminal (150kHz to 30MHz)

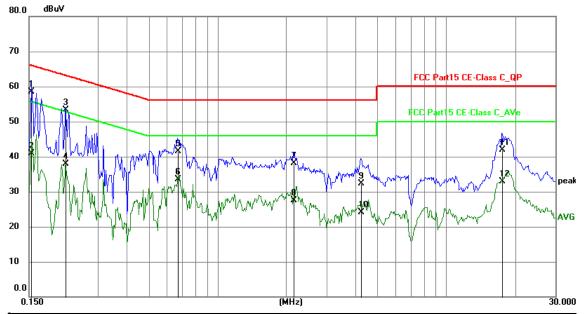
# **EUT Operating Environment**

Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 kPa

**EUT set Condition: Charging and Keep Transmitting** 

**Results: Pass** 

Please refer to following diagram for individual



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1539	48.64	9.78	58.42	65.79	-7.37	QP	Р
2	0.1539	31.13	9.78	40.91	55.79	-14.88	AVG	Р
3	0.2163	43.63	9.75	53.38	62.96	-9.58	QP	Р
4	0.2163	28.16	9.75	37.91	52.96	-15.05	AVG	Р
5	0.6687	31.64	9.78	41.42	56.00	-14.58	QP	Ъ
6	0.6687	23.77	9.78	33.55	46.00	-12.45	AVG	П
7	2.1546	28.31	9.81	38.12	56.00	-17.88	QP	Р
8	2.1546	17.65	9.81	27.46	46.00	-18.54	AVG	Р
9	4.2363	22.47	9.90	32.37	56.00	-23.63	QP	Р
10	4.2363	14.18	9.90	24.08	46.00	-21.92	AVG	Р
11	17.5509	31.38	10.53	41.91	60.00	-18.09	QP	Р
12	17.5509	22.39	10.53	32.92	50.00	-17.08	AVG	Р

Date: 2022-03-24



# B: Conducted Emission on Neutral Terminal (150kHz to 30MHz)

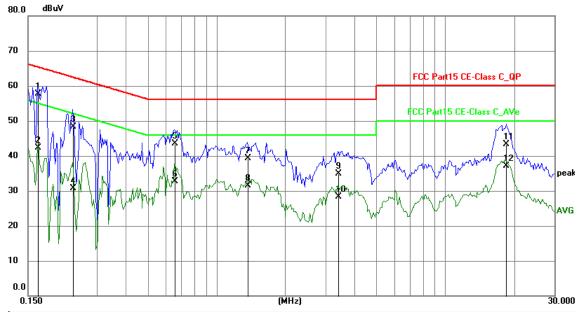
# **EUT Operating Environment**

Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 kPa

**EUT set Condition: Charging and Keep Transmitting** 

**Results: Pass** 

Please refer to following diagram for individual



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1655	47.97	9.77	57.74	65.18	-7.44	QP	А
2	0.1655	32.45	9.77	42.22	55.18	-12.96	AVG	Р
3	0.2358	38.58	9.75	48.33	62.24	-13.91	QP	Р
4	0.2358	21.00	9.75	30.75	52.24	-21.49	AVG	Р
5	0.6570	33.66	9.78	43.44	56.00	-12.56	QP	Р
6	0.6570	22.96	9.78	32.74	46.00	-13.26	AVG	Р
7	1.3668	29.42	9.79	39.21	56.00	-16.79	QP	А
8	1.3668	21.66	9.79	31.45	46.00	-14.55	AVG	Р
9	3.4056	25.02	9.86	34.88	56.00	-21.12	QP	Р
10	3.4056	18.35	9.86	28.21	46.00	-17.79	AVG	Р
11	18.4869	32.70	10.59	43.29	60.00	-16.71	QP	Р
12	18.4869	26.49	10.59	37.08	50.00	-12.92	AVG	Р

Date: 2022-03-24

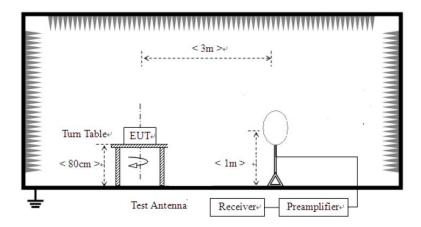


#### **6** Radiated Emission Test

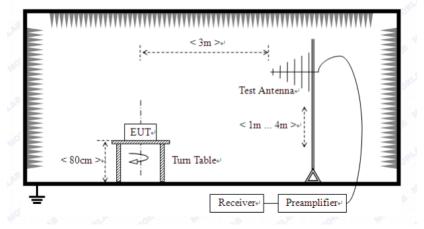
- 6.1 Test Method and test Procedure:
- (1) The EUT was tested according to ANSI C63.10-2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No. 744189
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2013.
- (3) The frequency spectrum from 30 MHz to 25 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz (Note: for Fundamental frequency radiated emission measurement, RBW=3MHz, VBW=10MHz). Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) The antenna polarization: Vertical polarization and Horizontal polarization.

#### **Block diagram of Test setup**

For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30MHz to1GHz



The report refers only to the sample tested and does not apply to the bulk.

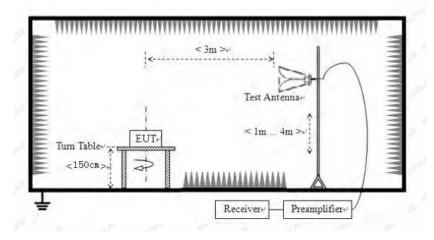
This report is issued in confidence to the client and it will be strictly treated as such by the SHENZHEN TIMEWAY TESTING LABORATORIES. It may not be reproduced rather in its entirety or in part and it may not be used for adverting. The client to whom the report is issued may, however, show or send it . or a certified copy there of prepared by the SHENZHEN TIMEWAY TESTING LABORATORIES. to his customer. Supplier or others persons directly concerned. SHENZHEN TIMEWAY TESTING LABORATORIES. will not, without the consent of the client enter into any discussion of correspondence with any third party concerning the contents of the report.

In the event of the improper use of the report. The SHENZHEN TIMEWAY TESTING LABORATORIES. reserves the rights to withdraw it and to adopt any other remedies which may be appropriate.

Date: 2022-03-24



For radiated emissions above 1GHz



- 6.2 Configuration of The EUT

  Same as section 5.3 of this report
- 6.3 EUT Operating Condition
  Same as section 5.4 of this report.
- 6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

# A FCC Part 15 Subpart C Paragraph 15.249(a) Limit

Fundamental Frequency	Field Stre	ength of Fundame	ntal (3m)	Field Strength of Harmonics (3m)			
(MHz)	mV/m	dBuV/m		uV/m	dBuV/m		
2400-2483.5	50	94 (Average)	114 (Peak)	500	54 (Average)	74 (Peak)	

Note:

- 1. RF Field Strength (dBuV) = 20 log RF Voltage (uV)
- 2.Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- 3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

The report refers only to the sample tested and does not apply to the bulk.

Report No.: TW2203034-01E Page 14 of 39

Date: 2022-03-24



# B. Frequencies in restricted band are complied to limit on Paragraph 15.209.

	1	8 1
Frequency Range (MHz)	Distance (m)	Field strength (dB µ V/m)
0.009-0.490	3	20log(2400/F(kHz)) +40log (300/3)
0.490-1.705	3	20log(24000/F(kHz)) +40log (30/3)
1.705-30	3	69.5
30-80	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note:

- 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
- 2. In the Above Table, the tighter limit applies at the band edges.
- 3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT
- 4. This is a handhold device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.
- 5. All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30-1000MHz.As to 1G-25G, the final emission level got using PK. For fundamental measurement, PK detector used.
- 6. For radiated emissions from 9kHz to 30MHz, the emission level is much less than the limit for more than 20dB. No necessary to take down the record.
- 7. Battery full charged during tests.

Report No.: TW2203034-01E Page 15 of 39

Date: 2022-03-24

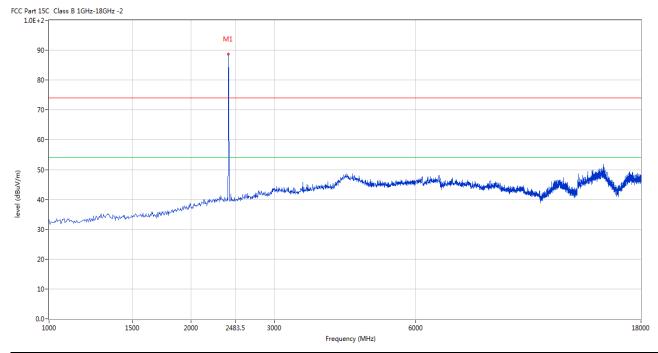


# 6.5 Test result

# A Fundamental & Harmonics Radiated Emission Data

Please refer to the following test plots for details: Low Channel-2403MHz

#### Horizontal



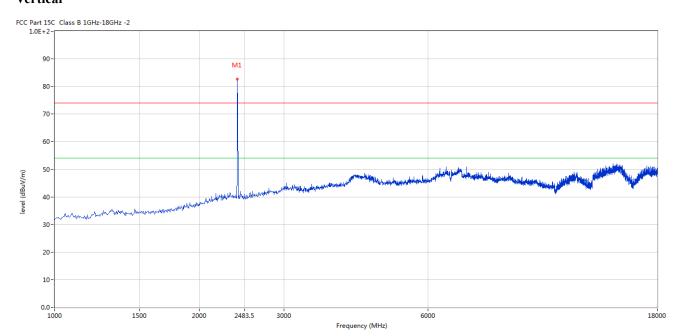
No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table (o)	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)			(cm)		
1	2402.373	88.79	-3.57	114.0	-25.21	Peak	272.00	100	Horizontal	Pass

Report No.: TW2203034-01E Page 16 of 39

Date: 2022-03-24



# Vertical



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
1	2402.373	82.77	-3.57	114.0	-31.23	Peak	60.00	100	Vertical	Pass

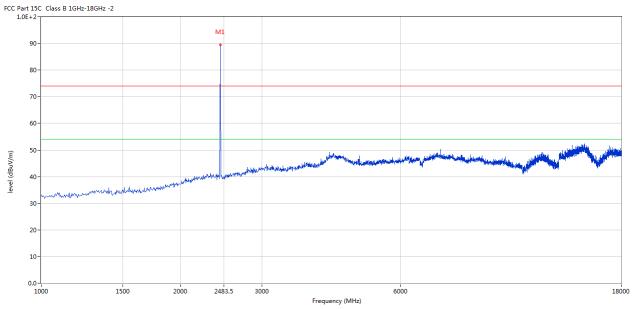
Report No.: TW2203034-01E Page 17 of 39

Date: 2022-03-24



Please refer to the following test plots for details: Middle Channel-2441MHz

#### Horizontal



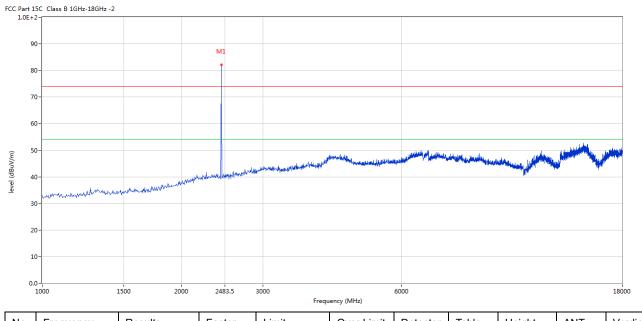
No.	Frequency	Results	Factor	Limit	Over	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	Limit (dB)		(o)	(cm)		
1	2441.015	89.36	-3.57	114.0	-24.64	Peak	270.00	100	Horizontal	Pass

Report No.: TW2203034-01E Page 18 of 39

Date: 2022-03-24



## Vertical



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
1	2441.015	82.13	-3.57	114.0	-31.87	Peak	64.00	100	Vertical	Pass

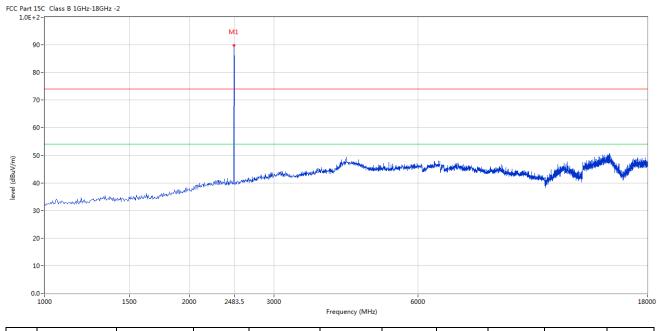
Report No.: TW2203034-01E Page 19 of 39

Date: 2022-03-24



Please refer to the following test plots for details: High Channel-2480MHz

#### Horizontal



No.	Frequency	Results	Factor	Limit	Over	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	Limit (dB)		(0)	(cm)		
1	2479.384	89.35	-3.57	114.0	-24.65	Peak	280.00	100	Horizontal	Pass

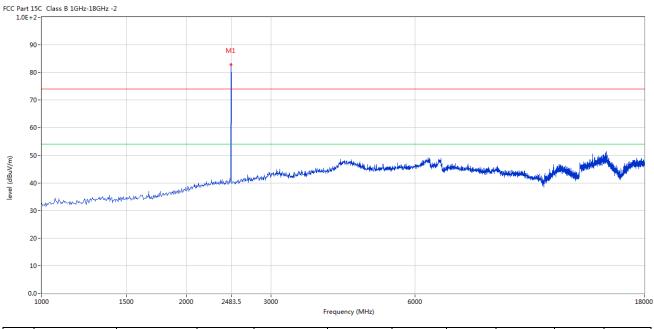
Page 20 of 39

Report No.: TW2203034-01E

Date: 2022-03-24



#### Vertical



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
1	2479.384	82.95	-3.57	114.0	-31.05	Peak	76.00	100	Vertical	Pass

Note: (2) Emission Level = Reading Level + Antenna Factor + Cable Loss-Amplifier

- (3)Margin=Emission-Limits
- (4)According to section 15.35(b), the peak limit is 20dB higher than the average limit
- (5) For test purpose, keep EUT continuous transmitting
- (5) For emission above 18GHz and Below 30MHz, It is only the floor noise. No necessary to take down.
- (6) the measured PK value less than the AV limit.

Report No.: TW2203034-01E Page 21 of 39

Date: 2022-03-24

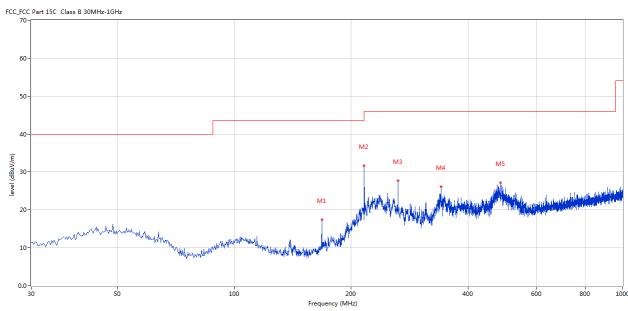


# B. General Radiated Emission Data Radiated Emission In Horizontal (30MHz----1000MHz)

EUT set Condition: Keep Tx transmitting

**Results:** Pass

Please refer to following diagram for individual



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(0)	(cm)		
1	167.948	17.45	-16.14	43.5	-26.05	Peak	286.00	100	Horizontal	Pass
2	215.951	31.58	-13.60	43.5	-11.92	Peak	301.00	100	Horizontal	Pass
3	263.954	27.70	-11.79	46.0	-18.30	Peak	252.00	100	Horizontal	Pass
4	340.322	26.07	-9.79	46.0	-19.93	Peak	229.00	100	Horizontal	Pass
5	485.059	27.22	-7.28	46.0	-18.78	Peak	100.00	100	Horizontal	Pass

Report No.: TW2203034-01E Page 22 of 39

Date: 2022-03-24

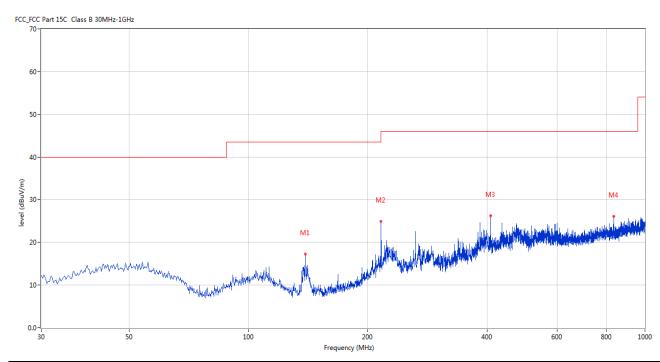


# Radiated Emission In Vertical (30MHz----1000MHz)

EUT set Condition: Keep Tx transmitting

**Results:** Pass

Please refer to following diagram for individual



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table (o)	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)			(cm)		
1	139.098	17.30	-17.21	43.5	-26.20	Peak	342.00	100	Vertical	Pass
2	215.951	24.92	-13.60	43.5	-18.58	Peak	265.00	100	Vertical	Pass
3	407.963	26.18	-8.47	46.0	-19.82	Peak	359.00	100	Vertical	Pass
4	833.444	26.15	-2.82	46.0	-19.85	Peak	220.00	100	Vertical	Pass

Date: 2022-03-24

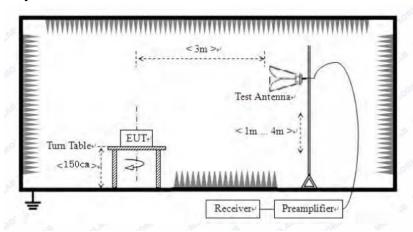


#### 7. Band Edge

#### 7.1 Test Method and test Procedure:

- (1) The EUT was tested according to ANSI C63.10–2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No. 744189
- (2) Set Spectrum as RBW=1MHz, VBW=3MHz and Peak detector used for PK value. RBW=1MHz, VBW=10Hz and Peak detector used for AV value.
- (3) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (4) The antenna polarization: Vertical polarization and Horizontal polarization.

# 7. 2 Radiated Test Setup



For the actual test configuration, please refer to the related items – Photos of Testing

# 7.3 Configuration of The EUT

Same as section 5.3 of this report

#### 7.4 EUT Operating Condition

Same as section 5.4 of this report.

# 7.5 Band Edge Limit

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

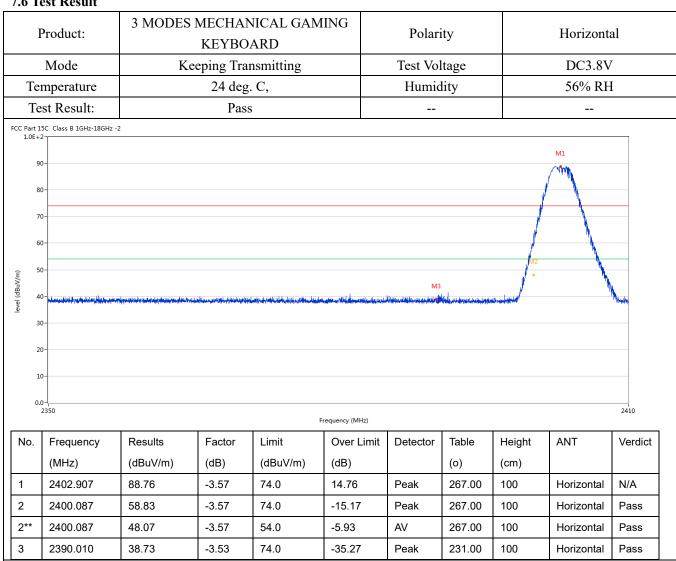
The report refers only to the sample tested and does not apply to the bulk.

Report No.: TW2203034-01E Page 24 of 39

Date: 2022-03-24



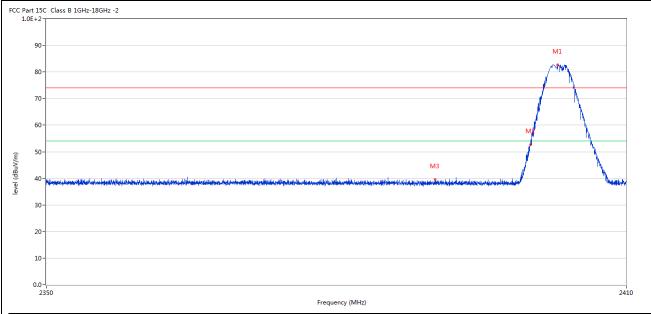
## 7.6 Test Result



Report No.: TW2203034-01E Page 25 of 39



Duo duot.	3 MODES MECHANICAL GAMING	Datastan	Vantical
Product:	KEYBOARD	Detector	Vertical
Mode	Keeping Transmitting	Test Voltage	DC3.8V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Test Result: Pass		
500 D 1450 OL D 4011 40011 1		•	

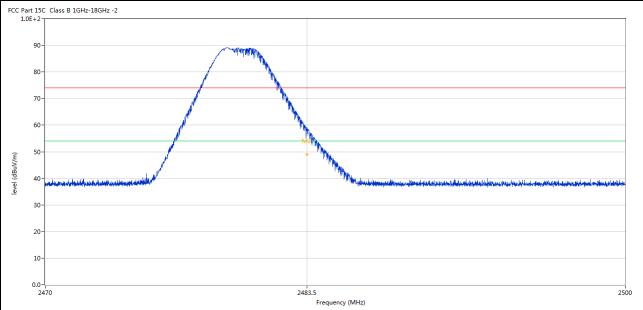


	No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
		(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
	1	2402.832	82.69	-3.57	74.0	8.69	Peak	71.00	100	Vertical	N/A
	2	2399.983	52.78	-3.57	74.0	-21.22	Peak	76.00	100	Vertical	Pass
	3	2390.040	39.47	-3.53	74.0	-34.53	Peak	25.00	100	Vertical	Pass
Г											

Report No.: TW2203034-01E Page 26 of 39



Product:	3 MODES MECHANICAL GAMING KEYBOARD	Polarity	Horizontal
Mode	Keeping Transmitting	Test Voltage	DC3.8V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass		



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
1	2479.358	89.05	-3.57	74.0	15.05	Peak	268.00	100	Horizontal	N/A
2	2483.482	59.21	-3.57	74.0	-14.79	Peak	273.00	100	Horizontal	Pass
2**	2483.482	48.88	-3.57	54.0	-5.12	AV	273.00	100	Horizontal	Pass

Report No.: TW2203034-01E Page 27 of 39



	Product:	3 MODES MECHANICAL GAMING KEYBOAI				ARD	Detecto	r	Vertical		
	Mode		Keepir	ng Transmittir	-	Test Volta	age	DC3.8	V		
Te	mperature		24 deg. C,						56% R	Н	
Те	est Result:			Pass							
C Part 1 1.0E+	15C Class B 1GHz-18GHz 2-	-2				•					
٥	0-										
8	0-										
7	0-		/								
6	0-	/	<i></i>								
			<u> </u>								
. 5	0-			M2N							
. 5	0-			M2				h	a a decide b		
, 4	O-	on a second of the second		M2	De Marie de La constitución de l	<u>ئىلى دېرى يېرى ئىرى دى ئىلىلىمى دې ياد ھوپ</u>	Alexandra descriptiva de parente de la constanta de la constan	of Comparison of Source of	on the state of th	intropologi	
. 4	0-	North-surprised of the distribution		M2 No.	The advantages and the standards	ned skylved address, vide god felderil eller	Alexandra distribution of the state of the s	of anastrican phonostropada (galab)	dicaminina dindrata di Nationaggo, ling	anda arrangal	
. 4	O-	Notice and a state of the state		M2	Marine State of State	vosikandaksivi goʻqiqqisika	ALAUSSA-Slauipindopsooksandu	والإرجاد الإرجاد الإرج	di anjan di di dinanda di di magin king	pitappodji	
. 4 3		recisiones areados describedos de consessiones de consessiones de consessiones de consessiones de consessiones		M2	Manufacture and the stand	waitzadakai wi ya gagapida	ti desiya diniqabiya sabasata	of marsh y may be made a facility the little of the little	Bit agraphs of public field from gyreling	ing page	
, 4 3 2 1		North-way annick of the device.		M2	Management series are desirable as	nesissanikus vien prenisia	Maries designates and party	ok marin, miss na siringahin kahi	the essential photosophic phot		
4 3 2		Novineering annual collection of the collection		M2 2483.5 Fre	quency (MHz)	ensissenska urban paseiske	Alekaliya direliya diye wekardar	ek gessie, wyży zak spodu trękkól	de espelar de aleman de aleman la companya (in a	2500	
4 3 2		Results	Factor			Detector	Table	Height	ANT		
4 3 2 1	0-		Factor (dB)	Fre	quency (MHz)					2500	
4 3 2 1	0- 0- 0- 2470	Results		Limit	quency (MHz) Over Limit		Table	Height		2500	
3 3 2 1 1 0.	o- 0- 0- 0- 0- 0- 2470 Frequency (MHz)	Results (dBuV/m)	(dB)	Limit (dBuV/m)	quency (MHz) Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	2500 Verdic	

Note: 1. The PK emission level less than the AV limit. No necessary to record the AV emission level.

Date: 2022-03-24



Page 28 of 39

# 8.0 Antenna Requirement

# **Applicable Standard**

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.

This product has a PCB antenna. The antenna gain is -1.85dBi Max. It fulfills the requirement of this section. Test Result: Pass

Page 29 of 39

Report No.: TW2203034-01E



Product:	3 MODES MECHANICAL GAMING KEYBOARD					Test Mode:			Keep transmitting			
Mode		Keepi	ng Transm	nitting		Te	st Voltage		DC3.8V			
Temperature			24 deg. C,			F	Humidity		56%	RH		
Test Result:			Pass			]	Detector		Pk			
20dB Bandwidth		2	2.485MHz									
Ref Lvl	1	ndB		.00 dB	VI	3W 3W	100 k	Hz	· Att	20 dB		
10 dBm		BW 2	2.484969	994 MHZ	SI	VT	5 m	s Ur	nit	dBm	l ii	
0							<b>V</b> 1	[T1]	-5 2.40237	.44 dBm 375 GHz	I	
			1	~	\ _		ndB BW <b></b>	(T1)	2.48496	.00 dB 994 MHz .31 dBm		
-10								T11	2.40167 -25			
-20		T1						T2	2.40415	731 GHz	11	
-30	V. JA							- Lun	<u>۸</u>	ч		
-40 -50										Tank war.		
-60												
-70												
-80												
-90												
Center 2.	403 GH	z		500	kHz/				Spa	n 5 MHz		

Page 30 of 39

Report No.: TW2203034-01E



Product:	3 MODES MECHANICAL GAMING KEYBOARD					Т	est Mode:		Keep transmitting			
Mode	Keeping Transmitting					Test Voltage Humidity		;	DC3.8V 56% RH			
Temperature	24 deg. C,											
Test Result:			Pass				Detector		]	PK		
20dB Bandwidth		2.	305MHz									
(R)	Ma	arker	1 [T1 r	ndB]	R	.BW	100 k	Hz R	F Att	20 dB		
Ref Lvl	no	dB	20.	00 dB	V	BW	300 k	Hz				
10 dBm	BV	W 2	2.304609	22 MHz	S	WT	5 m	s U	nit	dBm	ļ	
0							▼ <sub>1</sub>	[T1]	20	.82 dBm 503 GHz	A	
			$\wedge$	نہ	<b>\</b> _		BW ▼ <sub>T</sub>		2.30460			
-10					$\bigvee$	~~		T11 (T1)	-26 2.43986 -26	273 GHz		
-20 1MAX		T						T2	2.44216	733 GHz	1MA	
-40	mmy many							hum	way the same			
-50 www										Und		
-60												
-70												
-80												
-90 Center 2	.441 GHz			500	kHz/				Spa	ın 5 MHz		
Date: 21	L.MAR.202	22 09	:59:21									

Page 31 of 39

Report No.: TW2203034-01E



Product:	3 MODES MECHANICAL GAMING KEYBOARD			Test Mode:			DC3.8V 56% RH			
Mode	oing Transmi	ng Transmitting 24 deg. C,			Test Voltage Humidity					
Temperature	24 deg. C,									
Test Result:		Pass				Detector		]	PK	
20dB Bandwidth		2.295MHz								
Ref Lvl 10 dBm	Marke ndB BW	r 1 [T1 n 20. 2.294589	00 dB	V	BW BW WT	100 ki 300 ki 5 ms	Hz	F Att	20 dB dBm	
0		1				▼1 ndB	[T1]	2.47938 2.29458	.49 dBm 377 GHz .00 dB	A
-10					<b>/-/</b>	V <sub>T</sub> -	[T1]	-25 2.47886 -25	.64 dBm 273 GHz .02 dBm	
-30	7						T2	2.48115	731 GHz	1MA
-40	way was a second						Lyn	marrow	VIII.	
-60										
-70										
-80										
Center 2		10:00:19	500 ]	kHz/		'		Spa	ın 5 MHz	I

Report No.: TW2203034-01E Page 32 of 39

Date: 2022-03-24



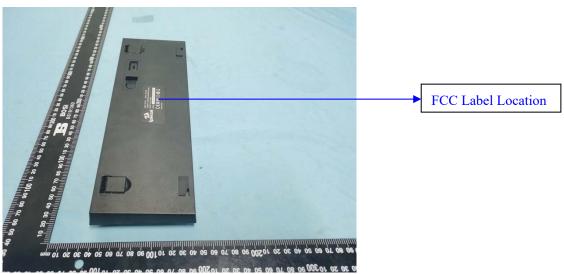
#### 10.0 FCC ID Label

#### FCC ID: TUVET-8559

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

#### **Mark Location:**



Page 33 of 39

Report No.: TW2203034-01E

Date: 2022-03-24



#### 11.0 Photo of testing

#### 11.1 Conducted test View--



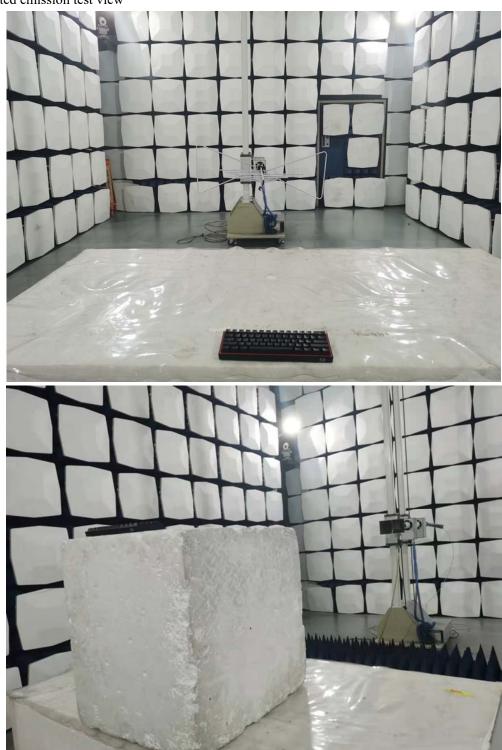
Page 34 of 39

Report No.: TW2203034-01E

Date: 2022-03-24



#### Radiated emission test view



The report refers only to the sample tested and does not apply to the bulk.

This report is issued in confidence to the client and it will be strictly treated as such by the SHENZHEN TIMEWAY TESTING LABORATORIES. It may not be reproduced rather in its entirety or in part and it may not be used for adverting. The client to whom the report is issued may, however, show or send it . or a certified copy there of prepared by the SHENZHEN TIMEWAY TESTING LABORATORIES. to his customer. Supplier or others persons directly concerned. SHENZHEN TIMEWAY TESTING LABORATORIES. will not, without the consent of the client enter into any discussion of correspondence with any third party concerning the contents of the report.

In the event of the improper use of the report. The SHENZHEN TIMEWAY TESTING LABORATORIES. reserves the rights to withdraw it and to adopt any other remedies which may be appropriate.

Date: 2022-03-24



#### 11.2 Photographs-EUT

#### Outside View



The report refers only to the sample tested and does not apply to the bulk.

This report is issued in confidence to the client and it will be strictly treated as such by the SHENZHEN TIMEWAY TESTING LABORATORIES. It may not be reproduced rather in its entirety or in part and it may not be used for adverting. The client to whom the report is issued may, however, show or send it . or a certified copy there of prepared by the SHENZHEN TIMEWAY TESTING LABORATORIES. to his customer. Supplier or others persons directly concerned. SHENZHEN TIMEWAY TESTING LABORATORIES.

will not, without the consent of the client enter into any discussion of correspondence with any third party concerning the contents of the report.

In the event of the improper use of the report. The SHENZHEN TIMEWAY TESTING LABORATORIES. reserves the rights to withdraw it and to adopt any other remedies which may be appropriate.

Page 36 of 39

Report No.: TW2203034-01E

Date: 2022-03-24



Outside View





The report refers only to the sample tested and does not apply to the bulk.

This report is issued in confidence to the client and it will be strictly treated as such by the SHENZHEN TIMEWAY TESTING LABORATORIES. It may not be reproduced rather in its entirety or in part and it may not be used for adverting. The client to whom the report is issued may, however, show or send it . or a certified copy there of prepared by the SHENZHEN TIMEWAY TESTING LABORATORIES. to his customer. Supplier or others persons directly concerned. SHENZHEN TIMEWAY TESTING LABORATORIES.

will not, without the consent of the client enter into any discussion of correspondence with any third party concerning the contents of the report.

In the event of the improper use of the report. The SHENZHEN TIMEWAY TESTING LABORATORIES. reserves the rights to withdraw it and to

adopt any other remedies which may be appropriate.

Report No.: TW2203034-01E Page 37 of 39



Outside View



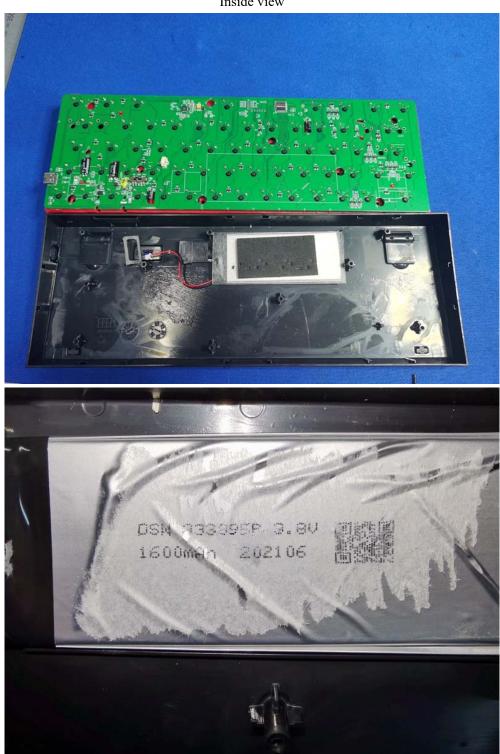
Page 38 of 39

Report No.: TW2203034-01E

Date: 2022-03-24



Inside view



The report refers only to the sample tested and does not apply to the bulk.

This report is issued in confidence to the client and it will be strictly treated as such by the SHENZHEN TIMEWAY TESTING LABORATORIES. It may not be reproduced rather in its entirety or in part and it may not be used for adverting. The client to whom the report is issued may, however, show or send it . or a certified copy there of prepared by the SHENZHEN TIMEWAY TESTING LABORATORIES. to his customer. Supplier or others persons directly concerned. SHENZHEN TIMEWAY TESTING LABORATORIES.

will not, without the consent of the client enter into any discussion of correspondence with any third party concerning the contents of the report.

In the event of the improper use of the report. The SHENZHEN TIMEWAY TESTING LABORATORIES. reserves the rights to withdraw it and to

adopt any other remedies which may be appropriate.

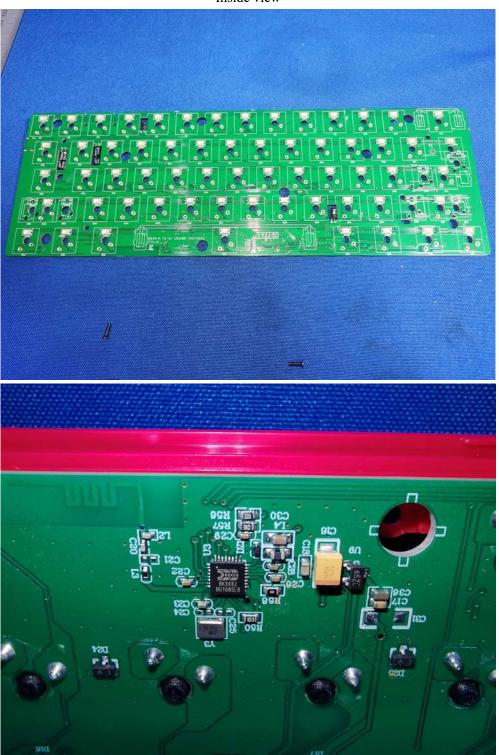
Page 39 of 39

Report No.: TW2203034-01E

Date: 2022-03-24



Inside view



-- End of the report--

The report refers only to the sample tested and does not apply to the bulk.

This report is issued in confidence to the client and it will be strictly treated as such by the SHENZHEN TIMEWAY TESTING LABORATORIES. It may not be reproduced rather in its entirety or in part and it may not be used for adverting. The client to whom the report is issued may, however, show or send it . or a certified copy there of prepared by the SHENZHEN TIMEWAY TESTING LABORATORIES. to his customer. Supplier or others persons directly concerned. SHENZHEN TIMEWAY TESTING LABORATORIES. will not, without the consent of the client enter into any discussion of correspondence with any third party concerning the contents of the report.

In the event of the improper use of the report. The SHENZHEN TIMEWAY TESTING LABORATORIES. reserves the rights to withdraw it and to

adopt any other remedies which may be appropriate.