EMC

Measurement and Test Report

EN 55032:2015+AC:2016

EN 55035:2017

For

STAR WAVE TECHNOLOGY CO.,LTD

4F, Building 6, 2nd Area, Sanxing Industrial park, Fuhai Avenue, Fuyong Street, Bao'an District, Shenzhen, China

Prepared By:

Shenzhen HSO. Test Technology Co., Ltd.

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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen HSO. Test Technology Co., Ltd.

TEST RESULTS CERTIFICATION

Compiled by (+ signature)..... Iris Liu/ Project Engineer

Approved by (+ signature)..... Frank Liu/ assistant Manager

SHENZHEN HSO TEST TECHNOLOGY CO., LTD. APPROVED

Applicant's Name.....: STAR WAVE TECHNOLOGY CO.,LTD

Address……..……..…….: 4F, Building 6, 2nd Area, Sanxing Industrial park, Fuhai Avenue, Fuyong Street, Bao'an District, Shenzhen, China

Manufacturer's name.....: STAR WAVE TECHNOLOGY CO.,LTD

Address……..……..…….: 4F, Building 6, 2nd Area, Sanxing Industrial park, Fuhai Avenue, Fuyong Street, Bao'an District, Shenzhen, China

Product description

Product name.....: Wired Keyboard

Trade mark.....: N/A

Model and/or type reference..: SW-GK320,SW-GK3,SW-GK002,SW-GK003,SW-GK004,SW-GK005, SW-GK006,SW-GK801,SW-GK802,SW-GK803,SW-GK804,SW-GK805, SW-GK806,SW-GK807,SW-GK808,SW-GK809,SW-GK810,SW-GK811, SW-GK812,SW-GK813,SW-GK814,SW-GK815,SW-GK816,SW-HK817, SW-GK910,SW-GK930,SW-GK950,SW-GK971

Test specification:

Standards.....: EN 55032:2015+AC:2016
EN 55035:2017

This device described above has been tested by HSO lab,and the test results show that the equipment under test (EUT) is in compliance with the EC Council Directive of 2014/30/EU. And it is applicable only to the tested sample identified in the report.

Date ofTesting.....:

Receipt of test item.....: Nov.18,2019

Date (s) of performance of tests....: From Nov.18,2019 to Nov.22,2019

Date of issue.....: Nov.22,2019

Test result.....: **Pass**

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1. GENERAL INFORMATION

1.1 product Description for Equipment Under Test (EUT)

1. **GENERAL DESCRIPTION OF EUT**	
Product Name:	Wired Keyboard
Model No.	SW-GK320
Adding Model(s)	SW-GK3,SW-GK002,SW-GK003,SW-GK004,SW-GK005, SW-GK006,SW-GK801,SW-GK802,SW-GK803,SW-GK804, SW-GK805,SW-GK806,SW-GK807,SW-GK808,SW-GK809, SW-GK810,SW-GK811,SW-GK812,SW-GK813,SW-GK814, SW-GK815,SW-GK816,SW-HK817,SW-GK910,SW-GK930, SW-GK950,SW-GK971
Note:N/A	

Technical Characteristics of EUT	
Rated Voltage:	5VDC
Rated Current:	/
Rated Power:	/
Classification of ITE	Class B

1.2 Test Standards

The following report is prepared on behalf of the STAR WAVE TECHNOLOGY CO.,LTD in accordance with EN55032, Information technology equipment - Radio disturbance characteristics -Limits and methods of measurement, and EN55035, Immunity characteristics Limits and methods of measurement.

The objective of the manufacturer is to demonstrate compliance with the standards EN55032 and EN55035 for Information Technology Equipment.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with the standards EN55032 and EN55035 for Information Technology Equipment, and all related testing and measurement techniques intentional standards.

1.4Test Facility

Shenzhen HSO. Test Technology Co., Ltd.
713,No.6321 Bao'an Avenue, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

1.5 EUT Setup and Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission/immunity level. The test modes were adapted according to the operation manual for use, more detailed description as follows:

Test Mode List:

Test Mode	Description	Remark
Mode 1FM Mode(charging)	Specification:MS	/
Mode 2FM Mode(discharging)	Specification:MS	

EUT Cable List and Details

Cable Description	Length(M)	Shieded/Unshielde	With Core/Without Core
/	/	/	/

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

Special Cable List and Details

Cable Description	Length(M)	Shieded/Unshielde	With Core/Without Core
/	/	/	/

1.6 Performance Criteria for EMS

All the test data has been collected, reduced, and analyzed within this report in accordance with Immunity requires the following as specific performance criteria:

A. The apparatus shall continue to operate as intended during and after the test. The manufacturer specifies some minimum performance level. The performance levely be specified by the manufacturer as a permissible loss of performance.

B. The apparatus shall continue to operate as intended after the test. This indicates that the EUT does not need to function at normal performance levels during the test, but must recover. Again some minimal performance is defined by the manufacture. No change in operating state or loss or data is

permitted.

C. Temporary loss of function is allowed. Operation of the EUT may stop as long as it is either automatically reset or can be manually restored by operation of the controls.

2. SUMMARY OF TEST RESULTS

Standards	Description of Test Item	Result
EN 55032	Conducted Disturbance	N/A
	Radiated Disturbance	Compliant
EN 61000-3-2	Harmonic Current Emission	N/A
EN 61000-3-3	Voltage Fluctuation and Flicker	N/A
EN 55035	Electrostatic Discharge Immunity in accordance with IEC 61000-4-2	Compliant
	Continuous Radiated Disturbances Immunity in accordance with IEC 61000-4-3	Compliant
	Electrical Fast Transient/Burst Immunity in Accordance with IEC 61000-4-4	N/A
	Surges Immunity in accordance with IEC 61000-4-5	N/A
	Continuous Conducted Disturbances Immunity in accordance with IEC 61000-4-6	N/A
	Power-frequency Magnetic Fields Immunity in accordance with IEC 61000-4-8	N/A
	Voltage Dips/Interruptions Immunity in accordance with IEC61000-4-11	N/A

N/A: not applicable

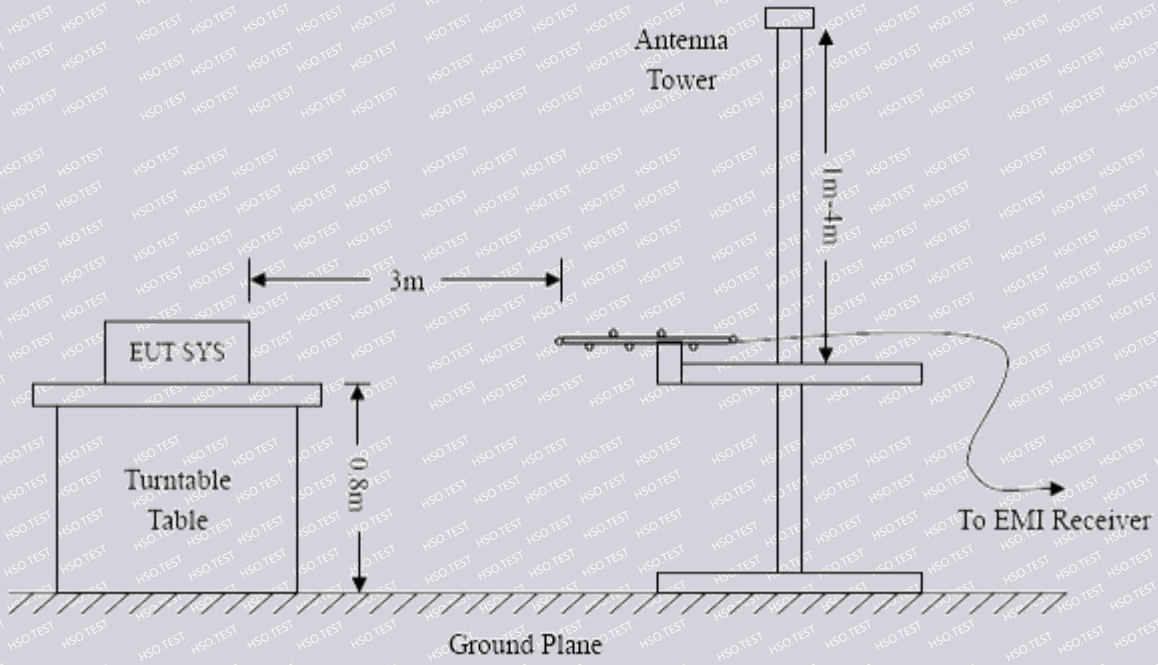
3. Radiated Disturbance

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is + 5.10 dB.

3.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2019-05-16	2020-05-15
EMI Test Receiver	R&S	ESVB	825471/005	2019-05-16	2020-05-15
Pre-amplifier	Agilent	8447F	3113A06717	2019-05-16	2020-05-15
Pre-amplifier	Compliance Direction	PAP-0118	24002	2019-05-16	2020-05-15
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2019-05-16	2020-05-15
Horn Antenna	ETS	3117	00086197	2019-05-16	2020-05-15

Test is conducting under the description of EN55032 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.



3.4 Corrected Amplitude &Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "Margin" column of the following data tables indicates the degree of compliance with the applicable
limit. For example, a margin of -6dB V means the emission is 6dB V below the maximum limit for Class B device. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – EN55032 Class B Limit

3.5environmental Conditions

Temperature:	25℃
Relative Humidity:	56%
ATM Pressure:	1011mbar

3.6 summary of Test Results/Plots

According to the data in section 4.6, the EUT complied with the EN55032 Class B standards, and had the worst margin is:

Plot of Radiated Emissions Test Data

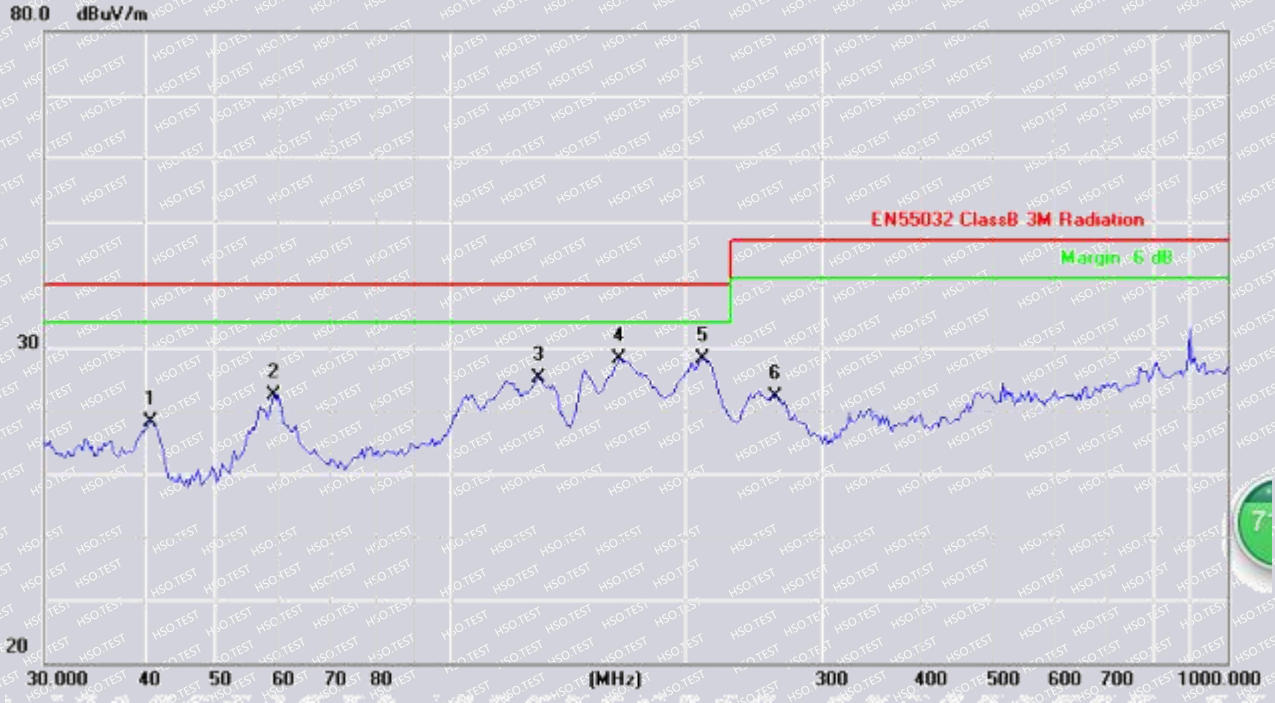
EUT: Wired Keyboard

Tested Model: SW-GK320

Operating Condition: TM1

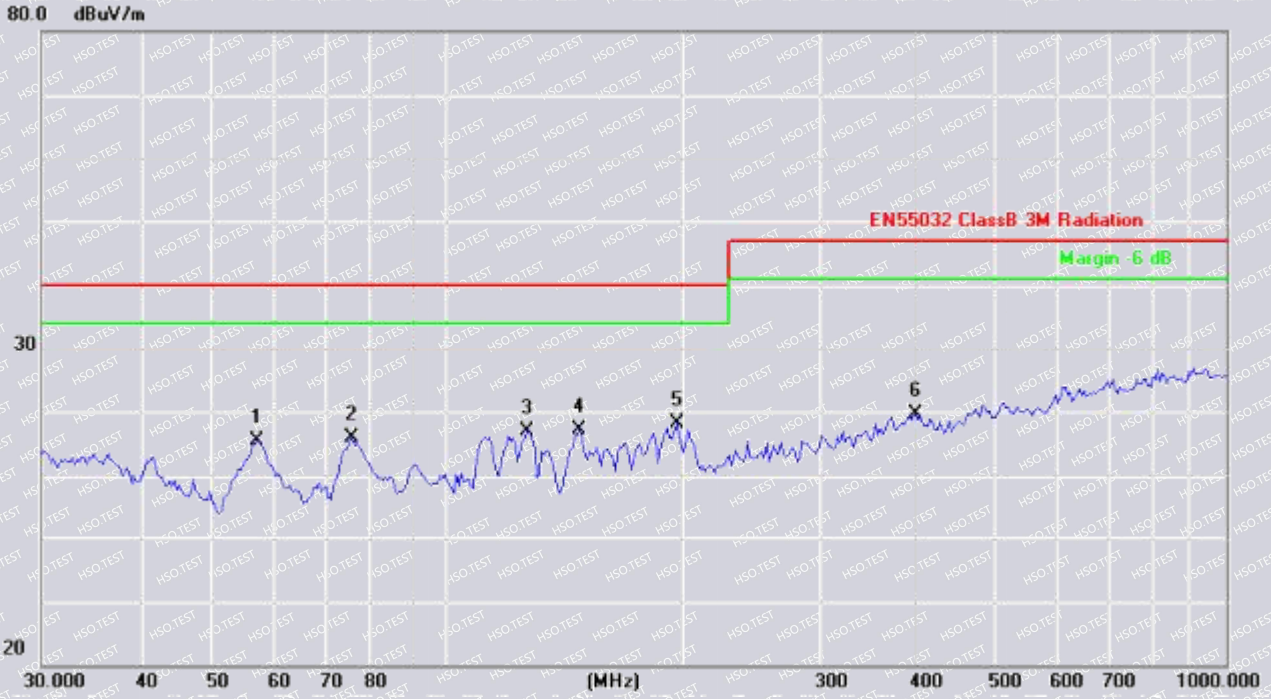
Comment: DC 5.0V

Test Specification: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		41.1320	38.27	-20.08	18.19	40.00	-21.81	peak			
2		59.2325	46.34	-23.92	22.42	40.00	-17.58	peak			
3		129.9226	46.77	-21.55	25.22	40.00	-14.78	peak			
4	*	164.9075	48.19	-20.09	28.10	40.00	-11.90	peak			
5		210.7860	47.06	-18.96	28.10	40.00	-11.90	peak			
6		261.9753	39.01	-16.78	22.23	47.00	-24.77	peak			

Test Specification: Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		56.7917	39.35	-23.89	15.46	40.00	-24.54	peak			
2		75.1822	38.81	-22.89	15.92	40.00	-24.08	peak			
3		126.3286	38.45	-21.68	16.77	40.00	-23.23	peak			
4		147.4036	37.75	-20.73	17.02	40.00	-22.98	peak			
5	*	196.5098	37.80	-19.65	18.15	40.00	-21.85	peak			
6		399.0302	31.59	-11.86	19.73	47.00	-27.27	peak			

4. Electrostatic Discharges (ESD)

4.1 Test Equipment List and Detais

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
ESD Generator	RTESQAG	NSG437	161	2019-05-16	2020-05-15

4.2 Test Procedure

Test is conducting under the description of IEC61000-4-2.

Test Performance

Performance Criterion:B

Environmental Conditions

Temperature:	25℃
Relative Humidity:	56%
ATM Pressure:	1011mbar

4.3 Electrostatic Discharge Immunity Test Data

Model:TM1

Table 1: Electrostatic Discharge Immunity (Air Discharge)

EN 61000-4-2	Test Levels(KV)									
Test Points	-2	+2	-4	+4	-6	+6	-8	+8	-15	-15
Contact surfaces	A	A	A	A	A	A	A	A		
button	A	A	A	A	A	A	A	A		

Table 2: Electrostatic Discharge Immunity (Direct Contact)

EN 61000-4-2	Test Levels(KV)									
Test Points	-2	+2	-4	+4	-6	+6	-8	+8	-15	-15
I/O port	A	A	A	A						

Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

EN 61000-4-2	Test Levels(KV)									
Test Points	-2	+2	-4	+4	-6	+6	-8	+8	-15	-15
Front Side	A	A	A	A						
Top Side	A	A	A	A						
Back Side	A	A	A	A						
Left Side	A	A	A	A						
Right Side	A	A	A	A						

Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

EN 61000-4-2	Test Levels(KV)									
Test Points	-2	+2	-4	+4	-6	+6	-8	+8	-15	-15
Front Side	A	A	A	A						
Top Side	A	A	A	A						
Back Side	A	A	A	A						
Left Side	A	A	A	A						
Right Side	A	A	A	A						

Test Results：pass

5. Continuous Radiated Disturbances (R/S)

5.1 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Signal Generator	R&S	SMT03	100059	2019-05-16	2020-05-15
Voltage Probe	R&S	URV5-Z2	100013	2019-05-16	2020-05-15
Power amplifie	AR	150W1000	300999	2019-05-16	2020-05-15
Power amplifier	AR	25S1G4AM1	305993	2019-05-16	2020-05-15
Trilog Antenna	SCHWARZBECK	VULB9163	9163-333	2019-05-16	2020-05-15
Anechoic chamber	Albatross Projects	MCDC	----	2019-05-16	2020-05-15

Test is conducting under the description of IEC61000-4-3.

Test Performance

Performance Criterion: A

Environmental Conditions

Temperature:	25℃
Relative Humidity:	56%
ATM Pressure:	1011mbar

5.3 Continuous Radiated Disturbances Test Data

Frequency step: 1% of fundamental

Dwell time: 1 second
Modulation: AM by 1kHz sine wave with 80% modulation depth

Frequency Range(MHz)	Field (V/m)	Front		Rear		Left Side		Right Side	
		VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	3	A	A	A	A	A	A	A	A

Test Result: Pass

EXHIBIT 1 - PRODUCT LABELING



Specifications: Text is Black in color and is justified. Labels are printed in indelible ink on permanent adhesive backing or silk-screened onto the EUT or shall be affixed at a conspicuous location on the EUT. The ‘CE’ marking must be affixed to the EUT or to its data plate. Where this is not possible or not warranted on account of the nature of the apparatus, it must be affixed to the packaging, if any, and to the accompanying documents. The ‘CE’ marking must have a height of at least 5 mm. If the ‘CE’ marking is reduced or enlarged the proportions given in the above graduated drawing must be respected.

EXHIBIT 2 - EUT PHOTOGRAPHS

Fig. 1

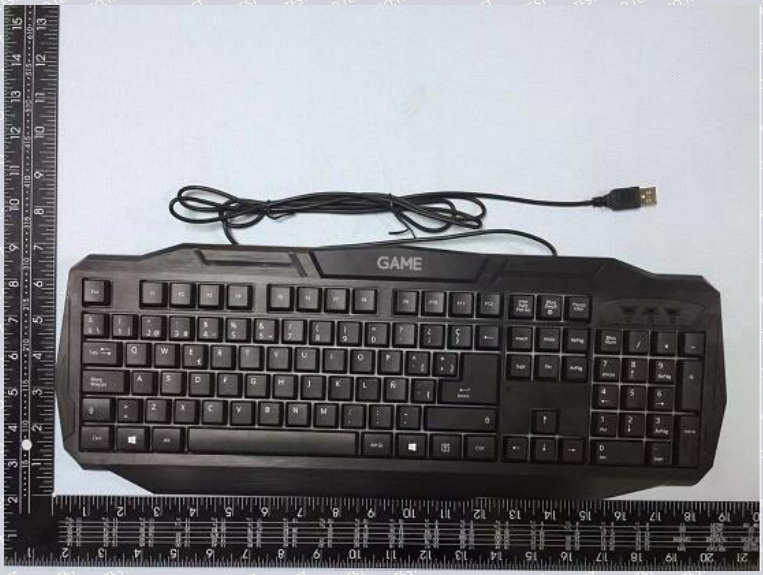


Fig. 2



Fig. 3



Fig. 4

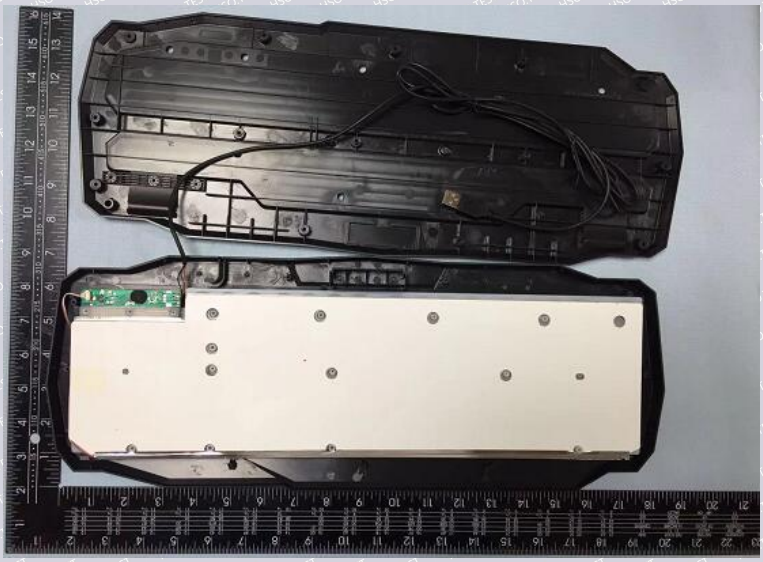


Fig. 5



Fig. 6

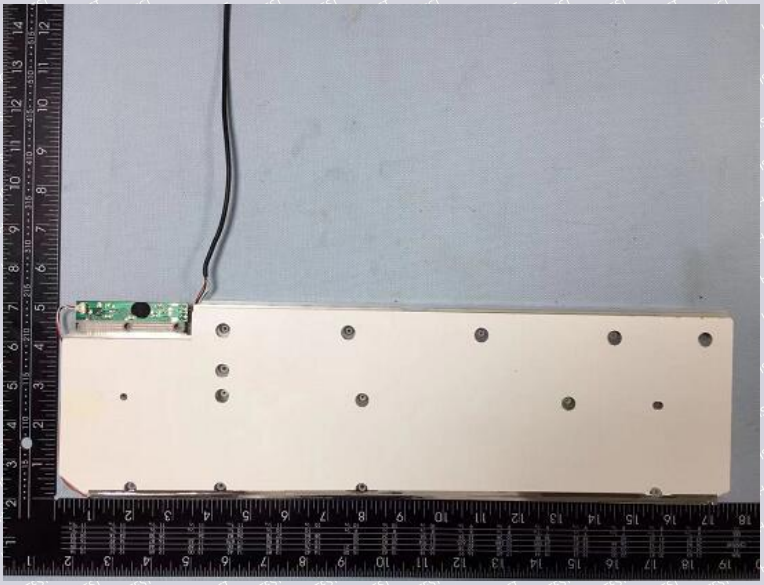


Fig. 7

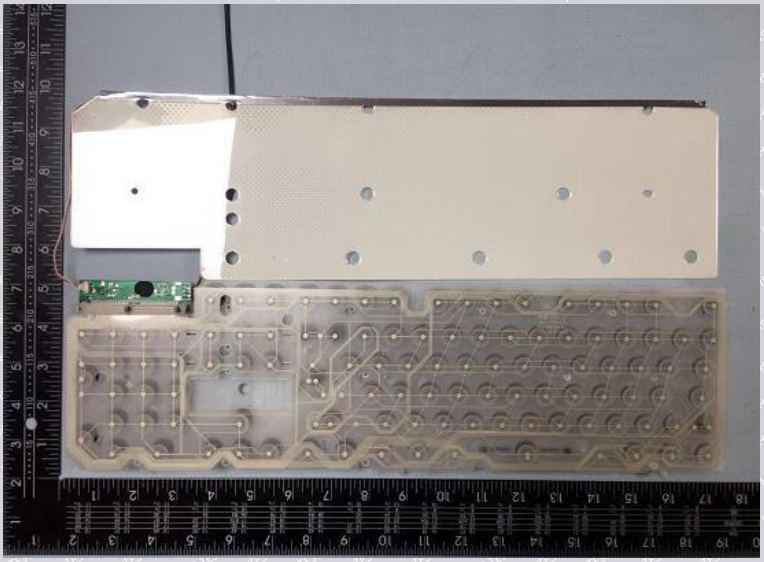


Fig. 8

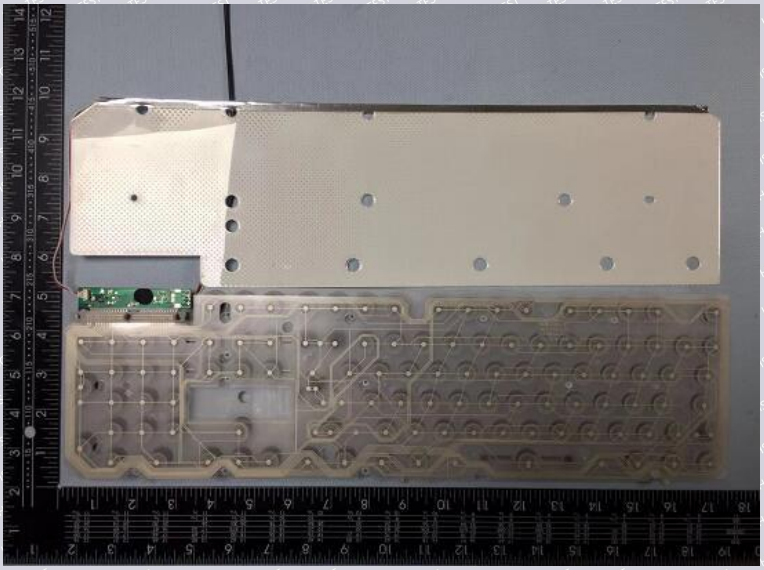


Fig. 9

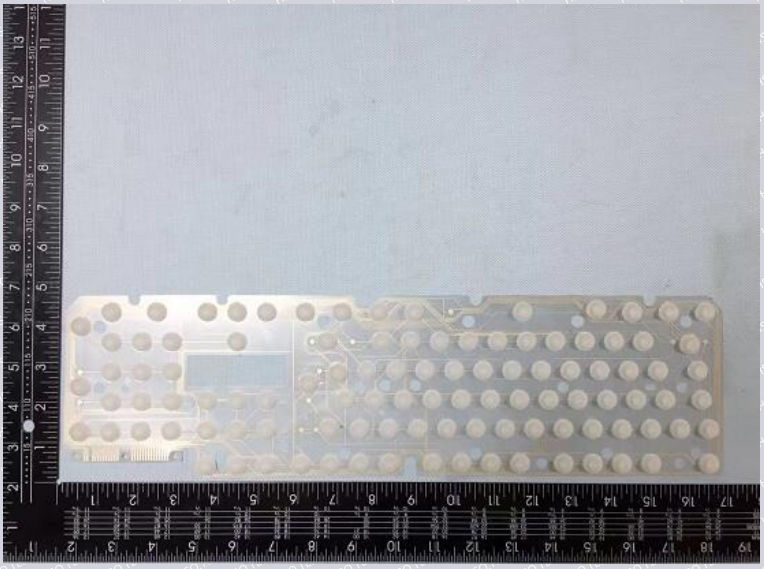


Fig. 10

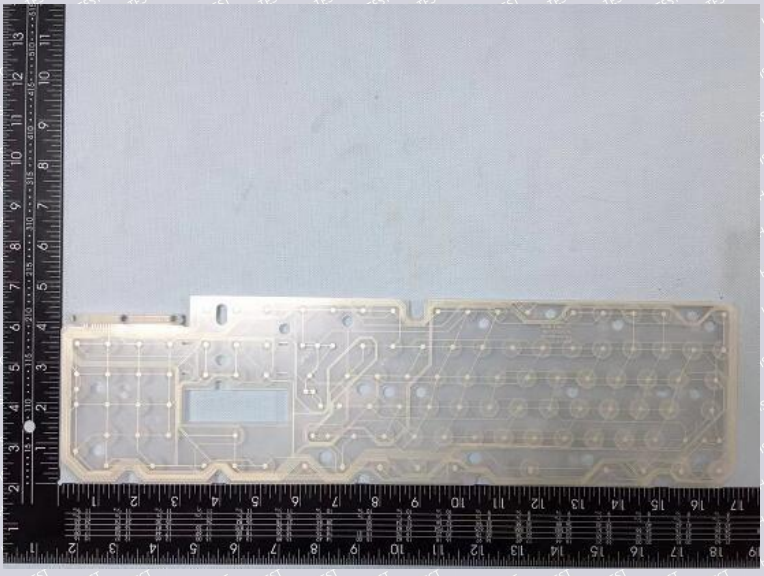


Fig. 11

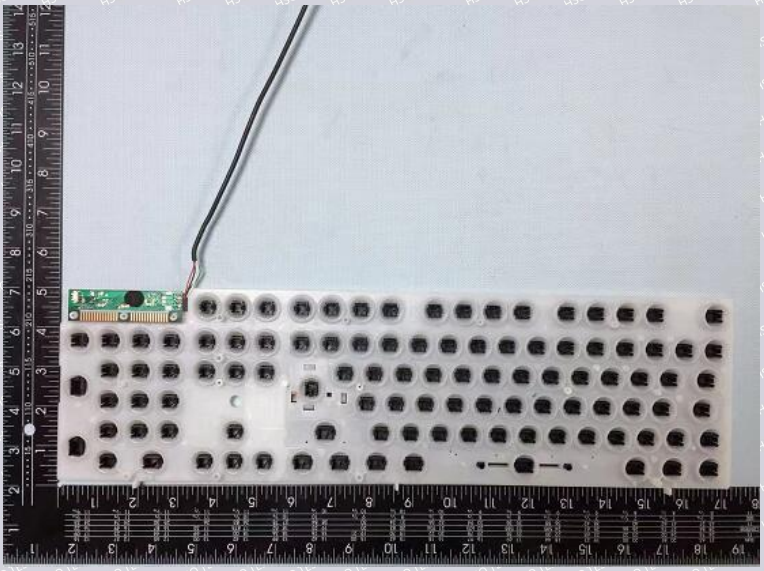


Fig. 12

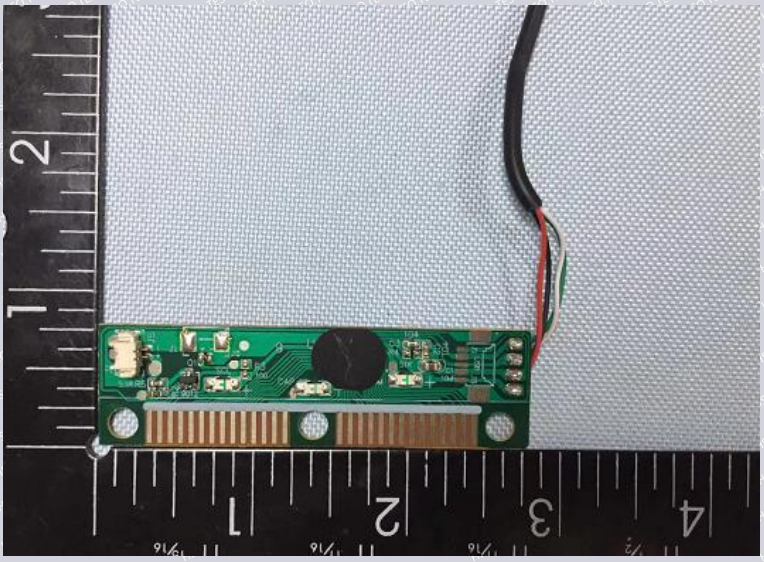


Fig. 13

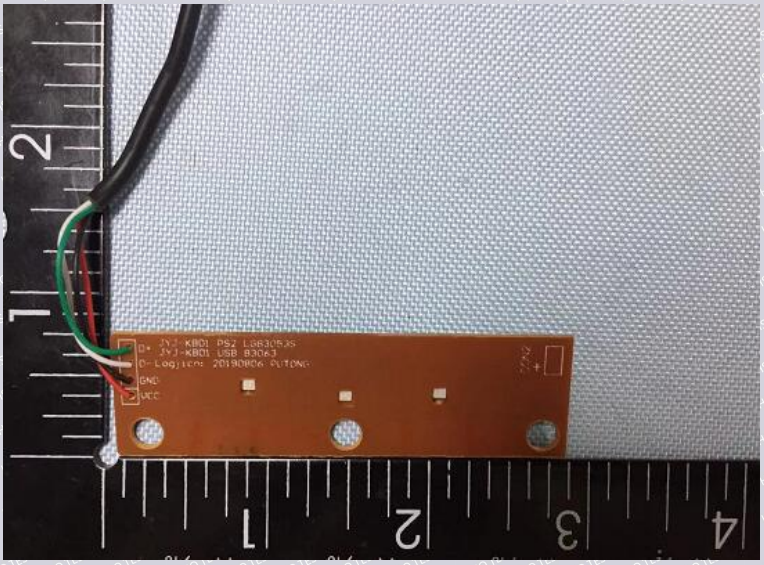


Fig. 14

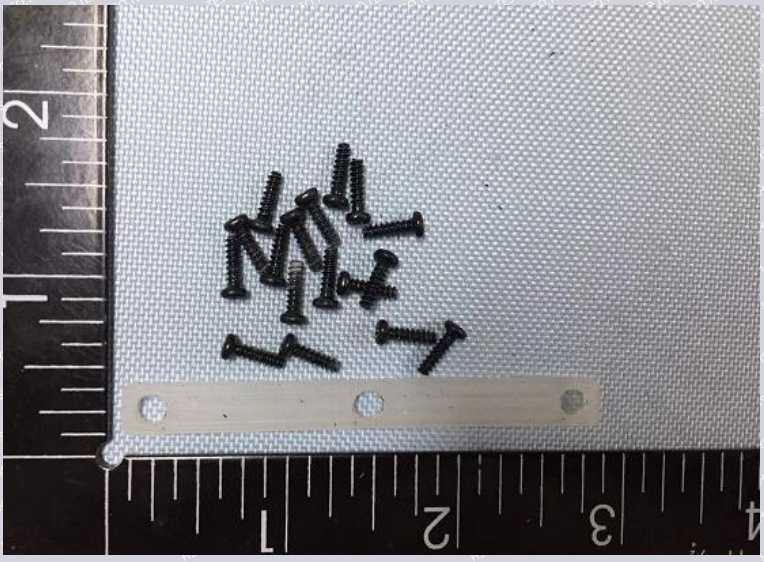
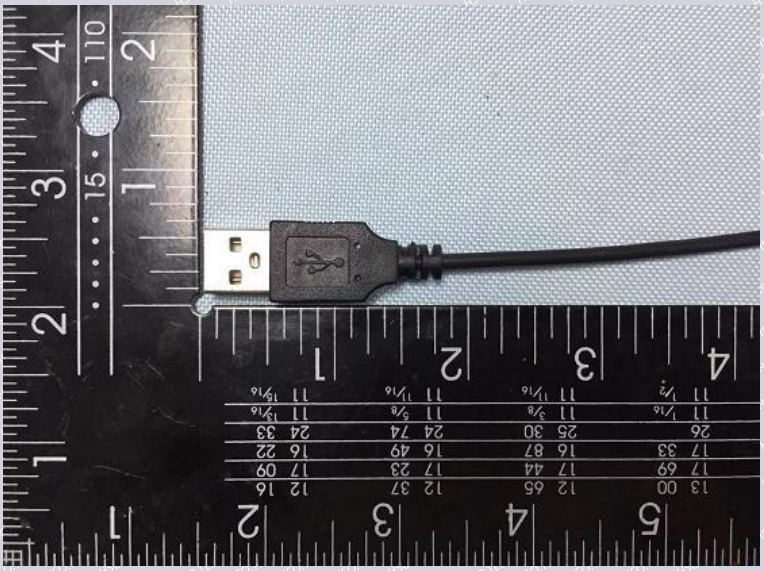


Fig. 15



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