

FCC TEST REPORT

UNDER
FCC 15 Subpart C, Paragraph 15.227

PREPARED FOR :

MLK Technologies Limited

Block A1, 1st Industrial Park, 3rd Industrial Zone,
Fenghuang Village, FuYong, BaoAn, Shenzhen, P.R.China.

FCC ID: PP2020051

EUT: Wireless Keyboard

Model: 020051(MLK); WCU90D(CREATIVE)

May 31, 2003

Report Type: Original Report

Test Engineer: Peter Lin

Test Date: May 28, 2003

Review By: _____

Apollo Liu

PREPARED BY :

Shenzhen Academy of Metrology & Quality Inspection

Longzhu Road, Nanshan

FCC Registration Number: 97379

TABLE OF CONTENTS

1. Summary of Test Results.....	3
2. Test Statement	4
2. 1 Test Statement.....	4
2. 2 Departure From Document Policies, Procedure or Specifications, The Statement	4
3. EUT Modifications	5
4. Conducted Power Line Test	6
4. 1 Test Equipment	6
4. 2 Test Procedure	6
4. 3 Test Setup	6
4. 4 Configuration of The EUT.....	7
4. 5 EUT Operating Condition.....	8
4. 6 Conducted Power Line Emission Limits.....	8
4. 7 Conducted Power Line Test Result.....	9
5. RADIATED EMISSION TEST	10
5. 1 Test Equipment	10
5. 2 Test Procedure	10
5. 3 Radiated Test Setup	10
5. 4 Configuration of The EUT.....	11
5. 5 EUT Operating Condition.....	11
5. 6 Radiated Emission Limit	11
5. 7 Radiated Emission Test Result.....	12
6. Band Edge	14
6. 1 Test Equipment	14
6. 2 Test Procedure	14
6. 3 Radiated Test Setup	14
6. 4 Configuration of The EUT.....	15
6. 5 EUT Operating Condition.....	15
6. 6 Band Edge Limit.....	15
6. 7 Band Edge Test Result.....	15
7. PHOTOS OF TESTING.....	16
7. 1 EUT Test Photographs	16
7. 2 EUT Detailed Photographs	17
8. FCC ID LABEL.....	21
9. Test Equipment	22

1. Summary of Test Results

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.207	Conducted Test	N/A	Owing to the DC operation of EUT, this test item is not performed.
FCC Part 15 Subpart C Paragraph 15.227 Limit	Field Strength of Fundamental	PASS	Minimum passing margin is – 17.50 dB at 27.146 MHz Horizontal
FCC Part 15 , Paragraph 15.209	Radiated Test	PASS	Meets Class B Limit Minimum passing margin is – 1.8 dB at 447.935 MHz Horizontal
Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).	Band Edge Test	PASS	The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209.

2. Test Statement

2.1 Test Statement

- A. This statement explains the test condition of this project. The EUT was tested under the condition of each test item.
- B. The data shown in this report reflects the worst – case data for the condition as the summary of test result.
- C. EUT conditions.

Note: (1)The EUT is a Wireless Keyboard intends to use in household and office PC system or related application.
(2)Regarding to the frequency band operation, one channel (Channel 1) were selected to perform the test, then shown on this report.
(3) It is acknowledged by MLK Technologies Limited. that Selling Model No.: 020051, Brand Name: MLK ; Model No.: WCU90D,Brand Name: CREATIVE are identical. The Model difference is for marketing purposes only.

2.2 Departure From Document Policies, Procedure or Specifications, The Statement

1. Did have any departure from document policies & procedures or from specifications.
Yes , No
If yes , the description as below.
2. The report must not be used by the client to claim product endorsement by any agency the government.
3. This product is a test sample that was shown as the photos of this test report only.
4. The effect that the results relate only to the items tested.

3. EUT Modifications

No modification by Shenzhen Academy of Metrology & Quality Inspection.

4. Conducted Power Line Test

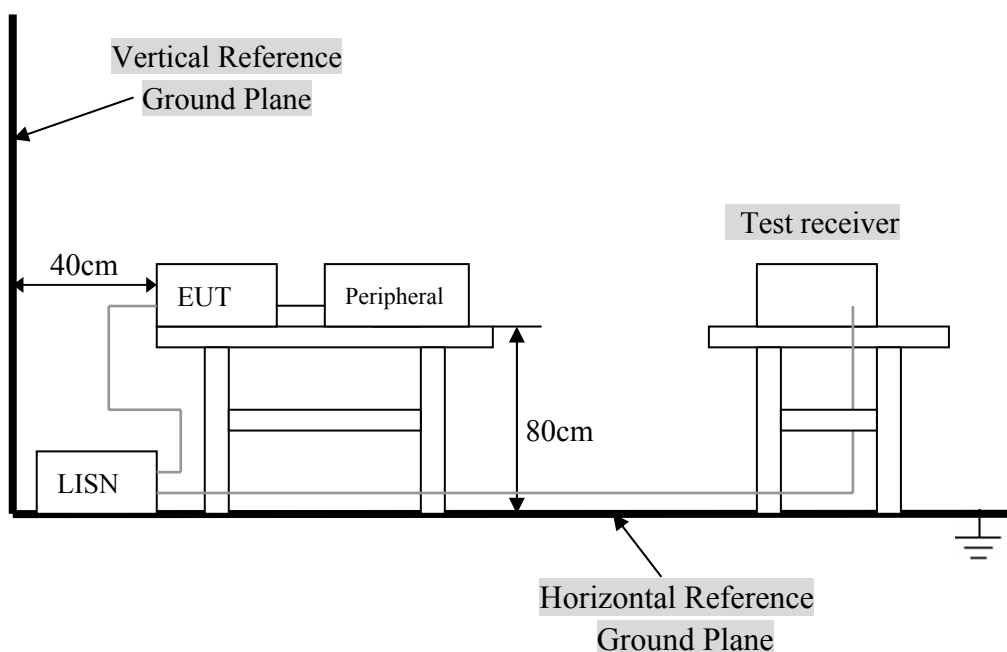
4.1 Test Equipment

Please refer to Section 9 this report.

4.2 Test Procedure

The EUT was tested according to ANSI C63.4 - 1992. The frequency spectrum from 0.45 MHz to 30 MHz was investigated. The LISN used was 50 ohm / 50 uHenry as specified by section 5.1 OF ANSI C63.4 - 1992. cables and peripherals were moved to find the maximum emission levels for each frequency.

4.3 Test Setup



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

4.4 Configuration of The EUT

The EUT was configured according to ANSI C63.4-1992. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

A. EUT

DEVICE	MANUFACTURER	MODEL #	FCCID / DoC
Wireless Keyboard	MLK Technologies Limited	020051 (MLK); WCU90D (CREATIVE)	PP2020051

B. Internal Devices

DEVICE	MANUFACTURER	MODEL #	FCCID / DoC
N/A			

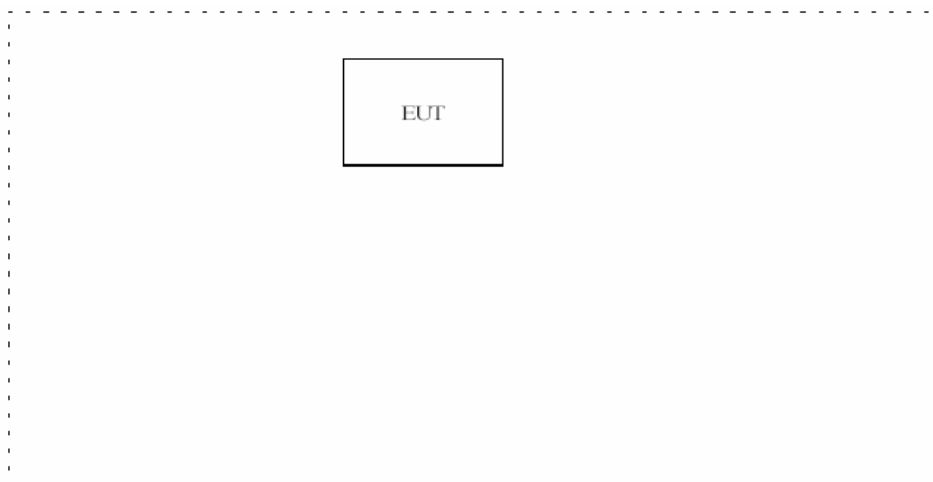
C. Peripherals

DEVICE	MANUFACTURER	MODEL # SERIAL #	FCC ID/ DoC	CABLE
PRINTER	EPSON	P310B	Doc	1.5m unshielded power cord 1.2m shielded data cable.
MODEM	DATATRONICS	1200CK	E2050V1200CK	1.5m unshielded power cord 1.2m shielded data cable.
NOTEBOOK	IBM	T23	N/A	1.5m unshielded power cord

4.5 EUT Operating Condition

Operating condition is according to ANSI C63.4 - 1992.

- A. Setup the EUT and simulators as shown on follow.
- B. Enable RF signal and confirm EUT active.
- C. Modulate output capacity of EUT up to specification.



4.6 Conducted Power Line Emission Limits

FCC Part 15 Paragraph 15.207 (dBuV)		
FREQUENCY RANGE (MHz)	CLASS A QP/AV	CLASS B QP/AV
0.15 – 0.5	79/66	66-56/56-46
0.5 – 5.0	73/60	56/46
5.0 - 30	73/60	60/50

NOTE : In the above table, the tighter limit applies at the band edges.

4.7 Conducted Power Line Test Result

Owing to the DC operation of EUT, this test item is not performed.

5. Radiated Emission Test

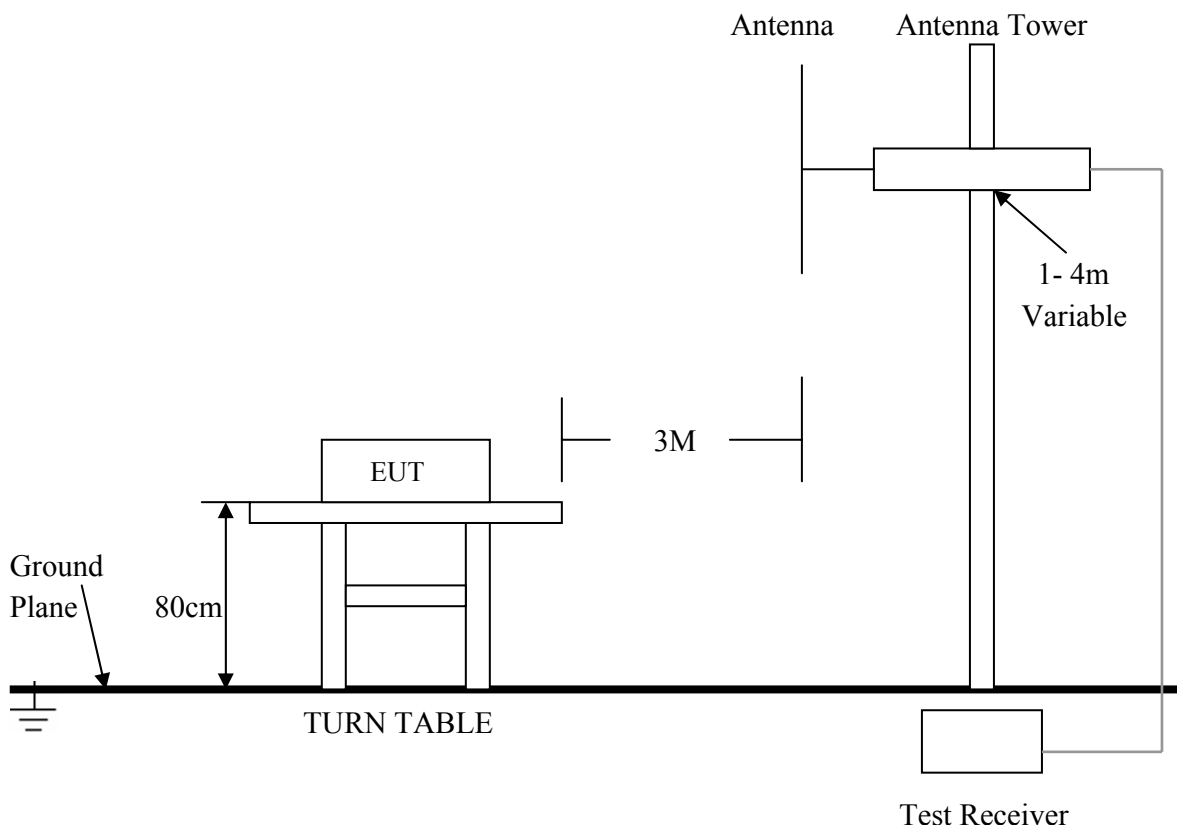
5.1 Test Equipment

Please refer to Section 9 this report.

5.2 Test Procedure

1. The EUT was tested according to ANSI C63.4 - 1992. The radiated test was performed at Shenzhen Academy of Metrology and Quality Inspection. This site is on file with the FCC laboratory division, Registration No. 97379.
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 C63.4-1992.
3. The frequency spectrum from 30 MHz to 1 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 . 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. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "QP" in the data table.
6. The antenna polarization : Vertical polarization and Horizontal polarization.

5.3 Radiated Test Setup



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

5.4 Configuration of The EUT

Same as section 4.4 of this report

5.5 EUT Operating Condition

Same as section 4.5 of this report.

5.6 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 15.227 Limit

Fundamental Frequency (MHz)	Field Strength of Fundamental	
	uV/m	dBuV/m
26.96 – 27.28	10000	80.0

- Note:**
- (1) RF Voltage (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. Measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

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

Frequency (MHz)	Distance (m)	Field Strength (dBuV/m)
30 - 88	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

5. 7 Radiated Emission Test Result

A. Fundamental Radiated Emission Data

Product : Wireless Keyboard
 Test Item : Fundamental Radiated Emission Data
 Test Voltage : DC 3V (Power by Battery)
 Test Mode : Normal
 Temperature : 26 °C
 Humidity : 51%RH
 Test Result : PASS

FREQ. (MHz)	EMISSION (dBuV/m)	HORIZ /VERT	LIMITS (dBuV/m)	MARGIN (dB)
27.146	62.50	HORIZ	80	-17.50
27.146	61.12	VERT	80	-18.88

- Note:**
- (1) All Readings are Peak value.
 - (2) Emission Level = Reading Level + Probe Factor + Cable Loss.
 - (3) The average measurement was not performed when the peak measured data under the limit of average detection.

B. General Radiated Emission Data

Product : Wireless Keyboard
 Test Item : General Radiated Emission Data
 Test Voltage : DC 3V (Power by Battery)
 Test Mode : Normal
 Temperature : 25 °C
 Humidity : 53%RH
 Test Result : PASS

FREQ. (MHz)	EMISSION (dBuV)	HORIZ / VERT	LIMITS (dBuV/m)	MARGIN (dB)
39.719	37.6	HORIZ	40.0	-2.4
39.719	38.1	VERT	40.0	-1.9
148.577	38.5	HORZ	43.5	-5.0
148.577	32.6	VERT	43.5	-10.9
447.935	44.2	HORZ	46.0	-1.8
447.935	40.3	VERT	46.0	-5.7

- Note:**
- (1) All Reading Levels below 1GHz are Quasi-Peak, above are peak and average value.
 - (2) Emission Level = Reading Level + Probe Factor + Cable Loss.

Radiated Disturbance

FCC15

EUT: Wireless Keyboard M/N: 020051

Manufacturer: MLK Technologies Limited

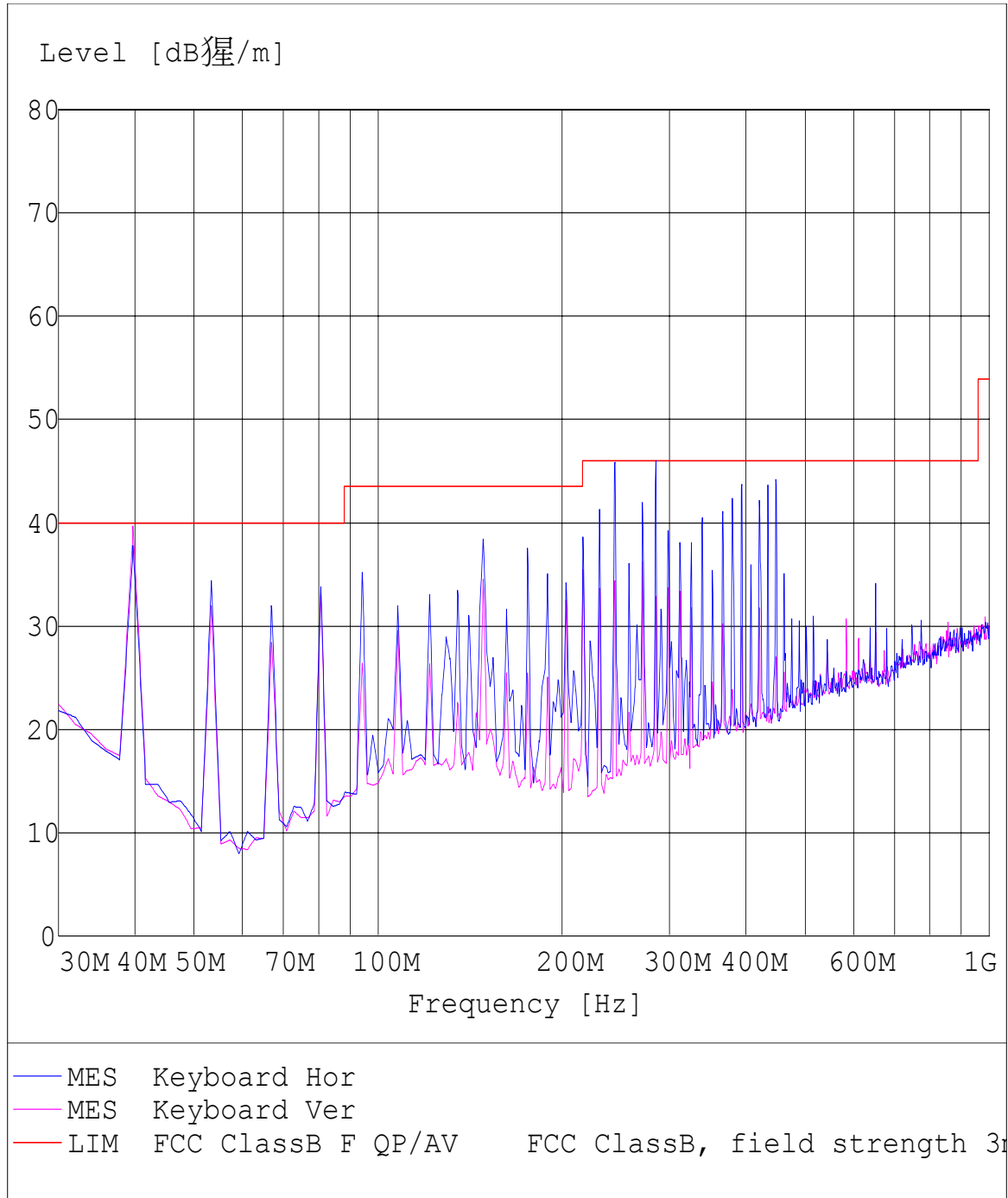
Operating Condition: Normal

Test Site: SMQ EMC Laboratory, SAC

Operator: Peter Lin

Test Specification: Vertical & Horizontal

Comment:



6. Band Edge

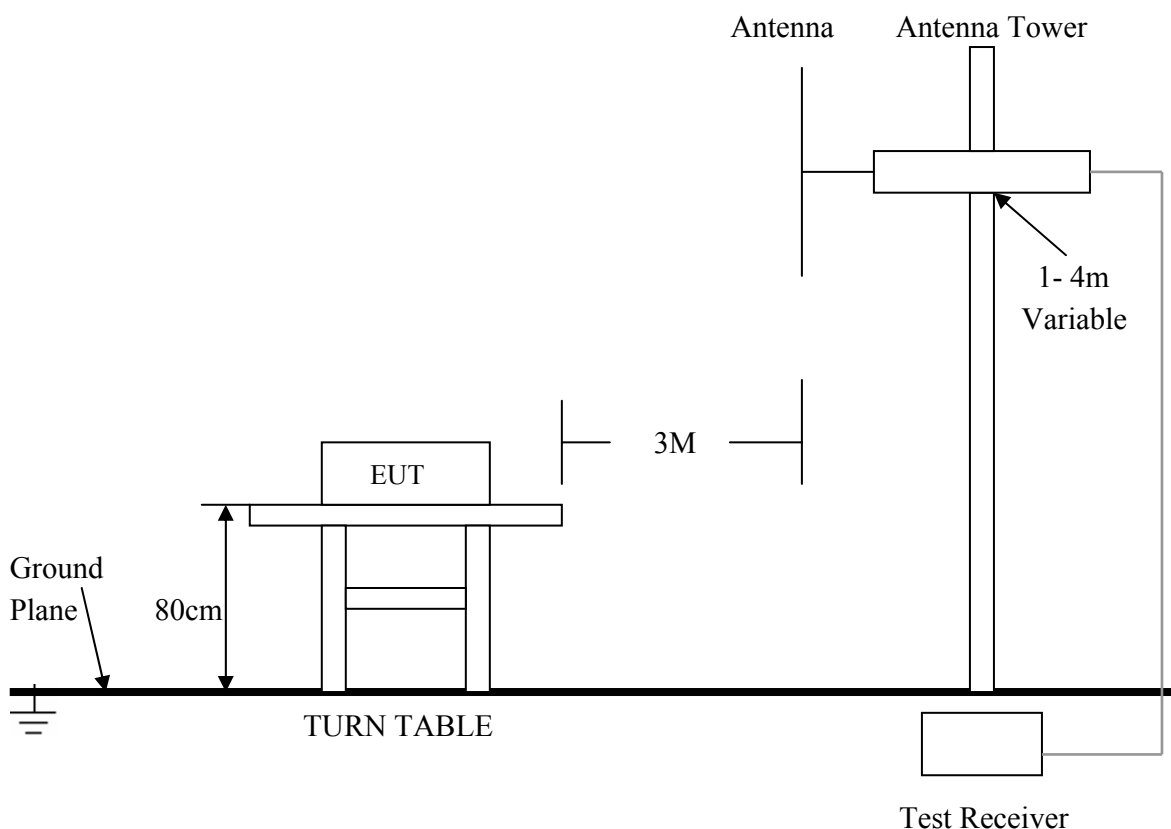
6.1 Test Equipment

Please refer to Section 9 this report.

6.2 Test Procedure

1. The EUT was tested according to ANSI C63.4 - 1992. The radiated test was performed at Shenzhen Academy of Metrology & Quality Inspection. This site is on file with the FCC laboratory division, reference 97379.
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 C63.4-1992.
3. The frequency spectrum from 30 MHz to 1 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 . Measurements were made at 3 meters.
4. The antenna high were varied from 1 m to 4 m high to find the maximum emission for each frequency.
5. The additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of harmonics measurement. The bandwidth below 30MHz setting on the field strength meter is 10 kHz, above 1GHz are 1 MHz.
6. Maximizing procedure was performed on the highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "QP" in the data table.
7. The antenna polarization : Vertical polarization and horizontal polarization.

6.3 Radiated Test Setup



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

6.4 Configuration of The EUT

Same as section 4 . 4 of this report

6.5 EUT Operating Condition

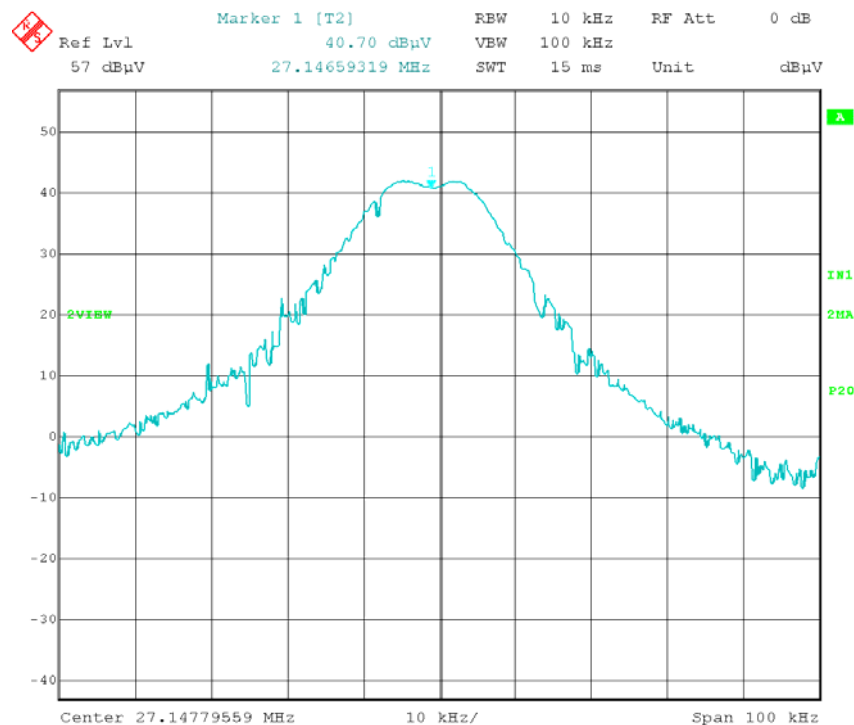
Same as section 4 . 5 of this report.

6.6 Band Edge Limit

Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.7 Band Edge Test Result

Product : Wireless Keyboard
 Test Item : Band Edge Data
 Test Mode : Normal Operation
 Temperature : 25 °C
 Humidity : 56%RH



- Note:**
- (1) The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209.
 - (2) The average measurement was not performed when the peak measured data under the limit of average detection.

7. Photos of Testing

7.1 EUT Test Photographs

Radiated emission test view



7.2 EUT Detailed Photographs

(1) EUT top view

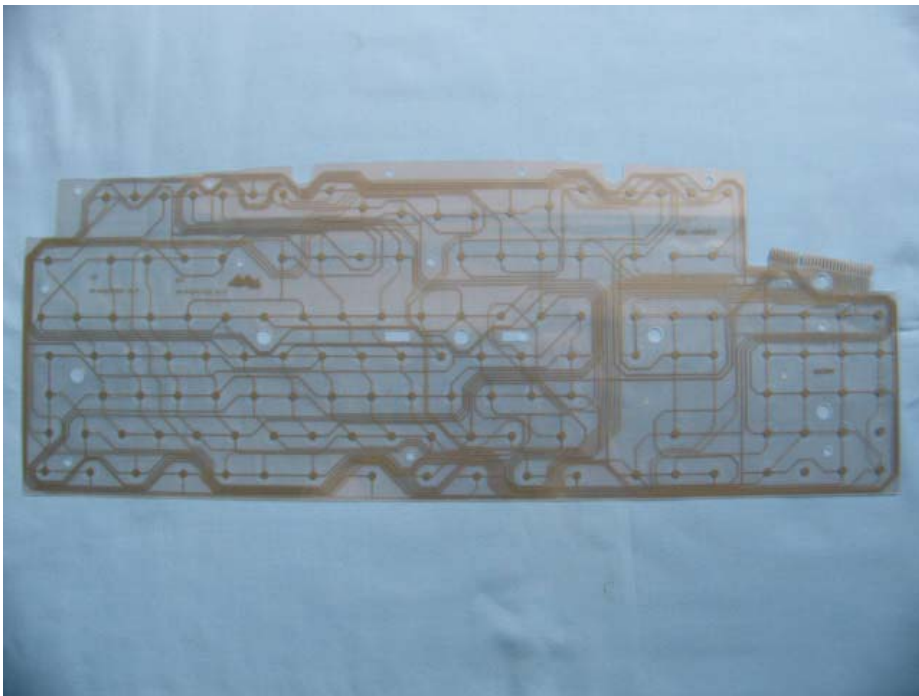
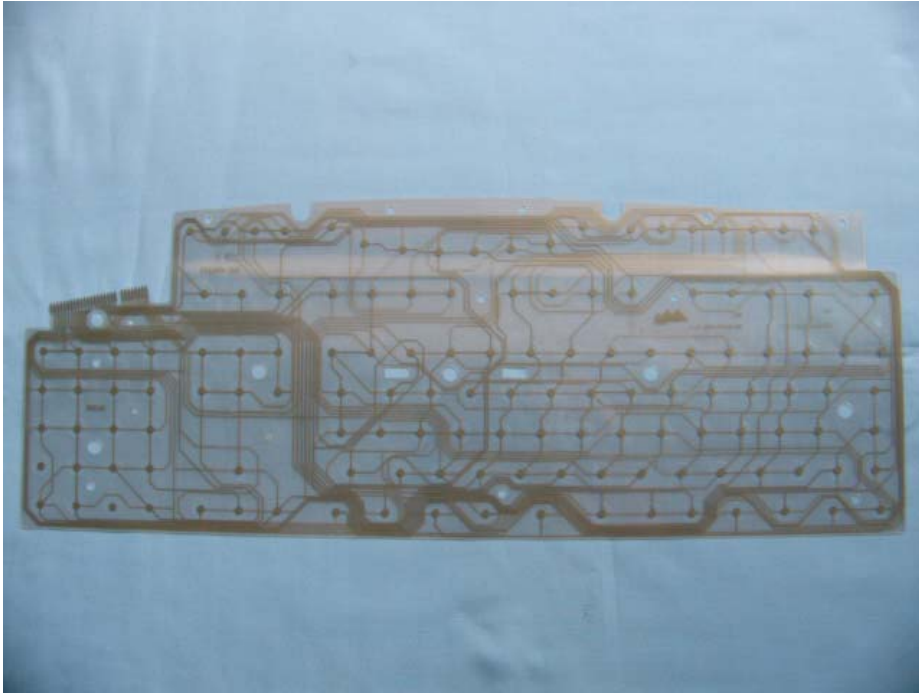


(2) EUT bottom view

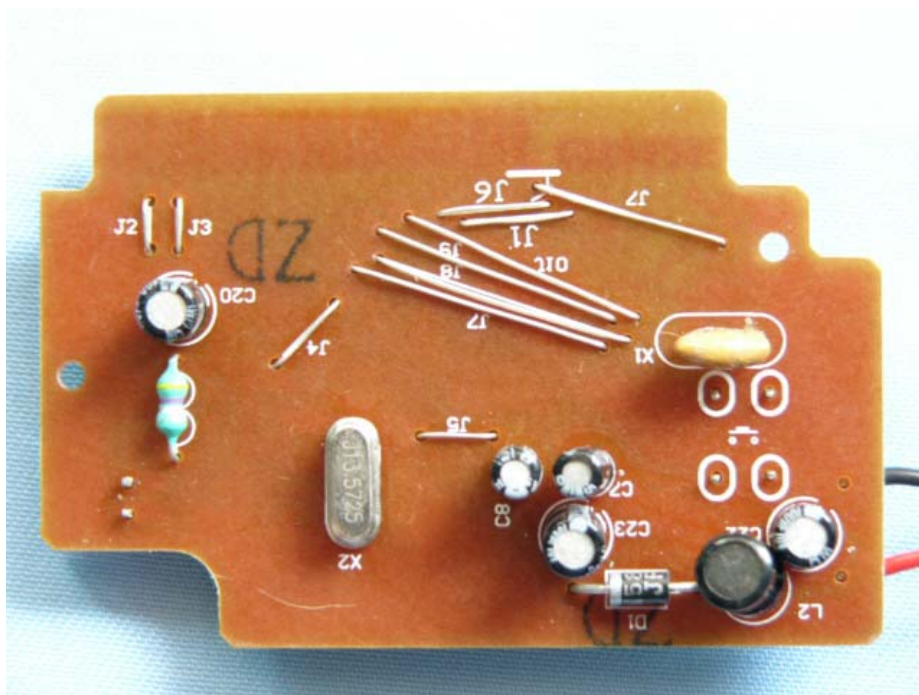


(3) EUT inside whole view

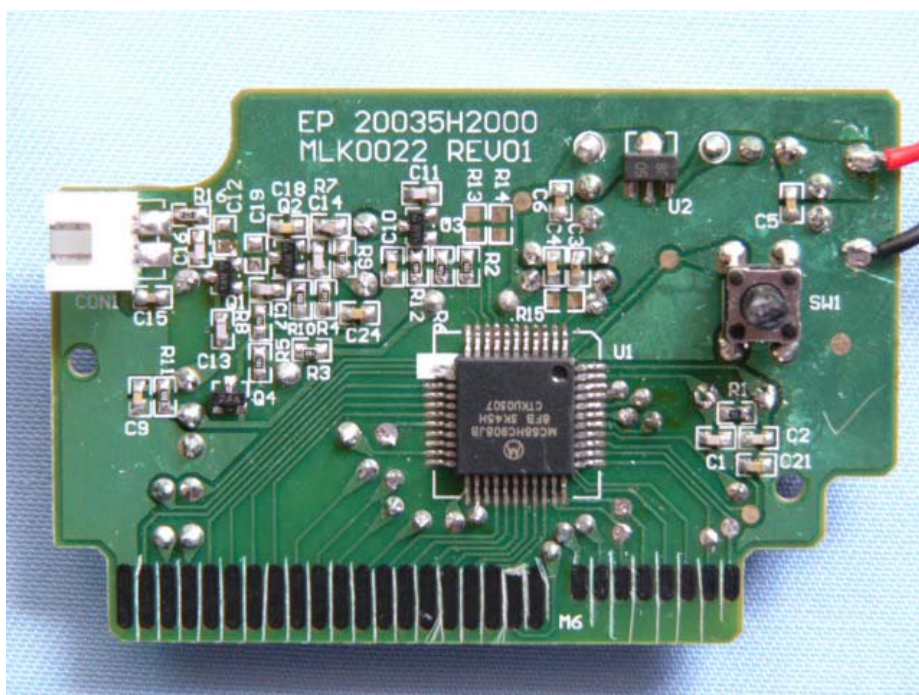




(4) Main board component side



(5) Main board solder side



8. FCC ID Label

FCC ID: PP2020051

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.

Proposed Label Location on EUT

EUT Bottom View/Proposed FCC Mark Location



9. Test Equipment

The following test equipments were used during the radiated & conducted emission test:

Equipment/ Facilities	Manufacturer	Model #	Serial No.	Date of Cal.	Due Date
EMI Test Receiver	Rohde & Schwarz	ESCS30	100003	Feb 27, 2003	Feb 27, 2004
AMN	Rohde & Schwarz	ESH3-Z5	100002	Feb 01, 2003	Feb 01, 2004
LISN	Kyoritsu	KNW-407	8-1441-8	Feb 23, 2003	Feb 23, 2004
EMI Test Receiver	Rohde & Schwarz	ESI26	838786/013	Feb 01, 2003	Feb 01, 2004
Bilog Antenna	Chase	CBL6112B	2591	Feb 01, 2003	Feb 01, 2004
Horn Antenna	Rohde & Schwarz	HF906	100014	Feb 01, 2003	Feb 01, 2004
3m Semi-Anechoic Chamber	Albatross Projects	9mX6mX6m	N/A	Feb 01, 2003	Feb 01, 2004