

EMC TEST REPORT
For

Oki Electric Technology(Kunshan) Co.,Ltd

USB Keyboard

Model No.: KC 4020

Additional Model No.: HMB6013YCA, KC 4000, HMB6014YCA

Prepared for
Address: Oki Electric Technology(Kunshan) Co.,Ltd
: No.228, Baojiaqiao Road, High-tech industrial Park,
Kunshan City, Jiangsu Province, ChinaPrepared by
Address: Shenzhen LCS Compliance Testing Laboratory Ltd.
: 1F., Xingyuan Industrial Park, Tongda Road, Bao'an Blvd.,
Bao'an District, Shenzhen, Guangdong, ChinaDate of receipt of test sample : May 21, 2013
Number of tested samples : 1
Serial number : Prototype
Date of Test : May 21, 2013 - May 27, 2013
Date of Report : May 27, 2013

FCC TEST REPORT
FCC CFR 47 PART 15 Subpart B: 2012

Report Reference No. : LCS130521626TF

Date Of Issue..... : May 27, 2013

Testing Laboratory Name : Shenzhen LCS Compliance Testing Laboratory Ltd.

Address : 1F., Xingyuan Industrial Park, Tongda Road, Bao'an Blvd., Bao'an District, Shenzhen, Guangdong, China

Testing Location/ Procedure : Full application of Harmonised standards

Partial application of Harmonised standards

Other standard testing method

Applicant's Name..... : Oki Electric Technology(Kunshan) Co.,Ltd

Address : Park Bao Jia Road, Kunshan Hi-Tech Industrial, Kunshan City, Jiangsu Province, China

Test Specification

Standard : FCC CFR 47 PART 15 Subpart B:2012, ANSI C63.4-2009

Test Report Form No. : LCSEMC-1.0

TRF Originator..... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF : Dated 2011-03

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Test Item Description. : USB Keyboard

Trade Mark..... : **CHERRY** 

Model/ Type Reference..... : KC 4020

Ratings : DC 5V

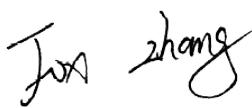
Result : Positive

Compiled by:



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Fox Zhang/ Technique principal

Approved by:



Gavin Liang/ Manager

FCC TEST REPORT

Test Report No. : **LCS130521626TF**May 27, 2013
Date of issue

Type/ Model..... : KC 4020

EUT..... : USB Keyboard

Applicant..... : Oki Electric Technology(Kunshan) Co.,Ltd

Address..... : Park Bao Jia Road, Kunshan Hi-Tech Industrial, Kunshan City, Jiangsu Province, China

Telephone..... : /

Fax..... : /

Manufacturer..... : Oki Electric Technology(Kunshan) Co.,Ltd

Address..... : Park Bao Jia Road, Kunshan Hi-Tech Industrial, Kunshan City, Jiangsu Province, China

Telephone..... : /

Fax..... : /

Factory..... : Oki Electric Technology(Kunshan) Co.,Ltd

Address..... : Park Bao Jia Road, Kunshan Hi-Tech Industrial, Kunshan City, Jiangsu Province, China

Telephone..... : /

Fax..... : /

Test Result**Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. SUMMARY 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
Conducted disturbance at mains terminals	FCC CFR 47 PART 15 Subpart B: 2012	Class B	PASS
Radiated disturbance	FCC CFR 47 PART 15 Subpart B: 2012	Class B	PASS
N/A is an abbreviation for Not Applicable.			

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT : USB Keyboard
Model Number : KC 4020
Power Supply : DC 5V
EUT Clock : ≤108MHz

2.2. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
Dell Inc	PC	Optiplex 380MT	2YK643X	DoC
Dell Inc	LCD Monitor	E170SC	CN-00V539 -64180-134-30EL	DoC
Dell Inc	Mouse	MS111-P	CN-011D3V -71581-13U-171Y	DoC

2.3. External I/O Port

I/O Port Description	Quantity	Cable
USB Port	1	1.8m,unshielded

2.4. Description of Test Facility

Site Description

EMC Lab. : Accredited by CNAS, June 04, 2010
The Certificate Registration Number. is L4595.
Accredited by FCC, July 14, 2011
The Certificate Registration Number. is 899208.
Accredited by Industry Canada, May. 02, 2011
The Certificate Registration Number. is 9642A-1
Accredited by VCCI, Japan January 30, 2012
The Certificate Registration Number. is C-4260 and R-380

2.5.Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

2.6.Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Radiation Uncertainty :	30MHz~200MHz	$\pm 2.96\text{dB}$	(1)
	200MHz~1000MHz	$\pm 3.10\text{dB}$	(1)
	1GHz~26.5GHz	$\pm 3.80\text{dB}$	(1)
Conduction Uncertainty :	150kHz~30MHz	$\pm 1.63\text{dB}$	(1)
Power disturbance	30MHz~300MHz	$\pm 1.60\text{dB}$	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

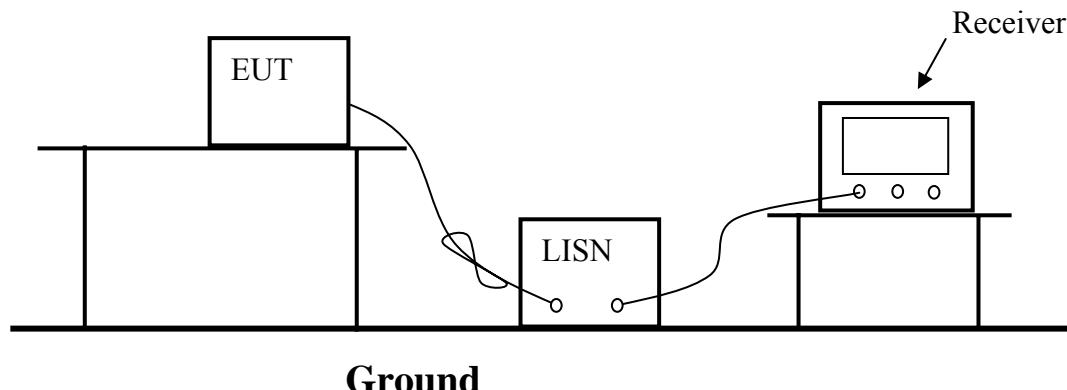
3. POWER LINE CONDUCTED MEASUREMENT

3.1. Test Equipment

The following test equipments are used during the power line conducted measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	101142	2012/06/18	2013/06/17
2	EMI Test Receiver	ROHDE & SCHWARZ	ESPI	101840	2012/06/18	2013/06/17
3	Artificial Mains	ROHDE & SCHWARZ	ENV216	101288	2012/06/18	2012/06/17

3.2. Block Diagram of Test Setup



3.3. Power Line Conducted Emission Measurement Limits (Class B)

Frequency of Emission (MHz)	Conducted Limit (dB _B uV)	
	Quasi-peak	Average
0.15 ~ 0.50	66 to 56*	56 to 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

3.4. Configuration of EUT on Measurement

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

3.5. Operating Condition of EUT

- (1) Setup the EUT and simulator as shown as Section 3.2.
- (2) Turn on the power of all equipment.
- (3) Let the EUT work in test mode (ON) and measure it.

3.6. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC/ANSI C63.4-2009 on Conducted Emission Measurement.

The bandwidth of test receiver is set at 9kHz.

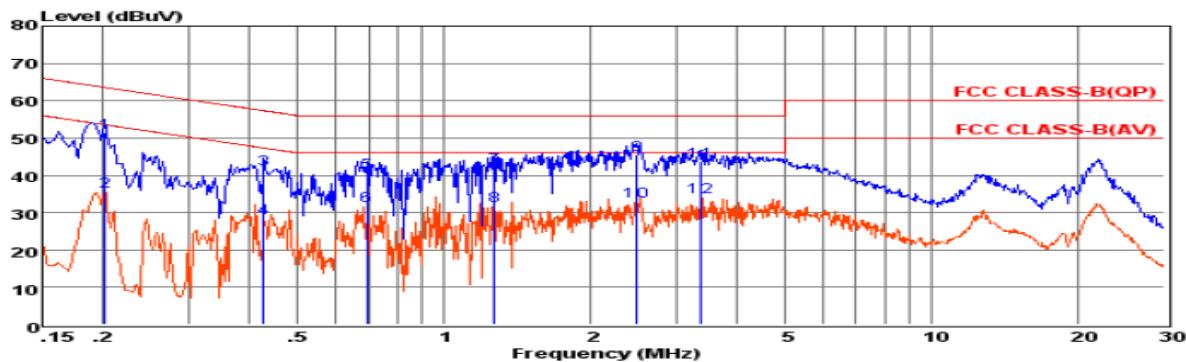
The frequency range from 150kHz to 30MHz is checked.

3.7. Test Results

PASS.

The test data please refer to following page.

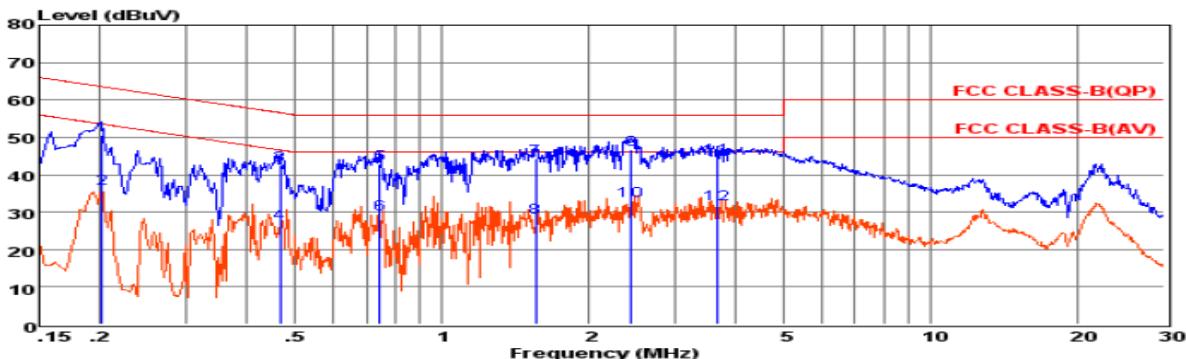
Temperature	25°C	Humidity	60%
EUT	USB Keyboard	Model Name	KC 4020



Env. Ins: 24*/56%
 Power Rating: DC 5V From PC
 Test Mode: On
 Operator: Andy
 Memo:
 Pol: LINE

Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.20	41.70	9.63	0.02	51.35	63.54	-12.19 QP
2	0.20	26.06	9.63	0.02	35.71	53.54	-17.83 Average
3	0.43	31.98	9.62	0.04	41.64	57.33	-15.69 QP
4	0.43	18.84	9.62	0.04	28.50	47.33	-18.83 Average
5	0.69	31.10	9.64	0.04	40.78	56.00	-15.22 QP
6	0.69	22.01	9.64	0.04	31.69	46.00	-14.31 Average
7	1.27	32.52	9.63	0.05	42.20	56.00	-13.80 QP
8	1.27	22.00	9.63	0.05	31.68	46.00	-14.32 Average
9	2.49	35.77	9.64	0.05	45.46	56.00	-10.54 QP
10	2.49	23.34	9.64	0.05	33.03	46.00	-12.97 Average
11	3.35	33.89	9.65	0.06	43.60	56.00	-12.40 QP
12	3.35	24.41	9.65	0.06	34.12	46.00	-11.88 Average

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss.
 2. The emission levels that are 20dB below the official limit are not reported.



Env. Ins: 24*/56%
 Power Rating: DC 5V From PC
 Test Mode: On
 Operator: Andy
 Memo:
 Pol: NEUTRAL

Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.20	40.91	9.59	0.02	50.52	63.54	-13.02 QP
2	0.20	26.66	9.59	0.02	36.27	53.54	-17.27 Average
3	0.47	32.94	9.62	0.04	42.60	56.58	-13.98 QP
4	0.47	17.27	9.62	0.04	26.93	46.58	-19.65 Average
5	0.75	33.24	9.63	0.04	42.91	56.00	-13.09 QP
6	0.75	19.78	9.63	0.04	29.45	46.00	-16.55 Average
7	1.55	34.58	9.63	0.05	44.26	56.00	-11.74 QP
8	1.55	18.81	9.63	0.05	28.49	46.00	-17.51 Average
9	2.43	36.89	9.64	0.05	46.58	56.00	-9.42 QP
10	2.44	23.44	9.64	0.05	33.13	46.00	-12.87 Average
11	3.66	34.77	9.65	0.06	44.48	56.00	-11.52 QP
12	3.66	22.43	9.65	0.06	32.14	46.00	-13.86 Average

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss.
 2. The emission levels that are 20dB below the official limit are not reported.

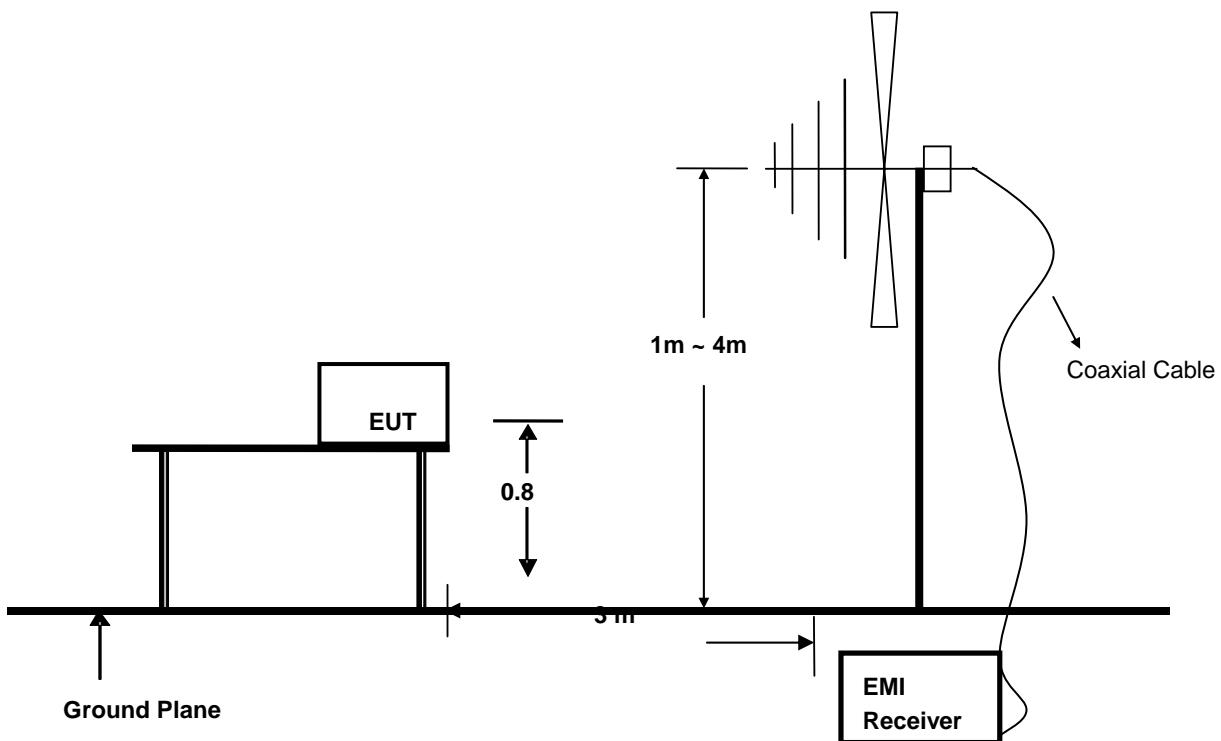
4. RADIATED EMISSION MEASUREMENT

4.1. Test Equipment

The following test equipments are used during the radiated emission measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	101142	2012/06/18	2013/06/17
2	EMI Test Receiver	ROHDE & SCHWARZ	ESPI	101840	2012/06/18	2013/06/17
3	Log per Antenna	ROHDE & SCHWARZ	VULB9163	9163-470	2012/06/18	2013/06/17
4	Spectrum Analyzer	Agilent	E4407B	MY41440754	2012/06/18	2013/06/17
5	Horn Antenna	ETS.LINDGREN	3115	00034771	2012/06/18	2013/06/17

4.2. Block Diagram of Test Setup



4.3. Radiated Emission Limit (Class B)

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μ V/m	dB(μ V)/m
30~88	3	100	40.0
88~216	3	150	43.5
216~960	3	200	46.0
960~1000	3	500	54.0

Remark : (1) Emission level (dB) μ V = 20 log Emission level μ V/m

(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

Limits for radiated disturbance Above 1GHz			
FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT	
		Average Limit (dB μ V/m)	Peak Limit (dB μ V/m)
1000-10 Harmonics	3	54	74

Note: The lower limit applies at the transition frequency.

4.4. EUT Configuration on Measurement

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

4.5. Operating Condition of EUT

- (1) Setup the EUT as shown in Section 4.2.
- (2) Let the EUT work in test mode (on) and measure it.

4.6. Test Procedure

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 m to 4 m) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than

average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

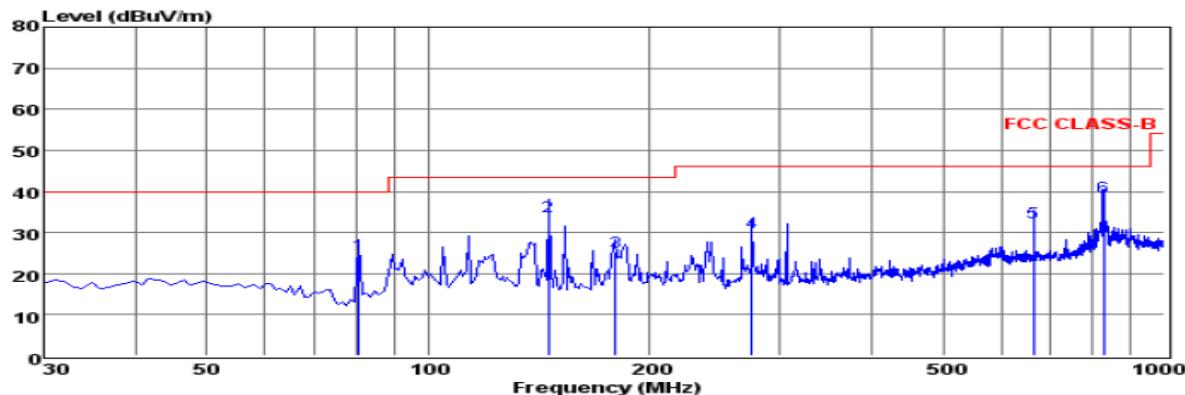
EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated by-log antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4-2009 on radiated emission measurement.

4.7. Test Results

PASS.

The test data please refer to following page.

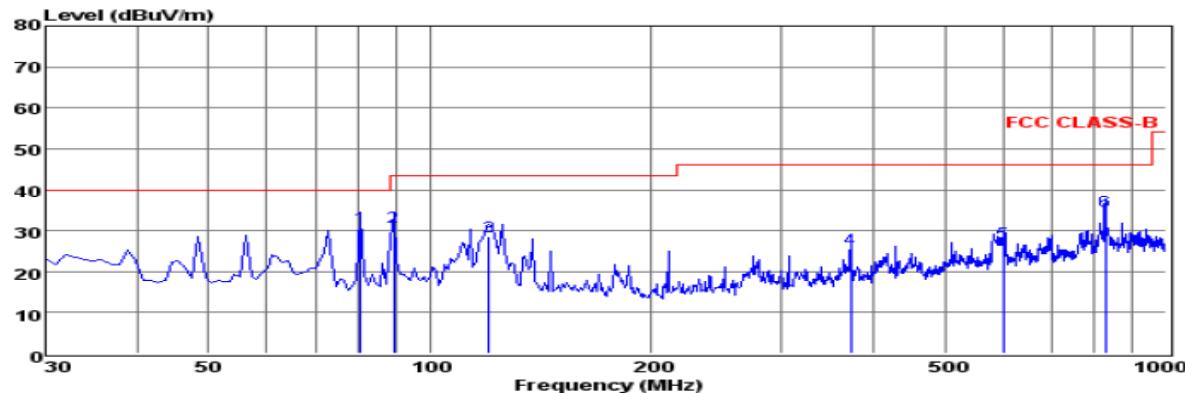
Temperature	25°C	Humidity	60%
EUT	USB Keyboard	Model Name	KC 4020



Env. /Ins: 24°C /56%
 Power Rating: DC5V From PC
 Test Mode: On
 Operator: ANDY
 Memo:
 pol: HORIZONTAL

	Freq	Reading	CabLoS	AntFac	PreFac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	80.44	15.23	0.65	8.70	0.00	24.58	40.00	-15.42	QP
2	145.43	24.99	0.77	8.23	0.00	33.99	43.50	-9.51	QP
3	179.38	14.84	0.89	9.64	0.00	25.37	43.50	-18.13	QP
4	275.41	16.61	1.00	12.53	0.00	30.14	46.00	-15.86	QP
5	664.38	12.12	1.55	18.68	0.00	32.35	46.00	-13.65	QP
6	826.37	16.42	1.80	20.33	0.00	38.55	46.00	-7.45	QP

Note: 1. All readings are Quasi-peak values.
 2. Measured = Reading + Antenna Factor + Cable Loss - Amp Factor.
 3. The emission levels that are 20dB below the official limit are not reported.



Env. /Ins: 24°C /56%
 Power Rating: DC5V From PC
 Test Mode: On
 Operator: ANDY
 Memo:
 pol: VERTICAL

	Freq	Reading	CabLoS	AntFac	PreFac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	80.44	21.71	0.65	8.70	0.00	31.06	40.00	-8.94	QP
2	89.17	18.75	0.68	11.64	0.00	31.07	43.50	-12.43	QP
3	120.21	17.53	0.64	10.45	0.00	28.62	43.50	-14.88	QP
4	372.41	9.91	1.20	14.53	0.00	25.64	46.00	-20.36	QP
5	601.33	7.30	1.43	18.45	0.00	27.18	46.00	-18.82	QP
6	826.37	12.60	1.80	20.33	0.00	34.73	46.00	-11.27	QP

Note: 1. All readings are Quasi-peak values.
 2. Measured = Reading + Antenna Factor + Cable Loss - Amp Factor.
 3. The emission levels that are 20dB below the official limit are not reported.

7. MANUFACTURER/ APPROVAL HOLDER DECLARATION

The following Series model(s):

HMB6013YCA	KC 4000	HMB6014YCA	--
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Belong to the tested device:

Product description : USB Keyboard

Model name : KC 4020

Remark: PCB board, structure and internal of these model(s) are the same,
So no additional models were tested.

-----THE END OF REPORT-----