TEST REPORT

No.I16N00808-EMC

for

Silicon Application Corp.

Bluetooth GPS MODEL

Model Name: LINKIT2523HDK

FCC ID: 2AINMLINKIT2523HDK

with

Hardware Version: ELINK-T100-V2

Software Version: MT2523G_iot_sdk_dev_HDK_E2

Issued Date: 2016-09-02

Test Laboratory:

FCC 2.948 Listed: No.342690

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

Test Laboratory:

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I16N00808-EMC	Rev.0	1st edition	2016-09-02

CONTENTS

1. Test Laboratory

1.1. Testing Location

Address:	TCL International E city No. 1001 Zhongshanyuan Road, Nanshan District, Shenzhen, Guangdong, China
Postal Code:	518048
Telephone:	+86(755)33322000
Fax:	+86(755)33322000

1.2. Testing Environment

Normal Temperature:	15-35℃
Relative Humidity:	20-75%

1.3. Project data

Testing Start Date:	2016-07-21
Testing End Date:	2016-09-01

1.4. Signature

Liang Yong
(Prepared this test report)

Zhang Yunzhuan
(Reviewed this test report)

Cao junfei
Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Silicon Application Corp.
Address:	7F,Block 2,Kai Da Er Building,No.168 TongShaRoad,XiLi Town,Nanshan,ShenZhen

2.2. Manufacturer Information

Company Name:	ShenZhen ElinkTime Technology Co.,LTD
Address:	Room545,Block A,Mingyou lidustrial City,No.168 of Baoyuan Road,XiXiang,Baoan District,ShenZhen,China

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Bluetooth GPS MODE
Model Name	LINKIT2523HDK
FCC ID	2AINMLINKIT2523HDK

Equipment Under Test (EUT) is a model of Bluetooth GPS MODEL.
The EUT has GPS receiver ,Bluetooth functions.
Remark: The above EUT's information is declared by manufacturer. Please refer to the specifications or user's manual for more detailed information.
Note: According to description, The computer supply power, The EUT and the computer does not transfer data.

3.2. Internal Identification of EUT

EUT ID*	SN or IMEI
EUT	MT2523G-07

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE

AE ID*	Description	SN
AE1	Computer	/

AE1

Model	ThinkPad E460 20ET-A00DCD

*AE ID: is used to identify the test sample in the lab internally.

3.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT+ computer	Charging mode

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 15, Subpart B	Radio frequency devices	10-1-2015 Edition
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-18000MHz,>90dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	< ±4 dB, 3 m distance, from 30 to 1000 MHz

Shield room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. =35 %, Max. = 60 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-10000MHz,>90dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω

Fully-anechoic chamber did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-18000MHz,>90dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
Voltage Standing Wave Ratio （VSWR）	≤ 6 dB, from 1 to 18 GHz， 3 m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

6. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:	
P	Pass
NA	Not applicable
F	Fail

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Radiated Emission	15.109(a)	A.1	P
2	Conducted Emission	15.107(a)	A.2	P

7. Test Facilities Utilized

NO.	NAME	TYPE	SERIES NUMBER	PRODUCER	CALDUE DATE	CAL PERIOD
1.	Test Receiver	ESCI	100701	R&S	2017.08.09	1 year
2.	Test Receiver	ESCI	100702	R&S	2017.06.26	1 year
3.	Spectrum Analyzer	FSP 40	100378	R&S	2016.12.18	1 year
4.	BiLog Antenna	VULB9163	9163 329	Schwarzbeck	2017.01.20	3 years
5.	LISN	ESH2-Z5	100196	R&S	2017.01.12	1 year
6.	Horn Antenna	3117	00066585	ETS-Lindgren	2019.03.05	3 years
7.	Universal Radio Communication Tester	CMW270	100540	R&S	2017.04.13	1 year
8.	PC	ThinkPad E460 20ET-A00DCD	PF-0IYDAK	Lenovo	/	/

ANNEX A: MEASUREMENT RESULTS

A.1 Radiated Emission (§15.109(a))

Reference

FCC: CFR Part 15.109(a)

A.1.1 Method of measurement

The field strength of radiated emissions from the unintentional radiator (USB mode of MS and charging mode of MS) at a distance of 3 meters is tested. Tested in accordance with the procedures of ANSI C63.4 - 2014, section 8.3.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

A.1.2 EUT Operating Mode:

The MS is operating in the charging mode. During the test MS is connected to a PC via a USB cable in the case of charging mode. The model of the PC is Lenovo ThinkPad E460 20ET-A00DCD, and the serial number of the PC is PF-0IYDAK. The computer supply power, The EUT and the computer does not transfer data.

A.1.3 Measurement Limit

Limit from CFR Part 15.109(a)

Frequency range (MHz)	Field strength limit (μV/m)		
	Quasi-peak	Average	Peak
30-88	100		
88-216	150		
216-960	200		
960-1000	500		
>1000		500	5000

*Note: The original limit is defined at 10m test distance. This limit is calculated according to CISPR requirements.

A.1.4 Test Condition

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	120kHz (IF bandwidth)	5
Above 1000	1MHz/3MHz	15

A.1.5 Measurement Results

A "reference path loss" is established and the A_{Rpl} is the attenuation of “reference path loss”. It includes the antenna factor of receive antenna and the path loss.

The measurement results are obtained as described below:

Result = $P_{Mea} + A_{Rpl} = P_{Mea} + G_A + G_{PL}$

Where

G_A: Antenna factor of receive antenna

G_{PL}: Path Loss

P_{Mea}: Measurement result on receiver.

Note: the result contains vertical part and Horizontal part

RE Measurement uncertainty: 30M-1GHz: 5.08dB (k=2);
1GHz-18GHz: 4.56 dB (k=2)

Set.1 Charging mode / Peak detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A_{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
14501.500000	55.9	H	11.8	18.1	74.0
14742.000000	57.0	H	11.9	17.0	74.0
15634.000000	58.4	V	12.5	15.6	74.0
16198.500000	58.9	H	13.1	15.1	74.0
16761.000000	59.2	H	13.9	14.8	74.0
17332.000000	59.0	V	14.0	15.0	74.0

Set.1 Charging mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A_{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
14551.000000	44.4	H	11.9	9.6	54.0
15143.500000	45.0	V	12.1	9.0	54.0
15707.000000	46.5	H	12.7	7.5	54.0
16210.000000	47.2	V	13.1	6.8	54.0
16780.000000	47.6	V	13.9	6.4	54.0
17341.500000	47.1	V	14.0	6.9	54.0

Note: The measurement result of Set.1 showed here are worst cases of combinations of different batteries and USB cables.

Charging mode: Set 1

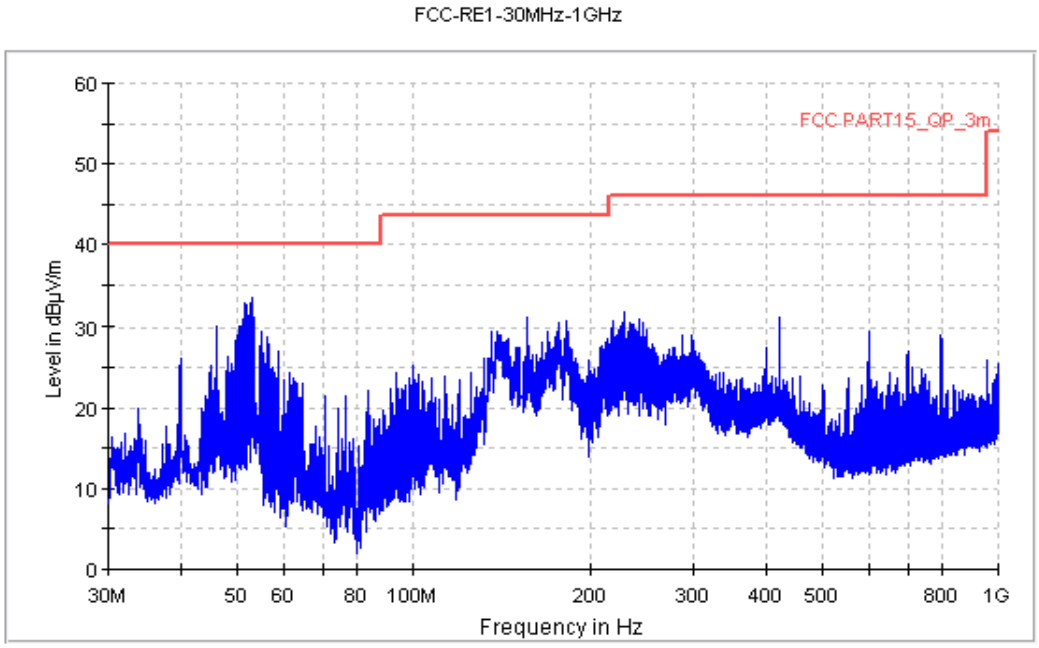

Figure A.1 Radiated Emission from 30MHz to 1GHz

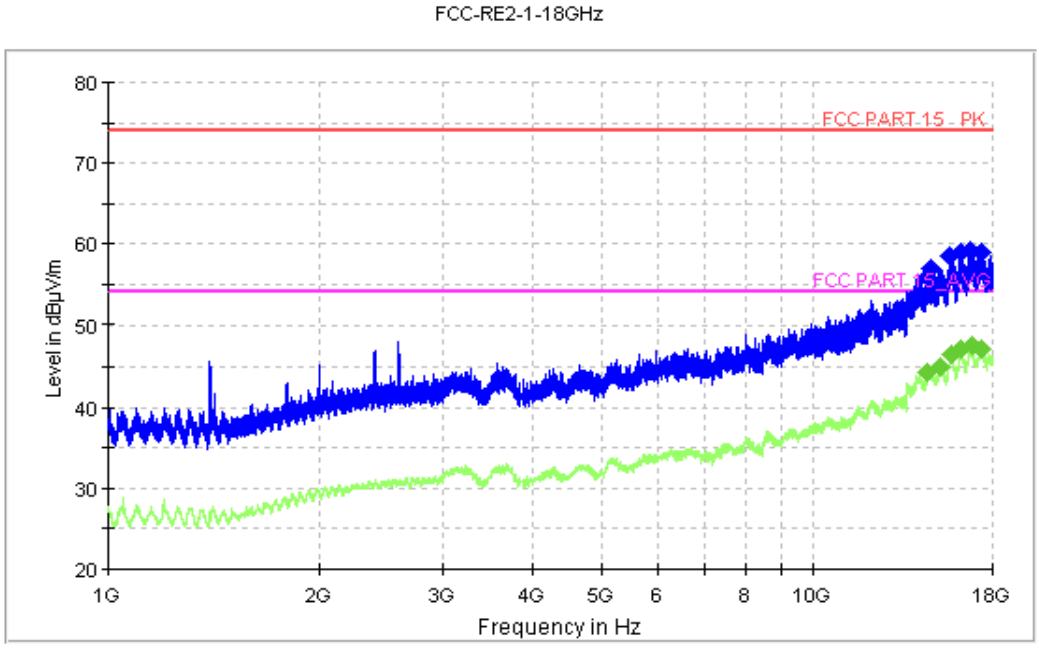

Figure A.2 Radiated Emission from 1GHz to 18GHz

A.2 Conducted Emission (§15.107(a))

Reference

FCC: CFR Part 15.107(a)

A.2.1 Method of measurement

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits. Tested in accordance with the procedures of ANSI C63.4 - 2014, section 7.3.

A.2.2 EUT Operating Mode:

The MS is operating in the charging mode. During the test MS is connected to a PC via a USB cable in the case of charging mode. The model of the PC is Lenovo ThinkPad E460 20ET-A00DCD, and the serial number of the PC is PF-0IYDAK. The computer supply power, The EUT and the computer does not transfer data.

A.2.3 Measurement Limit

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency		

A.2.4 Test Condition in charging mode

Voltage（V）	Frequency（Hz）
120	60

RBW	Sweep Time(s)
9kHz	1

CE Measurement uncertainty: 2.7 dB (k=2)

A.2.5 Measurement Results

Charging mode:Set.1

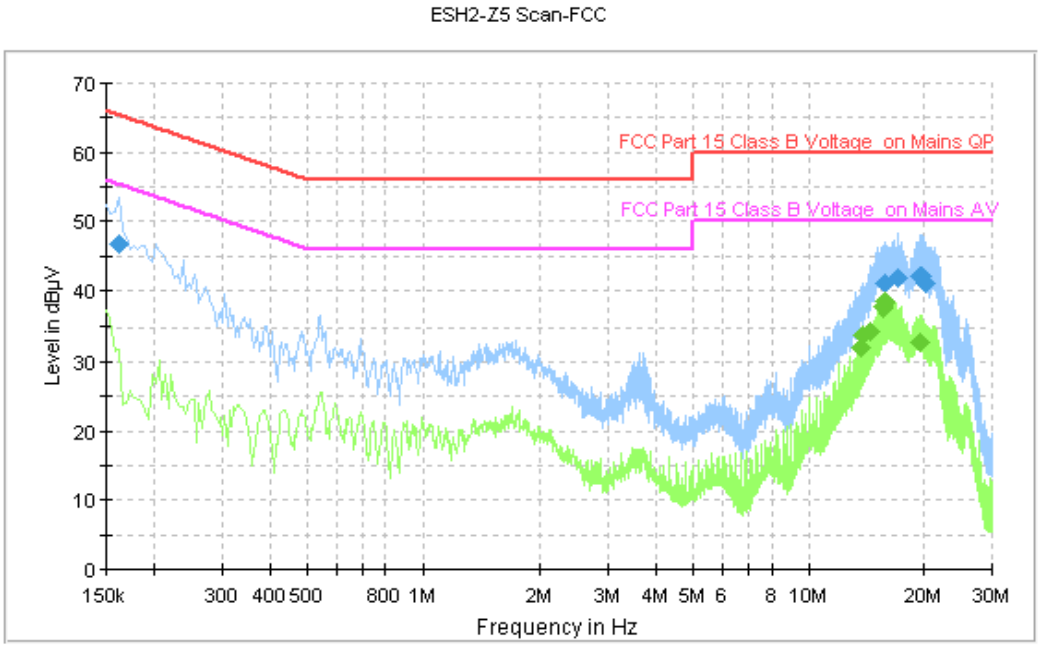

Figure A.3 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.162000	46.8	GND	L1	9.8	18.5	65.4
15.850000	41.2	GND	L1	9.8	18.8	60.0
17.066000	41.7	GND	N	9.9	18.3	60.0
19.586000	42.1	GND	L1	9.8	17.9	60.0
19.794000	42.0	GND	L1	9.8	18.0	60.0
20.162000	41.0	GND	L1	9.8	19.0	60.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.650000	32.1	GND	L1	9.9	17.9	50.0
13.878000	33.7	GND	L1	9.9	16.3	50.0
14.486000	34.4	GND	N	9.9	15.6	50.0
15.546000	37.7	GND	N	9.9	12.3	50.0
15.774000	38.4	GND	L1	9.8	11.6	50.0
19.402000	32.8	GND	L1	9.8	17.2	50.0

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