

Report No.: SZEMO11010041601

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China 518057

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FCC REPORT

Application No: SZEMO110100416RF

Applicant: CHIN FAI ELECTRONICS COMPANY
Manufacturer/Factory: CHIN FAI ELECTRONICS COMPANY
Product Name: SILICON BLUETOOTH KEYBOARD

Operation Frequency: 2402MHz to 2480MHz

FCC ID: XJ4KB6117

Standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247: 2009

Date of Receipt: 2011-01-26

Date of Test: 2011-01-27 to 2011-01-28

Date of Issue: 2011-01-30

Test Result : PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Jack Zhang

Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.



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3 Test Summary

Test Item	Section in CFR 47	Result
Conducted Peak Output Power	15.247 (b)(1)	Pass
RF Antenna Conducted spurious emissions	15.247(d)	Pass
Radiated Emission	15.205/15.209	Pass

Remark:

Pass: The EUT complies with the essential requirements in the standard.

Fail: The EUT does not comply with the essential requirements in the standard.

Note:

Build-in Lithium rechargeable battery of original products is DC 3.7V/200mhA. Build-in Lithium rechargeable battery of present products is DC 3.7V/450mhA.



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4 General Information

4.1 Client Information

Applicant:	CHIN FAI ELECTRONICS COMPANY
Manufacturer/Factory:	CHIN FAI ELECTRONICS COMPANY
Address of Applicant:	Building 2C-2D, Yingfeng industrial Part, Sanhe economic development Zone, Huiyang District, Huizhou City, Guangdong Province, China
Address of Manufacturer:	Building 2C-2D, Yingfeng industrial Part, Sanhe economic development Zone, Huiyang District, Huizhou City, Guangdong Province, China
Address of Factory:	Building 2C-2D, Yingfeng industrial Part, Sanhe economic development Zone, Huiyang District, Huizhou City, Guangdong Province, China

4.2 General Description of E.U.T.

Product Name:	SILICON BLUETOOTH KEYBOARD	
Model No.:	KB-6117	
Operation Frequency:	2402MHz~2480MHz	
No. of Channel:	79	
Channel separation:	1MHz	
Modulation type:	GFSK	
Antenna Type:	Integral	
Antenna gain:	2dBi	
PC supply:	PC USB port supply(charge)	
Battery:	3.7V 450mAh (Lithium battery)	



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Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
3	2404MHz	23	2424MHz	43	2444MHz	63	2464MHz
4	2405MHz	24	2425MHz	44	2445MHz	64	2465MHz
5	2406MHz	25	2426MHz	45	2446MHz	65	2466MHz
6	2407MHz	26	2427MHz	46	2447MHz	66	2467MHz
7	2408MHz	27	2428MHz	47	2448MHz	67	2468MHz
8	2409MHz	28	2429MHz	48	2449MHz	68	2469MHz
9	2410MHz	29	2430MHz	49	2450MHz	69	2470MHz
10	2411MHz	30	2431MHz	50	2451MHz	70	2471MHz
11	2412MHz	31	2432MHz	51	2452MHz	71	2472MHz
12	2413MHz	32	2433MHz	52	2453MHz	72	2473MHz
13	2414MHz	33	2434MHz	53	2454MHz	73	2474MHz
14	2415MHz	34	2435MHz	54	2455MHz	74	2475MHz
15	2416MHz	35	2436MHz	55	2456MHz	75	2476MHz
16	2417MHz	36	2437MHz	56	2457MHz	76	2477MHz
17	2418MHz	37	2438MHz	57	2458MHz	77	2478MHz
18	2419MHz	38	2439MHz	58	2459MHz	78	2479MHz
19	2420MHz	39	2440MHz	59	2460MHz	79	2480MHz
20	2421MHz	40	2441MHz	60	2461MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the lowest frequency, the middle frequency, and the highest frequency of channel were selected for testing:

Channel	Frequency
lowest channel	2402MHz
middle channel	2441MHz
highest channel	2480MHz



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4.3 E.U.T Operation mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	50 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
PC charge	Keep the PC charging to EUT.
PC charge + Bluetooth	Keep the EUT communicating with other Bluetooth device and PC charging to EUT.
Bluetooth	Keep the EUT communicating with other Bluetooth device.
Transmitting	Keep the EUT in transmitting mode at low channel, middle channel and high channels.
Idle	Keep the EUT in standby mode.

SGS

SGS-CSTC Standards Technical Services Ltd.

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4.4 Test Facility

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

CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

VCCI

The 3m Semi-anechoic chamber and Shielded Room (7.5m x 4.0m x 3.0m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2197 and C-2383 respectively.

Date of Registration: September 29, 2008. Valid until September 28, 2011.

FCC - Registration No.: 556682

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen 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 556682, June 27, 2008.

Industry Canada (IC)

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1.

4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch E&E Lab No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594 No tests were sub-contracted.

4.6 Other Information Requested by the Customer

None.



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4.7 Test Instruments list

RE i	RE in Chamber						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)	
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	2010-06-17	2011-06-17	
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEL0023	2010-11-05	2011-11-05	
3	EMI Test software	AUDIX	E3	SEL0050	N/A	N/A	
4	Coaxial cable	SGS	N/A	SEL0028	2008-06-18	2011-06-18	
5	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0015	2010-11-09	2011-11-09	
6	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0006	2010-11-09	2011-11-09	
7	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEL0076	2010-11-09	2011-11-09	
8	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	2010-06-02	2011-06-02	
9	Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEL0168	2010-10-27	2011-10-27	
10	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	SEL0080	2010-06-04	2011-06-04	
11	Band filter	Amindeon	82346	SEL0094	2010-06-02	2011-06-02	

RF c	RF conducted						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date	Cal.Due date	
1	Spectrum Analyzer	Rohde & Schwarz	FSP 30	SEL0154	2010-10-27	2011-10-27	
2	Coaxial cable	SGS	N/A	SEL0028	2008-06-18	2011-06-18	



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5 Test results and Measurement Data

5.1 Antenna requirement:

Standard requirement: FCC Part15 C Section 15.203 /247(c)

15.203 requirement:

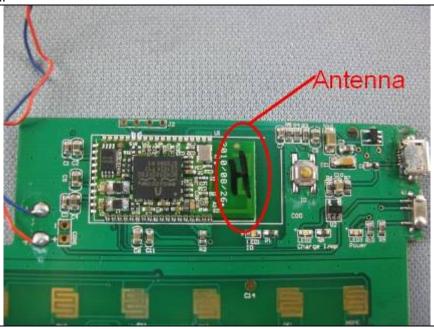
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

E.U.T Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best gain of the antenna is 2dBi.





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5.2 Conducted Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(1)	
Test Method:	ANSI C63.10:2009 and KDB DA00-705	
Limit:	30dBm	
Test setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane	
	Remark: Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.	
Test Instruments:	Refer to section 4.7 for details	
Test state:	Non-hopping transmitting with all kinds of modulation.	
Test results:	Pass	

Measurement Data

	GFSK mode					
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result			
Lowest	-3.60	30.00	Pass			
Middle	-1.71	30.00	Pass			
Highest	-2.36	30.00	Pass			

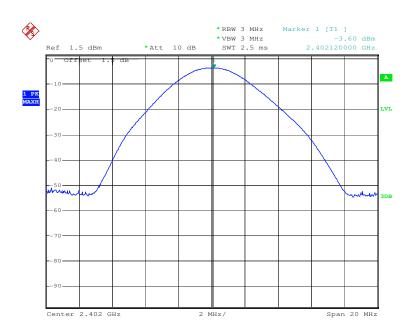


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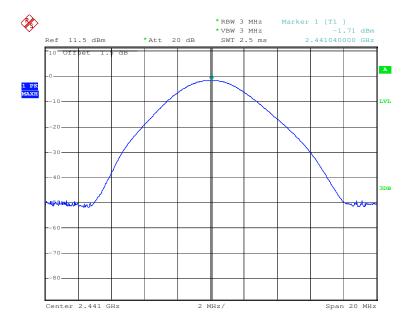
Test plot as follows:

Test mode: GFSK Test channel: Lowest



Date: 4.JUN.2010 15:46:40

Test mode: GFSK Test channel: Middle



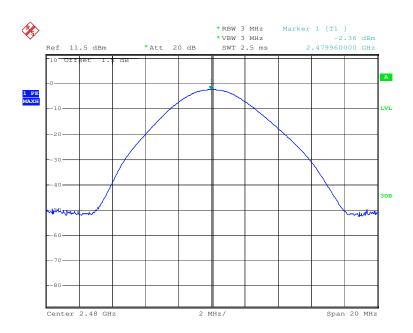
Date: 4.JUN.2010 16:38:15



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Test mode: GFSK Test channel: Highest



Date: 6.JUN.2010 15:54:17



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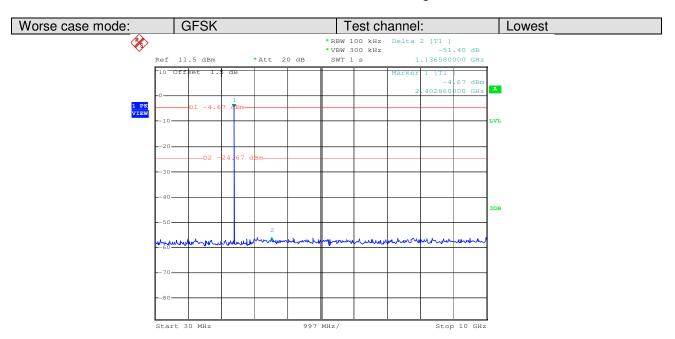
5.3 RF Antenna Conducted spurious emissions

Test Requirement:	FCC Part15 C Section 15.247 (d)	
Test Method:	ANSI C63.10:2009 and KDB DA00-705	
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.	
Test setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane Remark: Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.	
Test Instruments:	Refer to section 4.7 for details	
Test results:	Pass	

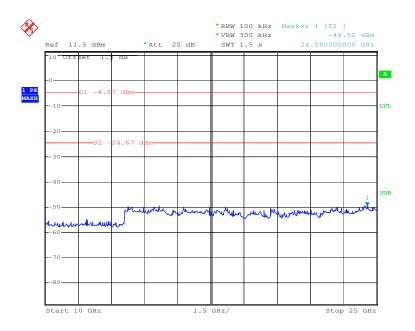


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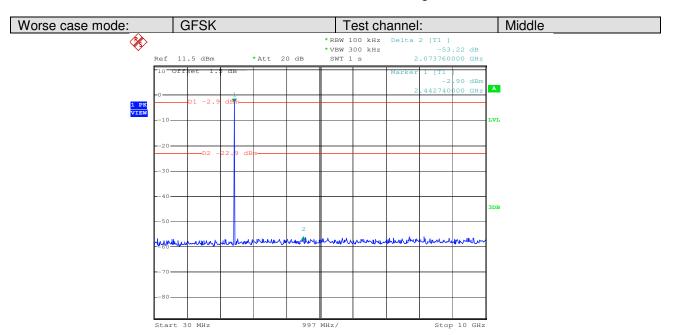


Date: 4.JUN.2010 16:16:14

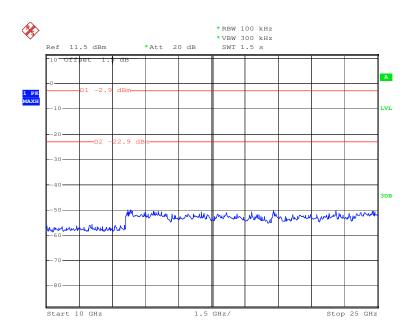


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Date: 4.JUN.2010 16:41:08

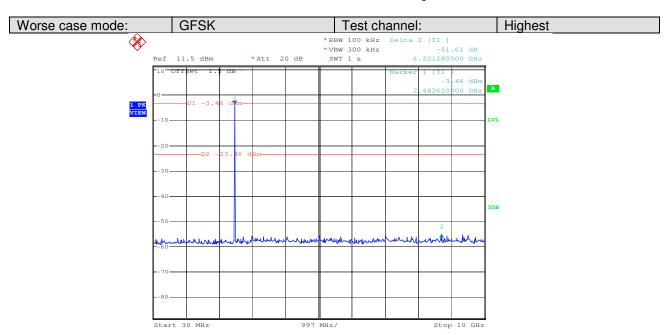


Date: 4.JUN.2010 16:41:25

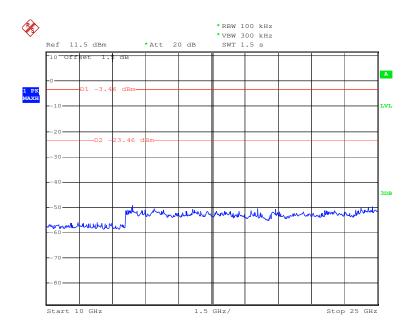


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Date: 6.JUN.2010 15:53:10



Date: 6.JUN.2010 15:53:31



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5.4 Pseudorandom Frequency Hopping Sequence

Test Requirement: FCC Part15 C Section 15.247 (a)(1) requirement:

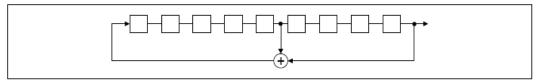
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively. Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

EUT Pseudorandom Frequency Hopping Sequence

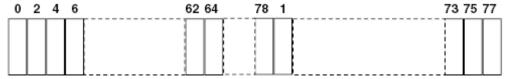
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence: 29 -1 = 511 bits
- · Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.



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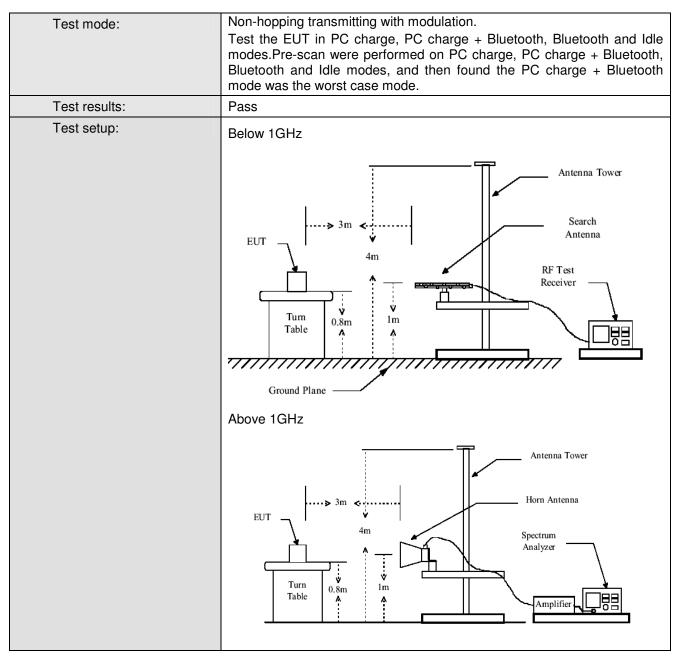
5.5 Radiated Emission

Test Method: Test Frequency Range: 30MHz to 25GHz Test site: Measurement Distance: 3m (Semi-Anechoic Chamber) Receiver setup: Frequency 30MHz-1GHz Above 1GHz Peak 1MHz 300kHz 10Hz Peak 1MHz 10Hz Peak 1MHz 10Hz Average Value Frequency 10MHz-89MHz 40.0 Quasi-peak Value 88MHz-216MHz 43.5 Quasi-peak Value 88MHz-216MHz 43.5 Quasi-peak Value 88MHz-960MHz 43.5 Quasi-peak Value 980MHz-16Hz 54.0 Quasi-peak Value 980MHz-16Hz 54.0 Quasi-peak Value Above 1GHz 74.0 Peak Value Test Procedure: Test Procedure: a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the filed strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by oue using peak, quasi-peak or average method as specified and then reported in a data sheet.	Test Requirement:	FCC Part15 C Section 15.209 and 15.205						
Test site: Measurement Distance: 3m (Semi-Anechoic Chamber)	Test Method:	ANSI C63.10: 2	009					
Frequency Detector RBW VBW Remark	Test Frequency Range:	30MHz to 25GHz						
Frequency Detector RBW VBW Remark 30MHz-1GHz Quasi-peak Value Peak 110MHz 300MHz Quasi-peak Value Peak 1MHz 300MHz Peak Value Peak 1MHz 10Hz Average Value	Test site:							
Frequency Detector RBW VBW Remark 30MHz-1GHz Quasi-peak Value Peak 110MHz 300MHz Quasi-peak Value Peak 1MHz 300MHz Peak Value Peak 1MHz 10Hz Average Value	Receiver setup:							
Limit: Frequency		Frequency	Detector	RBW	VBW	Remark		
Limit: Frequency		30MHz-1GHz	Quasi-peak	100kHz	300kHz	Quasi-peak Value		
Limit: Frequency Limit (dBuV/m @3m) Remark		Ahove 1GHz						
Frequency Limit (dBuV/m @3m) Remark 30MHz-88MHz 40.0 Quasi-peak Value 88MHz-216MHz 43.5 Quasi-peak Value 216MHz-960MHz 46.0 Quasi-peak Value 960MHz-1GHz 54.0 Quasi-peak Value Above 1GHz 54.0 Average Value 74.0 Peak Value a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.		Above Tariz	Peak	1MHz	10Hz	Average Value		
30MHz-88MHz	Limit:							
B8MHz-216MHz				,				
### Test Procedure: Test Procedure: Above 1GHz								
Second Head of the procedure Second Head of the procedure								
Test Procedure: a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasipeak or average method as specified and then reported in a data sheet.						-		
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Total to obtain in for detaile	Test Instruments:	Refer to section 4.7 for details						



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Note:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor



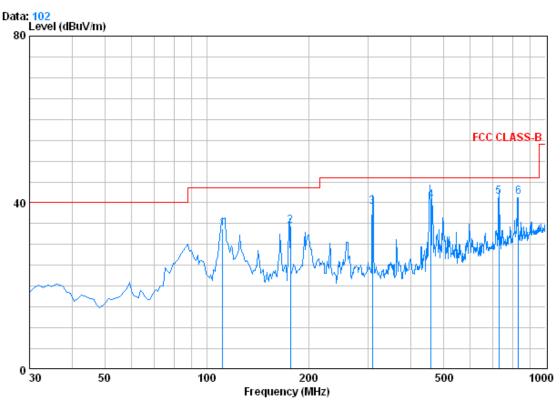
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5.5.1 Radiated emission below 1GHz

PC charge + Bluetooth mode

Vertical:



Condition : FCC CLASS-B 3m 0042673 VERTICAL EUT : SILICON BLUETOOTH KEYBORAD

No. : 0416RF

Test Mode : PC Charge+Bluetooth

	-	Cable	ıntenna	Preamp	Read		Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	111.480	1.23	8.51	27.12	51.21	33.83	43.50	-9.67	QP
2	176.470	1.36	9.77	26.79	50.12	34.46	43.50	-9.04	QP
3	308.390	1.93	14.20	26.46	49.35	39.02	46.00	-6.98	QP
4	459.710	2.45	17.22	27.50	48.29	40.47	46.00	-5.53	QP
5	729.370	2.99	21.61	27.37	44.16	41.39	46.00	-4.61	QP
6 @	831.220	3.33	22.40	27.13	42.86	41.46	46.00	-4.54	QP

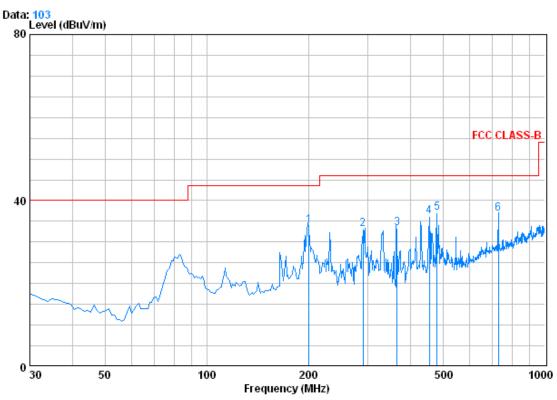
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Horizontal:



Condition : FCC CLASS-B 3m 0042673 HORIZONTAL EUT : SILICON BLUETOOTH KEYBORAD

No. : 0416RF

Test Mode : PC Charge+Bluetooth

	_	Cable	lntenna	Preamp	Read		Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	200.720	1.40	10.24	26.70	49.09	34.04	43.50	-9.46	QP
2	289.960	1.86	13.44	26.43	44.27	33.14	46.00	-12.86	QP
3	365.620	2.10	15.78	26.91	42.27	33.25	46.00	-12.75	QP
4	454.860	2.43	17.03	27.46	44.19	36.19	46.00	-9.81	QP
5	480.080	2.53	17.80	27.60	44.23	36.96	46.00	-9.04	QP
6	729.370	2.99	21.61	27.37	39.69	36.92	46.00	-9.08	QP

Remark:

For Radiated Emission above 1GHz, there was not any unwanted emission detected.