






RF Exposure Evaluation Report

Report Reference No.:	MTEB23060092-H	
FCC ID :	2ATYP-HK5910	
Compiled by (position+printed name+signature)..:	File administrators Alisa Luo	
Supervised by (position+printed name+signature)..:	Test Engineer Sunny Deng	
Approved by (position+printed name+signature)..:	Manager Yvette Zhou	
Date of issue.....:	Jun.09,2023	
Representative Laboratory Name ..:	Shenzhen Most Technology Service Co., Ltd.	
Address	No.5, 2nd Langshan Road, North District, Hi-tech Industrial Park, Nanshan, Shenzhen, Guangdong, China.	
Applicant's name:	Shiji (US) Inc.	
Address	730 Peachtree Street NE, Suite 375, Atlanta, Georgia, 30319, United States	
Test specification/ Standard	47 CFR Part 1.1307;47 CFR Part 1.1310 KDB447498D01 General RF Exposure Guidance v06	
TRF Originator.....:	Shenzhen Most Technology Service Co., Ltd.	
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Test item description	POS COMPUTER	
Trade Mark	Shiji	
Manufacturer	Shiji (US) Inc.	
Model/Type reference.....:	HK5910	
Listed Models	HK578	
Modulation Type	GFSK CCK/DSSS/ OFDM GFSK, π/4DQPSK, 8DPSK OFDM ASK	
Operation Frequency.....:	From 2402MHz to 2480MHz From 2412 - 2462MHz From 2402MHz to 2480MHz From 5180MHz-5240MHz; 5745MHz-5825MHz 13.56MHz	
Hardware Version.....	HS-J6412	
Software Version	MEHL0401	
Rating	DC 24V (by Adapter)	

Result.....: **PASS**

TEST REPORT

Equipment under Test : POS COMPUTER

Model /Type : HK5910

Listed Models HK578

Remark Only the model name is different, the others are the same.

Applicant : **Shiji (US) Inc.**

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United States

Manufacturer : **Shiji (US) Inc.**

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Test Result:	PASS
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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.

1. Revision History

Revision	Issue Date	Revisions	Revised By
00	2023-06-09	Initial Issue	Alisa Luo

2. SAR Evaluation

2.1 RF Exposure Compliance Requirement

2.1.1 Standard Requirement

According to KDB447498D01 General RF Exposure Guidance v06

4.3.1. Standalone SAR test exclusion considerations

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

2.1.2 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$ Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2.1.3 EUT RF Exposure

Antenna Gain: 5.6dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.4 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

BLE

GFSK			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2402MHz)	3.197	3.197 ± 1	4.197
Middle(2440MHz)	3.804	3.804 ± 1	4.804
Highest(2480MHz)	4.124	4.124 ± 1	5.124

Worst case: GFSK						
Channel	Maximum Peak Conducted Output Power (dBm)	Maximum Peak Conducted Output Power (MW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Highest(2480 MHz)	5.124	3.25	5.6	0.0023	1.0	Pass

Note: 1) Refer to report **MTEB23060092-R1** for EUT test Max Conducted average Output Power value.

Note: 2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (3.25 * 3.6) / (4 * 3.1416 * 20^2) = 0.0023$

Antenna Gain: 5.6dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.4 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

BT classic

GFSK			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2402MHz)	0.829	0.829 ± 1	1.829
Middle(2441MHz)	1.308	1.308 ± 1	2.308
Highest(2480MHz)	2.350	2.350 ± 1	3.35

$\pi/4$ DQPSK			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2402MHz)	1.580	1.580 ± 1	2.58
Middle(2441MHz)	2.124	2.124 ± 1	3.124
Highest(2480MHz)	3.047	3.047 ± 1	4.047

8DPSK			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2402MHz)	2.014	2.014 ± 1	3.014
Middle(2441MHz)	2.483	2.483 ± 1	3.483
Highest(2480MHz)	3.403	3.403 ± 1	4.403

Worst case: 8DPSK						
Channel	Maximum Peak Conducted Output Power (dBm)	Maximum Peak Conducted Output Power (MW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Highest(2480 MHz)	4.403	2.76	5.6	0.0020	1.0	Pass

Note: 1) Refer to report **MTEB23060092-R** for EUT test Max Conducted average Output Power value.

Note: 2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (2.76 * 3.6) / (4 * 3.1416 * 20^2) = 0.0020$

Note: 3) EUT's Bluetooth module is more than 20cm away from the human body.

Antenna Gain A: 5.4dBi(MAIN)

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.4 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

WIFI 2.4G

802.11b			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2412MHz)	19.13	19.13 ± 1	20.13
Middle(2437MHz)	19.02	19.02 ± 1	20.02
Highest(2462MHz)	19.04	19.04 ± 1	20.04

802.11g			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2412MHz)	17.12	17.12±1	18.12
Middle(2437MHz)	22.10	22.10±1	23.1
Highest(2462MHz)	16.80	16.80±1	17.8

802.11n(H20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2412MHz)	16.72	16.72±1	17.72
Middle(2437MHz)	21.53	21.53±1	22.53
Highest(2462MHz)	16.27	16.27±1	17.27

802.11n(H40)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2422MHz)	14.60	14.60±1	15.6
Middle(2437MHz)	21.23	21.23±1	22.23
Highest(2452MHz)	14.43	14.43±1	15.43

WIFI 2.4G

Worst case: 802.11g						
Channel	Maximum tune-up Power (dBm)	Maximum tune-up Power (MW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Middle(2437MHz)	23.1	204.17	5.4	0.14	1.0	Pass

Note: 1) Refer to report **MTEB23060092-R2** for EUT test Max Conducted average Output Power value.

Note: 2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (204.17 * 3.5) / (4 * 3.1416 * 20^2) = 0.14$

Antenna Gain B: 5.2(AUX)

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.4 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

WIFI 2.4G

802.11b			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2412MHz)	20.17	20.17 ± 1	21.17
Middle(2437MHz)	20.70	20.70 ± 1	21.7
Highest(2462MHz)	19.06	19.06 ± 1	20.06

802.11g			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2412MHz)	22.16	22.16 ± 1	23.16
Middle(2437MHz)	20.30	20.30 ± 1	21.3
Highest(2462MHz)	17.61	17.61 ± 1	18.61

802.11n(H20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2412MHz)	18.43	18.43 ± 1	19.43
Middle(2437MHz)	15.09	15.09 ± 1	16.09
Highest(2462MHz)	15.78	15.78 ± 1	16.78

802.11n(H40)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2422MHz)	16.69	16.69 ± 1	17.69
Middle(2437MHz)	17.81	17.81 ± 1	18.81
Highest(2452MHz)	16.12	16.12 ± 1	17.12

WIFI 2.4G

Worst case: 802.11 g						
Channel	Maximum tune-up Power (dBm)	Maximum tune-up Power (MW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Middle(2412MHz)	23.16	207.01	5.2	0.14	1.0	Pass

Note: 1) Refer to report **MTEB23060092-R2** for EUT test Max Conducted average Output Power value.

Note: 2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (207.01 * 3.3) / (4 * 3.1416 * 20^2) = 0.14$

Antenna B+ Antenna B:

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.4 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

WIFI 2.4G

802.11n(H20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2412MHz)	19.20	19.20 ± 1	20.20
Middle(2437MHz)	21.25	21.25 ± 1	22.25
Highest(2462MHz)	18.63	18.63 ± 1	19.63

802.11n(H40)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2422MHz)	20.30	20.30 ± 1	20.30
Middle(2437MHz)	17.45	17.45 ± 1	17.45
Highest(2452MHz)	18.25	18.25 ± 1	18.25

WIFI 2.4G

Worst case: 802.11n(H20)						
Channel	Maximum tune-up Power (dBm)	Maximum tune-up Power (MW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Middle(2412MHz)	22.25	167.88	5.4	0.14	1.0	Pass

Note: 1) Refer to report **MTEB23060092-R2** for EUT test Max Conducted average Output Power value.

Note: 2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (167.88 * 3.5) / (4 * 3.1416 * 20^2) = 0.12$

Antenna Gain A: 5.6dBi(MAIN)

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.4 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

WIFI 5G

IEEE for 802.11a			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
149	13.497	13.497±1	14.497
157	13.218	13.218±1	14.218
165	10.516	10.516± 1	11.516

IEEE for 802.11n(HT20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
149	13.740	13.740±1	14.74
157	10.964	10.964 ±1	11.964
165	8.429	8.429 ±1	9.429

IEEE for 802.11n(HT40)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
151	9.632	9.632±1	10.632
159	4.986	4.986 ±1	5.986

IEEE for 802.11ac(HT20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
149	13.746	13.746±1	14.746
157	13.171	13.171±1	14.171
165	7.912	7.912± 1	8.912

IEEE for 802.11 ac(HT40)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
151	14.154	14.154±1	15.154
159	5.051	5.051 ±1	6.051

IEEE for 802.11ac(HT80)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
155	3.041	3.041±1	4.041

Worst case: IEEE for 802.11 ac(HT40)						
Channel	Maximum Peak Conducted Output Power	Maximum Peak Conducted Output Power	Antenna Gain	Power Density at R = 20 cm	Limit	Result
	(dBm)	(MW)	(dBi)	(mW/cm ²)		
Lowest (5755MHz)	15.154	32.76	5.6	0.023	1.0	Pass

Note: 1) Refer to report **MTEB23060092-R4** for EUT test Max Conducted average Output Power value.

Note: 2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (32.76 * 3.6) / (4 * 3.1416 * 20^2) = 0.0023$

Antenna Gain B: 5.3(AUX)

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.4 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

WIFI 5G

IEEE for 802.11a			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
149	13.831	13.831±1	14.831
157	12.898	12.898±1	13.898
165	12.462	12.462± 1	13.462

IEEE for 802.11n(HT20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
149	11.892	11.892±1	12.892
157	9.788	9.788 ±1	10.788
165	10.331	10.331 ±1	11.331

IEEE for 802.11n(HT40)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
151	13.324	13.324±1	14.324
159	12.828	12.828 ±1	13.828

IEEE for 802.11ac(HT20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
149	13.863	13.863±1	14.863
157	12.836	12.836±1	13.836
165	10.292	10.292± 1	11.292

IEEE for 802.11 ac(HT40)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
151	12.537	12.537±1	13.537
159	11.948	11.948 ±1	12.948

IEEE for 802.11ac(HT80)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
155	12.307	12.307±1	13.307

Worst case: IEEE for 802.11ac(HT20)						
Channel	Maximum Peak Conducted Output Power	Maximum Peak Conducted Output Power	Antenna Gain	Power Density at R = 20 cm	Limit	Result
	(dBm)	(MW)	(dBi)	(mW/cm ²)		
Lowest (5745MHz)	14.863	30.64	5.3	0.0207	1.0	Pass

Note: 1) Refer to report **MTEB23060092-R4** for EUT test Max Conducted average Output Power value.

Note: 2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (30.64 * 3.4) / (4 * 3.1416 * 20^2) = 0.0207$

Antenna B+ Antenna B:

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.4 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

WIFI 5G

IEEE for 802.11n(HT20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
149	14.320	14.320±1	15.320
157	12.341	12.341±1	13.341
165	13.252	13.252 ± 1	14.252

IEEE for 802.11n(HT40)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
151	10.256	10.256±1	11.256
159	13.401	13.401 ± 1	14.401

IEEE for 802.11ac(HT20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
149	14.210	14.210±1	15.210
157	13.688	13.688±1	14.688
165	10.005	10.005±1	11.005

IEEE for 802.11 ac(HT40)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
151	12.110	12.110±1	13.110
159	11.782	11.782±1	12.782

IEEE for 802.11ac(HT80)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
155	13.022	13.022±1	14.022

Worst case: IEEE for 802.11n(HT20)						
Channel	Maximum Peak Conducted Output Power	Maximum Peak Conducted Output Power	Antenna Gain	Power Density at R = 20 cm	Limit	Result
	(dBm)	(MW)	(dBi)	(mW/cm ²)		
Lowest (5745MHz)	15.320	34.04	5.6	0.024	1.0	Pass

Note: 1) Refer to report **MTEB23060092-R4** for EUT test Max Conducted average Output Power value.
 Note: 2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (34.04 * 3.6) / (4 * 3.1416 * 20^2) = 0.024$

NFC:

The worst case (refer to report **MTEB23060092-R3**) is below:

Antenna polarization: Horizontal		
Frequency (MHz)	Level (dBuV/m)	Polarization
13.56	78.5	Peak

$E = EIRP - 20 \log d + 104.8$
 E: is the electric field strength in dBuV/m
 EIRP: is the equivalent isotropically radiated power in dBm
 d: is the specified measurement distance in m
 d=3m
 $EIRP = 78.5 + 20 \log 3 - 104.8 = -16.76 \text{ dBm}$

13.56MHz < 30MHz, Add a 6DB maximum ground factor.
 $EIRP = -16.76 \text{ dBm} + 6 = -10.7 \text{ dBm}$

The EIPR of the product is small enough, RF Exposure meets the requirements.

.....**THE END OF REPORT**.....