Shenzhen Most Technology Service Co., Ltd.
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RF Exposure Evaluation Report

Report Reference No.:	**MTEB23090094-H**
FCC ID:	**2A397-HK316K**
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:	**September.12,2023**
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:	**QINGDAO HISTONE INTELLIGENT COMMERCIAL SYSTEM CO., LTD.**
Address:	Wisdom Valley, No.8 Shengshui Road, Laoshan District, Qingdao City, China
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.

Test item description:	POS COMPUTER
Trade Mark:	Histone
Manufacturer:	QINGDAO HISTONE INTELLIGENT COMMERCIAL SYSTEM CO., LTD.
Model/Type reference:	HK316K
Listed Models:	HK316 3568,HK316
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:	AIoT-3568
Software Version:	HK316_3568

Rating	.....	DC 24V (by Adapter)
Result	.....	**PASS**

TEST REPORT

Equipment under Test	:	POS COMPUTER
Model /Type	:	HK316K
Listed Models		HK316 3568,HK316
Remark		All models are identical to each other, except model name.
Applicant	:	**QINGDAO HISTONE INTELLIGENT COMMERCIAL SYSTEM CO., LTD.**
Address	:	Wisdom Valley, No.8 Shengshui Road, Laoshan District, Qingdao City, China
Manufacturer	:	**QINGDAO HISTONE INTELLIGENT COMMERCIAL SYSTEM CO., LTD.**
Address	:	Wisdom Valley, No.8 Shengshui Road, Laoshan District, Qingdao City, China

Test Result:	**PASS**

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	2023-09-12	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: Pd = (Pout*G)/(4* Pi * R 2) Where
Pd = power density in mW/cm2
Pout = output power to antenna in mW
G = gain of antenna in linear scale
Pi = 3.1416

R = distance between observation point and center of the radiator in cm
Pd id 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: 4.54dBi
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)	2.736	2.736±1	3.736
Middle(2440MHz)	3.608	3.608±1	4.608
Highest(2480MHz)	3.818	3.818±1	4.818

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/cm2)	Limit	Result
Highest(2480 MHz)	4.608	2.89	4.54	0.0016	1.0	Pass

Note: 1) Refer to report **MTEB23090094-R1** for EUT test Maximum tune-up Power.
Note: 2) Pd = (Pout*G)/(4* Pi * R2)=(2.89*2.84)/(4*3.1416*20^2)=0.0016
Note: 3)EUT's Bluetooth module is more than 20cm away from the human body.

Antenna Gain: 4.54dBi
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)	3.154	3.154±1	4.154
Middle(2441MHz)	0.807	0.807±1	1.807
Highest(2480MHz)	-5.323	-5.323±1	-4.323

π/4DQPSK			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
Lowest(2402MHz)	2.104	2.104±1	3.104
Middle(2441MHz)	-0.064	-0.064±1	0.936
Highest(2480MHz)	-5.990	-5.990±1	-4.990

8DPSK			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
Lowest(2402MHz)	2.103	2.103±1	3.103
Middle(2441MHz)	-0.015	-0.015±1	0.985
Highest(2480MHz)	-6.022	-6.022±1	-5.022

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/cm2)	Limit	Result
Highest(2480 MHz)	4.154	2.60	4.54	0.001	1.0	Pass

Note: 1) Refer to report **MTEB23090094-R2** for EUT test Maximum tune-up Power.
Note: 2) Pd = (Pout*G)/(4* Pi * R2)=(2.60*2.84)/(4*3.1416*202)=0.001
Note: 3)EUT's Bluetooth module is more than 20cm away from the human body.

Antenna Gain : 4.54dBi
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)	17.77	17.77±1	18.77
Middle(2437MHz)	18.27	18.27±1	19.27
Highest(2462MHz)	18.65	18.65±1	19.65

802.11g			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
Lowest(2412MHz)	18.22	18.22±1	19.22
Middle(2437MHz)	18.70	18.70±1	19.20
Highest(2462MHz)	18.96	18.96±1	19.96

802.11n(H20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
Lowest(2412MHz)	18.13	18.13±1	19.13
Middle(2437MHz)	18.48	18.48±1	19.48
Highest(2462MHz)	18.89	18.89±1	18.89

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/cm2)	Limit	Result
Middle(2437MHz)	19.96	99.08	4.54	0.05	1.0	Pass

Note: 1) Refer to report **MTEB23090094-R3** for EUT test Maximum tune-up Power.
Note: 2) Pd = (Pout*G)/(4* Pi * R2)=(99.08*2.84)/(4*3.1416*20^2)=0.05
Note: 3)EUT's Bluetooth module is more than 20cm away from the human body.

Antenna Gain : 3.48dBi
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	3.19	3.19±1	4.19
157	4.67	4.67±1	5.67
165	4.01	4.01± 1	5.01

IEEE for 802.11n(HT20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
149	3.24	3.24±1	4.24
157	4.58	4.58 ±1	5.58
165	3.63	3.63±1	4.63

IEEE for 802.11n(HT40)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
151	3.65	3.65±1	4.65
159	4.99	4.99±1	5.99

IEEE for 802.11ac(HT20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
149	3.42	3.42±1	4.42
157	4.59	4.59±1	5.59
165	7.86	7.86±1	8.86

IEEE for 802.11 ac(HT40)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
151	3.79	3.79±1	4.79
159	5.02	5.02 ±1	5.02

IEEE for 802.11ac(HT80)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)
155	8.57	8.57±1	9.57

Worst case: IEEE for 802.11 ac(HT40)						
Channel	Maximum Peak Conducted Output Power (dBm)	Maximum Peak Conducted Output Power (MW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm2)	Limit	Result
Lowest (5755MHz)	9.57	9.06	3.48	0.004	1.0	Pass

Note: 1) Refer to report **MTEB23090094-R4** for EUT test Maximum tune-up Power.
Note: 2) Pd = (Pout*G)/(4* Pi * R2)=(9.06*2.23)/(4*3.1416*20^2)=0.004
Note: 3)EUT's Bluetooth module is more than 20cm away from the human body.

NFC:

The worst case (refer to report **MTEB23090094-R5**) is below:

Antenna polarization: Horizontal		
Frequency (MHz)	Level (dBuV/m)	Polarization
13.56	77.9	Peak

E=EIRP-20logd+104.8
E: is the electric field strength in dBuV/m
EIRP: is the equivalent isotropically radiated powerin dBm
d: is the specified measurement distance in m
d=3m
EIRP=77.9+20log3-104.8=-17.30dBm

13.56MHz< 30MHz, Add a 6DB maximum ground factor.
EIRP=-17.30dBm+6=-11.3dBm

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

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