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RF Exposure Evaluation Report

Report No.: CQASZ20210300255E-03
Applicant: VTIN TECHNOLOGY CO.,LIMITED
Address of Applicant: UNIT D 16/F ONE CAPITAL PLACE 21 LUARD ROAD WAN CHAI HK
Equipment Under Test (EUT):
EUT Name: Projector
Model No.: BH500B,BH500C, A1, A2, A3, A5, A7, Q5, Q6, Q7, X5
Test Model No.: BH500A
Brand Name: Victsing
FCC ID: 2AIL4-BH500A
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2021-3-10
Date of Test: 2021-3-10 to 2021-3-31
Date of Issue: 2021-3-31
Test Result: **PASS***

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

Tested By: Jun Li

(Jun Li)

Reviewed By: Ares Liu

(Ares Liu)

Approved By: Sheek Luo

(Sheek Luo)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210300255E-03	Rev.01	Initial report	2021-3-31

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3 General Information

3.1 Client Information

Applicant:	VTIN TECHNOLOGY CO.,LIMITED
Address of Applicant:	UNIT D 16/F ONE CAPITAL PLACE 21 LUARD ROAD WAN CHAI HK
Manufacturer:	VTIN TECHNOLOGY CO.,LIMITED
Address of Manufacturer:	UNIT D 16/F ONE CAPITAL PLACE 21 LUARD ROAD WAN CHAI HK
Applicant:	Shenzhen Ying Boshi Technology Co., Ltd
Address of Applicant:	Room 702,Building K,Jinchangda 2000089,Shangwei Industrial Park, Zhangkengjing Community,Guanhu Subdistrict,Longhua District, Shenzhen

3.2 General Description of EUT

Product Name:	Projector
Model No.:	BH500B,BH500C, A1, A2, A3, A5, A7, Q5, Q6, Q7, X5
Test Model No.:	BH500A
Trade Mark:	Victsing
Hardware Version:	V1.0
Software Version:	V1.0
EUT Power Supply:	120V 60Hz

3.3 General Description of BT Classic

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V5.0
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK
Number of Channel:	79
Transfer Rate:	1Mbps/2Mbps
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	<input type="checkbox"/> Mobile <input type="checkbox"/> Portable <input checked="" type="checkbox"/> Fix Location
Antenna Type:	PCB antenna
Antenna Gain:	0dBi
EUT Power Supply:	Input: AC100V-240V~, 68W

3.4 General Description of 2.4G WIFI

Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422 MHz to 2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n(HT40): 7 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11 g/n(HT20)/n(HT40) : OFDM
Product Type:	<input type="checkbox"/> Mobile <input type="checkbox"/> Portable <input checked="" type="checkbox"/> Fix Location
Test Software of EUT:	RF test (manufacturer declare)
Antenna Type:	IPEX Antenna
Antenna Gain:	0dBi
EUT Power Supply:	Input: 100V-240V~ · 68W

Note:

Model No.: BH500B,BH500C, A1, A2, A3, A5, A7, Q5, Q6, Q7, X5

Only the model BH500A was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

4 SAR Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limitst

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 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.

4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.1.3 EUT RF Exposure

1) For BT Classic

Antenna Gain: 0 dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	-3.210	-4.5±1	-3.5	0.447
Middle(2441MHz)	-4.870	-6±1	-5	0.316
Highest(2480MHz)	-4.420	-5.5±1	-4.5	0.355
π/4DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	-3.210	-4.5±1	-3.5	0.447
Middle(2441MHz)	-4.640	-6±1	-5	0.447
Highest(2480MHz)	-4.180	-5±1	-4	0.398

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
0.447	0	0.00009	1.0	PASS

Note: 1) Refer to report No. CQASZ20210300255-01 for EUT test Max Conducted Peak Output Power value.

2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (0.447 * 1.0) / (4 * 3.1416 * 20^2) = 0.00009$

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

2) For 2.4G WIFI

Antenna Gain: 0 dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

802.11b mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
2412	Ant1	7.73	7±1.0	8	6.310
2437	Ant1	8.84	8±1.0	9	7.943
2462	Ant1	8.64	8±1.0	9	7.943

802.11g mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
2412	Ant1	9.4	8.5±1.0	9.5	8.913
2437	Ant1	11.07	10±1.0	11	12.589
2462	Ant1	15.63	15±1.0	16	39.811

802.11n(HT20) SISO mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
2412	Ant1	9.13	8±1.0	9	7.943
2437	Ant1	11.29	10.5±1.0	11.5	14.125
2462	Ant1	11.32	10.5±1.0	11.5	14.125

802.11n(HT40) SISO mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
2422	Ant1	13.39	12.5±1.0	13.5	22.387
2437	Ant1	9.91	9±1.0	10	10.000
2452	Ant1	8.31	7.5±1.0	8.5	7.079

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
39.811	0	0.0079	1.0	PASS

Note: 1) Refer to report No. CQASZ20210300255E-02 for EUT test Max Conducted average Output Power value.

2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (39.811 * 1.0) / (4 * 3.1416 * 20^2) = 0.0079$