



Shenzhen Huaxia Testing Technology Co., Ltd

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Telephone: +86-755-26648640

Fax: +86-755-26648637

Website: www.cqa-cert.com

Report Template Version: V04

Report Template Revision Date: 2018-07-06

RF Exposure Evaluation Report

Report No.: CQASZ20210500606E-02
Applicant: Burnon International Limited
Address of Applicant: Unit B, 7/F., Kader Building, No.22 Kai Cheung Road, Kowloon Bay, Hong Kong.
Equipment Under Test (EUT):
EUT Name: BLUETOOTH MODULE
Model No.: BM20SPKS1NBC-C001AA, BM20SPKS1NBC-C001AB, BM20SPKS1NBC-C001AC, BM20SPKS1NBC-C001AD, BM20SPKS1NBC-C001AE, BM20SPKS1NBC-C001AF, BM20SPKS1NBC-C001BA, BM20SPKS1NBC-C001BB, BM20SPKS1NBC-C001BC, BM20SPKS1NBC-C001CA, BM20SPKS1NBC-C001CB, BM20SPKS1NBC-C001CC, BM20SPKS1NBC-C001DD, BM20SPKS1NBC-C001EE, BM20SPKS1NBC-C001FF, BM20SPKS1NBC-C002AA, BM20SPKS1NBC-C002AB, BM20SPKS1NBC-C002AC, BM20SPKS1NBC-C003AA, BM20SPKS1NBC-C003AB, BM20SPKS1NBC-C003AC, BM20SPKS1NBC-C002BB, BM20SPKS1NBC-C002CC, BM20SPKS1NBC-C002DD, BM20SPKS1NBC-C003BB, BM20SPKS1NBC-C003CC, BM20SPKS1NBC-C003DD
Test Model No.: BM20SPKS1NBC-C001AA
Brand Name: N/A
FCC ID: 2AZVH-BM20SPKS1NBC
Standards: 47 CFR Part 1.1307, 47 CFR Part 1.1310
KDB447498D01 General RF Exposure Guidance v06
Date of Test: 2021-5-10 to 2021-5-21
Date of Issue: 2021-5-21
Test Result: PASS*

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

Tested By: Lewis Zhou
(Lewis Zhou)
Reviewed By: Jun Li
(Jun Li)
Approved By: Sheek Luo
(Sheek Luo)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210500606E-02	Rev.01	Initial report	2021-5-21

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3 General Information

3.1 Client Information

Applicant:	Burnon International Limited
Address of Applicant:	Unit B, 7/F., Kader Building, No.22 Kai Cheung Road, Kowloon Bay, Hong Kong.
Manufacturer:	HTC Electronics Co., Ltd
Address of Manufacturer:	Room 202, 2 Tanglian 5th Street, Tangxia Town, Dongguan City, Guangdong province
Factory:	HTC Electronics Co., Ltd
Address of Factory:	Room 202, 2 Tanglian 5th Street, Tangxia Town, Dongguan City, Guangdong province

3.2 General Description of EUT

Product Name:	BLUETOOTH MODULE
Model No.:	BM20SPKS1NBC-C001AA, BM20SPKS1NBC-C001AB, BM20SPKS1NBC-C001AC, BM20SPKS1NBC-C001AD, BM20SPKS1NBC-C001AE, BM20SPKS1NBC-C001AF, BM20SPKS1NBC-C001BA, BM20SPKS1NBC-C001BB, BM20SPKS1NBC-C001BC, BM20SPKS1NBC-C001CA, BM20SPKS1NBC-C001CB, BM20SPKS1NBC-C001CC, BM20SPKS1NBC-C001DD, BM20SPKS1NBC-C001EE, BM20SPKS1NBC-C001FF, BM20SPKS1NBC-C002AA, BM20SPKS1NBC-C002AB, BM20SPKS1NBC-C002AC, BM20SPKS1NBC-C003AA, BM20SPKS1NBC-C003AB, BM20SPKS1NBC-C003AC, BM20SPKS1NBC-C002BB, BM20SPKS1NBC-C002CC, BM20SPKS1NBC-C002DD, BM20SPKS1NBC-C003BB, BM20SPKS1NBC-C003CC, BM20SPKS1NBC-C003DD,
Test Model No.:	BM20SPKS1NBC-C001AA
Trade Mark:	N/A
Hardware Version:	V1.1
Software Version:	V1.1
EUT Power Supply:	Power by the PC

3.3 General Description of BT Classic

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V5.0+BDR/EDR
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channel:	79
Transfer Rate:	1Mbps/2Mbps/3Mbps
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	☐ Mobile ☐ Portable ☒ Fix Location
Antenna Type:	PCB antenna
Antenna Gain:	0dBi
EUT Power Supply:	Power by the PC

Note:

All model: BM20SPKS1NBC-C001AA, BM20SPKS1NBC-C001AB, BM20SPKS1NBC-C001AC, BM20SPKS1NBC-C001AD, BM20SPKS1NBC-C001AE, BM20SPKS1NBC-C001AF, BM20SPKS1NBC-C001BA, BM20SPKS1NBC-C001BB, BM20SPKS1NBC-C001BC, BM20SPKS1NBC-C001CA, BM20SPKS1NBC-C001CB, BM20SPKS1NBC-C001CC, BM20SPKS1NBC-C001DD, BM20SPKS1NBC-C001EE, BM20SPKS1NBC-C001FF, BM20SPKS1NBC-C002AA, BM20SPKS1NBC-C002AB, BM20SPKS1NBC-C002AC, BM20SPKS1NBC-C003AA, BM20SPKS1NBC-C003AB, BM20SPKS1NBC-C003AC, BM20SPKS1NBC-C002BB, BM20SPKS1NBC-C002CC, BM20SPKS1NBC-C002DD, BM20SPKS1NBC-C003BB, BM20SPKS1NBC-C003CC, BM20SPKS1NBC-C003DD,

Only the model BM20SPKS1NBC-C001AA 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 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.

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)	-2.470	-3.5±1	-2.5	0.562
Middle(2441MHz)	-1.340	-2.5±1	-1.5	0.708
Highest(2480MHz)	-0.020	-1±1	0	1.000
π/4DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	-1.900	-3±1	-2	0.631
Middle(2441MHz)	-0.790	-2±1	-1	0.794
Highest(2480MHz)	0.500	-0.5±1	0.5	1.122
8DPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	-1.650	-2.5±1	-1.5	0.708
Middle(2441MHz)	-0.410	-1.5±1	-0.5	0.891
Highest(2480MHz)	0.860	0±1	1	1.259

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
1.259	0	0.000250	1.0	PASS

Note: 1) Refer to report No. CQASZ20210500606E-01 for EUT test Max Conducted Peak Output Power value.

2) $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2) = (1.259 \cdot 1.0) / (4 \cdot 3.1416 \cdot 20^2) = 0.000250$

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