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RF Exposure Evaluation Report

Report No. : CQASZ20190400267E-02

Applicant: SHENZHEN DNINE TECHNOLOGY CO.,LTD

Address of Applicant: 5/F, Building A, 102 Longguan Expressway, Dalang Street, Longhua District, Shenzhen City, China

Manufacturer: SHENZHEN DNINE TECHNOLOGY CO.,LTD

Address of Manufacturer: 5/F, Building A, 102 Longguan Expressway, Dalang Street, Longhua District, Shenzhen City, China

Equipment Under Test (EUT):

Product: Billy Smart Bigdog, smart dog

All Model No.: IHP001, IHP002, IHP003, IHP004, IHP005, IHP006, IHP007, IHP008, IHP009

Test Mode No.: IHP001

Brand Name: N/A

FCC ID: 2ATAC-D9NI3S

Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
KDB447498D01 General RF Exposure Guidance v06

Date of Test: 2019-04-24 to 2019-05-06

Date of Issue: 2019-05-06

Test Result : PASS*

Tested By:

Daisy Kim

(Martin Lee)

Reviewed By:

Aaron Ma

(Aaron Ma)

Approved By:

Jack Ai
(Jack Ai)



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

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

2 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20190400267E-02	Rev.01	Initial report	2019-05-06

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4 General Information

4.1 Client Information

Applicant:	SHENZHEN DNINE TECHNOLOGY CO.,LTD
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Manufacturer:	SHENZHEN DNINE TECHNOLOGY CO.,LTD
Address of Manufacturer:	5/F, Building A, 102 Longguan Expressway, Dalang Street, Longhua District, Shenzhen City, China

4.2 General Description of EUT

Product Name:	Billy Smart Bigdog, smart dog
All Model No.:	IHP001, IHP002, IHP003, IHP004, IHP005, IHP006, IHP007, IHP008, IHP009
Test Model No.:	IHP001
Trade Mark:	N/A
Hardware Version:	DN32A_BT_V1.0
Software Version:	billy_bt_V1.0
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V4.2
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Transfer Rate:	1Mbps/2Mbps/3Mbps
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Product Type:	☒ Mobile ☐ Portable ☐ Fix Location
Test Software of EUT:	RTL8761_BT4.0 (manufacturer declare)
Antenna Type:	PCB antenna
Antenna Gain:	0dBi
Power Supply:	lithium battery:DC7.4V Adpater: model: JK120150-S04US Input: 100-240Vac, 50/60Hz, 0.5A Output: 12V----1500mA

Note:

1. The same product has two names.

2. All model: IHP001, IHP002, IHP003, IHP004, IHP005, IHP006, IHP007, IHP008, IHP009

Only the model IHP001 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.

5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 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.

5.1.2 Test Procedure

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

5.2 1.1.3 EUT RF Exposure Evaluation

1) For Bluetooth

Antenna Gain: 0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1 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)	-1.670	-1±1	0	1.000
Middle(2441MHz)	0.330	1.0±1	2	1.585
Highest(2480MHz)	1.370	1.0±1	2	1.585
π/4DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	-0.440	0±1	1	1.259
Middle(2441MHz)	1.420	2.0±1	3	1.995
Highest(2480MHz)	2.460	2.0±1	3	1.995
8DPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	0.370	1.0±1	2	1.585
Middle(2441MHz)	2.180	3.0±1	4	2.512
Highest(2480MHz)	3.180	3.0±1	4	2.512

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
2.512	0	0.0005	1.0	PASS

Note: 1) Refer to report No. CQASZ20190400267E-01 for EUT test Max Conducted Peak Output Power value.

2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (2.512 * 1) / (4 * 3.1416 * 20^2) = 0.0005$