

RF Exposure Evaluation Report

Product : New Energy Vehicle Integrated
: Detection Tool
Trade mark : SmartSafe
Model/Type reference : iSmartEV P03
Serial Number : N/A
Report Number : EED32O81503007
FCC ID : 2AYANEVP03
Date of Issue : Nov. 16, 2022
: 47 CFR Part 1.1307
Test Standards : 47 CFR Part 2.1093
: KDB447498D01 General RF Exposure Guidance v06
Test result : PASS

Prepared for:

HENZHEN SMARTSAFE TECH CO., LTD.

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2 Version

Version No.	Date	Description
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4 General Information

4.1 Client Information

Applicant:	SHENZHEN SMARTSAFE TECH CO., LTD.
Address of Applicant:	3F,Building B, Qiao'an Technology Industrial Park, Guanlan, Longhua New District, Shenzhen, China
Manufacturer:	SHENZHEN SMARTSAFE TECH CO., LTD.
Address of Manufacturer:	3F,Building B, Qiao'an Technology Industrial Park, Guanlan, Longhua New District, Shenzhen, China
Factory:	SHENZHEN SMARTSAFE TECH CO., LTD.
Address of Factory:	3F,Building B, Qiao'an Technology Industrial Park, Guanlan, Longhua New District, Shenzhen, China

4.2 General Description of EUT

Product Name:	New Energy Vehicle Integrated Detection Tool
Mode No.:	iSmartEV P03
Trade mark:	SmartSafe
EUT Supports Radios application:	Bluetooth 5.0 dual mode: 2402-2480MHz 2.4GHz Wi-Fi: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz 5GHz Wi-Fi: U-NII-1: 5180-5240MHz; U-NII-3: 5745-5825MHz

4.3 Product Specification subjective to this standard

Frequency Range:	Bluetooth : 2402-2480MHz 2.4GHz Wi-Fi: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz 5GHz Wi-Fi: U-NII-1: 5150-5250MHz; U-NII-3: 5745-5825MHz
Modulation Type:	IEEE for 802.11b:DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g:OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20/HT40): OFDM (64QAM, 16QAM,QPSK,BPSK) IEEE 802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM) IEEE 802.11ac(HT20/HT40/HT80): OFDM (BPSK, QPSK, 16QAM, 64QAM) BT/BLE: GFSK, 8DPSK, $\pi/4$ DQPSK
Test Power Grade:	Default
Antenna Type (Bluetooth):	FPC Antenna
Antenna Gain (Bluetooth):	3.72dBi

Antenna Type (Wi-Fi):	FPC Antenna	
Antenna Gain (Wi-Fi):	Module 1: (2.4G): 3.72dBi; (5G): 2.96dBi; Module 2: (2.4G): 2.33dBi; (5G): 3.18dBi;	
Function (Wi-Fi):	<input checked="" type="checkbox"/> SISO <input type="checkbox"/> 2x2 MIMO <input type="checkbox"/> 3x3 MIMO <input type="checkbox"/> 4x4MIMO	
Power Supply:	Adapter	model: CGSW65-120-5000II input: 100-240V~50/60Hz,1.5A output: 12.0V---5.0A 60.0W
Max Conducted Peak Output Power:	Module 1:BLE:7.26dBm, BT: -1.87dBm, 2.4G WIFI:16.55dBm, 5G WIFI:12.67dBm Module 2:2.4G WIFI:17.59dBm, 5G WIFI:7.56dBm.	
	The Max Conducted Peak Output Power data refer to the report EED32O81503001, EED32O81503002, EED32O81503003, EED32O81503004, EED32O81503005, EED32O81503006.	
Sample Received Date:	Sep. 23, 2022	
Sample tested Date:	Sep. 23, 2022 to Oct. 21, 2022	
Company Name and Address shown on Report, the sample(s) and sample Information was/ were provided by the applicant who should be responsible for the authenticity which CTI hasn't verified.		

4.4 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd

Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

No tests were sub-contracted.

FCC Designation No.: CN1164

4.5 Deviation from Standards

None.

4.6 Abnormalities from Standard Conditions

None.

4.7 Other Information Requested by the Customer

None.

5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{377}$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{377 d^2}$$

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

5.2 Maximum Permissible Exposure

Substituting the MPE safe distance using $d = 20$ cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

Module 1:

BLE:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
39	2480	5.321	2.355	20	0.0025	1

BT Classic:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
78	2480	0.65	2.355	20	0.0003	1

2.4G WIFI:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
1	2412	45.186	2.355	20	0.0212	1

5G WIFI:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
48	5240	18.493	1.977	20	0.0073	1

Module 2:

2.4G WIFI:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
1	2412	57.412	1.71	20	0.0195	1

5G WIFI:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
40	5200	5.702	2.080	20	0.0024	1

For BT Classic and WIFI

Module 1 and Module 2 can transmit simultaneously.

Simultaneous transmission mode	The sum of the ratios	Result
Module 1 BLE+ Module 2 2.4GWIFI	0.0025/1+0.0195/1	=0.022 < 1
Module 1 BLE+ Module 2 5GWIFI	0.0025/1+0.0024/1	=0.0049 < 1
Module 1 BT Classic+ Module 2 2.4GWIFI	0.0003/1+0.0195/1	=0.0198 < 1
Module 1 BT Classic+ Module 2 5GWIFI	0.0003/1+0.0024/1	=0.0027 < 1
Module 1 2.4GWIFI+ Module 2 2.4GWIFI	0.0212/1+0.0195/1	=0.0407 < 1
Module 1 2.4GWIFI+ Module 2 5GWIFI	0.0212/1+0.0024/1	=0.0236 < 1
Module 1 5GWIFI+ Module 2 2.4GWIFI	0.0073/1+0.0195/1	=0.0268 < 1
Module 1 5GWIFI+ Module 2 5GWIFI	0.0073/1+0.0024/1	=0.0097 < 1

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*** End of Report ***