



RF Exposure Evaluation Declaration

Report No.: S20221129093611

Issue Date: 04-20-2023

Applicant: SBOT Technologies LLC

Address: 230 W 39th St, 8th FL, New York United States 10018

FCC ID: 2A3Q4-CA03AN

Application Type: Certification

Product: Caper Cart M3 Android board

Model No.: PCBA-CAP-CA03AN-RK39

Trade Mark: /

FCC Rule Part(s): CFR 47, FCC Part 2.1091 Radio frequency radiation exposure evaluation: mobile devices.

Test Date: Feb 19 ~ Feb 23, 2023

Compiled By

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The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 558074 D01. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of Fangguang Inspection & Testing Co., Ltd. Wuxi Branch

The test report must not be used by the client to claim product certifications, approval, or endorsement by NVLAP, NIST or any agency of U.S. Government.

Revision History

Report No.	Version	Description	Issue Date
S20221129093611	Rev. 01	/	04-20-2023

1. Product Information

1.1. Equipment Description

Product Name:	Caper Cart M3 Android board
Model No.:	PCBA-CAP-CA03AN-RK39
Trade Mark:	/
Input Voltage Range:	DC 24V
Bluetooth Version:	5.0
Wi-Fi Specification:	802.11b/g/n-HT20 802.11a/n-HT20/n-HT40/ac-VHT20/ac-VHT40/ac-VHT80/ax-HE20/ ax-HE40/ax-HE80

1.2. Product Specification Subjective to this Report

Frequency Range:	BT/BLE:2402~2480MHz 802.11b/g/n-HT20: 2412 ~ 2462MHz For 802.11a/n-HT20/ac-VHT20/ax-HE20: 5180~5240MHz, 5745~5825MHz For 802.11n-HT40/ac-VHT40/ax-HE40: 5190~5230MHz, 5755~5795MHz For 802.11ac-VHT80/ax-HE80: 5210MHz, 5775MHz
Type of Modulation:	BLE:GFSK BT: GFSK, $\pi/4$ DQPSK, 8DPSK 802.11b: DSSS 802.11g/n: OFDM 802.11a/n/ac/ax:CCK/OFDM/BPSK/QPSK/DBPSK/DQPSK/16QAM/64QAM/256QAM/1024QAM
Data Rate:	BLE:1Mbps&2Mbps BT:1Mbps(GFSK), 2Mbps($\pi/4$ DQPSK), 3Mbps (8DPSK) 802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: MCS0~MCS7 802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 150Mbps 802.11ac: up to 433.3Mbps 802.11ax: up to 600Mbps

Antenna Type:	FPC Antenna
Antenna Gain:	BT/BLE:6.22dBi 2.4G WiFi: Ant1:6.22dBi Ant2:3.61dBi 5G RLAN: Ant1:4.48dBi Ant2:6.15dBi

2. RF Exposure Evaluation

2.1. Evaluation Method

Exposure category: General population/uncontrolled environment

EUT Type: Production Unit

Device Type: Mobile Device

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D04 Either SAR-based or MPE-based exemption may be considered for test exemption for fixed, mobile, or portable device exposure conditions; therefore, the contributions from each exemption in conjunction with the measured SAR (Evaluated_k term) shall be used to determine exemption for simultaneous transmission according to Formula (C.1)

$$\sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1 \quad (C.1)$$

Evaluated_k the maximum reported SAR or MPE of fixed, mobile, or portable RF source *k* either in the device or at the transmitter site from an existing evaluation.

Exposure Limit_k either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable sources, as applicable

the sum of the ratios of the applicable terms for SAR-based, MPE-based and measured SAR or MPE shall be less than 1, to determine simultaneous transmission exposure compliance

2.2. Limit

For mobile devices at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in Table B.2 is necessary if the ERP of the device is greater than ERP_{20cm} in Formula (B.1)

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (B.1)$$

(B.2)Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength(H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100,000	/	/	1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

2.3. Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S=PG/4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to anisotropic radiator

R=distance to the center of radiation of the antenna

From the EUT RF output power, the minimum mobile separation distance, d=20cm, as well as the maximum gain of the used as following information, the RF power density can be obtained.

3. Estimation Result

3.1. Measurement Results

STANDALONE MPE

Mode	Frequency (MHz)	Maximum Conducted OutputPower (dBm)	Antenna Gain (dBi)	PG		MPE (mW/cm ²)	MPE Limits (mW/cm ²)
				(dBm)	(mW)		
WCDMA Band 2	1850 - 1910	25	4.33	29.33	857.038	0.171	1.00
WCDMA Band 4	1710 -1755	25	4.33	29.33	857.038	0.171	1.00
WCDMA Band 5	824 - 849	25	4.33	29.33	857.038	0.171	0.55
FDD LTE Band 2	1850 - 1910	25	4.33	29.33	857.038	0.171	1.00
FDD LTE Band 4	1710 -1755	25	4.33	29.33	857.038	0.171	1.00
FDD LTE Band 5	824 - 849	25	4.33	29.33	857.038	0.171	0.55
FDD LTE Band 12	699 - 716	25	4.33	29.33	857.038	0.171	0.47
FDD LTE Band 13	777 - 787	25	4.33	29.33	857.038	0.171	0.52
FDD LTE Band 14	788 - 798	25	4.33	29.33	857.038	0.171	0.53
TDD LTE Band 66	1710 - 1780	25	4.33	29.33	857.038	0.171	1.00
TDD LTE Band 71	663 - 698	25	4.33	29.33	857.038	0.171	0.45
2.4 GHz WIFI	2412 - 2462	13.77	6.22	19.99	97.724	0.019	1.00
U-NII	5150 - 5250 5745 - 5825	Ant1:13.22 Ant2: 13.67	Ant1:4.48 Ant2:6.15	Total:21.90	154.882	0.031	1.00
BT	2402 - 2480	7.16	6.22	13.38	21.777	0.004	1.00
BLE	2402 - 2480	6.07	6.22	12.29	16.943	0.003	1.00

Remark: 1. MPE use distance is 20cm from manufacturer declaration of user manual.

Remark: 2.Use the maximum gain of all bands when evaluating

Maximum Simultaneous transmission MPE Ratio for WWLAN & WLAN & BT(BR+EDR&BLE)

Maximum MPE ratio (LTE Band 12)	Maximum MPE ratio (5 GHz WIFI)	Maximum MPE ratio (2.4 GHz WIFI)	Maximum MPE ratio (BT)	Σ MPE ratios	Limit	Results
0.171/0.47	0.031/1	0.019/1	0.004/1	0.418	1.000	Pass

Note: The estimation distance is 20cm.

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