

RF Exposure Evaluation Report

Report Reference No......: **MTEB22111601-H**

FCC ID.....: **2A9SC-TNPHASER02**

Compiled by

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Date of issue.....: **November 18,2022**

Representative Laboratory Name .: **Shenzhen Most Technology Service Co., Ltd.**

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Applicant's name.....: **SHENZHEN MARVO TECHNOLOGY CO., LTD**

Address: 601-604, 6th Floor, Building A,DongFangYaYuan, ChenTian
community,Xixiang, BaoMin 2nd Road, Bao'an District, Shenzhen,
China

Test specification/ Standard: **47 CFR Part 1.1307**

47 CFR Part 1.1310

KDB447498D01 General RF Exposure Guidance v06

TRF Originator.....: Shenzhen Most Technology Service Co., Ltd.

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Test item description: Computer Speaker

Trade Mark: Tilted Nation、Marvo

Manufacturer: SHENZHEN MARVO TECHNOLOGY CO., LTD

Model/Type reference.....: TNPHASER

Listed Models: TNPHASERW, TNPHASER-B, TNPHASER-W, SD-022
SD-***(**stand for 0-9), SG-***(**stand for 0-9), SK-***(**stand
for 0-9),SP-***BT(**stand for 0-9)

Modulation Type.....: GFSK, $\pi/4$ DQPSK, 8DPSK

Operation Frequency.....: 2402MHz to 2480MHz

Hardware Version.....: V2.0

Software Version: AFF2

Rating: DC 5V by USB Port

Result.....: PASS

TEST REPORT

Equipment under Test : Computer Speaker

Model /Type : TNPHASER

Listed Models : TNPHASERW, TNPHASER-B, TNPHASER-W, SD-022
SD-***(**stand for 0-9), SG-***(**stand for 0-9), SK-***(**stand
for 0-9),SP-***BT(**stand for 0-9)

Remark All the model are the same circuit and RF module, only for model
name. Test sample model: SD-022 (TNPHASER)

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Test Result:	PASS
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The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test
laboratory.

1. Revision History

Revision	Issue Date	Revisions	Revised By
00	2022-11-18	Initial Issue	Alisa Luo

2. SAR Evaluation

2.1 RF Exposure Compliance Requirement

2.1.1 Standard Requirement

According to KDB447498D01 General RF Exposure Guidance v06

4.3.1. Standalone SAR test exclusion considerations

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

2.1.2 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: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$ 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.

2.1.3 EUT RF Exposure

Antenna Gain: -0.58dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.4 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

EDR

GFSK			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2402 MHz)	4.443	4.443 ± 1	5.443
Middle(2441MHz)	4.120	4.120 ± 1	5.120
Highest(2480MHz)	3.951	3.951 ± 1	4.951

$\pi/4$ DQPSK			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2402 MHz)	4.230	4.230 ± 1	5.230
Middle(2441MHz)	4.011	4.011 ± 1	5.011
Highest(2480MHz)	4.360	4.360 ± 1	5.360

8DPSK			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2402 MHz)	4.012	4.012 ± 1	5.012
Middle(2441MHz)	3.082	3.082 ± 1	4.082
Highest(2480MHz)	3.366	3.366 ± 1	4.366

EDR

Worst case: GFSK						
Channel	Maximum Peak Conducted Output Power (dBm)	Maximum Peak Conducted Output Power (MW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Highest(2441 MHz)	5.443	3.50	-0.58	0.0006	1.0	Pass

Note: 1) Refer to report **MTEB22111601-R** for EUT test Max Conducted average Output Power value.Note: 2) $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2) = (3.50 \cdot 0.87) / (4 \cdot 3.1416 \cdot 20^2) = 0.0006$

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

.....**THE END OF REPORT**.....