

Test Report for FCC & ISED

Report Number		ESTRGC2309-007	
Applicant	Company name	Suprema Inc	
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	Contact person	Jae-Won Lee, Han-Chul Kim	
Product	Product name	Biostation 2a	
	Factory address	17F-5, Parkview Office Tower, 248, Jeongjail-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, South Korea	
	Model No.	BS2A-OAPWB	Manufacturer Suprema Inc
	Serial No.	NONE	Country of origin KOREA
Test date	13-Sep-23 ~ 22-Sep-23		Date of issue 30-Sep-23
FCC ID		TKWBS2A-OAPWB	
ISED ID		23080-BS2AOAPWB	
Testing location		140-16, Eongmalli-ro, Majang-myeon, Icheon-si, Gyeonggi-do, Rep. of Korea	
Standard		RSS-102	
MRA Registration number		KR0019	
Tested by	Senior Engineer H.G. Lee (Signature)		
Reviewed by	Engineering Manager K.I. Hong (Signature)		
Abbreviation	OK, Pass = Passed, Fail = Failed, N/A = not applicable		
* Note - This test report is not permitted to copy partly without our permission - This test result is dependent on only equipment to be used - This test report is not related to KOLAS accreditation - Additional models name: BS2A-ODPB(Delete wifi module) - Software version:V01 - Hardware version:V1.0.0			

RF Exposure Measurement

1. Introduction

The maximum Gain measured in Fully Anechoic Chamber

IC Safety Code 6 (2018), RSS-102 Section 2.2.2: To ensure compliance with the basic restrictions outlined in Section 2.1, at frequencies between 10 MHz and 300 GHz, the reference levels for electric- and magnetic-field strength and power density must be complied with.

2. Classification

MODE: BT, RFID LF , RFID HF

The antenna of the product, under normal use condition, is at least 20 cm away from the body of the user. Warning statement for keeping 20 cm separation distance and the prohibition of operating next to a person has been printed on the user's manual. So, this product is classified as the Mobile Device.

TABLE 4:RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field Strength (V/m)(RMS)	Magnetic Field Strength(A/m)(RMS)	Power Density (W/m ²)	Reference Period (minutes)
0.003 – 10 ²¹	83	90	–	Instantaneous*
0.1–10	–	0.73/ f	–	6**
1.1–10	87/ f ^{0.5}	–	–	6**
10 – 20	27.46	0.0728	2.0	6
20 – 48	58.07/ f ^{0.25}	0.1540/ f ^{0.25}	8.944/ f ^{0.5}	6
48 – 300	22.06	0.05852	1.291	6
300 – 6000	3.142 f ^{0.3417}	0.008335 f ^{0.3417}	0.02619f ^{0.6834}	6
6000 – 15000	61.4	0.613	10	6
15000 – 150000	61.4	0.613	10	616000/ f ^{1.2}
150000 – 300000	0.158 f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000/ f ^{1.2}
Note: f is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

TABLE 6: Reference Levels for Electric Field Strength, Magnetic Field Strength and Power Density in Controlled Environments

Frequency Range (MHz)	Electric Field Strength (V/m)(RMS)	Magnetic Field Strength(A/m)	Power Density (W/m ²)	Reference Period (minutes)
0.003 – 10 ²³	170	180	–	Instantaneous*
0.1–10	–	1.6/ f	–	6**
1.1–10	193/ f ^{0.5}	–	–	6**
10 – 20	61.4	0.163	10.0	6
20 – 48	129.8/ f ^{0.25}	0.3444/ f ^{0.25}	44.72/ f ^{0.5}	6
48 – 300	49.33	0.1309	6.455	6
300 – 6000	15.6 f ^{0.25}	0.04138 f ^{0.25}	0.6455f ^{0.5}	6
6000 – 15000	137	0.364	50	6
15000 – 150000	137	0.364	50	616000/ f ^{1.2}
150000 – 300000	0.354 f ^{0.5}	9.4 x 10 ⁻⁴ f ^{0.5}	3.33 x 10 ⁻⁴ f	616000/ f ^{1.2}
Note: f is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

4. Friis Formula

$$R = \sqrt{\frac{PG}{4\pi S}}$$

The maximum Gain measured in Fully Anechoic Chamber

BT : 4.39 dBi or 2.747 (nematic)

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

$\pi = 3.1416$

MODE: BLE, RFID LF, RFID HF

P_d is the limit of MPE, $1\text{mW}/\text{cm}^2$. 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.

The software provided by Manufacturer enabled the EUT to transmit with max power at lowest, middle and highest channel individually.

5. Test Results

5.1 The maximum Gain measured in Fully Anechoic Chamber

Band	antenna gain (dBi)	nemeric
BT(BLE)	4.39 dBi	2.747 (numeric)
RFID LF	–	–
RFID HF	–	–

5.2 Output Power into Antenna & Power Density (1mW/cm2) :

MODE: BT

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm2)	Power Density Limit(mW/cm2)
First ch	2 402	0.81	0.000444	5.350
Middle ch	2 440	0.86	0.000470	5.408
Last ch	2 480	0.94	0.000514	5.468

MODE: RFID

Channel	Channel Frequency (MHz)	Field Strength (dBuV/m)	Output Power (mW)	Power Density Limit(mW/cm2)
RFID	13.56	76.51	0.0008954	0.000000178
RFID	0.13	75.05	0.0006397	0.000000127

MODE:BT+RFID

0.001409 (mW/cm2) < 1.0 (mW/cm2)

Bluetooth, RFID, NFC SAR was not required