



Estech
your best partner

Test Report for FCC

Report Number		ESTRGC2402-005	
Applicant	Company name	Suprema Inc	
	Address	17F-5, Parkview Office Tower, 248, Jeongjail-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, South Korea	
	Telephone	+82-31-710-4922	
	Contact person	Jae-Won Lee, Han-Chul Kim	
Product	Product name	Xpass 2	
	Factory address	17F-5, Parkview Office Tower, 248, Jeongjail-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, South Korea	
	Model No.	XP2-MAPB	Manufacturer Suprema Inc
	Serial No.	NONE	Country of origin KOREA
Test date	12-Feb-24 ~ 22-Feb-24	Date of issue	27-Feb-24
FCC ID		TKWXP2-MAPB	
Testing location	140-16, Eongmalli-ro, Majang-myeon, Icheon-si, Gyeonggi-do, Rep. of Korea		
Standard	FCC 1.1307 and 1.1310		
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 - Software version:V1.0.0 - Hardware version:V1.0.0			

RF Exposure Measurement

1. Introduction

The maximum Gain measured in Fully Anechoic Chamber

Because this device is transmitting the high power signal, it is regarded specially as a dangerous band for its heating harmfulness to the human body. The manufacturer whose product is working in this frequency band is obligatory to prove the harmfulness of his product. In this document, we try to prove the safety of radiation harmfulness to the human body for our product. The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 and RSS-210 Issue 5 is followed. The Gain of the antenna used in this product is measured in a Fully Anechoic Chamber (FAC), and the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

2. Classification

MODE: BT,NFC(HF), NFC(LF)

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.

3. RF Exposure Limit

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency(RF) radiation as specified in 1.1307(b).

RSS-102 clause 2.5.2 Routine RF exposure evaluation exemption limit for transmitters operating at 20 MHz or lower frequencies is 1 W eirp

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE) – Class A

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Average Time (minutes)
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

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE) – Class B

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Average Time (minutes)
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 * = Plane-wave equivalent power density

4. Friis Formula

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

The maximum Gain measured in Fully Anechoic Chamber

BT : 1.72 dBi or 1.486 (nematic)

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

$\pi = 3.1416$

MODE: BT, NFC(HF), NFC(LF)

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
Bluetooth	1.72 dBi	1.486 (numeric)

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

MODE: Bluetooth

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm2)
First ch	2402.00	1.01	0.000299
Middle ch	2440.00	1.08	0.000319
Last ch	2480.00	1.08	0.000319

MODE: NFC(HF)

Frequency Range (MHz)	Field Strength (dBuV/m)	Output Power (mW)	Power Density (mW/cm2)
13.56	71.99	0.00003160	0.000000031

MODE: NFC(LF)

Frequency Range (kHz)	Field Strength (dBuV/m)	Output Power (mW)	Power Density (mW/cm2)
130.4	70.35	0.00002167	0.0000004311

MODE: BT+NFC(HF)+NFC(LF)

0.0003197 (mW/cm2) < 1.0 (mW/cm2)