MPE REPORT

FCC

APPLICANT

Safetrust Inc

MODEL NAME

SA210

FCC ID

2ANI5SA210

REPORT NUMBER

HA200902-STI-002-R04

TEST REPORT

Date of Issue
December 23, 2020

Test Site
Hyundai C-Tech, Inc. dba HCT America, Inc.
1726 Ringwood Ave, San Jose, CA 95131, USA

Applicant	Safetrust Inc
Applicant Address	8116 Mill Creek Rd, Fremont, CA 94539, U.S.A.
FCC ID	2ANI5SA210
Model Name	SA210
EUT Type	SABRE Module
FCC Classification	Digital Transmission System (DTS)
FCC Rule Part(s)	Part 1 (§1.1310), Part 2 (§2.1091)
Test Procedure	KDB 447498 D01 v06

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was in accordance with the procedures specified in §2.947. The results in this report apply only to the product which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Hyundai C-Tech, Inc. dba HCT America, Inc. certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

Tested By	**Reviewed By**
Billy Kim	Sunwoo Kim
Test Engineer	Technical Manager

REVISION HISTORY

The revision history for this document is shown in table.

TEST REPORT NO.	DATE	DESCRIPTION
HA200902-STI-002-R04	12/23/2020	Initial Issue

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Hyundai C-Tech, Inc. dba HCT America, Inc., 1726 Ringwood Avenue, San Jose, CA 95131, USA TEL: +1-510-933-8848 FAX: +1-510-933-8849

1. EUT DESCRIPTION

Model	SA210	
EUT Type	SABRE Module	
Power Supply	DC 5.0 V	
RF Specification	WIFI 2.4 GHz : IEEE 802.11b/g/n HT20 (SISO) Bluetooth LE MCU (1Mbps) : nRF52832 Bluetooth LE MESH (1Mbps) : nRF52832 Bluetooth LE RX (1Mbps) : nRF52811 (Receive only)	
Modulation Type	WIFI 2.4 GHz : DSSS/CCK, OFDM Bluetooth LE : GFSK	
Frequency Range	WIFI 2.4 GHz : 2412 MHz – 2462 MHz Bluetooth LE : 2402 MHz – 2480 MHz	
Antenna Specification [1)]	WIFI 2.4 GHz	2.0 dBi (Peak Gain)
	BLE 1M (nRF52840)	2.0 dBi (Peak Gain)
	BLE 1M (nRF52832)	2.0 dBi (Peak Gain)
Operating Environment	Indoor and outdoor	
Operating Temperature	-20 °C ~ 50 °C	

Note :
1. Antenna information is based on the document provided.

2. INTRODUCTION

2.1. LIMIT

The limit for Maximum Permissible Exposure (MPE), specified in FCC Rule Part §1.1310 listed in the table below, shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation specified in §1.1310 (b)

Frequency Range (MHz)	E- Field Strength (V/m)	H- Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (Minutes)
(A) Limits for Occupational / Controlled Exposure				
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 – 1,500	-	-	f / 300	6
1,500 – 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 – 1,500	-	-	f / 1500	30
1,500 – 100,000	-	-	1.0	30

f = frequency in MHz, * = Plane-wave equivalent power density

2.2. MAXIMUM PERMISSIBLE EXPOSURE PREDICTION

Prediction of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S : Power density (mW/cm^2)
P : Output power to antenna (mW)
G : Antenna gain in linear scale
R : Distance between the center of radiator and observation point (cm)

3. RESULT

3.1. MPE Calculation

Bluetooth LE MCU				
Frequency (MHz)	2402	MHz		
MPE Limit (mW/cm²)	1.0	mW/cm²		
Distance (R)	20	Cm		
Output Power (P)	1.00	dBm	1.26	mW
Antenna Gain (G)	2.00	dBi	1.58	-
Power density (S) at distance 20 cm	**0.000397**	mW/cm²	at 20 cm separation distance	

Bluetooth LE MESH				
Frequency (MHz)	2480	MHz		
MPE Limit (mW/cm²)	1.0	mW/cm²		
Distance (R)	20	Cm		
Output Power (P)	1.00	dBm	1.26	mW
Antenna Gain (G)	2.00	dBi	1.58	-
Power density (S) at distance 20 cm	**0.000397**	mW/cm²	at 20 cm separation distance	

WIFI 2.4 GHz				
Frequency (MHz)	2412	MHz		
MPE Limit (mW/cm²)	1.0	mW/cm²		
Distance (R)	20	Cm		
Output Power (P)	8.00	dBm	6.31	mW
Antenna Gain (G)	2.00	dBi	1.58	-
Power density (S) at distance 20 cm	**0.001989**	mW/cm²	at 20 cm separation distance	

3.2. SUMMARY OF RESULTS

Mode	Frequency Range (MHz)	Ant Gain (dBi)	Power Density (mW/cm^2)	MPE Ratio (PD/MPE Limit)
BLE MCU	2402 – 2480	2.0	0.000397	0.000397
BLE MESH	2402 – 2480	2.0	0.000397	0.000397
WIFI 2.4 GHz	2412 – 2462	2.0	0.001989	0.001989

The worst-case configuration is simultaneous transmission of both Bluetooth LE (MCU and MESH) and WIFI 2.4 GHz.

Sample Calculation

TOTAL MPE (20cm distance) = 0.000397/1.0 + 0.000397/1.0 + 0.001989/1.0 = **0.002783** < 1.0