

RF Exposure Report

Report No.: SABCKS-WTW-P21123397

FCC ID: 2AAAS-BB02

Test Model: BB02

Received Date: 2021/12/10

Test Date: 2022/2/1

Issued Date: 2022/3/16

Applicant: Vivint. Inc.

Address: 4931 N. 300 W. Provo, UT 84604 USA

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan

Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan

**FCC Registration /
Designation Number:** 723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
SABCKS-WTW-P21123397	Original release.	2022/3/16

1 Certificate of Conformity

Product: Vivint Air Tower

Brand: Vivint, Inc.

Test Model: BB02

Sample Status: Engineering sample


Applicant: Vivint. Inc.

Test Date: 2022/2/1

FCC Rule Part: FCC Part 2 (Section 2.1091)

Standards: KDB 447498 D01 General RF Exposure Guidance v06

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by :  , **Date:** 2022/3/16
Claire Kuan / Specialist

Approved by :  , **Date:** 2022/3/16
Clark Lin / Technical Manager

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

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

2.2 MPE Calculation Formula

$$Pd = (Pout * G) / (4 * \pi * r^2)$$

where

Pd = power density in mW/cm²

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 27cm away from the body of the user.

So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

Antenna No.	RF Chain No.	Model	Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type
5G1	0	WHVA1	4.5	5.15~5.35 (Scanning, RX only)	PIFA	None
5G2	1	WHVA1	4.5	5.47~5.85 (Scanning, RX only)	PIFA	None
ANT 2 (2a)	2G	48XKAB18	3.5	2.4~2.4835	Dipole	ipex(MHF)
	5GL		3.1	5.15~5.35		
ANT 2 (2b)	5GH	48XKAB18	3.6	5.47~5.85	Dipole	ipex(MHF)
ANT 3 (3a)	2G	48XKAB19	2.7	2.4~2.4835	Dipole	ipex(MHF)
	5GL		3.7	5.15~5.35		
ANT 3 (3b)	BT	48XKAB19	2.9	2.4~2.4835 (BT)	Dipole	ipex(MHF)
	5GH		3.5	5.47~5.85		

Note: The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

2.5 Calculation Result

Bluetooth

Operation Mode	Evaluation Frequency (MHz)	Max. Average Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
BT-EDR	2402~2480	7.43	2.90	27	0.00158	1
BT-LE	2402~2480	8.017	2.90	27	0.00171	1

WLAN

CDD mode:

Operation Mode	Evaluation Frequency (MHz)	Max. Average Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN (2.4GHz)	2412~2462	537.07	3.50	27	0.13125	1
WLAN (U-NII-1)	5180~5240	691.186	3.70	27	0.17687	1
WLAN U-NII-2A	5260~5320	248.521	3.70	27	0.0636	1
WLAN U-NII-2C	5500~5720	236.067	3.60	27	0.05903	1
WLAN (U-NII-3)	5745~5825	779.328	3.60	27	0.19489	1

Beamforming mode:

Operation Mode	Evaluation Frequency (MHz)	Max. Average Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN (2.4GHz)	2412~2462	443.178	6.12	27	0.19799	1
WLAN (U-NII-1)	5180~5240	679.555	6.42	27	0.32530	1
WLAN U-NII-2A	5260~5320	221.341	6.42	27	0.10596	1
WLAN U-NII-2C	5500~5720	211.507	6.56	27	0.10457	1
WLAN (U-NII-3)	5745~5825	737.75	6.56	27	0.36473	1

NOTE:

- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- 2.4GHz: Directional gain = $10 \log[(10^{\text{Chain0}/20} + 10^{\text{Chain1}/20})^2 / 2] = 6.12 \text{ dBi}$
- 5GHz:
 - For U-NII-1, U-NII-2A: Directional gain = $10 \log[(10^{\text{Chain0}/20} + 10^{\text{Chain1}/20})^2 / 2] = 6.42 \text{ dBi}$
 - For U-NII-2C, U-NII-3: Directional gain = $10 \log[(10^{\text{Chain0}/20} + 10^{\text{Chain1}/20})^2 / 2] = 6.56 \text{ dBi}$

Conclusion:

The formula of calculated the MPE is:

$$\text{CPD1} / \text{LPD1} + \text{CPD2} / \text{LPD2} + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

Simultaneously transmission condition.

Condition	Technology		
1	WLAN 2.4GHz	WLAN 5GHz (Low Band)	WLAN 5GHz (High Band)
2	WLAN 5GHz (Low Band)	WLAN 5GHz (High Band)	Bluetooth

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

CDD mode:

Condition 1: $0.13125 / 1 + 0.17687 / 1 + 0.19489 / 1 = 0.50301$

Condition 2: $0.17687 / 1 + 0.19489 / 1 + 0.00171 / 1 = 0.37347$

Beamforming mode:

Condition 1: $0.19799 / 1 + 0.32530 / 1 + 0.36473 / 1 = 0.88802$

Condition 2: $0.32530 / 1 + 0.36473 / 1 + 0.00171 / 1 = 0.69174$

Therefore the maximum calculations of above situations are less than the "1" limit.

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