RF Exposure Report

Report No.:	SABCKS-WTW-P21050677
FCC ID:	2ASE7-BIOHB021G120
Test Model:	BIOHB021G121
Series Model:	BIOHB021G122
Received Date:	May 18, 2021
Test Date:	July 16 to Sep. 30, 2021
Issued Date:	Oct. 15, 2021
Applicant:	BioIntelliSense, Inc
Address:	570 El Camino Real #200, Redwood City, CA 94063 US
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-P21050677	Original release.	Oct. 15, 2021

1 Certificate of Conformity

Product:	Biohub2
Brand:	BioIntelliSense, Inc
Test Model:	BIOHB021G121
Series Model:	BIOHB021G122
Sample Status:	Engineering sample
Applicant:	BioIntelliSense, Inc
Test Date:	July 16 to Sep. 30, 2021
Standards:	FCC Part 2 (Section 2.1091) 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 : Phoenix Huang , **Date:** Oct. 15, 2021

Phoenix Huang / Specialist

Approved by : , **Date:** Oct. 15, 2021

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/cm^2

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 20 cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

WLAN & Bluetooth					
Antenna No.	RF Chain No.	Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type
1	0	4.67	2.4~2.4835	PCB	ipex(MHF)
		5.2	5.15~5.25		
		5.33	5.25~5.35		
		4.43	5.47~5.725		
		4.25	5.725~5.85		
2	1	3.62	2.4~2.4835	PCB	ipex(MHF)
		3.85	5.15~5.25		
		3.78	5.25~5.35		
		3.22	5.47~5.725		
		2.89	5.725~5.85		
Note: The Bluetooth technology will fix transmission on Chain (1).					

WWAN												
Antenna Type	Connector Type	Antenna gain (dBi)										
		GPRS 850	GPRS 1900	Cat-M 1 B2	Cat-M1 B4	Cat-M1 B5	Cat-M1 B12	Cat-M1 B13	Cat-M1 B25	Cat-M1 B26	Cat-M1 B66	Cat-M 1 B85
PIFA	None	-1.22	2.06	2.06	2.20	-1.22	-7.22	-4.03	2.06	0.10	2.20	-7.22

*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

The EUT inside has one WWAN module which FCC ID: 2ASE7-BIOHB02CTM10.

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
WLAN (2.4GHz)	2412~2462	289.767	7.17	20	0.30045	1
WLAN (U-NII-1)	5180~5240	244.08	7.56	20	0.27686	1
WLAN (U-NII-2A)	5260~5320	146.34	7.6	20	0.16753	1
WLAN (U-NII-2C)	5500~5720	178.447	6.86	20	0.17228	1
WLAN (U-NII-3)	5745~5825	480.345	6.61	20	0.43781	1
BT-EDR	2402~2480	14.555	3.62	20	0.00666	1
BT-LE	2402~2480	3.396	3.62	20	0.00155	1

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. 2.4GHz: The directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 7.17 dBi.
3. 5GHz:
   For U-NII-1 band: The directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 7.56 dBi.
   For U-NII-2A band: The directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 7.6 dBi.
   For U-NII-2C band: The directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 6.86 dBi.
   For U-NII-3 band: The directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 6.61 dBi.

For WWAN module (FCC ID: 2ASE7-BIOHB02CTM10) <Worst-case>

Frequency Band (MHz)	Max Avg. Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
824.7-848.3	2103.77844	-1.22	20	0.31603	0.54947

Conclusion:

The formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

WLAN 2.4GHz + WLAN 5GHz + Bluetooth = 0.30045 / 1 + 0.43781 / 1 + 0.00666 / 1 = 0.74492

Bluetooth + WWAN = 0.00666 / 1 + 0.31603 / 0.54947 = 0.58181

WLAN 2.4GHz + Bluetooth = 0.30045 / 1 + 0.00666 / 1 = 0.30711

WLAN 5GHz + Bluetooth = 0.43781 / 1 + 0.00666 / 1 = 0.44447

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

Appendix

For WWAN module (FCC ID: 2ASE7-BIOHB02CTM10)

Operation Mode	Evaluation Frequency (MHz)	Maximum Output Power		Antenna Gain (dBi)	Power Density (mW/cm^2)		Ratio
		mW	dBm	dBi	Value	Limit	
GSM850	824.2-848.8	2103.77844	33.23	-1.22	0.31603	0.54947*	0.74437
GSM1900	1850.2-1909.8	1035.142167	30.15	2.06	0.33093	1	0.33093
Cat-M1 (Band 2)	1850.7-1909.3	221.309471	23.45	2.06	0.07075	1	0.07075
Cat-M1 (Band 4)	1710.7-1754.3	228.0342072	23.58	2.20	0.07529	1	0.07529
Cat-M1 (Band 5)	824.7-848.3	224.3881924	23.51	-1.22	0.03371	0.5498*	0.08119
Cat-M1 (Band 12)	699.7-715.3	219.2804935	23.41	-7.22	0.00827	0.46647*	0.01773
Cat-M1 (Band 13)	779.5-784.5	199.986187	23.01	-4.03	0.01573	0.51967*	0.03027
Cat-M1 (Band 25)	1850.7-1914.3	227.5097431	23.57	2.06	0.07273	1	0.07273
Cat-M1 (Band 26) Part 22H	824.7-848.3	226.9864852	23.56	0.10	0.04621	0.5498*	0.08405
Cat-M1 (Band 26) Part 90S	814.7-823.3	216.2718524	23.35	0.10	0.04403	0.54313*	0.08107
Cat-M1 (Band 66)	1710.7-1779.3	233.3458062	23.68	2.20	0.07704	1	0.07704
Cat-M1 (Band 85)	700.5-713.5	207.0141349	23.16	-7.22	0.00781	0.467*	0.01672

Note: *Limit of Power Density = F/1500

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