

Report No.: GZCR220300025805

Page: 1 of 11 FCC ID:2AYLDI95

RF EXPOSURE EVALUATION REPORT

Application No.: GZCR2203000258AT

Applicant: IVATIV, Inc

Address of Applicant: 6141 Running Springs Rd, San Jose, CA 95135, USA

Manufacturer: IVATIV, Inc

Address of Manufacturer: 6141 Running Springs Rd, San Jose, CA 95135, USA

Factory: IVATIV, Inc

Address of Factory: 6141 Running Springs Rd, San Jose, CA 95135, USA

Equipment Under Test (EUT):

EUT Name: BALI series

Wi-Fi 11abgn/ac + BT 5.0 module

Model No.: 1950HCR0, 1951HCR0, 1950HC00, 1951HC00 and 1952HC00 ♣

Please refer to section 2 of this report which indicates which model was

actually tested and which were electrically identical.

Standard(s): FCC Rules 47 CFR §2.1093

KDB 447498 D04 interim General RF Exposure Guidance v01

Date of Receipt: 2022-01-22

Date of Evaluation: 2022-03-02 to 2022-05-09

Date of Issue: 2022-05-20

Evaluation Result: Pass*



Manager



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^{*} In the configuration evaluated, the EUT complied with the standards specified above.



Report No.: GZCR220300025805

Page: 2 of 11

	Revision Record							
Version	Chapter	Date	Modifier	Remark				
01		2022-05-20		Original				

Authorized for issue by			
	Jim Li	L	
	Jim Li/Project Engineer		
	Riday Liv		
	Ricky Liu/Reviewer		



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Report No.: GZCR220300025805

Page: 3 of 11

2 Evaluation Summary

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

Declaration of EUT Family Grouping:

Model No.: I950HCR0, I951HCR0, I950HC00, I951HC00 and I952HC00

Only the Model No: I952HCR0 was tested, since according to the declaration from the applicant, the electrical circuit design, PCB layout, components that affect RF and internal wiring and functions are identical for all the above models. only different on:

I950HCR0: Supports SDIO interface instead of USB I951HCR0: Supports PCI interface instead of USB

I950HC00: Supports SDIO interface instead of USB and doesn't support BT I951HC00: Supports PCI interface instead of USB and doesn't support BT

1952HC00: Supports USB interface and doesn't support BT

Clear directions of how to use EVIA without BT is given in documentation.





Rev 1.0

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Report No.: GZCR220300025805

Page: 4 of 11

3 Contents

EMC-TRF-03

		r	Page						
1	Cov	er Page	1						
2	Eval	luation Summary	3						
3	Con	tents	4						
4	Gen	eral Information	5						
	4.1	General Description of E.U.T.	5						
	4.2	Details of E.U.T.							
	4.3	Separation Distance	6						
	4.4	Evaluating Location	7						
	4.5	Facility							
	4.6	Deviation from Standards	7						
	4.7	Abnormalities from Standard Conditions							
5	Tech	hnical Requirements Specification							
•									
	5.1	Blanket 1 mW Blanket Exemption							
	5.2	MPE-based Exemption							
	5.3	SAR-based Exemption	9						
6	Mea	surement and Calculation	11						
	6.1	Maximum transmit power	11						
	6.2	RF Exposure Calculation	11						
		·							
7	EUT	Constructional Details (EUT Photos)	11						



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Report No.: GZCR220300025805

Page: 5 of 11

General Information

4.1 General Description of	ſΕ,	.U.T	٦.
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	☐ Portable device
Product Type:	☐ Mobile device
	⊠ Fixed device

4.2 Details of E.U.T.

Power supply: DC 3.3V. Bluetooth Version: V5.0

For BT:

Operation Frequency: 2402MHz to 2480MHz

Spectrum Spread

Frequency Hopping Spread Spectrum(FHSS) Technology:

Modulation Type: GFSK, p/4DQPSK, 8DPSK

Number of Channels: 79 **Channel Spacing:** 1MHz

Antenna Type: Screw mount Dipole Antenna

Antenna Gain: 2.37dBi

For BLE:

2402MHz to 2480MHz Operation Frequency:

Modulation Type: **GFSK** Number of Channels: 40 Date Rate: 1Mbps

2MHz Channel Spacing: Data rate: 1Mpbs

Screw mount Dipole Antenna Antenna Type:

Antenna Gain: 2.37dBi

For 2.4G:

802.11b/g/n(HT20): 2412MHz to 2462MHz Operation Frequency:

802.11n(HT40): 2422MHz to 2452MHz

802.11b: DSSS (CCK, DQPSK, DBPSK)

802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)

802.11b/g/n(HT20):11 Number of Channels:

802.11n(HT40):7

Channel Spacing: 5MHz

Modulation Type:

Antenna Type: Screw mount Dipole Antenna

ANT1: 2.37dBi; ANT2: 2.37dBi Antenna Gain: Note: SISO for Ant1 and Ant2

For 5G:

U-NII-1: 5180-5240MHz; Operation Frequency (20MHz): U-NII-2A: 5260-5320MHz;



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Report No.: GZCR220300025805

Page: 6 of 11

U-NII-2C: 5500-5700MHz:

U-NII-3: 5745-5825MHz

U-NII-1: 5190-5230MHz;

Operation Frequency

Rev 1.0

(40MHz):

U-NII-2A: 5270-5310MHz: U-NII-2C: 5510-5670MHz;

U-NII-3: 5755-5795MHz

U-NII-1: 5210MHz;

Operation Frequency

(80MHz):

U-NII-2A: 5290MHz;

U-NII-2C: 5530-5610MHz;

U-NII-3: 5775MHz

802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK);

Modulation Type: 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM);

802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)

802.11a/n(HT20)/ac(HT20): 20MHz;

Channel Spacing: 802.11n(HT40)/ac(HT40): 40MHz;

802.11ac(HT80): 80MHz

DFS Function: Slave without Radar detection

TPC Function: Without TPC function

Antenna Type: Screw mount Dipole Antenna

ANT1: 2.93dBi; ANT2: 2.93dBi Antenna Gain: Note: SISO for Ant1 and Ant2

4.3 Separation Distance

Minimum test separation distance:

20cm

Remark: This minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander.



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Report No.: GZCR220300025805

Page: 7 of 11

4.4 Evaluating Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory, 198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District,

Guangzhou, China 510663

Tel: +86 20 82155555

Fax: +86 20 82075059

No tests were sub-contracted.

4.5 Facility

The facility is recognized, certified, or accredited by the following organizations:

• NVLAP (Lab Code: 200611-0)

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

ACMA

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

FCC Recognized Accredited Test Firm(Registration No.: 486818)

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

• ISED (Registration No.: 4620B, CAB identifier: CN0052)

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

• CBTL (Lab Code: TL129)

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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Report No.: GZCR220300025805

Page: 8 of 11

5 Technical Requirements Specification

Test exemptions apply for devices used in general population/uncontrolled exposure environments, according to the SAR-based, or MPE-based exemption thresholds.

5.1 Blanket 1 mW Blanket Exemption

The 1 mW Blanket Exemption of §1.1307(b)(3)(i)(A) applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power of no more than 1 mW, regardless of separation distance.

The 1-mW blanket exemption applies at separation distances less than 0.5 cm, including where there is no separation. This exemption shall not be used in conjunction with other exemption criteria other than those for multiple RF sources in paragraph §1.1307(b)(3)(ii)(A).

The 1-mW exemption is independent of service type and covers the full range of 100 kHz to 100 GHz, but it shall not be used in conjunction with other exemption criteria or in devices with higher-power transmitters operating in the same time-averaging period. Exposure from such higher-power transmitters would invalidate the underlying assumption that exposure from the lower-power transmitter is the only contributor to SAR in the relevant volume of tissue.

5.2 MPE-based Exemption

General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz.

Table B.1—Thresholds For Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency			Minimum Distance			Threshold ERP
f∟ MHz		f _H MHz	λ∟ / 2π		λн / 2π	W
0.3	_	1.34	159 m	_	35.6 m	1,920 R ²
1.34	_	30	35.6 m	_	1.6 m	3,450 R ² /f ²
30	_	300	1.6 m	_	159 mm	3.83 R ²
300	_	1,500	159 mm	_	31.8 mm	0.0128 R ² f
1,500	_	100,000	31.8 mm	_	0.5 mm	19.2R ²

Subscripts L and H are low and high; λ is wavelength.

From §1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.

The table applies to any RF source (i.e. single fixed, mobile, and portable transmitters) and specifies power and distance criteria for each of the five frequency ranges used for the MPE limits. These criteria apply at separation distances from any part of the radiating structure of at least $\lambda/2\pi$. The thresholds are



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Report No.: GZCR220300025805

Page: 9 of 11

based on the general population MPE limits with a single perfect reflection, outside of the reactive near-field, and in the main beam of the radiator.

For mobile devices that are not exempt per Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in §1.1310 is necessary if the ERP of the device is greater than *ERP*_{20cm} in Formula (B.1) [repeated from §2.1091(c)(1); also in §1.1307(b)(1)(i)(B)].

$$P_{\text{th}} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \le f < 1.5 \text{ GHz} \\ \\ 3060 & 1.5 \text{ GHz} \le f \le 6 \text{ GHz} \end{cases}$$
(B. 1)

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

Limit calculation						
Frequency range	Frequency(MHz)	R(λ/2π)(m)	Threshold ERP(W)			
300~1500MHz	915	0.0522	0.032			
1500~100000MHz	2480	0.0193	0.007			

5.3 SAR-based Exemption

SAR-based thresholds are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum time-averaged power or maximum time-averaged ERP, whichever is greater.

If the ERP of a device is not easily determined, such as for a portable device with a small form factor, the applicant may use the available maximum time-averaged power exclusively if the device antenna or radiating structure does not exceed an electrical length of $\lambda/4$.

As for devices with antennas of length greater than $\lambda/4$ where the gain is not well defined, but always less than that of a half-wave dipole (length $\lambda/2$), the available maximum time-averaged power generated by the device may be used in place of the maximum time-averaged ERP, where that value is not known.

The separation distance is the smallest distance from any part of the antenna or radiating structure for all persons, during operation at the applicable ERP. In the case of mobile or portable devices, the separation distance is from the outer housing of the device where it is closest to the antenna.



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Report No.: GZCR220300025805

Page: 10 of 11

The SAR-based exemption formula of $\S1.1307(b)(3)(i)(B)$, repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula (B.2).

$$P_{\text{th}} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \le 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \le 40 \text{ cm} \end{cases}$$
(B. 2)

where

EMC-TRF-03

$$x = -\log_{10}\left(\frac{60}{ERP_{20}\operatorname{cm}\sqrt{f}}\right)$$

and f is in GHz, d is the separation distance (cm), and ERP_{20cm} is per Formula (B.1).

Example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

								,		
Frequency					Distanc	ce(mm)				
(MHz)	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

Limit calculation						
Frequency range(GHz) Frequency(GHz) X Distance(cm) Pth (mW)						
0.3~1.5	0.915	1.474	0.5	8.133		
1.5~6	2.48	1.905	0.5	2.717		



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Report No.: GZCR220300025805

Page: 11 of 11

6 Measurement and Calculation

6.1 Maximum transmit power

The Power Data is based on the RF Test Report GZCR220300025801& GZCR220300025802 & GZCR220300025803 & GZCR220300025804.

Mode	Test Channel	Conducted Power[dBm]	Conducted Power[mW]	Antenna Gain [dBi]	EIRP [dBm]	EIRP [mW]
ВТ	2441	6.87	4.86	2.37	9.24	8.39
BLE	2440	6.68	4.66	2.37	9.05	8.04
2.4G	2462	19.14	82.04	2.37	21.51	141.58
5G	5180	16.62	45.92	2.93	19.55	90.16

6.2 RF Exposure Calculation

The Max conducted power is 82.04mW, the Max EIRP is 141.58mW.

Remark: we used the maximum power between the conducted power and ERP/EIRP to perform RF exposure exemption evaluation.

	Evaluation method	Exempt Limit(mW)	Verdict
	Blanket 1 mW Blanket Exemption	1mW	N/A
	MPE-based Exemption(ERP)	7mW(ERP)	N/A
\boxtimes	SAR-based Exemption($P_{ ext{th}}$)	3060mW	Yes

So, the device is to qualify for SAR test exemption, the exemption report is in lieu of the SAR report.

7 EUT Constructional Details (EUT Photos)

Refer to appendix - external and internal photos for GZCR2203000258AT.

- End of the Report -



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