

RF Exposure Exemption

Applicant : HIVOX BIOTEK INC.
Product Type : RF MODULE
Trade Name : HIVOX BIOTEK INC.
Model Number : RFM-001
Applicable Standard : 47 CFR § 2.1091
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Taiwan Accreditation Foundation accreditation number: 1330
Test Firm MRA designation number: TW0010

Note:

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- 3.The relevant information is provided by customers in this test report. According to the correctness, appropriateness or completeness of the information provided by the customer, if there is any doubt or error in the information which affects the validity of the test results, the laboratory does not take the responsibility.

Revision History

Rev.	Issued Date	Revisions	Revised By
00	Mar. 30, 2022	Initial Issue	Vivien Li

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1. General Information

1.1 Reference Applicable Standard

Standard	Description	Version
47 CFR Part §2.1091	Radiofrequency radiation exposure evaluation: mobile devices.	-
47 CFR Part §1.1310	Radiofrequency radiation exposure limits.	-
IEEE C95.1	IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz	1992
KDB 447498 D04	RF exposure procedures and equipment authorization policies for mobile and portable devices	v01

2. Description of Equipment under Test (EUT)

Applicant	HIVOX BIOTEK INC. 5F., No.123, Xingde Rd., Sanchong Dist., New Taipei City 241, Taiwan, R.O.C.			
Product Type	RF MODULE			
Trade Name	HIVOX BIOTEK INC.			
Model Number	RFM-001			
FCC ID	2A32IRFM-001			
Frequency Range	SRD: 2400-2483.5 MHz			
Antenna Information	Model	Type	Max. Gain (dBi)	
	HIVOX BIOTEK INC.	Planar inverted-F antenna	2400 – 2483.5	1.5

The above equipment was tested by A Test Lab Techno Corp. For compliance with the requirements set forth in 47 CFR § 2.1091 / 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

3. RF Exposure Limit

For devices that operate at larger distances from persons, where there are minimal RF coupling interactions between a device and the user or nearby persons, RF exposure compliance using maximum permissible exposure (MPE) limits is applied. The limits for MPE is listed as below:

Limits for General Population / Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (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 / 1,500	30
1,500-100,000	-	-	1.0	30
Limits for Occupational / Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1,842 / 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

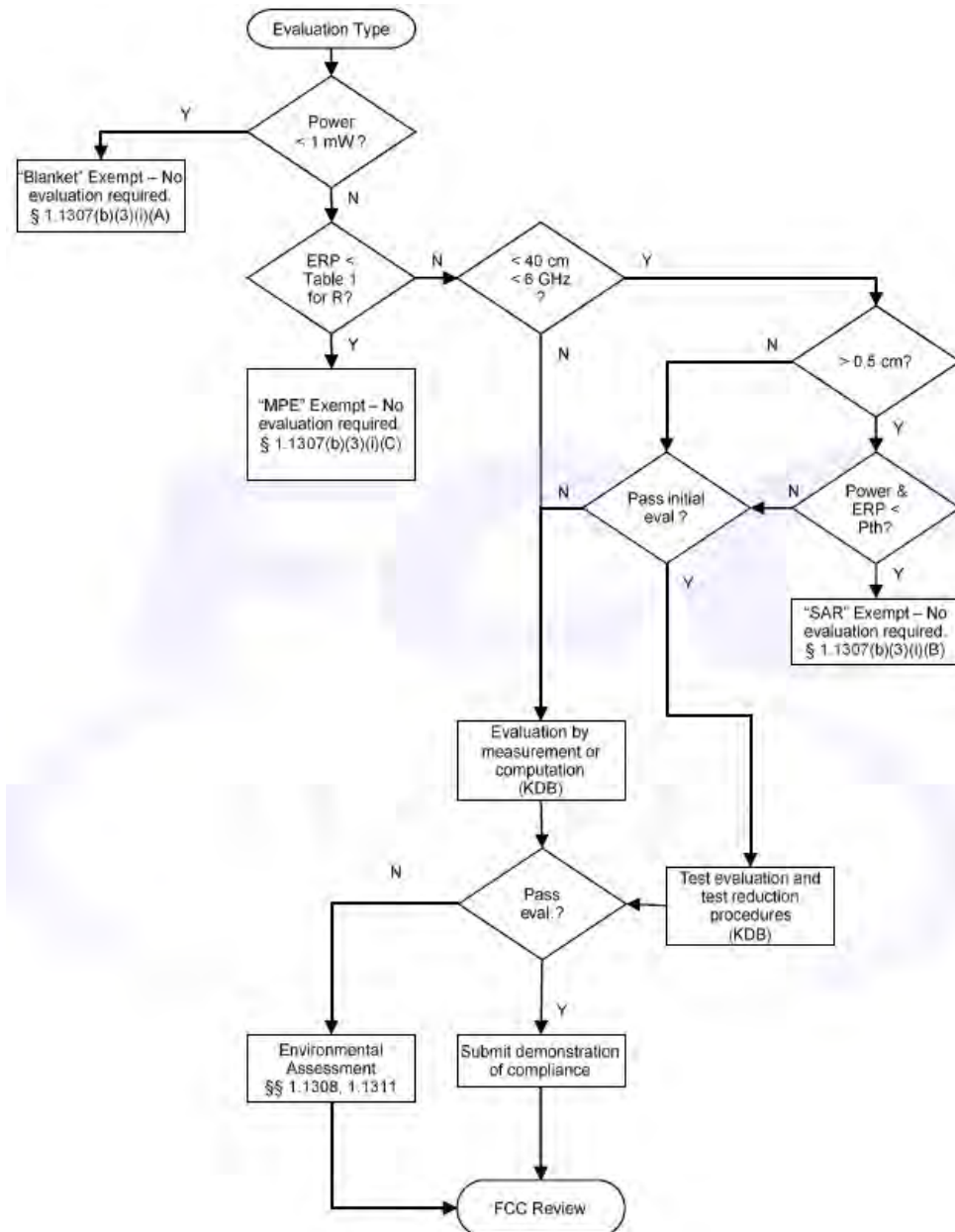
f = frequency in MHz. * = Plane-wave equivalent power density.

4. Exposure Assessment

4.1 MPE Exemption Evaluation

Exemption evaluation was performed according to the appendix A and B in KDB447498 D04.

The General Sequence for Determination of Procedure demonstrated in Figure A.1 of KDB447498 D04 was applied.



4.2 Human Exposure Assessment

Due to the design and installation of this product, it is not possible to conduct SAR evaluation. This is because client either manufactures or supplies the antenna(s) that will be used in the installation of this product.

Therefore, this product will be evaluated as a mobile device per 47 CFR § 1.1310 titled "Radiofrequency radiation exposure limits", generally referred to as MPE limits.

In 47 CFR § 2.1091, paragraph (b) defines a mobile device as "a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons." This product is intended to be installed into a vehicle such that the unit is physically secured at one location. In the installation guide supplied with the product,

Client has made the following statement: "IMPORTANT: To meet the FCC's RF Exposure Guidelines, the antenna should be installed so there is at least 20 cm of separation between the body of the user and nearby persons and the antenna". Based on the installation of the transceiver and the antenna, the transmitters radiating structure is more than 20 cm from the user. Thus, this product is a "mobile device" as defined in section § 2.1091 paragraph (b).

Exposure Evaluation

$$S_{eirp} = \frac{EIRP}{4\pi d^2} = \frac{PG}{4\pi d^2} (W / m^2)$$

Where

S: is the input power (W);

G: is the antenna gain;

d : is the distance between antennas and evaluation point (m).

5. EIRP Evaluation

3M	Frequency	Reading	Correct Factor	Near-field Result	Derived value	Limit	Margin	EIRP
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	(dB)
H	2430.2400	96.06	-7.15	88.91	48.91	94.00	-45.09	4.14
V	2430.2100	85.27	-7.15	78.12	38.12	94.00	-55.88	-6.65

Field strength is then converted to EIRP as follows:

(i) $EIRP = ((E \cdot d)^2) / 30$

where:

E is the field strength in V/m;

d is the measurement distance in meters;

EIRP is the equivalent isotropically radiated power in watts.

(ii) Working in dB units, the above equation is equivalent to: $EIRP[dBm] = E[dBuV/m] + 20$

$\log(d[meters]) - 104.77$

(iii) Or, if d is 10 meters: $EIRP[dBm] = E[dBuV/m] - 84.77$

6. Test Result

Band	Freq. (Min)	Freq. (Max)	Distance (cm)	EIRP	ERP (W)	MPE Exemption <§1.1307(b)(3)(i)(C)> Minimum Distance (m)	MPE Exemption <§1.1307(b)(3)(i)(C)> Threshold ERP (W)	MPE Exemption <§1.1307(b)(3)(i)(C)> considerations
SRD	2400	2483.5	20.00	4.14	0.002	0.020	0.008	Qualified

Note:

1. Mobile or fixed location transmitters, minimum separation distance is 0.2 m, even if calculations indicate MPE distance is less.
2. This device is qualified for the exemption of §1.1307(b)(3)(i)(C).

7. Conclusion

The result shows that this device is qualified for MPE-Based Exemption in KDB447498. Therefore, MPE evaluation is not required.

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