

1. RF Exposure Requirements

1.1 General Information

Client Information

Applicant:	Vetech Enterprise Inc. dba BZBGear
Address of applicant:	830 National Dr Ste 140, Sacramento CA 95834 United States
Manufacturer:	Vetech Enterprise Inc. dba BZBGear
Address of manufacturer:	830 National Dr Ste 140, Sacramento CA 95834 United States

General Description of EUT:

Product Name:	4K HDMI Wireless Extender
Trade Name:	BZBGear
Model No.:	BG-AIR4KAST
Adding Model(s):	/
Rated Voltage:	DC5V
Battery Capacity:	/
	NBS12E050200VU
Power Adapter:	Input:AC100-240 50/60Hz 0.3A Output:DC5V2.0A
FCC ID:	2BAR2-BG AIR4KASTTX
Equipment Type:	Mobile device

Technical Characteristics of EUT:

Support Standards:	802.11a, 802.11n-HT20 , 802.11n-HT40, 802.11ac-VHT20 , 802.11ac-VHT40, 802.11ac-VHT80
Frequency Range:	5180-5240MHz
Max. RF Output Power:	Antenna 1:15.80dBm (Conducted) Antenna 2:15.70dBm (Conducted)
Type of Modulation:	QPSK, 16QAM, 64QAM,256QAM
Type of Antenna:	External Antenna
Antenna Gain:	5.93dBi

1.2 RF Exposure Exemption

According to §1.1307(b)(3) and KDB 447498 D04 Interim General RF Exposure Guidance v01, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

Option A: FCC Rule Part 1.1307 (b)(3)(i)(A): The available maximum time-averaged power is no more than 1mW, regardless of separation distance.

Option B: FCC Rule Part 1.1307 (b)(3)(i)(B): The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. P_{th} is given by:

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

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

Option C: FCC Rule Part 1.1307 (b)(3)(i)(C): The minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters.

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$
1.34-30	$3,450 R^2/f^2$
30-300	$3.83 R^2$
300-1,500	$0.0128 R^2 f$
1,500-100,000	$19.2 R^2$

For Multiple RF sources: FCC Rule Part 1.1307(b)(3)(ii):

- (A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required).
- (B) In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

1.3 Calculated Result

Radio Access Technology	Prediction Frequency	Output Power	Antenna Gain	Duty Cycle	Tune-Up Time-Averaged Power	ERP
	(MHz)	(dBm)	(dBi)	(%)	(dBm)	(dBm)
Wi-Fi(Ant 1)	5180	15.08	5.93	100	16.00	19.78
Wi-Fi(Ant 2)	5180	15.70	5.93	100	16.00	19.78

Frequency (MHz)	Option	Min. Distance	Max. Power		Exposure Limit	Ratio	Result
		(cm)	(dBm)	(mW)	(mW)		Pass/Fail
5180	C	20.00	19.78	95.06	768.00	0.12	Pass
5180	C	20.00	19.78	95.06	768.00	0.12	Pass

Note: 1. Time-Averaged Power=Output Power * Duty Cycle; ERP= Time-Averaged Power+ Antenna gain-2.15dB

2. Option A, B and C refers as clause 1.2.

3. For option B, Max (time-averaged power, effective radiated power (ERP)) converts to Max. Power. For option C, ERP converts to Max. Power;

4. For option B, P_{th} (mW) converts to Exposure Limit (mW); For option C, ERP (W) converts to Exposure Limit (mW).

5. Ratio= Tune-Up ERP (mW)/ Exposure Limit (mW)

Mode for Simultaneous Multi-band Transmission:

Radio Access Technology	Ratio 1	Ratio 2	Simultaneous Ratio	Limit	Result
					Pass/Fail
Ant 1 + Ant 2	0.12	0.12	0.24	1	Pass

Result: Pass