FCC RF EXPOSURE REPORT

FCC ID: G95-FGA2235

Product description	:	Dual Band Wi-Fi 6 GPON Gateway
Model No.	:	FGA2235TCH2
Series Models.		FGA2235XYZn (XYZ stands for customer abbreviation, e.g. VTR; and n in digit 0 ~ 9 means revision roll-up for same customer and n is optional.)
Spec. Difference		All models are identical to each other except for model name.
Trade Mark	:	vantiva Pushing the edge
Product No.	:	POC230727009-S002
Applicant	:	Vantiva USA LLC 4855 Peachtree Industrial Blvd. Suite 200, Norcross, Georgia 30092
Receipt date	:	2023.07.28
Test date	:	2023.08.07~2023.08.23
Issued Date	:	2023.10.12
Standard(s)	:	FCC Guidelines for Human Exposure IEEE C95.1 FCC Title 47 Part 2.1091 KDB 447498 D01 General RF Exposure Guidance v06

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History of this test report

Original Report Issue Date: 2023.10.12

● No additional attachment

○ Additional attachments were issued following record

Attachment No.	Issue Date	Description

1. TEST LOCATION

Company:	Shenzhen Haiyun Standard Technical CO., Ltd.
Address:	No. 110-113, 115, 116, Block B, Jinyuan Business Building, Bao'an District, Shenzhen, China
CNAS Registration Number:	CNAS L18252
CAB identifier	CN0145
A2LA Certificate Number	6823.01
Telephone:	0755-26024411

2. MPE CALCULATION METHOD

Calculation Method of RF Safety Distance:

$$S = \frac{PG}{4\pi r^2} = \frac{EIRP}{4\pi r^2}$$

where:
S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Table for Filed Antenna

For 2.4GWiFi

Ant.	Antenna Type	Connector	Gain (dBi)
1	Internal	N/A	3.94
2	Internal	N/A	3.85
3	Internal	N/A	2.42

Transmit Operating Mode		Directional Gain (dBi)	
		Power spectral density	Power
802.11b	3TX With CDD	6.45	3.94
802.11g	3TX With CDD	6.45	3.94
802.11n(HT20MHz)	3TX With Beamforming	6.45	6.45
802.11n(HT40MHz)	3TX With Beamforming	6.45	6.45
802.11ax(HE20MHz)	3TX With Beamforming	6.45	6.45
802.11ax(HE40MHz)	3TX With Beamforming	6.45	6.45
Note: Directional gain provided by the manufacturer.			

For 5GWiFi

/	Frequency (MHz)	5150~5350	5470~5725	5725~5850
Antenna gain(dBi)	ANT1	5.1	4.4	3.3
	ANT2	4.5	4.6	4.1
	ANT3	3.9	3.3	3.6
	ANT4	4.8	4.6	4.7

Transmit Operating Mode	Frequency（MHz）	Directional Gain (dBi)	
		Power spectral density	Power
4TX With CDD	5150~5350	7.0	5.1
	5470~5725	6.6	4.6
	5725~5850	6.3	4.7
4TX With Beamforming	5150~5350	7.0	7.0
	5470~5725	6.6	6.6
	5725~5850	6.3	6.3
Note: Directional gain provided by the manufacturer.			

☒With Beamforming Mode

If all antennas have the same gain, G_{ANT}

☐ Directional gain = G_{ANT} + 10 log(N_{ANT}/N_{SS}) dBi, where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi.

If antenna gains are not equal and each transmit antenna is driven by only one spatial stream, directional gain may be calculated by either of the following two formulas.

☐ Directional gain = G_{ANT} MAX + 10 log(N_{ANT}/N_{SS}) dBi, where N_{SS} = the number of independent spatial streams of data and G_{ANT} MAX is.the gain of the antenna having the highest gain (in dBi).

☒ Or

$$DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$$

where

Each antenna is driven by no more than one spatial stream;

N_{SS} = the number of independent spatial streams of data;

N_{ANT} = the total number of antennas

$g_{j,k} = 10^{G_k/20}$ if the kth antenna is being fed by spatial stream j, or zero if it is not;

G_k is the gain in dBi of the kth antenna.

$$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;
N_{SS} = the number of independent spatial streams of data;
N_{ANT} = the total number of antennas
$g_{j,k} = 10^{G_k / 20}$ if the *k*th antenna is being fed by spatial stream *j*, or zero if it is not;
G_k is the gain in dBi of the kth antenna.

EUT with the lowest possible NSS =1

☒With Cyclic Delay Diversity (CDD)
If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.
For power spectral density (PSD) measurements on all devices,
Array Gain = 10 log(N_{ANT}/N_{SS}) dB.
☒For power measurements on IEEE 802.11 devices,
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.

☐ If antenna gains are not equal, the user may use either of the following methods to calculate directional gain, provided that each transmit antenna is driven by only one spatial stream:
☐ Directional gain may be calculated by using the formulas applicable to equal gain antennas with GANT set equal to the gain of the antenna having the highest gain;

☒ or,

$$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;
N_{SS} = the number of independent spatial streams of data;
N_{ANT} = the total number of antennas
$g_{j,k} = 10^{G_k / 20}$ if the *k*th antenna is being fed by spatial stream *j*, or zero if it is not;
G_k is the gain in dBi of the kth antenna.

EUT with the lowest possible NSS =1

3. EVALUATION RESULTS

Worst case as below:
For 2.4GHz: IEEE 802.11ax(HE20)_2437MHz

Ant No.	Directional Gain (dBi)	Directional Gain (numeric)	Max. Output Power (dBm)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
1	6.45	4.42	25.33	0.1713	1	Complies
2	6.45	4.42	24.07	0.1282	1	Complies
3	6.45	4.42	24.77	0.1506	1	Complies

For 5GHz: IEEE 802.11ax(HE20)_5745MHz

Ant No.	Directional Gain (dBi)	Directional Gain (numeric)	Max. Output Power (dBm)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
1	6.30	4.27	23.88	0.1227	1	Complies
2	6.30	4.27	23.47	0.1116	1	Complies
3	6.30	4.27	23.70	0.1177	1	Complies
4	6.30	4.27	23.59	0.1148	1	Complies

Note: 1. The calculated distance is 26 cm.
2. The 2.4G Wifi function can transmit at the same time with the 5G Wifi function.

Simultaneous transmitting consideration

The ratio= $MPE_{2.4G\ Wifi\ Ant1}$/limit + $MPE_{2.4G\ Wifi\ Ant2}$/limit + $MPE_{2.4G\ Wifi\ Ant3}$/limit + $MPE_{5G\ Wifi\ Ant1}$/limit+ $MPE_{5G\ Wifi\ Ant2}$/limit+ $MPE_{5G\ Wifi\ Ant3}$/limit+ $MPE_{5G\ Wifi\ Ant4}$/limit=0.9169<1.0

Result: Complies

（END OF REPORT）