RF EXPOSURE EVALUATION

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency(RF) Radiation as specified in §1.1307(b)

FCC ID: **2AFDGRP-WD009**

EUT Specification

EUT	**FileHub**
Frequency band (Operating)	☒WLAN: 2.412GHz ~ 2.462GHz ☒WLAN: 5.18GHz ~ 5.24GHz ☒WLAN: 5.745GHz ~ 5.825GHz ☐Others: 2.402GHz~2.480GHz
Device category	☐Portable (<20cm separation) ☒Mobile (>20cm separation) ☐Others ___
Exposure classification	☐Occupational/Controlled exposure (S = 5mW/cm2) ☒General Population/Uncontrolled exposure (S=1mW/cm2)
Antenna diversity	☐Single antenna ☒Multiple antennas ☐Tx diversity ☐Rx diversity ☐Tx/Rx diversity
Max. output power	2.4GHz WiFi: 18.94dBm (0.0783W) 5.1GHz WIFI: 17.18dBm (0.0522W) 5.8GHz WIFI: 16.64dBm (0.0461W)
Antenna gain (Max)	2.4GHz WiFi: 2 dBi, 5.1GHz WiFi: 2 dBi 5.8GHz WIFI: 2 dBi
Evaluation applied	☒MPE Evaluation ☐SAR Evaluation

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**
(A) Limits for Occupational/Control Exposures				
300-1500	**--**	**--**	**F/300**	**6**
1500-100000	**--**	**--**	**5**	**6**
(B) Limits for General Population/Uncontrol Exposures				
300-1500	**--**	**--**	**F/1500**	**6**
1500-100000	**--**	**--**	**1**	**30**

Friis transmission formula: Pd=(Pout*G)\(4*pi*R2)

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
Pd the limit of MPE, 1mW/cm2. If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

Measurement Result

2.4GHz

ANT 1:

Operating Mode	Channel Frequency	Measured Power	Tune up tolerance	Max. Tune up Power	Antenna Gain	Power density at 20cm	Power density Limits (mW/cm^2)
	(MHz)	(dBm)	(dBm)	(dBm)	(dBi)	(mW/cm^2)	
802.11b	2412	12.25	12.25±1	13.25	2	0.0067	1
	2437	12.29	12.29±1	13.29	2	0.0067	1
	2462	13.68	13.68±1	14.68	2	0.0093	1
802.11g	2412	14.78	14.78±1	15.78	2	0.0119	1
	2437	14.62	14.62±1	15.62	2	0.0115	1
	2462	15.90	15.90±1	16.90	2	0.0154	1
802.11n (HT20)	2412	14.78	14.78±1	15.78	2	0.0119	1
	2437	14.49	14.49±1	15.49	2	0.0112	1
	2462	16.00	16.00±1	17.00	2	0.0158	1
802.11n (HT40)	2422	13.74	13.74±1	14.74	2	0.0094	1
	2437	13.93	13.93±1	14.93	2	0.0098	1
	2452	14.98	14.98±1	15.98	2	0.0125	1

ANT 2:

Operating Mode	Channel Frequency (MHz)	Measured Power (dBm)	Tune up tolerance (dBm)	Max. Tune up Power (dBm)	Antenna Gain (dBi)	Power density at 20cm (mW/cm^2)	Power density Limits (mW/cm^2)
802.11b	2412	12.21	12.21±1	13.21	2	0.0066	1
	2437	12.23	12.23±1	13.23	2	0.0066	1
	2462	13.63	13.63±1	14.63	2	0.0092	1
802.11g	2412	14.98	14.98±1	15.98	2	0.0125	1
	2437	14.69	14.69±1	15.69	2	0.0117	1
	2462	15.91	15.91±1	16.91	2	0.0155	1
802.11n (HT20)	2412	14.72	14.72±1	15.72	2	0.0118	1
	2437	14.74	14.74±1	15.74	2	0.0118	1
	2462	15.85	15.85±1	16.85	2	0.0153	1
802.11n (HT40)	2422	14.57	14.57±1	15.57	2	0.0114	1
	2437	13.90	13.90±1	14.90	2	0.0097	1
	2452	14.72	14.72±1	15.72	2	0.0118	1

ANT1+ANT2:

Operating Mode	Channel Frequency (MHz)	ANT 1 Power density at 20cm (mW/cm^2)	ANT 2 Power density at 20cm (mW/cm^2)	Power density at 20cm (mW/cm^2)	Power density Limits (mW/cm^2)
802.11n (HT20)	2412	0.0119	0.0118	0.0237	1
	2437	0.0112	0.0118	0.0230	1
	2462	0.0158	0.0153	0.0311	1
802.11n (HT40)	2422	0.0094	0.0114	0.0208	1
	2437	0.0098	0.0097	0.0195	1
	2452	0.0125	0.0118	0.0243	1

***Note: The two antennas (ANT1 & ANT2) are exactly the same, so the antenna gain used for calculation is 2dBi

5.1GHz WiFi:

Operating Mode	Channel Frequency	Measured Power	Tune up tolerance	Max. Tune up Power	Antenna Gain	Power density at 20cm	Power density Limits
	(MHz)	(dBm)	(dBm)	(dBm)	(dBi)	(mW/ cm2)	(mW/cm2)
802.11a	5180	16.98	16.98±1	17.98	2	0.0198	1
	5200	17.04	17.04±1	18.04	2	0.0201	1
	5240	16.70	16.70±1	17.70	2	0.0186	1
802.11n20	5180	17.14	17.14±1	18.14	2	0.0205	1
	5200	16.82	16.82±1	17.82	2	0.0191	1
	5240	16.67	16.67±1	17.67	2	0.0184	1
802.11n40	5190	**17.18**	**17.18**±1	18.18	2	0.0207	1
	5230	16.36	16.36±1	17.36	2	0.0172	1
802.11ac20	5180	17.03	17.03±1	18.03	2	0.0200	1
	5200	16.87	16.87±1	17.87	2	0.0193	1
	5240	16.47	16.47±1	17.47	2	0.0176	1
802.11ac40	5190	16.69	16.69±1	17.69	2	0.0185	1
	5230	16.71	16.71±1	17.71	2	0.0186	1
802.11ac80	5210	16.58	16.58±1	17.58	2	0.0181	1

5.8GHz WiFi:

Operating Mode	Channel Frequency (MHz)	Measured Power (dBm)	Tune up tolerance (dBm)	Max. Tune up Power (dBm)	Antenna Gain (dBi)	Power density at 20cm (mW/ cm2)	Power density Limits (mW/cm2)
802.11a	5745	16.02	16.02±1	17.02	2	0.0159	1
	5785	15.59	15.59±1	16.59	2	0.0144	1
	5825	15.16	15.16±1	16.16	2	0.0130	1
802.11n20	5745	14.94	14.94±1	15.94	2	0.0124	1
	5785	15.17	15.17±1	16.17	2	0.0131	1
	5825	15.40	15.40±1	16.40	2	0.0138	1
802.11n40	5745	14.95	14.95±1	15.95	2	0.0124	1
	5785	14.80	14.80±1	15.80	2	0.0120	1
802.11ac20	5825	15.35	15.35±1	16.35	2	0.0136	1
	5755	**16.64**	**16.64**±1	17.64	2	0.0183	1
	5795	15.36	15.36±1	16.36	2	0.0136	1
802.11ac40	5755	16.00	16.00±1	17.00	2	0.0158	1
	5795	16.21	16.21±1	17.21	2	0.0166	1
802.11ac80	5775	15.92	15.92±1	16.92	2	0.0155	1

Max transmitted simultaneously:

1)2.4G ANT1(max）+5G(max)=0.0158+0.0207=0.1787<1

2) 2.4G ANT2(max）+5G(max)= 0.0155+0.0207=0.1757<1

3) 2.4G ANT1+ANT2 (max）+5G(max)= 0.0311+0.0207=0.3317<1