

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: 2AW9A-TS-100

EUT Specification

EUT	Multi-format 4K Switcher cum Scaler with built-in Wireless Presentation System
Frequency band (Operating)	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input checked="" type="checkbox"/> WLAN: 5.18GHz ~ 5.24GHz <input checked="" type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz <input type="checkbox"/> Others: 2.402GHz~2.480GHz
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others ____
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm ²) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna diversity	<input type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
Max. output power	2.4G WiFi: 20.54 dBm (0.0333W) 5.1G WiFi: 16.35 dBm (0.0372W) 5.8G WiFi: 17.86 dBm (0.0442W)
Antenna gain (Max)	3 dBi
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> 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: $P_d = \frac{P_{out} * G}{4 * \pi * R^2}$

Where

P_d = Power density in mW/cm²

P_{out} = output power to antenna in Mw

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d 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

2.4G WiFi ANT A:

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	17.34	17.34±1	18.34	3	0.0271	1
	2437	17.57	17.57±1	18.57	3	0.0286	1
	2462	17.63	17.63±1	18.63	3	0.0290	1
802.11g	2412	14.58	14.58±1	15.58	3	0.0143	1
	2437	14.77	14.77±1	15.77	3	0.0150	1
	2462	14.69	14.69±1	15.69	3	0.0147	1
802.11n (HT20)	2412	14.50	14.50±1	15.50	3	0.0141	1
	2437	14.73	14.73±1	15.73	3	0.0149	1
	2462	14.57	14.57±1	15.57	3	0.0143	1
802.11n (HT40)	2422	14.26	14.26±1	15.26	3	0.0133	1
	2437	14.16	14.16±1	15.16	3	0.0130	1
	2452	14.21	14.21±1	15.21	3	0.0132	1

2.4G WiFi ANT B:

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	17.35	17.35±1	18.35	3	0.0271	1
	2437	17.49	17.49±1	18.49	3	0.0280	1
	2462	17.39	17.39±1	18.39	3	0.0274	1
802.11g	2412	14.71	14.71±1	15.71	3	0.0148	1
	2437	14.67	14.67±1	15.67	3	0.0146	1
	2462	14.54	14.54±1	15.54	3	0.0142	1
802.11n (HT20)	2412	14.33	14.33±1	15.33	3	0.0135	1
	2437	14.58	14.58±1	15.58	3	0.0143	1
	2462	14.57	14.57±1	15.57	3	0.0143	1
802.11n (HT40)	2422	13.92	13.92±1	14.92	3	0.0123	1
	2437	13.89	13.89±1	14.89	3	0.0122	1
	2452	14.14	14.14±1	15.14	3	0.0130	1

ANT A+ANT B

Operating Mode	Channel Frequency (MHz)	ANT A Power density at 20cm (mW/cm ²)	ANT B Power density at 20cm (mW/cm ²)	ANT A+ANT B Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
802.11b	2412	0.0271	0.0271	0.0542	1
	2437	0.0286	0.0280	0.0566	1
	2462	0.0290	0.0274	0.0564	1
802.11g	2412	0.0143	0.0148	0.0291	1
	2437	0.0150	0.0146	0.0296	1
	2462	0.0147	0.0142	0.0289	1
802.11n (HT20)	2412	0.0141	0.0135	0.0276	1
	2437	0.0149	0.0143	0.0292	1
	2462	0.0143	0.0143	0.0286	1
802.11n (HT40)	2422	0.0133	0.0123	0.0256	1
	2437	0.0130	0.0122	0.0252	1
	2452	0.0132	0.0130	0.0262	1

5.1G WiFi ANT A:

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	13.17	13.17±1	14.17	3	0.0104	1
	5200	12.60	12.60±1	13.60	3	0.0091	1
	5240	13.11	13.11±1	14.11	3	0.0102	1
802.11n20	5180	12.61	12.61±1	13.61	3	0.0091	1
	5200	12.29	12.29±1	13.29	3	0.0085	1
	5240	13.13	13.13±1	14.13	3	0.0103	1
802.11ac20	5180	13.10	13.10±1	14.10	3	0.0102	1
	5200	13.29	13.29±1	14.29	3	0.0107	1
	5240	12.28	12.28±1	13.28	3	0.0084	1
802.11n40	5190	12.15	12.15±1	13.15	3	0.0082	1
	5230	13.73	13.73±1	14.73	3	0.0118	1
802.11ac40	5190	12.28	12.28±1	13.28	3	0.0084	1
	5230	12.40	12.40±1	13.40	3	0.0087	1
802.11ac80	5210	12.56	12.56±1	13.56	3	0.0090	1

5.1G WiFi ANT B:

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	12.92	12.92±1	13.92	3	0.0098	1
	5200	13.06	13.06±1	14.06	3	0.0101	1
	5240	13.36	13.36±1	14.36	3	0.0108	1
802.11n20	5180	12.79	12.79±1	13.79	3	0.0095	1
	5200	12.70	12.70±1	13.70	3	0.0093	1
	5240	13.44	13.44±1	14.44	3	0.0110	1
802.11ac20	5180	12.79	12.79±1	13.79	3	0.0095	1
	5200	12.78	12.78±1	13.78	3	0.0095	1
	5240	13.72	13.72±1	14.72	3	0.0118	1
802.11n40	5190	11.99	11.99±1	12.99	3	0.0079	1
	5230	12.90	12.90±1	13.90	3	0.0097	1
802.11ac40	5190	12.65	12.65±1	13.65	3	0.0092	1
	5230	12.72	12.72±1	13.72	3	0.0093	1
802.11ac80	5210	12.50	12.50±1	13.50	3	0.0089	1

ANT A+ANT B:

Operating Mode	Channel Frequency	ANT A Power density at 20cm	ANT B Power density at 20cm	ANT A+ANT B Power density at 20cm	Power density Limits
	(MHz)	(mW/ cm ²)	(mW/ cm ²)	(mW/ cm ²)	(mW/cm ²)
802.11a	5180	0.0104	0.0098	0.0202	1
	5200	0.0091	0.0101	0.0192	1
	5240	0.0102	0.0108	0.0210	1
802.11n20	5180	0.0091	0.0095	0.0186	1
	5200	0.0085	0.0093	0.0178	1
	5240	0.0103	0.0110	0.0213	1
802.11ac20	5180	0.0102	0.0095	0.0197	1
	5200	0.0107	0.0095	0.0202	1
	5240	0.0084	0.0118	0.0202	1
802.11n40	5190	0.0082	0.0079	0.0161	1
	5230	0.0118	0.0097	0.0215	1
802.11ac40	5190	0.0084	0.0092	0.0176	1
	5230	0.0087	0.0093	0.0180	1
802.11ac80	5210	0.0090	0.0089	0.0179	1

5.8G WiFi ANT A:

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/ cm ²)	(mW/cm ²)
802.11a	5745	13.81	13.81±1	14.81	3	0.0120	1
	5785	13.57	13.57±1	14.57	3	0.0114	1
	5825	13.70	13.70±1	14.70	3	0.0117	1
802.11n20	5745	13.92	13.92±1	14.92	3	0.0123	1
	5785	13.81	13.81±1	14.81	3	0.0120	1
	5825	13.41	13.41±1	14.41	3	0.0110	1
802.11ac20	5745	13.73	13.73±1	14.73	3	0.0118	1
	5785	13.73	13.73±1	14.73	3	0.0118	1
	5825	12.73	12.73±1	13.73	3	0.0094	1
802.11n40	5755	12.86	12.86±1	13.86	3	0.0097	1
	5795	13.34	13.34±1	14.34	3	0.0108	1
802.11ac40	5755	13.35	13.35±1	14.35	3	0.0108	1
	5795	12.53	12.53±1	13.53	3	0.0089	1
802.11ac80	5775	13.53	13.53±1	14.53	3	0.0113	1

5.8G WiFi ANT B:

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/ cm ²)	(mW/cm ²)
802.11a	5745	15.61	15.61±1	16.61	3	0.0182	1
	5785	15.26	15.26±1	16.26	3	0.0168	1
	5825	14.70	14.70±1	15.70	3	0.0147	1
802.11n20	5745	14.54	14.54±1	15.54	3	0.0142	1
	5785	15.69	15.69±1	16.69	3	0.0185	1
	5825	14.64	14.64±1	15.64	3	0.0145	1
802.11ac20	5745	14.94	14.94±1	15.94	3	0.0156	1
	5785	15.04	15.04±1	16.04	3	0.0159	1
	5825	14.76	14.76±1	15.76	3	0.0150	1
802.11n40	5755	14.05	14.05±1	15.05	3	0.0127	1
	5795	13.87	13.87±1	14.87	3	0.0122	1
802.11ac40	5755	13.28	13.28±1	14.28	3	0.0106	1
	5795	14.61	14.61±1	15.61	3	0.0144	1
802.11ac80	5775	13.59	13.59±1	14.59	3	0.0114	1

ANT A+ANT B:

Operating Mode	Channel Frequency	ANT A	ANT B	ANT A+ANT B	Power density Limits
	(MHz)	Power density at 20cm (mW/ cm2)	Power density at 20cm (mW/ cm2)	Power density at 20cm (mW/ cm2)	(mW/cm2)
802.11a	5745	0.0120	0.0182	0.0302	1
	5785	0.0114	0.0168	0.0282	1
	5825	0.0117	0.0147	0.0264	1
802.11n20	5745	0.0123	0.0142	0.0265	1
	5785	0.0120	0.0185	0.0305	1
	5825	0.0110	0.0145	0.0255	1
802.11ac20	5745	0.0118	0.0156	0.0274	1
	5785	0.0118	0.0159	0.0277	1
	5825	0.0094	0.0150	0.0244	1
802.11n40	5755	0.0097	0.0127	0.0224	1
	5795	0.0108	0.0122	0.0230	1
802.11ac40	5755	0.0108	0.0106	0.0214	1
	5795	0.0089	0.0144	0.0233	1
802.11ac80	5775	0.0113	0.0114	0.0227	1

Note:

2.4G WiFi(MIMO)+5.1G WiFi(MIMO)+5.8G WiFi(MIMO) simultaneous:
 $0.0566+0.0215+0.0305=0.1086 < 1$