

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: 2A22Z-W312

EUT Specification

EUT	Botslab Outdoor Pan/Tilt Camera Pro
Model Number	W312
Rating	ADAPTER: MODEL: TEKA-TB120100US INPUT: 100-240V~ 50/60Hz 0.35A Max OUTPUT: 12.0V 1.0A
Frequency band (Operating)	☒ WLAN: 2.412GHz ~ 2.462GHz ☒ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz ☒ WLAN: 5.745GHz ~ 5825GHz
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation)
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 (peak power)	IEEE 802.11b: 17.12 dBm IEEE 802.11g: 15.95dBm IEEE 802.11n-HT20: 14.98dBm IEEE 802.11n-HT40: 13.54dBm 5180 MHz to 5240 MHz: 11.48dBm 5260 MHz to 5320 MHz: 11.02dBm 5500 MHz to 5700 MHz: 11.41dBm 5745 MHz to 5825 MHz: 11.25dBm
Antenna gain (Max)	2.4GHz WIFI: 4.26dBi 5.8G WIFI:4.94dBi
Evaluation applied	☒ MPE Evaluation ☐ SAR Evaluation

Limits for Maximum Permissible Exposure(MPE)

Frequency	Electric Field	Magnetic Field	Power	Average
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Range(MHz)	Strength(V/m)	Strength(A/m)	Density(mW/cm ²)	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: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

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=20cm

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

2.4GHz WIFI:

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)	Limit (dBm)	Verdict
802.11b	1	2412	16.88	30	PASS
	6	2437	16.99	30	PASS
	11	2462	17.12	30	PASS
802.11g	1	2412	15.65	30	PASS
	6	2437	15.74	30	PASS
	11	2462	15.95	30	PASS
802.11n (HT20)	1	2412	14.86	30	PASS
	6	2437	14.98	30	PASS
	11	2462	14.01	30	PASS
802.11n (HT40)	3	2422	13.39	30	PASS
	6	2437	13.42	30	PASS
	9	2452	13.54	30	PASS

Operating Mode	Test Channel	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/ cm2)	Power density Limits (mW/ cm2)
802.11b	1	17 ± 1	18	63.096	4.26	2.667	0.033475	1
	6	17 ± 1	18	63.096	4.26	2.667	0.033475	1
	11	17 ± 1	18	63.096	4.26	2.667	0.033475	1
802.11g	1	16 ± 1	17	50.119	4.26	2.667	0.026590	1
	6	16 ± 1	17	50.119	4.26	2.667	0.026590	1
	11	16 ± 1	17	50.119	4.26	2.667	0.026590	1
802.11n (HT20)	1	15 ± 1	16	39.811	4.26	2.667	0.021121	1
	6	15 ± 1	16	39.811	4.26	2.667	0.021121	1
	11	14 ± 1	15	31.623	4.26	2.667	0.016777	1
802.11n (HT40)	3	13 ± 1	14	25.119	4.26	2.667	0.013327	1
	6	13 ± 1	14	25.119	4.26	2.667	0.013327	1
	9	14 ± 1	15	31.623	4.26	2.667	0.016777	1

5.8GHz WIFI:

UNII-1:

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)	Limit (dBm)	Verdict
			Ant1		
802.11a	36	5180	9.8	24	PASS
	40	5200	9.88	24	PASS
	48	5240	9.32	24	PASS
11n HT20	36	5180	11.13	24	PASS
	40	5200	11.19	24	PASS
	48	5240	11.04	24	PASS
11n HT40	38	5190	11.48	24	PASS
	46	5230	11.11	24	PASS

Operating Mode	Test Channel	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
802.11a	36	10 $\pm$ 1	11	12.589	4.94	3.119	0.007811	1
	40	10 $\pm$ 1	11	12.589	4.94	3.119	0.007811	1
	48	9 $\pm$ 1	10	10.000	4.94	3.119	0.006205	1
802.11n HT20	36	11 $\pm$ 1	12	15.849	4.94	3.119	0.009834	1
	40	11 $\pm$ 1	12	15.849	4.94	3.119	0.009834	1
	48	11 $\pm$ 1	12	15.849	4.94	3.119	0.009834	1
802.11n HT40	38	11 $\pm$ 1	12	15.849	4.94	3.119	0.009834	1
	46	11 $\pm$ 1	12	15.849	4.94	3.119	0.009834	1

UNII-2A:

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)	Limit (dBm)	Verdict
			Ant1		
802.11a	52	5260	10.81	24	PASS
	56	5280	10.38	24	PASS
	64	5320	9.1	24	PASS
11n HT20	52	5260	10.59	24	PASS
	56	5280	10.47	24	PASS
	64	5320	10.41	24	PASS
11n HT40	54	5270	10.62	24	PASS
	62	5310	11.02	24	PASS

Operating Mode	Test Channel	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
802.11a	52	11 $\pm$ 1	12	15.849	4.94	3.119	0.009834	1
	56	10 $\pm$ 1	11	12.589	4.94	3.119	0.007811	1
	64	9 $\pm$ 1	10	10.000	4.94	3.119	0.006205	1
802.11n HT20	52	11 $\pm$ 1	12	15.849	4.94	3.119	0.009834	1
	56	10 $\pm$ 1	11	12.589	4.94	3.119	0.007811	1
	64	10 $\pm$ 1	11	12.589	4.94	3.119	0.007811	1
802.11n HT40	54	11 $\pm$ 1	12	15.849	4.94	3.119	0.009834	1
	62	11 $\pm$ 1	12	15.849	4.94	3.119	0.009834	1

UNII-2C:

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)	Limit (dBm)	Verdict
			Ant1		
802.11a	100	5500	10.51	24	PASS
	116	5600	11.41	24	PASS
	140	5700	11.02	24	PASS
11n HT20	100	5500	9.14	24	PASS
	116	5600	9.42	24	PASS
	140	5700	10.03	24	PASS
11n HT40	102	5510	8.67	24	PASS
	118	5590	9.07	24	PASS
	134	5670	9.47	24	PASS

Operating Mode	Test Channel	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
802.11a	100	11±1	12	15.849	4.94	3.119	0.009834	1
	116	11±1	12	15.849	4.94	3.119	0.009834	1
	140	11±1	12	15.849	4.94	3.119	0.009834	1
802.11n HT20	100	9±1	10	10.000	4.94	3.119	0.006205	1
	116	9±1	10	10.000	4.94	3.119	0.006205	1
	140	10±1	11	12.589	4.94	3.119	0.007811	1
802.11n HT40	102	9±1	10	10.000	4.94	3.119	0.006205	1
	118	9±1	10	10.000	4.94	3.119	0.006205	1
	134	9±1	10	10.000	4.26	2.667	0.005305	1

UNII-3:

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)	Limit (dBm)	Verdict
			Ant1		
802.11a	149	5745	10.93	30	PASS
	157	5785	11.25	30	PASS
	165	5825	10.28	30	PASS
11n HT20	149	5745	9.88	30	PASS
	157	5785	9.52	30	PASS
	165	5825	9.39	30	PASS
11n HT40	151	5755	8.24	30	PASS
	159	5795	9.67	30	PASS

Operating Mode	Test Channel	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
802.11a	149	11±1	12	15.849	4.94	3.119	0.009834	1
	157	11±1	12	15.849	4.94	3.119	0.009834	1
	165	10±1	11	12.589	4.94	3.119	0.007811	1
802.11n HT20	149	10±1	11	12.589	4.94	3.119	0.007811	1
	157	10±1	11	12.589	4.94	3.119	0.007811	1
	165	9±1	10	10.000	4.94	3.119	0.006205	1
802.11n HT40	151	8±1	9	7.943	4.94	3.119	0.004929	1
	159	10±1	11	12.589	4.94	3.119	0.007811	1

The Product unsupported at the same time to Transmitting. According to KDB 447498, and no simultaneous SAR measurement is required.

Signature:



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Date: 2023-07-24