

RF EXPOSURE EVALUATION

EUT Specification

EUT	Projector
Model Number	ZMLF2001, ZMLF2002, ZMLF2003, ZMLF2004, ZMLF2005, ZMLF2006, ZMLF2007, ZMLF2008, ZMLF2009, ZMLF2010
FCC ID	2A6K3-ZMLF2001
Antenna gain (Max)	2.4GWIFI: 1.75dBi BT/BLE: 1.75dBi 5GWIFI: UNII-1 (5180MHz-5240MHz) :2.09dBi UNII-2A(5260MHz -5320MHz): 2.09dBi UNII-3(5745MHz-5825MHz):2.09dBi
Operation Frequency	BT/BLE:2402-2480MHz 2.4GWIFI:2412-2462MHz 5GWIFI: 802.11a/802.11ac20/802.11n(HT20)/802.11ax20: 5180-5240MHz, 5260-5320MHz, 5745-5825MHz 802.11ac40/802.11n(HT40)/802.11ax40: 5190-5230MHz, 5270-5310MHz, 5755-5795MHz 802.11ac80/802.11ax80: 5210MHz, 5290MHz, 5775MHz
Input Rating	AC 120V/60Hz
Max. output power	EDR: 19.01dBm, BLE: 2.97dBm 5GHz WiFi: UNII-1: 15.08 dBm, UNII-2A: 16.69dBm, UNII-3: 16.61dBm 2.4GHz WiFi: b:11.50dBm, g:11.15dBm, n20:11.11dBm, n40:12.41Bm

Test Requirement:

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)

KDB Test Methodology: KDB 447498 D01v06

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

11.1 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= Numeric gain of the antenna relative to isotropic antenna

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.

11.2 Measurement Result

Mode	Modulation	Max measured power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power (dBm)	Antenna Gain (Numeric)	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
EDR	GFSK	19.01	19±1	20	1.496	0.029782	1
BLE	GFSK	2.97	3±1	4	1.496	0.000748	1
2.4GWIFI	802.11b	11.50	12±1	13	1.496	0.005942	1
	802.11g	11.15	11±1	12	1.496	0.004720	1
	802.11n20	11.11	11±1	12	1.496	0.004720	1
	802.11n40	12.41	12±1	13	1.496	0.005942	1
5G WIFI	UNII-1	15.08	15±1	16	1.618	0.012822	1
	UNII-2A	16.69	17±1	18	1.618	0.020321	1
	UNII-3	16.61	17±1	18	1.618	0.020321	1

Maximum Simultaneous transmission MPE Ratios for 2.4GWIFI+BT:

Max MPE ratio _{WIFI}	Max MPE Ratio _{BT}	∑MPE ratios	Limit	Result
0.005942	0.029782	0.035724	1	Pass
MPE= Limit of Power Density (S) (mW/cm ²)/ Limit of Power Density (S) (mW/cm ²) ratios				

Maximum Simultaneous transmission MPE Ratios for 5GWIFI+BT:

Max MPE ratio _{WIFI}	Max MPE Ratio _{BT}	∑MPE ratios	Limit	Result
0.020321	0.029782	0.050103	1	Pass
MPE= Limit of Power Density (S) (mW/cm ²)/ Limit of Power Density (S) (mW/cm ²) ratios				

Signature:

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