

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: 2AFDGVA-HS002A

EUT Specification

EUT	IPC for Home Cam
Frequency band (Operating)	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5825GHz <input checked="" type="checkbox"/> Others: 915MHz
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(WiFi,915MHz antenna different, no MIMO) <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
Max. output power	21.91 dBm (155.2mW);79.38dBuV/m(0.026mW)
Antenna gain (Max)	3 dBi;3dBi
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: $Pd=(Pout \cdot G) \cdot (4 \cdot \pi \cdot R^2)$

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, $1mW/cm^2$. 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

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/cm^2)	Power density Limits (mW/cm^2)
802.11b	2412	20.45	± 1	21.45	3	0.0554	1
	2437	20.84	± 1	21.84	3	0.0606	1
	2462	21.27	± 1	22.27	3	0.0669	1
802.11g	2412	21.66	± 1	22.66	3	0.0732	1
	2437	21.79	± 1	22.79	3	0.0755	1
	2462	21.91	± 1	22.91	3	0.0776	1
802.11n (HT20)	2412	21.06	± 1	22.06	3	0.0638	1
	2437	21.53	± 1	22.53	3	0.0711	1
	2462	21.63	± 1	22.63	3	0.0727	1
802.11n (HT40)	2422	20.92	± 1	21.92	3	0.0618	1
	2437	21.40	± 1	22.40	3	0.0690	1
	2452	21.23	± 1	22.23	3	0.0663	1

915MHz:

Channel Frequency (MHz)	Max Output Power (dBuV/m)	Max Output Power (dBm)	Tolerance	Max. Tune up Power (dBm)	Max. Tune up Power (mW)	Antenna Gain (dBi)	Power density at 20cm (mW/cm^2)	Power density Limits (mW/cm^2)
915	79.38	-15.87	± 1	-14.87	0.033	3	0.00002	1

$$E = \text{EIRP} - 20 \log D + 104.8$$

where:

E = electric field strength in dB μ V/m,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

$$\text{EIRP} = E - 104.8 + 20 \log D = 79.38 - 104.8 + 20 \log 3 = -15.87 \text{ dBm}$$

WiFi+915MHz simultaneous (802.11g is the worst case for WiFi) :

$$0.0776 + 0.00002 = 0.07762 < 1$$

The SAR is not necessary.