

RF EXPOSURE EVALUATION

EUT Specification

EUT	WiFi Video Doorbell
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(433.92MHz)
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others ____
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	18.80dBm(75.86mW) for WIFI 75.95dBuV/m -19.31dBm(0.0117mW) for 433.92MHz
Antenna gain	For WIFI: 2.5dBi; For 433.92MHz: -15dBi
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: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = Power density in mW/cm^2

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, $1mW/cm^2$. 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

For WIFI

Channel	Channel Frequency (MHz)	Max Output power (dBm)	Tolerance	Max Tune-UP power (mW)	Power density at 20cm (mW/cm^2)	Power density Limits (mW/cm^2)
802.11b						
Low	2412	12.20	± 0.5	18.62	0.0066	1
Middle	2437	14.47	± 0.5	31.41	0.0111	1
High	2462	14.61	± 0.5	32.43	0.0115	1
802.11g						
Low	2412	15.59	± 0.5	102.09	0.0361	1
Middle	2437	18.07	± 0.5	71.94	0.0255	1
High	2462	18.23	± 0.5	74.64	0.0264	1
802.11n HT20						
Low	2412	15.65	± 0.5	41.21	0.0146	1
Middle	2437	17.94	± 0.5	69.82	0.0247	1
High	2462	18.04	± 0.5	71.45	0.0253	1
802.11n HT40						
Low	2422	18.80	± 0.5	85.11	0.0301	1
Middle	2437	17.38	± 0.5	61.38	0.0217	1
High	2452	14.15	± 0.5	29.17	0.0103	1

For 433.92MHz

Channel Frequency (MHz)	Max Output power (dBm)	Tolerance	Max Tune-UP power (mW)	Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
433.92	-19.31	±0.5	0.01315	8.27e-8	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.

$$\text{EIRP} = E - 104.8 + 20\log D = 75.95 - 104.8 + 20\log 3 = -19.31 \text{ dBm}$$