



RF EXPOSURE EVALUATION

EUT Specification

EUT	Wireless Router
FCC ID	2AR6UR2
Frequency band (Operating)	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input checked="" type="checkbox"/> WLAN: 5.180GHz-5.240GHz <input checked="" type="checkbox"/> WLAN: 5.745GHz ~ 5825GHz <input type="checkbox"/> Others
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
Antenna gain (Max)	5.0dBi (for per antenna port Max) 8.01dBi for MIMO(Ant1+Ant2 Directional Gain)
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation



Applicable Standard:

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J. Section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m Normally can be maintained between the user and the device.

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				
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	F/1500	30
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

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

Max power Result:

2.4G Band:

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)			Limit (dBm)	Verdict
			Ant1	Ant2	Sum		
802.11b	1	2412	17.19	16.89	--	30	PASS
	6	2437	17.17	16.75	--	30	PASS
	11	2462	16.25	16.14	--	30	PASS
802.11g	1	2412	15.34	14.22	--	30	PASS
	6	2437	15.08	14.05	--	30	PASS
	11	2462	14.68	13.62	--	30	PASS
802.11n (HT20)	1	2412	13.48	13.24	14.65	28	PASS
	6	2437	13.24	12.08	13.28	28	PASS
	11	2462	12.04	12.48	11.58	28	PASS
802.11n (HT40)	3	2422	12.62	11.36	8.94	28	PASS
	6	2437	11.48	11.08	6.49	28	PASS
	9	2452	11.85	10.69	9.34	28	PASS

Antenna 1:

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)
802.11b	1	18±1	19	79.43	5	3.162	0.049972	1
	6	18±1	19	79.43	5	3.162	0.049972	1
	11	16±1	17	50.12	5	3.162	0.031530	1
802.11g	1	15±1	16	39.81	5	3.162	0.025045	1
	6	15±1	16	39.81	5	3.162	0.025045	1
	11	14±1	15	31.62	5	3.162	0.019894	1
802.11n (HT20)	1	13±1	14	25.12	5	3.162	0.015803	1
	6	13±1	14	25.12	5	3.162	0.015803	1
	11	12±1	13	19.95	5	3.162	0.012552	1
802.11n (HT40)	3	12±1	13	19.95	5	3.162	0.012552	1
	6	11±1	12	15.85	5	3.162	0.009971	1
	9	11±1	12	15.85	5	3.162	0.009971	1



Antenna 2:

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)
802.11b	1	16±1	17	50.12	5	3.162	0.031530	1
	6	16±1	17	50.12	5	3.162	0.031530	1
	11	16±1	17	50.12	5	3.162	0.031530	1
802.11g	1	15±1	16	39.81	5	3.162	0.025045	1
	6	15±1	16	39.81	5	3.162	0.025045	1
	11	14±1	15	31.62	5	3.162	0.019894	1
802.11n (HT20)	1	13±1	14	25.12	5	3.162	0.015803	1
	6	13±1	14	25.12	5	3.162	0.015803	1
	11	12±1	13	19.95	5	3.162	0.012552	1
802.11n (HT40)	3	12±1	13	19.95	5	3.162	0.012552	1
	6	11±1	12	15.85	5	3.162	0.009971	1
	9	11±1	12	15.85	5	3.162	0.009971	1

MPE Result:

Operation Mode	Channel Number	Channel Frequency (MHz)	Power density at 20cm (mW/cm ²)			Power density Limits (mW/cm ²)	Verdict
			Ant 1	Ant 2	Sum		
802.11b	1	2412	0.049972	0.031530	--	1	PASS
	6	2437	0.049972	0.031530	--	1	PASS
	11	2462	0.031530	0.031530	--	1	PASS
802.11g	1	2412	0.025045	0.025045	--	1	PASS
	6	2437	0.025045	0.025045	--	1	PASS
	11	2462	0.019894	0.019894	--	1	PASS
802.11n (HT20)	1	2412	0.015803	0.015803	0.031606	1	PASS
	6	2437	0.015803	0.015803	0.031606	1	PASS
	11	2462	0.012552	0.012552	0.025104	1	PASS
802.11n (HT40)	3	2422	0.012552	0.012552	0.025104	1	PASS
	6	2437	0.009971	0.009971	0.019942	1	PASS
	9	2452	0.009971	0.009971	0.019942	1	PASS



UNII Band:

Max power Result:

UNII Band	Mode	Frequency (MHz)	Conducted Output Power (dBm)			Limit (dBm)	Result
			Ant 3	Ant 4	Total		
5150-5250 MHz	802.11 a	5180	12.97	12.96	/	30	PASS
		5200	13.18	13.24	/	30	
		5240	13.28	13.27	/	30	PASS
	802.11 HT20	5180	9.42	9.14	12.26	30	PASS
		5200	9.59	9.15	12.39	30	PASS
		5240	9.11	9.48	12.31	30	PASS
	802.11 HT40	5190	9.27	9.09	12.19	30	PASS
		5230	8.83	8.95	11.9	30	PASS
	802.11 AC 80	5210	7.31	7.18	10.26	30	PASS
5725-5850 MHz	802.11 a	5745	12.97	13.11	/	30	PASS
		5785	12.65	12.69	/	30	PASS
		5825	12.65	12.71	/	30	PASS
	802.11 HT20	5745	8.52	9.00	11.78	30	PASS
		5785	8.70	9.33	12.04	30	PASS
		5825	8.26	9.14	11.73	30	PASS
	802.11 HT40	5755	8.64	9.04	11.85	30	PASS
		5795	8.67	8.90	11.80	30	PASS
	802.11 AC 80	5775	7.17	7.38	10.29	30	PASS

5150-5250MHz Antenna 3 and Antenna 4

Operating Mode	Frequency (MHz)	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)
802.11 a	5180	12±1	13	19.95	5	3.162	0.012552	1
	5200	13±1	14	25.12	5	3.162	0.015803	1
	5240	13±1	14	25.12	5	3.162	0.015803	1
802.11 HT20	5180	9±1	10	10.00	5	3.162	0.006291	1
	5200	9±1	10	10.00	5	3.162	0.006291	1
	5240	9±1	10	10.00	5	3.162	0.006291	1
802.11 HT40	5190	9±1	10	10.00	5	3.162	0.006291	1
	5230	8±1	9	7.94	5	3.162	0.004997	1
802.11 AC 80	5210	7±1	8	6.31	5	3.162	0.003969	1



MPE Result:

Operation Mode	Channel Frequency (MHz)	Power density at 20cm (mW/ cm ²)			Power density Limits (mW/cm ²)	Verdict
		Ant 3	Ant 4	Sum		
802.11 a	5180	0.012552	0.012552	--	1	PASS
	5200	0.015803	0.015803	--	1	PASS
	5240	0.015803	0.015803	--	1	PASS
802.11 HT20	5180	0.006291	0.006291	0.012582	1	PASS
	5200	0.006291	0.006291	0.012582	1	PASS
	5240	0.006291	0.006291	0.012582	1	PASS
802.11 HT40	5190	0.006291	0.006291	0.012582	1	PASS
	5230	0.004997	0.004997	0.009994	1	PASS
802.11 a	5210	0.003969	0.003969	0.007938	1	PASS



5725-5850MHz Antenna 3 and Antenna 4

Operating Mode	Frequency (MHz)	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)
802.11 a	5745	12±1	13	19.95	5	3.162	0.012552	1
	5785	12±1	13	19.95	5	3.162	0.012552	1
	5825	12±1	13	19.95	5	3.162	0.012552	1
802.11 HT20	5745	8±1	9	7.94	5	3.162	0.004997	1
	5785	8±1	9	7.94	5	3.162	0.004997	1
	5825	8±1	9	7.94	5	3.162	0.004997	1
802.11 HT40	5755	8±1	9	7.94	5	3.162	0.004997	1
	5795	8±1	9	7.94	5	3.162	0.004997	1
802.11 AC 80	5775	7±1	8	6.31	5	3.162	0.003969	1

MPE Result:

Operation Mode	Channel Frequency (MHz)	Power density at 20cm (mW/cm ²)			Power density Limits (mW/cm ²)	Verdict
		Ant 3	Ant 4	Sum		
802.11 a	5180	0.012552	0.012552	--	1	PASS
	5200	0.012552	0.012552	--	1	PASS
	5240	0.012552	0.012552	--	1	PASS
802.11 HT20	5180	0.004997	0.004997	0.009994	1	PASS
	5200	0.004997	0.004997	0.009994	1	PASS
	5240	0.004997	0.004997	0.009994	1	PASS
802.11 HT40	5190	0.004997	0.004997	0.009994	1	PASS
	5230	0.004997	0.004997	0.009994	1	PASS
802.11 a	5210	0.003969	0.003969	0.007938	1	PASS

Signature

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