

## RF EXPOSURE EVALUATION

### EUT Specification

<b>EUT</b>	300Mbps High Gain Wireless N Router
<b>FCC ID</b>	S8J-WR4300H
<b>Frequency band (Operating)</b>	<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 type="checkbox"/> Others
<b>Device category</b>	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others ____
<b>Exposure classification</b>	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm <sup>2</sup> ) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )
<b>Antenna diversity</b>	<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
<b>Max. output power</b>	17.65dBm for 802.11b; 14.05dBm for 802.11g; 16.03dBm for 802.11n(H20); 14.84 dBm for 802.11n(H40);
<b>Antenna gain (Max)</b>	5.0dBi ( for per antenna port Max) 8.01dBi for MIMO(Ant0+Ant1 Directional Gain)
<b>Evaluation applied</b>	<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 <sup>2</sup> )	Average Time
<b>(A) Limits for Occupational/Control Exposures</b>				
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>(B) Limits for General Population/Uncontrol Exposures</b>				
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/cm<sup>2</sup>,  $P_{out}$ =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

$P_d$  the limit of MPE, 1mW/cm<sup>2</sup>. 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:

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)			Limit (dBm)	Verdict
			Ant0	Ant1	Sum		
802.11b	1	2412	17.65	17.53	--	30	PASS
	6	2437	16.82	15.49	--	30	PASS
	11	2462	15.04	14.72	--	30	PASS
802.11g	1	2412	13.42	14.05	--	30	PASS
	6	2437	12.69	13.69	--	30	PASS
	11	2462	11.82	11.43	--	30	PASS
802.11n (HT20)	1	2412	13.08	12.95	16.03	28	PASS
	6	2437	12.72	11.04	14.97	28	PASS
	11	2462	11.16	9.72	13.51	28	PASS
802.11n (HT40)	3	2422	12.16	11.48	14.84	28	PASS
	6	2437	10.74	10.69	13.73	28	PASS
	9	2452	9.85	9.46	12.67	28	PASS

Antenna 0:

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 <sup>2</sup> )	Power density Limits (mW/cm <sup>2</sup> )
802.11b	1	18±1	19	79.43	5	3.162	0.049968	1
	6	17±1	18	63.10	5	3.162	0.039691	1
	11	15±1	16	39.81	5	3.162	0.025043	1
802.11g	1	13±1	14	25.12	5	3.162	0.015801	1
	6	13±1	14	25.12	5	3.162	0.015801	1
	11	12±1	13	19.95	5	3.162	0.012551	1
802.11n (H20)	1	13±1	14	25.12	5	3.162	0.015801	1
	6	13±1	14	25.12	5	3.162	0.015801	1
	11	11±1	12	15.85	5	3.162	0.009970	1
802.11n (H40)	3	12±1	13	19.95	5	3.162	0.012551	1
	6	11±1	12	15.85	5	3.162	0.009970	1
	9	10±1	11	12.59	5	3.162	0.007919	1

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 <sup>2</sup> )	Power density Limits (mW/cm <sup>2</sup> )
802.11b	1	17±1	18	63.10	5	3.162	0.039691	1
	6	15±1	16	39.81	5	3.162	0.025043	1
	11	15±1	16	39.81	5	3.162	0.025043	1
802.11g	1	14±1	15	31.62	5	3.162	0.019893	1
	6	14±1	15	31.62	5	3.162	0.019893	1
	11	12±1	13	19.95	5	3.162	0.012551	1
802.11n (H20)	1	12±1	13	19.95	5	3.162	0.012551	1
	6	11±1	12	15.85	5	3.162	0.009970	1
	11	10±1	11	12.59	5	3.162	0.007919	1
802.11n (H40)	3	11±1	12	15.85	5	3.162	0.009970	1
	6	11±1	12	15.85	5	3.162	0.009970	1
	9	9±1	10	10.00	5	3.162	0.006291	1

MPE Result:

Operation Mode	Channel Number	Channel Frequency (MHz)	Power density at 20cm (mW/cm <sup>2</sup> )			Power density Limits (mW/cm <sup>2</sup> )	Verdict
			Ant1	Ant2	Sum		
802.11b	1	2412	0.049968	0.039691	--	1	PASS
	6	2437	0.039691	0.025043	--	1	PASS
	11	2462	0.025043	0.025043	--	1	PASS
802.11g	1	2412	0.015801	0.019893	--	1	PASS
	6	2437	0.015801	0.019893	--	1	PASS
	11	2462	0.012551	0.012551	--	1	PASS
802.11n (HT20)	1	2412	0.015801	0.012551	0.028352	1	PASS
	6	2437	0.015801	0.009970	0.025771	1	PASS
	11	2462	0.009970	0.007919	0.017889	1	PASS
802.11n (HT40)	3	2422	0.012551	0.009970	0.022521	1	PASS
	6	2437	0.009970	0.009970	0.01994	1	PASS
	9	2452	0.007919	0.006291	0.01421	1	PASS