RF EXPOSURE EVALUATION

EUT Specification

EUT	300Mbps Wireless N Router
FCC ID	**S8J-WR2000**
Frequency band (Operating)	☒WLAN: 2.412GHz ~ 2.462GHz ☐WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz ☐WLAN: 5.745GHz ~ 5825GHz ☐Others
Device category	☐Portable (<20cm separation) ☒Mobile (>20cm separation) ☐Others ___
Exposure classification	☐Occupational/Controlled exposure (S = 5mW/cm2) ☒General Population/Uncontrolled exposure (S=1mW/cm2)
Antenna diversity	☐Single antenna ☒Multiple antennas ☐Tx diversity ☐Rx diversity ☐Tx/Rx diversity
Max. output power	17.77dBm for 802.11b; 16.76dBm for 802.11g; 15.21dBm for 802.11n(H20); 13.74dBm for 802.11n(H40);
Antenna gain (Max)	5dBi
Evaluation applied	☒MPE Evaluation ☐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: Pd=(Pout*G)\(4*pi*R2)

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

Max power Result:

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)			Limit (dBm)	Verdict
			Ant1	Ant2	Sum		
802.11b	1	2412	17.05	17.77	--	30	PASS
	6	2437	16.15	15.37	--	30	PASS
	11	2462	14.08	13.92	--	30	PASS
802.11g	1	2412	16.76	16.08	--	30	PASS
	6	2437	15.32	14.12	--	30	PASS
	11	2462	13.72	12.49	--	30	PASS
802.11n (HT20)	1	2412	12.54	11.82	15.21	30	PASS
	6	2437	10.38	10.04	13.22	30	PASS
	11	2462	8.49	9.26	11.90	30	PASS
802.11n (HT40)	3	2422	11.09	10.34	13.74	30	PASS
	6	2437	10.75	9.46	13.16	30	PASS
	9	2452	9.75	8.29	12.09	30	PASS
Note: For MIMO system, Maximum Conducted Output Power is summed at the total transmit power delivered to all antennas.							

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	17±1	18	63.10	5	3.162	0.039691	1
	6	16±1	17	50.12	5	3.162	0.031528	1
	11	14±1	15	31.62	5	3.162	0.019893	1
802.11g	1	16±1	17	50.12	5	3.162	0.031528	1
	6	15±1	16	39.81	5	3.162	0.025043	1
	11	13±1	14	25.12	5	3.162	0.015801	1
802.11n (H20)	1	12±1	13	19.95	5	3.162	0.012551	1
	6	10±1	11	12.59	5	3.162	0.007919	1
	11	8±1	9	7.94	5	3.162	0.004997	1
802.11n (H40)	3	11±1	12	15.85	5	3.162	0.009970	1
	6	10±1	11	12.59	5	3.162	0.007919	1
	9	9±1	10	10.00	5	3.162	0.006291	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	17±1	18	63.10	5	3.162	0.039691	1
	6	15±1	16	39.81	5	3.162	0.025043	1
	11	13±1	14	25.12	5	3.162	0.015801	1
802.11g	1	16±1	17	50.12	5	3.162	0.031528	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	11±1	12	15.85	5	3.162	0.009970	1
	6	10±1	11	12.59	5	3.162	0.007919	1
	11	9±1	10	10.00	5	3.162	0.006291	1
802.11n (H40)	3	10±1	11	12.59	5	3.162	0.007919	1
	6	9±1	10	10.00	5	3.162	0.006291	1
	9	8±1	9	7.94	5	3.162	0.004997	1

MPE Result:

Operation Mode	Channel Number	Channel Frequency (MHz)	Power density at 20cm (mW/ cm^2)			Power density Limits (mW/cm^2)	Verdict
			Ant1	Ant2	Sum		
802.11b	1	2412	0.039691	0.039691	--	1	PASS
	6	2437	0.031528	0.025043	--	1	PASS
	11	2462	0.019893	0.015801	--	1	PASS
802.11g	1	2412	0.031528	0.031528	--	1	PASS
	6	2437	0.025043	0.019893	--	1	PASS
	11	2462	0.015801	0.012551	--	1	PASS
802.11n (HT20)	1	2412	0.012551	0.009970	0.022521	1	PASS
	6	2437	0.007919	0.007919	0.015838	1	PASS
	11	2462	0.004997	0.006291	0.011288	1	PASS
802.11n (HT40)	3	2422	0.009970	0.007919	0.017889	1	PASS
	6	2437	0.007919	0.006291	0.014210	1	PASS
	9	2452	0.006291	0.004997	0.011288	1	PASS