

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: 2AJTU-K1

EUT Specification

EUT	GNSS RECEIVER
Frequency band (Operating)	☒ WLAN: 2.412GHz ~ 2.462GHz ☒ Others: 2.402GHz~2.480GHz (BDR &EDR and BLE) ☒ Others: GPRS/EGPRS&WCDMA<E ☒ Others:UHF
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	BDR &EDR: 1.731dBm (0.0015W), BLE: 0.921dBm (0.0012W), 2.4GHz WiFi: 16.87dBm (0.0486W) GPRS/EGPRS: 31dBm (1.2589W) WCDMA: 26dBm (0.3981W) LTE: 25dBm (0.3162W) UHF:39dBm(7.9432W)
Antenna gain (Max)	BT & 2.4G WiFi: 2 dBi GPRS/EGPRS&WCDMA<E: 2 dBi UHF:4 dBi
Evaluation applied	☒ MPE Evaluation ☐ 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/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

2.4GHz WiFi+BDR&EDR+BLE

Operating Mode	Channel Frequency	Measured Power	Tune up tolerance	Max. Tune up Power	Antenna Gain	Power density at 100cm	Power density Limits (mW/cm ²)
	(MHz)	(dBm)	(dBm)	(dBm)	(dBi)	(mW/ cm ²)	
802.11b	2412	15.15	15.15±1	16.15	2	0.0005	1
	2437	15.09	15.09±1	16.09	2	0.0005	1
	2462	14.89	14.89±1	15.89	2	0.0005	1
802.11g	2412	14.28	14.28±1	15.28	2	0.0004	1
	2437	15.01	15.01±1	16.01	2	0.0005	1
	2462	15.81	15.81±1	16.81	2	0.0006	1
802.11n (HT20)	2412	14.19	14.19±1	15.19	2	0.0004	1
	2437	15.87	15.87±1	16.87	2	0.0006	1
	2462	14.67	14.67±1	15.67	2	0.0005	1
802.11n (HT40)	2422	15.68	15.68±1	16.68	2	0.0006	1
	2437	15.48	15.48±1	16.48	2	0.0006	1
	2452	15.21	15.21±1	16.21	2	0.0005	1
BDR+EDR	2402	0.009	0.009±1	1.009	2	0.0000	1
	2441	0.581	0.581±1	1.581	2	0.0000	1
	2480	0.731	0.731±1	1.731	2	0.0000	1
	2402	-0.554	-0.554±1	0.446	2	0.0000	1
	2441	-0.110	-0.110±1	0.89	2	0.0000	1
	2480	-0.172	-0.172±1	0.828	2	0.0000	1
BLE	2402	-0.449	-0.449±1	0.551	2	0.0000	1
	2441	-0.143	-0.143±1	0.857	2	0.0000	1
	2480	-0.079	-0.079±1	0.921	2	0.0000	1

2G+3G+4G:

Operating Mode	Channel Frequency (MHz)	Measured Power (dBm)	Tune up tolerance (dBm)	Max. Tune up Power (dBm)	Antenna Gain (dBi)	Power density at 100cm (mW/ cm ²)	Power density Limits (mW/cm ²)
GPRS 850	824.2-848.8	30.71	30±1	31	2	0.0159	0.5495
GPRS 1900	1850.2-1909.8	28.89	28±1	29	2	0.0100	1

Operating Mode	Channel Frequency (MHz)	Measured Power (dBm)	Tune up tolerance (dBm)	Max. Tune up Power (dBm)	Antenna Gain (dBi)	Power density at 100cm (mW/ cm ²)	Power density Limits (mW/cm ²)
WCDMA (Band V)	826.4-846.6	25.10	25±1	26	2	0.0050	0.5509
WCDMA (Band II)	1852.4-1907.6	21.23	21±1	22	2	0.0020	1

Operating Mode	Channel Frequency (MHz)	Measured Power (dBm)	Tune up tolerance (dBm)	Max. Tune up Power (dBm)	Antenna Gain (dBi)	Power density at 100cm (mW/ cm ²)	Power density Limits (mW/cm ²)
LTE (Band 5)	824.7-848.3	24.43	24±1	25	2	0.0040	0.5509
LTE (Band 7)	2502.5-2567.5	23.59	23±1	24	2	0.0032	0.5509
LTE (Band 41)	2555-2655	23.77	23±1	24	2	0.0032	1

UHF:

Operating Mode	Channel Frequency (MHz)	Measured Power (dBm)	Tune up tolerance (dBm)	Max. Tune up Power (dBm)	Antenna Gain (dBi)	Power density at 100cm (mW/ cm ²)	Power density Limits (mW/cm ²)
GMSK	460.125-467.625	38.508	38±1	39	4	0.1588	0.3067

transmit simultaneous:

Mode	Power density at 100cm (mW/ cm ²)	Power density Limits (mW/cm ²)
802.11b+BDR+EDR	0.0005	1
802.11g+BDR+EDR	0.0006	1
802.11n (HT20)+BDR+EDR	0.0006	1
802.11n (HT40)+BDR+EDR	0.0006	1
UHF+BDR+EDR	0.1588	1
UHF+BLE	0.1588	1
UHF+802.11b	0.1593	1
UHF+802.11g	0.1594	1
UHF+802.11n (HT20)	0.1594	1
UHF+802.11n (HT40)	0.1594	1
UHF+Band 5	0.1628	1
UHF+Band 7	0.1620	1
UHF+Band 41	0.1620	1
802.11b+GPRS 850	0.0164	1
802.11b+GPRS 1900	0.0105	1
802.11g+GPRS 850	0.0165	1
802.11g+GPRS 1900	0.0106	1
802.11n(HT20)+GPRS 850	0.0165	1
802.11n(HT20)+GPRS1900	0.0106	1
802.11n(HT40)+GPRS 850	0.0165	1
802.11n(HT40)+GPRS 1900	0.0106	1
802.11b+WCDMA(Band V)	0.0055	1
802.11b+WCDMA(Band II)	0.0025	1
802.11g+WCDMA(Band V)	0.0056	1
802.11g+WCDMA(Band II)	0.0026	1
802.11n(HT20)+WCDMA(Band V)	0.0056	1
802.11n(HT20)+WCDMA(Band II)	0.0026	1
802.11n(HT40)+WCDMA(Band V)	0.0056	1
802.11n(HT40)+WCDMA(Band II)	0.0026	1
802.11b+Band 5	0.0045	1
802.11b+Band 7	0.0037	1
802.11b+Band 41	0.0037	1
802.11g+Band 5	0.0046	1
802.11g+Band 7	0.0038	1
802.11g+Band 41	0.0038	1
802.11n(HT20)+Band 5	0.0046	1

802.11n(HT20)+Band 7	0.0038	1
802.11n(HT20)+Band 41	0.0038	1
802.11n(HT40)+Band 5	0.0046	1
802.11n(HT40)+Band 7	0.0038	1
802.11n(HT40)+Band 41	0.0038	1