

RF EXPOSURE EVALUATION

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

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)

EUT Specification

FCC ID	2AT19-SHTSD10D
EUT	Industrial Computer
Frequency band (Operating)	☒ BT: 2.402GHz ~ 2.480GH ☒ WLAN: 2.412GHz ~ 2.462GHz ☐ RLAN: 5.180GHz ~ 5.240GHz ☐ RLAN: 5.260GHz ~ 5.320GHz ☐ RLAN: 5.500GHz ~ 5.700GHz ☐ RLAN: 5.745GHz ~ 5.825GHz ☒ Others: WCDMA Band II: 1852.40MHz~1907.60MHz WCDMA Band V: 826.40MHz~846.60MHz WCDMA Band IV: 1712.40MHz~1752.60MHz LTE FDD Band 2: 1850.7 MHz – 1909.3 MHz LTE FDD Band 4: 1710.7 MHz – 1754.3 MHz LTE FDD Band 5: 824.7 MHz – 848.3 MHz LTE FDD Band 12: 699.7 MHz – 715.3 MHz LTE FDD Band 13: 779.5 MHz – 784.5 MHz LTE FDD Band 66: 1710.7 MHz-1779.3 MHz
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

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	☐ Tx/Rx diversity
Antenna gain (Max)	BT: 0.15dBi Wi-Fi 2.4G: 0.15dBi WCDMA Band II: 0.89dBi WCDMA Band V: -1.42dBi WCDMA Band IV: 4.21dBi LTE FDD Band 2: 0.89dBi LTE FDD Band 4: -1.42dBi LTE FDD Band 5: 4.21dBi LTE FDD Band 12: -4.32dBi LTE FDD Band 13: 3.77dBi LTE FDD Band 66: 0.39dBi
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.

Max Measurement Result

Operating Mode	Max. Conducted Power	Tune up tolerance		Max. Tune up Power	Antenna Gain	Power density at 20cm	Power density Limits (mW/cm ²)
	(dBm)	(dBm)		(dBm)	(dBi)	(mW/ cm ²)	
BDR&EDR	5.79	5.79	±1	6.79	0.15	0.0010	1
BLE	0.56	0.56	±1	1.56	0.15	0.0003	1
WiFi 2.4G	14.23	14.23	±1	15.23	0.15	0.0069	1
WCDMA Band II	25.22	24.5	±1	25.50	0.89	0.0867	1
WCDMA Band V	25.46	25.0	±1	26.00	-1.42	0.0571	1
WCDMA Band IV	22.81	22.0	±1	23.00	4.21	0.1047	1
LTE Band 2	24.86	24.0	±1	25.00	0.89	0.0773	1
LTE Band 4	24.22	23.5	±1	24.50	-1.42	0.0405	1
LTE Band 5	24.14	23.5	±1	24.50	4.21	0.1479	1
LTE Band 12	24.71	24.0	±1	25.00	-4.32	0.0233	1
LTE Band 13	24.48	24.0	±1	25.00	3.77	0.1500	1
LTE Band 66	24.85	24.0	±1	25.00	0.39	0.0689	1

No. Applicable Simultaneous Transmission

1. BDR&EDR+WCDMA
2. BDR&EDR+LTE
3. BLE+WCDMA
4. BLE+LTE
5. WiFi 2.4G+WCDMA
6. WiFi 2.4G+LTE

The Maximum simultaneous transmission for WiFi 2.4G+LTE Band13:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$$= S_{WiFi\ 2.4G}/S_{limit} + S_{LTE\ B13}/S_{limit}$$

$$= 0.0069/1 + 0.1500/1$$

$$= 0.1569$$

$$< 1.0$$

Result: PASS.