FCC RF Exposure Evaluation

1. Product Information

FCCID	:	2AUZZ-UML3
EUT	:	Wireless Infrared Scouting Camera
Test Model	:	UML3
Power Supply	:	Input: DC 6V-12V Battery: 12*AA Batteries
Hardware Version	:	L3V50M
Software Version	:	DSP: JL3375; MCU: 18056.128.H
3G	:	
Support Band	:	☒ WCDMA Band II (U.S.-Band) ☒ WCDMA Band V (U.S.-Band) ☒ WCDMA Band IV (U.S.-Band) ☐ WCDMA Band I (EU-Band) ☐ WCDMA Band VIII (EU-Band)
Release Version	:	R9
Type Of Modulation	:	WCDMA: QPSK; HSDPA/HSUPA: QPSK
Antenna Description	:	External Antenna 3.0dBi (max.) For WCDMA Band II 3.0dBi (max.) For WCDMA Band IV 1.5dBi (max.) For WCDMA Band V
LTE	:	
Support Band	:	☒ E-UTRA Band 2(U.S.-Band) ☒ E-UTRA Band 4(U.S.-Band) ☒ E-UTRA Band 5(U.S.-Band) ☒ E-UTRA Band 12(U.S.-Band) ☒ E-UTRA Band 13(U.S.-Band) ☒ E-UTRA Band 25(U.S.-Band) ☒ E-UTRA Band 26(U.S.-Band)
LTE Release Version	:	R9
Type Of Modulation	:	QPSK/16QAM
Antenna Description	:	External Antenna 3.0dBi (max.) For E-UTRA Band 2 3.0dBi (max.) For E-UTRA Band 4 1.5dBi (max.) For E-UTRA Band 5 1.5dBi (max.) For E-UTRA Band 12 1.5dBi (max.) For E-UTRA Band 13 3.0dBi (max.) For E-UTRA Band 25 1.5dBi (max.) For E-UTRA Band 26
Power Class	:	Class 3
GPS function	:	Support and only RX
Extreme temp. Tolerance	:	-30°C to +50°C
Extreme vol. Limits	:	5VDC to 7VDC (nominal: 6VDC)
Exposure category	:	General population/uncontrolled environment
EUT Type	:	Production Unit
Device Type	:	Mobile Device

2. Evaluation Method

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.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0. The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3. Limit

3. 1 Refer Evaluation Method

ANSI C95.1–1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.
FCC CFR 47 part1 1.1310: Radiofrequency radiation exposure limits.
FCC CFR 47 part2 2.1091: Radiofrequency radiation exposure evaluation: mobile devices

3. 2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	($900/f^2$)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	($180/f^2$)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz
*=Plane-wave equivalent power density

4. MPE Calculation Method

Predication of MPE limit at a given distance
Equation from page 18 of OET Bulletin 65, Edition 97-01

$S=PG/4\pi R^2$

Where: S=power density
P=power input to antenna
G=power gain of the antenna in the direction of interest relative to an isotropic radiator
R=distance to the center of radiation of the antenna

5. Antenna Information

Artemis Antenna can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Note
Antenna 1	External Antenna	600MHz-3000MHz	3.0dBi for WCDMA Band II/IV 1.5dBi for WCDMA Band V 3.0dBi For E-UTRA Band 2 3.0dBi For E-UTRA Band 4 1.5dBi For E-UTRA	WCDMA/LTE Antenna

			Band 5 1.5dBi For E-UTRA Band 12 1.5dBi For E-UTRA Band 13 3.0dBi For E-UTRA Band 25 1.5dBi For E-UTRA Band 26	

6. Conducted Power And Tune up tolerance

<WCDMA Max. Average Power>

Mode	Channel	Frequency(MHz)	Max. Average Power (dBm)	Tune up tolerance (dBm)
WCDMA Band II	Low	1852.4	23.41	23±1
	Middle	1880	23.27	23±1
	High	1907.6	23.25	23±1
WCDMA Band IV	Low	1712.4	23.14	23±1
	Middle	1732.6	23.33	23±1
	High	1752.6	23.20	23±1
WCDMA Band V	Low	826.4	22.83	23±1
	Middle	836.4	22.96	23±1
	High	846.6	22.78	23±1

<LTE>

Mode		Frequency range(MHz)	Max. Average Power (dBm)	Tune up tolerance (dBm)
LTE	Band 2	1850-1910	22.97	22±2
LTE	Band 4	1710-1755	22.58	22±2
LTE	Band 5	824-849	23.54	22±2
LTE	Band 12	699-716	23.54	22±2
LTE	Band 13	777-787	23.36	22±2
LTE	Band 25	1850-1915	22.94	22±2
LTE	Band 26	814-824	23.22	22±2
LTE	Band 26	824-849	23.17	22±2

7. Measurement Results

7.1 Standalone MPE

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, r =20cm, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

Mode	Out Power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm2)	MPE Limits (mW/cm2)
	dBm	mw				
WCDMA Band II	24	251.1886	3.0	1.9953	0.0997	1.0000
WCDMA Band IV	24	251.1886	3.0	1.9953	0.0997	1.0000
WCDMA Band V	24	251.1886	1.5	1.4125	0.0706	0.5493
LTE Band 2	24	251.1886	3.0	1.9953	0.0997	1.0000
LTE Band 4	24	251.1886	3.0	1.9953	0.0997	1.0000
LTE Band 5	24	251.1886	1.5	1.4125	0.0706	0.5493
LTE Band 12	24	251.1886	1.5	1.4125	0.0706	0.4460
LTE Band 13	24	251.1886	1.5	1.4125	0.0706	0.5180
LTE Band 25	24	251.1886	3.0	1.9953	0.0997	1.0000
LTE Band 26(814-824)	24	251.1886	1.5	1.4125	0.0706	0.5427
LTE Band 26(824-849)	24	251.1886	1.5	1.4125	0.0706	0.5493

Remark:
1. *Output power including turn-up tolerance;*
2. *Output power is burst average power;*
3. *MPE values = PG/4πR*
4. *MPE evaluate distance is 20cm from user manual provide by manufacturer;*

7.2 Simultaneous Transmission MPE

Note: The WCDMA and LTE share the same antenna, so no need consider simultaneous transmission;

8. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

.....THE END OF REPORT.....