Maximum Permissible Exposure Report

1. Product Information

EUT	:	4G Module
Test Model	:	Air795U
Power Supply	:	DC 3.8V
Hardware Version	:	Air795U_A11
Software Version	:	/
2G		
Support Band	:	☒ GSM 850 (U.S.-Band) ☒ PCS 1900 (U.S.-Band)
Release Version	:	R99
GPRS Class	:	Class 12
Type Of Modulation	:	GMSK for GPRS
Antenna Description	:	External Antenna 0.78dBi (max.) For GSM 850 2.21dBi (max.) For DCS 1900
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 17(U.S.-Band) ☒ E-UTRA Band 25(U.S.-Band) ☒ E-UTRA Band 26(U.S.-Band) ☒ E-UTRA Band 38(U.S.-Band) ☒ E-UTRA Band 41(U.S.-Band) ☒ E-UTRA Band 66(U.S.-Band)
LTE Release Version	:	R13
Type Of Modulation	:	QPSK/16QAM
Antenna Description	:	PIFA Antenna 2.21dBi (max.) For E-UTRA Band 2 2.09dBi (max.) For E-UTRA Band 4 0.78dBi (max.) For E-UTRA Band 5 0.61dBi (max.) For E-UTRA Band 12 0.56dBi (max.) For E-UTRA Band 13 0.61dBi (max.) For E-UTRA Band 17 2.21dBi (max.) For E-UTRA Band 25 0.71dBi (max.) For E-UTRA Band 26

		2.77dBi (max.) For E-UTRA Band 38 2.79dBi (max.) For E-UTRA Band 41 2.09dBi (max.) For E-UTRA Band 66
Power Class	:	Class 3
Exposure category	:	General population/uncontrolled environment
EUT Type	:	Production Unit
Device Type	:	Mobile Devices

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 C95.1–2019: IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz 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/f2)*	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/Uncontrolled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f2)*	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

EUT can only use antennas certificated as follows provided by manufacturer;

Internal/External Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Notes
External	PIFA Antenna	824-849MHz 1850-1910MHz 1710-1755MHz 1850-1910MHz 1710-1755MHz 824-849MHz	2.21dBi (max.) For E-UTRA Band 2 2.09dBi (max.) For E-UTRA Band 4 0.78dBi (max.) For E-UTRA Band 5 0.61dBi (max.) For E-UTRA Band 12 0.56dBi (max.) For E-UTRA Band 13 0.61dBi (max.) For E-UTRA Band 17	GSM/LTE Antenna

		699-716MHz 777-787MHz 704-716MHz 1850-1915MHz 814-824MHz 824-849MHz 2570-2620MHz 2496-2690MHz 1710-1780MHz	2.21dBi (max.) For E-UTRA Band 25 0.71dBi (max.) For E-UTRA Band 26 2.77dBi (max.) For E-UTRA Band 38 2.79dBi (max.) For E-UTRA Band 41 2.09dBi (max.) For E-UTRA Band 66	

6. Conducted Power

[GSM Max Average Power]

Test Mode	Channel	Frequency (MHz)	Max Average Power (dBm)	ANT Max. Tune Up Power (dBm)
GSM 850	Low	824.2	32.50	32.0±1.0
	Middle	836.6	32.57	32.0±1.0
	High	848.8	32.50	32.0±1.0
GSM 1900	Low	1850.2	29.54	29.0±1.0
	Middle	1880.0	29.57	29.0±1.0
	High	1909.8	29.50	29.0±1.0

[LTE Max Average Power]

Test Mode		Channel	Max Average Power (dBm)	ANT Max. Tune Up Power (dBm)
LTE	Band 2	LCH	21.05	21.0±1.0
		MCH	21.25	21.0±1.0
		HCH	22.25	22.0±1.0
	Band 4	LCH	22.37	22.0±1.0
		MCH	22.24	22.0±1.0
		HCH	22.33	22.0±1.0
	Band 5	LCH	22.87	22.0±1.0
		MCH	22.88	22.0±1.0
		HCH	22.72	22.0±1.0
	Band 12	LCH	22.89	22.0±1.0
		MCH	22.75	22.0±1.0
		HCH	22.76	22.0±1.0
	Band 13	LCH	23.30	23.0±1.0
		MCH	23.19	23.0±1.0
		HCH	23.08	23.0±1.0
	Band 17	LCH	22.73	22.0±1.0
		MCH	22.80	22.0±1.0
		HCH	22.68	22.0±1.0
	Band 25	LCH	23.18	23.0±1.0
		MCH	21.89	21.0±1.0
		HCH	21.89	21.0±1.0
	Band 26	LCH	22.64	22.0±1.0
		MCH	22.62	22.0±1.0
		HCH	22.70	22.0±1.0
	Band 38	LCH	21.34	21.0±1.0
		MCH	21.08	21.0±1.0
		HCH	20.86	20.0±1.0
	Band 41	LCH	21.03	21.0±1.0
		MCH	21.10	21.0±1.0
		HCH	20.85	20.0±1.0
	Band 66	LCH	22.35	22.0±1.0
		MCH	22.26	22.0±1.0
		HCH	22.14	22.0±1.0

7. Measurement Results

7.1 Standalone MPE Evaluation

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.

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm2)	MPE Limits (mW/cm2)
	dBm	mW				
GSM 850	33.0	1995.2623	0.78	1.1967	0.4750	0.5493
GSM 1900	30.0	1000.0000	2.21	1.6634	0.3309	1.0000
LTE Band 2	23.0	199.5262	2.21	1.6634	0.0660	1.0000
LTE Band 4	23.0	199.5262	2.09	1.6181	0.0642	1.0000
LTE Band 5	23.0	199.5262	0.78	1.1967	0.0475	0.5667
LTE Band 12	23.0	199.5262	0.61	1.1508	0.0457	0.4660
LTE Band 13	24.0	251.1886	0.56	1.1376	0.0568	0.5180
LTE Band 17	23.0	199.5262	0.61	1.1508	0.0457	0.4893
LTE Band 25	24.0	251.1886	2.21	1.6634	0.0831	1.0000
LTE Band 26	23.0	199.5262	0.71	1.1776	0.0467	0.5427
LTE Band 38	22.0	158.4893	2.77	1.8923	0.0597	1.0000
LTE Band 41	22.0	158.4893	2.79	1.9011	0.0599	1.0000
LTE Band 66	23.0	199.5262	2.09	1.6181	0.0642	1.0000

Remark:
1. Output power including tune-up tolerance;
2. Output power was adjust to duty cycle at 100% if measured duty cycle less than 98%;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer.

8.2 Simultaneous Transmission MPE Evaluation

The EUT equiped with one antenna. So no need consider simultaneous transmission.

9. 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----------