

RF EXPOSURE EVALUATION

KDB 447498 D01 Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies v06.

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	2A7MV-100-RTU-020
EUT	UltraGate
Frequency band (Operating)	☒ BT: 2.402GHz ~ 2.480GHz ☒ BLE: 2.402GHz ~ 2.480GHz ☒ 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: GSM 850: 824.2MHz~848.8 MHz PCS 1900: 1850.2MHz~1909.8 MHz 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 7: 2502.5 MHz – 2567.5 MHz LTE FDD Band 12: 699.7 MHz – 715.3 MHz LTE FDD Band 13: 779.5 MHz – 784.5 MHz LTE FDD Band 25: 1850.7 MHz – 1914.3 MHz LTE FDD Band 26: 814.7 MHz – 848.3 MHz LTE TDD Band 38: 2572.5 MHz – 2617.5 MHz LTE TDD Band 41: 2498.5 MHz – 2687.5 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

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	☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity
Antenna gain (Max)	BT&BLE&Wi-Fi 2.4G: 2.93dBi GSM 850: 5.5dBi PCS 1900: 5.5dBi WCDMA Band II: 5.5dBi WCDMA Band V: 5.5dBi WCDMA Band IV: 5.5dBi LTE FDD Band 2: 5.5dBi LTE FDD Band 4: 5.5dBi LTE FDD Band 5: 5.5dBi LTE FDD Band 7: 5.5dBi LTE FDD Band 12: 5.5dBi LTE FDD Band 13: 5.5dBi LTE FDD Band 25: 5.5dBi LTE FDD Band 26: 5.5dBi LTE TDD Band 38: 5.5dBi LTE TDD Band 41: 5.5dBi LTE FDD Band 66: 5.5dBi
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	3.50	3.50	±1	4.50	2.93	0.0011	1
BLE	0.56	0.56	±1	1.56	2.93	0.0006	1
WiFi 2.4G	14.93	14.93	±1	15.93	2.93	0.0153	1
GSM 850	28.20	28.20	±0.5	27.20	5.5	0.5235	0.55
PCS 1900	27.77	27.77	±1	28.77	5.5	0.5320	1.00
WCDMA Band II	22.91	22.91	±1	23.91	5.5	0.1738	1.00
WCDMA Band V	23.09	23.09	±1	24.09	5.5	0.1811	1.00
WCDMA Band IV	21.00	21.00	±1	22.00	5.5	0.1119	0.55
LTE Band 2	23.37	23.37	±1	24.37	5.5	0.1932	1.00
LTE Band 4	21.69	21.69	±1	22.69	5.5	0.1312	1.00
LTE Band 5	22.9	22.9	±1	23.90	5.5	0.1734	0.55
LTE Band 7	20.33	20.33	±1	21.33	5.5	0.0959	1.00
LTE Band 12	22.28	22.28	±1	23.28	5.5	0.1503	0.47
LTE Band 13	22.49	22.49	±1	23.49	5.5	0.1577	0.52

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LTE Band 25	21.24	21.24 ±1	22.24	5.5	0.1183	1.00
LTE Band 26	22.34	22.34 ±1	23.34	5.5	0.1524	0.54
LTE Band 38	21.54	21.54 ±1	22.54	5.5	0.1268	1.00
LTE Band 41	21.26	21.26 ±1	22.26	5.5	0.1188	1.00
LTE Band 66	23.14	23.14 ±1	24.14	5.5	0.1832	1.00

No. Applicable Simultaneous Transmission

1. WiFi 2.4G+GSM 850
2. WiFi 2.4G+WCDMA
3. WiFi 2.4G+LTE

The Maximum simultaneous transmission for WiFi 2.4G+GSM 850:

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

$$=S_{WLAN}/S_{limit-2.4}+ S_{GSM 850}/S_{limit-LTE}$$

$$=0.0153/1+0.5235/0.55$$

$$=0.9671$$

$$< 1.0$$

Result: No Standalone SAR test is required.

