

FCC RF Exposure Evaluation

1. Product Information

| | | |
|-------------------------|---|--|
| FCC ID: | 2AZINICG200NA | |
| Product name | Edge Computer | |
| Test Model number | ICG-200-NA | |
| Power supply | 12Vdc | |
| Modulation Type | WIFI | 802.11b : DSSS 802.11g/n : OFDM |
| | Bluetooth | GFSK, 8DPSK, $\pi/4$ DQPSK |
| | WCDMA | BPSK |
| | LTE | QPSK, 16QAM |
| Antenna Type | Suction cup Antenna | |
| Antenna Gain | For WIFI: Suction cup Antenna with 3dBi gain For WCDMA/LTE: Suction cup Antenna Main antenna: 0dBi AUX-Only RX: 0dBi | |
| Hardware version | V10 | |
| Software version | V1.4 | |
| FCC Operation frequency | WIFI | 2412MHz~2462MHz |
| | WCDMA | 826.4 MHz ~ 846.6 MHz (FOR WCDMA 850) 1712.4 MHz ~ 1752.6 MHz (FOR WCDMA 1700) 1852.4 MHz ~ 1907.6 MHz (FOR WCDMA 1900) |
| | Bluetooth | 2402MHz~2480MHz |
| | LTE | LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 824 MHz ~ 849 MHz &814 MHz ~ 824 MHz LTE Band 30: 2307.5 MHz ~ 2312.5 MHz LTE Band 66: 1710.7 MHz ~ 1779.3 MHz |
| Exposure category | General population/uncontrolled environment | |
| EUT Type | Production Unit | |

2. Evaluation method and Limit

According to ANSI/IEEE C95.1-1992, the Criteria Listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

| Frequency range (MHz) | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm ²) | Averaging time (minutes) |
|--|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| (A) 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 |
| 300-1,500 | | | f/300 | 6 |
| 1,500-100,000 | | | 5 | 6 |
| (B) Limits for General Population/Uncontrolled Exposure | | | | |
| 0.3-1.34 | 614 | 1.63 | *100 | 30 |
| 1.34-30 | 824/f | 2.19/f | *180/f ² | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1,500 | | | f/1500 | 30 |
| 1,500-100,000 | | | 1.0 | 30 |

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

The MPE was calculated at **20 cm** to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna

Maximum conducted output power (Measured) & Manufacturing tolerance

| Specification | Operating Mode | Conducted Output Power (dBm) | Target (dBm) | Tolerance \pm (dB) |
|------------------|--------------------------|------------------------------|--------------|----------------------|
| 2.4GWIFI | 802.11b | 14.78 | 14 | 1 |
| | 802.11g | 15.23 | 15 | 1 |
| | 802.11n(HT20) | 17.15 | 17 | 1 |
| Bluetooth BR+EDR | GFSK | 3.96 | 4 | 1 |
| | $\pi/4$ DQPSK | 3.31 | 4 | 1 |
| | 8DPSK | 3.56 | 4 | 1 |
| Bluetooth LE | GFSK | 3.88 | 4 | 1 |
| WCDMA | Band II | 23.32 | 23 | 1 |
| | Band IV | 23.34 | 23 | 1 |
| | Band V | 23.36 | 23 | 1 |
| LTE | Band 25/2 | 23.88 | 23 | 1 |
| | Band 66/4 | 22.97 | 23 | 1 |
| | Band 26/5 @824-849MHz | 23.70 | 23 | 1 |
| | Band 7 | 23.77 | 23 | 1 |
| | Band 12 | 23.50 | 23 | 1 |
| | Band 13 | 23.33 | 23 | 1 |
| | Band 26 @814-824MHz | 23.54 | 23 | 1 |
| Band 30 | 23.90 | 23 | 1 | |

Note:

LTE BAND 26 (824-849MHz) overlaps the entire frequency range of LTE BAND 5 (824-849MHz). therefore, test data provided in this report covers BAND 5, as well as BAND 26 subject to Part 22.

LTE BAND 66 (1710-1780MHz) overlaps the entire frequency range of LTE BAND 4(1710-1755MHz). therefore, test data provided in this report covers BAND 66 as well as BAND 4.

LTE BAND 25 (1850-1915MHz) overlaps the entire frequency range of LTE BAND 2 (1850-1910MHz). therefore, test data provided in this report covers BAND 25 as well as BAND 2.

According to KDB Publication 447498 D01, Section 7.2

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0 , according to calculated/estimated, numerically modeled, or measured field strengths or power density. 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 the 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.

3. Conducted Power

3.1 Test Setup Block Diagram for WWAN



3.2 Test Setup Block Diagram for WLAN



3.3 Test Procedure

WWAN:

- 1) The EUT was directly connected to the Base Station and antenna output port as show in the Block diagram;
- 2) Reading average power in RMS detector.

WLAN/RLAN

- 1) The EUT was directly connected to the spectrum analyser and antenna output port as show in the Block diagram;
- 2) Reading average power in RMS detector.

3.3 Measurement Equipment

| Item | Equipment | Manufacturer | Model No. | Inventory No. | Last Cal. | Next Cal. |
|------|-------------------|--------------|-----------|---------------|------------|------------|
| 1 | Base Station | R&S | CMW500 | 164998 | 2020-01-05 | 2022-01-04 |
| 2 | Spectrum Analyzer | Keysight | N9010A | MY56070788 | 2020-01-05 | 2022-01-04 |

4. Evaluation Results

| Collocated WWAN and other Wireless | | | | | | | | For FCC | |
|------------------------------------|-----------------|-----------------------|------------------------|---------------------|-------------------------|-----------------------|-------------------|---|-----------------------------|
| Band | Frequency (MHz) | Antenna Distance (cm) | Antenna Gain in Linear | Maximum Power (dBm) | Maximum EIRP(ERP) (dBm) | Maximum EIRP(ERP) (W) | Average EIRP (mW) | Power Density at 20cm (mW/cm ²) | Limit (mW/cm ²) |
| WCDMA Band II | 1852.4 | 20 | 1.00 | 24 | 24.00 | 0.251 | 251.19 | 0.049 | 1 |
| WCDMA Band IV | 1712.4 | 20 | 1.00 | 24 | 24.00 | 0.251 | 251.19 | 0.049 | 1 |
| WCDMA Band V | 826.4 | 20 | 1.00 | 24 | 23.65 | 0.232 | 251.19 | 0.049 | 0.55 |
| LTE Band 2 | 1850.7 | 20 | 1.00 | 24 | 24.00 | 0.251 | 251.19 | 0.049 | 1 |
| LTE Band 4 | 1710.7 | 20 | 1.00 | 24 | 24.00 | 0.251 | 251.19 | 0.049 | 1 |
| LTE Band 5 | 824.7 | 20 | 1.00 | 24 | 23.65 | 0.232 | 251.19 | 0.049 | 0.55 |
| LTE Band 7 | 2502.5 | 20 | 1.00 | 24 | 24.00 | 0.251 | 251.19 | 0.049 | 1 |

| | | | | | | | | | |
|------------------|--------|----|------|----|-------|-------|--------|--------|------|
| LTE Band 12 | 699.7 | 20 | 1.00 | 24 | 23.65 | 0.232 | 251.19 | 0.049 | 0.47 |
| LTE Band 13 | 779.5 | 20 | 1.00 | 24 | 23.65 | 0.232 | 251.19 | 0.049 | 0.52 |
| LTE Band 25 | 1850.7 | 20 | 1.00 | 24 | 24.00 | 0.251 | 251.19 | 0.049 | 1 |
| LTE Band 26 | 814.7 | 20 | 1.00 | 24 | 23.65 | 0.232 | 251.19 | 0.049 | 0.54 |
| Band30 | 2307.5 | 20 | 1.00 | 24 | 24.00 | 0.251 | 251.19 | 0.049 | 1 |
| Band 66 | 1710.7 | 20 | 1.00 | 24 | 24.00 | 0.251 | 251.19 | 0.049 | 1 |
| 2.4GHz WLAN | 2412 | 20 | 2.00 | 18 | 21.00 | 0.126 | 63.10 | 0.024 | 1 |
| 2.4GHz Bluetooth | 2402 | 20 | 2.00 | 5 | 8.00 | 0.006 | 6.31 | 0.0001 | 1 |

For WIFI 2.4G, Bluetooth and LTE WCDMA can transmit simultaneously, the total evaluation result as below:

| Collocated WWAN and other Wireless | | | | | | For FCC | | |
|------------------------------------|----------------|--|------|-----------|-------------------------|-----------------------------|-----------------------------|-----------|
| No. | Configurations | Maximum MPE Value (mw/cm ²) | | | | Limits(mw/cm ²) | Margin(mw/cm ²) | PASS/Fail |
| | | WWAN | WLAN | Bluetooth | Transmit simultaneously | | | |
| 1 | WCDMA Band 2 | 0.05 | 0.02 | 0.00006 | 0.07 | 1 | 0.93 | PASS |
| 2 | WCDMA Band 4 | 0.05 | 0.02 | 0.00006 | 0.07 | 1 | 0.93 | PASS |
| 3 | WCDMA Band 5 | 0.09 | 0.02 | 0.00006 | 0.11 | 1 | 0.89 | PASS |
| 4 | LTE Band 2 | 0.05 | 0.02 | 0.00006 | 0.07 | 1 | 0.93 | PASS |
| 5 | LTE Band 4 | 0.05 | 0.02 | 0.00006 | 0.07 | 1 | 0.93 | PASS |
| 6 | LTE Band 5 | 0.09 | 0.02 | 0.00006 | 0.11 | 1 | 0.89 | PASS |
| 7 | LTE Band 7 | 0.05 | 0.02 | 0.00006 | 0.07 | 1 | 0.93 | PASS |
| 8 | LTE Band 12 | 0.11 | 0.02 | 0.00006 | 0.13 | 1 | 0.87 | PASS |
| 9 | LTE Band 13 | 0.09 | 0.02 | 0.00006 | 0.12 | 1 | 0.88 | PASS |
| 10 | LTE Band 25 | 0.05 | 0.02 | 0.00006 | 0.07 | 1 | 0.93 | PASS |
| 11 | LTE Band 26 | 0.09 | 0.02 | 0.00006 | 0.12 | 1 | 0.88 | PASS |
| 12 | LTE Band 30 | 0.05 | 0.02 | 0.00006 | 0.07 | 1 | 0.93 | PASS |
| 13 | LTE Band 66 | 0.05 | 0.02 | 0.00006 | 0.07 | 1 | 0.93 | PASS |

Remark:

1. Output power including tune up tolerance;
2. The exposure safety distance is 20cm;
3. $EIRP = EPR + 2.15 (dB)$

5. Conclusion

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

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