

TEST REPORT

Applicant: Cavli Inc.
Address: 99 South Almaden Blvd., Suite 600, San Jose, CA
95113 United States
Equipment Type: LTE MODEM
Model Name: C42GM (refer to section 2.3)
Brand Name: CAVLI WIRELESS
FCC ID: 2BB64C42GM
Test Standard: 47 CFR Part 2.1091
KDB 447498 D04 v01
Sample Arrival Date: May 31, 2023
Test Date: Jul. 10, 2023 - Dec. 08, 2023
Date of Issue: Dec. 26, 2023

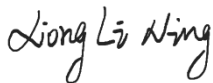
ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Xiong Lining

Checked by: Xu Rui

Approved by: Tolan Tu
(Testing Director)



| Revision History | | |
|-------------------------|----------------------|----------------------|
| Version | Issue Date | Revisions Content |
| <u>Rev. 01</u> | <u>Dec. 26, 2023</u> | <u>Initial Issue</u> |

TABLE OF CONTENTS

| | | |
|-----|---|----|
| 1 | GENERAL INFORMATION..... | 3 |
| 1.1 | Test Laboratory | 3 |
| 1.2 | Test Location | 3 |
| 2 | PRODUCT INFORMATION | 4 |
| 2.1 | Applicant Information | 4 |
| 2.2 | Manufacturer Information..... | 4 |
| 2.3 | General Description for Equipment under Test (EUT)..... | 4 |
| 2.4 | Technical Information | 4 |
| 3 | SUMMARY OF TEST RESULT | 6 |
| 3.1 | Test Standards | 6 |
| 4 | DEVICE CATEGORY AND LEVELS LIMITS | 7 |
| 5 | ASSESSMENT RESULT | 9 |
| 5.1 | Output Power | 9 |
| 5.2 | Tune-up power | 10 |
| 5.3 | RF Exposure Evaluation Result | 11 |
| 5.4 | Conclusion..... | 11 |

1 GENERAL INFORMATION

1.1 Test Laboratory

| | |
|--------------|--|
| Name | Shenzhen BALUN Technology Co., Ltd. |
| Address | Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China |
| Phone Number | +86 755 6685 0100 |

1.2 Test Location

| | |
|---------------------------|---|
| Name | Shenzhen BALUN Technology Co., Ltd. |
| Location | <input checked="" type="checkbox"/> Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China |
| | <input type="checkbox"/> 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China |
| Accreditation Certificate | The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196. |

2 PRODUCT INFORMATION

2.1 Applicant Information

| | |
|-----------|---|
| Applicant | Cavli Inc. |
| Address | 99 South Almaden Blvd., Suite 600, San Jose, CA 95113 United States |

2.2 Manufacturer Information

| | |
|--------------|---|
| Manufacturer | Cavli Inc. |
| Address | 99 South Almaden Blvd., Suite 600, San Jose, CA 95113 United States |

2.3 General Description for Equipment under Test (EUT)

| | |
|---|--|
| EUT Name | LTE MODEM |
| Model Name Under Test | C42GM |
| Series Model Name | C42GM-N16S0N, C42GM-N16S0H, C42GM-N16GNN, C42GM-N16GNH, C42GM-M16S0N, C42GM-M16S0H, C42GM-M16GNN, C42GM-M16GNH, C42GM-N32S0N, C42GM-N32S0H, C42GM-N32GNN, C42GM-N32GNH, C42GM-M32S0N, C42GM-M32S0H, C42GM-M32GNN, C42GM-M32GNH |
| Description of Model name differentiation | The difference between the series models is whether they support GNSS or not, with different memory (16MB or 32MB) and internal sim variant will have additional eSim. The circuit schematic and PCB layout are exactly the same. (this information provided by the customer) |
| Hardware Version | C42GM_V3.4(2410) |
| Software Version | V1.2.1 |
| Dimensions (Approx.) | N/A |
| Weight (Approx.) | N/A |

2.4 Technical Information

| | |
|-----------------------------------|---|
| Network and Wireless connectivity | 4G Network FDD LTE-M1 Band 2/4/5/12/13/14/17/18/19/26/66/71/85 FDD NB-IoT Band 2/4/5/12/13/14/17/18/19/26/66/71/85 BDS, GPS, SBAS, GLONASS, Galileo, QZSS |
|-----------------------------------|---|

The requirement for the following technical information of the EUT was tested in this report:

| | | | |
|-----------------|------------|---------------------|---------------------|
| Operating Mode | LTE | | |
| Frequency Range | LTE Band 2 | TX: 1850 ~ 1910 MHz | RX: 1930 ~ 1990 MHz |
| | LTE Band 4 | TX: 1710 ~ 1755 MHz | RX: 2110 ~ 2155 MHz |

| | | | |
|-------------------|--|---------------------|---------------------|
| | LTE Band 5 | TX: 824 ~ 849 MHz | RX: 869 ~ 894 MHz |
| | LTE Band 12 | TX: 699 ~ 716 MHz | RX: 729 ~ 746 MHz |
| | LTE Band 13 | TX: 777 ~ 787 MHz | RX: 746 ~ 756 MHz |
| | LTE Band 14 | TX: 788 ~ 798 MHz | RX: 758 ~ 768 MHz |
| | LTE Band 17 | TX: 704 ~ 716 MHz | RX: 734 ~ 746 MHz |
| | LTE Band 18 | TX: 814~ 824 MHz | RX: 860 ~ 869 MHz |
| | | TX: 824~ 830 MHz | RX: 869 ~ 875 MHz |
| | LTE Band 19 | TX: 830 ~ 845 MHz | RX: 875 ~ 890 MHz |
| | LTE Band 25 | TX: 1850 ~ 1915 MHz | RX: 1930 ~ 1995 MHz |
| | LTE Band 26 | TX: 814 ~ 824 MHz | RX: 859 ~ 869 MHz |
| | | TX: 824 ~ 849 MHz | RX: 869 ~ 894 MHz |
| | LTE Band 71 | TX: 663 ~ 698 MHz | RX: 617 ~ 652 MHz |
| | LTE Band 85 | TX: 698 ~ 716 MHz | RX: 728 ~ 746 MHz |
| Antenna Type | WWAN | External antenna | |
| Exposure Category | General Population/Uncontrolled Exposure | | |
| Product Type | Mobile Device | | |

3 SUMMARY OF TEST RESULT

3.1 Test Standards

| No. | Identity | Document Title |
|-----|--------------------|--|
| 1 | 47 CFR Part 2.1091 | Radiofrequency radiation exposure evaluation: mobile devices |
| 2 | KDB 447498 D04 v01 | 447498 D04 Interim General RF Exposure Guidance v01 |

4 DEVICE CATEGORY AND LEVELS LIMITS

Mobile Device:

CFR Title 47 §2.1091(b)

(b) For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.

FCC KDB 447498 D04 General RF Exposure Guidance v01 Limit

Evaluation of compliance with the exposure limits in § 1.1310 is necessary if the ERP of the device is greater than ERP_{20cm} in Formula (B.1) [repeated from § 2.1091(c)(1) and § 1.1307(b)(1)(i)(B)].

$$P_{\text{th}} \text{ (mW)} = \text{ERP}_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B.1})$$

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i. e., without consideration of ERP only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

The SAR-based exemption formula of § 1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula (B.2).

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad \text{(B.2)}$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20\text{cm}}$ is per Formula (B.1). The example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

| Frequency (MHz) | Distance (mm) | | | | | | | | | |
|-----------------|---------------|----|----|-----|-----|-----|-----|-----|-----|-----|
| | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| 300 | 39 | 65 | 88 | 110 | 129 | 148 | 166 | 184 | 201 | 217 |
| 450 | 22 | 44 | 67 | 89 | 112 | 135 | 158 | 180 | 203 | 226 |
| 835 | 9 | 25 | 44 | 66 | 90 | 116 | 145 | 175 | 207 | 240 |
| 1900 | 3 | 12 | 26 | 44 | 66 | 92 | 122 | 157 | 195 | 236 |
| 2450 | 3 | 10 | 22 | 38 | 59 | 83 | 111 | 143 | 179 | 219 |
| 3600 | 2 | 8 | 18 | 32 | 49 | 71 | 96 | 125 | 158 | 195 |
| 5800 | 1 | 6 | 14 | 25 | 40 | 58 | 80 | 106 | 136 | 169 |

5 ASSESSMENT RESULT

5.1 Output Power

| LTE-M1 | | | | | | | | |
|-----------------------|--------|--------|--------|---------|---------|---------|---------|--------------------------|
| Mode | Band 2 | Band 4 | Band 5 | Band 12 | Band 13 | Band 14 | Band 17 | Band 18 (824-830 MHz) |
| Conducted Power (dBm) | 22.55 | 21.96 | 22.63 | 24.56 | 22.97 | 22.80 | 24.22 | 22.48 |
| Antenna Gain (dBi) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| EIRP/ERP (dBm) | 24.55 | 23.96 | 22.48 | 24.41 | 22.82 | 22.65 | 24.07 | 22.33 |

Note: This report listed the worst case power value, please refer to BL-SZ2370129-501 report for more details.

| LTE-M1 | | | | | | | | |
|-----------------------|--------------------------|---------|---------|---------------------|---------------------|---------|---------|---------|
| Mode | Band 18 (815-824 MHz) | Band 19 | Band 25 | Band 26 (Part22) | Band 26 (Part90) | Band 66 | Band 71 | Band 85 |
| Conducted Power (dBm) | 22.37 | 22.59 | 22.57 | 22.94 | 22.59 | 22.13 | 24.71 | 24.33 |
| Antenna Gain (dBi) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| EIRP/ERP (dBm) | 22.22 | 22.44 | 24.57 | 22.79 | 22.44 | 24.13 | 24.56 | 24.18 |

Note: This report listed the worst case power value, please refer to BL-SZ2370129-501 report for more details.

| NB-IoT | | | | | | | | |
|-----------------------|--------|--------|--------|---------|---------|---------|---------|--------------------------|
| Mode | Band 2 | Band 4 | Band 5 | Band 12 | Band 13 | Band 14 | Band 17 | Band 18 (824-830 MHz) |
| Conducted Power (dBm) | 21.40 | 20.72 | 22.64 | 23.45 | 22.69 | 22.89 | 23.68 | 23.37 |
| Antenna Gain (dBi) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| EIRP/ERP (dBm) | 23.40 | 22.72 | 22.49 | 23.30 | 22.54 | 22.74 | 23.53 | 23.22 |

Note: This report listed the worst case power value, please refer to BL-SZ2370129-501 report for more details.

| NB-IoT | | | | | | | | |
|-----------------------|--------------------------|---------|---------|---------------------|---------------------|---------|---------|---------|
| Mode | Band 18 (815-824 MHz) | Band 19 | Band 25 | Band 26 (Part22) | Band 26 (Part90) | Band 66 | Band 71 | Band 85 |
| Conducted Power (dBm) | 23.47 | 23.13 | 21.42 | 23.52 | 23.64 | 20.55 | 24.17 | 23.83 |
| Antenna Gain (dBi) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| EIRP/ERP (dBm) | 23.32 | 22.98 | 23.42 | 23.37 | 23.49 | 22.55 | 24.02 | 23.68 |

Note: This report listed the worst case power value, please refer to BL-SZ2370129-501 report for more details.

5.2 Tune-up power

| Mode | Conducted Power Range (dBm) | EIRP Range (dBm) | ERP Range (dBm) |
|------------------------------|-----------------------------|------------------|-----------------|
| LTE-M1 Band 2 | [21.00,23.00] | [23.00,25.00] | [20.85,22.85] |
| LTE-M1 Band 4 | [20.00,22.00] | [22.00,24.00] | [19.85,21.85] |
| LTE-M1 Band 5 | [21.00,23.00] | / | [20.85,22.85] |
| LTE-M1 Band 12 | [23.00,25.00] | / | [22.85,24.85] |
| LTE-M1 Band 13 | [21.00,23.00] | / | [20.85,22.85] |
| LTE-M1 Band 14 | [21.00,23.00] | / | [20.85,22.85] |
| LTE-M1 Band 17 | [23.00,25.00] | / | [22.85,24.85] |
| LTE-M1 Band 18 (824-830 MHz) | [21.00,23.00] | / | [20.85,22.85] |
| LTE-M1 Band 18 (815-824 MHz) | [21.00,23.00] | / | [20.85,22.85] |
| LTE-M1 Band 19 | [21.00,23.00] | / | [20.85,22.85] |
| LTE-M1 Band 25 | [21.00,23.00] | [23.00,25.00] | [20.85,22.85] |
| LTE-M1 Band 26 (Part 22) | [21.00,23.00] | / | [20.85,22.85] |
| LTE-M1 Band 26 (Part 90) | [21.00,23.00] | / | [20.85,22.85] |
| LTE-M1 Band 66 | [21.00,23.00] | [23.00,25.00] | [20.85,22.85] |
| LTE-M1 Band 71 | [23.00,25.00] | / | [22.85,24.85] |
| LTE-M1 Band 85 | [23.00,25.00] | / | [22.85,24.85] |
| NB-IoT Band 2 | [20.00,22.00] | [22.00,24.00] | [19.85,21.85] |
| NB-IoT Band 4 | [19.00,21.00] | [21.00,23.00] | [18.85,20.85] |
| NB-IoT Band 5 | [21.00,23.00] | / | [20.85,22.85] |
| NB-IoT Band 12 | [22.00,24.00] | / | [21.85,23.85] |
| NB-IoT Band 13 | [21.00,23.00] | / | [20.85,22.85] |
| NB-IoT Band 14 | [21.00,23.00] | / | [20.85,22.85] |
| NB-IoT Band 17 | [22.00,24.00] | / | [21.85,23.85] |
| NB-IoT Band 18 (824-830 MHz) | [22.00,24.00] | / | [21.85,23.85] |
| NB-IoT Band 18 (815-824 MHz) | [22.00,24.00] | / | [21.85,23.85] |
| NB-IoT Band 19 | [22.00,24.00] | / | [21.85,23.85] |
| NB-IoT Band 25 | [20.00,22.00] | [22.00,24.00] | [19.85,21.85] |
| NB-IoT Band 26 (Part 22) | [22.00,24.00] | / | [21.85,23.85] |
| NB-IoT Band 26 (Part 90) | [22.00,24.00] | / | [21.85,23.85] |
| NB-IoT Band 66 | [19.00,21.00] | [21.00,23.00] | [18.85,20.85] |
| NB-IoT Band 71 | [23.00,25.00] | / | [22.85,24.85] |
| NB-IoT Band 85 | [22.00,24.00] | / | [21.85,23.85] |

Note1: ERP= EIRP -2.15dB.

Note2: According KDB 447498 D04, used the greater of maximum conducted power and ERP to compare with the threshold value Pth.

5.3 RF Exposure Evaluation Result

| Evolution mode | Maximum power (dBm) | Maximum power (mw) | Distance (mm) | Threshold Power (mW) | Verdict |
|------------------------------|---------------------|--------------------|---------------|----------------------|---------|
| LTE-M1 Band 2 | 23.00 | 199.53 | 200 | 3060.00 | Pass |
| LTE-M1 Band 4 | 22.00 | 158.49 | 200 | 3060.00 | Pass |
| LTE-M1 Band 5 | 23.00 | 199.53 | 200 | 1680.96 | Pass |
| LTE-M1 Band 12 | 25.00 | 316.23 | 200 | 1425.96 | Pass |
| LTE-M1 Band 13 | 23.00 | 199.53 | 200 | 1585.08 | Pass |
| LTE-M1 Band 14 | 23.00 | 199.53 | 200 | 1607.52 | Pass |
| LTE-M1 Band 17 | 25.00 | 316.23 | 200 | 1436.16 | Pass |
| LTE-M1 Band 18 (824-830 MHz) | 23.00 | 199.53 | 200 | 1680.96 | Pass |
| LTE-M1 Band 18 (815-824 MHz) | 23.00 | 199.53 | 200 | 1662.60 | Pass |
| LTE-M1 Band 19 | 23.00 | 199.53 | 200 | 1693.20 | Pass |
| LTE-M1 Band 25 | 23.00 | 199.53 | 200 | 3060.00 | Pass |
| LTE-M1 Band 26 (Part 22) | 23.00 | 199.53 | 200 | 1680.96 | Pass |
| LTE-M1 Band 26 (Part 90) | 23.00 | 199.53 | 200 | 1660.56 | Pass |
| LTE-M1 Band 66 | 23.00 | 199.53 | 200 | 3060.00 | Pass |
| LTE-M1 Band 71 | 25.00 | 316.23 | 200 | 1352.52 | Pass |
| LTE-M1 Band 85 | 25.00 | 316.23 | 200 | 1423.92 | Pass |
| NB-IoT Band 2 | 22.00 | 158.49 | 200 | 3060.00 | Pass |
| NB-IoT Band 4 | 21.00 | 125.89 | 200 | 3060.00 | Pass |
| NB-IoT Band 5 | 23.00 | 199.53 | 200 | 1680.96 | Pass |
| NB-IoT Band 12 | 24.00 | 251.19 | 200 | 1425.96 | Pass |
| NB-IoT Band 13 | 23.00 | 199.53 | 200 | 1585.08 | Pass |
| NB-IoT Band 14 | 23.00 | 199.53 | 200 | 1607.52 | Pass |
| NB-IoT Band 17 | 24.00 | 251.19 | 200 | 1436.16 | Pass |
| NB-IoT Band 18 (824-830 MHz) | 24.00 | 251.19 | 200 | 1680.96 | Pass |
| NB-IoT Band 18 (815-824 MHz) | 24.00 | 251.19 | 200 | 1662.60 | Pass |
| NB-IoT Band 19 | 23.00 | 199.53 | 200 | 1693.20 | Pass |
| NB-IoT Band 25 | 22.00 | 158.49 | 200 | 3060.00 | Pass |
| NB-IoT Band 26 (Part 22) | 24.00 | 251.19 | 200 | 1680.96 | Pass |
| NB-IoT Band 26 (Part 90) | 24.00 | 251.19 | 200 | 1660.56 | Pass |
| NB-IoT Band 66 | 21.00 | 125.89 | 200 | 3060.00 | Pass |
| NB-IoT Band 71 | 25.00 | 316.23 | 200 | 1352.52 | Pass |
| NB-IoT Band 85 | 24.00 | 251.19 | 200 | 1423.92 | Pass |

5.4 Conclusion

This EUT is deemed to comply with the reference level limits, therefore the basic restrictions are compliant with human exposure limits.

Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--END OF REPORT--