



MAXLAB Testing Co.,Ltd.

Report No.: MAX25112712-P01R01RF

## RF TEST REPORT

Report Reference No..... : MAX25112712-P01R01RF

FCC ID..... : 2AZ23-LIMCETBOX

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Date of issue..... : December 16, 2025

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Applicant's name..... : Shenzhen Limcet Technology Co.,Ltd

Address..... : 201, Floor 2, Building 1, Yintian Xifa Yonggi Science Park, No. 66, Tiezai Road, Xixiang Street, Baoan District, Shenzhen

Test specification..... :

Standard..... : KDB 447498 D01 v06

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Test item description..... : In-vehicle intelligent terminal system

Trade Mark..... : N/A

Manufacturer..... : Shenzhen Limcet Technology Co.,Ltd

Model/Type reference..... : LIMCET BOX

Listed Models ..... : LIMCET-T113-(A~Z)\*00(1~3), LIMCET-T113-SS\*003, LIMCET-T3-WS10041, LIMCET-QCM6125-(A~Z)\*004

Modulation ..... : GFSK,  $\pi/4$ DQPSK, 8DPSK  
CCK/ DSSS/ OFDM  
OFDM

Frequency..... : From 2402MHz to 2480MHz  
From 2412 - 2462MHz  
From 5180MHz-5240MHz, 5745MHz-5825MHz

Rating..... : DC 12V

Result..... : PASS

## RF Exposure Evaluation

### Limits

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)

According to KDB 447498 D01 General RF Exposure Guidance v06, Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition(s), listed below, is (are) satisfied.

Limits for Maximum Permissible Exposure (MPE)

| Frequency range (MHz)                                   | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|---------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| (A) Limits for Occupational/Controlled Exposures        |                               |                               |                                     |                          |
| 0.3–3.0                                                 | 614                           | 1.63                          | *(100)                              | 6                        |
| 3.0–30                                                  | 1842/f                        | 4.89/f                        | *(900/f <sup>2</sup> )              | 6                        |
| 30–300                                                  | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300–1500                                                |                               |                               | f/300                               | 6                        |
| 1500–100,000                                            |                               |                               | 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 <sup>2</sup> )              | 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

Friis transmission formula:  $Pd = (Pout \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

**Pd** = power density in mW/cm<sup>2</sup>, **Pout** = output power to antenna in mW;

**G** = gain of antenna in linear scale, **Pi** = 3.1416;

**R** = distance between observation point and center of the radiator in cm

Pd is the limit of MPE, 1 mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

### Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

**Test Result of RF Exposure Evaluation**

**BT**

Operation Frequency: 2402-2480MHz,

Power density limited: 1mW/ cm<sup>2</sup>

**2.4GWiFi:**

Operation Frequency: WIFI 802.11b/g/n HT20: 2412-2462MHz,

Power density limited: 1mW/ cm<sup>2</sup>

**5GWiFi:**

802.11a: 20 MHz

802.11n: 20 MHz, 40 MHz

802.11ac: 20 MHz, 40 MHz, 80MHz .

**Antenna Type:** PCB Antenna/BT

**Antenna Type:** External patch antenna/ WIFI

Antenna gain: 3.03dBi(BT)/ 2.27dBi(WIFI2.4G)/ 3.45dBi(WIFI5G)

R=20cm

**BR+EDR+BLE**

| Channel  | Frequency (MHz) | Output power to antenna (dBm) | Output power to antenna (mW) | Power Density at R=20cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Result |
|----------|-----------------|-------------------------------|------------------------------|-----------------------------------------------|-----------------------------|--------|
| GFSK     | 2402            | 4.621                         | 2.90                         | 0.00116                                       | 1.0                         | PASS   |
|          | 2441            | 4.262                         | 2.67                         | 0.00107                                       | 1.0                         | PASS   |
|          | 2480            | 4.069                         | 2.55                         | 0.00102                                       | 1.0                         | PASS   |
| Π/4DQPSK | 2402            | 6.760                         | 4.74                         | 0.00190                                       | 1.0                         | PASS   |
|          | 2441            | 6.409                         | 4.37                         | 0.00175                                       | 1.0                         | PASS   |
|          | 2480            | 6.239                         | 4.21                         | 0.00168                                       | 1.0                         | PASS   |
| 8DPSK    | 2402            | 7.230                         | 5.28                         | 0.00211                                       | 1.0                         | PASS   |
|          | 2441            | 7.072                         | 5.10                         | 0.00204                                       | 1.0                         | PASS   |
|          | 2480            | 6.690                         | 4.67                         | 0.00187                                       | 1.0                         | PASS   |
| GFSK     | 2402            | 5.642                         | 3.67                         | 0.00147                                       | 1.0                         | PASS   |
|          | 2440            | 5.354                         | 3.43                         | 0.00137                                       | 1.0                         | PASS   |
|          | 2480            | 5.241                         | 3.34                         | 0.00134                                       | 1.0                         | PASS   |

**WiFi 2.4G**

| Channel           | Frequen<br>cy<br>(MHz) | Output power<br>to antenna<br>(dBm) | Output power to<br>antenna (mW) | Power Density at<br>R=20cm<br>(mW/cm <sup>2</sup> ) | Limit<br>(mW/cm <sup>2</sup> ) | Result |
|-------------------|------------------------|-------------------------------------|---------------------------------|-----------------------------------------------------|--------------------------------|--------|
| 802.11b           | 2412                   | 12.41                               | 17.42                           | 0.00585                                             | 1.0                            | PASS   |
|                   | 2437                   | 12.62                               | 18.28                           | 0.00614                                             | 1.0                            | PASS   |
|                   | 2462                   | 12.24                               | 16.75                           | 0.00562                                             | 1.0                            | PASS   |
| 802.11g           | 2412                   | 11.85                               | 15.31                           | 0.00514                                             | 1.0                            | PASS   |
|                   | 2437                   | 11.42                               | 13.87                           | 0.00466                                             | 1.0                            | PASS   |
|                   | 2462                   | 11.62                               | 14.52                           | 0.00487                                             | 1.0                            | PASS   |
| 802.11n<br>(HT20) | 2412                   | 10.54                               | 11.32                           | 0.00380                                             | 1.0                            | PASS   |
|                   | 2437                   | 10.26                               | 10.62                           | 0.00356                                             | 1.0                            | PASS   |
|                   | 2462                   | 10.11                               | 10.26                           | 0.00344                                             | 1.0                            | PASS   |
| 802.11n<br>(HT40) | 2422                   | 9.85                                | 9.66                            | 0.00324                                             | 1.0                            | PASS   |
|                   | 2437                   | 9.45                                | 8.81                            | 0.00296                                             | 1.0                            | PASS   |
|                   | 2452                   | 9.32                                | 8.55                            | 0.00287                                             | 1.0                            | PASS   |

**WiFi 5G / UNII-1**

| Channel            | Frequency<br>(MHz) | Output power<br>to antenna<br>(dBm) | Output power to<br>antenna (mW) | Power Density at<br>R=20cm<br>(mW/cm <sup>2</sup> ) | Limit<br>(mW/cm <sup>2</sup> ) | Result |
|--------------------|--------------------|-------------------------------------|---------------------------------|-----------------------------------------------------|--------------------------------|--------|
| 802.11a            | 5180               | 14.52                               | 28.31                           | 0.01247                                             | 1.0                            | PASS   |
|                    | 5200               | 14.23                               | 26.49                           | 0.01167                                             | 1.0                            | PASS   |
|                    | 5240               | 14.16                               | 26.06                           | 0.01148                                             | 1.0                            | PASS   |
| 802.11n<br>(HT20)  | 5180               | 13.54                               | 22.59                           | 0.00995                                             | 1.0                            | PASS   |
|                    | 5200               | 13.62                               | 23.01                           | 0.01014                                             | 1.0                            | PASS   |
|                    | 5240               | 13.34                               | 21.58                           | 0.00950                                             | 1.0                            | PASS   |
| 802.11n<br>(HT40)  | 5190               | 11.41                               | 13.84                           | 0.00609                                             | 1.0                            | PASS   |
|                    | 5230               | 11.26                               | 13.37                           | 0.00589                                             | 1.0                            | PASS   |
| 802.11ac<br>(HT20) | 5180               | 11.38                               | 13.74                           | 0.00605                                             | 1.0                            | PASS   |
|                    | 5200               | 12.54                               | 17.95                           | 0.00791                                             | 1.0                            | PASS   |
|                    | 5240               | 12.23                               | 16.71                           | 0.00736                                             | 1.0                            | PASS   |
| 802.11ac<br>(HT40) | 5200               | 10.85                               | 12.16                           | 0.00536                                             | 1.0                            | PASS   |
|                    | 5240               | 10.62                               | 11.53                           | 0.00508                                             | 1.0                            | PASS   |
| 802.11ac<br>(HT80) | 5210               | 8.84                                | 7.66                            | 0.00337                                             | 1.0                            | PASS   |

**UNII-3**

| Channel         | Frequency (MHz) | Output power to antenna (dBm) | Output power to antenna (mW) | Power Density at R=20cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Result |
|-----------------|-----------------|-------------------------------|------------------------------|-----------------------------------------------|-----------------------------|--------|
| 802.11a         | 5745            | 14.16                         | 26.06                        | 0.01148                                       | 1.0                         | PASS   |
|                 | 5785            | 14.24                         | 26.55                        | 0.01169                                       | 1.0                         | PASS   |
|                 | 5825            | 14.34                         | 27.16                        | 0.01197                                       | 1.0                         | PASS   |
| 802.11n (HT20)  | 5745            | 13.42                         | 21.98                        | 0.00968                                       | 1.0                         | PASS   |
|                 | 5785            | 13.39                         | 21.83                        | 0.00962                                       | 1.0                         | PASS   |
|                 | 5825            | 13.14                         | 20.61                        | 0.00908                                       | 1.0                         | PASS   |
| 802.11n (HT40)  | 5755            | 11.58                         | 14.39                        | 0.00634                                       | 1.0                         | PASS   |
|                 | 5795            | 11.44                         | 13.93                        | 0.00614                                       | 1.0                         | PASS   |
| 802.11ac (HT20) | 5745            | 11.65                         | 14.62                        | 0.00644                                       | 1.0                         | PASS   |
|                 | 5785            | 12.74                         | 18.79                        | 0.00828                                       | 1.0                         | PASS   |
|                 | 5825            | 12.65                         | 18.41                        | 0.00811                                       | 1.0                         | PASS   |
| 802.11ac (HT40) | 5755            | 10.11                         | 10.26                        | 0.00452                                       | 1.0                         | PASS   |
|                 | 5795            | 10.06                         | 10.14                        | 0.00447                                       | 1.0                         | PASS   |
| 802.11ac (HT80) | 5775            | 9.08                          | 8.09                         | 0.00356                                       | 1.0                         | PASS   |

**Simultaneous Transmission MPE Evaluation**

$MP_{BT} + MPE_{WIFI} = 0.00614 + 0.01247 = 0.01861 < 1.0$

**Conclusion: No SAR is required.**

**----END OF REPORT----**