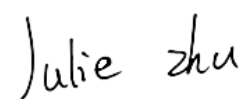


TEST REPORT

Applicant: MatchX GmbH
Address: Tempelhofer Ufer 17, 10963 Berlin, Germany
Equipment Type: NEO
Model Name: MX2311
Brand Name: MatchX
FCC ID: 2AMPF-MX2311
Test Standard: 47 CFR Part 2.1091
KDB 447498 D04 v01
Sample Arrival Date: Feb. 20, 2023
Test Date: Feb. 28, 2023 - Mar. 20, 2023
Date of Issue: Mar. 29, 2023

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Julie Zhu**Checked by:** Xu Rui**Approved by:** Tu Lang
(Testing Director)

Revision History

| Version | Issue Date | Revisions Content |
|----------------|----------------------|----------------------|
| <u>Rev. 01</u> | <u>Mar. 29, 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 | Factory Information..... | 4 |
| 2.4 | General Description for Equipment under Test (EUT)..... | 4 |
| 2.5 | Ancillary Equipment..... | 4 |
| 2.6 | Technical Information | 5 |
| 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 | 9 |
| 5.3 | RF Exposure Evaluation Result | 9 |
| 5.4 | Collocated Power Calculation | 10 |
| 5.5 | Conclusion..... | 10 |

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 | MatchX GmbH |
| Address | Tempelhofer Ufer 17, 10963 Berlin, Germany |

2.2 Manufacturer Information

| | |
|--------------|--|
| Manufacturer | MatchX GmbH |
| Address | Tempelhofer Ufer 17, 10963 Berlin, Germany |

2.3 Factory Information

| | |
|---------|-----|
| Factory | N/A |
| Address | N/A |

2.4 General Description for Equipment under Test (EUT)

| | |
|---|--------|
| EUT Name | NEO |
| Model Name Under Test | MX2311 |
| Series Model Name | N/A |
| Description of Model name differentiation | N/A |
| Hardware Version | 1.2 |
| Software Version | 1.0.0 |
| Dimensions (Approx.) | N/A |
| Weight (Approx.) | N/A |

2.5 Ancillary Equipment

Note: Not applicable.

2.6 Technical Information

| | |
|-----------------------------------|--|
| Network and Wireless connectivity | WIFI 802.11b, 802.11g, 802.11n Lora |
|-----------------------------------|--|

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

| | | |
|-------------------|--|---------------------|
| Operating Mode | WLAN; Lora | |
| Frequency Range | 802.11b/g/n(HT20/HT40) | 2412 MHz ~ 2462 MHz |
| | Lora | 2403 MHz ~ 2479 MHz |
| Antenna Type | WLAN | PCB |
| | Lora | PCB |
| Exposure Category | General Population/Uncontrolled Exposure | |
| EUT 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)].

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

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).

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

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

| Mode | Lora | WLAN 2.4G |
|--|------|-----------|
| Conducted Power (dBm) | 3.65 | 18.98 |
| Antenna Gain (dBi) | 3.35 | 3.30 |
| EIRP (dBm) | 7.00 | 22.28 |
| Note: This report listed the worst case power value, please refer to BL-SZ2320945-601, BL-SZ2320945-602 report for more details. | | |

5.2 Tune-up power

| Mode | Conducted Power Range (dBm) | EIRP Range (dBm) | ERP Range (dBm) |
|--|-----------------------------|------------------|-----------------|
| Lora | [2.00, 4.00] | [5.35, 7.35] | [3.20, 5.20] |
| WLAN 2.4G | [17.00, 19.00] | [20.30, 22.30] | [18.15, 20.15] |
| 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) | Power / Limit | Verdict |
|----------------|---------------------|--------------------|---------------|----------------------|---------------|---------|
| Lora | 5.20 | 3.31 | 200 | 3060.00 | 0.001 | Pass |
| WLAN 2.4G | 20.15 | 103.51 | 200 | 3060.00 | 0.034 | Pass |

5.4 Collocated Power Calculation

| Evolution mode | Frequency(GHz) | Power /Limit | $\Sigma(\text{Power} / \text{Limit})$ of WLAN + Lora | Verdict |
|----------------|----------------|--------------|--|---------|
| Lora | 2.479 | 0.001 | 0.035 | Pass |
| WLAN 2.4G | 2.462 | 0.034 | | |

Note:

1. $\Sigma(\text{Power} / \text{Limit})$: This is a summation of [(power for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding Power limit)], for Lora+WLAN 2.4G.
2. Both of the Lora/WLAN 2.4G can transmit simultaneously, the formula of calculated the Power is $CP1 / LP1 + CP2 / LP2 + \dots \text{etc.} < 1$
 CP = Calculation power
 LP = Limit of power
3. The worst-case situation is 0.035, which is less than "1". This confirmed that the device comply with FCC KDB 447498 D04 Power limit.
4. The DUT work frequency range used is 2412 MHz ~ 2462 MHz and 2403 MHz ~ 2479 MHz the result close to the limit by the above formula, so we select worst case power to calculate the exclusion power threshold.
5. More power list please refer to RF test report.

5.5 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.
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--END OF REPORT--