

# RF EXPOSURE REPORT

**Product:** IoT Wireless Device

**Model Name:** TMX08-EX

**FCC ID:** 2ATV9TMX08-EX

**Applicant:** ThingsMatrix Inc.

**Address:** 9442 North Capital of Texas Hwy, Plaza One, Suite 500, Austin, TX 78759

**Manufacturer:** ThingsMatrix Inc.

**Address:** 9442 North Capital of Texas Hwy, Plaza One, Suite 500, Austin, TX 78759

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**Report No.:** SA A210305W001

**Received Date:** Mar. 15, 2021

**Test Date:** Mar. 17, 2021 ~ Mar. 25, 2021

**Issued Date:** Mar. 25, 2021

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
SA190701W004	Original release	Jul. 25, 2019
SAA210305W001	Base on the original release changes the non-RF components include DC-DC power chip model , add RS232 debug external interface and digital temperature sensor , an NTC thermistor, use lidar sensor instead of ultrasonic sensor ,verify conducted power	Mar. 26, 2021



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# 1 CERTIFICATION

**PRODUCT:** IoT Wireless Device  
**BRAND NAME:** ThingsMatrix  
**MODEL NAME:** TMX08-EX  
**APPLICANT:** ThingsMatrix Inc.  
**TESTED:** Mar. 17, 2021 ~ Mar. 25, 2021  
**TEST SAMPLE:** Identical Prototype  
**STANDARDS:** **FCC Part 2 (Section 2.1091)**  
**KDB 447498 D01 General RF Exposure Guidance v06**  
**IEEE C95.1**

The above equipment has been tested by **BV 7Layers Communications Technology (Shenzhen) Co. Ltd** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

*Simon*

**PREPARED BY :** \_\_\_\_\_, **DATE:** Mar. 26, 2021  
(Simon Wang / Engineer)

*Luke Lu*

**APPROVED BY :** \_\_\_\_\_, **DATE:** Mar. 26, 2021  
(Luke Lu / Manager)



## 2 GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	IoT Wireless Device	
<b>MODEL NAME</b>	TMX08-EX	
<b>NOMINAL VOLTAGE</b>	12Vdc (from adapter)	
<b>OPERATING TEMPERATURE RANGE</b>	-20 ~ 75°C	
<b>MODULATION TYPE</b>	<b>LTE</b>	QPSK, 16QAM
<b>OPERATING FREQUENCY</b>	<b>LTE</b>	1850.7MHz ~ 1909.3MHz (FOR LTE Band2) 1710.7MHz ~ 1754.3MHz (FOR LTE Band4) 824.7MHz ~ 848.3MHz (FOR LTE Band5) 699.7MHz ~ 715.3MHz (FOR LTE Band12) 779.5MHz ~ 784.5MHz (FOR LTE Band13) 814.7MHz ~ 848.3MHz (FOR LTE Band26)
<b>ANTENNA GAIN</b>	<b>LTE Band 2</b>	Fixed External Antenna with 2.5dBi gain
	<b>LTE Band 4</b>	Fixed External Antenna with 2.0dBi gain
	<b>LTE Band 5</b>	Fixed External Antenna with 2.0dBi gain
	<b>LTE Band 12</b>	Fixed External Antenna with 0 dBi gain
	<b>LTE Band 13</b>	Fixed External Antenna with -2.0dBi gain
	<b>LTE Band 26</b>	Fixed External Antenna with 1.4dBi gain
<b>HW VERSION</b>	V2.0	
<b>SW VERSION</b>	TMX08-EXV02	
<b>I/O PORTS</b>	Refer to user's manual	
<b>CABLE SUPPLIED</b>	N/A	

**NOTE:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

### 3 RF EXPOSURE

#### 3.1 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> )	AVERAGE TIME (minutes)
LIMITS FOR GENERAL POPULATION / UNCONTROLLED EXPOSURE				
300-1500	...	...	F/1500	30
1500-100,000	...	...	1.0	30

F = Frequency in MHz

#### 3.2 MPE CALCULATION FORMULA

$$P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$$

where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = 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

#### 3.3 CLASSIFICATION

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as **Mobile Device**.

### 3.4 CONDUCTED POWER

#### TUNE-UP POWER TABLE

Band	Frequency (MHz)	Operating Mode	Tune-Up Power And Tolerance (dBm)
LTE 2	1850~1910	QPSK	24.0
LTE 4	1710~1755	QPSK	23.0
LTE 5	824~849	QPSK	24.0
LTE 12	699~716	QPSK	24.0
LTE 13	777~787	QPSK	24.0
LTE 26	814~849	QPSK	24.0



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## CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

### LTE

Band	Frequency (MHz)	Operating Mode	Antenna Gain (dBi)	Tune-up Power (dBm)	E.I.R.P Power (mW)	Power Density (mW/cm <sup>2</sup> )	limit (mW/cm <sup>2</sup> )	PASS / FAIL
Band2	1850~1910	QPSK	2.50	24.00	446.684	0.089	1.00	PASS
Band4	1710~1755	QPSK	2.00	23.00	316.228	0.063	1.00	PASS
Band5	824~849	QPSK	2.00	24.00	398.107	0.079	0.55	PASS
Band12	699~716	QPSK	0.00	24.00	251.189	0.050	0.47	PASS
Band13	777~787	QPSK	-2.00	24.00	158.489	0.032	0.52	PASS
Band26	814~849	QPSK	1.40	24.00	346.737	0.069	0.54	PASS

--END--