

## RF Exposure Evaluation Report

**Client:** Fireboard Labs LLC

**Address:** 501 Charlotte St  
Kansas City, MO 64106

**EUT:** FBXPD

**Test Report No.:** R20241227-81-M1A

**Approved By:**   
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iNARTE EMC-50662-E

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**Total Pages:** 9

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## Revision Page

| Rev. No. | Date             | Description                                                                                                               |
|----------|------------------|---------------------------------------------------------------------------------------------------------------------------|
| 0        | 22 October 2025  | Issued by BWinter<br>Reviewed by FLane<br>Prepared by BWinter                                                             |
| A        | 10 November 2025 | Revision A – BWinter<br><br>1. Change statement about BLE antenna gain.<br>2. Change statement about 900MHz antenna gain. |

# 1 Regulatory Requirements:

FCC Part 1.1310, 2.1091, 2.1093  
RSS-102, Issue 6  
KDB 447498 D01

## **Summary:**

The purpose of this report is to evaluate the EUT's transmitter for exemption from routine SAR testing.

## **EUT:**

|         |             |
|---------|-------------|
| Model:  | FBXPD       |
| FCC ID: | 2A29A-FBXPD |
| IC:     | 27842-FBXPD |
| HVIN:   | FBXPD       |

## **BLE Module:**

|         |                   |
|---------|-------------------|
| Model:  | ESP32-S3-WROOM-1  |
| FCC ID: | 2AC7Z-ESPS3WROOM1 |

|                                |                                               |
|--------------------------------|-----------------------------------------------|
| MPE Lab                        | Nebraska Center for Excellence in Electronics |
| MPE Labs FCC Cab Designation:  | US1060                                        |
| MPE Labs ISED Cab Designation: | US0177                                        |

## 2 FCC Limits, Part 1.1310

| Frequency range (MHz)                                          | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposure</b>         |                               |                               |                                     |                          |
| 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                        |
| 300-1,500                                                      |                               |                               | f/300                               | 6                        |
| 1,500-100,000                                                  |                               |                               | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 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                       |
| 300-1,500                                                      |                               |                               | f/1500                              | 30                       |
| 1,500-100,000                                                  |                               |                               | 1.0                                 | 30                       |

## Calculations:

### BLE

|                                 |              |                 |                                      |               |                             |            |        |
|---------------------------------|--------------|-----------------|--------------------------------------|---------------|-----------------------------|------------|--------|
| Occupational/Controlled         |              |                 |                                      |               |                             |            |        |
| General Population/uncontrolled |              |                 | YES                                  |               |                             |            |        |
| FBXPD                           |              |                 |                                      |               |                             |            |        |
| Frequency                       | Antenna Gain | Power Conducted | Power (conducted) +10% for tolerance | Power Density | Limit at specified distance | % of limit | Result |
| MHz                             | numerical    | mW              | mW                                   | mW/cm^2       | mW/cm^2                     |            |        |
| 2400 - 2483.5                   | 1.71         | 100             | 110                                  | 0.0374        | 1.000000                    | 3.74       | PASS   |

|          |    |    |
|----------|----|----|
| Distance | 20 | cm |
|----------|----|----|

Gain values were taken from the tables in the ESP32-S3-WROOM-1 module datasheet.

EIRP (mW) = Conducted power (mW) x antenna gain (numeric).

### EUT Module

|                                 |               |                  |                                      |               |                             |            |        |
|---------------------------------|---------------|------------------|--------------------------------------|---------------|-----------------------------|------------|--------|
| Occupational/Controlled         |               |                  |                                      |               |                             |            |        |
| General Population/uncontrolled |               |                  | YES                                  |               |                             |            |        |
| FBXPD                           |               |                  |                                      |               |                             |            |        |
| Frequency                       | Antenna Gain* | Power Conducted* | Power (conducted) +10% for tolerance | Power Density | Limit at specified distance | % of limit | Result |
| MHz                             | numerical     | mW               | mW                                   | mW/cm^2       | mW/cm^2                     |            |        |
| 902 - 928                       | 1.0           | 14.22            | 15.65                                | 0.0031        | 0.60                        | 0.52       | PASS   |

\*EIRP is used

|          |    |    |
|----------|----|----|
| Distance | 20 | cm |
|----------|----|----|

Gain value is assumed to be one because EIRP was used. The selected frequency band is based on the worst-case Conducted Power/Antenna Gain product.

EIRP (mW) = Conducted power (mW) x antenna gain (numeric).

Combined RF exposure: 3.74% + 0.52% = 4.26%

3.74% was the worst-case from the BLE module.

4.26% was the worst-case from the combined RF exposure, which is below the limit.

**Result:**

The EUT was found to be exempt from routine SAR testing and **COMPLIANT** with RF exposure requirements.

**Result:**

**Complies**

**Note:**

The user's manual will stipulate that a 20cm distance from the user is to be maintained.  
EIRP values in mW were multiplied by 1.1 to account for a 10% tolerance.

### 3 ISED RSS 102, Issue 6, Section 6.4

Devices operating at or below the applicable output power levels (adjusted for tune-up tolerance) specified in table 11, based on the separation distance, are exempt from SAR evaluation. The separation distance, defined as the distance between the user and/or bystander and the antenna and/or radiating element of the device or the outer surface of the device, shall be less than or equal to 20 cm for these exemption limits to apply.

Table 11: Power limits for exemption from routine SAR evaluation based on the separation distance

| Frequency (MHz) | ≤ 5 mm(mW) | 10 mm (mW) | 15 mm(mW) | 20 mm(mW) | 25 mm(mW) | 30 mm(mW) | 35 mm(mW) | 40 mm(mW) | 45 mm(mW) | > 50 mm(mW) |
|-----------------|------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|
| ≤ 300           | 45         | 116        | 139       | 163       | 189       | 216       | 246       | 280       | 319       | 362         |
| 450             | 32         | 71         | 87        | 104       | 124       | 147       | 175       | 208       | 248       | 296         |
| 835             | 21         | 32         | 41        | 54        | 72        | 96        | 129       | 172       | 228       | 298         |
| 1900            | 6          | 10         | 18        | 33        | 57        | 92        | 138       | 194       | 257       | 323         |
| 2450            | 3          | 7          | 16        | 32        | 56        | 89        | 128       | 170       | 209       | 245         |
| 3500            | 2          | 6          | 15        | 29        | 50        | 72        | 94        | 114       | 134       | 158         |
| 5800            | 1          | 5          | 13        | 23        | 32        | 41        | 54        | 74        | 102       | 128         |

The exemption limits in table 11 Table 11 are based on measurements and simulations of half-wave dipole antennas at separation distances of 5 mm to 50 mm from a flat phantom, which provides a SAR value of approximately 0.4 W/kg for 1 g of tissue.

For limb-worn devices where the 10 gram of tissue applies, the exemption limits for routine evaluation in table 11 are multiplied by a factor of 2.5.

For controlled-use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in table 11 Table 11 are multiplied by a factor of 5.

When the operating frequency of the device is between two frequencies located in table 11, linear interpolation shall be applied for the applicable separation distance. If the separation distance of the device is between two distances located in table 11, linear interpolation may be applied for the applicable frequency. Alternatively, the limit corresponding to the smaller distance may be employed. For example, in case of a 7 mm separation distance, either use the exception value for a 5 mm separation distance or interpolate between the limits corresponding to 5 mm and 10 mm separation distances.

For implanted medical devices, the exemption limit for routine SAR evaluation is set at an output power of 1 mW, regardless of frequency.

The SAR levels from exempted transmitters shall be included in the compliance assessment and the determination of the TER. Detailed guidance is included in sections 7.1.8 and 8.2.2.1.

### **Calculations:**

The sum of the maximum time-averaged power of the two sources in this device is less than 1mW per Section 6.4.

### **EUT**

| Maximum time-averaged power calculations |                 |                                    |                   |            |               |                    |                   |        |
|------------------------------------------|-----------------|------------------------------------|-------------------|------------|---------------|--------------------|-------------------|--------|
| Freq.                                    | Peak Power EIRP | Peak Power EIRP +10% for Tolerance | On time per cycle | Cycle Time | Average Power | Average Power Sum* | Exemption Limit** | Result |
| MHz                                      | mW              | mW                                 | Seconds           | Seconds    | mW            | mW                 | mW                |        |
| 2400-2483.5                              | 1.52            | 1.67                               | 1                 | 1          | 1.67          | 482.15             | 745               | PASS   |
| 902-928                                  | 436.8           | 480.48                             | 1                 | 1          | 480.48        |                    |                   |        |

\*Average Power = (Peak Power EIRP + 10%) \* (On time per cycle) / (Cycle Time)

\*\*Applied limit in Section 6.4 is for >50mm separation at 835MHz. In addition, the user's limb is most likely to be subjected to exposure, so a multiplying factor of 2.5 has been applied to the limit. This device passes the applied limit.

Result:

The EUT was found to be exempt from routine SAR testing and COMPLIANT with RF exposure exemption requirements.

Result:

Complies

**REPORT END**