# FCC RF Exposure Evaluation

## 1. Product Information

| | |
|---|---|
| FCC ID | 2AVEM-PS70PRO |
| Product name | Diagnosis System |
| Model number | PS70 Pro, X100 PAD, AutoProPAD Basic, EZ400 Pro，EZ300 Pro |
| Model Declaration | PCB board, structure and internal of these model(s) are the same, So no additional models were tested |
| Power supply | DC 3.7V By lithium ion polymer battery(4000mAh)<br>Recharged by DC 5V/2A adapter |
| Operation frequency | IEEE 802.11b:2412-2462MHz<br>IEEE 802.11g:2412-2462MHz<br>IEEE 802.11n HT20:2412-2462MHz<br>IEEE 802.11n HT40:2422-2452MHz<br>Bluetooth: 2402MHz-2480MHz |
| Modulation Type | IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)<br>IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)<br>IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK,BPSK)<br>GFSK, π/4-DQPSK, 8-DPSK for Bluetooth V4.0 (DSS) |
| Channel Number | 11 Channels for 20MHz bandwidth(2412~2462MHz)<br>7 Channels for 40MHz bandwidth(2422~2452MHz)<br>79 Channels for Bluetooth V4.0 (BDR/EDR) |
| Channel Spacing | 5MHz for IEEE 802.11b/g/n<br>1MHz for Bluetooth V4.0 (BDR/EDR) |
| Antenna Type | PIFA Antenna |
| Antenna Gain | 1dBi(Max.) |
| Hardware version | PS70Pro_V12 |
| Software version | Android |
| Exposure category | General population/uncontrolled environment |
| EUT Type | Production Unit |
| Device Type | Portable Device |

## 2. Evaluation Method and Limit

According to KDB447498 D01 General RF Exposure Guidance v06Section 4.3.1 Standalone SAR test exclusion considerations: “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, listed below, is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions. The minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander (see 5) of section 4.1). To qualify for SAR test exclusion, the test separation distances applied must be fully explained and justified

by the operating configurations and exposure conditions of the transmitter and applicable host platform requirements, typically in the SAR measurement or SAR analysis report, according to the required published RF exposure KDB procedures. When no other RF exposure testing or reporting is required, a statement of justification and compliance must be included in the equipment approval, in lieu of the SAR report, to qualify for the SAR test exclusion. When required, the device specific conditions described in the other published RF exposure KDB procedures must be satisfied before applying these SAR test exclusion provisions; for example, handheld PTT two-way radios, handsets, laptops & tablets etc."
[(max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm)] · [√f (GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where:

- f (GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to f) in section 4.1 is applied to determine SAR test exclusion.

When one of the following test exclusion conditions is satisfied for all combinations of simultaneous transmission configurations, further equipment approval is not required to incorporate transmitter modules in host devices that operate in the mixed mobile and portable host platform exposure conditions. The grantee is responsible for documenting this according to Class I permissive change requirements. Antennas that qualify for standalone SAR test exclusion must apply the estimated standalone SAR to determine simultaneous transmission test exclusion.

a) The [∑ of (the highest measured or estimated SAR for each standalone antenna configuration, adjusted for maximum tune-up tolerance) / 1.6 W/kg] + [∑ of MPE ratios] is ≤ 1.0.
b) The SAR to peak location separation ratios of all simultaneously transmitting antenna pairs operating in portable device exposure conditions are all ≤ 0.04, and the [∑ of MPE ratios] is ≤ 1.0.

## 3. Refer Evaluation Method

ANSI C95.1–1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
FCC KDB publication 447498 D01 General RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.
FCC CFR 47 part1 1.1310: Radiofrequency radiation exposure limits.
FCC CFR 47 part2 2.1093: Radiofrequency radiation exposure evaluation: portable devices

## 4. Conducted Power Results

| Mode | Channel | Frequency (MHz) | Peak Conducted Output Power (dBm) |
|---|---|---|---|
| GFSK | 0 | 2402 | 3.863 |
| | 39 | 2441 | 1.812 |
| | 78 | 2480 | 2.776 |
| π/4DQPSK | 0 | 2402 | 2.841 |
| | 39 | 2441 | 1.093 |
| | 78 | 2480 | 2.372 |
| 8DPSK | 0 | 2402 | 3.051 |
| | 39 | 2440 | 1.437 |
| | 78 | 2480 | 2.270 |
| IEEE 802.11b | 1 | 2412 | 8.26 |
| | 6 | 2437 | 8.36 |
| | 11 | 2462 | 8.14 |
| IEEE 802.11g | 1 | 2412 | 7.64 |
| | 6 | 2437 | 6.38 |
| | 11 | 2462 | 8.64 |
| IEEE 802.11n HT20 | 1 | 2412 | 7.84 |
| | 6 | 2437 | 8.86 |
| | 11 | 2462 | 7.64 |
| IEEE 802.11n HT40 | 3 | 2422 | 8.15 |
| | 6 | 2437 | 8.42 |
| | 9 | 2452 | 8.22 |

## 5. Manufacturing Tolerance

| GFSK (Peak) | | | |
|---|---|---|---|
| Channel | Channel 0 | Channel 39 | Channel 78 |
| Target (dBm) | 3.0 | 1.0 | 2.0 |
| Tolerance ±(dB) | 1.0 | 1.0 | 1.0 |
| π/4DQPSK (Peak) | | | |
| Channel | Channel 0 | Channel 39 | Channel 78 |
| Target (dBm) | 2.0 | 1.0 | 2.0 |
| Tolerance ±(dB) | 1.0 | 1.0 | 1.0 |
| 8DPSK (Peak) | | | |
| Channel | Channel 0 | Channel 39 | Channel 78 |
| Target (dBm) | 3.0 | 1.0 | 2.0 |
| Tolerance ±(dB) | 1.0 | 1.0 | 1.0 |
| IEEE 802.11b (Peak) | | | |
| Channel | Channel 1 | Channel 6 | Channel 11 |
| Target (dBm) | 8.0 | 8.0 | 8.0 |
| Tolerance ±(dB) | 1.0 | 1.0 | 1.0 |
| IEEE 802.11g (Peak) | | | |
| Channel | Channel 1 | Channel 6 | Channel 11 |
| Target (dBm) | 7.0 | 6.0 | 8.0 |
| Tolerance ±(dB) | 1.0 | 1.0 | 1.0 |
| IEEE 802.11n HT20 (Peak) | | | |
| Channel | Channel 1 | Channel 6 | Channel 11 |
| Target (dBm) | 7.0 | 8.0 | 7.0 |
| Tolerance ±(dB) | 1.0 | 1.0 | 1.0 |
| IEEE 802.11n HT40 (Peak) | | | |
| Channel | Channel 3 | Channel 6 | Channel 9 |
| Target (dBm) | 8.0 | 8.0 | 8.0 |
| Tolerance ±(dB) | 1.0 | 1.0 | 1.0 |

## 6. Evaluation Results

### 6.1 Standalone Evaluation

| Band/Mode | f (GHz) | Antenna Distance (mm) | RF output power | | SAR Test Exclusion Threshold | SAR Test Exclusion |
|---|---|---|---|---|---|---|
| | | | dBm | mW | | |
| GFSK | 2.450 | 5 | 4.00 | 2.5119 | 0.8 < 3.0 | Yes |
| π/4DQPSK | 2.450 | 5 | 3.00 | 1.9953 | 0.6 < 3.0 | Yes |
| 8DPSK | 2.450 | 5 | 4.00 | 2.5119 | 0.8 < 3.0 | Yes |
| IEEE 802.11b | 2.450 | 5 | 9.00 | 7.9433 | 2.5 < 3.0 | Yes |
| IEEE 802.11g | 2.450 | 5 | 9.00 | 7.9433 | 2.5< 3.0 | Yes |
| IEEE 802.11n HT20 | 2.450 | 5 | 9.00 | 7.9433 | 2.5< 3.0 | Yes |
| IEEE 802.11n HT40 | 2.450 | 5 | 9.00 | 7.9433 | 2.5< 3.0 | Yes |

*Remark:*
*1. Output power including tune up tolerance;*
*2. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to f) in section 4.1 of KDB447498 is applied to determine SAR test exclusion.*

### 6.2 Simultaneous Transmission for SAR Exclusion

The sample only support one WLAN/Bluetooth modular and one WLAN/Bluetooth antenna, no need consider simultaneous transmission.

## 7. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1093 for the uncontrolled RF Exposure and SAR Exclusion Threshold per KDB 447498 v06.

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