

Environmental evaluation and exposure limit according to FCC CFR 47part 1, §1.1307, §1.1310 and ANSI/IEEE C95.1-1992

This calculation was done based on the test performed by Hermon Laboratories.

The 131H-Plus are devices that classified as portable, included 1 transmitter operating according to FCC part 15 section 15.258 in frequency range 119000 – 122980 MHz.

The 130H-Plus are devices that classified as portable, included 1 transmitter operating according to FCC part 15 section 15.258 in frequency range 119000 – 122980 MHz and approve by FCC Wi-Fi module, FCC ID: 2AC7Z-ESPWROOM32DC .

131H-Plus models:

In 119000 – 122980 MHz range:

The SAR Test Exclusion Thresholds of the guidance is limited only up to 6 GHz. According to ANSI/IEEE C95.1-1992 the portable device operating at frequencies above 6 GHz is evaluated in terms of MPE limits. Since the EUT is device to cover the frequency range of the EUT above 6 GHz, the MPE will be used as per general guidance for mobile device with minimum separation distance applicable to the operating of 5 cm.

Limit for power density for general population/uncontrolled environment is 10 mW/cm² for 15000 - 300000 MHz frequency range.

The power density **P (mW/cm²) = P_T / 4π r²**, where

PT is the maximum equivalent isotropically radiated power (EIRP), measured value is 19.26 dBm, which is equal to 84.33 mW.

The power density at 5 cm calculated as follows:

$$84.33 \text{ mW} / 4\pi (5 \text{ cm})^2 \approx 0.268 \text{ mW/cm}^2 \ll 10 \text{ mW/cm}^2$$

General public cannot be exposure to dangerous RF level.

130H-Plus models:**In 119000 – 122980 MHz range:**

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In 2412-2462 MHz range:

The Wi-Fi modular transmitter as approval under FCC ID: 2AC7Z-ESPWROOM32DC will be used in portable device (130H-Plus).

The maximum conducted output power of the module is limited to 19 dBm according to the manufacturer manual.

Maximum declare transmitter power obtained from the User Manual:

P _{out} EIRP		Maximum antenna gain, dBi	P _{out} conducted	
dBm	mW		dBm	mW
22.71	186.63	3.71	19	79.43

According to KDB 447498 D01 v05r02 section 4.3.1 the exemption limit for 100 MHz to 6 GHz at ≤ 50 mm distance is determined as follow:

$$[(\text{max. power including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \times [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g whole body SAR}$$

SAR test exclusion threshold for frequency 2462 MHz at minimum separation distance of 50 mm:

$$3 \times 50 \text{ mm} / (\sqrt{2.462}) = 95.60 \text{ mW}$$

Summation

When all the antennas are at least 5 cm away from the user but individual antennas cannot be separated by 5 cm from each other, the following equation shall be fulfilled

$$\begin{aligned} S1/\text{Limit} + S2/\text{Limit} &< 1, \text{ i.e.} \\ 0.268 \text{ mW/cm}^2 / 10 \text{ mW/cm}^2 + 79.43 \text{ mW} / 95.60 \text{ mW} &= 0.0268 + 0.8308 = \\ &= 0.8576 < 1 \end{aligned}$$

General public cannot be exposed to dangerous RF level.



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