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 basis on the test performed by Hermon Laboratories.

The 131H/131W 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/130W 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/131W 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 separation distance of 5 cm.

Limit for power density for general population/uncontrolled environment is 10 mW/cm^2 for 15000 - 300000 MHz frequency range.

The power density $\mathbf{P\ (mW/cm^2) = P_T / 4\pi\ r^2}$, where

PT is the maximum equivalent isotropically radiated power (EIRP), measured value is 19.72 dBm, which is equal to 93.76 mW.

The power density at 5 cm calculated as follows:

$93.76\ mW / 4\pi\ (5\ cm)^2 \approx 0.298\ mW/cm^2 << 10\ mW/cm^2$

General public cannot be exposure to dangerous RF level.

130H/130W 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 separation distance of 5 cm.

Limit for power density for general population/uncontrolled environment is 10 mW/cm^2 for 15000 - 300000 MHz frequency range.

The power density $\mathbf{P\ (mW/cm^2) = P_T / 4\pi\ r^2}$, where

PT is the maximum equivalent isotropically radiated power (EIRP), measured value is 19.72 dBm, which is equal to 93.76 mW.

The power density at 5 cm calculated as follows:

$93.76\ mW / 4\pi\ (5\ cm)^2 \approx 0.298\ mW/cm^2 << 10\ mW/cm^2$

In 2412-2462 MHz range:

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

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:

Pout EIRP		Maximum antenna gain, dBi	Pout 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:

[(max. power including tune-up tolerance, mW) / (min. test separation distance, mm)] x [√f(GHz)] ≤ 3.0 for 1-g whole body SAR

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

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

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

S1/Limit + S2/Limit < 1, i.e.
0.298 mW/cm^2 /10 mW/cm^2 + 79.43 mW /95.60 mW = 0.0298 +0.8308 =
= 0.8606 < 1

General public cannot be exposed to dangerous RF level.