

RF exposure information according to KDB 447498 D01 guidance

- 1) The EUT, Walabot DIY2 product is used as a portable device equipped Wi-Fi(BLE) integral antenna operating in 2400 -2483.5 MHz band. BLE transmitter operating in 2402-2480 MHz band.
- 2) WiFi and BLE won't work together as it's the same chipset and antenna

Maximum measured transmitter power obtained from test report VAYRAD_FCC_15.247.39637:

Pout conducted		Maximum antenna gain, dBi	Pout EIRP	
dBm	mW		dBm	mW
6.62	4.59	0	6.62	4.59

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$$[(\text{max. power including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \times [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g whole body SAR and } \leq 7.5 \text{ for 10-g extremities SAR}$$

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;
- The value 3.0 and 7.5 are referred to as numeric threshold.

It is hand held device that is unlikely to be used close to the body based on the device typical usage and application. The minimum separation distance of 5.2 mm is ensured by the physical dimensions of the case, PCB and integrated antenna and was measured as the distance between the closest point of the external case to the outermost point of the internal antenna.

The 10-g body SAR test exclusion threshold at frequency 2.48 GHz and test separation distances 5.2 mm was determined as follows:

$$[4.59 \text{ mW}/5.2 \text{ mm}] \times \sqrt{2.48} = 0.88 \times 1.575 = 1.39 < 7.5$$

According to KDB 447498 D01 v05r02 the device is excluded from SAR evaluation.

- 3) The **UWB** Modular Transmitter as approval under FCC ID: 2AHIS-VMAKERPROUWB will be used in a hand-held portable device (Walabot DIY2)

Maximum measured transmitter power obtained from test report VAYRAD_FCC_15.519.39637:

P _{out} EIRP		Maximum antenna gain, dBi	P _{out} conducted	
dBm	mW		dBm	mW
-8.49	0.14	4	-12.49	0.06

The SAR Test Exclusion Thresholds of the guidance is limited only up to 6 GHz. According to FCC §2.1093 the portable device operating at frequencies above 6 GHz is evaluated in terms of MPE limits.

Since the EUT is an UWB device to cover the frequency range of the EUT above 6 GHz, the MPE will be used as per general guidance for Mobile devices.

Compliance shall be made at a minimum distance of 5 cm consistent with the FCC §2.1093.

According to FCC §2.1093 evaluation at a distance of less than 5 cm is not required. But as the device will be used in a hand-held portable device and can be used in close proximity to extremities, additional calculation at distance in 5 mm is given below

Limit for power density for general population/uncontrolled exposure is 1 mW/cm² for 1500 -100000 MHz frequency range.

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

P_T is the transmitted power, which is equal to the peak transmitter output power (-12.49) dBm plus maximum antenna gain 4 dBi, the maximum equivalent isotropically radiated power

EIRP is -8.49 dBm = 0.14 mW

The power density at 50 mm calculated as follows:

$$0.14 \text{ mW} / 4\pi (5 \text{ cm})^2 = 0.00044 \text{ mW/cm}^2 \ll 1 \text{ mW/cm}^2$$

The power density at 5 mm calculated as follows:

$$0.14 \text{ mW} / 4\pi (0.5 \text{ cm})^2 = 0.044 \text{ mW/cm}^2 \ll 1 \text{ mW/cm}^2$$

General public cannot be exposed to dangerous RF level.

Summation:

$$S1/\text{Limit} + S2/\text{Limit} < 1, \text{ i.e}$$

$$1.39/7.5 + 0.00044/1 = 0.185 + 0.00044 = 0.185 < 1$$

General public cannot be exposed to dangerous RF level.