

MPE/RF EXPOSURE EVALUATION REPORT



Evaluation of: Athos Hub

to

To: FCC CFR 47 Part 15 RF Exposure requirements

Test Report Serial No.: ATHOS11-U4 Rev A

This report supersedes: NONE

Applicant: Athos Inc.
201 Arch Street
Redwood City, CA 94062
USA

Product Function: Hub for downloading Athos Cores

Issue Date: 19th December 2018

This Test Report is Issued Under the Authority of:

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Calculations for Maximum Permissible Exposure Levels

Power Density = P_d (mW/cm^2) = $\text{EIRP}/(4 \cdot \pi \cdot d^2)$

$\text{EIRP} = P \cdot G$

P = Peak output power (mW)

G = Antenna numeric gain (numeric)

d = Separation distance (cm)

Numeric Gain = $10^{(G(\text{dBi})/10)}$

Assessment for simultaneous operation.

The Athos Hub contains a total of 4 different modules of which 3 are already certified. These are;-

FCC ID; 2ABCB-RP132, ISED ID; 20953-RP132 Bluegiga – Raspberry Pi 3 Model B

FCC ID; 2ADUT-LGPAU06; ISED ID 1253A-12345 – Panda Wireless PAU06

FCC ID; QOQ-BLED112; ISED ID 5123A-BGTBLED112 –Silicon Labs Bluegiga BLED112

Conducted RF Power and antenna gain information for these 3 pre-certified modules was used in this assessment for simultaneous operation.

The 4th module was tested by MiCOM Labs, reference MiCOM Labs test report ATHOS11-U4 Rev A Athos Hub H101 FCC 15.247 & RSS-247.

Because the EUT belongs to the General Population/Uncontrolled Exposure the limit of power density is $1 \text{ mW}/\text{cm}^2$

The following assessment assumes worst case with all 4 modules (5 transmitters) operating simultaneously. These calculations represent worst case in terms of the exposure levels for the Athos Hub.

Freq. Band (MHz)	Ant Gain (dBi)	Numeric Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Calculated Power Density (mW/cm^2) @ 20cm	Power Density Limit (mW/cm^2)
2400.0 - 2483.5 BLE	1.80	1.51	-0.13	0.97	0.000292	1.0
Panda 2400.0 - 2483.5	1.30	1.35	19.89	97.50	0.026166	1.0
Raspberry WiFi 2400.0 - 2483.5	1.50	1.41	21.30	134.9	0.037908	1.0
Raspberry BT 2400.0 - 2483.5	1.50	1.41	4.2	2.6	0.000739	1.0
Bluegiga 2400.0 - 2483.5 BLE	0.00	1.00	-1.70	0.68	0.000135	1.0

Total power density @ 20cm distance = $0.066 \text{ mW}/\text{cm}^2$ Limit = $1.0 \text{ mW}/\text{cm}^2$

Note: for mobile or fixed location transmitters the minimum separation distance is 20cm, even if calculations indicate the MPE distance to be less.

Maximum Permissible Exposure Limits

FCC §1.1310 Limit = $1 \text{ mW}/\text{cm}^2$ from 1.310 Table 1 for devices operating in the 2400 to 2483.5 MHz band.



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Specification - Maximum Permissible Exposure Limits

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500	--	--	f/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f ²	30
30-300	27.5	0.073	0.2	30
300-1,500	--	--	f/1500	30
1,500-100,000	--	--	1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

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