

FCC MPE calculation Albus Home G2

The Albus Home G2 contains three radio transmitters:

- Quectel EG25 Cellular Modem. FCC ID: XMR201903EG25G and IC: 10224A-201903EG25G with Molex-**209142-0180** antenna which has gains of:
 - 1.2 dBi maximum between 698 and 960 MHz
 - 5.2 dBi maximum between 1710 and 2690 MHz
- Laird LWB5+ WiFi Modem, FCC ID: SQG-LWB5PLUS and IC ID: 3147A-LWB5PLUS with Ezurio (formerly Laird)- **EMF2449A1-10MH4L** antenna which has gains of:
 - 2.8 dBi maximum between 2400 - 2500 MHz
 - 3.4 dBi maximum between 4900 – 5875 MHz
- FMCW transmitter with integral antenna

RF Exposure – USA evaluation of mobile device to 2.1091

The Albus Home G2 is powered by an external mains-DC power supply and is designed to be placed on a bedside table or similar location at a distance of 50 – 150 cm from the body being measured by the 60 GHz radar.

For Mobile use, the safe distance from the antenna is the greater of:

20cm

Or

r cm, where $r = \sqrt{PG/4\pi S}^1$

P: power input to antenna(s) in mW

G: numeric gain of antenna relative to isotropic radiator

S: power density in mW/cm²

The maximum permitted values of S for general population / uncontrolled exposure are:

- F/1500 mW/cm² for frequencies 300 – 1500 MHz
- 1.0 mW/cm² for frequencies above 1500 MHz

For the purposes of this calculation of minimum distance “r” is calculated assuming all three radios are transmitting simultaneously and is made by summing the EIRP of the three radios, so the WiFi transmit power and 60 GHz transmit power are added to the cellular power and compared to the limit for the cellular band in question.

The table of calculations is on the page below, but all values of r are ≤ 16.04 cm so the safe distance is 20 cm.

The limit for S is given in 47CFR1.1310(e)(1) table 1:

(ii) 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.*

¹ This is derived from the formula $S = \frac{PG}{4\pi r^2}$ in OET Bulletin 65

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Frequency Band	Lowest Freq. (MHz)	Cellular modem			WiFi radio EIRP (mW) ²	FMCW EIRP (mW) ³	Limit for S (mW/cm ²)	Minimum r (cm) for S < limit	S (mW/cm ²) at 20 cm distance
		Transmit power (W) ⁴	Antenna gain (dBi)	EIRP (mW)					
LTE band 2	1850	0.4198	2.7	781.7	556.4	0.153	1.00	10.32	0.27
LTE band 4	1710	0.4887	2.7	910.0	556.4	0.153	1.00	10.80	0.29
LTE band 5	824	0.2582	1.2	340.4	556.4	0.153	0.55	11.40	0.18
LTE band 7	2500	0.4864	2.7	905.7	556.4	0.153	1.00	10.79	0.29
LTE band 12	698	0.3475	1.2	458.1	556.4	0.153	0.47	13.17	0.20
LTE band 13	777	0.4395	1.2	579.4	556.4	0.153	0.52	13.21	0.23
LTE band 25	1850	0.4111	2.7	765.5	556.4	0.153	1.00	10.26	0.26
LTE band 26 (pt90)	814	0.2455	1.2	323.6	556.4	0.153	0.54	11.36	0.18
LTE band 26 (pt22)	824	0.2582	1.2	340.4	556.4	0.153	0.55	11.40	0.18
LTE band 38	2570	0.3926	2.7	731.1	556.4	0.153	1.00	10.12	0.26
LTE band 41	2496	0.4853	2.7	903.7	556.4	0.153	1.00	10.78	0.29
GSM 850	824	1.8493	1.2	1218.9 ⁵	556.4	0.153	0.55	16.04	0.35
GSM 1900	1850	1.3335	2.7	1241.5 ³	556.4	0.153	1.00	11.96	0.36
UMTS band 2	1850	0.3524	2.7	656.2	556.4	0.153	1.00	9.82	0.24
UMTS band 4	1710	0.3819	2.7	711.1	556.4	0.153	1.00	10.04	0.25
UMTS band 5	824	0.2512	1.2	331.1	556.4	0.153	0.55	11.34	0.18

² From FCC Grant for FCC ID: which confirms that highest transmit power in 2.4 GHz band is 0.292 W and 0.101 W in the 5 GHz band, so 2.4 GHz band with 2.8 dBi antenna is worst case transmit power.

³ TUV report 75961718-02 gives radiated power as 13.65 dBm with a duty cycle of 0.66%.

⁴ From FCC Grant for FCC ID: XMR201903EG25G

⁵ Power reduced by 50% as maximum of 4 time slots are supported by GPRS