

MPE / SAR exemption letter according Interim procedure KDB 447498 D04

Customer	Product	Model	Type	HW Status	SW status	FCC ID
Eliko Tehnoloogia Arenduskeskus OÜ Aiandi 13/1 12918 Tallinn Estonia	Positioning device	ELIKO ANCHOR	standard	KA4D37UEW	4.1	2AF2I-ANCHOR , Contains FCC ID: 2AC7Z- ESPWROOM32D

Declared minimum distance to human body according to customer ≥ 20 cm according external customer's document "MPE Information Requirements Anchor_V2".

The customer thus declares that the device is not body-worn.

RF Exposure Test Exemptions for Single Source

MPE-based Exemption

According 1.1307(b)(3)(i)(C) Option C – ERP at frequencies above 300 kHz but at distances $R > \lambda/2\pi$ can be exempted as follows:

TABLE B.1—THRESHOLDS FOR SINGLE RF SOURCES
SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	–	1.34	159 m	–	35.6 m	1,920 R ²
1.34	–	30	35.6 m	–	1.6 m	3,450 R ² /f ²
30	–	300	1.6 m	–	159 mm	3.83 R ²
300	–	1,500	159 mm	–	31.8 mm	0.0128 R ² f
1,500	–	100,000	31.8 mm	–	0.5 mm	19.2R ²
Subscripts L and H are low and high; λ is wavelength. From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.						

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SAR-based Exemption

According 1.1307(b)(3)(i)(B) Option B – Available maximum time-averaged power or effective radiated power (ERP) at frequencies above 300 kHz and below 6 GHz, but with distances from 0.5 cm to 40 cm may be exempted as follows:

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B. 1})$$

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B. 2})$$

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where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)									
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

Calculation based on external document “MPE Information Requirements Anchor_V2”, provided by customer.

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WLAN

MPE-based Exemption

Exemption acc. TABLE 1 TO § 1.1307(b)(3)(i)(C)—SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION																
Band	Technology	Frequency	$\lambda/2\pi$	R	$R \geq \lambda/2\pi$ fulfilled	Maximum Rated Conducted Output Power	Maximum Tolerance	Minimum Path Loss to Antenna connector	Minimum Path Loss in Antenna cable	Maximum Antenna Gain	Duty Cycle	EIRP	ERP	ERP	Threshold ERP	MPE Exemption fulfilled
		(MHz)	(m)	(m)		(dBm)	(dB)	(dB)	(dB)	(dBi)	(%)	(dBm)	(dBm)	(W)	(W)	
2.4 GHz	WLAN 802.11b	2412.0	0.020	0.200	yes	13.1	1.5	0.0	0.0	3.7	100	18.3	16.2	0.041	0.768	yes
		2442.0	0.020	0.200	yes	12.5	1.5	0.0	0.0	3.7	100	17.7	15.6	0.036	0.768	yes
		2472.0	0.019	0.200	yes	12.9	1.5	0.0	0.0	3.7	100	18.1	16.0	0.039	0.768	yes
2.4 GHz	WLAN 802.11g	2412.0	0.020	0.200	yes	14.3	1.5	0.0	0.0	3.7	100	19.5	17.4	0.054	0.768	yes
		2442.0	0.020	0.200	yes	13.3	1.5	0.0	0.0	3.7	100	18.5	16.4	0.043	0.768	yes
		2472.0	0.019	0.200	yes	13.2	1.5	0.0	0.0	3.7	100	18.4	16.3	0.042	0.768	yes
2.4 GHz	WLAN 802.11n HT20	2412.0	0.020	0.200	yes	14.1	1.0	0.0	0.0	3.7	100	18.8	16.7	0.046	0.768	yes
		2442.0	0.020	0.200	yes	13.4	1.0	0.0	0.0	3.7	100	18.1	16.0	0.039	0.768	yes
		2472.0	0.019	0.200	yes	13.2	1.0	0.0	0.0	3.7	100	17.9	15.8	0.038	0.768	yes
2.4 GHz	WLAN 802.11n HT40	2422.0	0.020	0.200	yes	13.9	1.0	0.0	0.0	3.7	100	18.6	16.5	0.044	0.768	yes
		2442.0	0.020	0.200	yes	13.6	1.0	0.0	0.0	3.7	100	18.3	16.2	0.041	0.768	yes
		2462.0	0.019	0.200	yes	13.3	1.0	0.0	0.0	3.7	100	18.0	15.9	0.038	0.768	yes

UWB

MPE-based Exemption

Exemption acc. TABLE 1 TO § 1.1307(b)(3)(i)(C)—SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION																
Band	Technology	Frequency	$\lambda/2\pi$	R	$R \geq \lambda/2\pi$ fulfilled	Maximum Rated Conducted Output Power	Maximum Tolerance	Minimum Path Loss to Antenna connector	Minimum Path Loss in Antenna cable	Maximum Antenna Gain	Duty Cycle	EIRP	ERP	ERP	Threshold ERP	MPE Exemption fulfilled
		(MHz)	(m)	(m)		(dBm)	(dB)	(dB)	(dB)	(dBi)	(%)	(dBm)	(dBm)	(W)	(W)	
3100 MHz - 10600 MHz	UWB	6500.0	0.007	0.200	yes yes yes	-23.34	2.0	0.00	0.00	3.5	100.0	-17.8	-20.0	0.000010	0.768	yes

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Simultaneous Transmission

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

		2.4 GHz WLAN 802.11b	2.4 GHz WLAN 802.11g	2.4 GHz WLAN 802.11n HT20	2.4 GHz WLAN 802.11n HT40
	Ratio of Value/Limit	0.053659	0.070736	0.060206	0.057496
UWB	0.000013	0.053672	0.070749	0.060219	0.057509

Remark: only maximum value in band / mode is shown

Maximum Value	=	0.070749
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Conclusion

MPE-/ SAR Based Exemption fulfilled

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Version	Applied changes	Date of release
--	Initial release	2023-Nov-20