

Manufacturer: Topcon Positioning Systems, Inc.

Name: Oscar Frau

FCC: WR4-CL20

Title: Project handler

Signature: 

MPE limits (§1.1310)

	Mode	Frequency	Duty Cycle	Power	Antenna		EIRP ¹	EIRP	Distance	PD ²	PD Limit ³	Margin	2.1091 EIRP	2.1091 EIRP	Worst PD/PD values to be considered
					Gain ^{7,8}								Limit ⁴	Margin	
		MHz	%	dBm	dBi		dBm	mW	cm	mW/cm ²	mW/cm ²	dB	mW	dB	
LARA-R6001D	GSM 1900 ^{5,6,7}	1850,2	50	30,5	2,50		29,99	997,6	20	0,198	1,00	7,02	1260	1,01	0,19847
LARA-R6001D	UMTS FDD 5 ^{5,6,7}	826,4	100	24,0	1		25,00	316,2	20	0,063	0,551	9,42	694	3,41	0,11419
LARA-R6001D	UMTS FDD 2 ^{5,6,7}	1852,4	100	24,0	2,50		26,50	446,7	20	0,089	1,00	10,51	1260	4,50	0,08886
LARA-R6001D	LTE eFDD13 ^{5,6,7}	779,5	100	24,0	1		25,00	316,2	20	0,063	0,520	9,17	655	3,16	0,12106
LARA-R6001D	LTE eFDD4 ^{5,6,7}	1710,7	100	24,0	2,50		26,50	446,7	20	0,089	1,00	10,51	1260	4,50	0,08886
CL20	WIFI 2.4GHz ^{8,9}	2412	100	21,5	3		24,50	281,8	20	0,056	1,00	12,51	1260	6,50	0,05607
Co-Location =			0,19847	+	0,05607	=	0,3	< 1							

¹EIRP = (Power dBm + Antenna Gain dBi) + 10 x Log (Duty Cycle % / 100)

²PD = EIRP / (4xπxD²)

³CFR 47 Part 1, §1.1310(e), table 1 (General Population/Uncontrolled Exposure)

⁴CFR 47 Part 1, §1.1307 (b)(3)(i)

⁵See FCC ID: XPYUBX21BE01, IC: 8595A-UBX21BE01, HVIN: LARA-R6001D

⁶See 7layers GmbH, Assessment Reference: MDE_UBLOX_2029_MPE_01_rev03, p.9 section 3.2.2

⁷Tekfun FX-W06-113G-150-IPEX antenna

⁸FCC ID: WR4-CL20, IC: 6050B-CL20, HVIN: CL20

⁹From the original filing FCC ID: XPYLILYW1

§2.1091 EIRP Limit

§1.1307 (b)(3)(i)(C) exemption limit

RF Source						Threshold	Threshold	Threshold			
Frequency	f	R	λ	λ/2π	R/(λ/2π)	ERP	EIRP	EIRP	EIRP	Margin	
MHz	MHz	m	m	m		W	W	mW	mW	dB	
300-1500	826,4	0,20	0,363	0,0578	3,46	0,42312	0,694	694	316,2	3,41	
	779,5	0,20	0,385	0,0613	3,27	0,39910	0,655	655	316,2	3,16	
1500-100000	1850,2	0,20	0,162	0,0258	7,8	0,768	1,260	1260	997,6	1,01	
	1852,4	0,20	0,162	0,0258	7,8	0,768	1,260	1260	446,7	4,50	
	1710,7	0,20	0,175	0,0279	7,17	0,768	1,260	1260	446,7	4,50	
	2412	0,20	0,124	0,0198	10,10	0,768	1,260	1260	281,8	6,50	

§2.1091 EIRP Limit

§1.1307 (b)(3)(i)(B) exemption limit

0.3 GHz ≤ f < 1.5 GHz (20 cm < d ≤ 40 cm)										
f	ERP _{20cm}	Pth = ERP _{20cm}	Pth = EIRP _{20cm}	EIRP	Margin					
GHz	mW	mW	mW	mW	dB					
0,8264	1686	1686	2765	316,2	9,42					
0,7795	1590	1590	2608	316,2	9,16					
f	ERP _{20cm}	Pth = ERP _{20cm}	Pth = EIRP _{20cm}	EIRP	Margin					
GHz	mW	mW	mW	mW	dB					
1,850	3060	3060	5018	997,6	7,02					
1,852	3060	3060	5018	446,7	10,51					
1,711	3060	3060	5018	446,7	10,51					
2,412	3060	3060	5018	281,8	12,51					