

Manufacturer: Topcon Positioning Systems, Inc.

Name: Oscar Frau

FCC: WR4-CL55

Title: Project handler

Signature:



MPE limits (§1.1310)

	Mode	Frequency MHz	Duty Cycle %	Power dBm	Antenna		EIRP ¹ dBm	EIRP mW	Distance cm	PD ² mW/cm ²	PD Limit ³ mW/cm ²	Margin dB	2.1091 EIRP	2.1091 EIRP	PD/PD Limit	Worst PD/PD values to be considered
					Gain ⁴ dBi								Limit ⁴ mW	Margin dB		
LARA-R6001D	GSM 1900 ^{5,6,7}	1850,2	50	30,5	3,79		31,28	1342,7	30	0,119	1,00	9,25	2834	3,24	0,11872	
LARA-R6001D	UMTS FDD 5 ^{5,6,7}	826,4	100	24,0	4,75		28,75	749,9	30	0,066	0,551	9,20	1561	3,18	0,12035	
LARA-R6001D	UMTS FDD 2 ^{5,6,7}	1852,4	100	24,0	3,79		27,79	601,2	30	0,053	1,00	12,74	2834	6,73	0,05316	0,12759
LARA-R6001D	LTE eFDD13 ^{5,6,7}	779,5	100	24,0	4,75		28,75	749,9	30	0,066	0,520	8,94	1473	2,93	0,12759	
LARA-R6001D	LTE eFDD4 ^{5,6,7}	1710,7	100	24,0	3,79		27,79	601,2	30	0,053	1,00	12,74	2834	6,73	0,05316	
SATEL-TR49	UHF 900 MHz ^{8,9}	902,2	100	29	0		29,03	800,0	30	0,071	0,601	9,30	1705	3,29	0,11761	0,11761
CLS5 ¹⁰	WIFI 2.4GHz ^{7,10}	2412	100	26,9	5,06		31,96	1570,4	30	0,139	1,00	8,57	2834	2,56	0,13885	
CLS5 ¹⁰	WIFI 5GHz ^{7,10}	5180	100	16,4	5,63		22,03	159,6	30	0,014	1,00	18,50	2834	12,49	0,01411	
CLS5 ¹⁰	WIFI 5GHz ^{7,10}	5260	100	17,0	5,63		22,63	183,2	30	0,016	1,00	17,90	2834	11,89	0,01620	0,13885
CLS5 ¹⁰	WIFI 5GHz ^{7,10}	5500	100	14,6	5,63		20,23	105,4	30	0,009	1,00	20,30	2834	14,29	0,00932	
CLS5 ¹⁰	WIFI 5GHz ^{7,10}	5745	100	13,2	5,63		18,83	76,4	30	0,007	1,00	21,70	2834	15,69	0,00675	
CLS5 ¹⁰	BT Classic ^{7,10}	2402	100	9,4	5,06		14,46	27,9	30	0,002	1,00	26,07	2834	20,06	0,00247	0,00247
CLS5 ¹⁰	BLE ^{7,10}	2402	100	2,5	5,06		7,56	5,7	30	0,001	1,00	32,97	2834	26,96	0,00050	
Co-Location =			0,12759	+	0,11761	+	0,13885	+	0,00247	=	0,4	< 1				

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

²PD = EIRP / (4πr²D²)

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

⁷See Taoglas type MA245.LBIC.008 (with 0.4m cable) datasheet

⁸FCC ID: MRBSATEL-TA37, IC: 2422A-SATELTA37, HVIN: SATEL-TR49

⁹See ComAnt type CA915H_A antenna datasheet

¹⁰FCC ID: WR4-CL55, IC: 60508-CL55, HVIN: CL55

§2.1091 EIRP Limit

§1.1307 (b)(3)(i)(C) exemption limit

RF Source	f	R	λ	λ/2π	R/(λ/2π)	Threshold ERP	Threshold EIRP	Threshold EIRP	EIRP	Margin
Frequency	MHz	m	m	m		W	W	mW	mW	dB
300-1500	826,4	0,30	0,363	0,0578	5,19	0,95201	1,561	1561	749,9	3,18
	779,5	0,30	0,385	0,0613	4,90	0,89798	1,473	1473	749,9	2,93
	902,2	0,30	0,333	0,0529	5,67	1,03933	1,705	1705	800,0	3,29
1500-100000	1850,2	0,30	0,162	0,0258	11,6	1,728	2,834	2834	1342,7	3,24
	1852,4	0,30	0,162	0,0258	11,6	1,728	2,834	2834	601,2	6,73
	1710,7	0,30	0,175	0,0279	10,75	1,728	2,834	2834	601,2	6,73
	2412	0,30	0,124	0,0198	15,16	1,728	2,834	2834	1570,4	2,56
	5180	0,30	0,058	0,0092	32,55	1,728	2,834	2834	159,6	12,49
	5260	0,30	0,057	0,0091	33,05	1,728	2,834	2834	183,2	11,89
	5500	0,30	0,055	0,0087	34,56	1,728	2,834	2834	105,4	14,29
	5745	0,30	0,052	0,0083	36,10	1,728	2,834	2834	76,4	15,69
	2402	0,30	0,125	0,0199	15,09	1,728	2,834	2834	27,9	20,06
	2402	0,30	0,125	0,0199	15,09	1,728	2,834	2834	5,7	26,96

§2.1091 EIRP Limit

§1.1307 (b)(3)(i)(B) exemption limit

0.3 GHz ≤ f < 1.5 GHz (20 cm < d ≤ 40 cm)						Pth = EIRP _{20cm}	EIRP	Margin
f	ERP _{20cm}	Pth = ERP _{20cm}	Pth = EIRP _{20cm}	EIRP	Margin			
GHz	mW	mW	mW	mW	dB			
0,8264	1686	1686	2765	749,9	5,67			
0,7795	1590	1590	2608	749,9	5,41			
0,9022	1840	1840	3018	800,0	5,77			
						Pth = EIRP _{20cm}	EIRP	Margin
f	ERP _{20cm}	Pth = ERP _{20cm}	Pth = EIRP _{20cm}	EIRP	Margin			
GHz	mW	mW	mW	mW	dB			
1,850	3060	3060	5018	1342,7	5,73			
1,852	3060	3060	5018	601,2	9,22			
1,711	3060	3060	5018	601,2	9,22			
2,412	3060	3060	5018	1570,4	5,05			
5,180	3060	3060	5018	159,6	14,98			
5,260	3060	3060	5018	183,2	14,38			
5,500	3060	3060	5018	105,4	16,78			
5,745	3060	3060	5018	76,4	18,18			
2,402	3060	3060	5018	27,9	22,55			
2,402	3060	3060	5018	5,7	29,45			