

Manufacturer: Topcon Positioning Systems, Inc.

Name: Oscar Frau

FCC: WR4-CL55

Title: Project handler

Signature: 

MPE limits (§1.1310)

													2.1091 EIRP	2.1091 EIRP	Worst PD/PD values	
Mode	Frequency	Duty Cycle	Power	Antenna	EIRP ¹	EIRP	Distance	PD ²	PD Limit ³	Margin	Limit ⁴	Margin	PD/PD Limit	to be considered		
	MHz	%	dBm	Gain ⁶	dBm	mW	cm	mW/cm ²	mW/cm ²	dB	mW	dB				
LARA-R204	LTE eFDD13 ^{5,6,7}	777	100	24	4,75	28,75	749,9	30	0,066	0,518	8,93	1468	2,92	0,12800	0,12800	
LARA-R204	LTE eFDD4 ^{5,6,7}	1710	100	24	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	
CL55 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		
CL55 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	0,13885	
CL55 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		
CL55 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		
CL55 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		
CL55 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	
CL55 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 =		0,12800	+	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: XPY1EIQN2NN, IC: 8595A-1EIQN2NN, HVIN: LARA-R204
⁶See 7layers GmbH, Assessment Reference: MDE_UBLOX_1603_MPEa, Conducted output power values bases on "Tune-up" information provided by manufacturer at page 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: 6050B-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 W	Threshold EIRP W	Threshold EIRP mW	EIRP mW	Margin dB
Frequency MHz	MHz	m	m	m						
	300-1500	777	0,30	0,386	0,0614	4,88	0,89510	1,468	1468	2,92
		902,2	0,30	0,333	0,0529	5,67	1,03933	1,705	1705	3,29
1500-100000	1710	0,30	0,175	0,0279	10,7	1,728	2,834	2834	601,2	6,73
	2412	0,30	0,124	0,0198	15,2	1,728	2,834	2834	159,6	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)					
f	ERP _{20cm}	Pth = ERP _{20cm}	Pth = EIRP _{20cm}	EIRP	Margin
GHz	mW	mW	mW	mW	dB
0,777	1585	1585	2600	749,9	5,40
0,9022	1840	1840	3018	800,0	5,77
f	ERP _{20cm}	Pth = ERP _{20cm}	Pth = EIRP _{20cm}	EIRP	Margin
GHz	mW	mW	mW	mW	dB
1,710	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