

Garmin GMN-0278300 RF Exposure Exhibit

HVIN/PMN: GMN-0278300
47CFR 1.1307, RSS-102 Issue 6

Measurements and Calculations

Garmin	GMN-0278300		Test Number:	241216					
MPE Calculator	The Usage Case for this product is in a Controlled / Occupational Environment								
	MPE uses EIRP for calculation. EIRP is based on TX power added to the antenna gain in dBi.								
	dBi = dB gain compared to an isotropic radiator.								
	S = power density in mW/cm ²								
					Antenna Gain (dBi)	3			
					dBi to dBd	2.2			
Tx Frequency (MHz)	1621	Peak Power (Watts)	75.8600		Antenna Gain (dBd)	0.83			
		Peak Power (mW)	75860.0						
Cable Loss (dB)	0.0	(dBm)	48.8		Antenna minus cable (dBi)	3.00			
		Max Duty Cycle (%)	36.4%						
		Adjusted Power (mW)	27613.0						
		Adjusted Power (dBm)	17.8						
	Calculated ERP (mw)	72.331		EIRP = Po(dBm) + Gain (dB)					
	Calculated EIRP (mw)	119.213		Radiated (EIRP) dBm		20.763			
				ERP = EIRP - 2.17 dB					
				Radiated (ERP) dBm		18.593			
Occupational Limit	Power density (S)								
5 mW/cm ²	EIRP								
50.00000 W/m ²	----- = mW/cm ²								
General Public Limit	4 p r ²								
1 mW/cm ²	r (cm) EIRP (mW)								
10.00000 W/m ²									
	FCC radio frequency radiation exposure limits per 1.1310								
	Frequency (MHz)	Occupational Limit W/m ²	Public Limit W/m ²						
	300-1,500	f/30	f/150						
	1,500-100,000	50	10						
	1621.0	50	10						
	IC radio frequency radiation exposure limits per RSS-102, Issue 6 Field Reference Level FRL Limit (W/m ²)								
Frequency (MHz)	Uncontrolled		Frequency (MHz)	Controlled					
10-20	2.0	2.0	10-20	10.0	10.0				
20-48	8.944/f ^{0.5}	0.2	20-48	44.72/f ^{0.5}	1.1				
48-300	1.291	1.291	48-100	6.455	6.455				
300-6,000	0.02619*f ^{0.6834}	4.1	100-6,000	0.6455*f ^{0.5}	26.0				
6,000-15,000	5.0	10.0	6,000-15,000	50.0	50.0				
15,000-150,000	10	10.0	15,000-150,000	50.0	50.0				
150,000-300,000	6.67*(10 ⁻⁵)*f	0.1	150,000-300,000	3.33*(10 ⁻⁴)*f	0.5				
						FCC	ISED		
f = Transmit Frequency (MHz)			f (MHz) =	1621	1621	MHz			
P _T = Power Input to Antenna (mW)			P _T (mW) =	75,860.0	75,860.0	mW			
Duty cycle (percentage of operation)			% =	36.4%	36.4%	%			
P _A = Adjusted Power due to Duty cycle or Cable Loss (mW)			P _A (mW) =	27,613.04	27,613.04	mW			
G _N = Numeric Gain of the Antenna			G _N (numeric) =	2.17	2.17	numeric			
S ₂₀ = Power Density of device at 20cm (mW/m ²)	S ₂₀ =(P _A G _N)/(4πR ₂₀) ²		S ₂₀ (mW/m ²) =	11.92	11.92	mW/m ²			
S ₂₀ = Power Density of device at 20cm (W/m ²)	S ₂₀ =(P _A G _N)/(4πR ₂₀) ²		S ₂₀ (W/m ²) =	119.21	119.21	W/m ²			
S _L = Power Density Limit (W/m ²)			S _L (W/m ²) =	50.00	25.99	W/m ²			
R _C = Minimum distance to the Radiating Element for Compliance	R _C =√(P _A G _N /4πS _L)		R _C (cm) =	31.9	43.8	cm			
S _C = Power Density of the device at the Compliance Distance R _C	S _C =(P _A G _N)/(4πR _C) ²		S _C (W/m ²) =	46.91	24.82	W/m ²			
R ₂₀ = 20cm			R ₂₀ =	20	20	cm			
			For Compliance with Use Case Limits	31.9	43.8	cm			
			Or in Meters for Compliance with Use Case Limits	0.32	0.44	Meters			
Summary: Standalone MPE Calculations and Summary									
Radio	Band (MHz)	Tx Duty Cycle (%)	Tx Frequency (MHz)	Power Total (mW)	Antenna Gain (dBi)	S _L (W/m ²)	S ₂₀ (W/m ²)	R _C (cm)	S _C (W/m ²)
SFX	1616.0-1626.5	36.4%	1621	27,613.0	2.2	50.0	119.21	31.9	46.91

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Conclusion

The GMN-0278300 meets RF exposure requirements for both FCC and Industry Canada, given product labelling that requires users to keep a safe distance from the product. Given its use case of being in an aircraft environment and not near passengers or workers, this is very accommodatable.

FCC:

The device needs to be a minimum of 31.9 cm distance away from people.

Industry Canada:

The device needs to be a minimum of 43.8 cm distance away from people.