



RF EXPOSURE EVALUATION

1. PRODUCT INFORMATION

Product Description	Pallet Tracker
Model Name	Ultra Long, Ultra Wide, Ultra Wide QP, Ultra Medium, Ultra Thin, Ultra Short, Ultra B
IC	23859-ULTRALONG



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2. EVALUATION METHOD AND LIMIT

Human exposure to RF emissions from mobile devices (47 CFR §2.1091) may be evaluated based on the MPE limits adopted by the IC for electric and magnetic field strength and/or power density, as appropriate, since exposures are assumed to occur at distances of 20 cm or more from persons.

LIMITS FOR GENERAL POPULATION / UNCONTROLLED EXPOSURE

Frequency Range (MHz)	E-field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (Minutes)
0.3 -- 1.34	614	1.63	(100)*	30
1.34 -- 30	824/f	2.19/f	(180/f ²)*	30
30 -- 300	27.5	0.073	0.2	30
300 -- 1500	--	--	f/1500	30
1500 -- 100,000	--	--	1.0	30

*Note:

1. f= Frequency in MHz * Plane-wave Equivalent Power Density
2. The averaging time for General Population/Uncontrolled exposure to fixed transmitters is not applicable for mobile and portable transmitters. See 47 CFR §§2.1091 and 2.1093 on source-based time-averaging requirement for mobile and portable transmitters.

$$S=PG/4\pi R^2$$

Where:

S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna



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3. CALCULATION

A minimum test separation distance ≥ 20 cm is required between the antenna and radiating structures of the device and nearby persons to apply mobile device exposure limits. The distance must be at least 20 cm and fully supported by the operating and installation configurations of the transmitter and its antenna(s), according to the source-based time-averaged maximum power requirements of § 2.1091(d)(2). In cases where cable losses or other attenuations are applied to determine compliance, the most conservative operating configurations and exposure conditions must be evaluated.

4. Maximum conducted output power(measured) and antenna Gain

the numeric gain (G) of the antenna with a gain specified in dB is determined by

$$\text{Numeric gain (G)} = 10^{\text{a}}(\text{antenna gain}/10)$$

Band	Time average maximum tune up procedure	Division Factors	Frame-Average Power (dBm)
GPRS 850	33	-9.03	23.97
GPRS 1900	30	-9.03	20.97

Test Mode	Output Power (dBm)	Output Power (mW)	Antenna Gain (dBi)	Antenna Gain (Linear)	Power Density (mW/cm ²)	Limit (mW/cm ²)	The MPE ratio
GPRS 850	23.97	249.46	1.95	1.57	0.078	0.55	0.14
PCS 1900	20.97	125.03	2.50	1.78	0.009	1.00	0.01
LTE Band 2	24	251.19	2.50	1.78	0.089	1.00	0.09
LTE Band 4	23	199.53	2.78	1.90	0.075	1.00	0.08
LTE Band 5	24	251.19	1.95	1.57	0.078	0.55	0.14
LTE Band 12	24	251.19	2.25	1.68	0.084	0.47	0.18
LTE Band 13	24	251.19	1.77	1.50	0.088	0.52	0.17
LTE Band 26	24	251.19	2.14	1.64	0.082	0.54	0.15



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Test Mode	Output Power (dBm)	Output Power (mW)	Antenna Gain (dBi)	Antenna Gain (Linear)	Power Density (mW/cm²)	Limit (mW/cm²)	The MPE ratio
BLE	-0.447	0.90	3.5	2.239	0.0004	1.00	0.0004
WIFI	14.14	25.94	3.5	2.239	0.0063	1.00	0.0063

Note: The MPE ratio=Power Density/Limit



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