



MPE Calculations

Systems operating under the provision of 47 CFR 1.1307(b)(1) shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the FCC guidelines.

The EUT will only be used with a separation of 20 centimeters or greater between the antenna and the body of the user or nearby persons and can therefore be considered a mobile transmitter per 47 CFR 2.1091(b). The MPE calculation for this exposure is shown below.

Using the Antennas with highest output power: Ethertronics & Wistron NeWeb Corp. Antennas

The peak radiated output power (EIRP) is calculated as follows:

<i>Antenna</i>	<i>Frequency (GHz)</i>	<i>Power input to the antenna (P) (dBm)</i>	<i>Power gain of the antenna (G) (dBi)</i>	<i>EIRP (P+G) (dBm)</i>	<i>EIRP $\text{Log}^{-1}(\text{dBm}/10)$ (mW)</i>
Tyco Stamped PIFA (Chain A)	2.4	23.84	2.74	26.58	454.99
Tyco Stamped PIFA (Chain A)	5	24.04	1.05	25.09	322.85
Tyco Stamped PIFA (Chain B)	2.4	23.84	2.76	26.60	457.09
Tyco Stamped PIFA (Chain B)	5	24.64	0.56	25.20	331.13
Tyco Stamped PIFA (Chain C)	2.4	24.04	2.61	26.65	462.38
Tyco Stamped PIFA (Chain C)	5	24.54	1.73	26.27	423.64

$\text{EIRP} = P + G$

Where

P = Power input to the antenna (mW).

G = Power gain of the antenna (dBi)

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

<i>Antenna</i>	<i>Frequency (GHz)</i>	<i>Antenna Gain (G) (dBi)</i>	<i>Numeric Antenna Gain $\text{Log}^{-1}(\text{dBm}/10)$ (dB)</i>
Tyco Stamped PIFA (Chain A)	2.4	2.74	1.88
Tyco Stamped PIFA (Chain A)	5	1.05	1.27
Tyco Stamped PIFA (Chain B)	2.4	2.76	1.89
Tyco Stamped PIFA (Chain B)	5	0.56	1.14
Tyco Stamped PIFA (Chain C)	2.4	2.61	1.82
Tyco Stamped PIFA (Chain C)	5	1.73	1.49

$G = \text{Log}^{-1}(\text{dB antenna gain}/10)$

**Power density at the specific separation:**

<i>Antenna</i>	<i>Frequency (GHz)</i>	<i>Power input to the antenna (P) (mW)</i>	<i>Numeric Power Gain of the Antenna (G) (dB)</i>	<i>Maximum Power Spectral Density $S=PG/(4R^2\pi)$ (mW/cm²)</i>	<i>Maximum Power Spectral Density Limit (mW/cm²)</i>
Tyco Stamped PIFA (Chain A)	2.4	242.10	1.88	0.091	1.00
Tyco Stamped PIFA (Chain A)	5	253.51	1.27	0.064	1.00
Tyco Stamped PIFA (Chain B)	2.4	242.10	1.89	0.091	1.00
Tyco Stamped PIFA (Chain B)	5	291.07	1.14	0.066	1.00
Tyco Stamped PIFA (Chain C)	2.4	253.51	1.82	0.092	1.00
Tyco Stamped PIFA (Chain C)	5	284.45	1.49	0.084	1.00

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

Where

S = Maximum power density (mW/cm²)

P = Power input to the antenna (mW).

G = Numeric power gain of the antenna

R = Distance to the center of the radiation of the antenna (20cm = limit for MPE)

The maximum permissible exposure (MPE) for the general population is 1mW/cm².

The power density at 20cm does not exceed the 1mW/cm² limit. Therefore, the exposure condition is compliant with FCC rules.

Aggregate Maximum Power Spectral Density:

<i>Antenna</i>	<i>Frequency (GHz)</i>	<i>Maximum Power Spectral Density Chain A (dBi)</i>	<i>Maximum Power Spectral Density Chain B (dBi)</i>	<i>Maximum Power Spectral Density Chain C (dBi)</i>	<i>Maximum Power Spectral Density Aggregate Chain A, B, & C (dBi)</i>	<i>Maximum Power Spectral Density Limit (mW/cm²)</i>
Tyco Stamped PIFA	2.4	0.091	0.091	0.092	0.091	1.00
Tyco Stamped PIFA	5	0.064	0.066	0.084	0.071	1.00