

## 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:

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 <math>\text{Log}^{-1}(\text{dBm}/10)</math> (mW)</i>
HP Altima	2.4	24.77	2.93	27.70	588.84
HP Altima	5	19.76	2.84	22.60	181.97
HP Jakarta 3.0	2.4	24.77	2.96	27.73	592.93
HP Jakarta 3.0	5	19.76	0.97	20.73	118.30

$$\text{EIRP} = P + G$$

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 <math>\text{Log}^{-1}(\text{dBm}/10)</math> (dB)</i>
HP Altima	2.4	2.93	1.96
HP Altima	5	2.84	1.92
HP Jakarta 3.0	2.4	2.96	1.98
HP Jakarta 3.0	5	0.97	1.25

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

**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 <math>S=PG/(4R^2\pi)</math> (mW/cm<sup>2</sup>)</i>	<i>Maximum Power Spectral Density Limit (mW/cm<sup>2</sup>)</i>
HP Altima	2.4	299.92	1.96	0.117	1.00
HP Altima	5	94.62	1.92	0.036	1.00
HP Jakarta 3.0	2.4	299.92	1.98	0.118	1.00
HP Jakarta 3.0	5	94.62	1.25	0.024	1.00

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

Where

S = Maximum power density (mW/cm<sup>2</sup>)

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/cm<sup>2</sup>.

The power density at 20cm does not exceed the 1mW/cm<sup>2</sup> limit. Therefore, the exposure condition is compliant with FCC rules.