

MPE Calculations for ThinkWireless -5 dBi Patch and L-Comm 9 dBi Yagi Antennas

ThinkWireless -5 dBi Patch

The -5 dBi patch has lower gain than the 2 dBi Omni already qualified for Portable Operation with the WIT934. The following calculation verifies MPE limits are met with the -5 dBi patch.

The Power Threshold for Portable designation without SAR testing is:

$(60 / F_{\text{GHz}}) \text{ mW}$ for distances $< 2.5 \text{ cm}$

For the **900 MHz** frequency band, this results in a limit of **67 mW**.

Given the maximum transmit duty cycle of 7.5% (shown in other associated exhibits), the average transmitted power of a WIT934 operating in Remote mode and using the -5 dBi Patch can be calculated as:

Maximum Pout = **250 mW** (24 dBm nominal)

Maximum Antenna Gain = **-5 dBi** (numeric gain of 0.3162)

Maximum Transmit Duty cycle in Remote mode operation = **0.074**

Pave (Source-based average) = $0.250 * 0.3162 * 0.074 = \mathbf{5.85 \text{ mW}}$

Conclusion:

A WIT934 configured as a Remote and connected to the ThinkWireless -5 dBi Patch Antenna meets the MPE limits for a Portable device operating in the general population.

L-Comm 9 dBi Yagi

The following calculation verifies MPE limits for Mobile Operation are met with the 9 dBi Yagi.

The Field Strength limit for Mobile Antenna in 900 MHz band is determined by the equation $F/1500 \text{ mW/cm}^2$ (where F in is MHz). For 900 MHz, the formula produces a value of

Limit = **0.6 mW/cm²**.

Given the maximum transmit duty cycle of 20.6% (shown in other associated exhibits), the radiated field strength of a WIT934 configured as an Access Point and using the 9 dBi Yagi can be calculated as:

Maximum Pout = **250 mW** (24 dBm nominal)

Maximum Antenna Gain = **9 dBi** (numeric gain of 7.94)

Maximum Transmit Duty cycle in Access Point mode of operation = **0.206**

Pave (Source-based average) = $0.250 * 7.9 * 0.206 = \mathbf{0.4069 \text{ W}}$

Field Strength at 20 cm (Mobile designation) = $\text{Pave}/(4*\text{Pi}*(20\text{cm})^2)$

Field Strength = **0.08135 mW/cm²**

Conclusion:

The WIT934 Configured as an Access Point and connected to the L-Comm 9 dBi Yagi Antenna meets the MPE limits for a Mobile device operating in the general population.