

Worst Case Transmit Duty Cycle for WIT608

The duty cycle derating factor used in the calculation of average radiated limits (per 15.209 for frequencies above 1GHz) is described below. This factor was calculated by first determining the worst case scenario for system operation - worst case being defined as the scenario when the WIT608 would be transmitting the longest period during a dwell.

This worst case operating scenario is as follows:

- 1) data flow is almost completely unidirectional (that is, one radio is relaying a large amount of data to the other radio with only synchronization data being passed back the other direction)
- 2) The amount of data being fed to the sending radio is exactly portioned out to fit the maximum packet size allowable (252 bytes). The radio cannot send more than 252 bytes on a single channel – additional data must be sent on the next hop.

For this example, a remote unit is transferring monitoring data to a base unit.

Maximum transmit time by Remote on a single channel:

$$= 252 \text{ bytes} * 8 \text{ bits/byte} * (1/230.4\text{Kbps}) = 8.75\text{ms}$$

Hop duration (dwell time) for this scenario is 35.28ms. Given that we have 32 channels in our hop set, it takes 1.12896 seconds to go through the entire hop table and repeat a transmission on the same channel. Therefore, only 8.75 milliseconds worth of data can be transmitted on a single channel in any 100 milliseconds time period.

The transmission duty cycle correction factor is then calculated as:

$$20 * \text{Log}_{10}(8.75\text{ms}/100\text{ms}) = \mathbf{-21.2 \text{ dB}}$$

A 35% duty cycle was assumed during the testing, which is the hop duration.