EDJ4S2-PC Theory of Operation

EDJ4S2-PC – General Atomics' Aspen™ Wire-Free USB™ Host Evaluation Dongle

General Atomics' Aspen Ultra-Wideband (UWB) reference designs are fully integrated products offering both a truly driver-less wire-free USB solution, as well as a high quality, low latency streaming data solution. The Aspen design incorporates General Atomics' Aspen chipset featuring a state-of-the-art UWB radio to provide a low-cost, low-power, multi-band, UWB solution.

The Aspen Host Evaluation Dongle is a wire-free USB solution based on the General Atomics Aspen chipset. This product enables simultaneous wire-free connection to up to 8 USB peripherals such as printers, external hard drives, web cameras, and personal media devices. The Aspen chipset consists of RF and a digital baseband ICs. The RF portion contains a low-noise amplifier in the receiver chain, a mixed signal IC containing analog IF sections of the receiver chain, the entire transmitter, and synthesizer blocks. The digital baseband IC incorporates a USB 2.0 compliant hub, an AES encryption engine, and a thin MAC, allowing a secure, plug-and-play, wireless connection. The driver-less feature enables Aspen to be compatible with all currently available USB 2.0 full-speed devices, independent of the host platform (e.g. Windows, MAC, Linux). The Aspen Host Evaluation Dongle is a component of the Aspen Wire-Free USB Evaluation Kit, which is designed to aid customers in evaluating the full potential of the Aspen product.

The Aspen Host Evaluation Dongle uses General Atomics' proprietary modulation approach, Spectral Keying® (SK), to transmit an FCC compliant UWB waveform. SK modulation is based on dividing the allocated 3.1 to 10.6 GHz spectrum into multiple sub-bands, with each sub-band having a 500 MHz minimum bandwidth as required by the FCC Report and Order for UWB communications. The data rate supported by SK is a function of the number of sub-bands used for the modulation and the pulse repetition rate (PRF). The number of symbols available with SK goes by the formula *n* factorial (n!) where n is the number of bands. The Aspen Host Evaluation Dongle uses 5 sub-bands, centered at, 3.48, 4.02, 4.56, 6.12 and 6.96 GHz respectively, and therefore is able to generate 120 symbols, or log2 (120) = 6.9 bits per symbol. At a PRF of 6 MHz, Aspen can generate an over-the-air data rate of about 40 Mbps.