

Theory of operation; Alereon AL4504 USB dongle.

The Alereon AL4504 is a UWB radio device with a USB interface to the host computer. This device is intended to provide a short-range wireless USB connection for computers and peripheral units equipped with a USB 2.0 interface. The AL4504 is powered entirely from the USB connector of the device to which it is attached. The AL4504 operates in the frequency band defined in the FCC rules and Regulations for UWB devices. Specifically, it operates between the frequencies of 3.168 and 4.752 GHz per the industry-defined WiMedia 1.1 specification.

The AL4504 is comprised of three integrated circuit devices and supporting circuitry for filtering, interface and power conditioning. The AL4504 has an integrated antenna, there is no facility for an external antenna. The schematic diagram shows a connector, Murata type MM8430, in the RF path. This is a production test connector, it is not accessible from outside of the unit housing. Following the integrated antenna is a bandpass filter with a passband from 3.1 GHz to 4.752 GHz which provides suppression of unwanted transmitter emissions and receiver interference rejection in the 2.4 GHz and 5.1 GHz bands.

The AL4100 RF Transceiver generates the system reference frequency from a 33 MHz crystal resonator. The 33 MHz reference frequency is multiplied to 4.224 GHz internally in the AL4100 by a PLL multiplier. From this frequency the three band frequencies, 3.432 GHz, 3.960 GHz and 4.488 GHz for both transmit and receive modes are derived internally within the AL4100 by direct synthesis. In addition to the band frequencies, a 1056 MHz clock for ADCs and DACs within the AL4200 Baseband Processor is generated.

The interface between the AL4100 RF Transceiver and the AL4200 Baseband Processor consists of the analog RX-I and -Q signals and the analog TX-I and -Q signals all of which are baseband, having 2 MHz to 264 MHz frequency band. The interface also includes a 1056 MHz clock signal and CMOS logic-level control signals which determine the band frequency and mode.

The interface between the AL4200 Baseband Processor and the I1480 MAC device is the industry-defined MPI consisting of CMOS logic-level: 8 data bits, control signals and a 66 MHz clock signal.

The interface between the AL4504 UUSB dongle and the host system is via the industry-defined USB 2.0.

References.

MultiBand OFDM Physical Layer Specification 1.1.

MAC-PHY Interface Specification 1.0.

Universal Serial Buss Specification 2.0.