Theory of operation; Alereon AL5705 PCI-e Expresscard.

The Alereon AL5705 is a UWB radio device with a PCI-e interface to the host computer. This device is intended to provide a short-range wireless connection for computers and peripheral units equipped with a PCI-e interface. The AL5705 is powered entirely from the PCI-e Expresscard connector of the device to which it is attached. The AL5705 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 9.504 GHz per the industry-defined WiMedia 1.1 specification.

The AL5705 is comprised of two integrated circuit devices and supporting circuitry for filtering, interface and power conditioning. The AL5705 has a permanently attached antenna external to the housing. The schematic diagram shows a connector, Hirose type U.FL, in the RF path. This connector, is not accessible from outside of the unit housing. Following the antenna connector is a Diplexer type bandpass filter having two sections; The LB section has a passband from 3.1 GHz to 4.752 GHz, the HB section has a passband from 6.336GHz to 9.504GHz. This filter provides suppression of unwanted out of band transmitter emissions and receiver interference rejection in the 2.4 GHz and 5.1 GHz bands.

The AL5100 RF Transceiver generates the system reference frequency from a 44 MHz crystal resonator. The 44 MHz reference frequency is multiplied to 16.896 GHz internally in the AL5100 by a PLL multiplier. From this frequency the local oscillator frequencies for band frequencies for both transmit and receive modes are derived internally within the AL5100 by direct synthesis. The local oscillator frequencies are as listed as F*mid* per the following table.

BG	Channel	Ch1	Ch0	F_{low}	F_{mid}	F_{high}
N/A	N/A	0	0	-	-	-
1	1 (A)	0	1	3168 MHz	3432 MHz	3696 MHz
	2 (B)	1	0	3696 MHz	3960 MHz	4224 MHz
	3 (C)	1	1	4224 MHz	4488 MHz	4752 MHz
3	7 (A)	0	1	6336 MHz	6600 MHz	6864 MHz
	8 (B)	1	0	6864 MHz	7128 MHz	7392 MHz
	9 (C)	1	1	7392 MHz	7656 MHz	7920 MHz
6	9 (A)	0	1	7392 MHz	7656 MHz	7920 MHz
	10 (B)	1	0	7920 MHz	8184 MHz	8448 MHz
	11 (C)	1	1	8448 MHz	8712 MHz	8976 MHz

In addition to the band frequencies, a 1056 MHz clock for ADCs and DACs within the AL5350 Baseband Processor/MAC is generated.

The interface between the AL5100 RF Transceiver and the AL5350 Baseband Processor/MAC 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 AL5350 Baseband Processor/MAC and the host P.C. is the industry-defined PCI-e consisting of CMOS logic-level: differential Rx and Tx data, single-ended control

signals and a 100 MHz differential clock signal. Interface buffering for the PCI-e signals is incorporated in the AL5350

References.

MultiBand OFDM Physical Layer Specification 1.1.

MAC-PHY Interface Specification 1.0.

PCI Express Base Specification Revision 1.1

PCI Express Card Electromechanical Specification Revision 1.1