

Wireless LAN Integrated Medium Access Controller with Baseband Processor

The Intersil ISL3873B Wireless LAN Integrated Medium Access Controller with Integrated Baseband Processor is part of the PRISM 2.4GHz radio chip set. The ISL3873B directly interfaces with the Intersil's IF QMODEM (HFA3783). Adding Intersil's RF/IF Converter (ISL3685) and Intersil's Power Amp (HFA3983) offers the designer a complete end-to-end WLAN Chip Set solution.

Protocol and PHY support are implemented in firmware thus, supporting customization of the WLAN solution. Firmware implements the full IEEE 802.11 Wireless LAN MAC protocol. It supports BSS and IBSS operation under DCF, and operation under the optional Point Coordination Function (PCF). Low level protocol functions such as RTS/CTS generation and acknowledgment, fragmentation and de-fragmentation, and automatic beacon monitoring are handled without host intervention. Active scanning is performed autonomously once initiated by host command. Host interface command and status handshakes allow concurrent operations from multi-threaded I/O drivers. Additional firmware functions specific to access point applications are also available.

The ISL3873B has on-board A/Ds and D/A for analog I and Q inputs and outputs, for which the HFA3783 IF QMODEM is recommended. Differential phase shift keying modulation schemes DBPSK and DQPSK, with data scrambling capability, are available along with Complementary Code Keying to provide a variety of data rates. Both Receive and Transmit AGC functions with 7-bit AGC control obtain maximum performance in the analog portions of the transceiver.

2.4GHz Power Amplifier and Detector

The ISL3984 is a 2.4GHz monolithic SiGe Power Amplifier designed to operate in the ISM Band. It features two low voltage single supply stages. Cascaded, they deliver 13dBm (Typ) output power for the typical DSSS signal (ACPR, 1st Side Lobe < -30dBc, 2nd Side Lobe < -50dBc).

In addition, the device includes a 2.4GHz detector which is accurate over a 15dB dynamic range within (\pm)1dB. Therefore, an accurate ALC function can be implemented.

2.4GHz RF/IF Converter and Synthesizer

The ISL3685 is a monolithic SiGe half duplex RF/IF transceiver designed to operate in the 2.4GHz ISM band. The receive chain features a low noise, gain selectable amplifier (LNA) followed by a down-converter mixer. An up-converter mixer and a high performance preamplifier compose the transmit chain. The remaining circuitry comprises a high frequency Phase Locked Loop (PLL) synthesizer with a three wire programmable interface for local oscillator applications. A reduced filter count is realized by multiplexing the receive and transmit IF paths and by sharing a common differential matching network. Furthermore, both transmit and receive RF amplifiers can be directly connected to mixers as bandwidth characteristics attenuate image frequencies. The inherent image rejection of both the transmit and receive functions allows this economic advantage.

I/Q Modulator/Demodulator and Synthesizer

The HFA3783 is a highly integrated and fully differential SiGe baseband converter for half duplex wireless applications. It features all the necessary blocks for quadrature modulation and demodulation of “I” and “Q” baseband signals. It has an integrated AGC receive IF amplifier with frequency response to 374MHz. The AGC has 70dB of voltage gain and better than 70dB of gain control range. The transmit output also features gain control with 70dB of range. The receive and transmit IF paths can share a common differential matching network to reduce the filter component count required for single IF half duplex transceivers. A pair of 2nd order antialiasing filters with an integrated DC offset cancellation architecture is included in the receive chain for baseband operation down to DC. In addition, an IF level detector is included in the AGC chain for threshold comparison. Up and down conversion are performed by doubly balanced mixers for “I” and “Q” IF processing. These converters are driven by a broadband quadrature LO generator with frequency of operation phase locked by an internal 3 wire interface synthesizer and PLL.