



Ensigma Whisper

Low Power Wi-Fi Hard Macro IP

IEEE 802.11 b/g/n Single Stream

Ensigma™ Whisper is a family of lower power wireless connectivity IPs for standards such as Bluetooth Low Energy (BLE), Bluetooth Dual-Mode, IEEE 802.15.4 and Wi-Fi. Specifically designed to meet the communications requirements for emerging low-power consumption markets such as the Internet of Things (IoT) and wearables, Ensigma Whisper implements all of the connectivity requirements of tomorrow's complex low-power System-on-Chips (SoCs).

The Ensigma™ Whisper Low Power Wi-Fi Hard Macro is a fully integrated radio transceiver that consists of RF, AFE, baseband PHY and MAC. The Hard Macro is offered in the 40nm TSMC CMOS process.

The Whisper Low Power Hard Macro interfaces a Micro Controller Unit (MCU) through an AXI host interface. The hard macro executes most of the Wi-Fi Stack, thus reducing the processing load on the host significantly.

The Whisper macro enables compact ultra-small form factor solutions with minimal external components to reduce the costs for large-scale production. Utilizing advanced design techniques and process technology to deliver the lowest active and idle power, the Whisper macro extends the system battery life while maintaining consistent connectivity and still provides a rich set of features

Wi-Fi Standards Support

2.4 GHz	IEEE 802.11b DSSS/CCK (1/2/5.5/11 Mbps)
	IEEE 802.11g OFDM (6/9/12/18/24/36/48/54 Mbps)
	IEEE 802.11n OFDM up to 72 Mbps 20 MHz channels, MCS0-7

Features

- Patchable ROM based firmware
- Fully Embedded MAC with very limited host load
- Designed for TSMC 40nm LP CMOS
- On chip LDO Converters with elaborate Power Management System
- Typical receive power consumption 66mA from 1.1V supply
- Sleep and Deep Sleep currents of 30 uA and 1uA from 1.1 V
- Sleep Controller to ensure overall System Level Power Consumption Reduction
- Design for QFN packages

Benefits

- Complete Low Power Wi-Fi solution
- Silicon proven design
- Lowest power
- Easy integration into an SoC
- Delivered as GDS2 with soft IP host processor interface
- Complete Baseband IP

Applications

- Internet of Things
- Connected consumer products
- Industrial automation

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General Features

- Complies with 802.11 b/g/n SISO
- Data rates up to MCS7, 20 MHz bandwidth
- Transmit power up to 16 dBm
- Optimised bit width to reduce area/power
- Slowest clock speed
- Optimised listen mode power consumption
- Increased immunity to noise/interference
- Dynamic power management based on packet signal quality
- Meets or exceeds standard specified sensitivity requirements including ACI/AACI
- 6.3 mm² die area including pads in TSMC 40 nm for Fully Embedded MAC
- 4.6 mm² die area including pads in TSMC 40 nm for Thin MAC

Software

- Fully Embedded MAC with RPU running the supplicant, SoftAP and Wi-Fi Direct functionality
- Host Software load limited to running the TCP/IP stack, wpa cli and Customer Application
- HW/SW partition optimised to minimise power consumption
- Upper MAC Processor absorbs most of the traditional HOST functionality
- Optimum PHY configuration based on previous beacon processing
- Save/restore implementation and retention memories.

Power Management Options

- GFSK modulation
- Power Management System Comprising
 - DC-DC converters (External)
 - LDO regulators
 - 32 kHz Real Time Clock
- Sleep Controller
 - Always On Block (AON) – Logic for 32 KHz design
- Multiple Power Domains

Frequency Reference Options

- Works with open source Bluetooth host stack implementations such as BlueZ , Blue Droid
- On-chip 32.768 kHz crystal oscillator and RC oscillator for Sleep Mode
- Option for an external 40 MHz external clock

Process

- TSMC 40 nm LP

Package

- Support for QFN packages – no requirement for external matching
- Other packages are supported but may require custom external matching

Wi-Fi Alliance Certification

- Wi-Fi Alliance IEEE 802.11b/g/n certified

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