



Enigma Whisper

Bluetooth Low Energy and IEEE 802.15.4 Hard Macro

Bluetooth Low Energy up to v5.0 and 802.15.4

Enigma™ 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, Enigma Whisper implements all of the connectivity requirements of tomorrow's complex low-power System-on-Chips (SoCs).

The Enigma™ Whisper BLE/802.15.4 Hard Macro is a fully integrated radio transceiver, baseband processor, Link Layer controller and Link Layer firmware up to the Host Controller Interface (HCI) supporting Bluetooth® Core Specification with a Low Energy Core Configuration (Bluetooth Smart®) also the IEEE 802.15.4 protocol (see configurations below). The interface from the Whisper BLE/802.15.4 Hard Macro to the host processor is provided as a soft IP in form of synthesizable RTL code. The Hard Macro is offered in the 40nm TSMC CMOS process.

The Whisper BLE/802.15.4 Hard Macro interfaces an Micro Controller Unit (MCU) through an AXI host interface.

The Whisper BLE/802.15.4 Hard Macro enables compact ultra-small form factor solutions with minimal external components to reduce the costs for large-scale production. Utilising 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.

Configurations

BLE only	Bluetooth 4.2 with 1 Mbps GFSK PHY
BLE / 802.15.4 combo	Bluetooth 4.2 with 1 Mbps GFSK PHY IEEE 802.15.4 2.4 GHz Hz DSSS PHY employing O-QPSK modulation

Features

- Designed for TSMC 40nm LP CMOS
- Direct supply from battery 1.1-3.3V, on chip DC-DC converter
- Typical power consumption 2.5 mA from 3.0V battery
- Additional 10mA at 1.05V is provided to MCU subsystem and other parts of the SoC by the internal DC/DC converter
- 26 MHz crystal oscillator for normal operation and 32.768 kHz oscillator for sleep
- Designed for QFN packages

Benefits

- Complete BLE solution
- Silicon proven design
- Lowest power
- Easy integration into an SoC
- Delivered as GDS2 with soft IP host processor interface

Applications

- Internet of Things
- Connected consumer products
- Industrial automation

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General Features

- Complies with Bluetooth V4.2, ETSI EN 300 328 and EN 300 440 Class 2 (Europe), FCC CFR47 Part 15 (US) and ARIB STD-T66 (Japan)
- All mandatory and optional BLE 4.2 features
- Complies with IEEE 802.15.4 (2006)
- Support for 2450 MHz DSSS PHY employing O-QPSK modulation
- Multiple simultaneous connections
- Integrated power management
- No external trimming required in production except for XO frequency trimming
- Wi-Fi coexistence through PTA (Packet Traffic Arbitrator) interface
- 4.0 mm² die area including pads in TSMC 40 nm
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RF Features

- 95dBm Rx sensitivity
- TX Output Power -20dBm to 0dBm
- Integrated transmit/receive switch for RF
- Single pin RF antenna interface

Control Interface Options

- AXI host interface to an MCU on the same SoC

Power Management Options

- Can operate directly from battery or external supply
- Wide range of battery voltage options from 1.1 to 3.3V
- Integrated DC-DC converter for supply voltages >1.5V
- On-chip LDO regulation
- Provides the SoC with Always On and Core Vdd supply rails

Software

- Controller stack (firmware)

Frequency Reference Options

- On-chip 26 MHz crystal oscillator and RC oscillator
- On-chip 32.768 kHz crystal oscillator and RC oscillator for Sleep Mode
- Option for an external 26 MHz clock

Package

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

BT-SIG Certification

- BT SIG certified

