IRIS

## WIRELESS MEASUREMENT SYSTEM

- 2.4 GHz IEEE 802.15.4, Tiny Wireless Measurement System

- Designed Specifically for Deeply Embedded Sensor Networks

- 250 kbps, High Data Rate Radio

- Wireless Communications with Every Node as Router Capability

- Expansion Connector for Light, Temperature, RH, Barometric Pressure, Acceleration/Seismic, Acoustic, Magnetic and other MEMSIC Sensor Boards

Applications

- Indoor Building Monitoring and Security

- Acoustic, Video, Vibration and Other High Speed Sensor Data

- Large Scale Sensor Networks (1000+ Points)
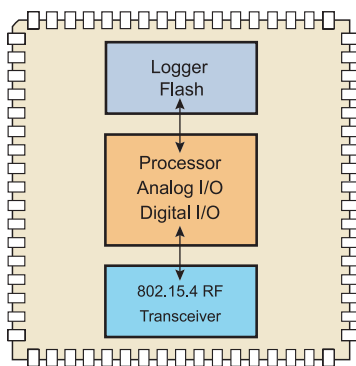
XM2110CA Block Diagram

IRIS

The IRIS is a 2.4 GHz Mote module used for enabling low-power, wireless sensor networks. The IRIS Mote features several new capabilities that enhance the overall functionality of MEMSIC's wireless sensor networking products.

Product features include:

- Up to three times improved radio range and twice the program memory over previous MICA Motes

- Outdoor line-of-sight tests have yeilded ranges as far as 500 meters between nodes without amplification

- IEEE 802.15.4 compliant RF transceiver

- 2.4 to 2.48 GHz, a globally compatible ISM band

- Direct sequence spread spectrum radio which is resistant to RF interference and provides inherent data security

- 250 kbps data rate

- Supported by MoteWorks™ wireless sensor network platform for reliable, ad-hoc mesh networking

- Plug and play with MEMSIC's sensor boards, data acquisition boards, gateways, and software

MoteWorks™ enables the development of custom sensor applications and is specifically optimized for low-power, battery-operated networks. MoteWorks is based on the open-source TinyOS operating system and provides reliable, ad-hoc mesh networking, over-the-air-programming capabilities, cross development tools, server middleware for enterprise network integration and client user interface for analysis and configuration.
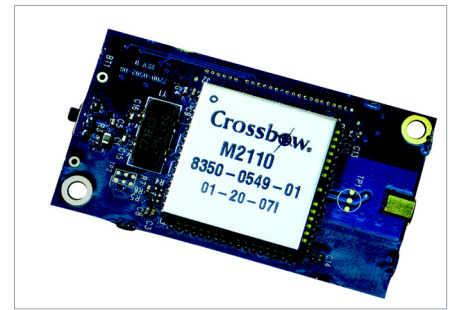
Processor & Radio Platform

The XM2110CA is based on the Atmel ATmega1281. The ATmega1281 is a low-power microcontroller which runs MoteWorks from its internal flash memory. A single processor board (XM2110) can be configured to run your sensor application/processing and the network/radio communications stack simultaneously. The IRIS 51-pin expansion connector supports Analog Inputs, Digital I/O, I2C, SPI and UART interfaces. These interfaces make it easy to connect to a wide variety of external peripherals.
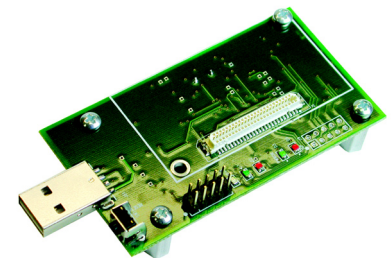
Sensor Boards

MEMSIC offers a variety of sensor and data acquisition boards for the IRIS Mote. All of these boards connect to the IRIS via the standard 51-pin expansion connector. Custom sensor and data acquisition boards are also available. Please contact MEMSIC for additional information.

Processor/Radio Board	XM2110CA	Remarks
Processor Performance		
Program Flash Memory	128K bytes	
Measurement (Serial) Flash	512K bytes	> 100,000 Measurements
RAM	8K bytes	
Configuration EEPROM	4K bytes	
Serial Communications	UART	0-3V transmission levels
Analog to Digital Converter	10 bit ADC	8 channel, 0-3V input
Other Interfaces	Digital I/O,I2C,SPI	
Current Draw	8 mA	Active mode
	8 μA	Sleep mode (total)
RF Transceiver		
Frequency band[1]	2405 MHz to 2480 MHz	ISM band, programmable in 1 MHz steps
Transmit (TX) data rate	250 kbps	
RF power	3 dBm (typ)	
Receive Sensitivity	-101 dBm (typ)	
Adjacent channel rejection	36 dB	+ 5 MHz channel spacing
	34 dB	- 5 MHz channel spacing
Outdoor Range	> 300 m	1/4 wave dipole antenna, LOS
Indoor Range	> 50 m	1/4 wave dipole antenna, LOS
Current Draw	16 mA	Receive mode
	10 mA	TX, -17 dBm
	13 mA	TX, -3 dBm
	17 mA	TX, 3 dBm
Electromechanical		
Battery	2X AA batteries	Attached pack
External Power	2.7 V - 3.3 V	Molex connector provided
User Interface	3 LEDs	Red, green and yellow
Size (in)	2.25 x 1.25 x 0.25	Excluding battery pack
(mm)	58 x 32 x 7	Excluding battery pack
Weight (oz)	0.7	Excluding batteries
(grams)	18	Excluding batteries
Expansion Connector	51-pin	All major I/O signals

Notes

[1] 5 MHz steps for compliance with IEEE 802.15.4/D18-2003.
Specifications subject to change without notice

IRIS Mote (bottom view)

MIB520CA Mote Interface Board

Base Stations

A base station allows the aggregation of sensor network data onto a PC or other computer platform. Any IRIS Mote can function as a base station when it is connected to a standard PC interface or gateway board. The MIB510 or MIB520 provides a serial/USB interface for both programming and data communications. MEMSIC also offers a stand-alone gateway solution, the MIB600 for TCP/IP-based Ethernet networks.

Ordering Information

Model	Description
XM2110CA	2.4 GHz IRIS OEM Reference Board