**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)

**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 yielded 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

<table>
<thead>
<tr>
<th>Model</th>
<th>XM2110CA</th>
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<table>
<thead>
<tr>
<th>Processor Performance</th>
<th>XM2110CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Flash Memory</td>
<td>128K bytes</td>
</tr>
<tr>
<td>Measurement (Serial) Flash</td>
<td>512K bytes</td>
</tr>
<tr>
<td>RAM</td>
<td>8K bytes</td>
</tr>
<tr>
<td>Configuration EEPROM</td>
<td>4K bytes</td>
</tr>
<tr>
<td>Serial Communications</td>
<td>UART 0-3V transmission levels</td>
</tr>
<tr>
<td>Analog to Digital Converter</td>
<td>10 bit ADC 8 channel, 0-3V input</td>
</tr>
<tr>
<td>Other Interfaces</td>
<td>Digital I/O, I2C, SPI</td>
</tr>
</tbody>
</table>

#### Current Draw
- Active mode: 8 mA
- Sleep mode: 8 μA

#### RF Transceiver
- Frequency band: 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
- 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: 5 MHz steps for compliance with IEEE 802.15.4/D18-2003. Specifications subject to change without notice.

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### 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.

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### Ordering Information

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>XM2110CA</td>
<td>2.4 GHz IRIS OEM Reference Board</td>
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