

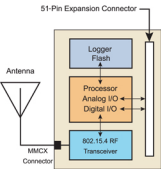
MICAz

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)



MPR2400 Block Diagram



MICAz

The MICAz is a 2.4 GHz Mote module used for enabling low-power, wireless sensor networks.

Product features include:

- 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 a configuration.

Processor & Radio Platform (MPR2400CA)

The MPR2400 is based on the Atmel ATmega128L. The ATmega128L is a low-power microcontroller which runs MoteWorks from its internal flash memory. A single processor board (MPR2400) can be configured to run your sensor application/ processing and the network/radio communications stack simultaneously. The 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. The MICAz (MPR2400) IEEE 802.15.4 radio offers both high speed (250 kbps) and hardware security (AES-128).

Sensor Boards

MEMSIC offers a variety of sensor and data acquisition boards for the MICAz Mote. All of these boards connect to the MICAz 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	MPR2400CA	Remarks
Processor Performance		
Program Flash Memory	128K bytes	
Measurement (Serial) Flash	512K bytes	> 100,000 Measurements
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,I ² C,SPI	
Current Draw	8 mA	Active mode
	< 15 μ A	Sleep mode
RF Transceiver		
Frequency band ¹	2400 MHz to 2483.5 MHz	ISM band, programmable in 1 MHz steps
Transmit (TX) data rate	250 kbps	
RF power	-24 dBm to 0 dBm	
Receive Sensitivity	-90 dBm (min), -94 dBm (typ)	
Adjacent channel rejection	47 dB	+ 5 MHz channel spacing
	38 dB	- 5 MHz channel spacing
Outdoor Range	75 m to 100 m	1/2 wave dipole antenna, LOS
Indoor Range	20 m to 30 m	1/2 wave dipole antenna
Current Draw	19.7 mA	Receive mode
	11 mA	TX, -10 dBm
	14 mA	TX, -5 dBm
	17.4 mA	TX, 0 dBm
	20 μ A	Idle mode, voltage regular on
	1 μ A	Sleep mode, voltage regulator off
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
¹5 MHz steps for compliance with IEEE 802.15.4/D18-2003.
 Specifications subject to change without notice

Base Stations

A base station allows the aggregation of sensor network data onto a PC or other computer platform. Any MICAz 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.



MIB520CB Mote Interface Board

Ordering Information

Model	Description
MPR2400CA	2.4 GHz MICAz Processor/Radio Board
WSN-START2400CA	2.4 GHz MICAz Starter Kit
WSN-PRO2400CA	2.4 GHz MICAz Professional Kit

MTS420/400

ENVIRONMENTAL SENSOR BOARD

- Compatible with IRIS/MICAz/ MICA2 Processor/ Radio Boards
- Onboard Temperature & Humidity, Barometric Pressure and Ambient Light Sensors
- Dual-Axis Accelerometer
- 64K EEPROM (CC versions), 2K EEPROM (CB versions) for User Configuration Data
- Optional GPS Module

Applications

- Agricultural Monitoring
- Art Preservation
- Environmental Monitoring
- Sensor Location Mapping* (*GPS Equipped)



MTS400CC

MTS420/400

Developed in conjunction with UC Berkeley and Intel Research Labs, the MTS400 and MTS420 offer five basic environmental sensing parameters and an optional GPS module (MTS420).

These sensor boards utilize the latest generation of IC-based surface mount sensors. These energy-efficient digital devices in turn provide extended battery-life and performance wherever low maintenance field-deployed sensor nodes are required.

These versatile sensor boards are intended for a wide variety of applications ranging from a simple wireless weather station to a full mesh network of environmental monitoring nodes. Applicable industries include Agricultural, Industrial, Forestry, HVAC and more.

Specifications:

Board

- Operating temp. range: -10°C to +60°C
- Operating humidity range 0% RH to 90% RH non-condensing

MTS420CC (with GPS Module)



Dual-axis Accelerometer

- Analog Devices ADXL202IE
- Acceleration range; resolution: ± 2 g; 2 mg at 60 Hz
- Nonlinearity: 0.2% of full scale
- Zero g bias level: 2.0 mg/°C from 25°C

Barometric Pressure Sensor

- Intersense MS5534AM
- Pressure range; resolution: 300-1100 mbar; 0.01 mbar
- Accuracy: $\pm 1.5\%$ at 25°C

Ambient Light Sensor

- TAOS TSL2550D
- Spectral responsivity: 400-1000 nm, similar to human eye

Relative Humidity & Temperature Sensor

- Sensirion SHT11
- Humidity range; resolution: 0-100% RH; 0.03% RH
- Absolute RH accuracy: $\pm 3.5\%$ RH
- Temp. accuracy: $\pm 0.5^\circ\text{C}$ @ 25°C

GPS Module (MTS420CC only)

- ublox LEA-4A
- Tracking channels: 16
- L1 frequency: 1575.42 MHz C/A code
- Position accuracy: 10 m, 2D
- Reacquisition time: < 1 sec. (typ.); (<30 sec. max. blockage)

Ordering Information

Model	Description
MTS400CC	Weather Sensor Board with Light, Temperature, Humidity, Barometric Pressure and Seismic
MTS420CC	Weather Sensor Board with Light, Temperature, Humidity, Barometric Pressure, Seismic and GPS

MTS/MDA

SENSOR, DATA ACQUISITION BOARDS

- Selection of 3 Standard Sensor/DAQ Boards
- MoteWorks™ Drivers Support Sensor Readings
- Supports IRIS, MICAz and MICA2 Motes
- Individual Power Control for Each Sensor

Applications

- Vibration and Magnetic Anomaly Detection
- External Sensor Connection
- Localization and Acoustic Tracking
- Robotics
- Wireless Sensor Networking



MTS310CB

MTS310

The MTS310 is a flexible sensor board with a variety of sensing modalities. These modalities include a Dual-Axis Accelerometer, Dual-Axis Magnetometer, Light, Temperature, Acoustic and Sounder. The MTS310 is for use with the IRIS, MICAz and MICA2 Motes.



MTS300CB

MTS300

The MTS300CB is a flexible sensor board with a variety of sensing modalities. These modalities include Light, Temperature, Acoustic and Sounder. The MTS300CB is for use with the IRIS, MICAz and MICA2 Motes.



MDA100CB

MDA100

The MDA100CB sensor and data acquisition board has a precision thermistor, a light sensor/photocell and general prototyping area. Designed for use with the IRIS, MICAz and MICA2 Motes, the prototyping area supports connection to all 51 pins on the expansion connector, and provides an additional 42 unconnected solder points for breadboarding.

Ordering Information

Model	Description
MTS310CB	Light, Temperature, Acoustic, Sounder, Dual-Axis Accel and Dual-Axis Mag Sensor Board
MTS300CB	Light, Temperature, Acoustic and Sounder Sensor Board
MDA100CB	Light, Temperature, Prototype Area Sensor/DAQ Board