

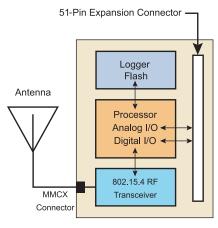


- 2.4 GHz IEEE 802.15.4, Tiny Wireless Measurement System
- Designed Specifically for Deeply Embedded Sensor Networks
- 250 kbps, High Data Rate Radio
- Wireless Communications with Every Node as Router Capability
- Expansion Connector for Light, Temperature, RH, Barometric Pressure, Acceleration/Seismic, 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.

Phone: 408.964.9700 Fax: 408.854.7702 E-mail: infoca@memsic.com www.memsic.com

Processor Performance 128K bytes Program Flash Memory 128K bytes Measurement (Serial) Flash 512K 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 VO,I2C,SPI Current Draw 8 mA Active mode RF Transceiver 15 μA Sleep mode Frequency band ¹ 2400 MHz to 2483.5 MHz ISM band, programmable in 1 MHz steps Transmit (TX) data rate 250 kbps 15 μA RF power -24 dBm to 0 dBm 4 max dbm, programmable in 1 MHz steps Receive Sensitivity -90 dBm (min), -94 dBm (typ) Adjacent channel rejection 47 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	Processor/Radio Board	MPR2400CA	Remarks
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,I2C,SPI Current Draw 8 mA Active mode RF Transceiver Sleep mode Frequency band¹ 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 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 1 μA Sleep mode, voltage regular on 1 μA Sleep mode, voltage regulator off Electromechanical Attached pack External P	Processor Performance		
Configuration EEPROM Serial Communications UART O-3V transmission levels Analog to Digital Converter Other Interfaces Digital VO,I2C,SPI Current Draw 8 mA Active mode < 15 μA Sleep mode RF Transceiver Frequency band¹ 2400 MHz to 2483.5 MHz If ansmit (TX) data rate 250 kbps RF power -24 dBm to 0 dBm Receive Sensitivity -90 dBm (min), -94 dBm (typ) Adjacent channel rejection 38 dB -5 MHz channel spacing Outdoor Range 75 m to 100 m 1/2 wave dipole antenna Current Draw 19.7 mA Receive mode 11 mA TX, -10 dBm 17.4 mA TX, -5 dBm 17.4 mA TX, 0 dBm 20 μA Idle mode, voltage regulator off Electromechanical Battery 2X AA batteries Attached pack External Power 2.25 x 1.25 x 0.25 Excluding batteries Weight (oz) 0.7 Excluding batteries	Program Flash Memory	128K 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 RF Transceiver	Measurement (Serial) Flash	512K bytes	> 100,000 Measurements
Analog to Digital Converter Other Interfaces Digital VO,I2C,SPI Current Draw 8 mA Active mode	Configuration EEPROM	4K bytes	
Other Interfaces Digital VO,I2C,SPI Current Draw 8 mA Active mode RF Transceiver 2400 MHz to 2483.5 MHz ISM band, programmable in 1 MHz steps Frequency band¹ 2400 MHz to 2483.5 MHz ISM band, programmable in 1 MHz steps Transmit (TX) data rate 250 kbps PodBm (min), -94 dBm (typ) Receive Sensitivity -90 dBm (min), -94 dBm (typ) + 5 MHz channel spacing Adjacent channel rejection 47 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 μA Idle mode, voltage regular on 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 Weight (o	Serial Communications	UART	0-3V transmission levels
Current Draw 8 mA Active mode RF Transceiver Sleep mode Frequency band¹ 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 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 μA Idle mode, voltage regular on I μA Sleep mode, voltage regulator off Electromechanical 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 <td>Analog to Digital Converter</td> <td>10 bit ADC</td> <td>8 channel, 0-3V input</td>	Analog to Digital Converter	10 bit ADC	8 channel, 0-3V input
RF Transceiver Frequency band¹ 2400 MHz to 2483.5 MHz Frequency band¹ 2400 MHz to 2483.5 MHz Frequency band¹ 2400 MHz to 2483.5 MHz ISM band, programmable in 1 MHz steps Frequency band¹ Receive Sensitivity -90 dBm (min), -94 dBm (typ) Adjacent channel rejection 47 dB +5 MHz channel spacing -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 TX, -10 dBm TX, -5 dBm TX, -5 dBm TX, -6 dBm I7.4 mA TX, 0 dBm 20 μA Idle 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) 58 x 32 x 7 Excluding batterips Excluding batterips	Other Interfaces	Digital I/O,I2C,SPI	
RF Transceiver2400 MHz to 2483.5 MHzISM band, programmable in 1 MHz stepsFrequency band¹2400 MHz to 2483.5 MHzISM band, programmable in 1 MHz stepsTransmit (TX) data rate250 kbps	Current Draw	8 mA	Active mode
Frequency band¹2400 MHz to 2483.5 MHzISM band, programmable in 1 MHz stepsTransmit (TX) data rate250 kbpsRF power-24 dBm to 0 dBmReceive Sensitivity-90 dBm (min), -94 dBm (typ)Adjacent channel rejection47 dB+ 5 MHz channel spacingOutdoor Range75 m to 100 m1/2 wave dipole antenna, LOSIndoor Range20 m to 30 m1/2 wave dipole antennaCurrent Draw19.7 mAReceive mode11 mATX, -10 dBm17.4 mATX, 0 dBm17.4 mATX, 0 dBm1 μASleep mode, voltage regular onElectromechanical1 μASleep mode, voltage regulator offExternal Power2.7 V - 3.3 VMolex connector providedUser Interface3 LEDsRed, green and yellowSize (in)2.25 x 1.25 x 0.25Excluding battery pack(mm)58 x 32 x 7Excluding battery packWeight (oz)0.7Excluding batteries		< 15 μΑ	Sleep mode
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 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 μA Idle mode, voltage regular on I μA 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 Weight (oz) 0.7 Excluding batteries	RF Transceiver		
RF power 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 10 μA Idle mode, voltage regular on I μA 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 Weight (oz) 0.7 Excluding batteries	Frequency band ¹	2400 MHz to 2483.5 MHz	ISM band, programmable in 1 MHz steps
Receive Sensitivity-90 dBm (min), -94 dBm (typ)Adjacent channel rejection47 dB+ 5 MHz channel spacing38 dB- 5 MHz channel spacingOutdoor Range75 m to 100 m1/2 wave dipole antenna, LOSIndoor Range20 m to 30 m1/2 wave dipole antennaCurrent Draw19.7 mAReceive mode11 mATX, -10 dBm14 mATX, -5 dBm17.4 mATX, 0 dBm20 μAIdle mode, voltage regular on1 μASleep mode, voltage regulator offElectromechanicalAttached packExternal Power2.7 V - 3.3 VMolex connector providedUser Interface3 LEDsRed, green and yellowSize (in)2.25 x 1.25 x 0.25Excluding battery pack(mm)58 x 32 x 7Excluding battery packWeight (oz)0.7Excluding batteries	Transmit (TX) data rate	250 kbps	
Adjacent channel rejection 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 17.4 mA TX, 0 dBm 17.4 mA TX, 0 dBm 20 μA Idle mode, voltage regular on 1 μA 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	RF power	-24 dBm to 0 dBm	
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 μA Idle mode, voltage regular on 1 μA 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	Receive Sensitivity	-90 dBm (min), -94 dBm (typ)	
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 µA Idle mode, voltage regular on 1 µA 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 batteries	Adjacent channel rejection	47 dB	+ 5 MHz channel spacing
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 ldle mode, voltage regular on 1 μA 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) 58 x 32 x 7 Excluding battery pack Weight (oz) 0.7 Excluding batteries		38 dB	- 5 MHz channel spacing
Current Draw 19.7 mA Receive mode 11 mA TX, -10 dBm 14 mA TX, -5 dBm 17.4 mA TX, 0 dBm 20 µA Idle mode, voltage regular on 1 µA 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	Outdoor Range	75 m to 100 m	1/2 wave dipole antenna, LOS
11 mA TX, -10 dBm 14 mA TX, -5 dBm 17.4 mA TX, 0 dBm 20 μA Idle mode, voltage regular on 1 μA 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	Indoor Range	20 m to 30 m	1/2 wave dipole antenna
14 mA TX, -5 dBm 17.4 mA TX, 0 dBm 20 μA Idle mode, voltage regular on 1 μA 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 batteries	Current Draw	19.7 mA	Receive mode
17.4 mA TX, 0 dBm 20 μA Idle mode, voltage regular on 1 μA 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		11 mA	TX, -10 dBm
20 μA Idle mode, voltage regular on 1 μA 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		14 mA	TX, -5 dBm
1 μA 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		17.4 mA	TX, 0 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		20 μΑ	Idle mode, voltage regular on
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		1 μΑ	Sleep mode, voltage regulator off
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	Electromechanical		
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	Battery	2X AA batteries	Attached pack
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	External Power	2.7 V - 3.3 V	Molex connector provided
(mm) 58 x 32 x 7 Excluding battery pack Weight (oz) 0.7 Excluding batteries	User Interface	3 LEDs	Red, green and yellow
Weight (oz) 0.7 Excluding batteries	Size (in)	2.25 x 1.25 x 0.25	Excluding battery pack
	(mm)	58 x 32 x 7	Excluding battery pack
(grams) 18 Excluding batteries	Weight (oz)	0.7	Excluding batteries
	(grams)	18	Excluding batteries
Expansion Connector 51-pin All major I/O signals	_	51-pin	



MIB520CB Mote Interface Board

Notes

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.

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	

¹5 MHz steps for compliance with IEEE 802.15.4/D18-2003. Specifications subject to change without notice