

chipKIT™ WiFi Shield Reference Manual

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Note: This document applies to REV C of the board.



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Overview

The chipKIT™ WiFi Shield is an interface board designed for use with Digiilent's chipKIT line of microcontroller boards such as the Uno32™, uC32™, or Max32™. The chipKIT line is a family of microcontroller boards based on the high performance Microchip PIC32 family of microcontrollers.

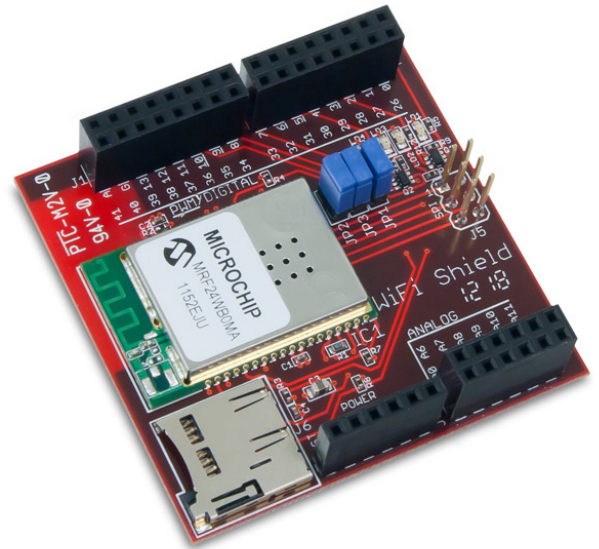
The WiFi Shield makes use of the Microchip MRF24WB0MA WiFi module and provides chipKIT microcontroller boards the ability to connect to and communicate via IEEE 802.11 compatible wireless networks.

The WiFi Shield is intended for use with the Digiilent network libraries, DNETcK and DWIFlck, available for free download from the Digiilent web site. These libraries make use of, and include a custom version of the Microchip Applications Library licensed from Microchip.

The WiFi Shield also provides a micro-SD card connector for use with micro-SD flash memory cards. The chipKIT MPIDE SD library can be used to read/write files stored on the micro-SD card.

Features include:

- IEEE 802.11b-compliant RF transceiver
- serialized unique MAC address
- 1 and 2Mbps data rates
- IEEE 802.11b/g/n-compatible
- integrated PCB antenna
- range: up to 400m (1300 ft.)
- radio regulation certification for the United States (FCC), Canada (IC), Europe (ETSI), and Japan (ARIB)
- Wi-Fi certified (WFA ID: WFA7150)
- micro SD card connector
- four LEDs



Functional Description

Overview

The chipKIT WiFi Shield provides IEEE 802.11b support for embedded applications at data rates of 1 and 2Mbps. It is compatible with 802.11b/g/n networks, and is designed for use with chipKIT™ and chipKIT™ compatible microcontroller boards.

The WiFi Shield is intended to be used with the Digilent network libraries, DNETcK and DWIFlck, available for free download from the Digilent web site. These libraries contain Microchip Applications Library code licensed for use by Digilent from Microchip. The Microchip Applications Library, available from www.microchip.com, could be used as a starting point to create custom library code to work with the WiFi Shield.

The WiFi shield also provides a micro-SD card connector and four discrete LEDs. The micro-SD card connector provides the ability to access files stored on a micro-SD size flash memory card using the chipKIT MPIDE SD library.

The discrete LEDs are connected to four digital I/O pins on the chipKIT microcontroller board and can be driving using the `pinMode()` and `digitalWrite()` functions in the MPIDE software.

Refer to the chipKIT WiFi Shield schematic, available on the Digilent web site, for detailed information about the circuits on the board.

802.11b Interface

The 802.11b compatible WiFi interface on the chipKIT WiFi Shield is provided by a Microchip MRF24WB0MA WiFi module. This module provides the radio transceiver, antenna, and 802.11 compatible network firmware in a single module.

The MRF24WB0MA firmware provides the 802.11 network software support. The

DNETcK and DWIFlck libraries provide the TCP/IP network protocol support on top of the 802.11 support provided by the WiFi module.

The primary communications interface with the WiFi module is an SPI bus. The MRF24WB0MA WiFi module supports SPI clock speeds up to 25MHz. An active low RESET signal can be used to reset the WiFi module, and an external interrupt signal, INT, is used by the module to signal to the host microcontroller that it needs attention.

The MRF24WB0MA provides the following additional input/output signals: WP, write protect; HIBERNATE; RESET; and INT.

More detailed information about the operation of the MRF24WB0MA can be obtained from the manufacturer data sheet available from the Microchip web site.

SD Card Interface

The micro-SD card connector provides the ability to access data stored on micro-SD sized flash memory cards.

SD memory cards are accessed via the same SPI bus as is used to access the WiFi module. A separate select line from that used by the WiFi module is used to enable access to the SD card.

The chipKIT MPIDE SD library can be used to access files stored on a micro-SD card

Library Software

The chipKIT WiFi Shield is intended for use with the Digilent chipKIT network libraries DNETcK and DWIFlck. The DNETcK library provides TCP/IP protocol support for all chipKIT compatible network interfaces supported by Digilent products, including the WiFi Shield. The DWIFlck library provides the additional support required for connecting to and operating on an 802.11b/g/n wireless network.

The Digilent chipKIT network libraries are available for download from the Digilent web site: www.digilentinc.com. These libraries make use of a custom version of the Microchip Application Library. It is necessary to accept the Microchip Application Library license agreement before downloading the library.

There are reference examples demonstrating the use of these libraries in the library download. There are more extensive examples available on the Digilent web site as well.

Signal Pin Assignments

| uC32/ Uno32 Pin # | Max32 Pin # | Connector Pin # | Signal |
|-------------------------|----------------|--------------------|--|
| 2 | 2 | J2-05 | INT – external interrupt from MRF24WB0MA |
| 3 | 3 | J2-07 | LED1 |
| 4 | 4 | J2-09 | SDCS – SPI select for SD card |
| 5 | 5 | J2-11 | LED2 |
| 6 | 6 | J2-13 | LED3 |
| 9 | 9 | J1-03 | LED4 |
| 10 | 10 | J5-05 | CS – SPI select for MRF24WB0MA |
| 11 | 11 | J5-04 | MOSI – data in (SDI) for MRF24WB0MA and SD card |
| 12 | 12 | J5-01 | MISO – data out (SDO) for MRF24WB0MA and SD card |
| 13 | 13 | J5-03 | SCK – SPI clock for MRF24WB0MA and SD card |
| 34 | 78 | J1-02 | HIBERNATE |
| 35 | 79 | J1-04 | WP |
| 36 | 80 | J1-06 | RESET |