chipKIT™ WiFi Shield™ Reference Manual

Revised January 23, 2014
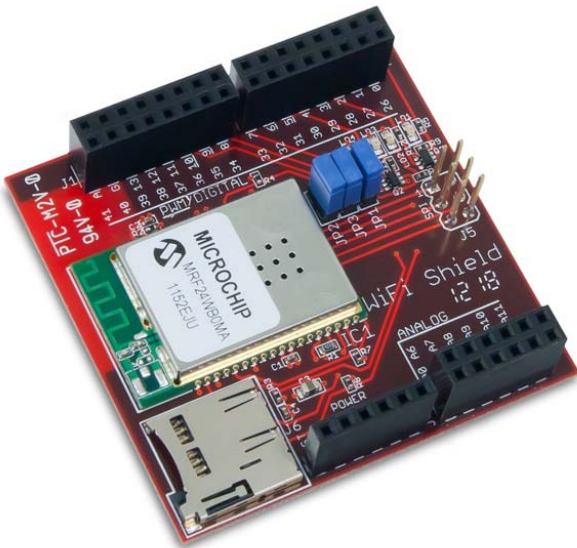**This manual applies to the chipKIT WiFi Shield rev. C**

Overview

The chipKIT WiFi Shield is designed for use with Digilent's growing line of chipKIT microcontroller boards such as the Uno32™, uC32™, WF32™, or Max32™. The chipKIT line of microcontroller boards is based on the high-performance Microchip® PIC32 microcontrollers.

The WiFi Shield gives chipKIT microcontroller boards the ability to connect to and communicate with IEEE 802.11-compatible wireless networks. It is intended to be used with the Digilent network libraries DNETcK and DWIFIcK, available at www.digilentinc.com in file DSD-0000318.

The WiFi Shield provides a microSD card connector. The chipKIT MPIDE SD library can be used to read and write files on microSD cards.

Early versions of the WiFi Shield use the Microchip MRF24WB0MA WiFi module. Later versions use the improved MRF24WG0MA WiFi module.

Features include:

- An IEEE 802.11b/g-compliant RF transceiver.
- A serialized unique MAC address.
- Peak data rates up to 2Mbps for 802.11b and 54Mbps for 802.11g .
- Open security, WEP, WPA-PSK, and WPA2-PSK security.
- An integrated PCB antenna.
- Radio regulation certification for the United States (FCC), Canada (IC), and Europe (ETSI).
- A micro SD card connector.
- Four user-accessible LEDs.

The chipKIT WiFi Shield with MRF24WB0MA.

1 Functional Description

The WiFi Shield supports IEEE 802.11b/g/n networks and is designed for use with chipKIT and chipKIT-compatible microcontroller boards.

The first version of the WiFi Shield uses the Microchip MRF24WB0MA WiFi module. This module supports IEEE 802.11b networks at 1 and 2 Mbps data rates.

Later productions versions of the WiFi Shield use the improved Microchip MRF24WG0MA module. This module provides IEEE 802.11b/g support for embedded applications at data rates of 1 or 2 Mbps for 802.11b or 6, 9, 12, 18, 24, 36, 48, and 54 Mbps for 802.11g.

The production version of the board can be determined by reading the part number of the MRF24Wx0MA module from the sticker (on the B module) or engraved on the metal shield (on the G module.)

The WiFi Shield is intended to be used with the Digilent network libraries DNETcK and DWIFIcK, available at www.digilentinc.com. The libraries use the chipKIT MPIDE development environment and contain Microchip Applications Library code licensed from Microchip.

To use the WiFi Shield outside of the MPIDE development environment, use the Microchip Applications Library, available from www.microchip.com, as a starting point to create custom library code.

The WiFi Shield has a microSD card connector and four discrete LEDs.

The card connector uses the chipKIT MPIDE SD library to access files on a microSD-size flash memory card.

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

For more information, see the chipKit WiFi Shield schematic at www.digilentinc.com.

2 802.11b/g Interface

The 802.11b/g compatible WiFi interface on the chipKIT WiFi Shield is provided by a Microchip MRF24Wx0MA WiFi module. This module provides the radio transceiver, antenna, and 802.11-compatible network firmware.

The MRF24Wx0MA firmware provides the 802.11 network protocol software support. The DNETcK and DWIFIcK libraries provide the TCP/IP network protocol support that works with the 802.11 protocol support provided by the WiFi module.

The primary communications interface with the WiFi module is a 4-wire SPI bus. The MRF24Wx0MA WiFi module supports SPI clock speeds up to 10MHz. 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 servicing by the microcontroller software.

The MRF24Wx0MA provides the following additional control signals: HIBERNATE (recommended for the G module only), RESET, and INT.

For detailed information on the MRF24Wx0MA, see the data sheet at www.microchip.com.

3 SD Card Interface

The microSD card connector lets you access data stored on microSD-sized cards.

SD memory cards are accessed via the same SPI bus used to access the WiFi module. The SD card uses a separate select line from that used by the WiFi module to enable API access to the SD card. The chipKIT MPIDE SD library is used to access files stored on the card.

4 Library Software

The WiFi Shield is intended for use with the Digilent chipKIT network libraries DNETcK and DWIFIcK. The DNETcK library provides TCP/IP and UDP/IP protocol support for all chipKIT-compatible network interfaces supported by Digilent products. The DWIFIcK library provides the additional library support required for connecting to and operating with the Microchip MRF24Wx0MA wireless network modules.

The DWIFIcK library supports both the MRF24WB0MA and MRF24WG0MA modules. The correct header file must be used for the version of the module on the WiFi Shield. When using a WiFi Shield with the MRF24WB0MA module, use the following:

```
#include <WiFiShieldOrPmodWiFi.h>
```

When using a WiFi Shield with the MRF24WG0MA module, use the following:

```
#include <WiFiShieldOrPmodWiFi_G.h>
```

The chipKIT network libraries are available from the www.digilentinc.com in file DSD-0000318. The file includes reference examples demonstrating the use of the libraries. More extensive examples are available for download as well.

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 MRF24Wx0MA
11	11	J5-04	MOSI – data in (SDI) for MRF24Wx0MA and SD card
12	12	J5-01	MISO – data out (SDO) for MRF24Wx0MA and SD card
13	13	J5-03	SCK – SPI clock for MRF24Wx0MA and SD card
34	78	J1-02	HIBERNATE
35	79	J1-04	WP
36	80	J1-06	RESET

Table 1. Signal pin assignments.

Declaration of Conformity

In accordance with EN ISO/IEC 17050-1:2010

Manufacturers Name: Digilent, Inc.

Manufacturers Address: 1300 NE Henley Court

                                       Pullman, WA 99163

                                       U.S.A.

Application of Council Directives:

Low Voltage   2006/95/EC

EMC   2004/108/EC

Standards:

EMC   EN55022:2010

                                       EN55024:2010

Safety   IEC 60950-1:2005

                                       EN 60950-1:2006

Product Name: chipKIT WiFi Shield

Product Model Number: Digilent P/N 210-231

Digilent Product Category: Serial Peripheral Devices

We, the undersigned, hereby declare that the equipment specified above conforms to the above Directives and Standards.

Location: Pullman, WA   Signature: *Clint Cole*

Date: June 18, 2012   Full Name (print): Clint Cole

                                    Title: President

Mouser Electronics

Authorized Distributor

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[410-231P-KIT](#) [410-231](#)