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**ZENA™ Wireless Adapter  
User's Guide**

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# ZENA™ WIRELESS ADAPTER USER'S GUIDE

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## Preface

### NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our web site ([www.microchip.com](http://www.microchip.com)) to obtain the latest documentation available.

Documents are identified with a “DS” number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is “DSXXXXA”, where “XXXX” is the document number and “A” is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE on-line help. Select the Help menu, and then Topics to open a list of available on-line help files.

## INTRODUCTION

This chapter contains general information that will be useful to know before using the ZENA™ Wireless Adapter. Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
- [Warranty Registration](#)
- [Recommended Reading](#)
- [The Microchip Web Site](#)
- [Development Systems Customer Change Notification Service](#)
- [Customer Support](#)
- [Document Revision History](#)

## DOCUMENT LAYOUT

This document describes how to use the ZENA™ Wireless Adapter. The manual layout is as follows:

- **Chapter 1. “Overview”** – This chapter provides a brief overview of the ZENA Wireless Adapter, including kits contents and features.
- **Chapter 2. “Getting Started”** – This chapter describes how to start using your ZENA™ Wireless Adapter.
- **Appendix A. “ZENA™ Wireless Adapter Construction Details”** – This appendix contains the schematics, PCB layout and bill of materials.

# ZENA™ Wireless Adapter User's Guide

## CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

### DOCUMENTATION CONVENTIONS

Description	Represents	Examples
<b>Arial font:</b>		
Italic characters	Referenced books	<i>MPLAB® IDE User's Guide</i>
	Emphasized text	...is the <i>only</i> compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	<u><i>File&gt;Save</i></u>
Bold characters	A dialog button	Click <b>OK</b>
	A tab	Click the <b>Power</b> tab
N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
<b>Courier New font:</b>		
Plain Courier New	Sample source code	#define START
	Filenames	autoexec.bat
	File paths	c:\mcc18\h
	Keywords	_asm, _endasm, static
	Command-line options	-Opa+, -Opa-
	Bit values	0, 1
	Constants	0xFF, 'A'
Italic Courier New	A variable argument	<i>file.o</i> , where <i>file</i> can be any valid filename
Square brackets [ ]	Optional arguments	mcc18 [options] <i>file</i> [options]
Curly brackets and pipe character: {   }	Choice of mutually exclusive arguments; an OR selection	errorlevel {0 1}
Ellipses...	Replaces repeated text	var_name [, var_name...]
	Represents code supplied by user	void main (void) { ... }

## WARRANTY REGISTRATION

Please complete the enclosed Warranty Registration Card and mail it promptly. Sending in the Warranty Registration Card entitles users to receive new product updates. Interim software releases are available at the Microchip web site.

## RECOMMENDED READING

This user's guide describes how to use the ZENA Wireless Adapter. The following Microchip documents are available from the Microchip web site ([www.microchip.com](http://www.microchip.com)), and are recommended as supplemental reference resources.

**MRF24J40MA 2.4 GHz IEEE Std. 802.15.4 RF Transceiver Module (DS70329)**

**PIC18F46J50 USB Microcontroller Data Sheet (DS39931)**

**MCP1700 Low Quiescent Current LDO (DS21826)**

**25LC256 256K SPI Bus Serial EEPROM (DS21822)**

**2K SPI Bus Serial EEPROM with EUI-48™ Node Identity Data Sheet (DS22123)**

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- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

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The Development Systems product group categories are:

- **Compilers** – The latest information on Microchip C compilers and other language tools. These include the MPLAB C18 and MPLAB C30 C compilers; MPASM™ and MPLAB ASM30 assemblers; MPLINK™ and MPLAB LINK30 object linkers; and MPLIB™ and MPLAB LIB30 object librarians.
- **Emulators** – The latest information on Microchip in-circuit emulators. This includes the MPLAB ICE 2000 and MPLAB ICE 4000.
- **In-Circuit Debuggers** – The latest information on the Microchip in-circuit debugger, MPLAB ICD 2.
- **MPLAB® IDE** – The latest information on Microchip MPLAB IDE, the Windows® Integrated Development Environment for development systems tools. This list is focused on the MPLAB IDE, MPLAB SIM simulator, MPLAB IDE Project Manager and general editing and debugging features.
- **Programmers** – The latest information on Microchip programmers. These include the MPLAB PM3 and PRO MATE® II device programmers and the PICSTART® Plus and PICKit™ 1 development programmers.

## CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: <http://support.microchip.com>

## DOCUMENT REVISION HISTORY

### Revision A (June 2011)

- This is the initial Release of the Document.



## Chapter 1. Overview

### 1.1 INTRODUCTION

The ZENA Wireless Adapter is a multi-function USB wireless adapter connecting USB-equipped desktop or notebook computers with Microchip wireless products for development or application uses. As a development tool, the ZENA Wireless Adapter can be used as a protocol analyzer or as a diagnostic tool. It can also be used to connect the computer as a wireless node to the network for application uses. The ZENA Wireless Adapter is capable of performing a variety of functions and each function can be programmed into the adapter using the built in USB boot loader.

Additional software and firmware updates can be downloaded from the Microchip website: <http://www.microchip.com/zena>.

This chapter discusses:

- ZENA Wireless Adapter Package Contents
- ZENA Wireless Adapter Description

### 1.2 ZENA WIRELESS ADAPTER PACKAGE CONTENTS

Depending on the frequency and device type ZENA Wireless Adapter ordered, the package may contain one of the following listed in [Table 1-1](#).

**TABLE 1-1: ZENA™ WIRELESS ADAPTER**

Description	Part Number
ZENA Wireless Adapter – 2.4 GHz MRF24J40	AC182015-1

### 1.3 ZENA WIRELESS ADAPTER DESCRIPTION

The ZENA Wireless Adapter is shown in [Figure 1-1](#).

**FIGURE 1-1: ZENA™ WIRELESS ADAPTER**



The ZENA Wireless Adapter plugs into the computers USB slot either directly or using an extension cable. The LED indicates operation status.

## 1.4 REGULATORY STATEMENTS

### 1.4.1 United States

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment OFF and ON, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

### 1.4.2 Canada

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.



# ZENA™ WIRELESS ADAPTER USER'S GUIDE

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## Chapter 2. Getting Started

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### 2.1 INTRODUCTION

The ZENA Wireless Adapter is a flexible, multipurpose device. Firmware applications can be updated from a computer application program such as the Wireless Development Studio.

The ZENA Wireless Adapter is preprogrammed with a MiWi™ Wireless Protocol Sniffer application. This allows the user to display MiWi Wireless Protocol packets in a graphical format in the Wireless Development Studio.

ZENA Wireless Adapter software and firmware updates can be downloaded from the Microchip website <http://www.microchip.com/zena>.

### 2.2 INSTALLATION

#### 2.2.1 Installing the Wireless Development Studio

The Wireless Development Studio can be downloaded from the Microchip website: <http://www.microchip.com/wds>. Install the program following the installation instructions that come with the package.

#### 2.2.2 Installing USB Drivers

The ZENA Wireless Adapter has been designed to communicate with the Microchip MPLABComm driver which is based on the libusb-win32 (for Windows) and libusb (for Mac and Linux operating systems) libraries. The USB Drivers come with the Wireless Development Studio. To install the USB drivers, follow the sections below for the operating system of choice.

**Note:** If MPLAB X is installed, the required USB drivers may already be installed.

# ZENA™ Wireless Adapter User's Guide

## 2.2.2.1 INSTALLING THE USB DRIVER FOR WINDOWS® 2000/XP/VISTA/7 OSs

To Install the USB Driver for windows, perform the following tasks:

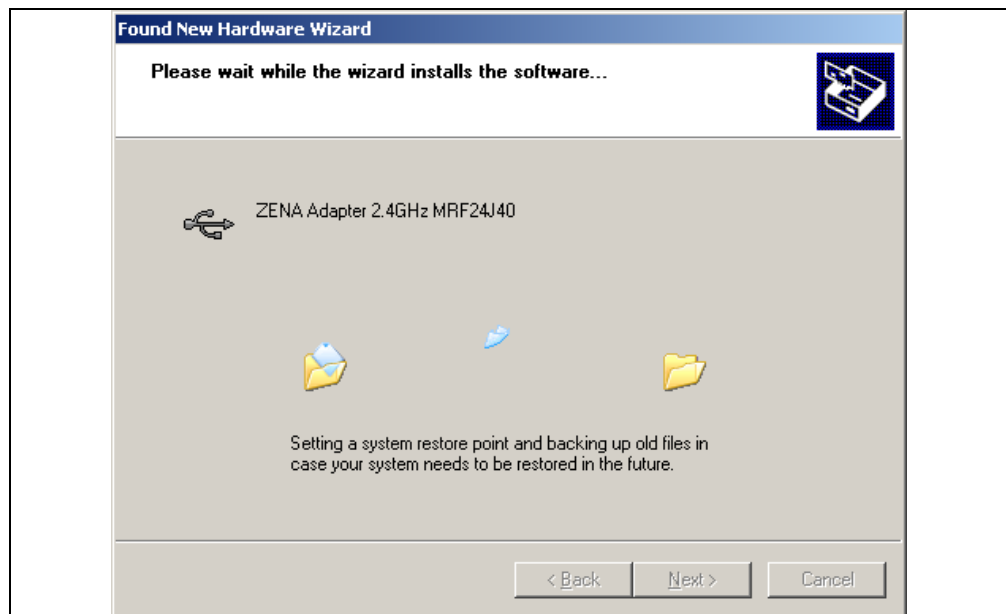
1. Plug in the ZENA Wireless Adapter into a USB port. Windows will prompt for a hardware installation as shown in [Figure 2-1](#).

**FIGURE 2-1: FOUND NEW HARDWARE WIZARD WINDOW**



2. Select *Install the software automatically (Recommended)* and then click *Next*. Windows will search and install the driver automatically as shown in [Figure 2-2](#).

**FIGURE 2-2: INSTALLING THE DRIVER**

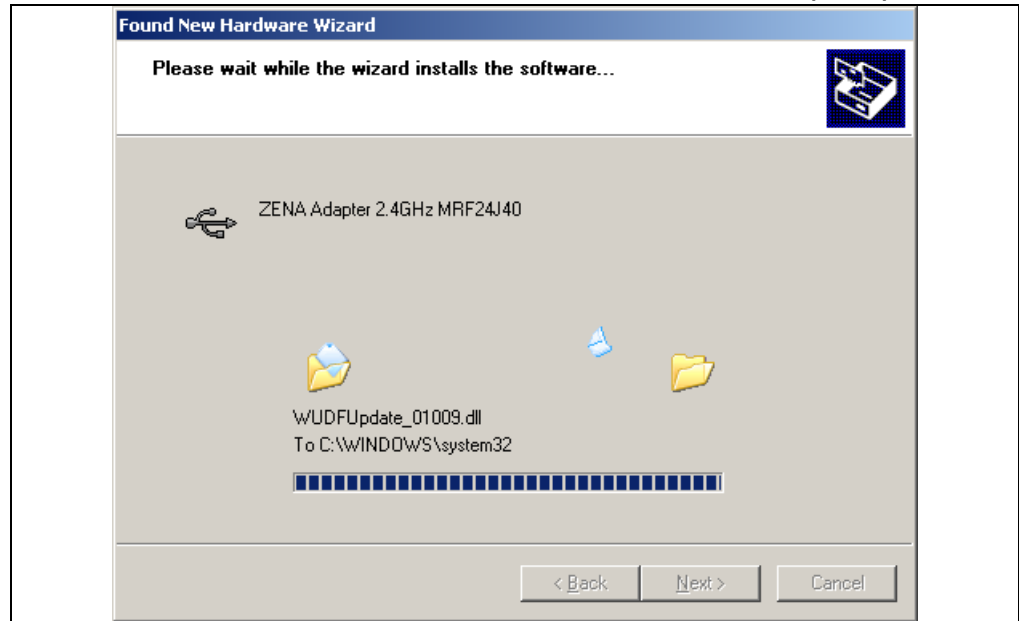


3. If Windows is unable to find the hardware for the device then click *Back* and select the option *Install from a list or specific location (Advanced)*.

The driver is located in the `Wireless Development Studio\Driver\Inf\` folder.

4. After installing the driver, Windows prompts the following DLLs:  
WinUSBCoInstaller2.dll, WdfCoInstaller01009.dll and WUDFUpdate\_01009.dll as shown in [Figure 2-3](#).
  - If installing in a Windows 32 bit system, point the folder location to "C:\Windows\system32"
  - If installing in a Windows 64-bit system, point the folder location to "C:\Windows\SysWOW64".

**FIGURE 2-3: INSTALLING DYNAMIC LINKED LIBRARIES (DLLs)**



5. After installing the driver and DLLs, the *Completing the Found New Hardware Wizard* appears on the screen as shown in [Figure 2-4](#).
6. Click *Finish* to complete the installation.

**FIGURE 2-4: COMPLETING THE FOUND NEW HARDWARE WIZARD**



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## 2.2.2.2 INSTALLING THE USB DRIVER FOR MAC OR LINUX OSs

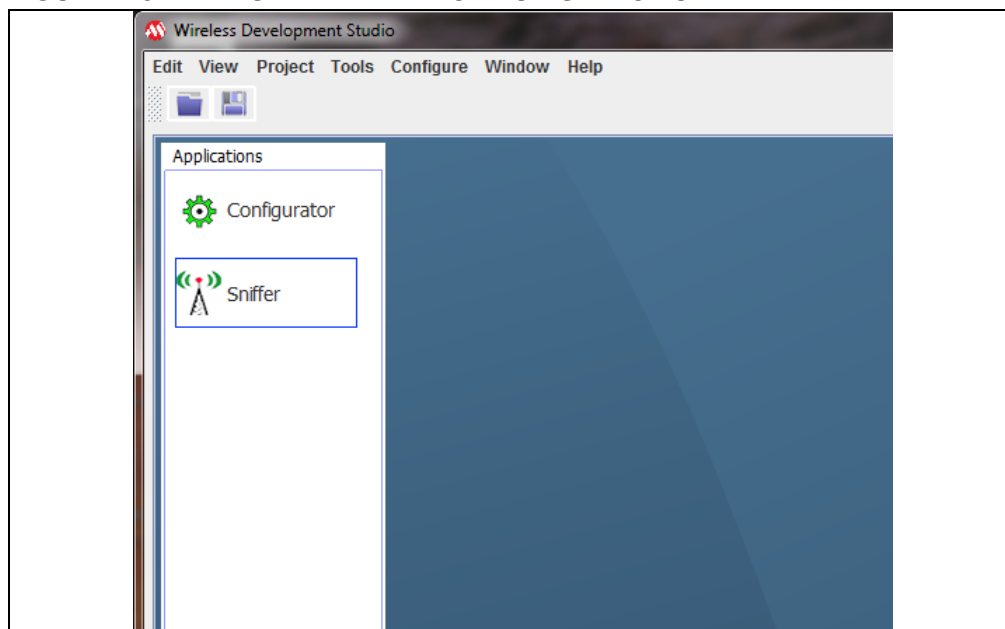
The ZENA Wireless Adapter uses the libUSB drivers. When installing the USB drivers on a Mac or Linux computer, the installer will place the USB drivers in the proper location.

## 2.3 USING ZENA WIRELESS ADAPTER WITH THE WIRELESS DEVELOPMENT STUDIO

To use the ZENA Wireless Adapter with the Wireless Development Studio, it must first be selected as the source device by performing the following tasks:

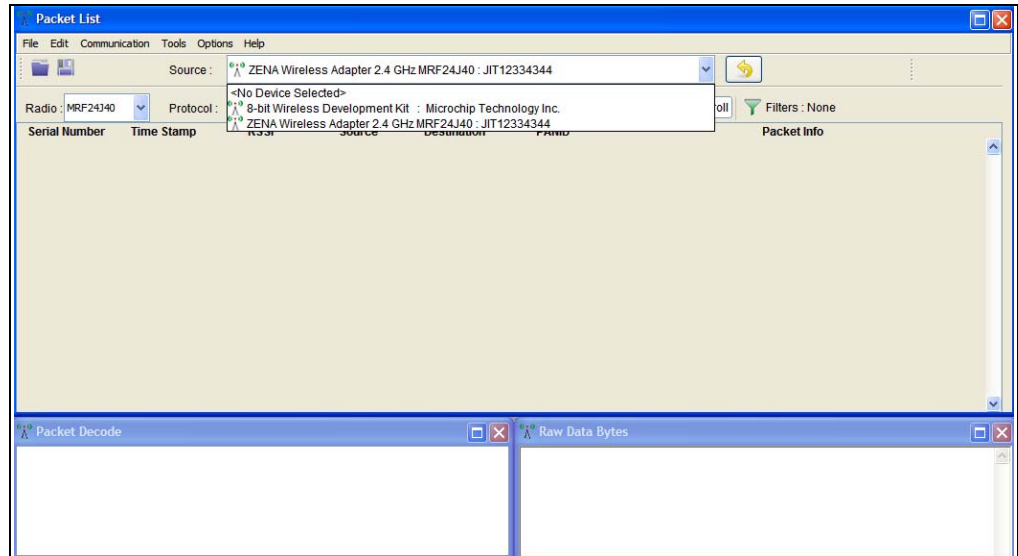
1. From the main window, select Sniffer as the active application, see [Figure 2-5](#). The Packet List window will appear.

**FIGURE 2-5: SNIFFER APPLICATION SELECTION**



- From the Packet List window, select ZENA Wireless Adapter from the Source drop-down box, see [Figure 2-6](#).

**FIGURE 2-6: WIRELESS DEVELOPMENT STUDIO SOURCE SELECTION**



**Note:** If multiple ZENA Wireless Adapters are plugged in, they can be individually chosen by serial number.

For more information on running the Wireless Development Studio, see the Wireless Development Studio help.

# ZENA™ Wireless Adapter User's Guide

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## Appendix A. ZENA™ Wireless Adapter Construction Details

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### A.1 INTRODUCTION

This appendix provides the ZENA™ Wireless Adapter schematics, PCB layout and Bill of Materials (BOM).

### A.2 ZENA WIRELESS ADAPTER SCHEMATIC

[Figure A-1](#) and [Figure A-2](#) illustrates the ZENA Wireless Adapter Schematics

FIGURE A-1: ZENA™ WIRELESS ADAPTER SCHEMATIC

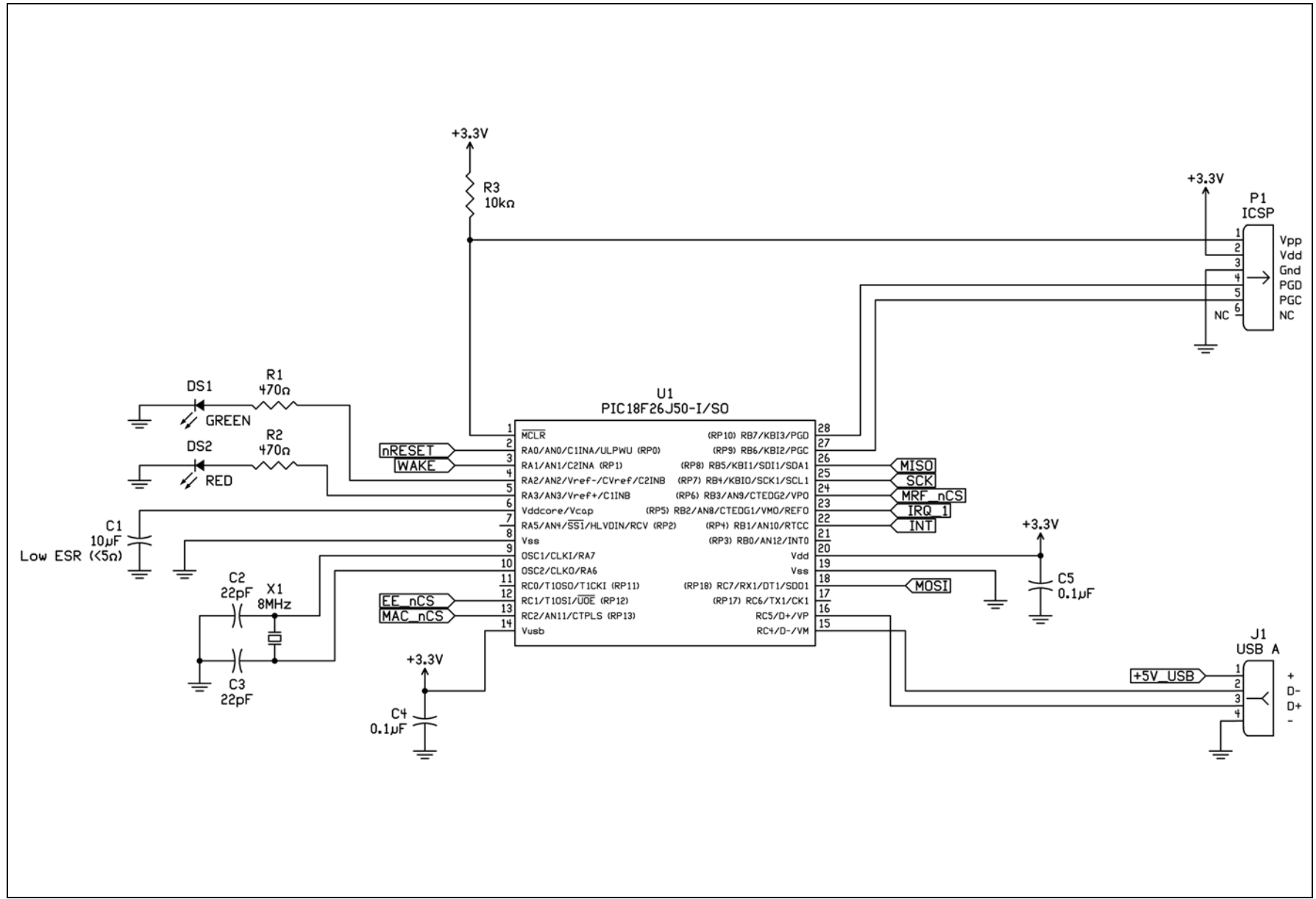
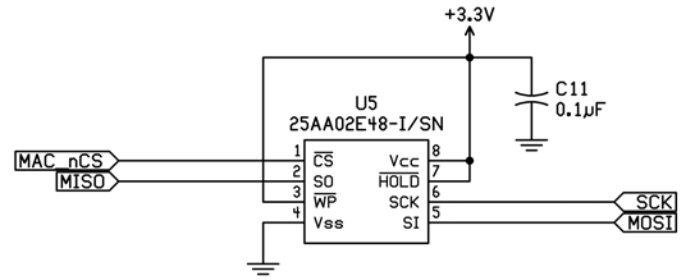
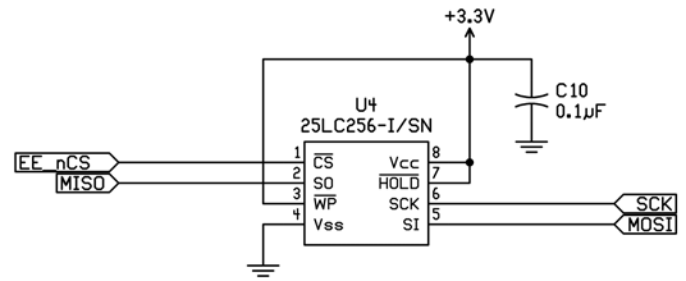
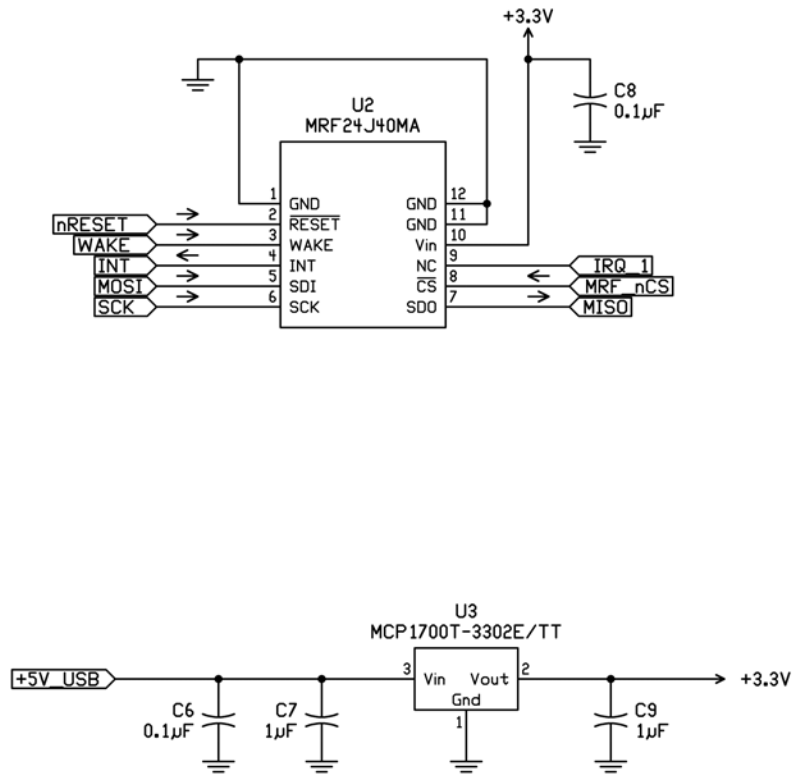


FIGURE A-2: ZENA™ WIRELESS ADAPTER SCHEMATIC

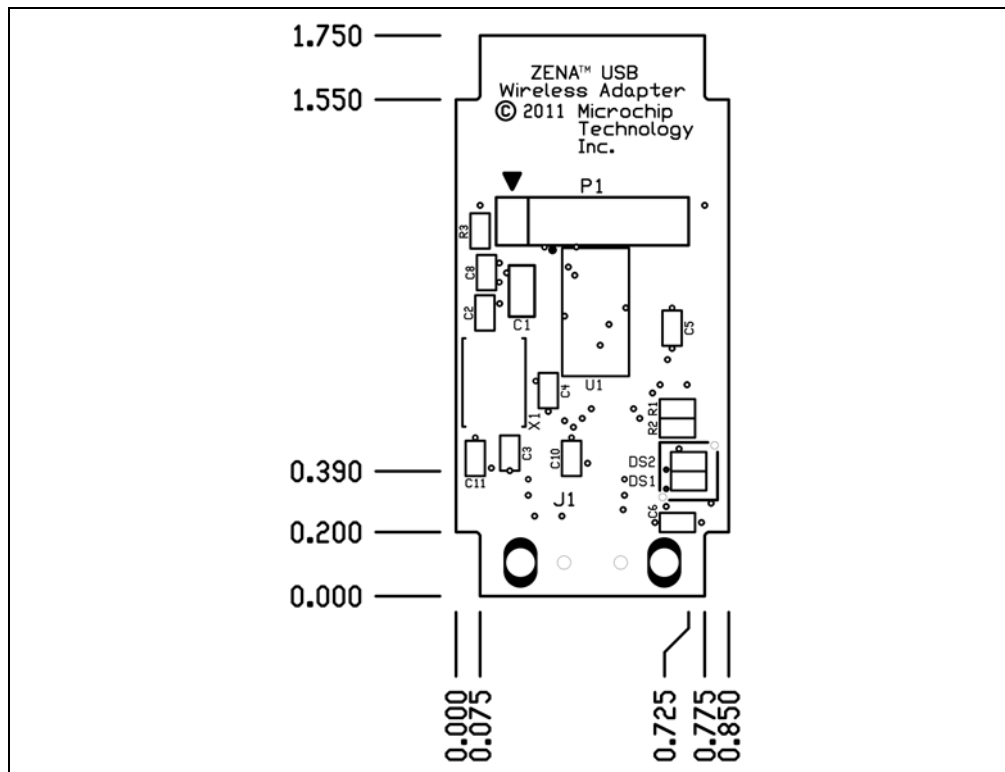


# ZENA™ Wireless Adapter User's Guide

## A.3 ZENA WIRELESS ADAPTER PCB LAYOUT

The ZENA Wireless Adapter PCB is a 4-layer, high temperature FR4, 0.031 inch, plated through hole construction. Figure A-3 through Figure A-8 show the PCB layers. Figure A-3 illustrates the ZENA Wireless Adapter top silk screen

FIGURE A-3: TOP SILKSCREEN



# ZENA™ Wireless Adapter Construction Details

Figure A-4 illustrates the ZENA Wireless Adapter top copper.

**FIGURE A-4: LAYER 1 — TOP COPPER**

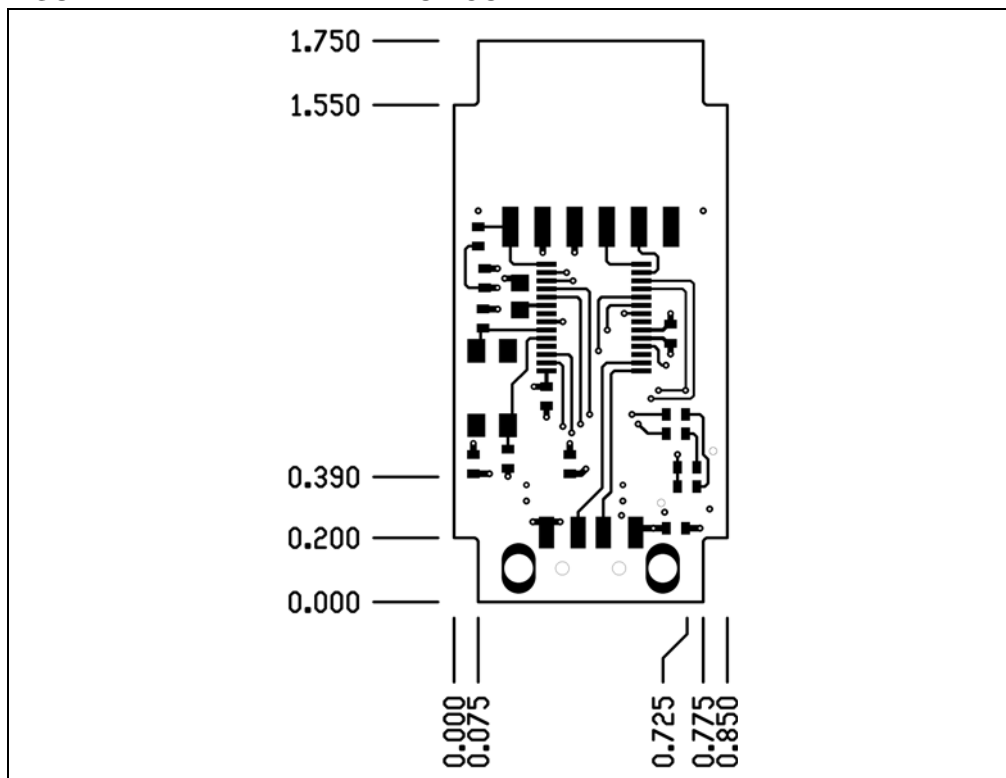
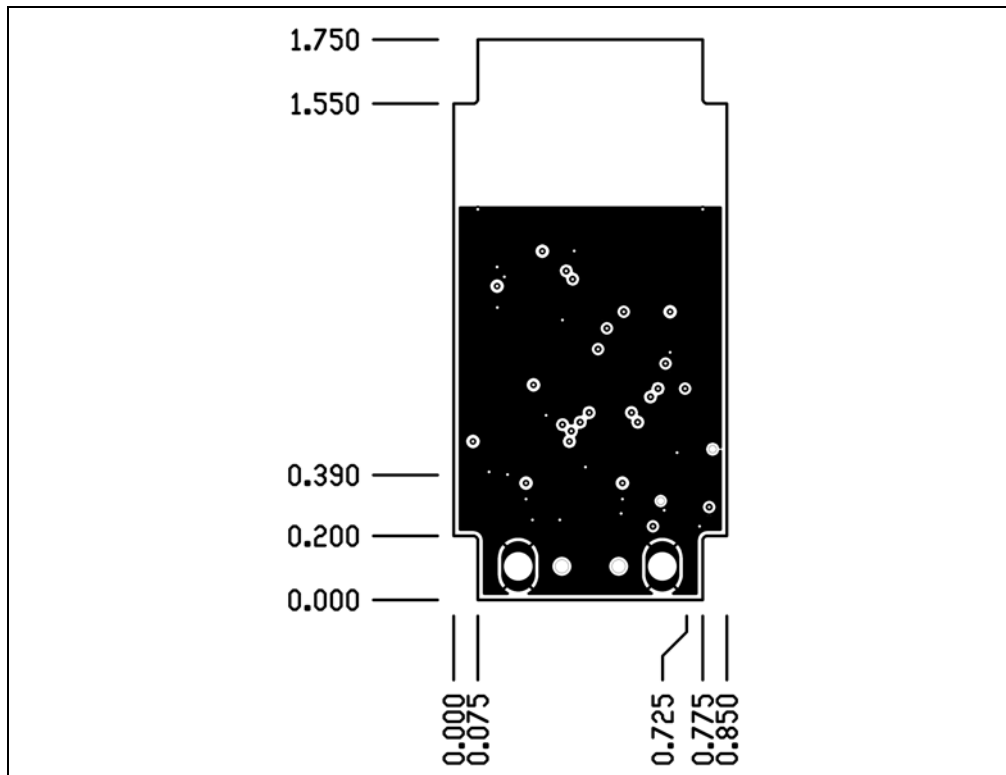


Figure A-5 illustrates the ZENA Wireless Adapter Ground Plane.

**FIGURE A-5: LAYER 2 — GROUND PLANE**



# ZENA™ Wireless Adapter User's Guide

Figure A-6 illustrates the ZENA Wireless Adapter Power Plane.

**FIGURE A-6: LAYER 3 — POWER PLANE**

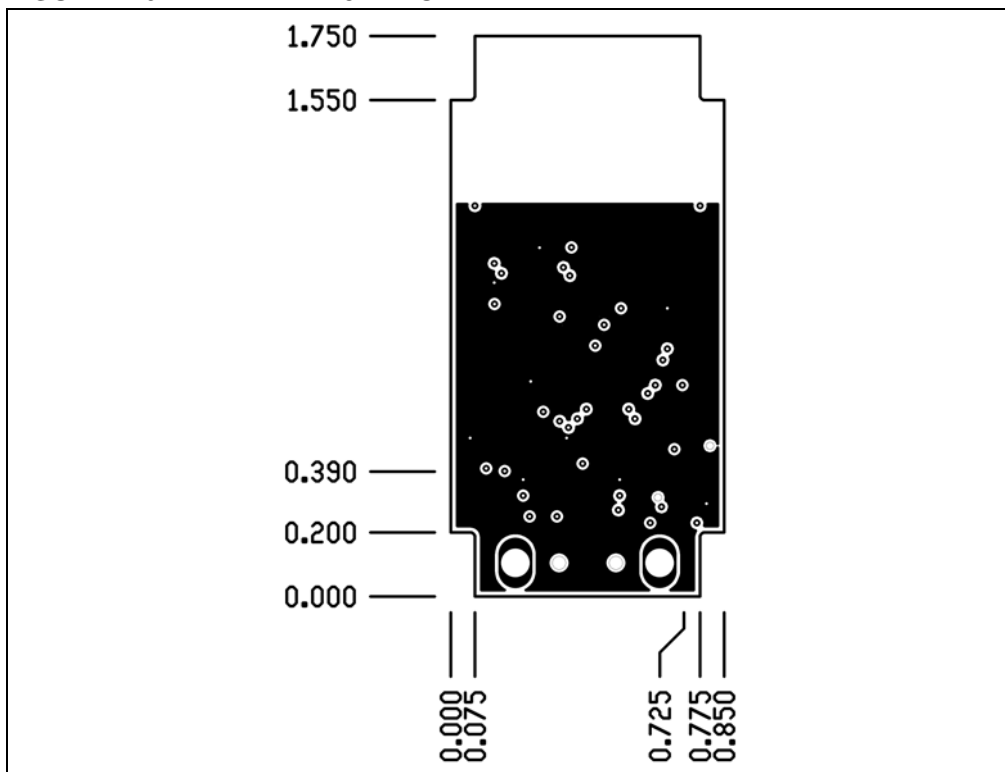
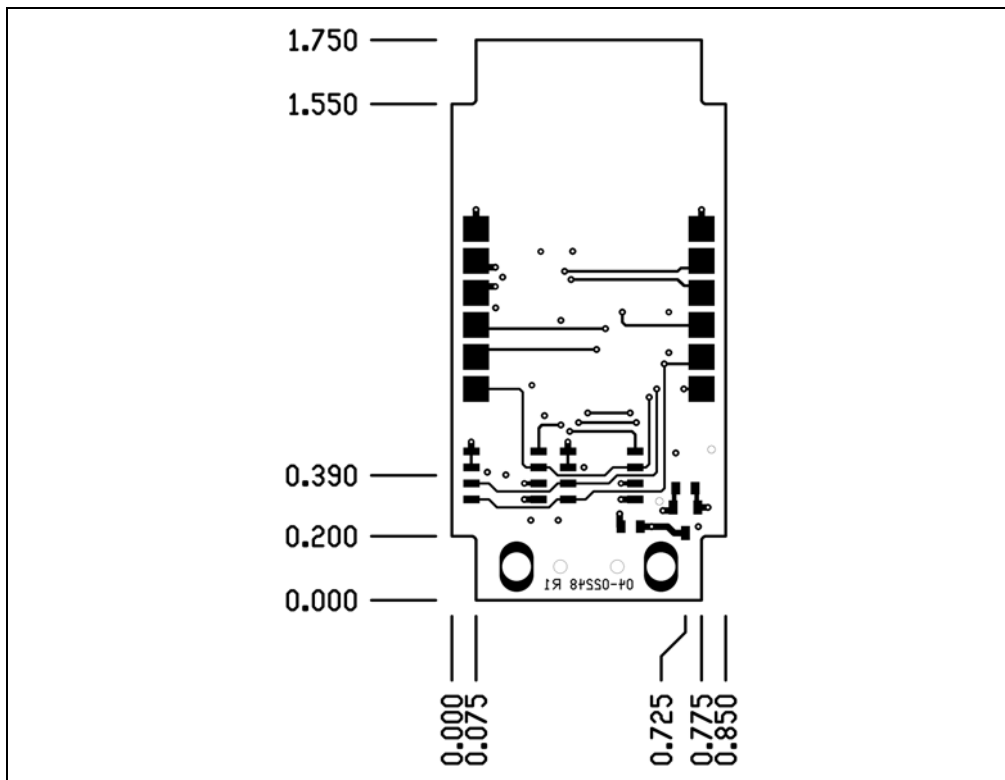


Figure A-7 illustrates the ZENA Wireless Adapter bottom copper.

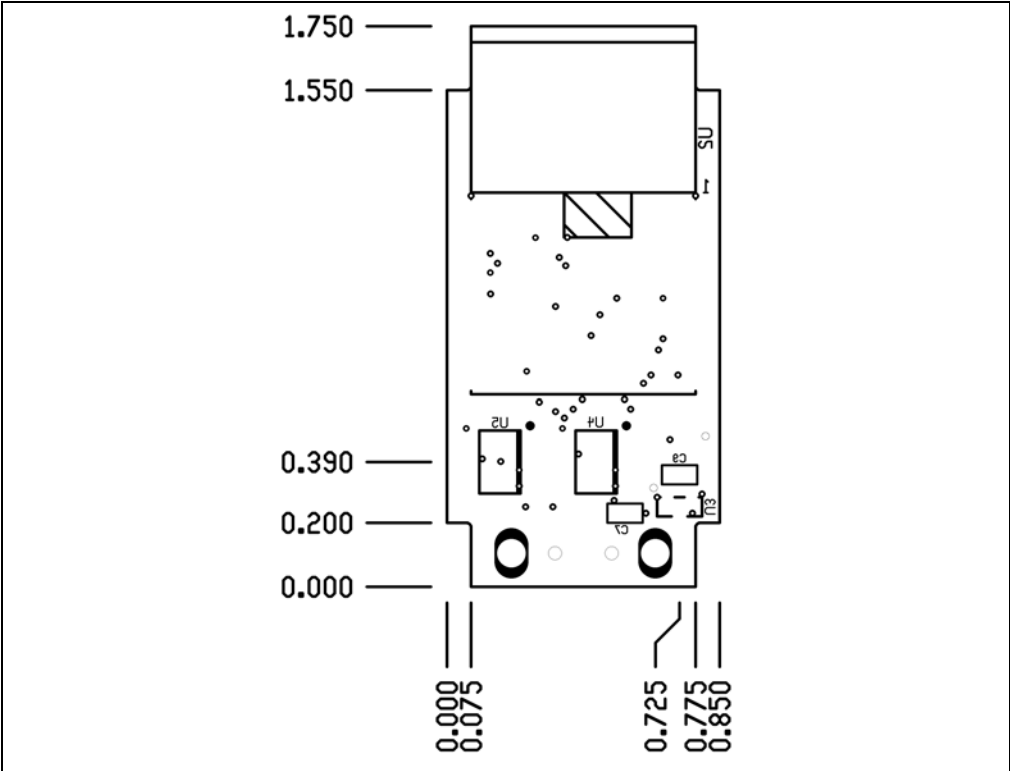
**FIGURE A-7: LAYER 4 — BOTTOM COPPER**



# ZENA™ Wireless Adapter Construction Details

Figure A-8 illustrates the ZENA Wireless Adapter bottom silkscreen.

**FIGURE A-8: BOTTOM SILKSCREEN**



# ZENA™ Wireless Adapter User's Guide

## A.4 ZENA WIRELESS ADAPTER BILL OF MATERIALS

Table A-1 provides a detailed description of the ZENA Wireless Adapter Bill of Materials (BOM).

**TABLE A-1: BILL OF MATERIALS**

Qty	Designator	Value	Description	Manufacturer	Manufacturer Part Number
2	C2, C3	22 pF	Capacitor, Ceramic, SMT 0603	Murata Electronics North America	GRM1885C1H220JA01D
6	C4, C5, C6, C8, C10, C11	0.1 µF	Capacitor, Ceramic, 16V, ±10%, X7R, SMT 0603	Murata Electronics North America	GRM188R71C104KA01D
2	C7, C9	1 µF	Capacitor, Ceramic, 6.3V, ±10%, X5R, SMT 0603	Murata Electronics North America	GRM188R60J105KA01D
1	C1	10 µF	Capacitor, Ceramic, 6.3V, ±20%, X5R, SMT 0805	Murata Electronics North America	GRM21BR60J106ME19L
1	DS1	Green	Diode, Light Emitting, Green	OSRAM	LG Q971-KN-1-0-20-R18
1	DS2	Red	Diode, Light Emitting, Red	OSRAM	LS Q976-NR-1-0-20-R18
1	J1	—	Connector, Plug USB 4Pos RT Ang SMD	Molex	480371000
2	R1, R2	470 ohms	Resistor, Thin Film File, SMT 0603	Stackpole Electronics	RMCF0603JT470R
1	R3	10K ohms	Resistor, Thin Film File, SMT 0603	Stackpole Electronics	RMCF0603JT10K0
1	U1	—	PIC18F26J50-I/SS	Microchip Technology	PIC18F26J50-I/SS
1	U2	—	MRF24J40MA	Microchip Technology	MRF24J40MA-I/RM
1	U3	—	MCP1700T-3302E	Microchip Technology	MCP1700T-3302E/TT
1	U4	—	25LC256-I/SN	Microchip Technology	25LC256-I/SN
1	U5	—	25AA02E48-I/SN	Microchip Technology	25AA02E48-I/SN
1	X1	8 MHz	Crystal, SMT, 8 MHz	Abracon	ABMM-8.000MHZ-B2-T
1	@DS1 and DS2	—	Light Pipe, Vertical, 0.300" round	Bivar Inc.	VLP-300-R
1	Enclosure	—	Enclosure, USB Device,	New Age Enclosures	P-201005





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Fax: 91-80-3090-4123

**India - New Delhi**  
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**India - Pune**  
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**Korea - Daegu**  
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**Korea - Seoul**  
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82-2-558-5934

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**Malaysia - Penang**  
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**Philippines - Manila**  
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**Singapore**  
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Fax: 65-6334-8850

**Taiwan - Hsin Chu**  
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**Taiwan - Kaohsiung**  
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**Taiwan - Taipei**  
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**Netherlands - Druenen**  
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**Spain - Madrid**  
Tel: 34-91-708-08-90  
Fax: 34-91-708-08-91

**UK - Wokingham**  
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05/02/11

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».



## JONHON

«**JONHON**» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«**FORSTAR**» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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