BROADCOM®

WICED™ Development System

WICED™ by **BROADCOM®**

Revision History

Revision	Date	Change Description
WICED-EUM201-R	April 19, 2013	Updated for WICED-SDK-2.3.0
WICED-EUM200-R	November 22, 2012	Updated for compatibility with WICED-SDK-2.x
WICED-EUM100-D2	March 8, 2012	Update to match P400 board revision to include sensor interface
WICED-EUM100-D1	July 15, 2011	Draft Release

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1   About this Document

1.1   Purpose and Scope

This document provides information describing Evaluation Boards for the Wireless Internet Connectivity for Devices (WICED™; pronounced "wicked") Development System. WICED EVBs are available directly from Broadcom, or from ODMs that manufacture and supply Broadcom Wi-Fi modules and evaluation boards.

Users of this guide should refer to the *WICED Quick Start Guide, document WICED-QSG2xx-R* [1]. The Quick Start describes how to install and use the WICED Software Development Kit (SDK).

1.2   Audience

This document is for engineers planning to use a Broadcom WICED Evaluation Board (EVB) and WICED module to write applications using the Broadcom WICED Development System.

1.3   How to Use this Guide

Section 2 contains a brief overview of the WICED Development System as background information.

Section 3 details the feature set of the Broadcom WICED Evaluation Board, including various WICED modules, and provides a diagram to enable easy identification of features. A description of power consumption measurement, and the sensor interface and expansion header, is also provided.

1.4   Acronyms and Abbreviations

In most cases, acronyms and abbreviations are defined on first use. For a comprehensive list of acronyms and other terms used in Broadcom documents, go to the URL below:

http://www.broadcom.com/press/glossary.php

1.5 Document Conventions

The following conventions may be used in this document:

Convention	Description
Bold	Buttons, tabs, lists and other GUI items
Monospace	Command lines and application outputs: `snip.scan-BCM943362WCD4 JTAG=Olimex_ARM-USB-TINY download run`
< >	Placeholders for *required* elements: <WICED-SDK>
' '	Application Names, Configuration Parameters: 'YOUR_AP_SSID'

1.6 References

The references in this section may be used with this document.

Note : Broadcom provides customer access to technical documentation and software through the WICED website (http://go.broadcom.com/wiced). Additional restricted material may be provided through the Customer Support Portal (CSP) and Downloads.

For Broadcom documents, replace the 'xx' in the document number with the largest number available to ensure you have the most current version of this document.

Document (or Item) Name	Number	Source
[1] WICED Quick Start Guide	WICED-QSG2xx-R	WICED SDK

1.7 Technical Support

Broadcom provides customer access to a wide range of information, including technical documentation, schematic diagrams, product bill of materials, PCB layout information, and software updates through its customer support portal. For a CSP account, contact your Broadcom® Sales or Engineering support representative.

General WICED support is available on the Broadcom forum at the URL shown below. After signing up to the forum, please apply to be a member of the WICED users group and identify yourself to the forum moderator. Access to the WICED forum is restricted to bona-fide WICED customers only.

http://forum.broadcom.com/forum.php

2   WICED Development System

WICED is a development system that facilitates Wireless Internet Connectivity for Embedded Devices. The development system, shown in Figure 1, comprises :

- A Software Development Kit including a GUI development environment, tool chain and build system, a Wi-Fi driver and software stack together with example applications. The SDK runs on various operating systems including Windows®, OS X and Linux.

- An Evaluation Board populated with a WICED module. Applications developed using the WICED SDK are downloaded via USB-JTAG (or optionally via J-Link) to a WICED module attached to a WICED Evaluation Board. The WICED module incorporates a Broadcom Wi-Fi device and a microcontroller (MCU).
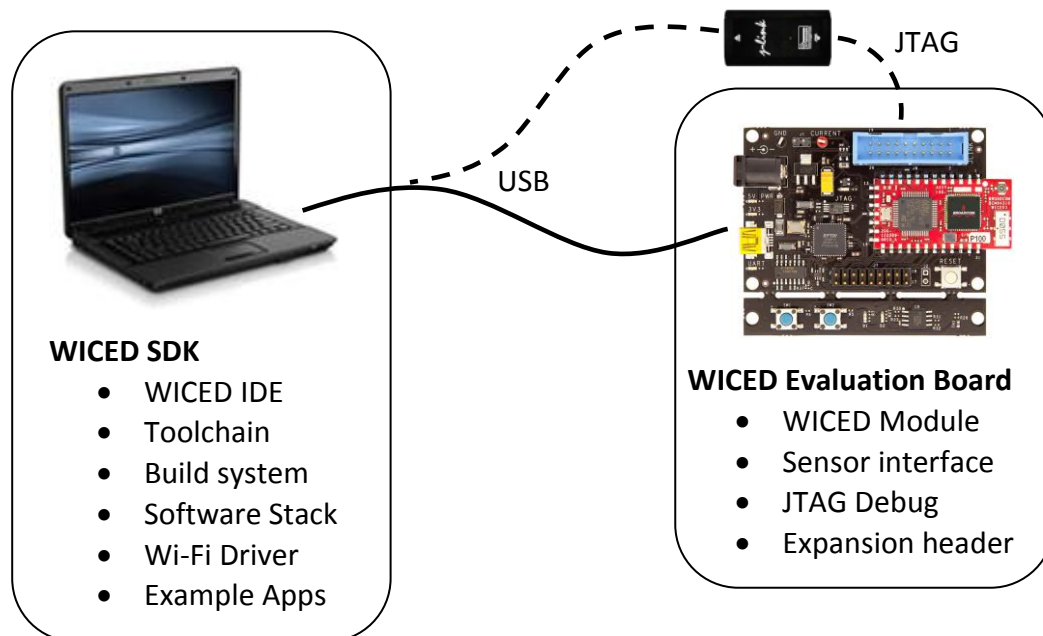

WICED SDK
- WICED IDE
- Toolchain
- Build system
- Software Stack
- Wi-Fi Driver
- Example Apps

WICED Evaluation Board
- WICED Module
- Sensor interface
- JTAG Debug
- Expansion header

Figure 1. WICED Development System

3 WICED Evaluation Board

The WICED Evaluation Board provides a platform for the design and development of applications that run on a WICED module.

3.1 Feature List

The evaluation board provides the features listed in Table 1.

Feature	Detail	
WICED Module	The module is a complete Wi-Fi and networking solution and includes a microcontroller, Broadcom Wi-Fi, antenna(e) and power supply.	
Program & Debug Interfaces	Applications are downloaded to the microcontroller and debugged using either a USB-JTAG interface or a J-Link JTAG interface	
USB-Serial UART Interface	A UART on the microcontroller connects to the EVB USB-serial interface to enable serial communications with a PC terminal application	
Expansion Header	The expansion header facilitates custom sensor interfaces and expansion boards	
Reset Switch	Enables manual reset of the WICED module	
Current Measurement	A current measurement circuit enables power profiling of the application running on the WICED module	
Power Supply	The EVB may be powered directly from the USB interface or from an external +5V power supply.	
LED Indicators	UART	Illuminates when transmit or receive characters appear on the UART
	JTAG	Illuminates when the JTAG programming interface is active
	3V3	Illuminates while power is supplied to the EVB (USB or external power)
	5V PWR	Illuminates when external +5V power is connected

Table 1. WICED Evaluation Board Features

3.2   Feature Identification

Features of the WICED Evaluation Board are called out in Figure 2.
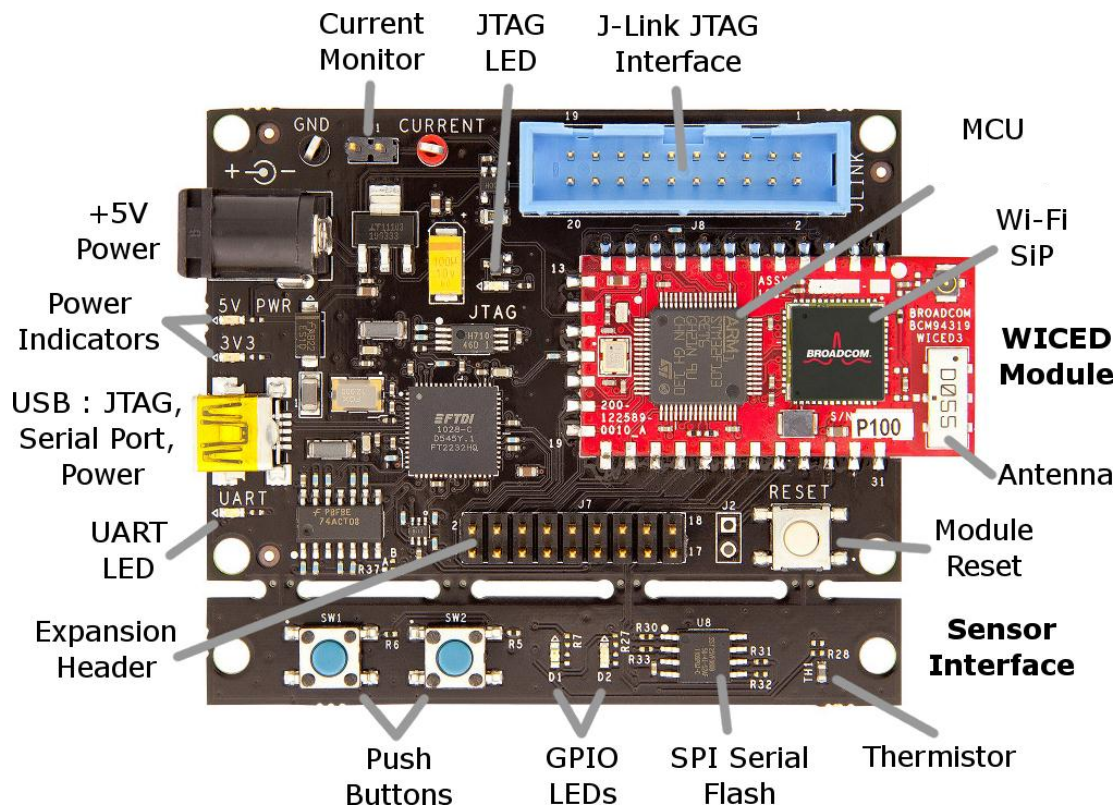

Figure 2. Broadcom WICED Evaluation Board Feature Identification

3.3   Broadcom WICED Modules

Broadcom WICED Modules provide a complete embedded Wi-Fi and networking solution incorporating a microcontroller, Broadcom Wi-Fi, antenna(e) and power supply. Table 2 contains brief specifications for each of the WICED evaluation modules available from Broadcom. Schematic and board layout packages for each module are available from Broadcom.

Note: WICED Evaluation Modules are provided for evaluation purposes ONLY, the modules have not been fully qualified for production and have not passed FCC/CE radio certification testing.

Module P/N	Wi-Fi Package	MCU Type	Antenna Diversity	Flash (kB)	RAM (kB)	Approximate Dimensions (mm)
BCM943362WCD2	CoB	STM32F103	No	512	64	40 x 20 x 3
BCM943362WCD4	SiP	STM32F205	Yes	1024	128	53 x 20 x 4
BCM943362WCD6	SiP	STM32F415	Yes	1024	192	53 x 20 x 4
BCM943362WCD8	SiP	AT91SAM4SB	Yes	1024	128	53 x 20 x 4
BCM9WCDUSI09	CoB (Integrated in a SiP)	STM32F205	Yes	1024	128	53 x 20 x 4

Table 2. Broadcom WICED Evaluation Modules

3.4   Power Supply

Power is provided to the EVB via the USB interface or external +5V connector independently or concurrently. Use of the external +5V power supply is recommended if a device connected to the expansion header consumes more than 100mA of current.

3.5   Power Consumption Measurement

A dedicated current measurement circuit is included on the EVB to enable system-level power profiling of applications running on the WICED module. The circuit is based on a Maxim MAX4376 current-sense amplifier that measures the differential voltage across a 0.2 Ohm resistor in series with the module power supply.

The current consumption profile of the application running on the WICED module is measured by connecting an oscilloscope across the header pins marked CURRENT and GND. The output voltage of the circuit is scaled to produce 1V for every 100mA (or 10V for every 1A) of current consumed. The power consumption of the module is calculated by multiplying current consumption by the VDD_3V3 voltage.

A current consumption profile of the WICED module obtained during boot and Wi-Fi association of a WICED SDK example application is shown in Figure 3. The plot is provided as an example profile only. Actual power consumption will vary depending on the WICED module, application and SDK version, hence the vertical scale has been removed.

Note: The current measurement circuit has limited accuracy below 5 mA and is therefore not suitable for low-range sleep current measurements.
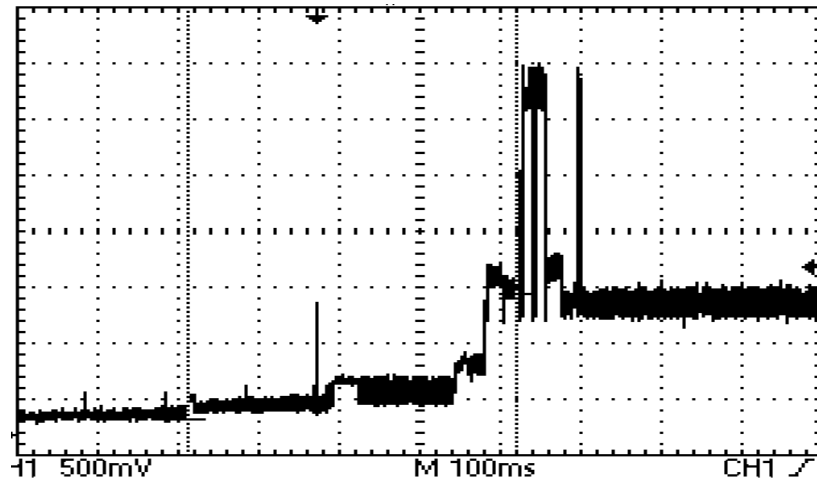
Figure 3. Example current consumption profile

3.6 Program & Debug Interfaces

The WICED EVB provides two independent interfaces for programming the microcontroller on the WICED module, a USB-JTAG interface and a J-Link JTAG interface.

The WICED SDK uses the USB interface for programming and debugging by default. To use the USB interface, connect the WICED EVB directly to a PC containing the WICED SDK. A driver for the board was installed during the SDK installation process.

To use the J-Link direct JTAG interface, ensure the board is powered, then connect the J-Link JTAG programmer to the JTAG header marked JLINK. To override the default USB programming interface, the `JTAG=jlink` option must be provided to the WICED SDK toolchain.

Low-cost JTAG programmers that connect to the WICED EVB J-Link header are available from Olimex. The WICED SDK provides instructions to use Olimex JTAG programmers at the following location : `<WICED-SDK>/Tools/OpenOCD/Olimex_README.txt`

During programming and debug, the JTAG LED flashes intermittently on and off.

3.7 USB-Serial UART Interface

In addition to a program and debug interface, the EVB USB interface provides a USB-serial UART interface to the microcontroller on the WICED module.

Almost all WICED SDK example applications use the UART to print status and debug information. Characters that appear on either the UART transmit or receive lines cause the UART LED to flash on and off.

3.8　Expansion Header

The expansion header provides power for external devices and enables custom sensor interfaces and expansion boards to be connected to the EVB. Pin numbering and a pin description is provided in Table 3.

The expansion header is connected in parallel with sensors and buttons on the sensor interface breakoff board. Before connecting a custom device to the expansion header, either break off the sensor interface board, or depopulate components on the sensor interface that may interfere with the operation of the custom device.

Pin Name	Pin No.	Pin No.	Pin Name
VDD_3V3	1	2	GND
ADC1	3	4	ADC2
ADC3	5	6	DAC1
DAC2	7	8	GND
MODULE_WAKEUP	9	10	HEADER_SRST_L
MODULE_UART_TX	11	12	MODULE_UART_RX
SPI_MOSI	13	14	SPI_MISO
SPI_SCK	15	16	SPI_SS_L
GND	17	18	VDD_3V3

Table 3. Expansion Header Pin Connections

Connecting
e v e r y t h i n g ®

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