

TIWI-C-W EVALUATION PLATFORM

USER GUIDE



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1 Introduction

1.1 Purpose & Scope

The purpose of this document is to provide details regarding the setup and use of the TiWi-C-W Evaluation Platform. This document covers a description of the Evaluation Platform and its features, and a brief tutorial on how to operate the module Evaluation Platform.

The TiWi-C-W reference design provides a designer the information necessary for designing the TiWi-C-W module into products that require 802.11 connectivity. It provides sample software applications to be executed on the board for the purpose of testing the modules capability as well as comparing a new designs performance to the performance of the TiWi-C-W reference design.

1.2 Applicable Documents

- *TiWi-C-W Datasheet (330-0129)*
- *TiWi-C-W Module User Guide (330-0158)*
- [TiWiConnect Online Users Guide](#)

1.3 Revision History

Date	ECN	Change Description	Revision
2/27/2015	50-2015	Initial release	1.0

Table 1 Revision History

1.4 Related LSR Products

LSR Part Number	Description
450-0143	TiWi-C-W Development Kit featuring TiWiConnect
450-0137	TiWi-C-W Evaluation Platform (Development Board Only)

2 TiWi-C-W Evaluation Platform Description

The TiWi-C-W Evaluation Platform is an evaluation platform for the LS Research TiWi-C-W 802.11 b/g/n WLAN module. The TiWi-C-W Evaluation Platform provides all of the necessary connectors, jumpers, indicators and switches to test and assess all aspects of the TiWi-C-W module. The TiWi-C-W Evaluation Platform can be used to evaluate basic WLAN connectivity of the TiWi-C-W module as well as the interface to the LSR TiWiConnect™ cloud connectivity platform.

In addition to being an evaluation platform, the TiWi-C-W platform also serves as a reference design for the TiWi-C-W module EMC certification. Product designers wishing to utilize the LSR EMC certifications should follow the TiWi-C-W evaluation PCB design to ensure EMC modular compliance.



Figure 1 - TiWi-C-W Evaluation Platform

3 TiWi-C-W Evaluation Platform Hardware

Please refer to the Reference Design Schematic, the Reference Design PCB, and the Reference Design BOM in the TiWi-C-W Module User Guide (330-0158) for more detail on the TiWi-C-W reference design PCB.

3.1 Antennas

There are two antennas on the TiWi-C-W evaluation platform, ANT1 and ANT2. They are positioned on the PCB to allow maximum performance while using a minimum amount of board space. The antenna placement provides for both spacial and polarized receive diversity.

3.2 RF Connectors

The TiWi-C-W Evaluation Platform includes two on board U.FL RF connectors J7 and J8. When used in conjunction with LSR 080-0001 U.FL to Reverse Polarity SMA Bulkhead Cable, they provide an external connection point to antennas or test equipment.

By default, the RF path from the TiWi-C-W module is routed to the chip antennas through zero ohm resistors R3 and R4. To route the RF path to the U.FL connectors, move R3 and R4 to the R1 and R8 positions.

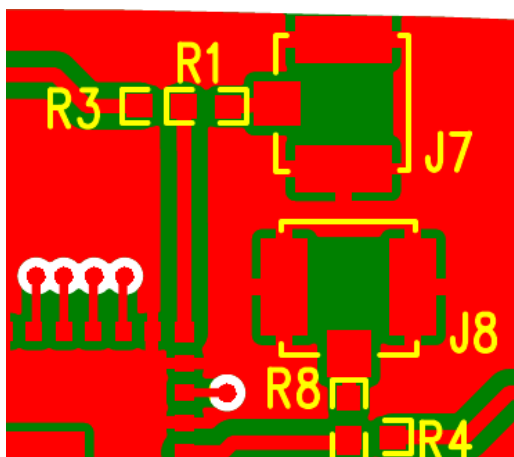


Figure 2 - Selecting U.FL RF Path

3.3 Sensors

There are two external sensors on the Evaluation Platform that provide sensor data to the TiWi-C-W module.

- U1 – passive infrared temperature sensor
- U4 – ambient light sensor

Both of the sensors interface to the TiWi-C-W module on an I2C bus.

3.4 LEDs

The TiWi-C-W Evaluation Platform provides three user controlled LEDs.

- LED1 – RED
- LED2 – GREEN
- LED3 – RGB

3.5 Switches

The TiWi-C-W Evaluation Platform provides three user controlled push button switches (S1,S2, and S6) and one switch dedicated to the module reset (S5). User controlled switches S1 (S3) and S6 (S4) provide a dual PCB foot print format to allow for various switch part selection.

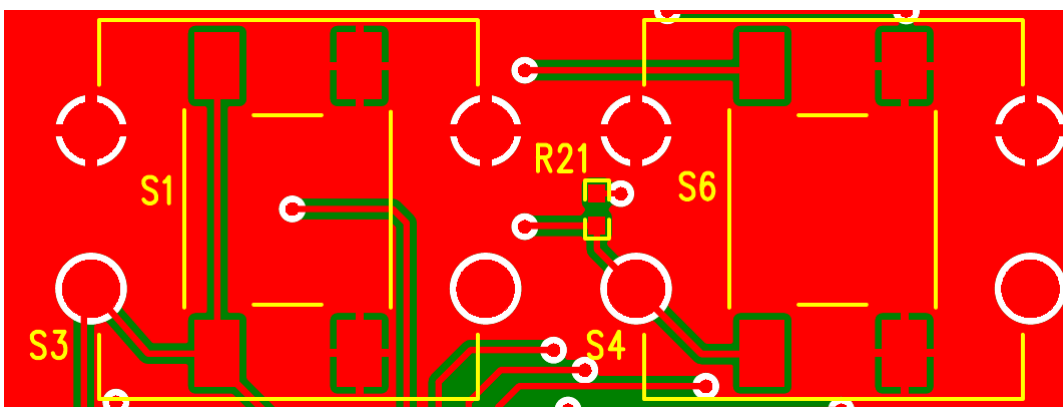


Figure 3 - Dual PCB Footprint

3.6 Interface Headers

The TiWi-C-W Evaluation Platform provides 2 standard single row 2mm headers (J6 and J10), and one dual row 2mm header (J2) to bring out all GPIO and control lines from the TiWi-C-W module. Table 2, Table 3, and Table 4 detail the signals brought to these headers. Keep in mind that the TiWi-C-W has a highly flexible ARM Cortex™ M3 MCU. Some of the I/O can be configured for alternate functions (Table 5).

J6 Pin Number	Pin Name	Module Pin Type	Description
1	3.3V	Power	POWER TO MODULE (3.13-3.46 VDC)
2	NC	-	Not Connected
3	NC	-	Not Connected
4	NC	-	Not Connected
5	NC	-	Not Connected
6	NC	-	Not Connected
7	NC	-	Not Connected
8	NC	-	Not Connected
9	GND	GROUND	MODULE GROUND
10	TCK_A3	Digital I/O	APPS JTAG TCK / GPIO A3
11	TDI_A4	Digital I/O	APPS JTAG TDI / GPIO A4
12	TMS_A2	Digital I/O	APPS JTAG TMS / GPIO A2
13	TD0_A5	Digital I/O	APPS JTAG TDO / GPIO A5
14	GND	GND	MODULE GROUND

Table 2 - Header J6 Signals

J10 Pin Number	Pin Name	Module Pin Type	Description
1	3.3V	Power	POWER TO MODULE (3.13-3.46 VDC)
2	nRESET	Digital INPUT	ACTIVE LOW RESET INPUT
3	WRF_GPIO_OUT	Digital I/O	
4	GPIO_B8	Digital I/O	GPIO B8 (see NOTE 1)
5	GPIO_B11	Digital I/O	GPIO B11 (see NOTE 1)
6	GPIO_B0	Digital I/O	GPIO B0 (see NOTE 1)
7	GPIO_B9	Digital I/O	GPIO B9 (see NOTE 1)
8	GPIO_B1	Digital I/O	GPIO B1 (see NOTE 1)
9	GPIO_B10	Digital I/O	GPIO B10 (see NOTE 1)
10	NC	-	Not Connected
11	NC	-	Not Connected
12	NC	-	Not Connected
13	NC	-	Not Connected
14	GND	GND	MODULE GROUND

Table 3 - Header J10 Signals

J2 Pin Number	Pin Name	Module Pin Type	Description
1	3.3V	Power	POWER TO MODULE (3.13-3.46 VDC)
2	SCL_GPIO_B7	Digital I/O	GPIO B7 (see NOTE 1)
3	UART4_RX	Digital I/O	UART 4 RECEIVE DATA INPUT
4	UART4_TX	Digital I/O	UART 4 TRANSMIT DATA OUTPUT
5	UART1_CTS_GPIO_A1	Digital I/O	UART 1 CLEAR-TO-SEND/GPIO A1
6	UART1_TXD	Digital I/O	UART 1 TRANSMIT DATA OUTPUT
7	UART1_RTS_N_A0	Digital I/O	UART 1 REQUEST-TO-SEND/GPIO A0
8	UART1_RXD	Digital I/O	UART 1 RECEIVE DATA INPUT
9	I2S_CLK_A9	Digital I/O	I2S CLOCK / GPIO A9
10	I2S_WS_A7	Digital I/O	I2S WORD SELECT / GPIO A7
11	WAKE_A10	Digital I/O	WAKE / GPIO A10
12	OSC_32K_OUT	Digital I/O	32.768 kHz OSCILLATOR OUTPUT
13	SDA_SPI_IRQ_A11	Digital I/O	Digital input/output, 20mA output drive
14	I2S_DO_A8	Digital I/O	Digital input/output
15	I2S_DI_A6	Digital I/O	Digital input/output
16	GND	GND	MODULE GROUND

Table 4 - Header J2 Signals

Module Pin	Header Pin Number	UART1	UART2	UART3	SPI	I2C	I2S	Debug	Wake
23	J2-7	/RTS		TX/RX	/CS				
21	J2-5	/CTS		TX/RX	CLK				
30	J6-12			TX/RX				JTAG_TMS	
28	J6-10			TX/RX				JTAG_TCK	
31	J6-11	TXD		TX/RX	MOSI	SCL		JTAG_TDI	
29	J6-13	RXD		TX/RX	MISO	SDA		JTAG_TDO	
19	J2-15		/RTS	TX/RX			DI		
16	J2-10		TXD	TX/RX			WS		
18	J2-14		/CTS	TX/RX			DO		
17	J2-9		RXD	TX/RX			CLK		
12	J2-11			TX/RX					Wake
5	J2-13			TX/RX	IRQ				

Table 5 - GPIO Alternate Functions

3.7 Power Circuitry

The TiWi-C-W module requires a nominal 3.3VDC (3.13 - 3.46 VDC) 800mA power supply. To allow for a greater supply voltage range, Buck Boost converter U2 permits a wider source supply voltage of 1.8V to 5.5 V to be used.

The TiWi-C-W evaluation platform can be powered from a variety of sources. Source power to the module can be supplied on either J12 or through the USB power jack J1. Selecting which power source supplies the board is done using JP1. Placing the jumper in position 1-2, routes power to the buck boost converter from J12. Placing a jumper in position 2-3, routes power to the buck boost converter from the micro USB connector.

Note: The micro USB connector is only used for supplying power to the board.

On/Off control is accomplished using switch S7. Slide the switch to the right to turn power on.

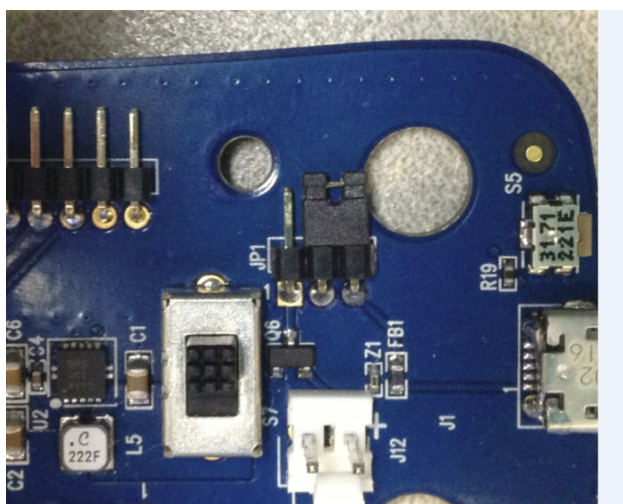


Figure 4 - Power Circuitry

4 Programming

The TiWi-C-W development kit comes pre-programmed with TiWiConnect Demonstration application software.

For programming custom application software, the TiWi-C-W module is programmed using a low-cost high-speed ARM USB JTAG Olimex programmer supported by OpenOCD open source arm debugger. The programming cable is connected to the TiWi-C-W evaluation platform board J9.

4.1 Required Equipment

- Olimex ARM-USB-TINY-H programmer - ARM JTAG DEBUGGER (Figure 5)
- TC2050-ARM2010 - ARM 20-PIN TO TC2050 ADAPTER (Figure 6)
- TC2050-IDC-NL - PLUG-OF-NAILS 10-PIN (Figure 7)
- USB Micro Cable
- PC running Win XP or later with LSR TiWi-C-W programming Application.
- TiWi-C-W Assembly.



Figure 5 - Olimex JTAG Programmer



Figure 6 - TC2050-ARM2010 Adapter



Figure 7 - TC2050-IDC-NL Programming Cable

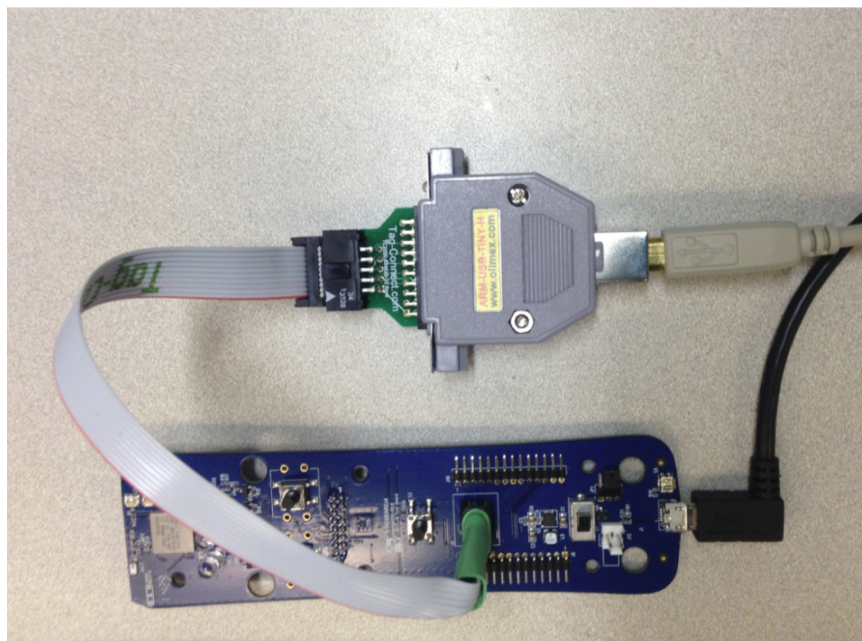


Figure 8 - Programming Tools System

4.2 Programming Software

LSR provides an easy to use programming application, for programming application software into the TiWi-C-W evaluation platform.

4.2.1 Install LSR TiWi-C-W programming Application

Run the exe which installs the LSR TiWi-C-W Programming Application.

4.3 Installing Olimex Programmer Drivers

4.3.1 Determine if Drivers are installed

- Before installing the Olimex ARM-USB-TINY-H drivers, make sure the LSR TiWi-C-W programming application is installed. This will copy the latest Olimex driver files to the PC.
- Determine if the drivers for the Olimex Programmer have been installed, they must be installed before proceeding.
 1. Plug the Olimex ARM-USB-TINY-H programmer into the USB port.
 2. Figure 9 shows drivers that have been installed.
 3. Figure 10 shows drivers that are not installed.

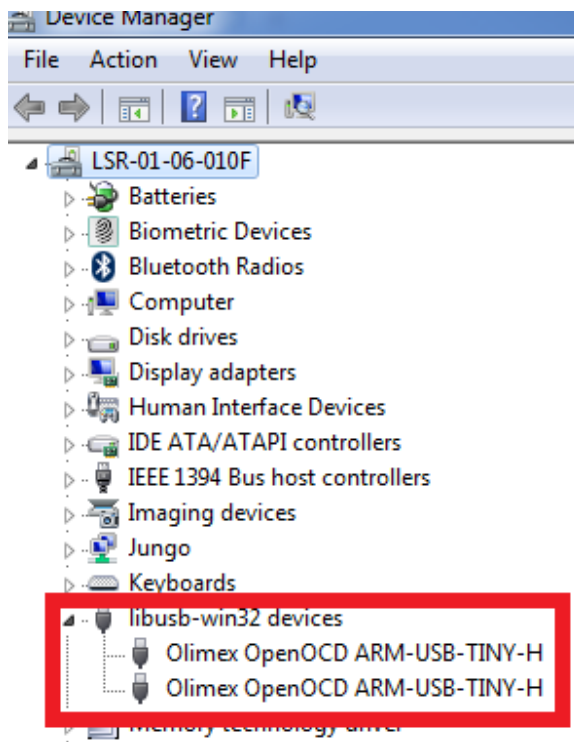


Figure 9 - Olimex Drivers Installed

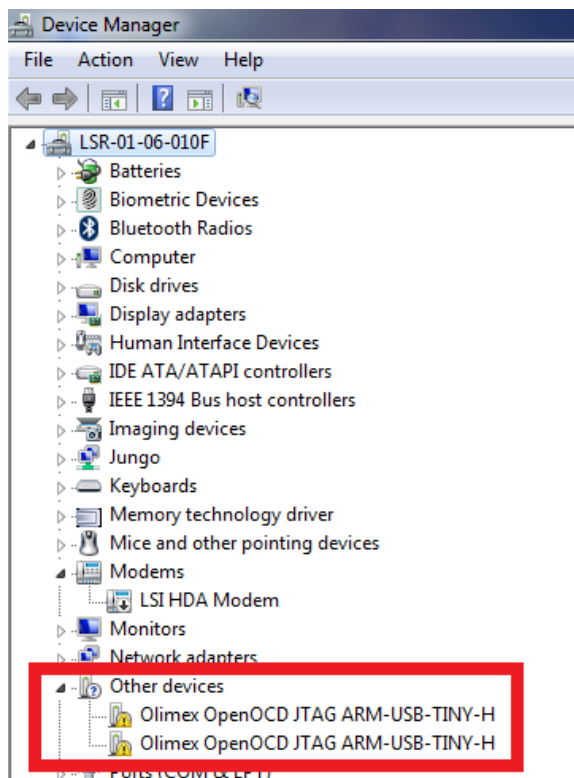


Figure 10 - Olimex Drivers Not Installed

4.3.1 Install Drivers

- If the drivers are not installed correctly, click one of the objects in the red box as shown in Figure 10, and click “Update Driver Software”.
- Choose to browse for the driver (Figure 11).
- Browse to C:\Program Files (x86)\LS Research\TiWi-C-W Programming Application\DRIVERS.
- Click next and the drivers should install (Figure 12).

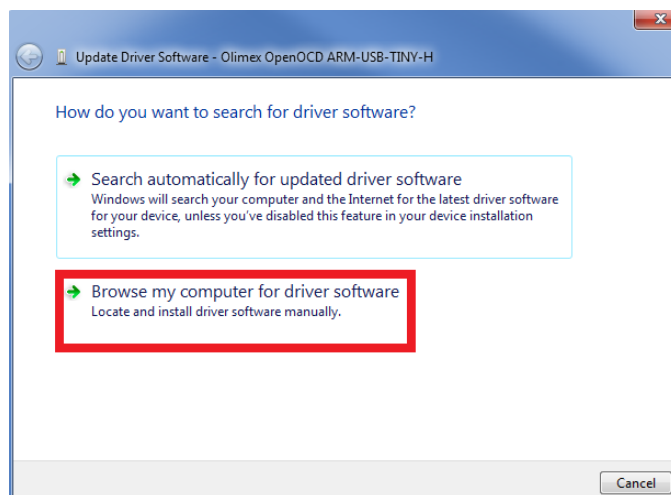


Figure 11 - Browse for drivers

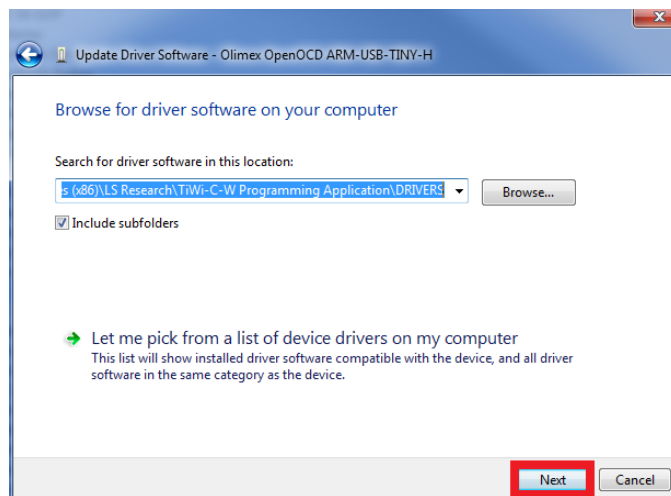


Figure 12 - Install Drivers

4.4 Run TiWi-C-W Programming Software

- Program the TiWi-C-W using the LSR TiWi-C-W programming application.
- Click on the TiWi-C-W ICON located on the desktop or in the program files.



Figure 13 - TiWi-C-W ICON (ICON may vary at any given time)

- Click Program to start the programming sequence. Programming should be completed in approximately 20 seconds.

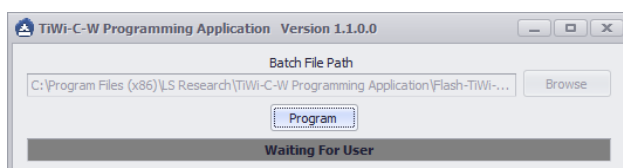


Figure 14 - Start Programming

- The indicator will turn yellow during the programming process.

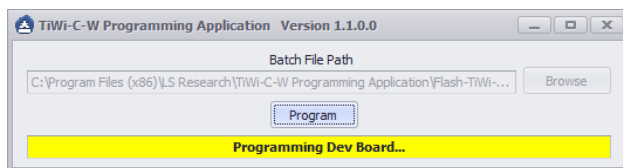


Figure 15 - Programming Progress

- If the indicator turns green the programming passed.

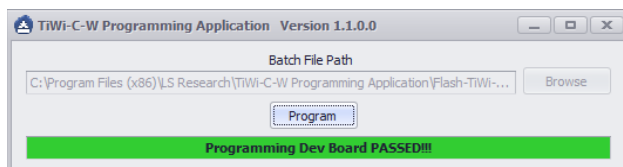


Figure 16 - Programming Passed

- If the indicator turns red the programming failed:

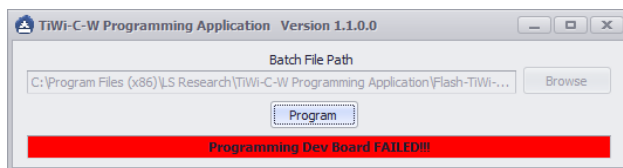


Figure 17 - Programming Failed

4.5 Available Software Applications

There are several applications available for the TiWi-C-W evaluation platform.

Manufacturing Test

The Manufacturing Test Application allows the end user to manually control the RF functions of the TiWi-C-W module for purposes of FCC and performance testing. It uses simple ASCII commands using a command line interface.

LSR TiWiConnect Demo App

The LSR TiWi-Connect Demo Application is used in conjunction with the TiWiConnect web page to demonstrate connectivity between the TiWi-C-W evaluation platform and the TiWiConnect server. Visit <http://www.lsr.com/embedded-wireless-modules/tiwiconnect> for further information.

5 Contacting LSR

Headquarters

LSR
W66 N220 Commerce Court
Cedarburg, WI 53012-2636
USA
Tel: 1(262) 375-4400
Fax: 1(262) 375-4248

Website

www.lsr.com

Technical Support

forum.lsr.com

Sales Contact

sales@lsr.com

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Наши контакты:

Телефон: +7 812 627 14 35

Электронная почта: sales@st-electron.ru

Адрес: 198099, Санкт-Петербург,
Промышленная ул, дом № 19, литера Н,
помещение 100-Н Офис 331