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# Laird BT830 Development Kit

Part #DVK-BT830-SA, DVK-BT830-ST

## HARDWARE INTEGRATION GUIDE

VERSION 1.0

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## REVISION HISTORY

Version	Revision Date	Change History	Approved By
1.0	08 Apr 2015	Initial Release	Jonathan Kaye

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## 1 OVERVIEW

Laird's Development Kit (DVK-BT830) provides a platform for rapid prototyping of BT830 series modules. The development board provides simple, easy to use access to the various hardware interfaces and configuration options for the module. The DVK is the perfect platform to provide for early development testing of the BT830 series features and functionality, prior to designing the module onto a host PCB.

This manual is for the development PCB which is DVK-BT830 R1.0 on PCB.

## 2 INTRODUCTION

The Laird DVK-BT830 is designed to support the rapid development of applications and evaluation for the specific Laird Bluetooth module part number BT830. In-depth documentation for this product is available from the BT830 series product pages: <http://www.lairdtech.com/Products/BT830>

### 2.1 Package Contents

Each DVK-BT830 includes the following items:

<b>Development motherboard</b>	The motherboard has the BT830 module already soldered down onto it and all of the available hardware interfaces are exposed.
<b>USB cable – USB A type male TO Mini-B type</b>	The USB cable can be used to power, control, and configure the BT830.
<b>Stand-off</b>	Screw nuts x 4 pcs ; Stand-off x 4 pcs
<b>Pin Header Fly Leads</b>	6 leads for easy prototyping into host board
<b>Insert card</b>	Provides links to additional information including BT830 User Manual, Utilities, Schematics, and Quick Start Guides.
<b>External Antenna</b>	Only supplied with DVK-BT830-ST. Antenna supplied is Laird part # 0600-00040.

### 2.2 DVK-BT830 – Main Development Board

The development board allows the BT830 module to be easily connected to a PC. The development board provides USB to UART converter linking to USB connector and the BT830 UART HCI interface. Any Windows PC (Windows 8 or later) auto-installs the necessary drivers and if your PC can not locate the drivers, you can download them from <http://www.ftdichip.com/Products/FT232R.htm>.





## 5 INTERFACE SPECIFICATION

### 5.1 PIOs (PIN HEADER – J12)

There are five PIO signals (PIO[0;1;2;4;9]) presented on pin header J12. These can be used for an LED indicator or Wi-Fi and BT coexistence. The default setting on BT830 is to support Wi-Fi and BT coexistence.

Further details on configuring the BT830 module for WLAN coexistence and LED status are available in the following application note:

- [BT830 Configuration File](#)

The oscillator Y1 provides a 32.768 kHz clock for deep sleep and other low-power modes.

The pin descriptions of J12 are shown in [Table 2](#).

*Table 2: J12 pin descriptions*

J12	Description	Direction
Pin-1	PIO[2]	I/O
Pin-2	PIO[0]/32K_CLK_IN	I/O
Pin-3	PIO[1]/BT_ACTIVE	I/O
Pin-4	PIO[4]/WLAN_ACTIVE	I/O
Pin-5	PIO[9]/BT_PRIORITY	I/O
Pin-6	GND	

Turn off the external 32 kHz oscillator by fitting a jumper on CON26.

There are two LED indicators on the DVK-BT830. LED2 is connected to BT\_PRIORITY/PIO[9]; LED3 is connected to WLAN\_ACTIVE/PIO[4]. With default Psk settings, the co-existence scheme is set to disable.



*Figure 2: Pin Headers - J12 and CON26*

You can configure the PIO for other applications such as LED indicators for different connection stages (inquiry, connection, and transmission). For more information for PIO PSkey settings, see the BT830 documentation, found at the BT830 page: <http://www.lairdtech.com/Products/BT830>

### 5.2 PCM/I<sup>2</sup>S/SPI (PIN HEADER – J11)

The DVK-BT830 has a 4-wire digital audio port capable of operating in PCM or I2S mode. The port also provides a debug SPI interface to the BT830 for use during test and development. Select between SPI and PCM using the PCM/SPI slide switch SW5 ([Figure 3](#)).

The pin descriptions of J11 in PCM/I2S or SPI mode are shown in [Table 3](#).

*Table 3: J11 Descriptions*

J11	Description (PCM/I <sup>2</sup> S/SPI)	Direction
Pin-1	PIO[3]	I/O
Pin-2	PCM_SYNC/ WS/SPI_CS#	I/O
Pin-3	PCM_CLK/SCK/SPI_CLK	I/O
Pin-4	PCM_IN/SD_IN/SPI_MOSI	Input
Pin-5	PCM_OUT/ SD_OUT/SPI_MISO	Output
Pin-6	GND	

The PIO[3] can send a wakeup signal depending on the PSkey setting.

For more information on PCM/I<sup>2</sup>S or SPI setting, please reference to document in Documentation tab at <http://www.lairdtech.com/Products/BT830>



*Figure 3: Pin Headers - J11 and SW5*

### 5.3 4-Wire UART Serial Interface

The DVK-BT830 provides access to the HCI interface of BT830 module through pin header J12 (Figure 4) OR through USB (via U9 FTDI USB-UART convertor chip). The default is USB.



*Figure 4: Pin Header J10*

#### 5.3.1 UART Interface Driven by USB

- **USB Connector.** The development kit provides a USB Type mini-B connector (CON4) which allows connection to any USB host device. The connector optionally supplies power to the DVK-BT830 when SW4 is set to the USB position. The USB signals are connected to a USB to serial convertor device (FT232R) (Figure 5).
- **USB – UART.** The development kit is fitted with a (U9) FTDI FT232R USB to UART converter which provides USB-to-Virtual COM port on any Windows PC (Win 7 or later). Upon connection, Windows auto-installs the required drivers. For more details and driver downloads, visit <http://www.ftdichip.com/Products/FT232R.htm>.



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- **UART interface driven by USB FTDI chip.** In normal operation, the BT830 HCI interface is driven by the FTDI FT232R USB to UART converter.

**Note:** Before using the 4-wire UART through J10, place the jumper on CON2 to disable the function of FT232R.

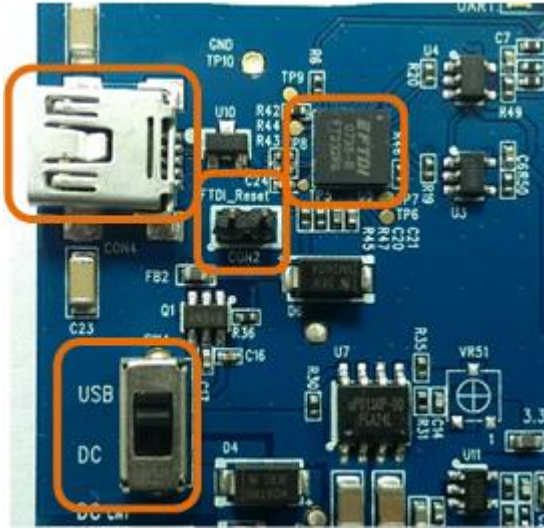


Figure 5: USB Connector (CON4), FT232R (U9), SW4, and CON2

### 5.3.2 Pin Header J10

The pins of header J10 are detailed in Table 4.

Table 4: J10 Descriptions

J10	Description (PCM/I <sup>2</sup> S/SPI)	Direction
Pin 1	GND	
Pin 2	Module_RTS	Output
Pin 3	NA	
Pin 4	Module_RX	Input
Pin 5	Module_TX	Output
Pin 6	Module_CTS	Input

**Note:** For a 3-wire interface, you can leave RTS/CTS floating. You can use TX/RX and GND pin to access the module.

## 5.4 Operating Voltage Selection and Push Button

Switch CON17 on the DVK-BT830 is used to toggle the operating voltage between 1.8V and 3.3V. This allows you to select a suitable I/O signal voltage level when the DVK-BT830 is connected to your platform.

SW2 (push button TACT switch) provides a reset signal to reset the BT830 module (Figure 6).

Push Button	Label on DVK-BT830 PCB	Description
SW2	Reset	Reset the BT830 module



Figure 6: CON17 and SW2

## 6 OTHER FEATURES

### 6.1 Current Consumption Measurement

A removable jumper (CON1) is provided to break the power supply line directly to the module (if SB9 is cut), allowing you to measure current consumption. For normal operation, CON1 must be fitted. Figure 7 shows the locations of SB9 and CON1.

**Note:** This measures the current consumption of the BT830 series module only.

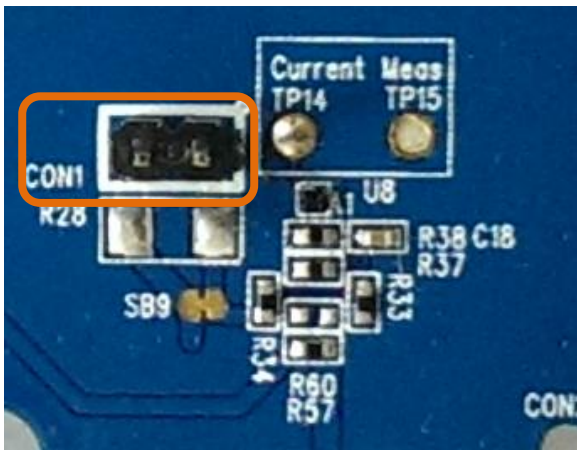


Figure 7: Current measurement circuit

To prepare the board for current measurement, **cut the shorting of the solder bridge SB9**. After this modification there are two primary ways to measure the current consumption:

- **Using Ammeter** – Connect an ampere meter between the two pins of connector CON1. This monitors the current directly.
- **Using Oscilloscope (Note)** – Mount a resistor on the footprint R28. The resistor should not be larger than 10 Ohm. Connect an oscilloscope or similar with two probes on the pin on the CON1 connector and measure the voltage drop. The voltage drop is proportional with current consumption. If a 1 Ohm resistor is chosen, 1 mV equals 1mA.

There is also a third way to measure current:

- **Using Current Shunt Monitor** – The current drawn by the BT830 module can be monitored using the Current Shunt Monitor (CSM), INA216 (U8). The gain of INA216 is 200 V/V for lowest possible drop voltage.

**Note:** The Current Shunt Monitor method allows the dynamic current consumption waveforms on oscilloscope as the BT830 radio operates. This can provide insight into power optimization.

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Current consumed by the BT830 series module is measured as a voltage (that is proportional to the current) using the CSM by connecting measuring voltmeter OR oscilloscope to TP14 Connect measuring voltmeter or oscilloscope GND to TP15.

$$I(\text{mA}) = V_{\text{meas\_TP14}}(\text{mV}) / 51$$

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**CAUTION:** Take care not to short TP14 (the Current Shunt Monitor IC (U8)) output to GND, as that will permanently damage the IC U8.

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## 7 ADDITIONAL DOCUMENTATION

Laird offers a variety of documentation and ancillary information to support our customers through the initial evaluation process and ultimately into mass production. Additional documentation can be found at the [BT830 product page](#) under the documentation tab. It includes:

- BT830 – Class 1 BT4.0 Dual Mode HCI module – Product brief
- BT830 HIG - Hardware Integration Guide
- BT830 UART HCI Bluetooth Module for Linux – Application Note – Using the BT830 with the BlueZ Linux BCCMD tool
- BT830 UART HCI Module for Big Windows – Application Note – Using the BT830 with the CSR BtCLI tool
- BT830 Configuration File – Application Note
- BT830 Software Integration Guide

For any additional questions or queries or to receive local technical support for the DVK-BT830 or BT830 module, please visit our support site at <https://laird-ews-support.desk.com/>.