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# EVB-USB5734
# Evaluation Board
# User's Guide

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**QUALITY MANAGEMENT SYSTEM**

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**Object of Declaration:   EVB-USB5734**

EU Declaration of Conformity
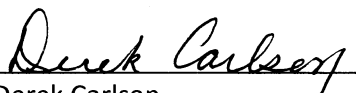
This declaration of conformity is issued by the manufacturer.
The development/evaluation tool is designed to be used for research and development in a laboratory environment.  This development/evaluation tool is not a Finished Appliance, nor is it intended for incorporation into Finished Appliances that are made commercially available as single functional units to end users under EU EMC Directive 2004/108/EC and as supported by the European Commission's Guide for the EMC Directive 2004/108/EC (8th February 2010).
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Signed for and on behalf of Microchip Technology Inc. at Chandler, Arizona, USA

*Derek Carlson*                                          *16-July-2013*
Derek Carlson                                            Date
VP Development Tools

**NOTES:**

# Table of Contents

**Appendix D. EVB-USB5734 Silk Screens**

# Preface

## NOTICE TO CUSTOMERS

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**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 "DSXXXXXA", where "XXXXX" 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 online help. Select the Help menu, and then Topics to open a list of available online help files.**

## INTRODUCTION

This chapter contains general information that will be useful to know before using the EVB-USB5734. Items discussed in this chapter include:

• Document Layout
• Conventions Used in this Guide
• The Microchip Web Site
• Development Systems Customer Change Notification Service
• Customer Support
• Document Revision History

## DOCUMENT LAYOUT

This document describes how to use the EVB-USB5734 Evaluation Board as a development tool for the USB5734 4-port USB 3.0 hub with battery charging features.

• **Chapter 1. "Overview"** – Shows a brief description of the EVB-USB5734 Evaluation Board.
• **Chapter 2. "Board Details & Configuration"** – Includes instructions on how to get started with the EVB-USB5734 Evaluation Board.
• **Chapter 3. "Configuration IO Modes"** – Provides information about the five IO daughter cards provided with the EVB-USB5734 Evaluation Board.
• **Appendix A. "EVB-USB5734 Evaluation Board"** – This appendix shows the EVB-USB5734 Evaluation Board.
• **Appendix B. "EVB-USB5734 Schematics"** – This appendix shows the EVB-USB5734 Evaluation Board schematics.
• **Appendix C. "EVB-USB5734 BOM"** – This appendix includes the EVB-USB5734 Evaluation Board Bill of Materials (BOM).
• **Appendix D. "EVB-USB5734 Silk Screens"** – This appendix includes the EVB-USB5734 Evaluation Board silk screens.

## CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

### DOCUMENTATION CONVENTIONS

| Description | Represents | Examples |
|---|---|---|
| **Arial font:** | | |
| Italic characters | Referenced books | *MPLAB® IDE User's Guide* |
| | Emphasized text | ...is the *only* 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 | *File>Save* |
| Bold characters | A dialog button | Click **OK** |
| | A tab | Click the **Power** 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> |
| **Courier New font:** | | |
| 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 | `file`.o, where `file` can be any valid filename |
| Square brackets [ ] | Optional arguments | `mcc18 [options] file [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) { ... }` |

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- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **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

## DEVELOPMENT SYSTEMS CUSTOMER CHANGE NOTIFICATION SERVICE

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- **Emulators** – The latest information on Microchip in-circuit emulators.This includes the MPLAB REAL ICE and MPLAB ICE 2000 in-circuit emulators.
- **In-Circuit Debuggers** – The latest information on the Microchip in-circuit debuggers. This includes MPLAB ICD 3 in-circuit debuggers and PICkit 3 debug express.
- **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 IDE Project Manager, MPLAB Editor and MPLAB SIM simulator, as well as general editing and debugging features.
- **Programmers** – The latest information on Microchip programmers. These include production programmers such as MPLAB REAL ICE in-circuit emulator, MPLAB ICD 3 in-circuit debugger and MPLAB PM3 device programmers. Also included are nonproduction development programmers such as PICSTART Plus and PIC-kit 2 and 3.

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

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

## DOCUMENT REVISION HISTORY

### Revision A (March 2015)

• Initial Release of this Document.

# Chapter 1. Overview

## 1.1 INTRODUCTION

The EVB-USB5734 Revision B is a demonstration and evaluation platform that provides the necessary requirements and interface options for evaluating the USB5734 Ultra Fast four port battery charging hub on a 4-layer RoHS-compliant Printed Circuit Board (PCB). This will allow the user to gain an understanding of the product and accelerate the integration of the EVB-USB5734 into the user's design. The EVB-USB5734 is compliant with the USB 3.0 USB Specification and supports Super-Speed (SS), High-Speed (HS), Full-Speed (FS), and Low-Speed (LS) USB signaling for complete coverage of all defined USB operation speeds. The evaluation platform supports four downstream ports that are USB 2.0 and USB 3.0 compliant. The EVB-USB5734 platform also supports battery charging on all four downstream ports (maximum of 5A total current at any one time). The EVB-USB5734 is configured for operation through internal default settings and supports custom configurations through SMBus or through the external 64-Mbit SPI Flash device, U8. The EVB-USB5734 demonstrates driver compatibility with Microsoft® Windows® 8x, Windows 7, Windows XP, Mac OS® X 10.4+, and Linux® hub drivers.

The EVB-USB5734 provides the following features:

- USB5734 in a 64-pin QFN RoHS compliant package
- USB 3.0 compliant (SS, HS, FS, and LS operation)
- USB pins are 5 V tolerant
- Four downstream USB 2.0/3.0 ports
- All downstream ports support individual port power and overcurrent sense
- All downstream ports are enabled for battery charging (2.1A max per port)
- Can support up to 5A total current downstream at any one time
- On-board SPI Flash for external downloadable firmware
- Low-cost 4-layer space saving design
- Operates from a single voltage (+12.0 V, regulated) external power supply
- On-board 25 MHz crystal
- Single on-board +5.25 V, 6 Amp regulator
- Single on-board +3.3 V, 0.5 Amp regulator
- Single on-board +1.2 V, 1 Amp regulator
- Port Power and Port Enable LED indicators
- LED indicators for SPI/Strap Configuration
- On-board IO connector for configurable Mode operations

**FIGURE 1-1:    EVB-USB5734 FUNCTIONAL BLOCK DIAGRAM**
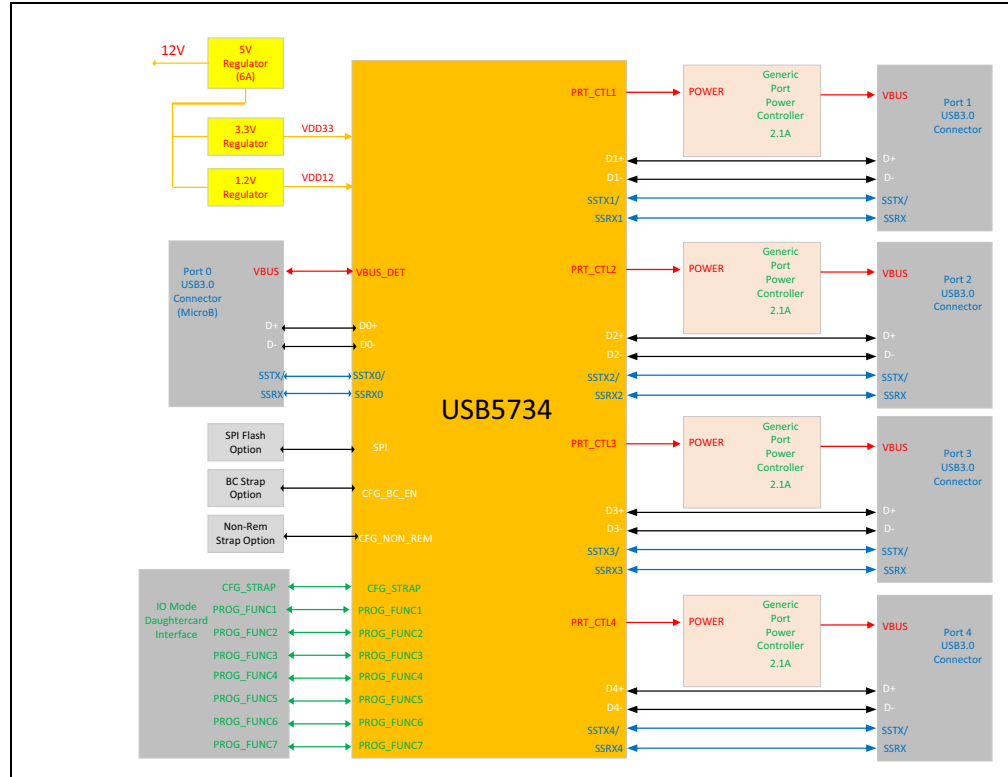


## 1.2    REFERENCES

Concepts and materials available in the following documents may be helpful when reading this document. Visit www.microchip.com for the latest documentation.

- USB5734 Datasheet
- EVB-USB5734 Schematics

## 1.3    TERMS AND ABBREVIATIONS

- EVB - Engineering Validation Board
- SPI - Serial Protocol Interface
- CFG - Configuration
- BC - Battery Charge
- Non-Rem - Non Removable
- UART - Universal Asynchronous Receiver/Transmitter
- DUT - Device Under Test
- DFP - Downstream Facing Port

# Chapter 2.  Board Details & Configuration

The Microchip EVB-USB5734 is designed for flexible configuration solutions. It can be configured via default internal register settings, downloadable external firmware to an on-board SPI Flash, through SMBus, or through the on-board configuration switches. When configured with the default internal register settings, the device operates as a USB 3.0/2.0 hub with four battery charge enabled USB ports and Microchip's standard VID/PID/DID settings.

This chapter describes details on the EVB-USB5734 Power, Clock and Configuration.

**FIGURE 2-1:          INITIAL CONFIGURATION**
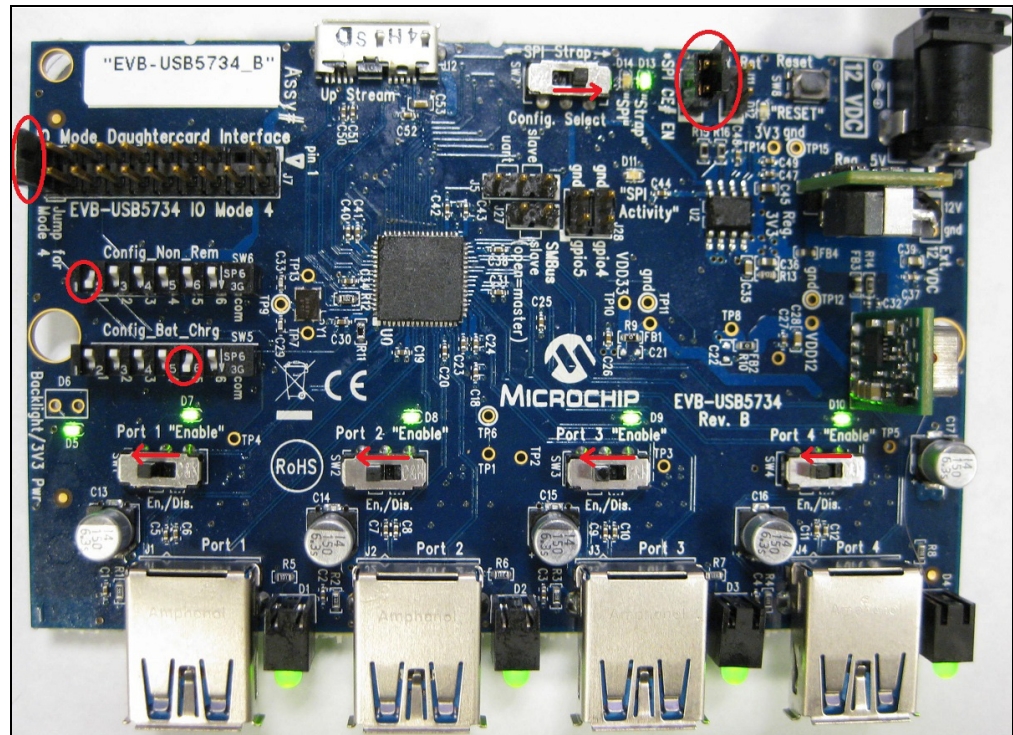


## 2.1    POWER SOURCE - SELF-POWERED

The EVB-USB5734 only supports self-powered operation, and is powered through one +12.0V regulated external power supply. The power supply plugs into the 2.5mm connector J9 on the board. Alternatively, an external voltage can be injected onto the J6 Ext. 12V header, which is not populated by default. The +12.0V feeds a 6A regulator which outputs +5.25V across the board. This +5.25V output supplies the +3.3V and +1.2V on-board regulators.

FIGURE 2-2:    EVB-USB5734 POWER SOURCE
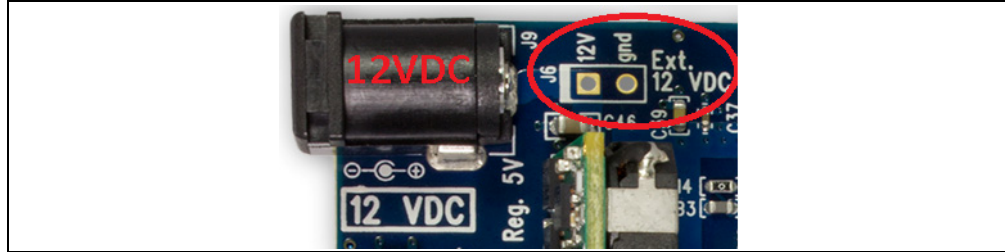


## 2.2    DOWNSTREAM PORT POWER CONTROL

USB power to the four downstream ports are controlled via port power controllers with auto-discharge function. This provides up to 2.1A of USB battery charging power to each port, limited to a total of 5A at any one time.

## 2.3    CLOCK

The EVB-USB5734 utilizes an external 25MHz 30ppm crystal to drive its internal oscillator circuit.

## 2.4    CONFIGURATION

The following sections describe the various board features and configuration settings. Figure 2-2 below shows a top view of the EVB-USB5734.

FIGURE 2-3:    EVB-USB5734 TOP VIEW
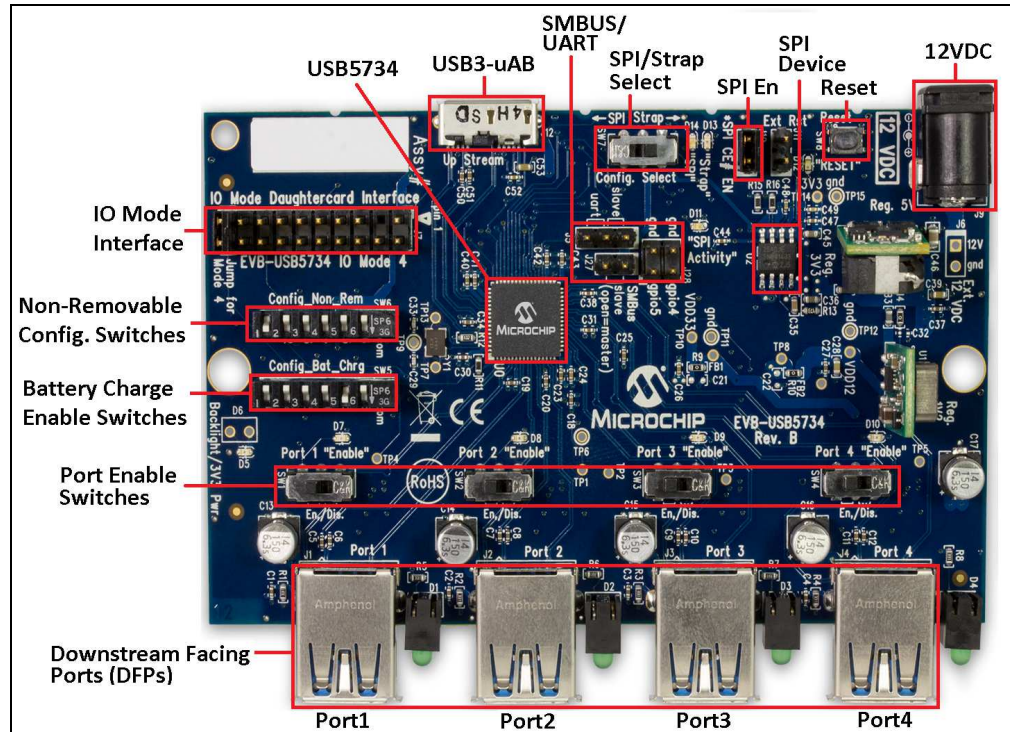


### 2.4.1    External SPI Flash

Upon power-up, the USB5734 first looks for an external SPI Flash device and a valid signature in the flash. If one is found, the external ROM is enabled and code execution is initiated from the external SPI device.

To select the SPI device, set the **Config. Select** switch (SW7) to the **SPI** position. The blue **"SPI"** LED will light. Note that the CFG_BC (Configuration Battery Charge) and CFG_Non-Rem (Configuration Non Removable) options are now de-selected. All configuration in SPI mode is done by the SPI.

> **Note:** If the SPI Flash is not properly programmed or has an invalid signature, the USB5734 will default to internal defaults even if the SPI Flash is selected.

**FIGURE 2-4:** **SPI SELECT**
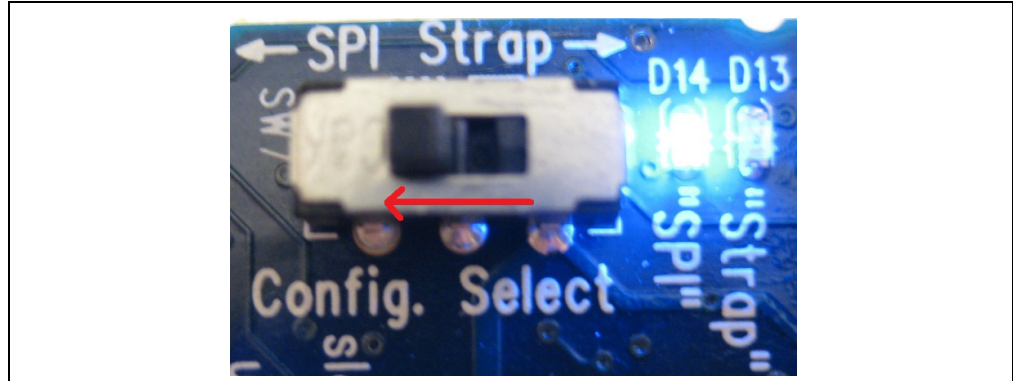


The pull-up resistors (R42 and R58) on the SPI device's Write Protect (WPn) and Hold (HOLDn) pins must be populated in order to use external flash. The pull-up resistor (R61) on the SPI_CE_N pin of the USB5734 must also be populated in order to select 60MHz SPI operation, as opposed to 30MHz operation. Additionally there must be a jumper placed across the J10 **SPI CE# EN** header in order to enable the SPI device.The external flash can be programmed using the Microchip ProTouch2 MPT software tool which can be downloaded from the Microchip website at http://www.microchip.com/ProTouch.

> **Note:** Refer to the Protouch MPT User Manual on using this software to program the configuration.

### 2.4.2 SMBus

If a SPI Flash device is not found, the firmware checks if the SMBus is enabled. To select SMBus configuration, set the **Config. Select** switch to the **Strap** position. The green **"Strap"** LED will light.

The SMBus interface must have correct pull-up resistors applied by external circuitry to function properly. The USB5734 can operate in SMBus Slave or I2C Bridging mode. To operate in SMBus Slave mode, install a jumper across pins 1 and 2 of the J5 and J27 SMBus headers. These jumpers are required in order to enable SMBus communication. To operate in I2C Bridging mode instead, the J5 and J27 SMBus headers must be left open.

> **Note:** If the USB5734 is configured for SMBus Slave operation, the DUT will wait indefinitely for data from the SMBus interface and will not enumerate until instructed by the SMBus interface.

**FIGURE 2-5:**        **SMBUS SELECT**
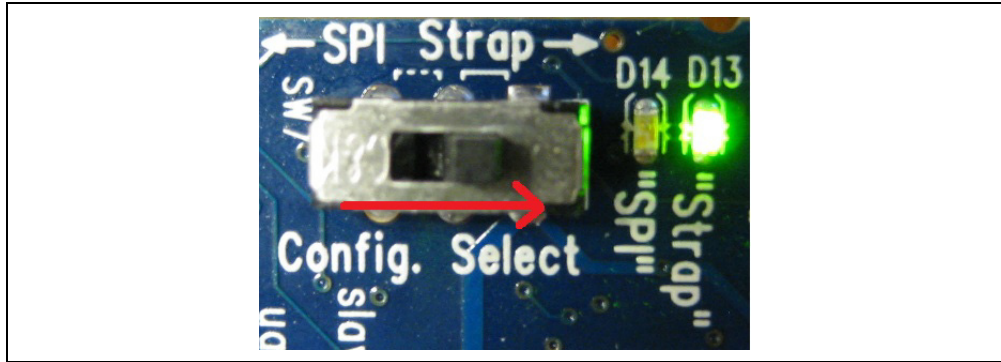


### 2.4.3    UART

The USB5734 provides a USB to UART bridge function that can be used in a simple two wire TX/RX mode or in a full modem signaling configuration (see Mode 6 section in Chapter 3). For simple two wire mode the J27 header must be left open and the J5 header must have a jumper installed across pins 2 and 3. This jumper is required in order to add a pull-down resistor on the UART_TX signal in order to enable the UART interface. Once in UART mode, the J28 UART header should be used for accessing the UART_RX and UART_TX signals on the USB5734. Note that UART can be enabled in configured IO Modes 1, 2, 3, 4, and 5. When IO Mode 6 is installed into the J7 IO connector (described more in section below), the J5 header does not require a jumper in order to configure the USB5734 for UART mode. The following table details the GPIO4/GPIO5 jumper options available to configure the USB5734 into different modes.

**TABLE 2-1:**    **SMBUS / UART SELECT**

| MODE | GPIO4 (J27) | GPIO5 (J5) | PU/PD STATUS |
|---|---|---|---|
| SMBUS Slave | short pins 1-2 | short pins 1-2 | GPIO4 = PU<br>GPIO5 = PU |
| I2C Bridging | open | open | GPIO4 = open<br>GPIO5 = open |
| UART | open | short pins 2-3 | GPIO4 = open<br>GPIO5 = PD |

**FIGURE 2-6:** **UART SELECT**
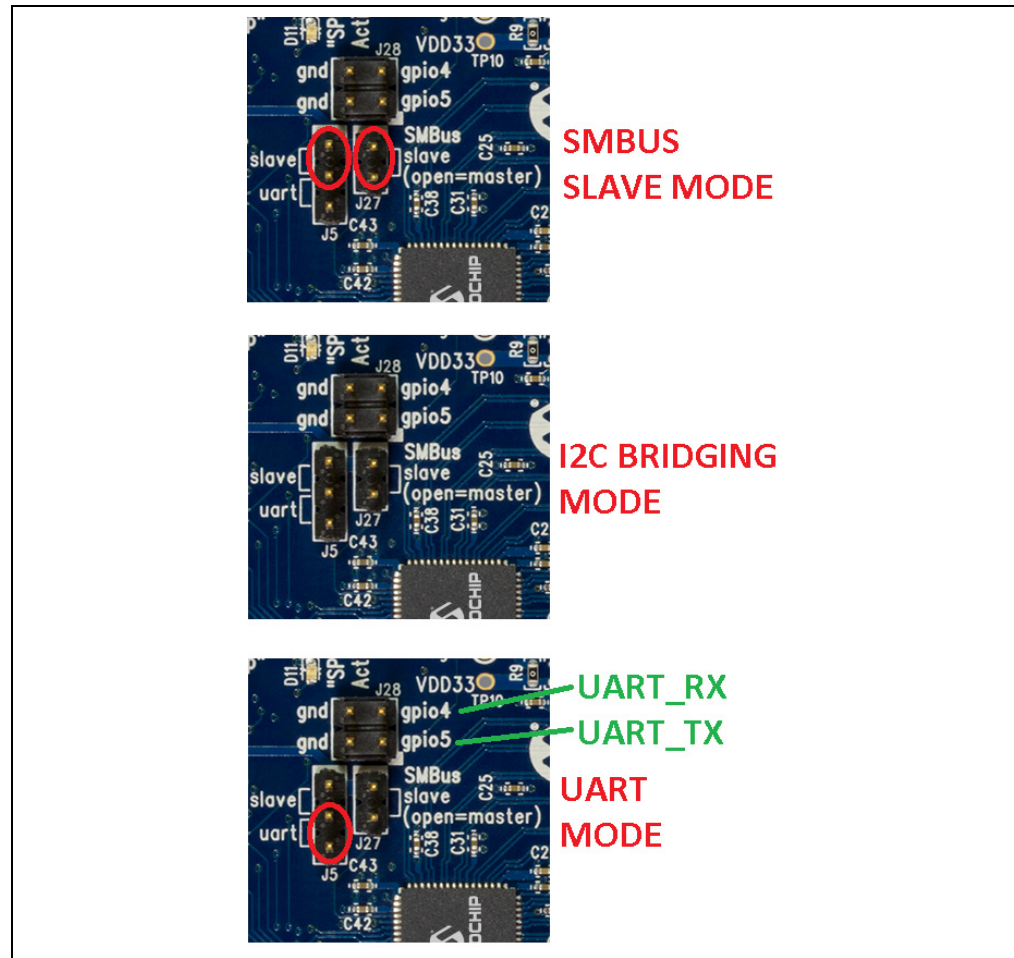


### 2.4.4 Configuration Source - Internal Default

When the USB5734 does not detect a valid SPI Flash image or SMBus configuration upon power-up, the EVB-USB5734 uses internal default register settings. It also sets the Vendor ID, Product ID, Language ID, and Device ID, and additional settings from internal ROM code.

### 2.4.5 Strapping Option

If configuration is not done through SPI, additional configuration is available through two functions: CFG_BC and CFG_Non-Rem. The controls are configured by selecting ONLY one of six resistor values for each pin. These are read by the USB5734 device and the BC and Non-Rem behavior of the downstream facing ports are determined.

To use the strapping option (which is the default configuration setup), set the **Config. Select** switch (SW7) to the **Strap** position. The green **"Strap"** LED will light. Select the desired CFG_BC and CFG_Non-Rem options by enabling only one position for each of the **Config_Bat_Chrg** Select and **Config_Non_Rem** Select switches (SW5 and SW6). The default setup for SW5 is to slide pin 5 to the **com** side of the switch (towards the downstream facing ports) which configures all four downstream ports to be enabled for battery charging. The default setup for SW6 is to slide pin 1 to the **com** side of the switch (towards the downstream facing ports) which configures all four downstream ports to be removable.
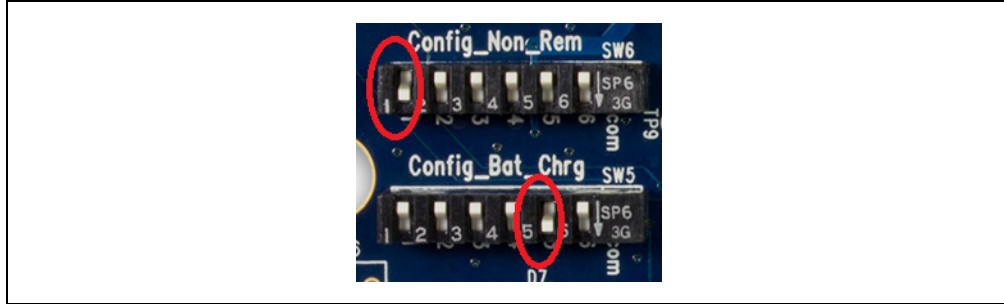
**FIGURE 2-7:** **STRAPPING OPTIONS**



**TABLE 2-2:** **STRAPPING OPTIONS FOR BATTERY CHARGING**

| SW5 Position | Configuration |
|---|---|
| 1 | No Ports BC Enabled |
| 2 | Port 1 is BC Enabled |
| 3 | Port 1 & 2 are BC Enabled |
| 4 | Port 1, 2 & 3 are BC Enabled |
| 5 | Port 1, 2, 3 & 4 are BC Enabled [default] |
| 6 | Reserved |

**TABLE 2-3:** **STRAPPING OPTIONS FOR PORT REMOVABLE**

| SW6 Position | Configuration |
|---|---|
| 1 | All ports are Removable [default] |
| 2 | Port 1 is Non-Removable |
| 3 | Port 1 & 2 are Non-Removable |
| 4 | Port 1, 2 & 3 are Non-Removable |
| 5 | Port 1, 2, 3 & 4 are Non-Removable |
| 6 | Reserved |

### 2.4.6 Port Power Options: Port Enable and Port Disable Select

Any downstream facing port on the EVB-USB5734 can be disabled if desired. When both DP & DM signals are pulled high to +3.3V, the USB5734 automatically disables the port, reports the corrected number of available ports to the host, and drives the PRT_CTRL line for the disabled port(s) low. By default, all four downstream facing ports are enabled.

To enable a port, use its **Port Enable** switch (SW1 - SW4) to select the **EN.** position. The associated **"Enable"** LED will light green.

To disable a port, slide its **Port Enable** switch (SW1 - SW4) to the **Dis.** position. The **"Enable"** LED will turn off.

The table below describes the port enable/disable strap options available for all four downstream ports on the USB5734.

**TABLE 2-4:** **PORT ENABLE/DISABLE STRAP OPTIONS**

| Downstream Port | Associated Switch | Switch Position | LED |
|---|---|---|---|
| 1 | SW1 | 1-2, 4-5 = Port Enabled (Default)<br>2-3, 5-6 = Port Disabled | D7 Green<br>D7 OFF |
| 2 | SW2 | 1-2, 4-5 = Port Enabled (Default)<br>2-3, 5-6 = Port Disabled | D8 Green<br>D8 OFF |

**TABLE 2-4: PORT ENABLE/DISABLE STRAP OPTIONS (CONTINUED)**

| Downstream Port | Associated Switch | Switch Position | LED |
|---|---|---|---|
| 3 | SW3 | 1-2, 4-5 = Port Enabled (Default) | D9 Green |
| | | 2-3, 5-6 = Port Disabled | D9 OFF |
| 4 | SW4 | 1-2, 4-5 = Port Enabled (Default) | D10 Green |
| | | 2-3, 5-6 = Port Disabled | D10 OFF |

# Chapter 3. Configurable IO Modes

The Microchip EVB-USB5734 is designed for flexible configuration solutions. Five IO daughter cards are included in the EVB-USB5734 kit. Each IO daughter card has a 2x10 connector on the bottom side of the board that has pin 3 keyed and has pin 1 clearly marked with a triangle on the silkscreen. In order to use the desired IO daughter card, insert its keyed 2x10 header onto the keyed 2x10 IO connector J7 that is on the EVB-USB5734. The pin one triangle indicator on the EVB-USB5734 should line up with the pin one triangle indicator on the IO daughter card that is inserted. The sections below describe the mode functions of each IO daughter card.

> **Note:** When configuring the USB5734 for IO Modes 1, 2, 3, 5, or 6, the jumper placed across pins 19 and 20 of the J7 IO connector must be removed from the EVB-USB5734. This jumper is only to be placed when configuring the USB5734 into IO Mode 4: Custom GPIO Mode.

## 3.1    CONFIGURATION IO DAUGHTER CARDS

The USB5734 can be configured for different IO modes depending on the pull-up or pull-down resistor chosen on the CFG_STRAP pin on the DUT. The table below shows the different resistor values required for the different IO mode settings. These resistor settings are populated by default on each IO daughter card.

**TABLE 3-1:    CONFIG STRAP RESISTOR SETTINGS**

| MODE | Configuration | SIGNAL | CFG_STRAP Resistor | PU/PD STATUS |
|:---:|:---:|:---:|:---|:---|
| 1 | Suspend Mode | C1_CONFIG | 200kΩ | PD to GND |
| 2 | Flex Mode | C2_CONFIG | 200kΩ | PU to 3V3 |
| 3 | USB Speed LEDs Mode | C3_CONFIG | 10kΩ | PD to GND |
| 4 | GPIO Mode (default) | CFG_STRAP | 10kΩ | PU to 3V3 |
| 5 | Battery Charging Mode | C5_CONFIG | 10Ω | PD to GND |
| 6 | UART Mode | C6_CONFIG | 10Ω | PU to 3V3 |

### 3.1.1    Mode 1: Suspend Mode

The Mode 1 IO daughter card configures the USB5734 into Suspend Indicator Mode. Once inserted onto the EVB-USB5734, the **"3V3"** Power LED should turn on green. The default setup is for pins 1 and 2 of the **VBus Select** header J29 to be shunted together. This jumper allows VBus Detect on the IO daughter card to be tied to 3.3V by default.   If an external VBus is to be supplied, then remove the jumper and pins 2 and 3 can be accessed for injecting an external VBus. An **SMBus** header J13 is provided as well for accessing the SMDAT and SMCLK signals of the USB5734 while in Suspend Mode. Additionally, the GPIO4/GPIO5 headerJ28 can be used in this mode to access the digital RX and TX UART signals. When accessing these signals, the J27 header must be left open and the J5 header must have a shunt placed across pins 2 and 3.

LED indicators **"PF1"** and **"PF2"** are provided for when accessing the PROG_FUNC1 and PROG_FUNC2 signals on the USB5734. When these function pins are driven high, their associated LED will turn on green. When these function pins are driven low, their associated LED will be OFF. The **"PF3"** LED is provided to indicate the state of the **PF3 Select** switch (SW12) as described below. A **"USB 2.0 Susp"** LED is also provided to indicate when USB 2.0 on the USB5734 is in suspend or active mode. When in suspend mode, this LED will turn on yellow. When in active mode, this LED will turn on green.

There are two slide switches provided on this daughter card. The **PF3 Select** switch (SW12) allows the user to manually select whether PROG_FUNC3 will be driven high or low. The default position is to slide this switch into the **0** or Low position. With this switch in the low position, as mentioned above, the associated **"PF3"** LED will be OFF. When the **PF3 Select** switch is switched into the **1** or High position, the associated **"PF3"** LED will turn on green. The second slide switch is the **Flex_CMD Select** switch (SW9). This switch allows the user to manually set the USB5734 into Flex mode. The default setup is to slide the **Flex_CMD Select** switch into the **0** or Low position which will turn the **"FLEXCMD"** LED OFF. When the **Flex_CMD Select** switch is in the **1** or High position, the **"FLEXCMD"** LED will turn on orange and the **"USB 2.0 Susp"** LED will turn on yellow to indicate that the USB5734 is in Flex mode.

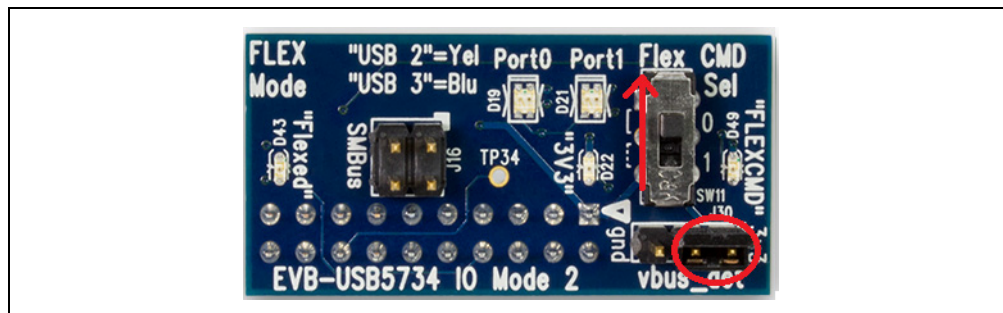**FIGURE 3-1:     IO MODE 1 DAUGHTER CARD**
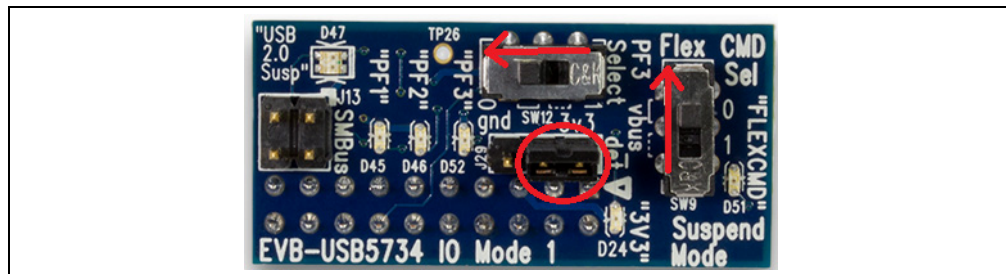


### 3.1.2     Mode 2: Flex Mode

The Mode 2 IO daughter card configures the USB5734 into Flex Mode. Once inserted onto the EVB-USB5734, the **"3V3"** Power LED should turn on green. The default setup is for pins 1 and 2 of the **VBus Select** header J30 to be shunted together. This jumper allows VBus Detect on the IO daughter card to be tied to 3.3V by default. If an external VBus is to be supplied, then remove the jumper and pins 2 and 3 can be accessed for injecting an external VBus. An **SMBus** header J16 is provided as well for accessing the SMDAT and SMCLK signals of the USB5734 while in Flex Mode. Additionally, the GPIO4/GPIO5 header J28 can be used in this mode to access the digital RX and TX UART signals. When accessing these signals, the J27 header must be left open and the J5 header must have a shunt placed across pins 2 and 3.

LEDs **"Port0"** and **"Port1"** are indicators for the USB Host bus speed. During Flex mode either Port 0 or Port 1 can be the USB host, and only the corresponding USB host LED will turn on. The LED color will indicate the USB host bus speed: yellow indicates USB 2.0 and blue indicates USB 3.0.

There is one slide switch provided on this daughter card. The **Flex_CMD Select** switch (SW11) allows the user to manually set the USB5734 into Flex mode. The default setup is to slide the **Flex_CMD Select** switch into the **0** or Low position which will turn the **"FLEXCMD"** and **"Flexed"** LEDs OFF. When the **Flex_CMD Select** switch is in the **1** or High position, the **"FLEXCMD"** and **"Flexed"** LEDs will turn on orange to indicate that the USB5734 is in Flex mode.

**FIGURE 3-2:**        **IO MODE 2 DAUGHTER CARD**



### 3.1.3      Mode 3: USB Speed LEDs Mode

The Mode 3 IO daughter card configures the USB5734 IO signals to indicate USB Speed status. Once inserted onto the EVB-USB5734, the **"3V3"** Power LED should turn on green. An **SMBus** header J14 is provided for accessing the SMDAT and SMCLK signals of the USB5734 while in USB Speed LEDs Mode. Additionally, the GPIO4/GPIO5 headerJ28 can be used in this mode to access the digital RX and TX UART signals. When accessing these signals, the J27 header must be left open and the J5 header must have a shunt placed across pins 2 and 3.

There are five speed LEDs on this daughter card that are labeled **"P0"** to **"P4"** which correspond to downstream Port 0 to Port 4. When a USB device is connected to a USB downstream port, the LED color will indicate the bus speed for the corresponding USB port: yellow indicates USB 2.0 and blue indicates USB 3.0. If there is no downstream device connected, the corresponding LED will be turned OFF.

**FIGURE 3-3:**        **IO MODE 3 DAUGHTER CARD**
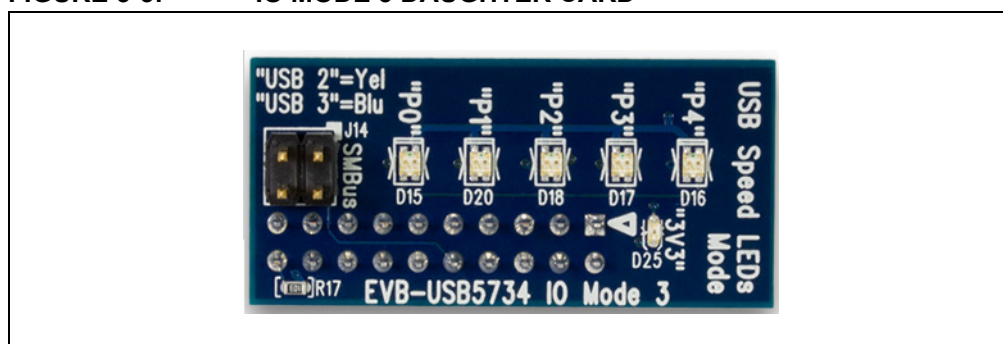


### 3.1.4      Mode 4: GPIO Mode

Mode 4 is the default IO configuration for the EVB-USB5734. There is no daughter card for Mode 4 operation. For the USB5734 to be set into GPIO Mode, a jumper needs to be placed across pins 19 and 20 on the 2x10 IO connector J7. When in GPIO mode, the programmable function pins of the USB5734 are set to TBD status. This mode is used for implementations that use the external SPI ROM and allows for custom configurations. The GPIO4/GPIO5 headerJ28 can be used in this mode to access the digital RX and TX UART signals. When accessing these signals, the J27 header must be left open and the J5 header must have a shunt placed across pins 2 and 3.

**FIGURE 3-4:** **IO MODE 4 (NO DAUGHTER CARD)**
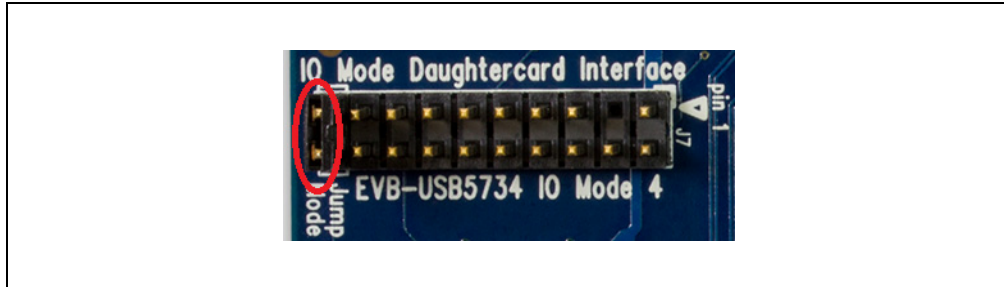


### 3.1.5 Mode 5: Battery Charging LEDs Mode

The Mode 5 IO daughter card configures the USB5734 IO signals to indicate Battery status, with three IO signals configured as GPIO signals. Once inserted onto the EVB-USB5734, the **"3V3"** Power LED should turn on green. The GPIO4/GPIO5 header J28 can be used in this mode to access the digital RX and TX UART signals. When accessing these signals, the J27 header must be left open and the J5 header must have a shunt placed across pins 2 and 3.

There are seven LEDs on this daughter card. The first four LEDs labeled P1 to P4 indicate the battery charge status of Ports 1 through 4. The LEDs **"P1"** - **"P4"** will turn on green to indicate that battery charging is enabled on the corresponding USB port. If a battery charging device is connected to a BC enabled port and BC1.2 negotiation is successful, the corresponding LED will turn yellow. There are also three GPIO LEDs on this daughter card that are labeled **"PF5"** - **"PF7"**. LEDs **"PF5"** and **"PF6"** are indicators for when GPIO8 and GPIO10 are set as outputs using the USB to GPIO bridge function. When these pins are driven high, the associated **"PFx"** LED(s) will turn on green. When these pins are driven low, the associated **"PFx"** LED(s) will be OFF. The **"PF7"** LED is provided to indicate the state of the **PF7 Select** switch (SW10) as described below.

There is one slide switch on this daughter card. The **PF7 Select** switch (SW10) allows the user to manually select whether the PROG_FUNC7 pin should be driven high or low. The USB to GPIO bridge function is used to configure GPIO11 and sample the state of SW10. The default setup is to slide this switch into the **0** or Low position which will turn the **"PF7"** LED off. When the PF7 Select switch is in the **1** or High position, the **"PF7"** LED will turn on green.

**FIGURE 3-5:** **IO MODE 5 DAUGHTER CARD**
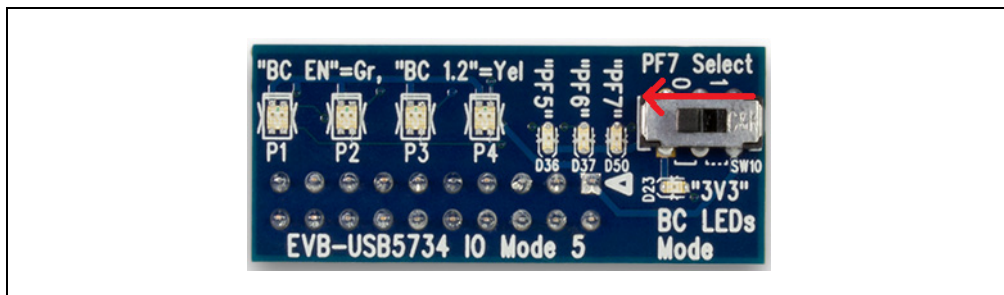


### 3.1.6 Mode 6: UART Mode

The Mode 6 IO daughter card configures the USB5734 into UART Mode. To insert this daughter card onto the EVB-USB5734, mate its 2x10 connector on the bottom side with the 2x10 IO connector on the EVB-USB5734, as done with the other IO cards. This daughter card has an additional standoff that inserts between the daughter card and the main EVB which provides extra support to the IO card.

Once inserted onto the EVB-USB5734, the **"3V3"** Power LED should turn on green. An **SMBus** header J15 is provided for accessing the SMDAT and SMCLK signals of the USB5734 while in UART Mode. There is a DTE serial connector on board (J18) which connects to a MAX3243 IC for RS232 communication. A 2x2 **UART** header J17 is provided so that the user can have the capability of using a straight cable or a simple null-modem cable. The default setup is to jumper pins 1-2 and 3-4 for a straight cable configuration. If a simple null-modem cable is used, then pins 1-3 and 2-4 should be shunted together on the J17 header. The **"TXD"** and **"RXD"** LEDs on this daughter card will turn on green to indicate activity on these signals.

There are two supported UART operations when using this IO card. The default operation is for normal flow control in which the user communicates through the DTE connector with the MAX3243transceiver in circuit. In this configuration, the **Xvr Disable** header J31 header should be left open. The second option available is to have no flow control with the MAX3242 transceiver removed from the circuit. In this configuration, the **Xvr Disable** header J31 should have a jumper across pins 1-2 in order to disable the MAX3242. The UART signals can then be accessed via the **UART** header J28 on the EVB-USB5734. Also for this operation, there must be a jumper placed across pins 2 and 3 of the J5 header on the EVB-USB5734 and the J27 header must be left open.

> **Note:** Use of this IO daughter card prevents the use of the on-board SPI and SMBus Slave.

**FIGURE 3-6:  IO MODE 6 DAUGHTER CARD**
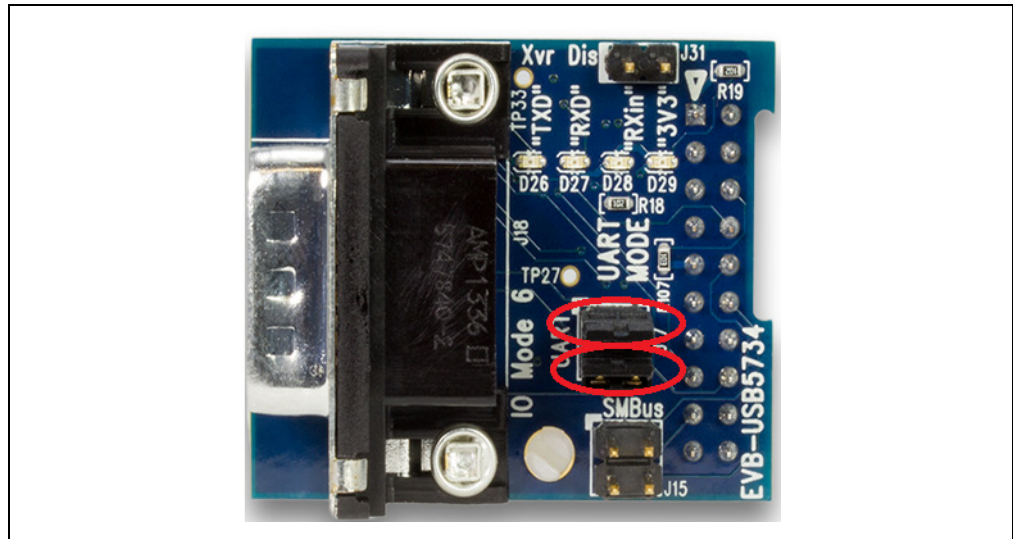
# Appendix A. EVB-USB5734 Evaluation Board

## A.1    INTRODUCTION

This appendix shows the EVB-USB5734 Evaluation Board.

**FIGURE A-1:        EVB-USB5734 EVALUATION BOARD**