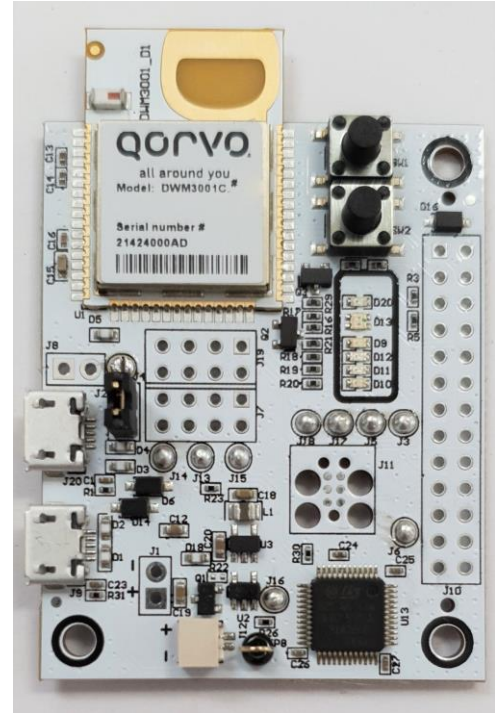


Product Overview

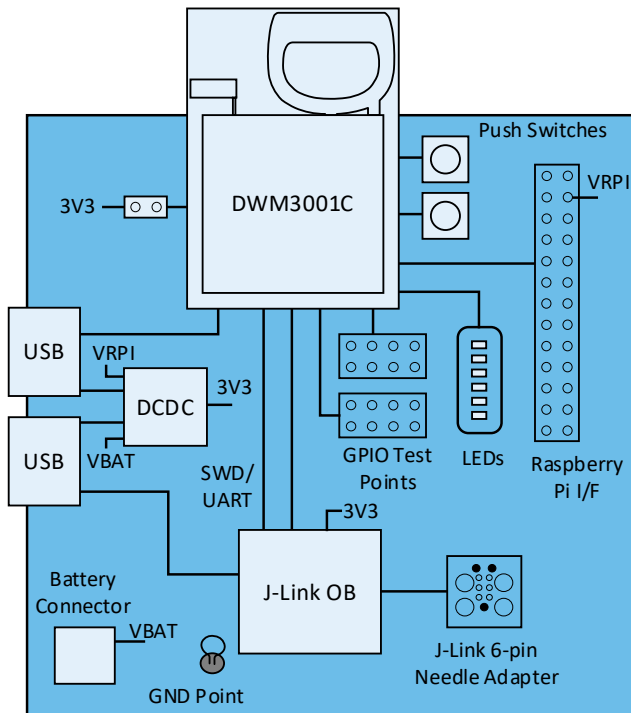
The Qorvo® DWM3001CDK has been developed as a development board for the DWM3001C fully integrated (UWB) transceiver module based on the Qorvo DW3110 IC. This kit can be used to evaluate hardware performance as a TWR or TDoA Tag and build an evaluation real time location system (RTLS).

An on-board J-Link debugger provides SWD and UART interfaces to the DWM3001C. Two micro-USB ports connect to the J-Link and DWM3001C USB interface. The board can be powered from either of these USB ports, a Raspberry Pi interface, a battery or an external power supply.

The DWM3001C is designed to be compliant to the FiRa™ PHY and MAC specifications, enabling interoperability with other FiRa™ compliant devices.



Functional Block Diagram



Key Features

- Convenient kit for evaluation of DWM3001C UWB module
- J-Link on-board for debug and flashing via USB
- USB port for direct connection to DWM3001C USB interface
- 26 pin Raspberry Pi compatible header
- Reset and user-defined buttons and LEDs
- Access to all DWM3001C GPIOs and interfaces
- Measure module current via header on VCC trace
- Supports UWB RF bands 5 (6.5 GHz) and 9 (8 GHz)
- nRF52833 Soc with Bluetooth 5.2
- Two integrated antennas for BLE and UWB
- IEEE 802.15.4-2015 and IEEE 802.15.4z BPRF compliant
- Software development with free to use IDE and debugger
- Fully aligned with FiRa™ PHY, MAC and certification development. Works with Apple Nearby Interaction software
- Software suite compliant with FiRa PHY/MAC specification.

Applications

- Evaluation of hardware performance as tag or anchor
- Building block for low power TWR and TDoA RTLS systems

1 Overview

The DWM3001CDK is a development board that facilitates evaluation of the DWM3001C module. Figure 1 highlights the main components and interfaces.

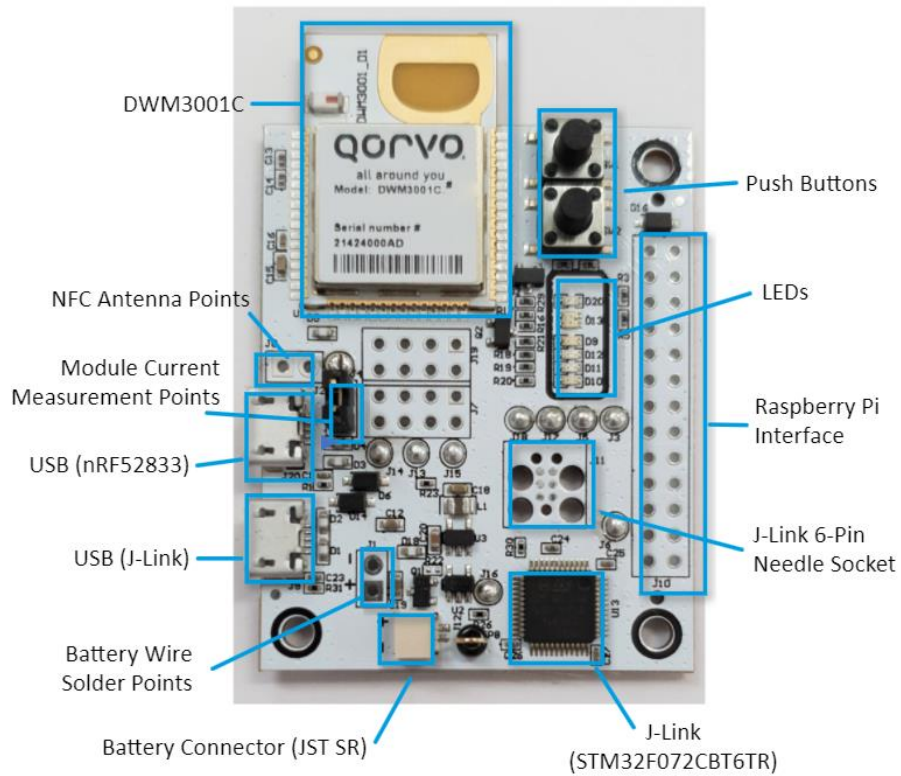


Figure 1. Overview of DWM3001CDK

2 Power Options

The DWM3001CDK can be powered via USB, battery, or Raspberry Pi. The connector numbers are listed in Table 1. The board does not include a battery charger.

Power Option	Connector on PCB
USB – J-Link	J9
USB – nRF52833	J20
Battery – JST SR Connector	J12
Battery – Loose Wires	J1
Raspberry Pi Interface	J10

Table 1. DWM3001CDK Power Options

3 Solder Bridge Jumpers

Table 2 lists the solder bridge jumpers on the development board. These can be desoldered to facilitate making current consumption measurements on the module, with peripherals such as LEDs and STM MCU isolated. The STM MCU runs the Segger J-link OB firmware.

Solder Bridge	Purpose	Default State
J3	Supply rail connection for LEDs. Desolder to remove power to LEDs, e.g. for minimizing current consumption.	Soldered
J4	Series bridge on DWM3001C module supply rail. Desolder to measure module current consumption at J2.	Soldered
J5	Ground connection for dual-LED (D13) circuit. Desolder to remove power to LED, e.g. for minimizing current consumption.	Soldered
J6	Series bridge on Segger RESET signal. Desolder to isolate IO leakage from current consumption measurement.	Soldered
J14	Series bridge on Segger TXD signal. Desolder to isolate IO leakage from current consumption measurement.	Soldered
J15	Series bridge on Segger RXD signal. Desolder to isolate IO leakage from current consumption measurement.	Soldered
J16	Series bridge on Segger MCU supply rail. Desolder to isolate MCU from current consumption measurement.	Soldered
J17	Series bridge on Segger SWDIO signal. Desolder to isolate IO leakage from current consumption measurement.	Soldered
J18	Series bridge on Segger SWDCLK signal. Desolder to isolate IO leakage from current consumption measurement.	Soldered

Table 2. Solder bridges and their purposes

4 Raspberry Pi Interface

The DWM3001CDK has an interface to allow connection to a Raspberry Pi board. A connector such as the stacking header shown in Figure 2 can be attached at J10 for this purpose.



Figure 2: Stacking Header for Raspberry Pi (e.g. Adafruit 1112)

Figure 3 shows how the DWM3001CDK board can be mounted on a Raspberry Pi board using the stacking header. The J10 pins are simply aligned with pins 1 to 26 of the Raspberry Pi header.

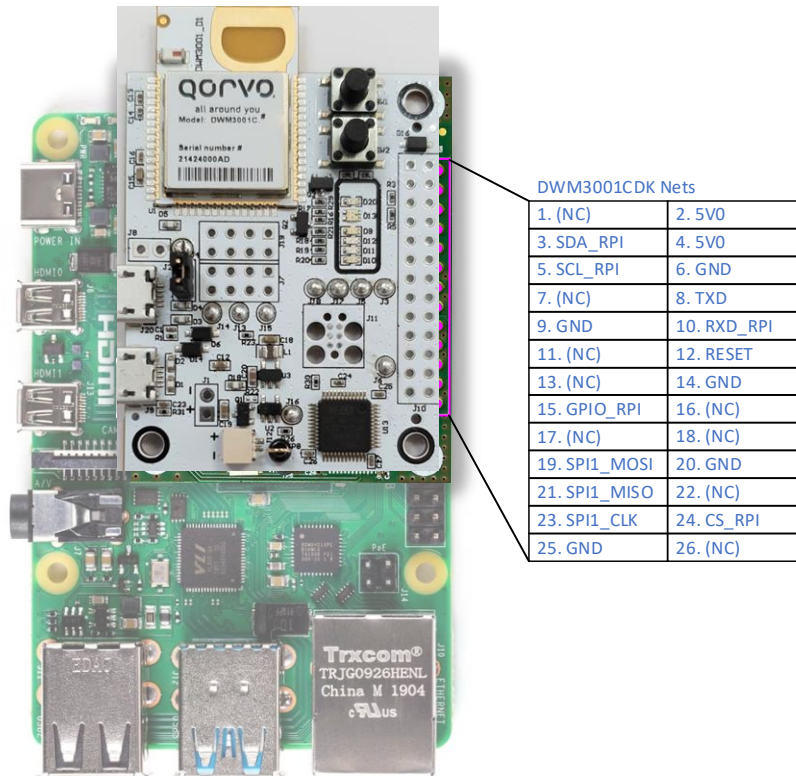


Figure 3. DWM3001C Mounted on Raspberry Pi

Table 3 below gives the connection details between the Raspberry Pi connector and the DWM3001C module. See the DWM3001C datasheet and the schematic for the DWM3001CDK development board at the end of this document.

Table 3: Connections between Raspberry Pi and DWM3001C module

Module Development Board RPi connector		Module Pin Number (and Name) from DWM3001C Module Data Sheet
Pin Number	Schematic Net Name	
3	SDA_RPI	Pin 37 (P0.26)
5	SCL_RPI	Pin 39 (P0.23)
9	GND	GND
15	GPIO_RPI	Pin 33 (P0.28)
19	SPI1_MOSI	Pin 41 (P0.27)
21	SPI1_MISO	Pin 40 (P0.07)
23	SPI1_CLK	Pin 42 (P0.31)
25	GND	GND
2	VRPI	Provides input power to Module Development Board. (Not connected directly to module)
4	VRPI	
6	GND	GND
8	TXD	Pin 32 (P0.15)
10	RXD_RPI/RXD	Pin 34 (P0.19)
12	RESET	Pin 47 (P0.18)
14	GND	GND
20	GND	GND
24	CS_RPI	Pin 43 (P0.30)

5 J-Link OB

The STM processor on the Module Development Board provides USB to SWD (Serial Wire Debug) conversion to allow programming and debug of software on the DWM3001C module.

Serial Wire Debug is a replacement for the more traditional 20-pin JTAG port. It uses a clock (SWDCLK) and a Single bi-directional data pin (SWDIO), providing all the normal JTAG debug and test functionality. SWDIO and SWCLK are overlaid on the TMS and TCK pins. In order to communicate with a SWD device, J-Link sends out data on SWDIO, synchronous to the SWCLK. With every rising edge of SWCLK, one bit of data is transmitted or received on the SWDIO. The data read from SWDIO can then be retrieved from the input buffer.

6 LEDs

The table below details the DWM3001CDK LED functionality.

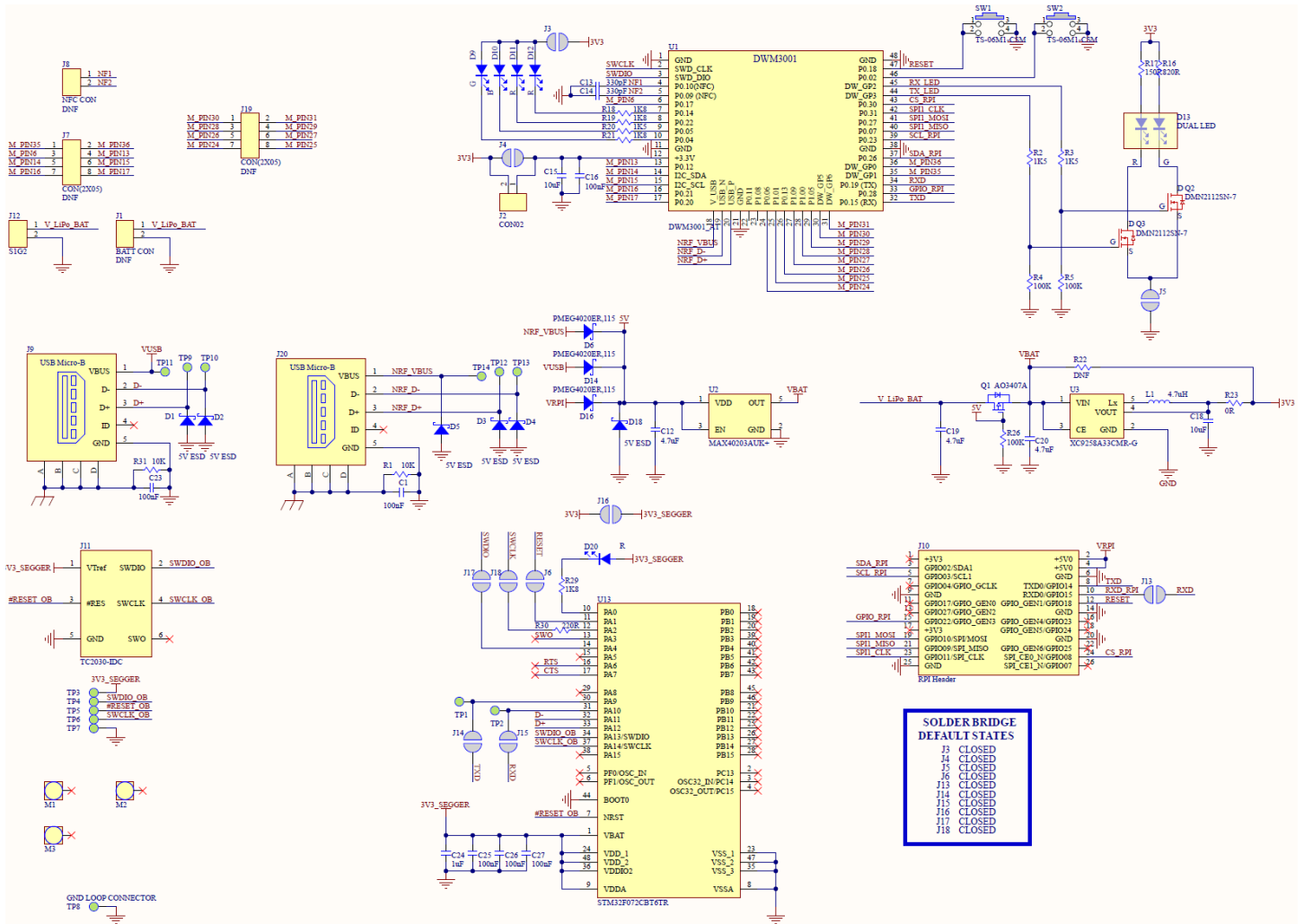
Table 4 DWM3001CDK LED Functions

LED #	Description
D20	When flashing, this indicates that the board is powered but the J-Link is not enumerated. When on, this indicates the J-Link is enumerated and the board is powered.
D13	TX and RX indication from the DW3110 transceiver
D9	User programmable. LED function is controlled by the DWM3001C firmware
D12	
D11	
D10	

7 Buttons SW1 and SW2

There are two buttons on the PCB, SW1 and SW2. SW1 is connected to the RESETn pin on the DWM3001C module and SW2 is connected to the BT_WAKE_UP pin on the DWM3001C module.

8 Schematic



SOLDER BRIDGE		DEFAULT STATES	
J3	CLOSED	J13	CLOSED
J4	CLOSED	J14	CLOSED
J5	CLOSED	J15	CLOSED
J6	CLOSED	J16	CLOSED
J7	CLOSED	J17	CLOSED
J8	CLOSED	J18	CLOSED

9 Antenna Delay Calibration

To measure range accurately, precise calculation of timestamps is required. To do this the antenna delay must be known. The DWM3001C allows this delay to be calibrated and provides the facility to compensate for delays introduced by PCB, external components, antenna and internal DWM3001C delays.

To calibrate the antenna delay, range is measured at a known distance using two DWM3001C systems. Antenna delay is adjusted until the known distance and reported range agree. The antenna delay can be stored in OTP memory.*

***Note: For Engineering Samples DWM3001C.E1.0SR, DWM3001C.E1.0SQ, DWM3001C.E1.0SB and DWM3001CDKE1.0: do not use the Channel 5 Antenna Delay in OTP – use default value 16390.**