DFCM-NNN40-DTxR

mbed Kit User Guide

Index:

Revision History

Version	Date	Reason of change	Maker
0.1	2015/2/11	First release	Tsungta Wu
0.2	2015/4/14	a. Remove Virtual COM port feature from HDK in whole document b. update section 1, section 1.1, section 2.1, section 4, section 4.1 to improve readability c. add section 2.2 DELTA DFCM-NNN40 mbed kit hardware figure d. change 3.3V to 3.6V and 3V3 to 3V6 in whole document e. Change document title and footnote f. Remove UV sensor in the whole g. Remove wording in section 2.3 h. Update figures in section 4.2 i. Update table in section 4.5 j. Update link in section 2.3.1 k. Update section 4.3	Tsungta Wu
0.3	2015/5/29	Add section 3.3 Setup Virtual Com Port Driver and section 4.6 UART Configuration	Tsungta Wu
0.4	2015/6/2	Update Platform Pin Out image	Tsungta Wu
0.5	2015/6/3	Update section 3.3	Tsungta Wu
0.6	2015/7/15	Update section 4.2 Kit PIN OUT	Marco.Hsu
0.7	2015/8/11	Add platform hyperlink Update section 4	Tsungta Wu
0.8	2016/8/2	Update hardware figure in section 2.2 Update pin out image in section 4.2 Update section 4.5	Tsungta Wu

Wireless LAN/Bluetooth Low Energy Combo Module MBED Kit Getting Start

1. Introduction

The DELTA DFCM-NNN40 development kit provides cost effective, low power, and flexible platform to rapid prototype of Wi-Fi® connectivity and Bluetooth Low Energy design. Kit has temperature sensor on board, it is convenient to set up example application and develop the relative prototype. The core of DELTA DFCM-NNN40 is DCFM-NNN40-DTxR module embed nRF51822 BLE SoC which integrating the 2.4GHz transceiver, a 32 bit ARM® Cortex-M0 CPU, flash memory, and analog and digital peripherals.

1.1 Minimum Requirements

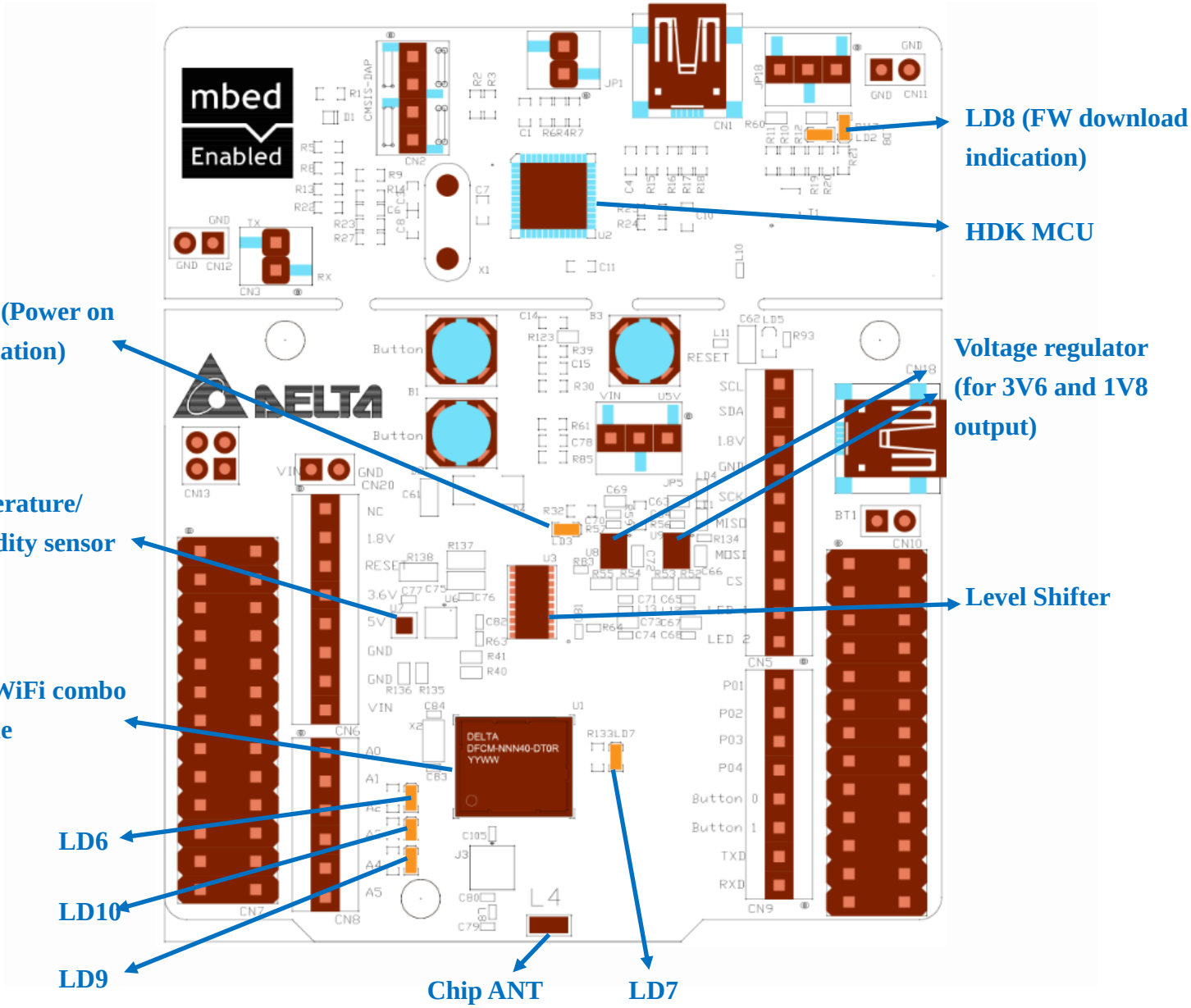
- Computer (supported OS; Window 7, Windows 8, Windows 8.1, Ubuntu Linux 12.04, MAC OS 9/10) with a USB port
- Micro USB cable

2. Kit Content

2.1 DELTA DFCM-NNN40 mbed kit hardware content

- DELTA DFCM-NNN40 mbed kit board x 1

2.2 DELTA DFCM-NNN40 mbed kit hardware figure



2.3 Downloadable Content

2.3.1 nRF51822 documentation

- nRF51 Series Reference Manual
- nRF51822 Product Specification
- S110 nRF51822 SoftDevice Specification
- nRF51822 Product Anomaly Notification

All documents can be found from the link below
http://www.nordicsemi.com/eng/Products/Bluetooth-Smart-Bluetooth-low-energy

2.3.2 Hardware related files

- Schematics
- Placement

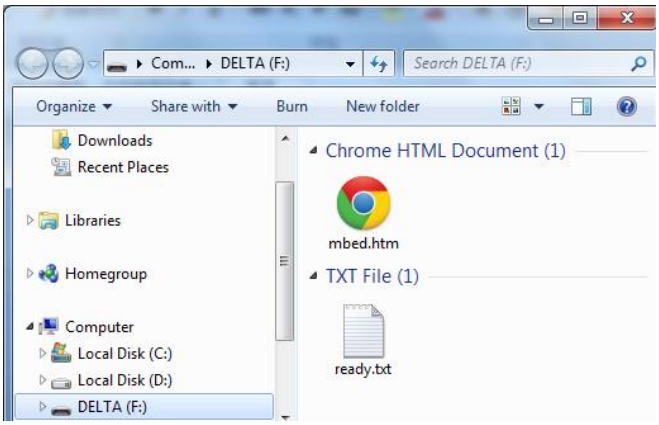
All documents can be found from DELTA DFCM-NNN40 platform page
https://developer.mbed.org/platforms/Delta-DFCM-NNN40/

3. Getting started

This section contains the procedure from login in mbed page to load application to DELTA DFCM-NNN40.

3.1 Connect your Delta DFCM-NNN40 mbed kit to a computer

(1) Connect your mbed kit to a computer with a USB cable.
(2) The status light (LD3) turn on, indicating the kit is powered on.
(3) After a few seconds, the computer will recognize the mbed microcontroller as a standard USB drive.



Windows Example

3.2 Click the MBED.HTM file to log in

(1) Go to the new USB Drive and click MBED.HTM to open it in a web browser.

(2) If you do not have an mbed account, click Signup to create your mbed account. Otherwise, log in with your normal username and password. This will give you access to the website, tools, libraries, and documentation.

3.3 Setup Virtual Com Port Driver

DELTA DFCM-NNN40 support CDC device. At step 3.1, the PC may have an unrecognized device. To enable the function, please refer the following step:

(1) Click the link http://www.st.com/web/en/catalog/tools/PF257938#. Download the latest stm32 virtual com port driver and install as the indication.

(2) Find the installed file at Program Files\STMicroelectronics\Software\Virtual COM Port Driver\stmcdc.inf. Modify the PID to **A16A** and add multi-interface **MI_01**, the complete modification should be

%DESCRIPTION%=DriverInstall,USB\VID_0483&PID_A16A&MI_01

The modified stmcdc.inf will look like following

```
;------------------------------------------------------------------------------
;            VID/PID Settings
;------------------------------------------------------------------------------
[DeviceList.NT]
%DESCRIPTION%=DriverInstall,USB\VID_0483&PID_A16A&MI_01

[DeviceList.NTamd64]
%DESCRIPTION%=DriverInstall,USB\VID_0483&PID_A16A&MI_01

[DriverInstall.NT]
Include=mdmcpq.inf
CopyFiles=FakeModemCopyFileSection
AddReg=DriverInstall.NT.AddReg

[DriverInstall.NT.AddReg]
HKR,,DevLoader,,*ntkern
HKR,,NTMPDriver,,usbser.sys
HKR,,EnumPropPages32,,"MsPorts.dll,SerialPortPropPageProvider"

[DriverInstall.NT.Services]
AddService=usbser, 0x00000002, DriverServiceInst

[DriverServiceInst]
DisplayName=%SERVICE%
ServiceType = 1 ; SERVICE_KERNEL_DRIVER
StartType = 3 ; SERVICE_DEMAND_START
ErrorControl = 1 ; SERVICE_ERROR_NORMAL
ServiceBinary= %12%\usbser.sys
LoadOrderGroup = Base
```

Modified as shown

(3) Double click dpinst_ia64.exe for 64-bit Windows installation or dpinst_x86 for 32-bit Windows installation.

(4) To test the functionality, connect the (CN3) jumper and use PC terminal tool to test the UART loop test.

3.4 Build up the first program on DELTA DFCM-NNN40

(1) After you login the mbed, click the new program button. Then choice one of the example program, the project will be generated from mbed.

(2) Click the compile button directly; the image file will be generated from mbed

(3) The image file can be saved to USB drive of DELTA DFCM-NNN40 directly. Or download to your local storage and use drag-n-drop to USB drive to load firmware.

(4) During the image uploading, the (LD8) should blink to indicate the uploading state.
(5) When the uploading is completed, the succ.txt should be appeared in USB drive. Then the uploaded application starts running on DELTA DFCM-NNN40.

4. Kit Description.

4.1 Kit Feature

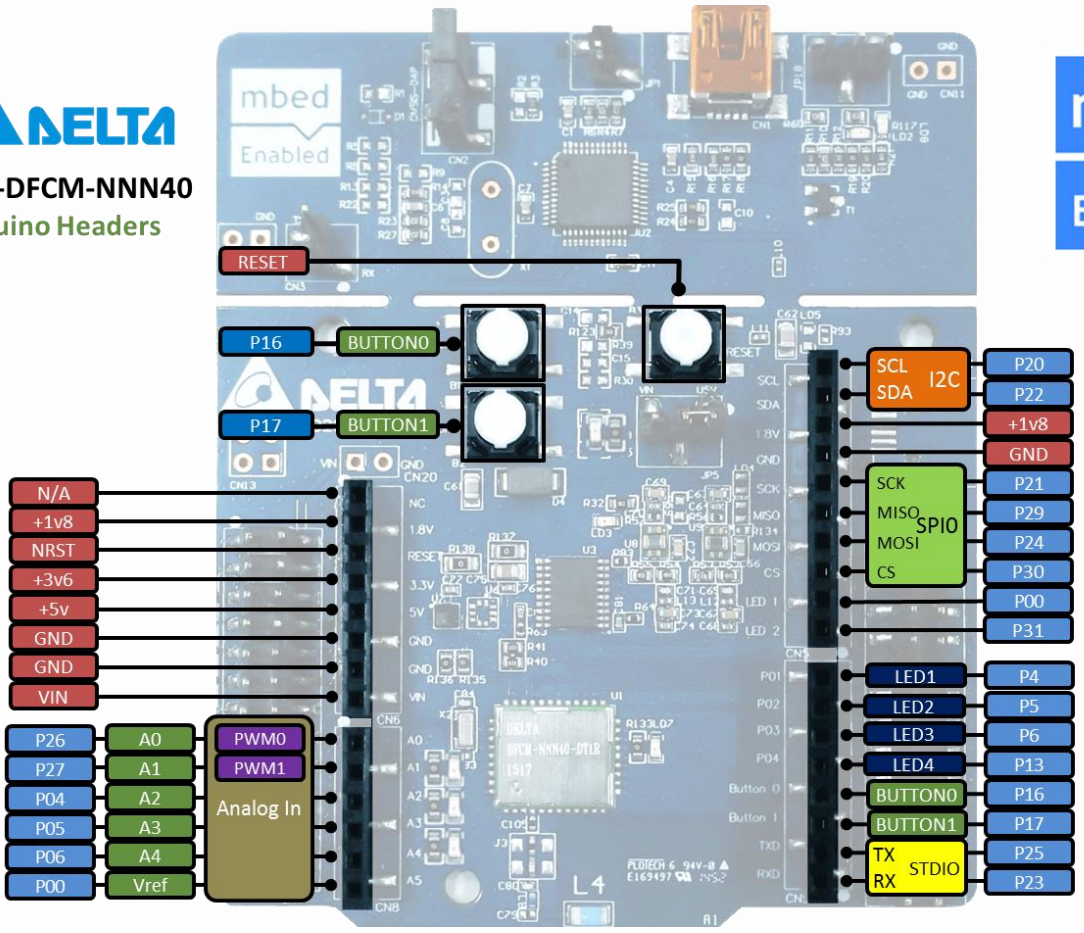
- DCFM-NNN40-DTxR BLE/WiFi combo module
  - Nordic nRF51822 with ARM® Cortex-M0 processor
  - 32MHz external crystal, 256KB flash memory, 32KB RAM
  - 2xSPI (up to 4MHz), 2xI2C (100/400Kbps), UART (up to 921600), 5xADC, 14xGPIO
  - LGA42 pin package
  - Built in RF switch for BLE and WLAN using a single antenna
  - BLE
    - Bluetooth 4.1 specification compliant
    - Support mbed official BLE API, refer to http://developer.mbed.org/teams/Bluetooth-Low-Energy/
  - WLAN
    - IEEE 802.11 b/g/n (1x1)
    - Supports IEEE 802.11 WEP, WPA, WPA2 Security
    - Support mbed official EthernetInterface and Socket API, refer to http://developer.mbed.org/handbook/Socket
- HDK
  - USB drag and drop programming
  - CMSIS-DAP interface for programming and debugging
  - Accepts power through USB and External source
  - Pin header for current measurement

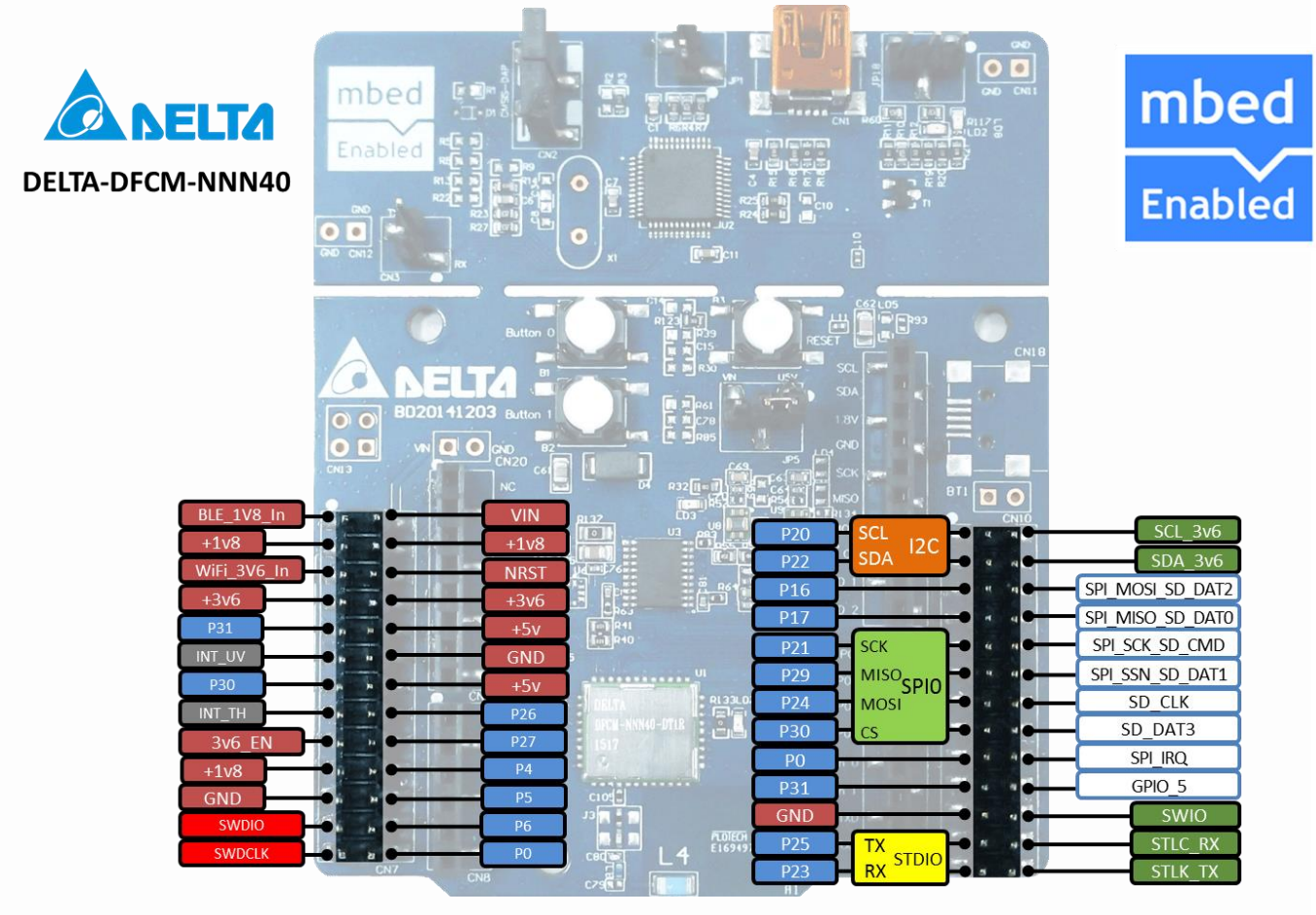
4.2 Kit PIN OUT

DELTA DFCM-NNN40 has a default profile pin out. The board has reserved SPI, I2C, ADC, UART and GPIO pin to access. The following is the detail of description for pin out.

- **1.8V pin**
  The voltage of power supply for BLE module is 1.8V. All BT GPIO (P4~P29), are connected to BLE SoC. It is notice that the voltage should be 1.8V.
- **3.6V pin**
  There are pins are passed through level shift to convert from 1.8V to 3.6V. Those are SCL_3V6, SDA_3V6, STLK_TX, and STLK_RX.
- **RF switch pin**
  To switch RF antenna to BLE or Wi-Fi, it is controlled by gpio pin SWIO, P19.
- **Use j-link to load image to BLE module directly**
  It is able to use j-link to load image to BLE module directly. The R124 and R125 should be removed. The SWDIO and SWDCLK is then accessible on CN7 pin 25, 23 respectively.
- **ADC function**
  P04, P05, P06, P26, P27 could be to ADC function. It is notice that only P06 could be configure to reference ADC voltage (ADC/LPCOMP reference input 0 and in input 1). Only one of the modules can be enabled at the same time.

DELTA-DFCM-NNN40
Arduino Headers





4.3 HDK Reset

The Reset button (SWDIO) is connected to the embedded Nordic nRF51822; it is working no matter the power supply is from USB or external power.

4.4 Power Supply

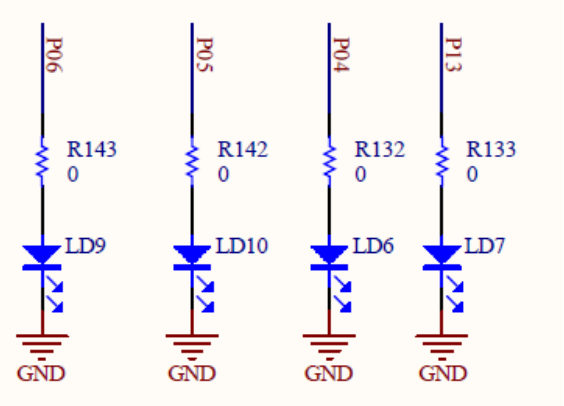
- USB
- External power supply from VIN (5V)

To select power supply, the JP5 is used to switch power source. Short pin 1 and pin 2 to power from USB, short pin 2 and pin 3 to power from VIN externally

4.5 Button and LED

The two user buttons and two LEDs on the mbed kit board are connected to dedicate I/Os on the nRF51822 chip. The connections are shown in blew table.

Part	GPIO	Short
Button0	P16	
Button1	P17	
LED1 (LD6)	P04	R132
LED2 (LD10)	P05	R142
LED3 (LD9)	P06	R143
LED4 (LD7)	P13	R133



4.6 UART Configuration

Below table shows an overview of the UART connections on DELTA DFCM-NNN40, refer to section 3.3 to setup the Virtual Com Port on your PC

nRF51822 Default GPIO	UART
P25	TXD
P23	RXD

4.7 Measuring Current

The current drawn by the DCFM-NNN40-DTxR module can be monitored on the DELTA DFCM-NNN40 mbed kit. To measure the current, you must first prepare the board by removing the 0Ω on R127and R128. To measure the current of BLE chip, please connect current meter series to 1V8 and BLE_1V8_IN pin on CN7; while the current of Wi-Fi chip measurement, please connect current meter series to 3V6 and WIFI_3V6_IN pin on CN7.