MANCHESTER 1824

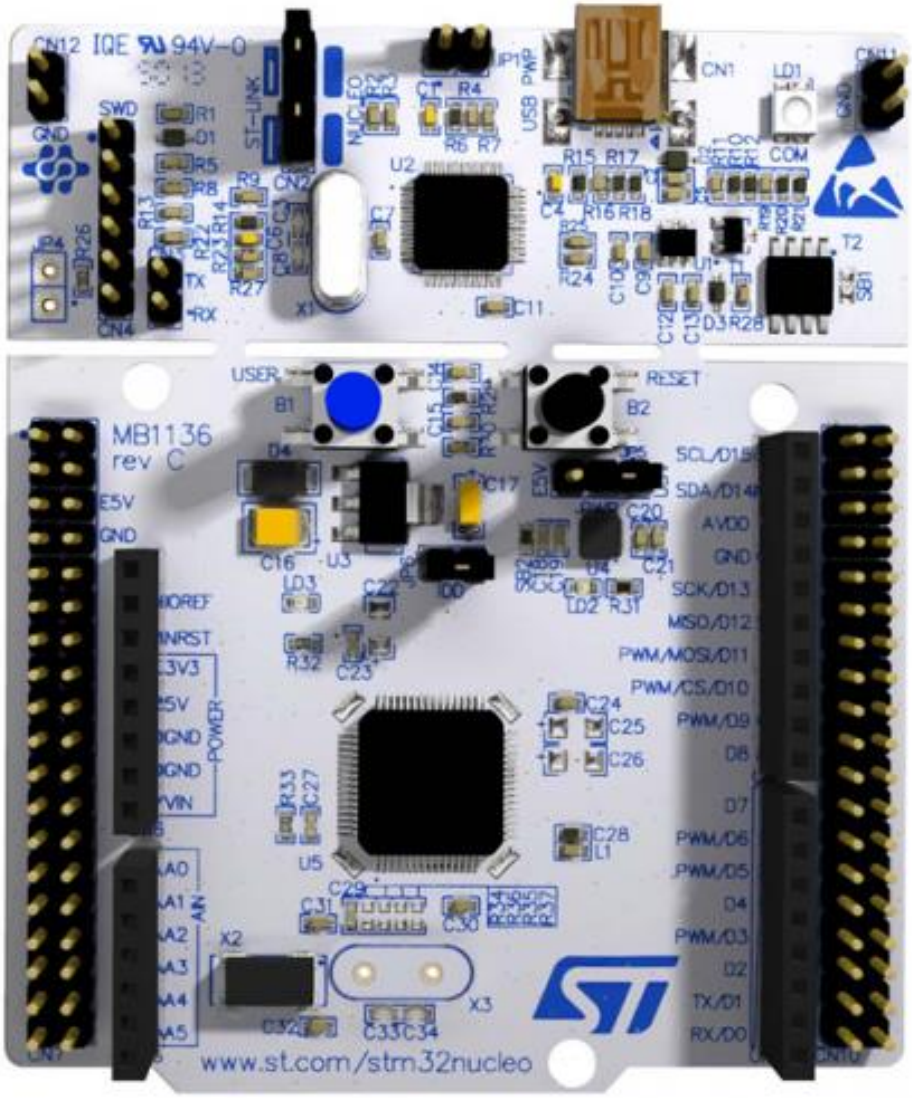
The University of Manchester

EEEN20019 Microcontroller Engineering 2

Nucleo Board and Application Shield Schematics

Dr Peter Green
School of Electrical and Electronic Engineering
University of Manchester
Office: SSB/E8b
Email: peter.green@manchester.ac.uk

Nucleo F401RE Board

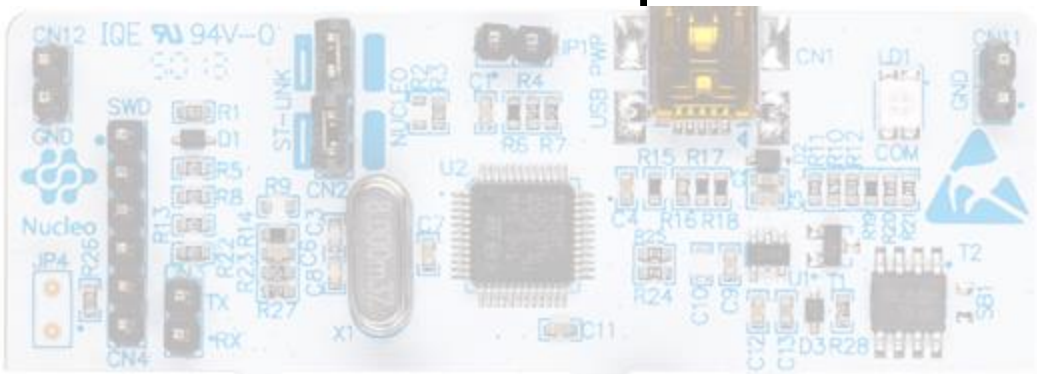


Nucleo F401RE Morpho Headers

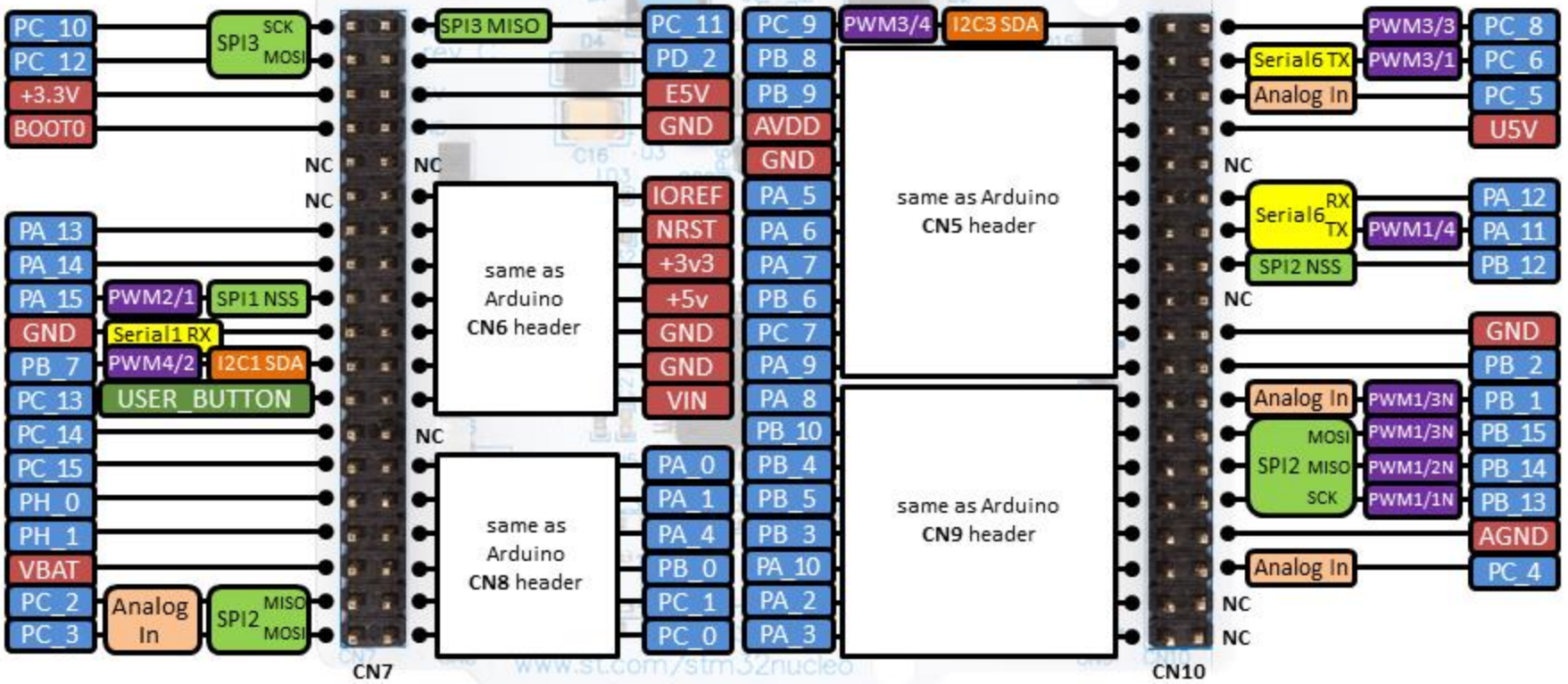
life.augmented

Nucleo F401RE

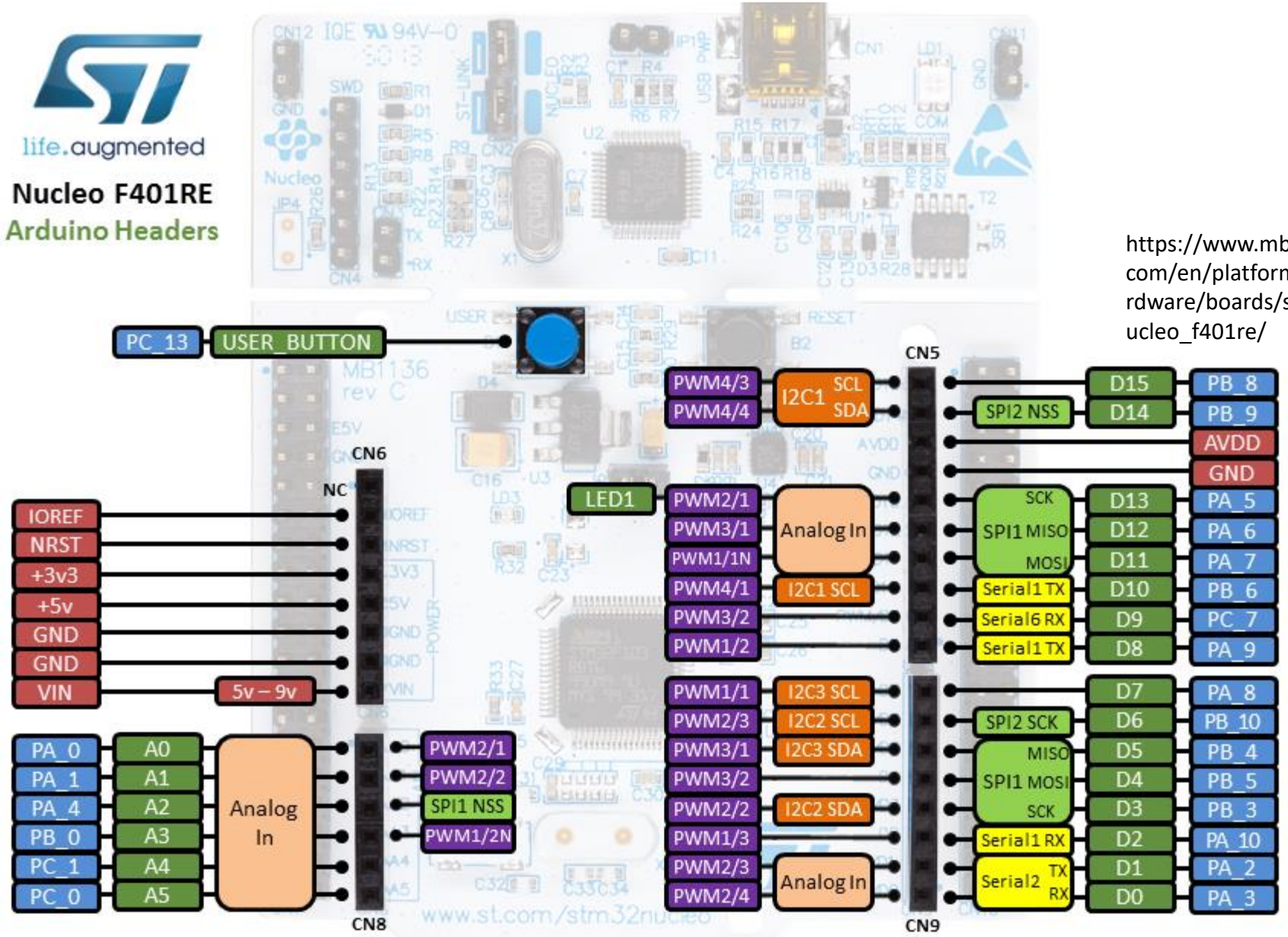
Morpho Headers



https://www.mbed.com/en/platform/hardware/boards/st/nucleo_f401re/

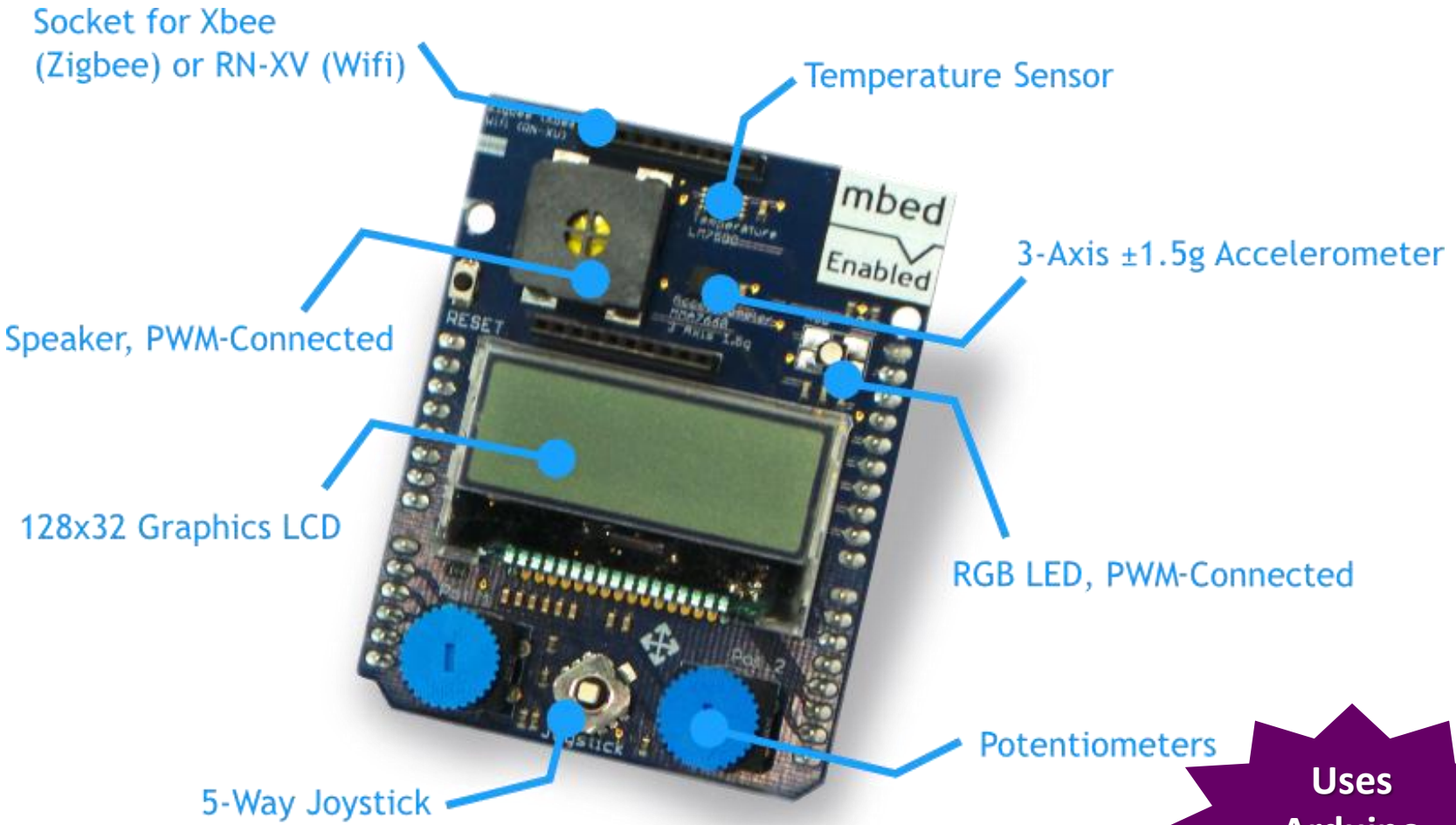


Nucleo F401RE Arduino Headers



https://www.mbed.com/en/platform/hardware/boards/st/nucleo_f401re/

IO Board aka Application Shield (AS)



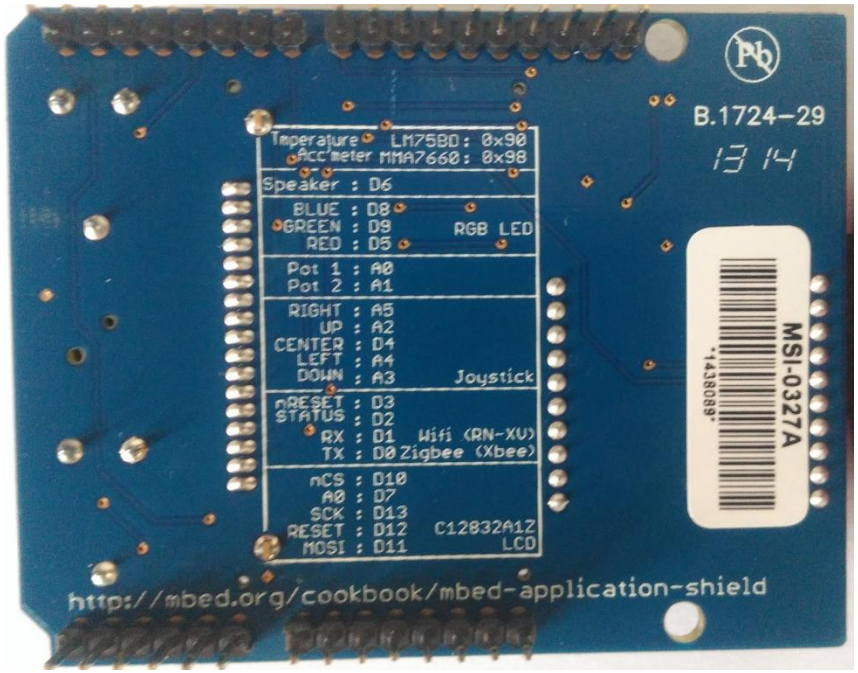
Uses Arduino headers

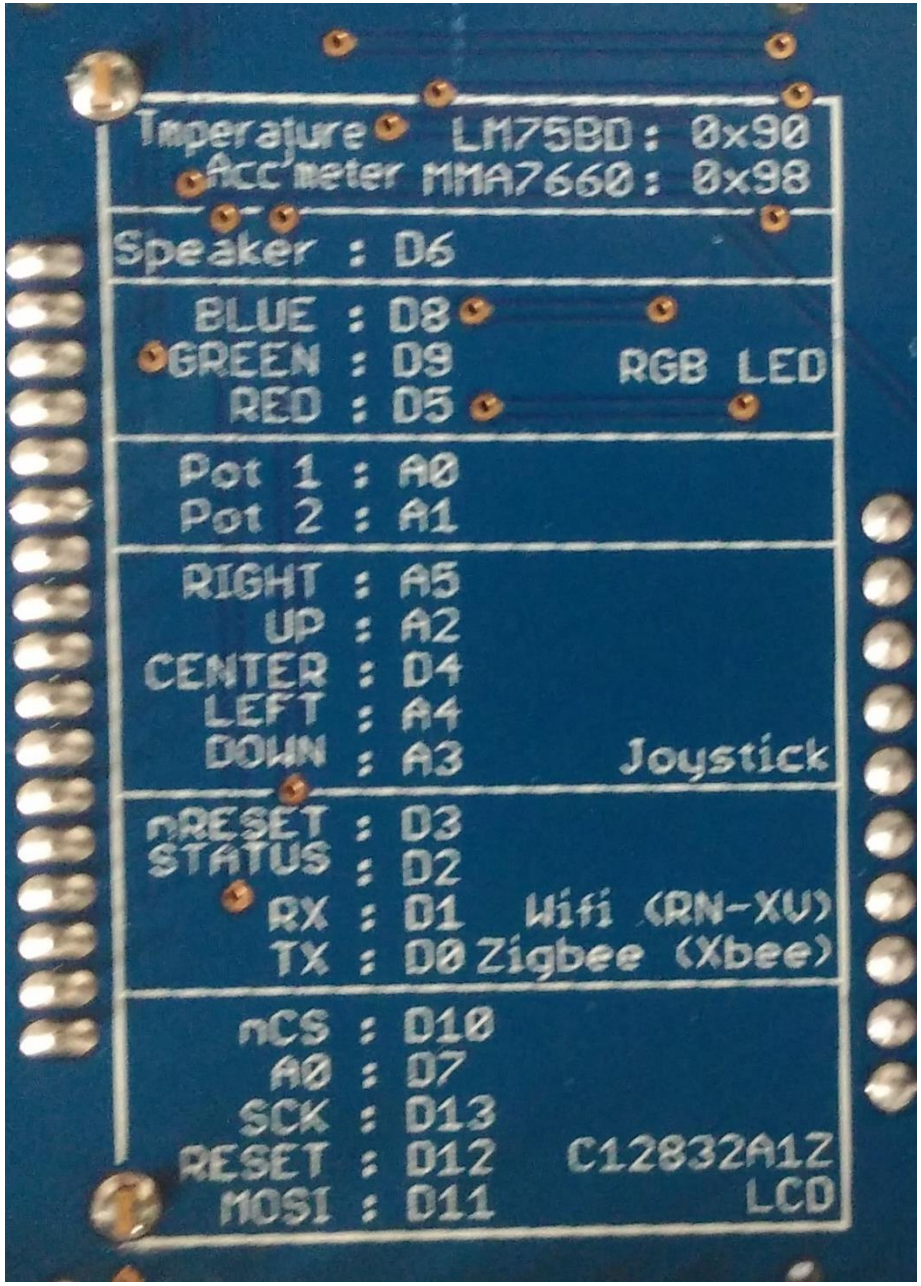
https://os.mbed.com/components/mbed-Application-Shield/

MANCHESTER 1824

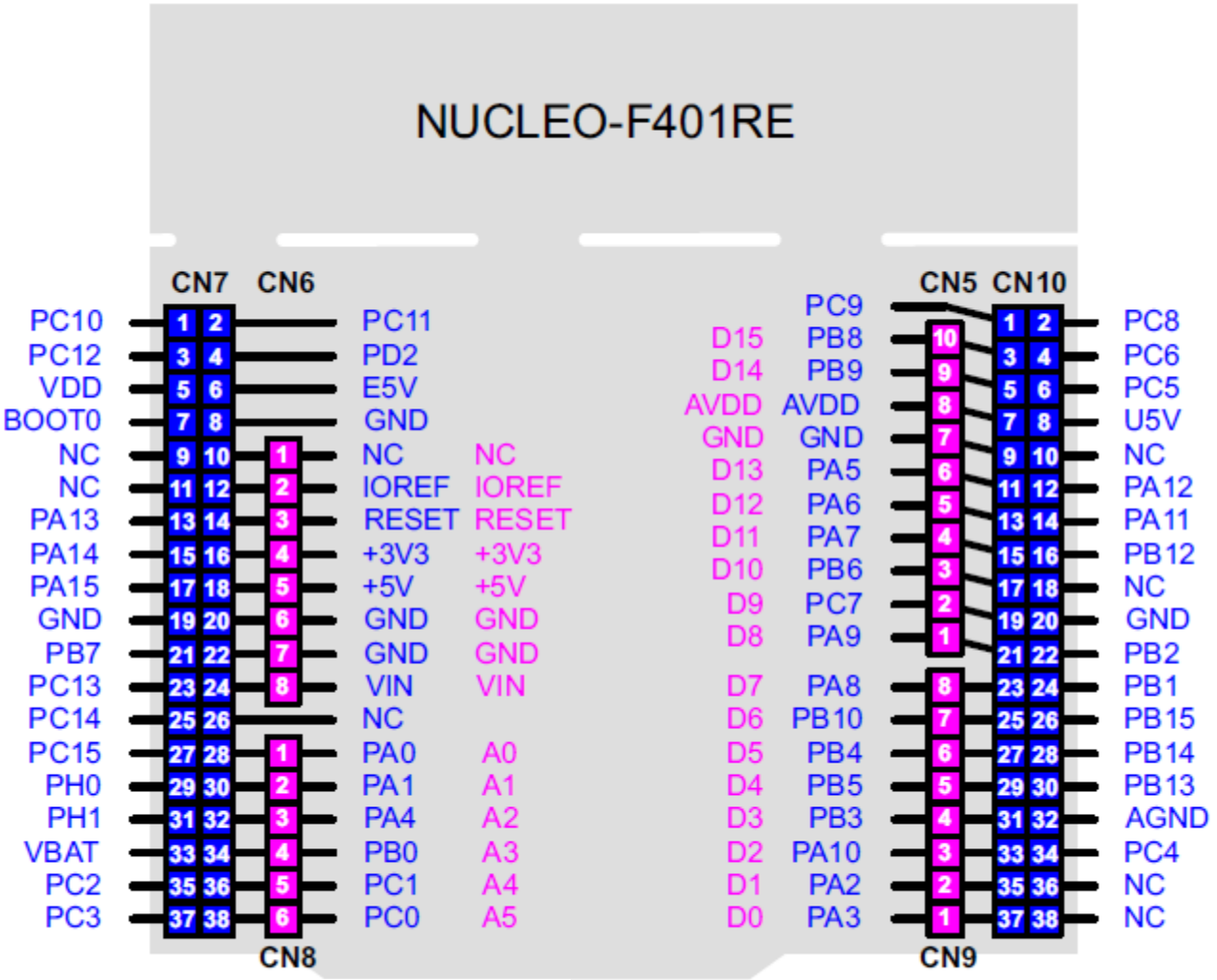
The University of Manchester

Application Shield Pin-Out



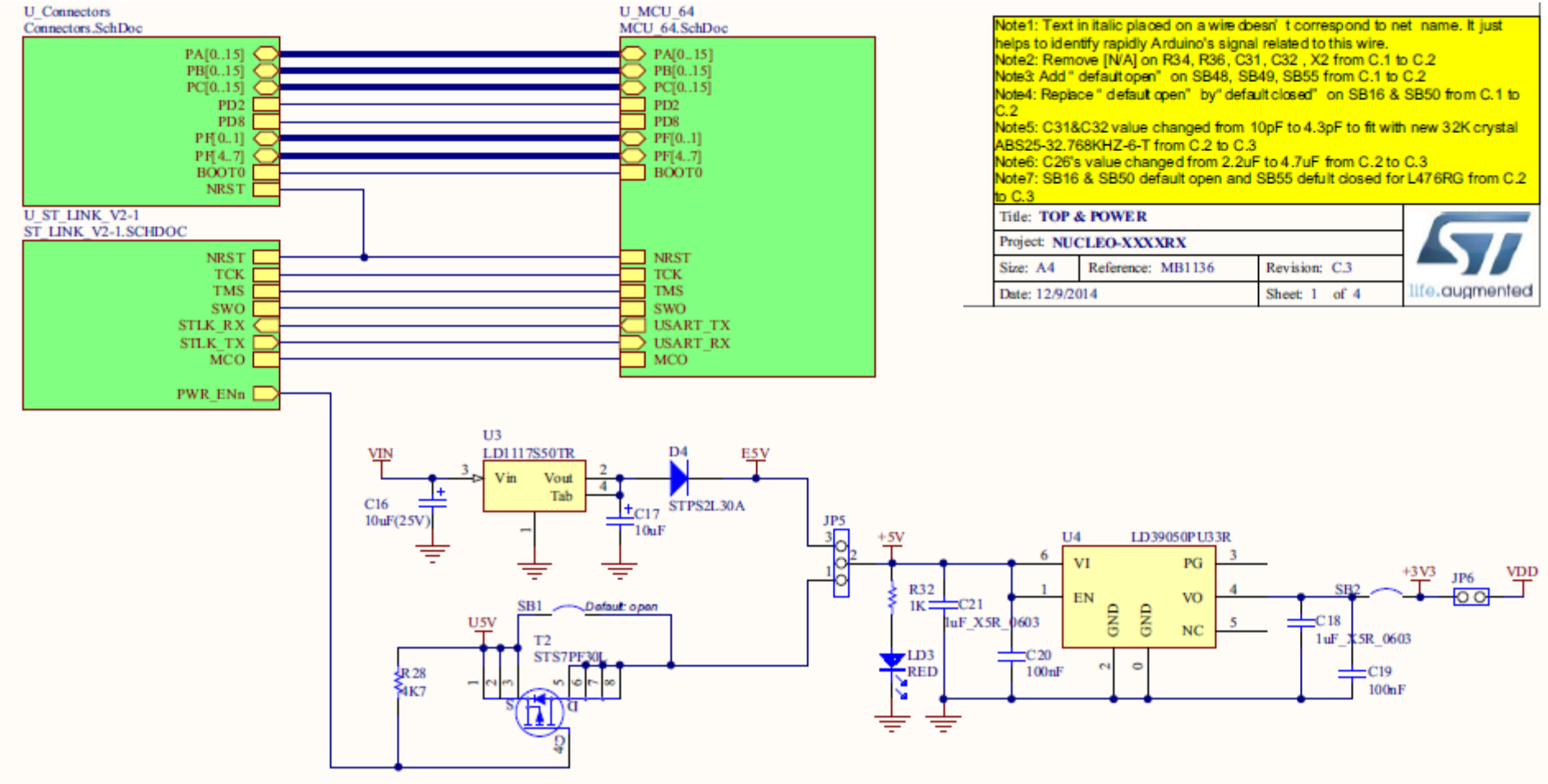


Nucleo Board Headers

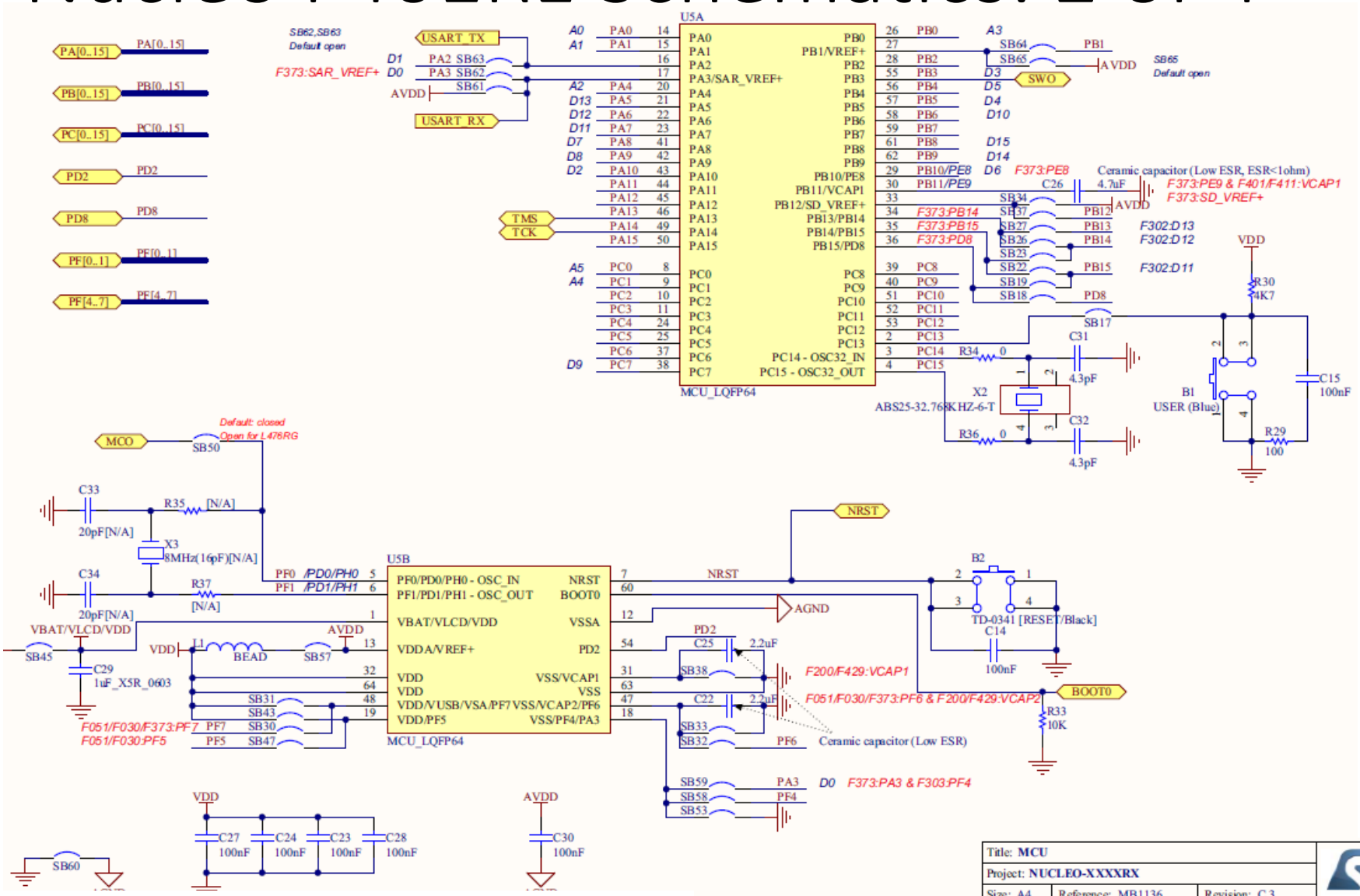


UM1724 User manual STM32 Nucleo boards

Nucleo F401RE Schematics: 1 of 4



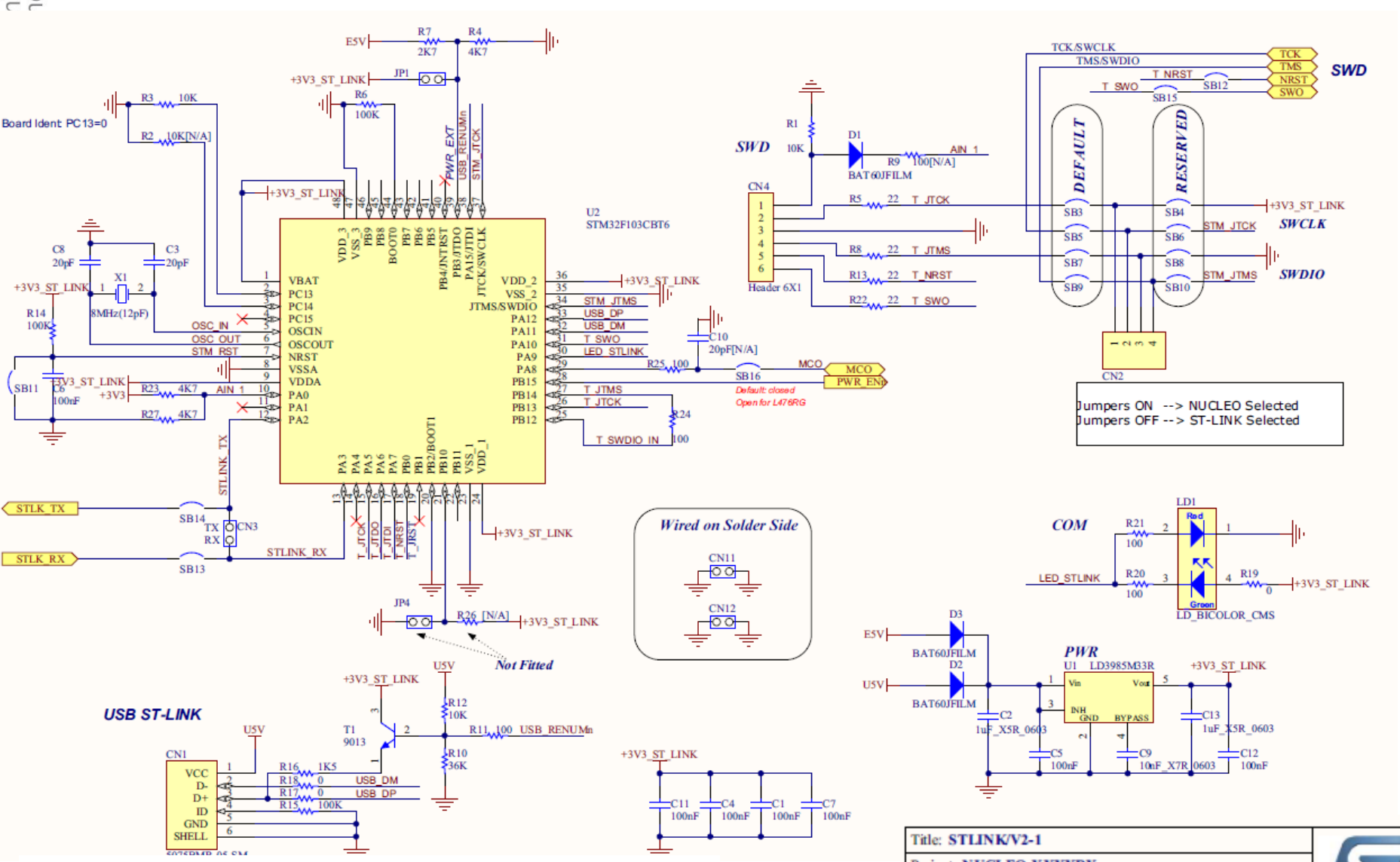
Nucleo F401RE Schematics: 2 of 4



MANCHESTER 1824

niversity nchester

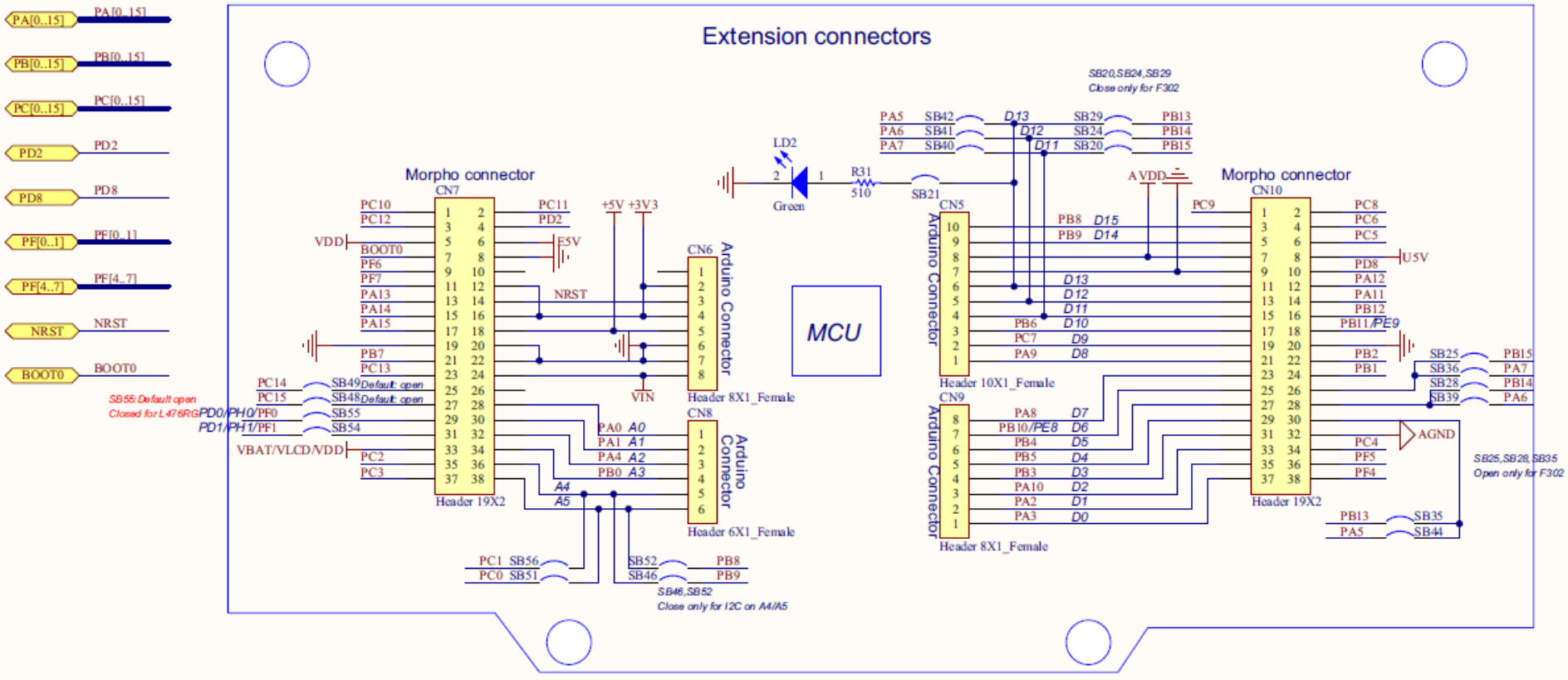
Nucleo F401RE Schematics: 3 of 4



Title: STLINK/V2-1		
Project: NUCLEO-XXXXRX		
Size: A4	Reference: MB1136	Revision: C.3
Date: 12/9/2014		Sheet: 3 of 4

life.augmented

Nucleo F401RE Schematics: 4 of 4

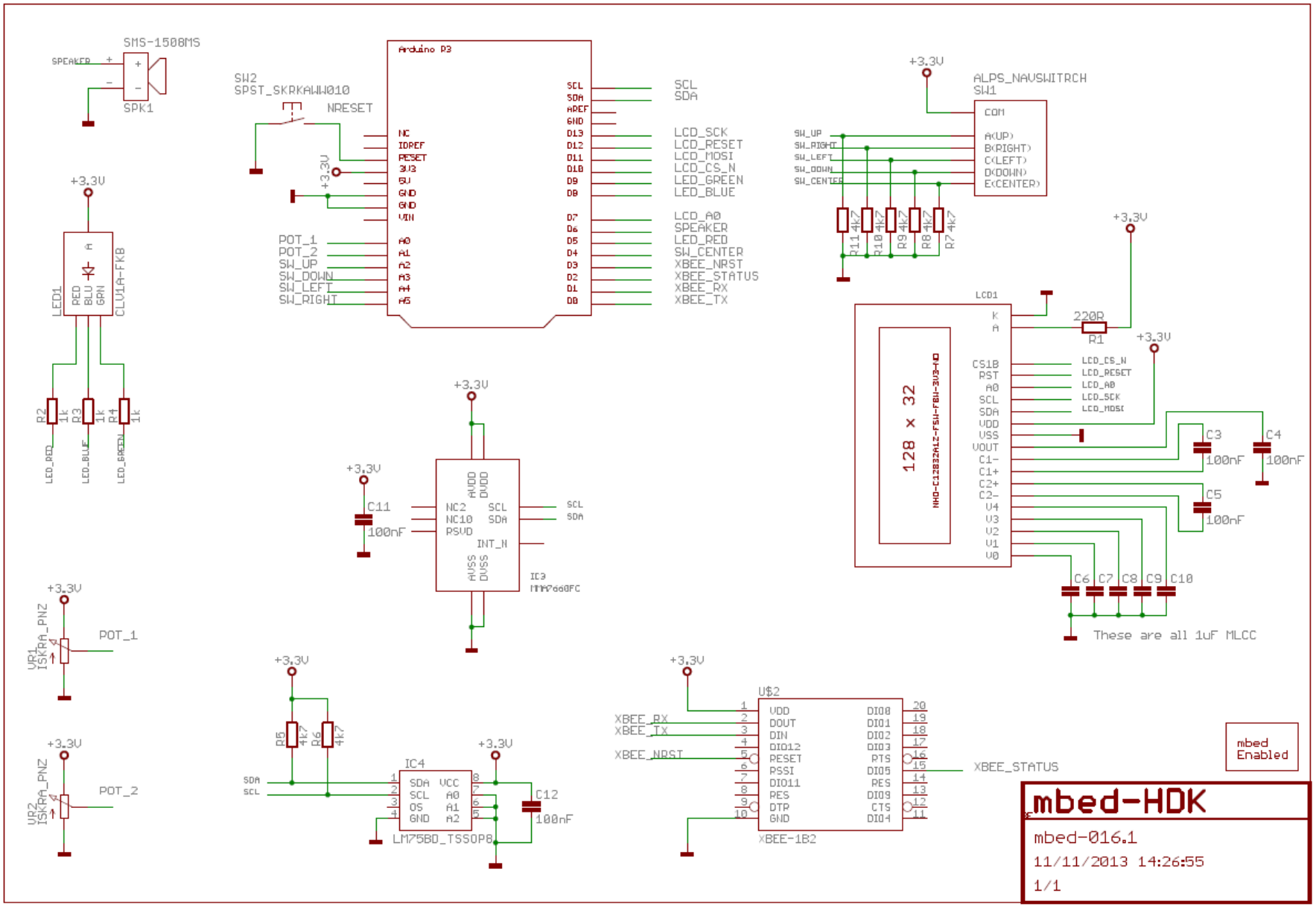


Title: Extension connectors		
Project: NUCLEO-XXXXRX		
Size: A4	Reference: MB1136	Revision: C.3
Date: 12/9/2014	Sheet: 4 of 4	

life.augmented

https://os.mbed.com/components/mbed-Application-Shield/

AS Schematic



Nucleo Board and **mbed**

- mbed is supported by a large number of boards
  - Including F401RE (i.e. YOUR board)
- When , writing **mbed** programs
  - It is necessary to reference features of the board/μC
    - e.g. GPIO pins, USART Rx and Tx pins....
- The next slide shows the naming conventions
  - That can be used in mbed programs
  - The key point is that a pin has multiple names
    - In **mbed** programs you can only use the names defined by colour codes
      - In 'Labels usable in code'
        - » e.g. don't refer to USART1_TX, specify PB_6 in **mbed** programs

Pin Names for F401 Board

Pins Legend

DIFFERENT NAMES FOR THE SAME PIN!

Labels usable in code

- PX_Y — MCU pin without conflict
- PX_Y — MCU pin connected to other components
  See **PeripheralPins.c** (link below) for more information
- XXX — Arduino connector names (A0, D1, ...)
- XXX — LEDs and Buttons (LED_1, USER_BUTTON, ...)

Labels not usable in code (for information only)

- XXX — Serial pins (USART/UART)
- XXX — SPI pins
- XXX — I2C pins
- XXX — PWMOut pins (TIMER n/c[N])
  n = Timer number c = Channel
  N = Inverted channel
- XXX — AnalogIn (ADC) and AnalogOut pins (DAC)
- XXX — CAN pins
- XXX — Power and control pins (3V3, GND, RESET, ...)

You can find more details on the available pins and labels in the following files (link to the latest mbed-dev library version):

- PeripheralPins.c
- PinNames.h

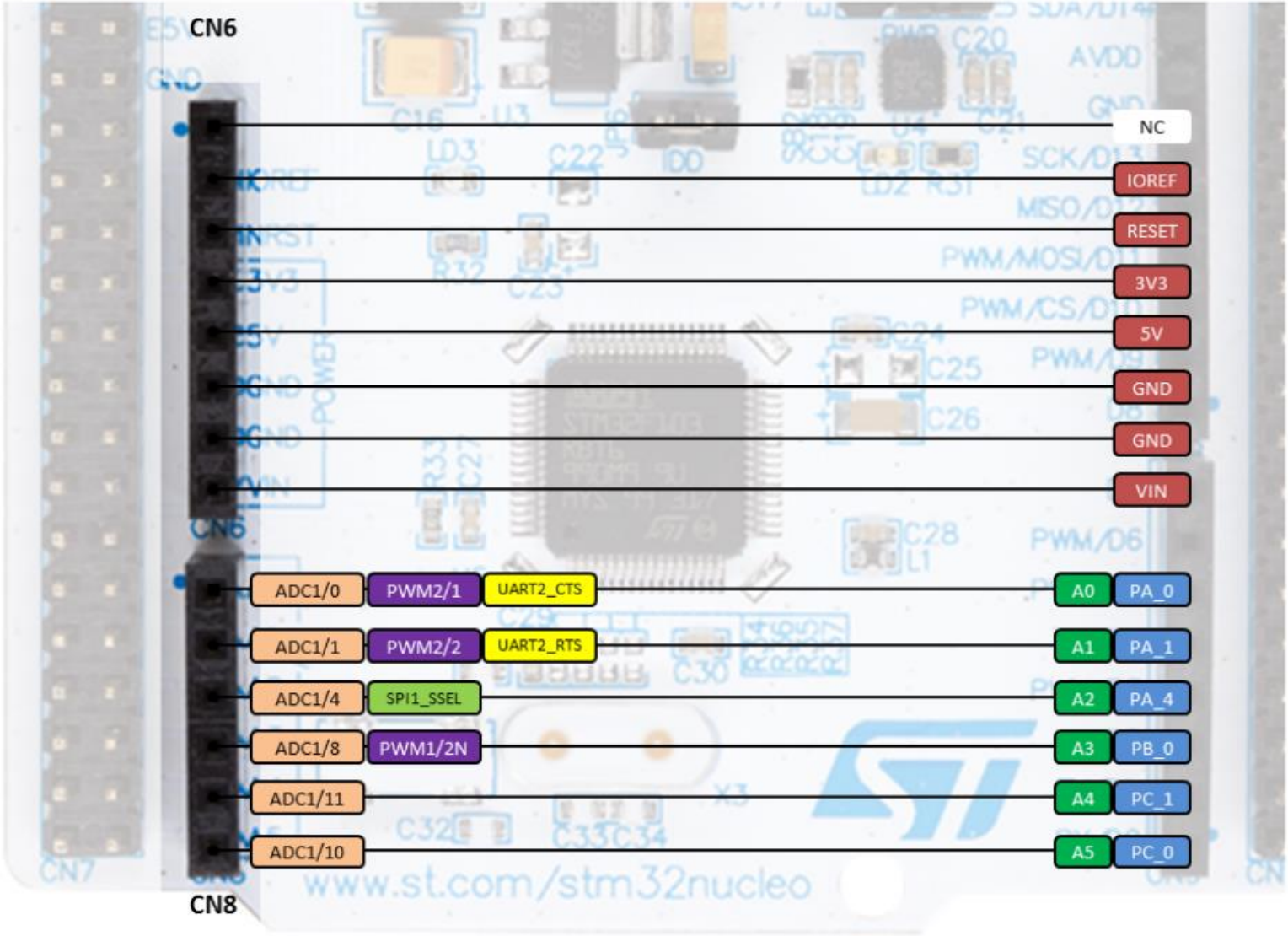
Arduino Left

life.augmented

NUCLEO-F401RE

ARDUINO HEADER

(top left side)



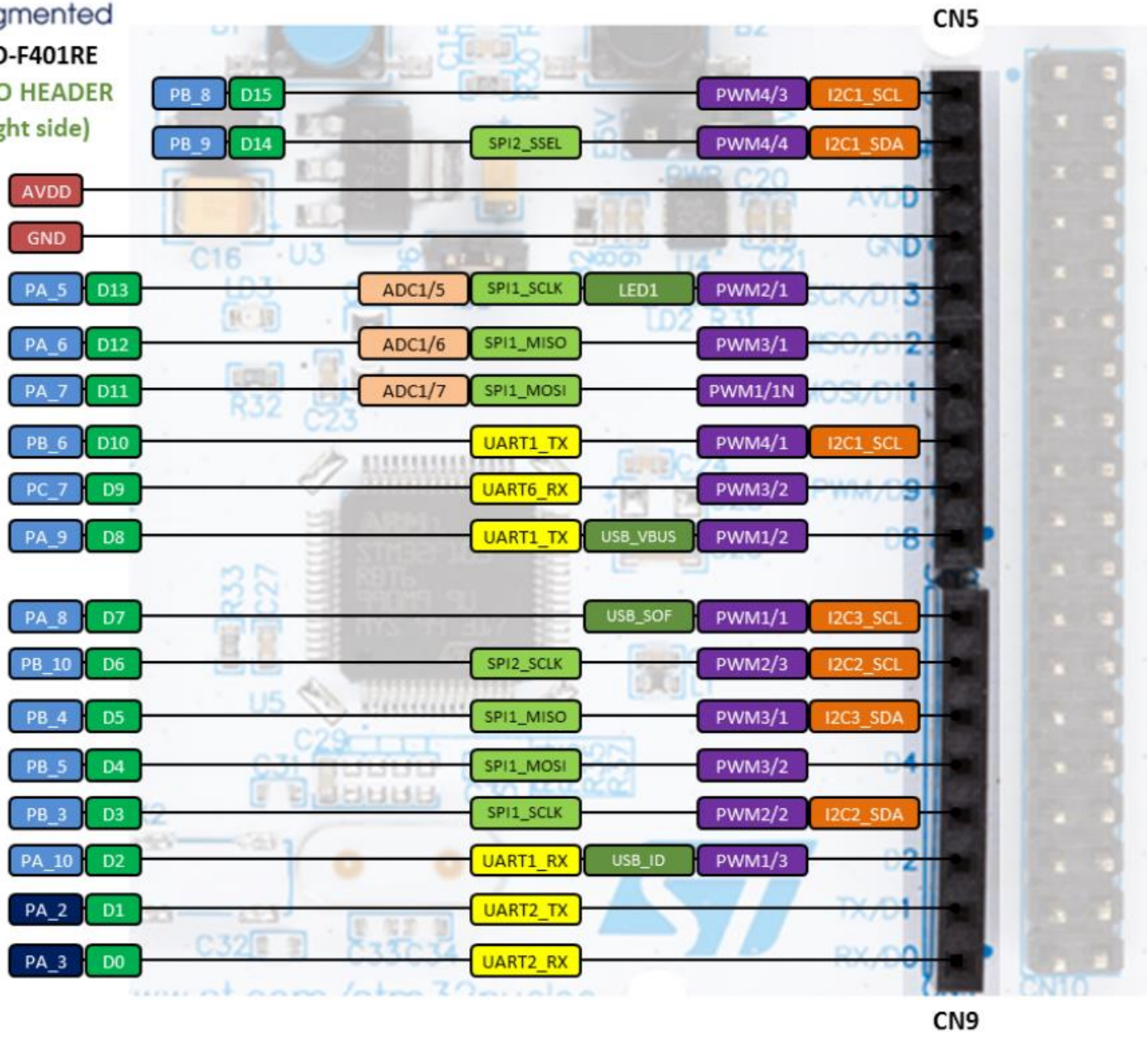
Arduino Right

life.augmented

NUCLEO-F401RE

ARDUINO HEADER

(top right side)

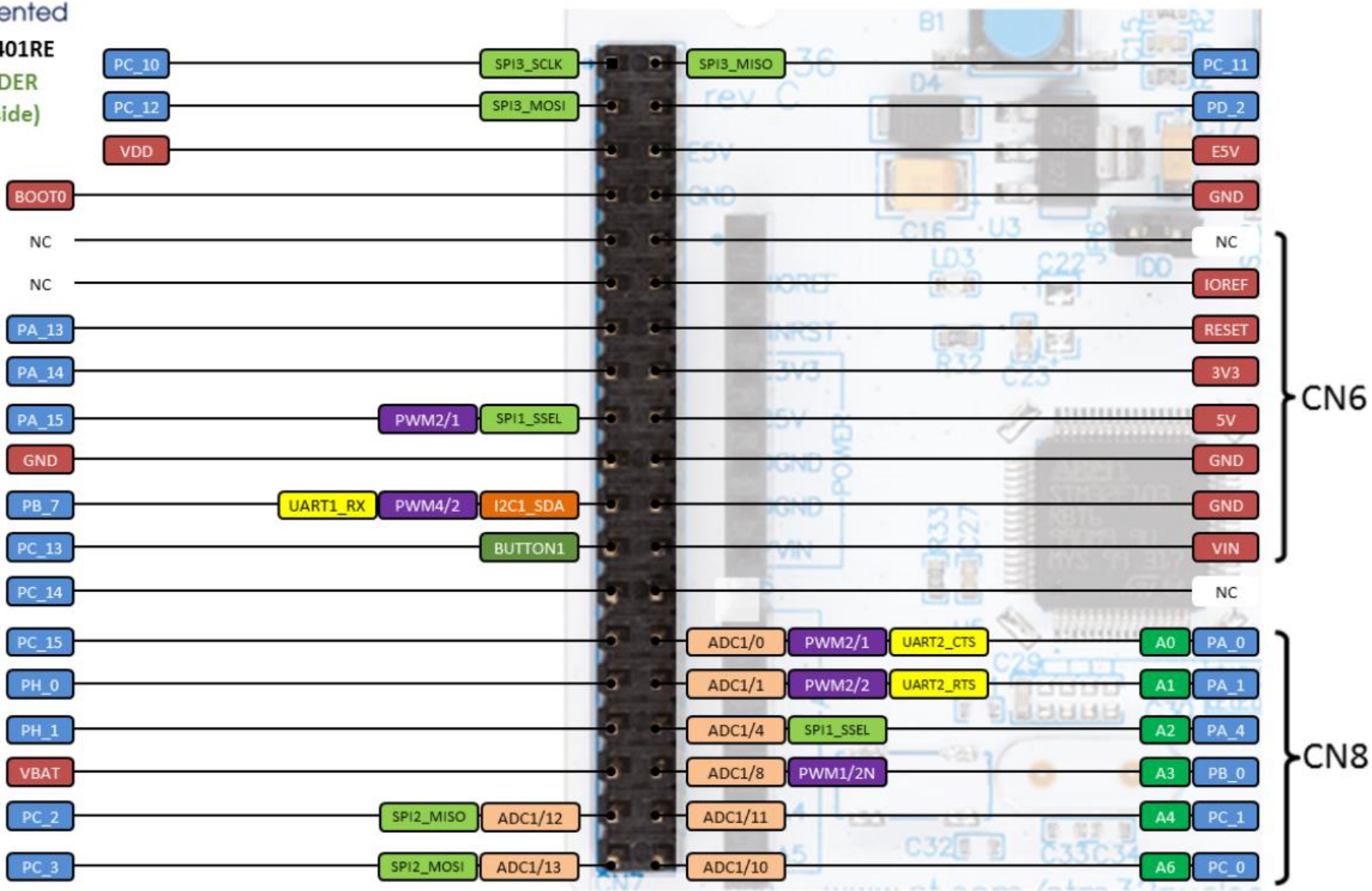


Morpho Left

life.augmented

NUCLEO-F401RE

CN7 HEADER
(top left side)



Morpho Right

life.augmented

NUCLEO-F401RE

CN10 HEADER

(top right side)