



r01lib and r01device

C++ libraries for easy MCU operation

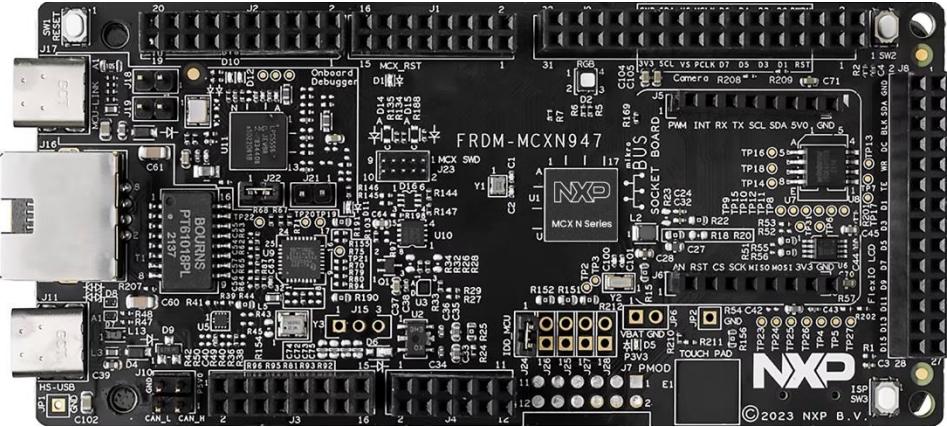
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CAS-Japan
2025-December-28

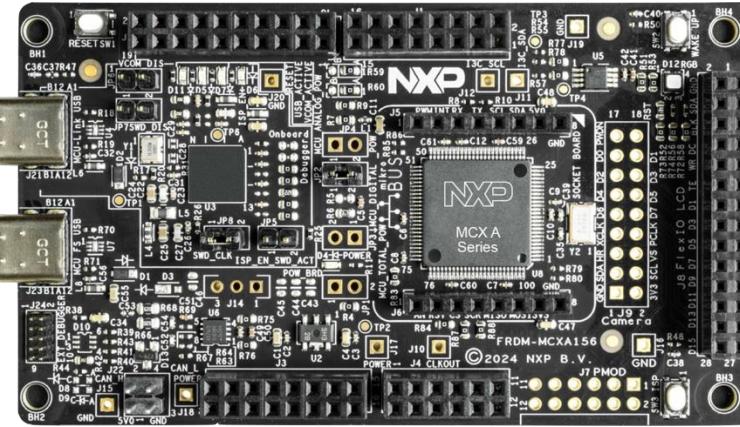
Executive summary

- **Libraries** are available which enables to write **I3C/I2C/SPI applications easy** on **MCX** microcontrollers!
- Same application code works on any supported MCX boards
- '**r01lib**' and '**r01device**' are the libraries provides **simple API** to operate MCU features/peripherals
- The libraries are **suitable** for **writing demo code** and **hands-on** for introducing devices
- Any comment, request, bug-report and pull-request are welcome ☺
→ akifumi.okano@nxp.com

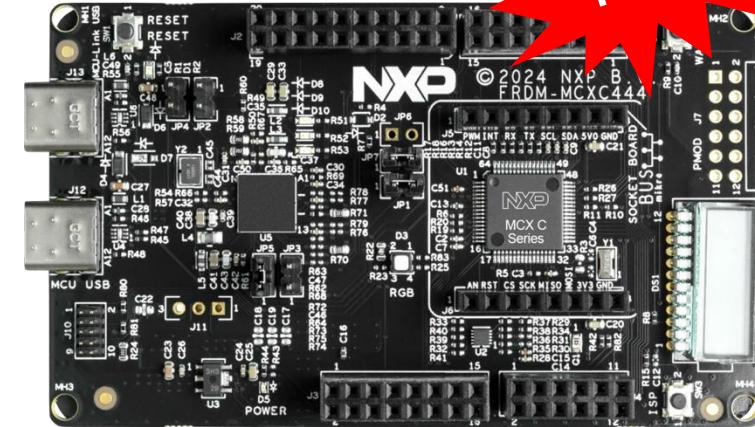
Supported MCU boards



FRDM-MCXN947



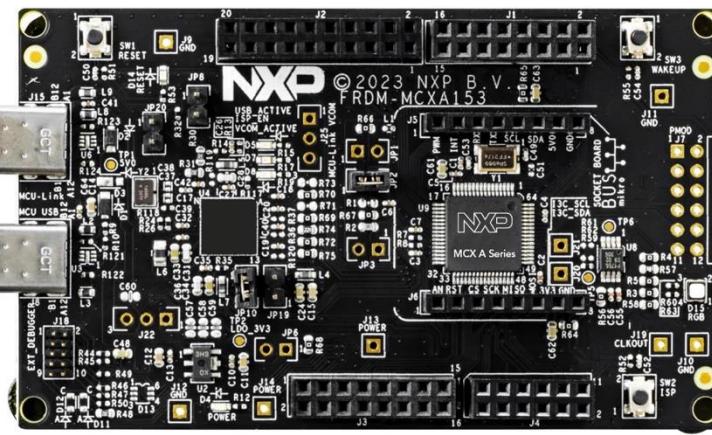
FRDM-MCXA156



FRDM-MCXC444

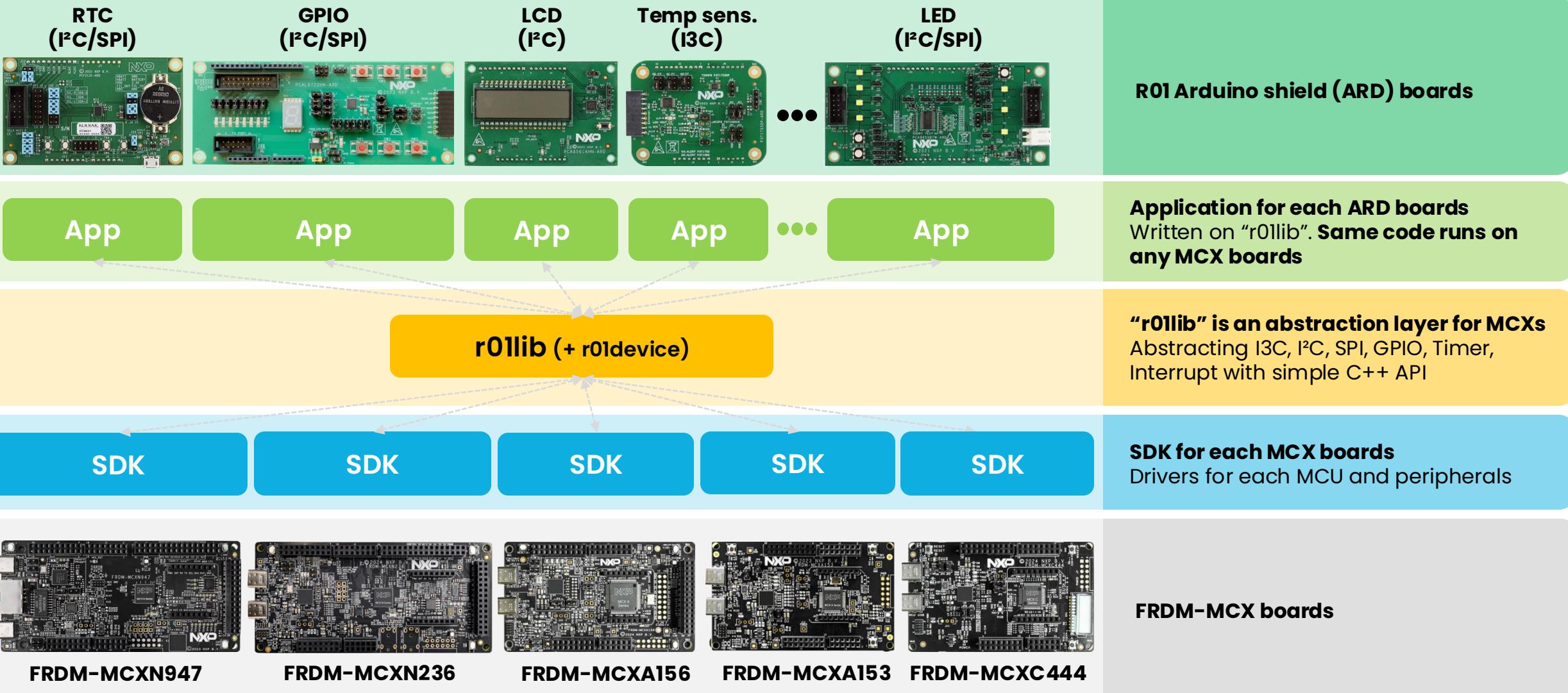


FRDM-MCXN236

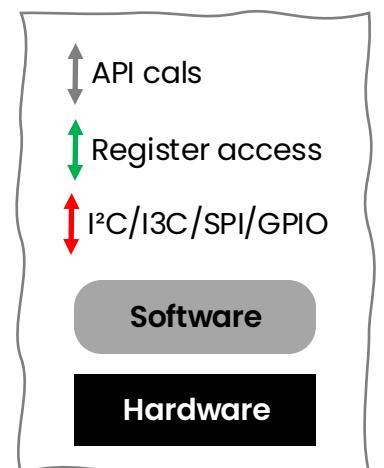
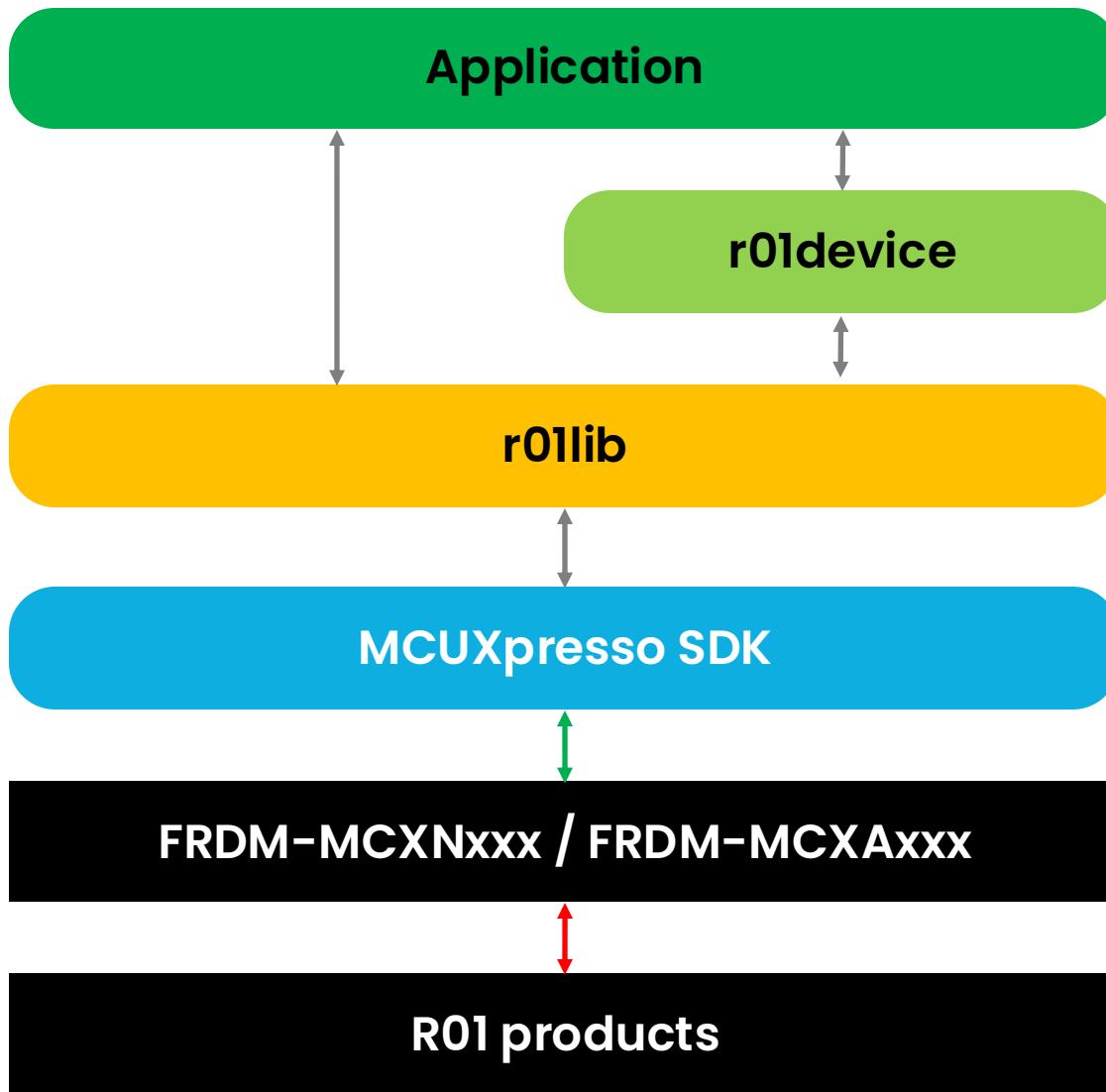


FRDM-MCXA153

For instance...: Evaluation board sample code can run any MCX with r01lib



Hardware/Software structure



How will it be looked like?

- The **r01lib** is delivered as a part of sample code

The **r01lib** is made as library project for each MCU boards

Various sample code projects those will be linked with **r01lib** library

The screenshot shows the MCUXpresso IDE interface. The top bar displays the project name "r01lib_MCUXpresso - z_r01lib_test_Ticker_FRDM_MCXN947/sou". The toolbar below has various icons for file operations, build, and debugging. The left sidebar shows a tree view of projects under "Proj X":

- > c_r01lib_frdm_mcxa153 [r01lib_MCUXpresso]
- > c_r01lib_frdm_mcxa156 [r01lib_MCUXpresso]
- > c_r01lib_frdm_mcxn236 [r01lib_MCUXpresso]
- > c_r01lib_frdm_mcxn947 [r01lib_MCUXpresso]

A red box highlights these four entries. To the right, a blue box highlights a list of sample code projects:

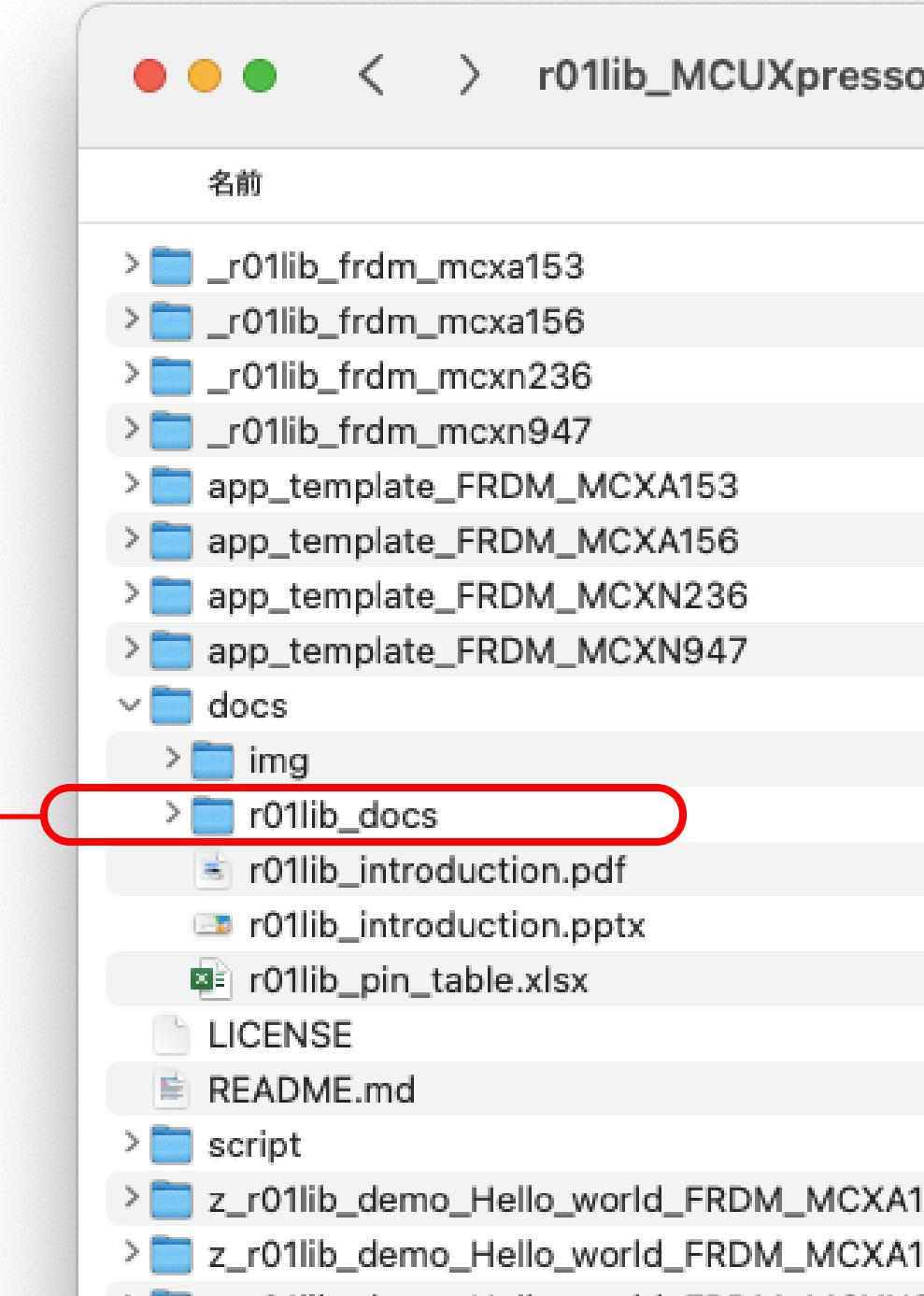
- > app_template_FRDM_MCXA153 [r01lib_MCU]
- > app_template_FRDM_MCXA156 [r01lib_MCU]
- > app_template_FRDM_MCXN236 [r01lib_MCU]
- > app_template_FRDM_MCXN947 [r01lib_MCU]
- > z_r01lib_demo_Hello_world_FRDM_MCXA153
- > z_r01lib_demo_Hello_world_FRDM_MCXA156
- > z_r01lib_demo_Hello_world_FRDM_MCXN236
- > z_r01lib_demo_Hello_world_FRDM_MCXN947
- > z_r01lib_demo_LED_blink_FRDM_MCXA153
- > z_r01lib_demo_LED_blink_FRDM_MCXA156
- > z_r01lib_demo_LED_blink_FRDM_MCXN236
- > z_r01lib_demo_LED_blink_FRDM_MCXN947
- > z_r01lib_test_BusOut_RGB_FRDM_MCXA153
- > z_r01lib_test_BusOut_RGB_FRDM_MCXA156
- > z_r01lib_test_BusOut_RGB_FRDM_MCXN236

The main editor window on the right contains the "main.cpp" file:

```
1 //** test code for r01lib
2 *
3 * @author Tedd OKANO
4 *
5 * Released under the MIT license
6 */
7 #include "r01lib.h"
8
9 Ticker t;
10 DigitalOut led( GREEN );
11
12 void callback( void )
13 {
14     led = !led;
15 }
16
17
18 int main( void )
19 {
20     PRINTF( "Check LED is blinking" );
21     t.attach( callback, 0.1 );
22
23     while ( true )
24     ;
25 }
```

API documents are available

The screenshot shows a browser window displaying the API documentation for r01lib 0.x. The title bar says "r01lib 0.x". The main content area is titled "I3C Class Reference". It includes a search bar, a navigation bar with "Main Page", "Related Pages", "Namespaces", "Classes", "Files", and a "Search" button. Below the navigation is a breadcrumb trail: "Public Types I Public Member Functions I Static Public Member Functions I Private Member Functions I Private Attributes I Static Private Attributes I List of all members". The "I3C Class Reference" section contains code snippets for including the header file and defining inheritance. It also lists public types, member functions, and inheritance details.



00

r01lib

MCU abstraction layer



Library for abstracting MCU on MCUXpresso

Simple interface to write sample code

- **r0llib** = A driver collection for MCU's bus/pin operations
- Problem so far
 - The **MCUXpresso SDK drivers** are available in **low level**. It is good to software engineer who needs to derive maximum MCU performance but not easy to use for everyone
 - Assigning MCU pin requires **low level port and clock settings or use of "Config Tool"**
 - MCX doesn't have user friendly development environment like other MCUs yet. For instance, "Mbed" and "Arduino" are not adopted for MCX those are popular SDKs providing simple API with abstracting MCUs.
- What has been done
 - Made a small set of library which controls **I3C, I2C, SPI, GPIO, pin-interrupt** and **timer**
 - The user-interface is made like Mbed SDK: Features and pins can be operated with high level simple interface
 - **wait()** function to control timing
 - The library can be bundled with demo code as a MCUXpresso project
 - The library is ported to FRDM-MCXN947, FRDM-MCXN236, FRDM-MCXA156 and FRDM-MCXA153. The library make possible to run same code on both evaluation boards

Available APIs

- DigitalInOut / DigitalIn / DigitalOut class
- BusInOut / BusIn / BusOut classes
- InterruptIn class
- Ticker class (FRDM-MCXC444 doesn't support this)
- I2C class
- I3C class (FRDM-MCXC444 doesn't support this)
- SPI class
- Wait function

01

r01lib operation sample

Simple API



Sample 0 : DigitalOut

LED blink

```
#include "r01lib.h"

DigitalOut led( GREEN );

int main(void)
{
    while ( 1 )
    {
        led = !led;
        wait( 0.5 );
    }
}
```

- GPIO can be controlled by simple interface
- No need to care about GPIO registers
- Pin names are defined in “component/r01lib/io.h”
- **Wait()** takes float number (seconds). Down to microsecond resolution

Sample 2 : DigitalOut

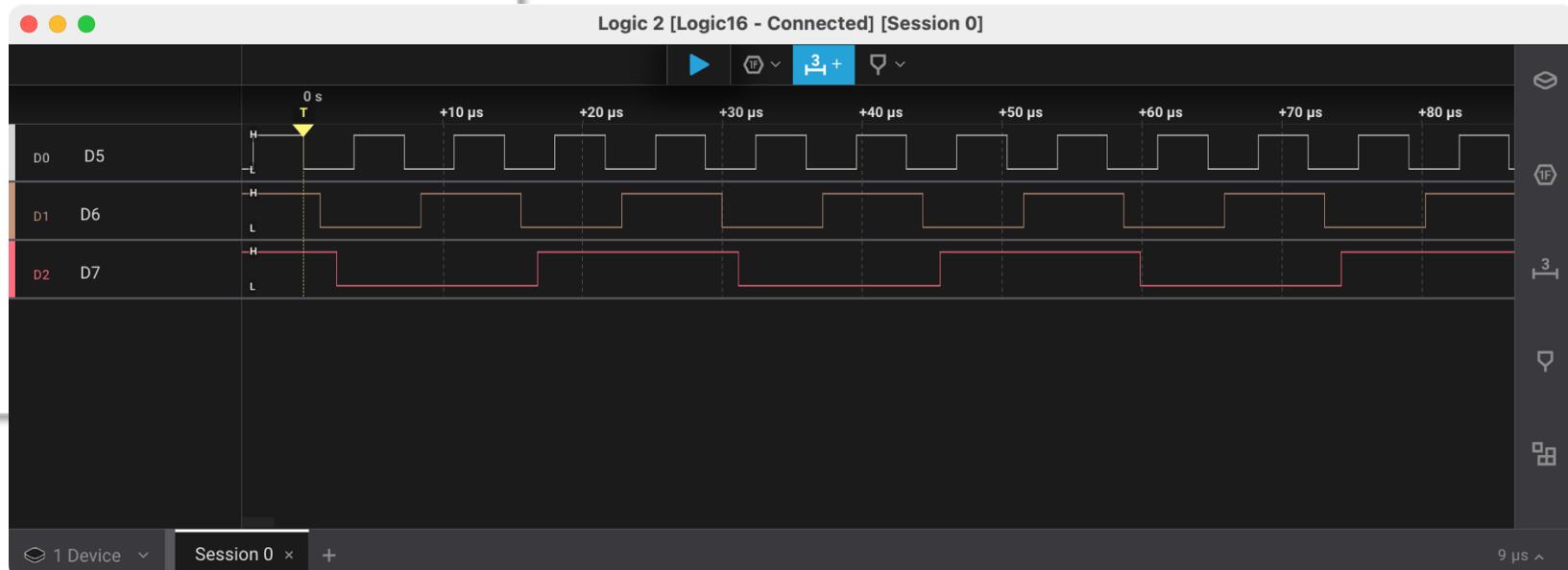
Flips GPIO pins

```
#include "r01lib.h"

DigitalOut d5( D5 );
DigitalOut d6( D6 );
DigitalOut d7( D7 );

int main(void)
{
    int count = 0;
    while ( 1 )
    {
        d5 = (count >> 0) & 0x01;
        d6 = (count >> 1) & 0x01;
        d7 = (count >> 2) & 0x01;
        count++;
    }
}
```

- It can handle multiple GPIOs
- Input can be done by **DigitalIn** and **DigitalInOut** classes



Sample 3 : I2C

Low level P3T1755 access

```
#include "r01lib.h"

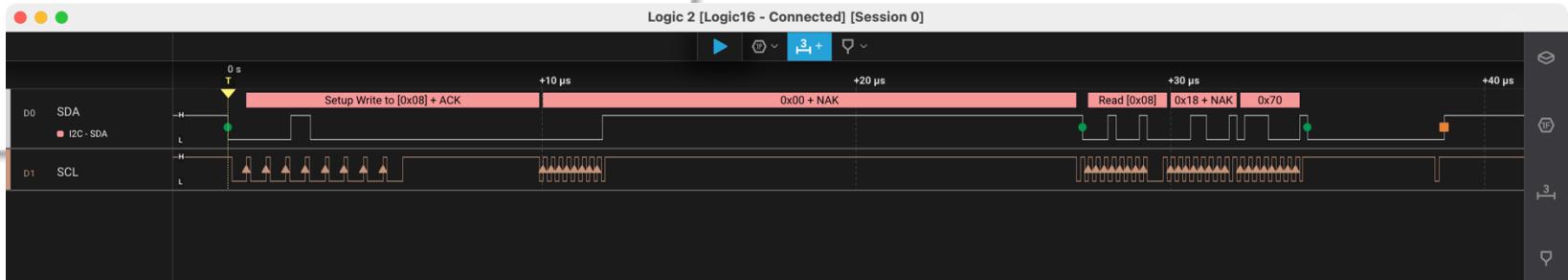
I2C i2c( I2C_SDA, I2C_SCL );

int main( void )
{
    constexpr uint8_t address = 0x4C;
    uint8_t w_data[] = { 0 };
    uint8_t r_data[ 2 ];

    while ( true )
    {
        i2c.write( address, w_data, sizeof( w_data ), I2C::NO_STOP );
        i2c.read( address, r_data, sizeof( r_data ) );

        printf( "0x %02X %02X\r\n", r_data[ 0 ], r_data[ 1 ] );
        wait( 1 );
    }
}
```

- I2C class provides a simple interface to perform transfer

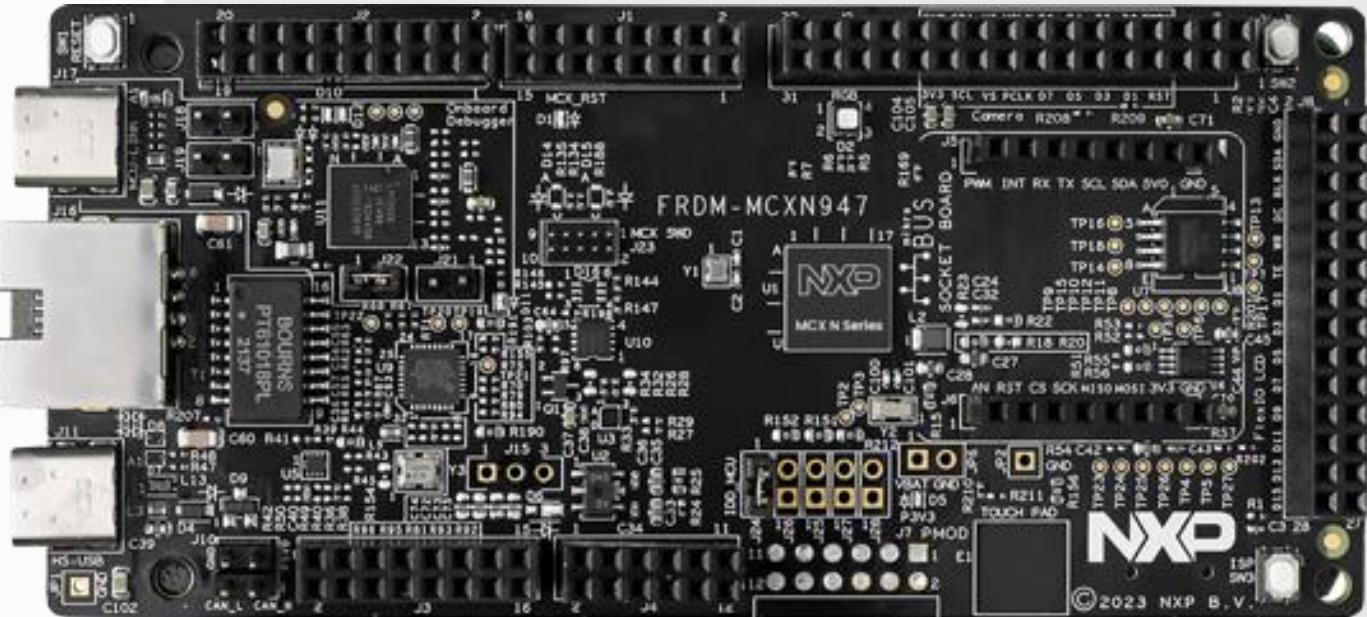


Available pins

FRDM-MCXN947
FRDM-MCXN236
FRDM-MCXA156
FRDM-MCXA153
FRDM-MCXC444

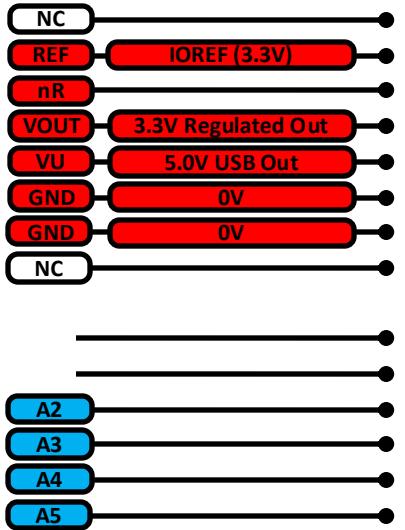
Pins

FRDM-MCXN947



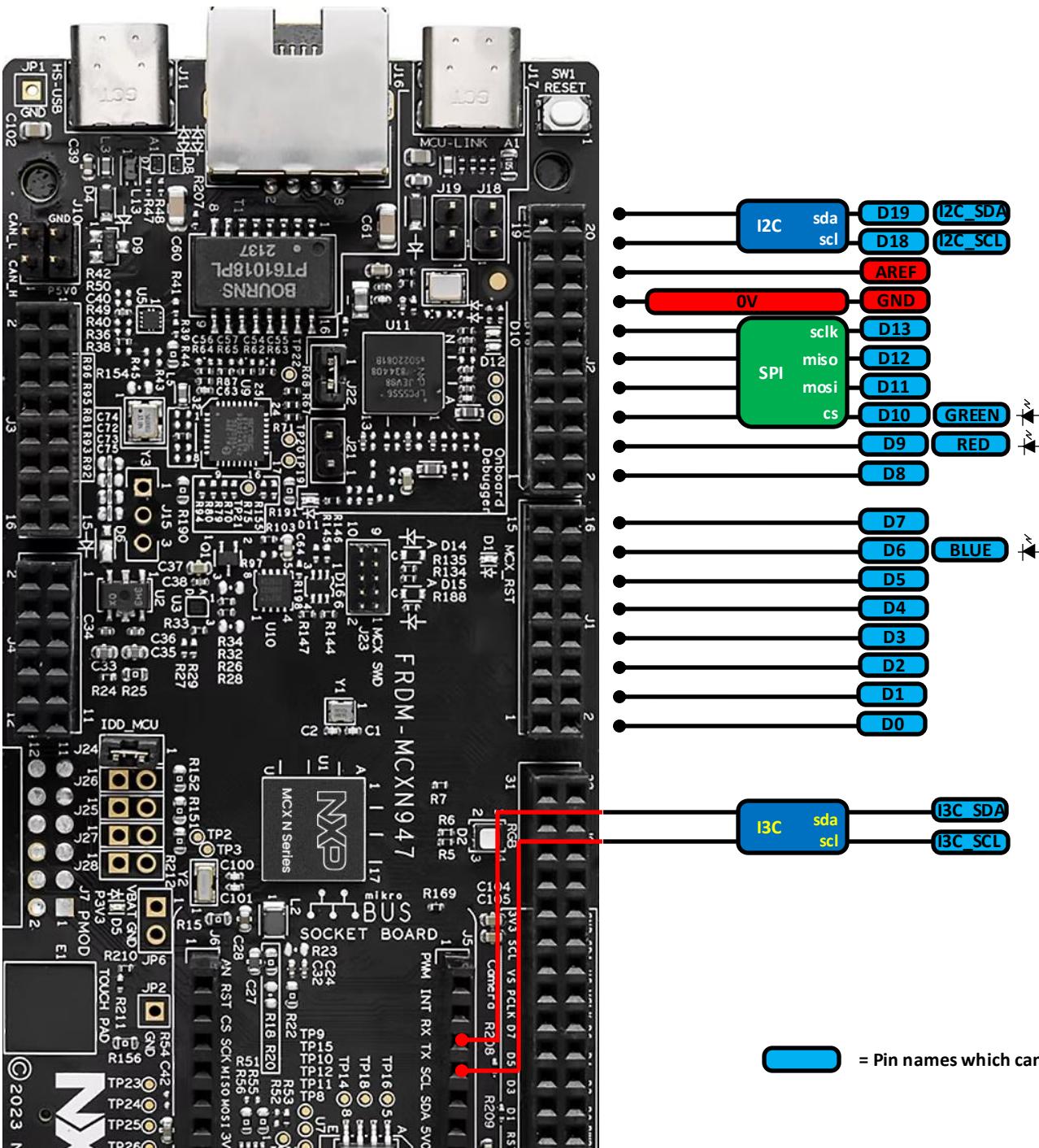
FRDM-MCXN947

Arduino socket



* Note: A5 pin is tied to 10kΩ pull-up and 100nF capacitor to GND on board

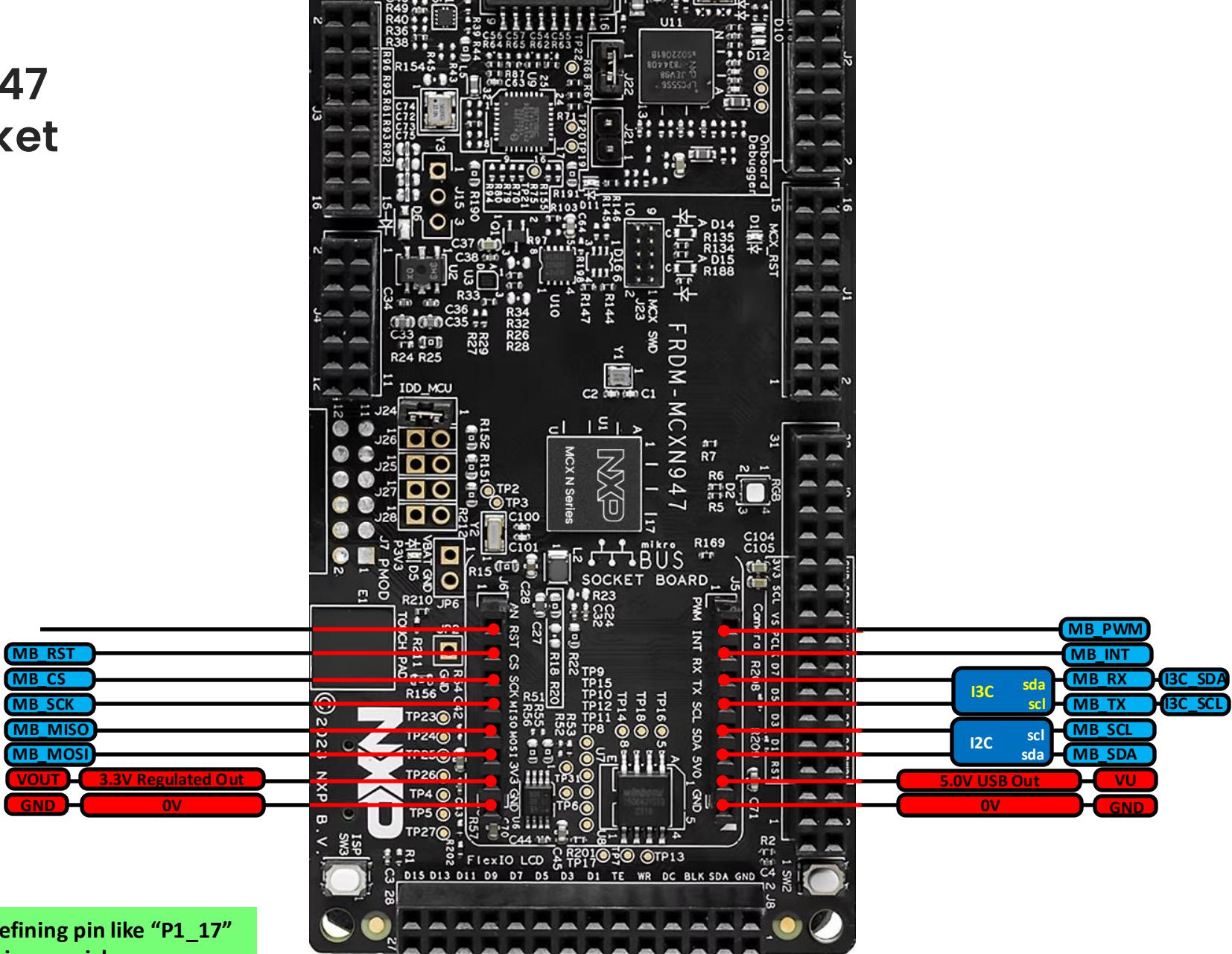
All pin sockets can be used by defining pin like "P1_17"
This page shows pin sockets having special name



= Pin names which can be used in the code

FRDM-MCXN947

mikroBUS socket



= Pin names which can be used in the code

Available pins

N947

r01lib pin names				pin definition					class			
pin name	other pin name (1)	other pin name (2)	other pin name (3)	Digital&Bus	InOut	InterruptIn	I2C	I3C	SPI			
D0			P4_3		✓	✓						
D1			P4_2		✓	✓						
D2			P0_29		✓	✓						
D3			P1_23		✓	✓						
D4			P0_30		✓	✓						
D5			P1_21		✓	✓						
D6	BLUE		P1_2		✓	✓						
D7			P0_31		✓	✓						
D8			P0_28		✓	✓						
D9	RED		P0_10		✓	✓						
D10	GREEN	SPI_CS	P0_27		✓	✓						
D11		SPI_MOSI	P0_24		✓	✓						✓
D12		SPI_MISO	P0_26		✓	✓						
D13		SPI_SCLK	P0_25		✓	✓						
D18		I2C_SDA	P4_0		✓	✓						✓
D19		I2C_SCL	P4_1		✓	✓						
A0												
A1												
A2			P0_14		✓	✓						
A3			P0_22		✓	✓						
A4			P0_15		✓	✓						
A5	SW2		P0_23		✓	✓						
MB_AN												
MB_RST			P1_3		✓	✓						
MB_CS			P3_23		✓	✓						
MB_SCK			P3_21		✓	✓						
MB_MISO			P3_22		✓	✓						
MB_MOSI			P3_20		✓	✓						
MB_PWM			P3_19		✓	✓						
MB_INT			P5_7		✓	✓						
MB_RX		I3C_SDA	P1_16		✓	✓						✓
MB_TX		I3C_SCL	P1_17		✓	✓						
MB_SCL			P1_1		✓	✓						
MB_SDA			P1_0		✓	✓						
	SW3		P0_6		✓	✓						

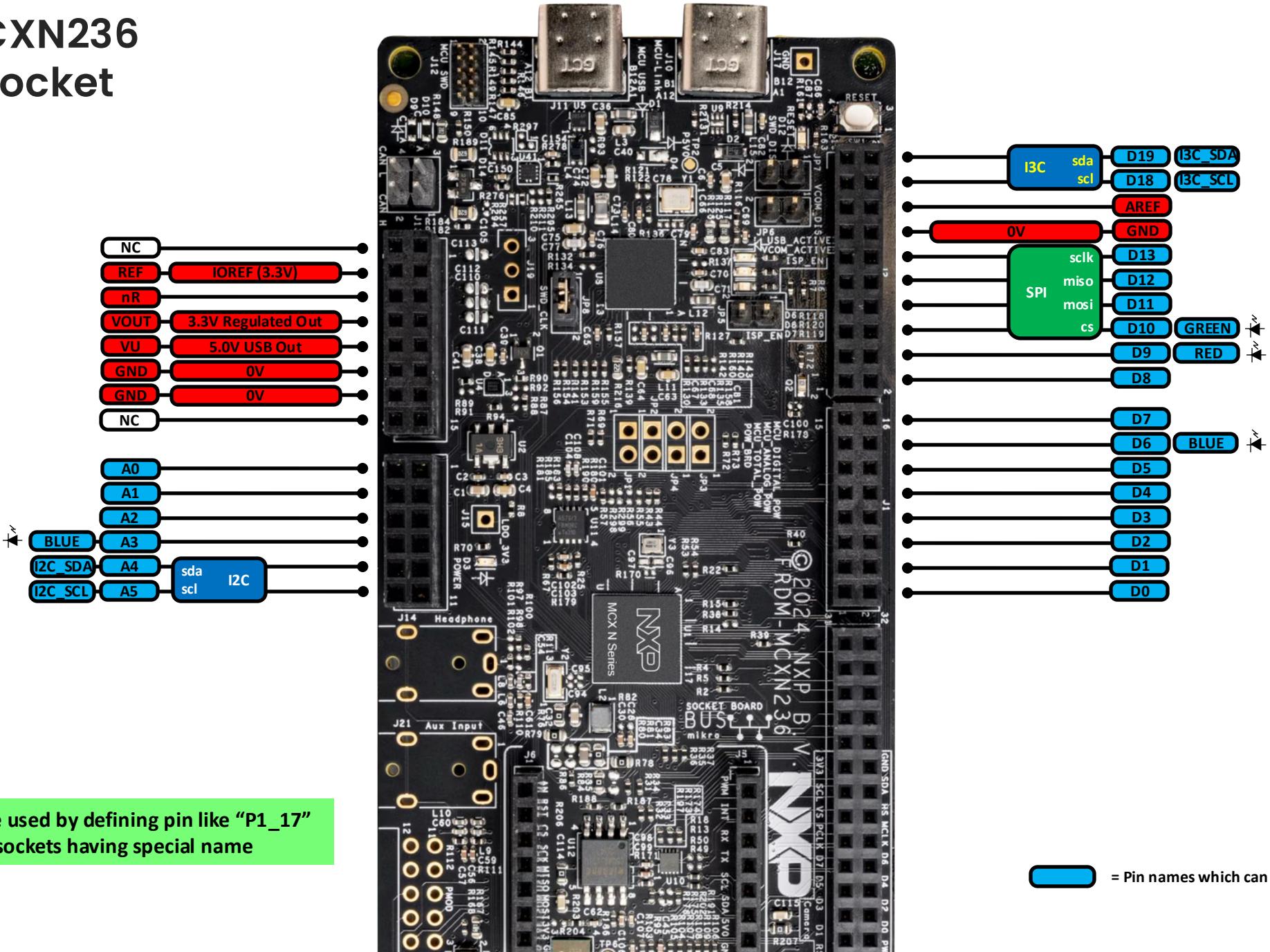
Pins

FRDM-MCXN236

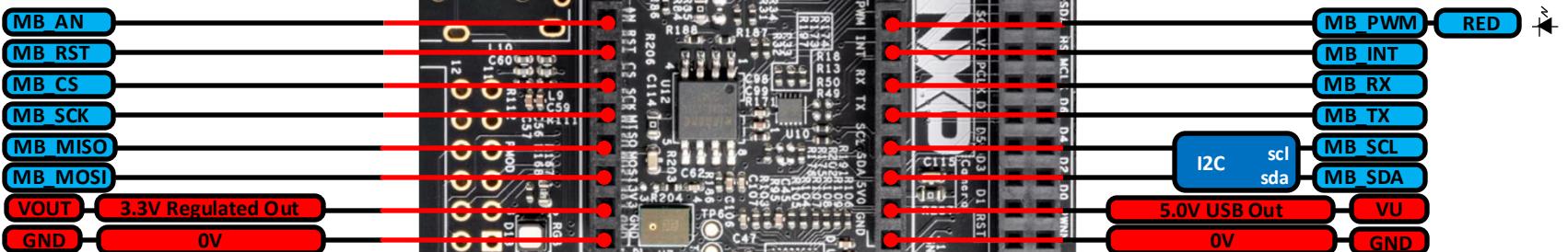


FRDM-MCXN236

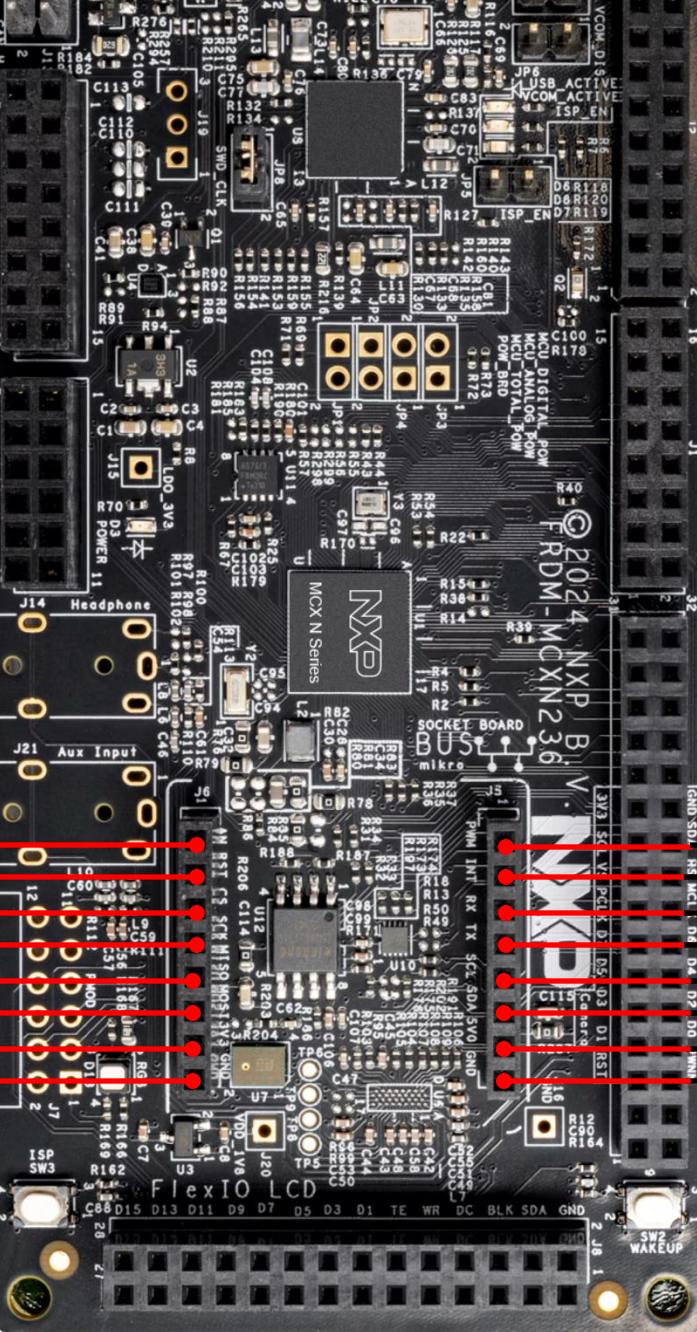
Arduino socket



FRDM-MCXN236 mikroBUS socket



All pin sockets can be used by defining pin like "P1_17"
This page shows pin sockets having special name



= Pin names which can be used in the code

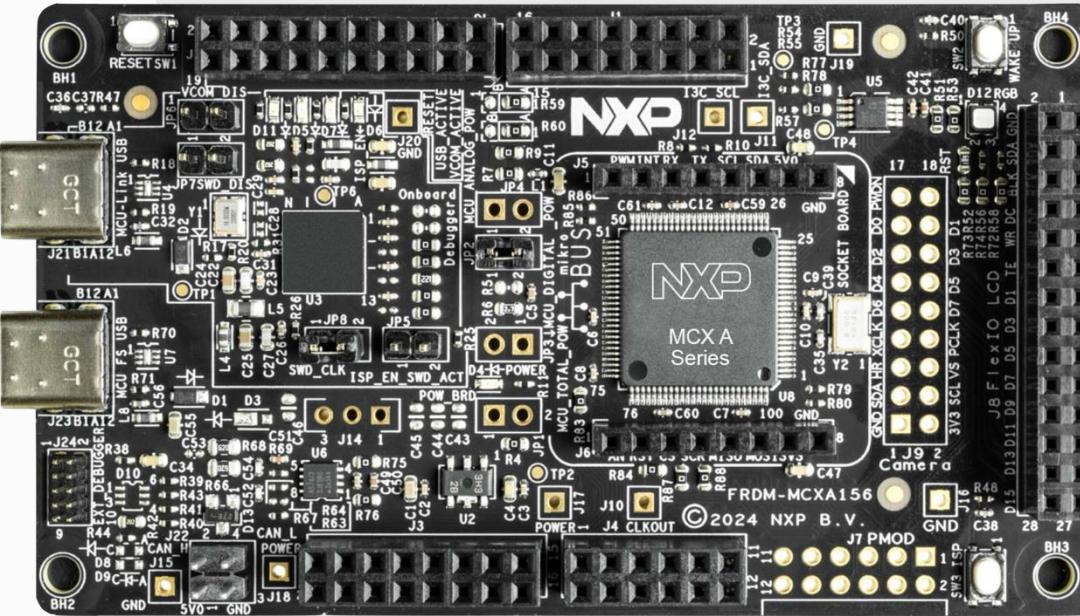
Available pins

N236

r01lib pin names				pin definition					class			
pin name	other pin name (1)	other pin name (2)	other pin name (3)	Digital&Bus	InOut	Interruptin	I2C	I3C	SPI			
D0	MB_RX		P4_3	✓		✓						
D1	MB_TX		P4_2	✓		✓						
D2			P2_0	✓		✓						
D3			P3_12	✓		✓						
D4			P0_21	✓		✓						
D5			P2_7	✓		✓						
D6			P3_17	✓		✓						
D7			P0_22	✓		✓						
D8			P0_23	✓		✓						
D9			P3_14	✓		✓						
D10	SPI_CS		P1_3	✓		✓						
D11	SPI_MOSI		P1_0	✓		✓						
D12	SPI_MISO		P1_2	✓		✓						
D13	SPI_SCLK		P1_1	✓		✓						✓
D18	MB_CS	I3C_SDA	P1_16	✓		✓						
D19		I3C_SCL	P1_17	✓		✓						
A0			P4_6	✓		✓						
A1			P4_15	✓		✓						
A2			P4_16	✓		✓						
A3	BLUE		P4_17	✓		✓						
A4		I2C_SDA	P4_12	✓		✓						
A5		I2C_SCL	P4_13	✓		✓						
MB_AN			P5_3	✓		✓						
MB_RST			P5_2	✓		✓						
MB_CS	D18		P1_16	✓		✓						
MB_SCK			P1_1	✓		✓						
MB_MISO			P1_2	✓		✓						
MB莫斯I			P1_0	✓		✓						
MB_PWM	RED		P4_18	✓		✓						
MB_INT			P5_6	✓		✓						
MB_RX	D0		P4_3	✓		✓						
MB_TX	D1		P4_2	✓		✓						
MB_SCL			P4_1	✓		✓						
MB_SDA			P4_0	✓		✓						
	GREEN		P4_19	✓		✓						
	SW2		P0_20	✓		✓						
	SW3		P0_6	✓		✓						

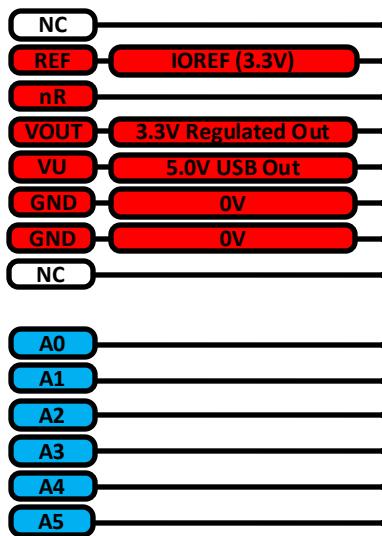
Pins

FRDM-MCXA156

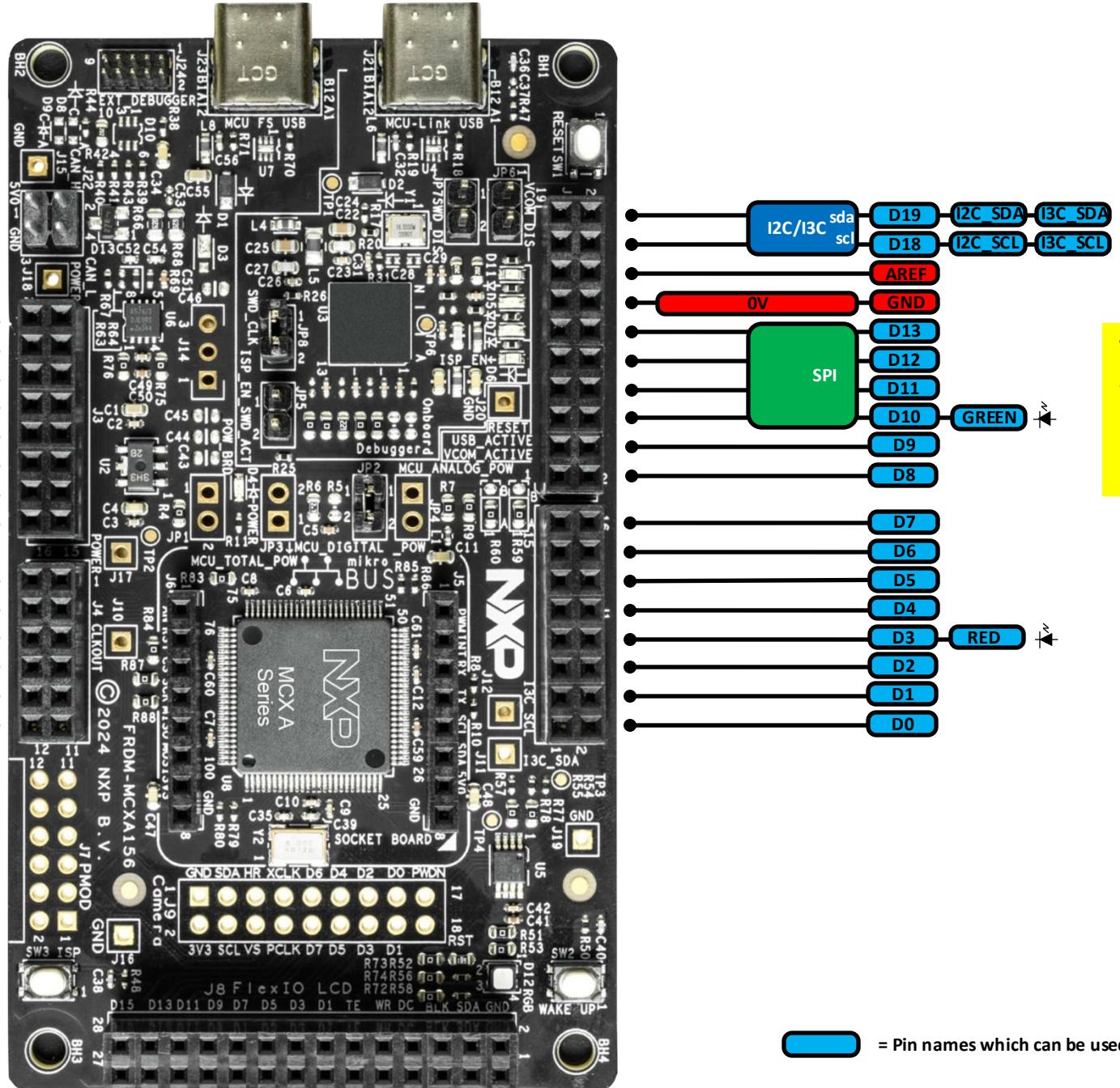


FRDM-MCXA156

Arduino socket



To use I²C on A4/A5,
remove R75 and R76



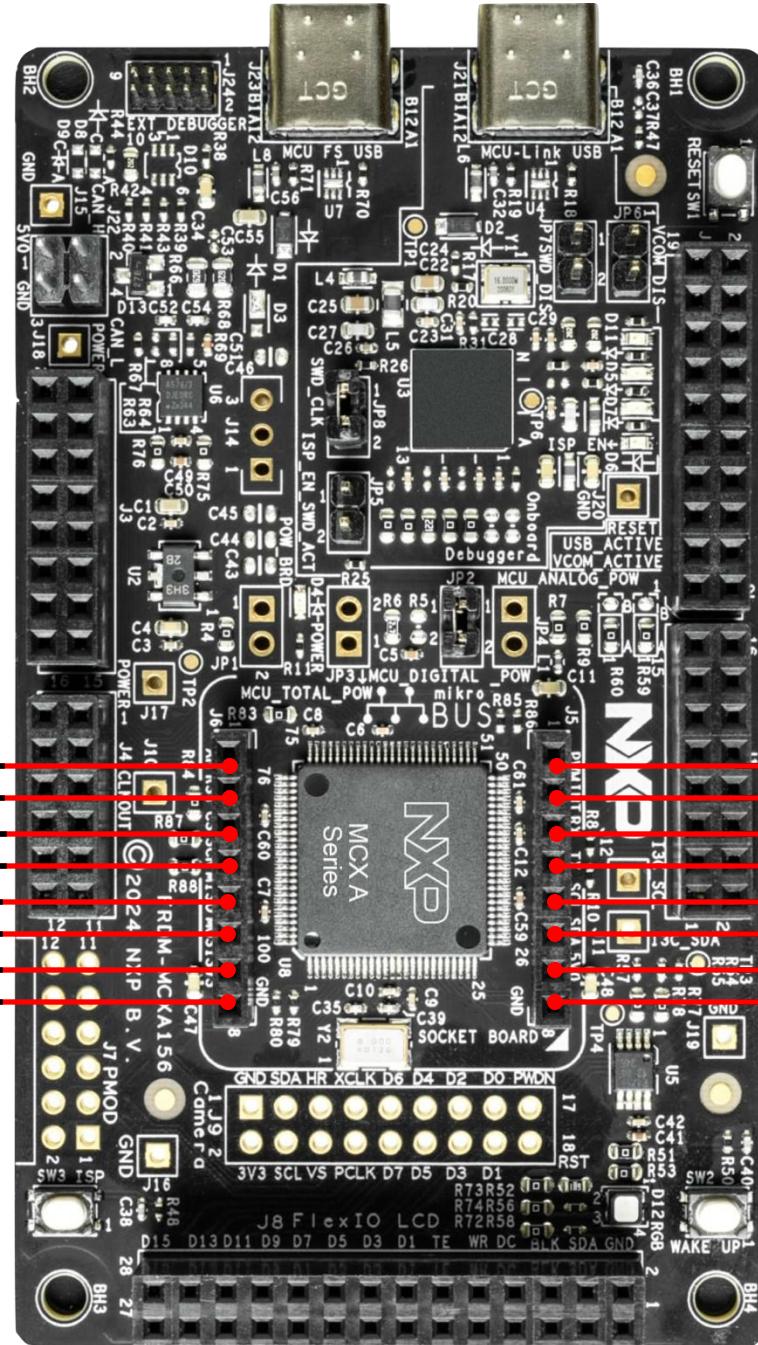
All pin sockets can be used by defining pin like "P1_17"
This page shows pin sockets having special name

= Pin names which can be used in the code

FRDM-MCXA156 mikroBUS socket



All pin sockets can be used by defining pin like "P1_17"
This page shows pin sockets having special name



Available pins

A156

r01lib pin names				pin definition					class			
pin name	other pin name (1)	other pin name (2)	other pin name (3)	Digital&Bus	InOut	InterruptIn	I2C	I3C	SPI			
D0			P2_11	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D1			P2_10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D2			P3_1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D3	RED		P3_12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D4			P3_31	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D5			P3_14	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D6			P3_16	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D7			P1_14	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D8			P1_15	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D9			P3_17	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D10	GREEN		P3_13	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
	ARD_CS		P2_6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D11			P3_15	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
	ARD_MOSI		P2_13	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D12	ARD_MISO		P2_16	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D13	ARD_SCK		P2_12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D18	I3C_SDA	I2C_SDA	P0_16	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
D19	I3C_SCL	I2C_SCL	P0_17	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
A0			P1_10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
A1			P2_5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
A2			P2_3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
A3			P2_4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
A4			P1_12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
A5			P1_13	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_AN			P3_30	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_RST	BLUE		P3_29	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_CS	SPI_CS		P1_3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_SCK	SPI_SCLK		P1_1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	with MK_MOSI			<input checked="" type="checkbox"/>
MB_MISO	SPI_MISO		P1_2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_MOSI	SPI莫斯		P1_0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	with MK_SCK			
MB_PWM			P3_18	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_INT			P3_19	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_RX			P3_20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_TX			P3_21	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_SCL			P3_27	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_SDA			P3_28	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>				
	SW2		P1_7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
	SW3		P0_6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						

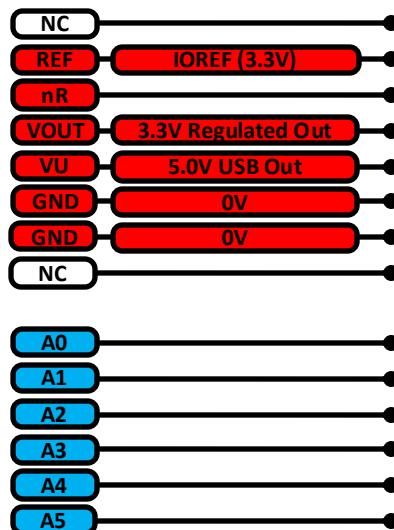
Pins

FRDM-MCXA153

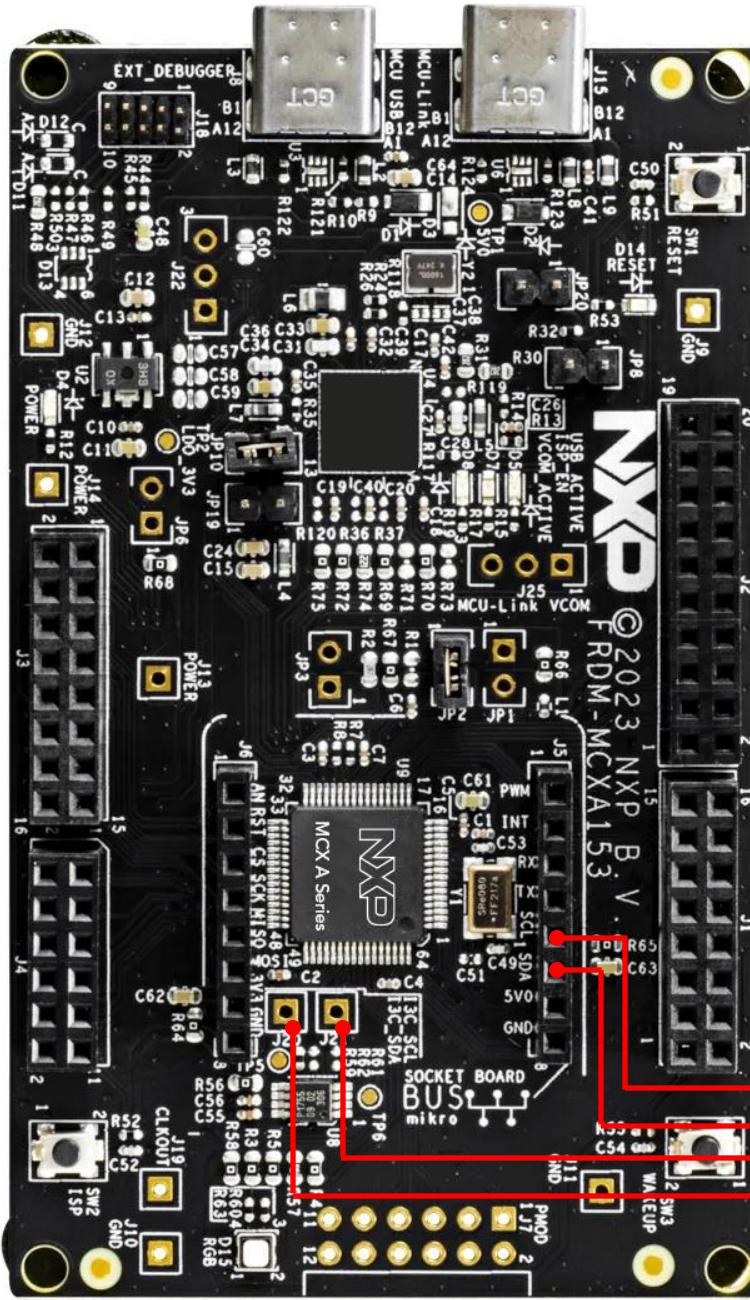


FRDM-MCXA153

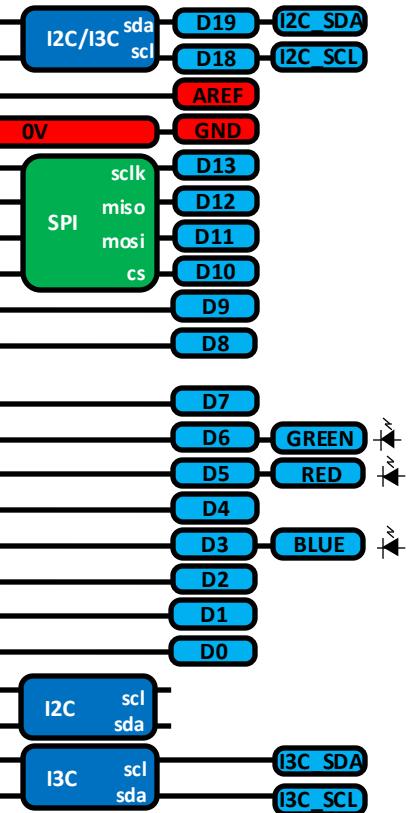
Arduino socket



All pin sockets can be used by defining pin like "P1_17"
 This page shows pin sockets having special name



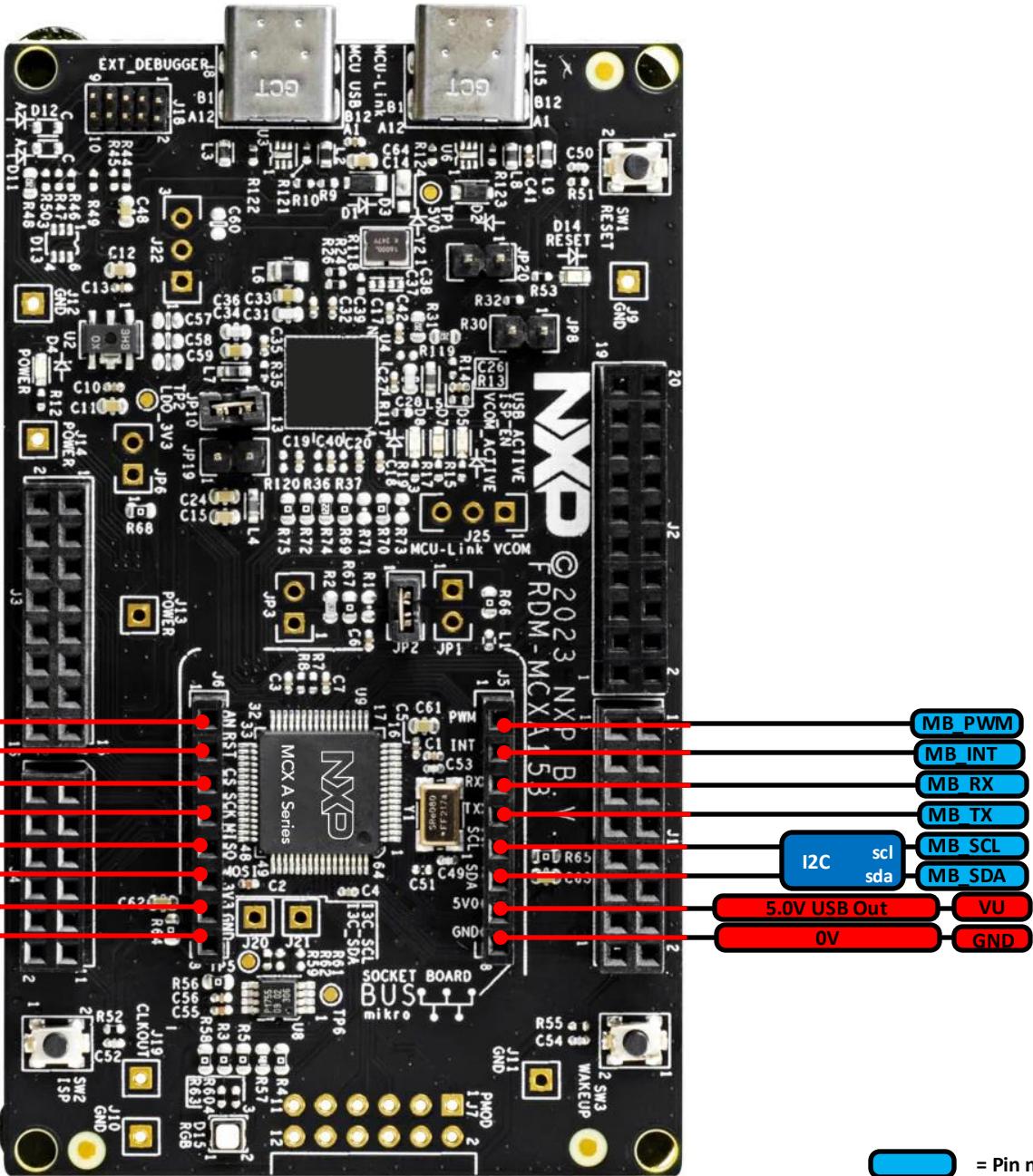
The I2C can be routed to D18 and D19 pins by
 declaring as **I2C(I2C_SDA, I2C_SCL)**



= Pin names which can be used in the code

FRDM-MCXA153

mikroBUS socket



Available pins

A153

r01lib pin names				pin definition					class			
pin name	other pin name (1)	other pin name (2)	other pin name (3)	Digital&Bus	InOut	InterruptIn	I2C	I3C	SPI			
D0			P1_4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D1			P1_5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D2			P2_4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D3	BLUE		P3_0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D4	MB_INT		P2_5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D5	RED		P3_12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D6	GREEN		P3_13	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D7	MB_RST		P3_1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D8	MB_TX		P3_15	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D9	MB_RX		P3_14	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D10		SPI_CS	P2_6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D11		SPI_MOSI	P2_13	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D12		SPI_MISO	P2_16	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D13		SPI_SCLK	P2_12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
D18		I2C_SDA	P1_8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
D19		I2C_SCL	P1_9	<input checked="" type="checkbox"/>								
A0			P1_10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
A1			P1_12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
A2			P1_13	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
A3			P2_0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
A4			P3_31	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
A5	MB_AN		P3_30	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_AN	A5		P3_30	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_RST	D7		P3_1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_CS			P1_3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_SCK			P1_1	<input checked="" type="checkbox"/> with MK_MOSI								
MB_MISO			P1_2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
MB_MOSI			P1_0	<input checked="" type="checkbox"/> with MK_SCK								
MB_PWM			P3_12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_INT	D4		P2_5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_RX	D9		P3_14	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_TX	D8		P3_15	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_SCL			P3_27	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
MB_SDA			P3_28	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>							
		I3C_SDA	P0_16	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
		I3C_SCL	P0_17	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
	SW2		P3_29	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
	SW3		P1_7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						

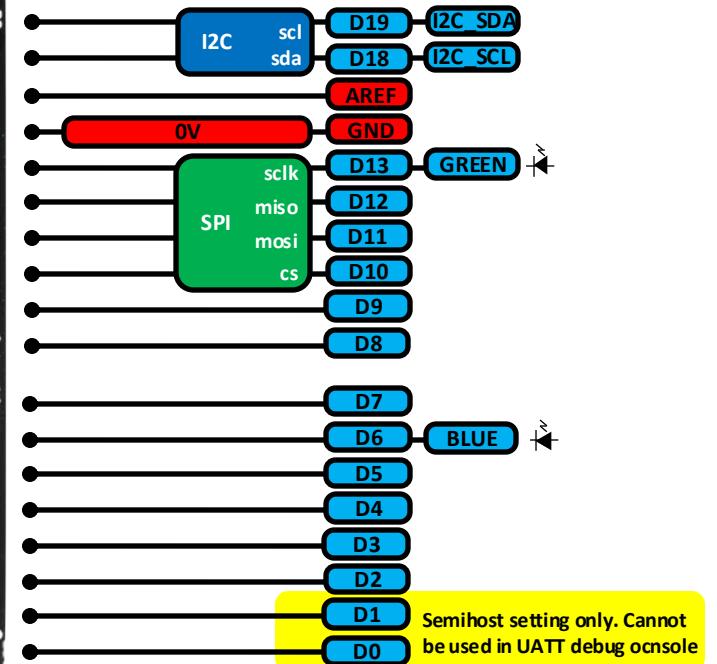
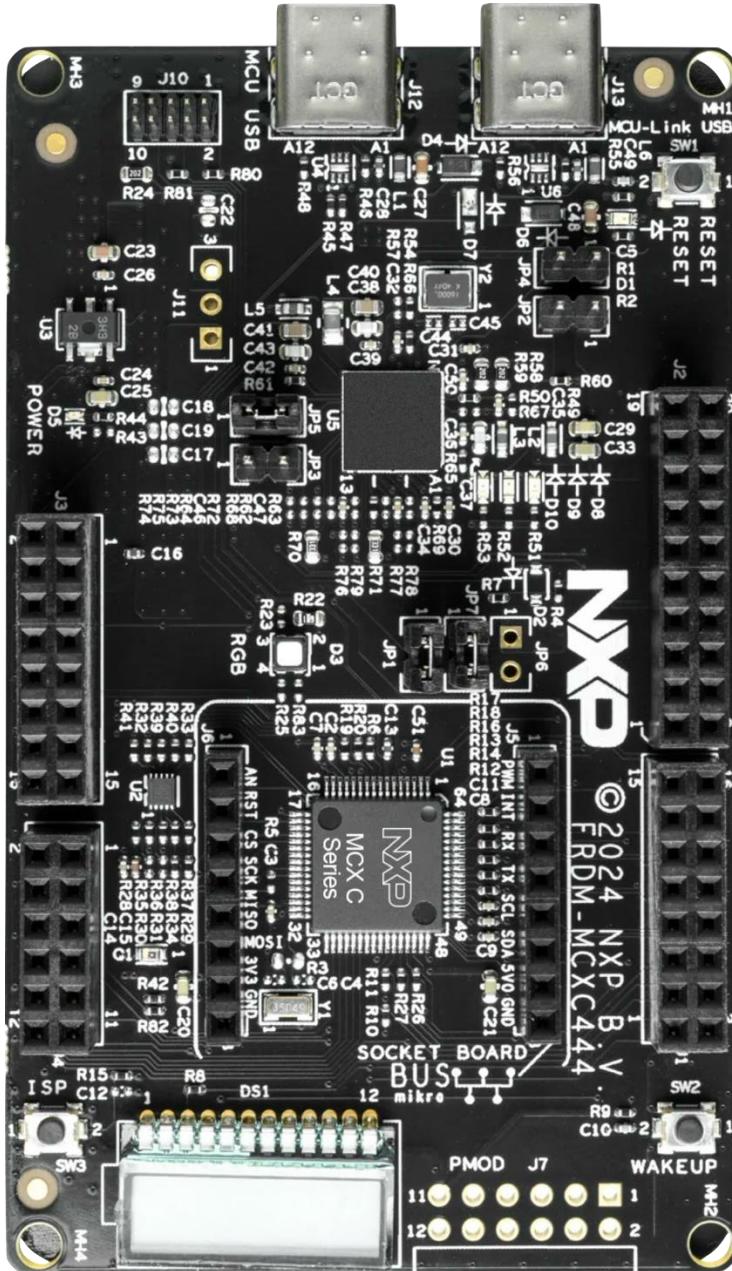
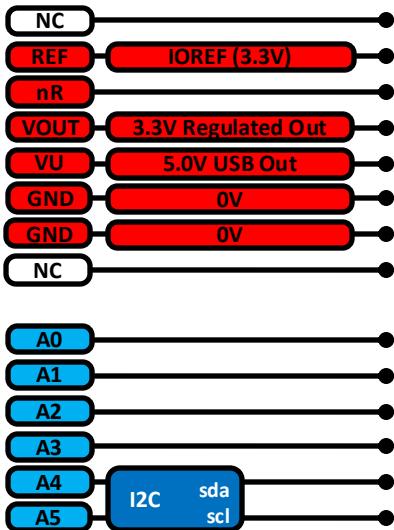
Pins

FRDM-MCXC444



FRDM-MCXC444

Arduino socket

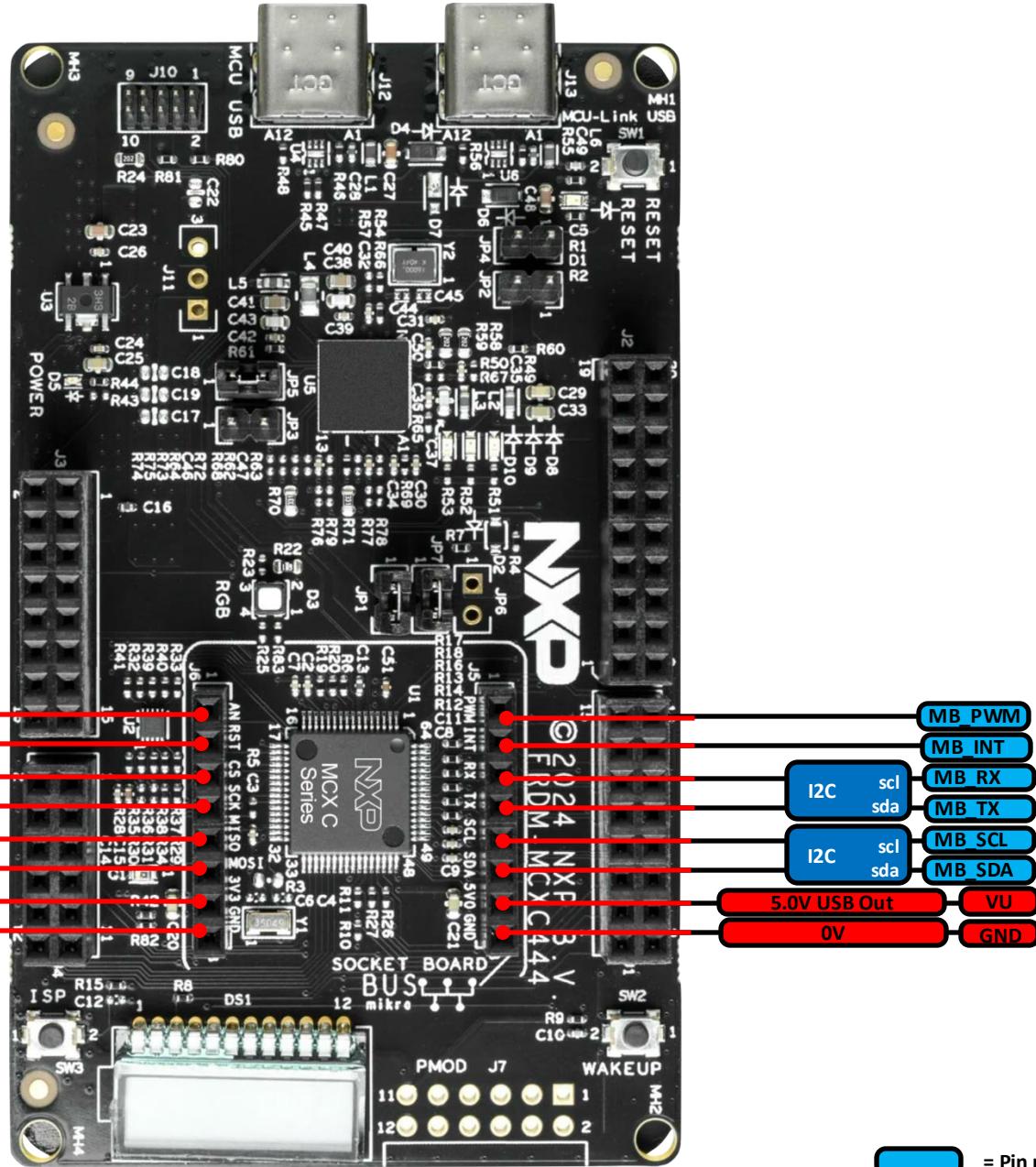


All pin sockets can be used by defining pin like "PTE31"
This page shows pin sockets having special name

= Pin names which can be used in the code

FRDM-MCXAC444

mikroBUS socket



= Pin names which can be used in the code

Available pins

A153

r01lib pin names				pin definition					class				
pin name	other pin name (1)	other pin name (2)	other pin name (3)	Digital&Bus	InOut	InterruptIn	I2C	I3C	SPI				
D0			PTA1		✓ (Semihost only)	✓ (Semihost only)							
D1			PTA2		✓ (Semihost only)	✓ (Semihost only)							
D2	MB_INT		PTD3		✓	✓							
D3	MB_PWM		PTA12		✓	✓							
D4	SW3		PTA4		✓	✓							
D5			PTA5		✓	✓							
D6	BLUE		PTE29		✓	✓							
D7	MB_RST		PTE30		✓	✓							
D8			PTA13		✓	✓							
D9			PTD2		✓	✓							
D10		ARD_CS	PTD4		✓	✓							
D11		ARD_MOSI	PTD6		✓	✓							
D12		ARD_MISO	PTD7		✓	✓							
D13	GREEN	ARD_SCK	PTD5		✓	✓							✓
D18	MB_TX	I2C_SDA	PTE0		✓	✓							
D19	MB_RX	I2C_SCL	PTE1		✓	✓							✓
A0	MB_AN		PTB0		✓	✓							
A1			PTB1		✓	✓							
A2			PTB2		✓	✓							
A3			PTB3		✓	✓							
A4	MB_SDA		PTC2		✓	✓							
A5	MB_SCL		PTC1		✓	✓							
MB_AN	A0		PTB0		✓	✓							
MB_RST	D7		PTE30		✓	✓							
MB_CS	SPI_CS	ARD_CS	PTD4		✓	✓							
MB_SCK	SPI_SCLK	ARD_SCK	PTD5		✓	✓							✓
MB_MISO	SPI_MISO	ARD_MISO	PTD7		✓	✓							
MB_MOSI	SPI_MOSI	ARD_MOSI	PTD6		✓	✓							
MB_PWM	D3		PTA12		✓	✓							
MB_INT	D2		PTD3		✓	✓							
MB_RX	D19	I2C_SCL	PTE1		✓	✓							✓
MB_TX	D18	I2C_SDA	PTE0		✓	✓							
MB_SCL	A5		PTC1		✓	✓							✓
MB_SDA	A4		PTC2		✓	✓							✓
	RED		PTE31		✓	✓							
SW2			PTC3		✓	✓							
SW3	D4		PTA4		✓	✓							

Example of defining I3C pins from code on FRDM-MCXA153

```
#include "r01lib.h"

I2C i2c( I2C_SDA, I2C_SCL );
```

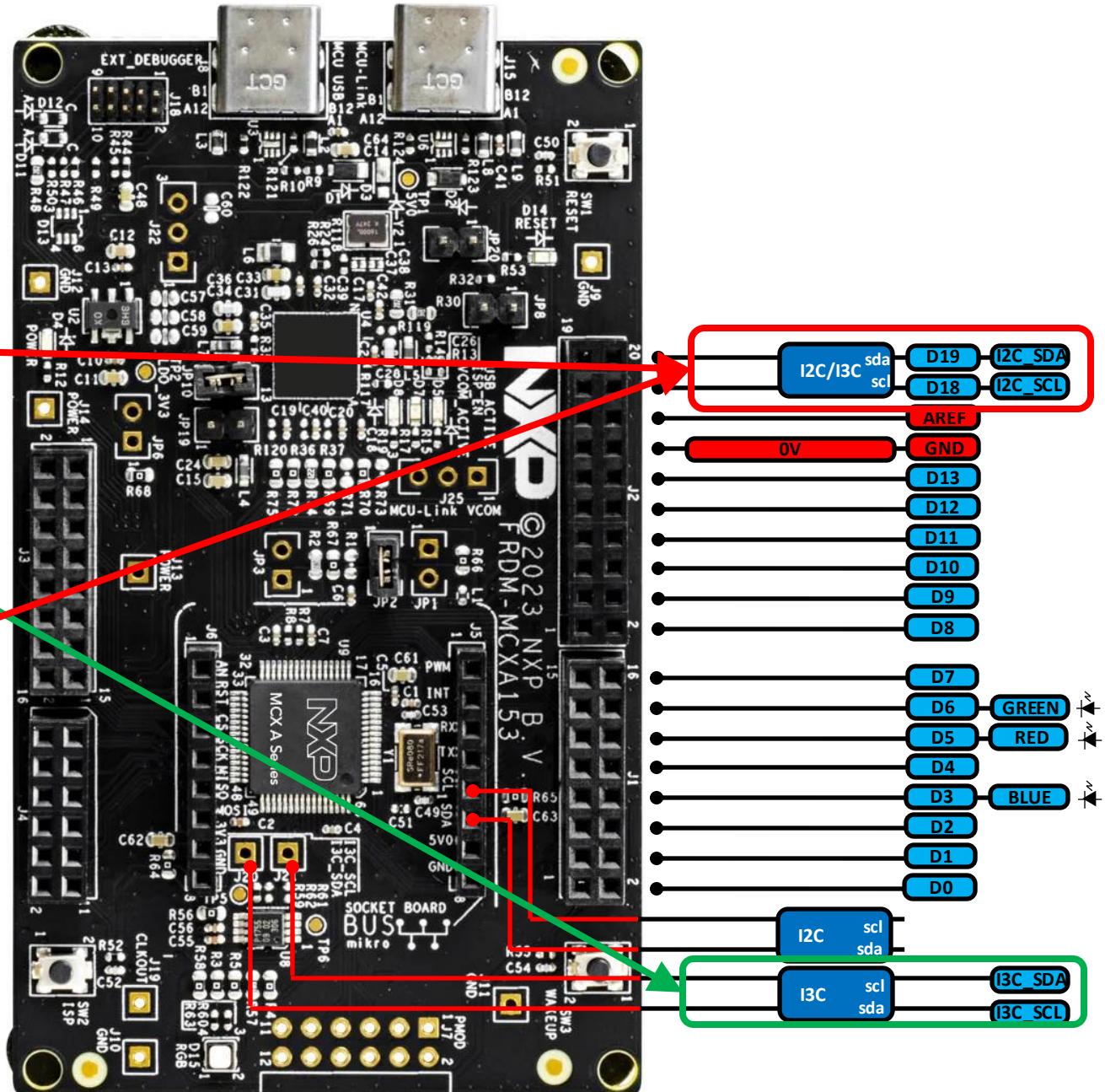
```
#include "r01lib.h"

I3C i3c( I3C_SDA, I3C_SCL );
```

```
#include "r01lib.h"

I3C i3c( I2C_SDA, I2C_SCL );
```

For instance, in I3C case, the signals can be changed to re-route the signals to D18 and D19 by giving arguments for constructor.



Example of defining I3C pins from code on FRDM-MCXN947

```
#include "r01lib.h"

I2C i2c( I2C_SDA, I2C_SCL );
```

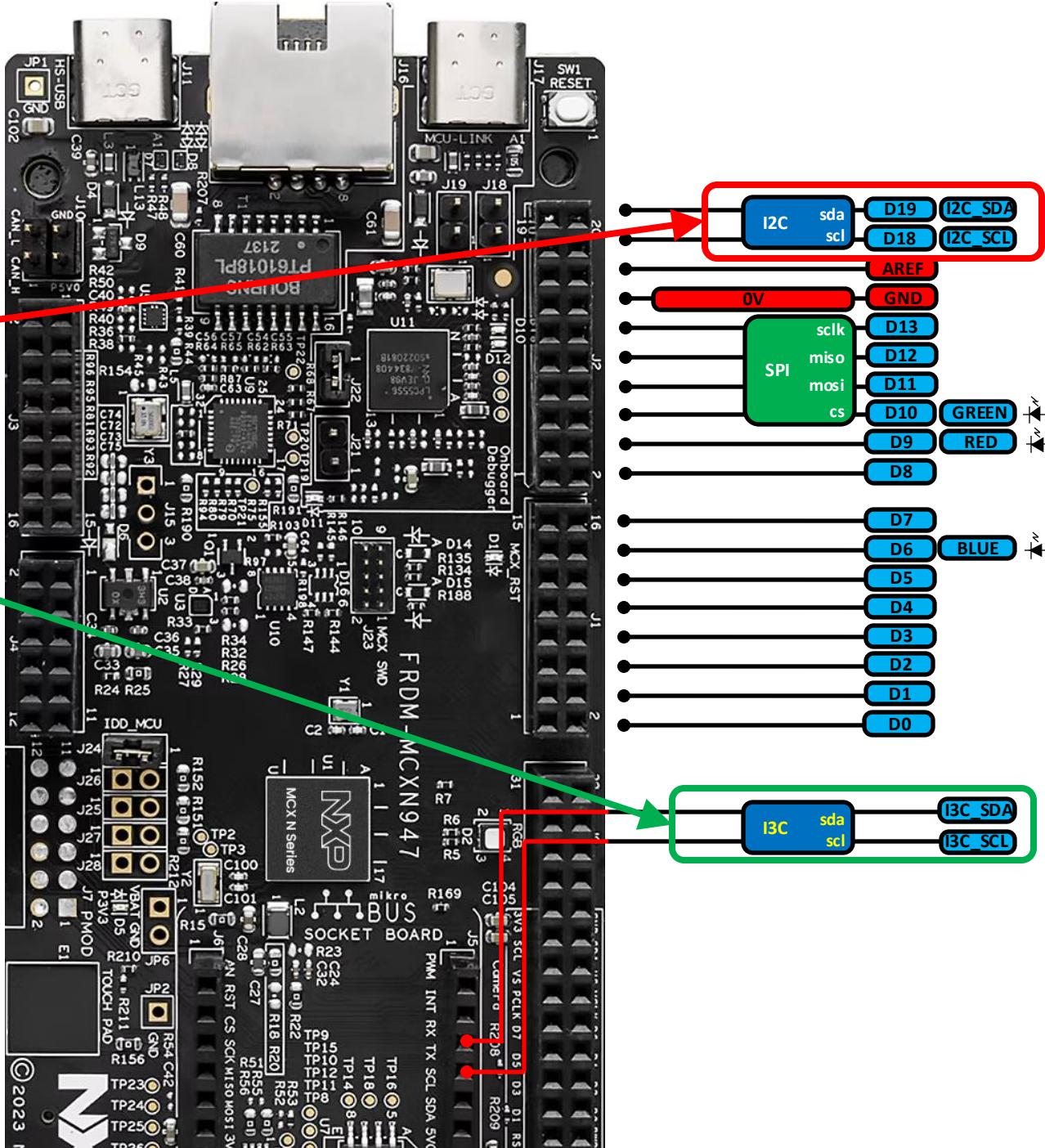
```
#include "r01lib.h"

I3C i3c( I3C_SDA, I3C_SCL );
```

```
#include "r01lib.h"

I3C i3c( I2C_SDA, I2C_SCL );
```

On FRDM-MCXN947, the I3C signals cannot be assigned to D18 and D19 because hardware doesn't allow this configuration



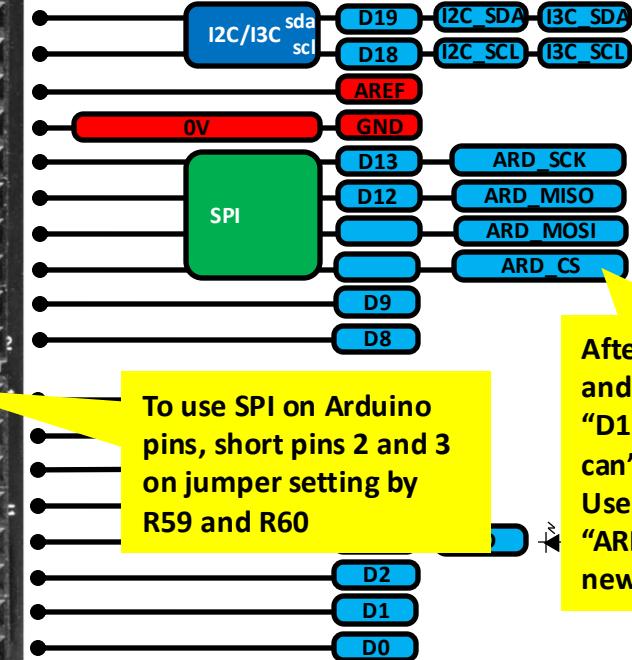
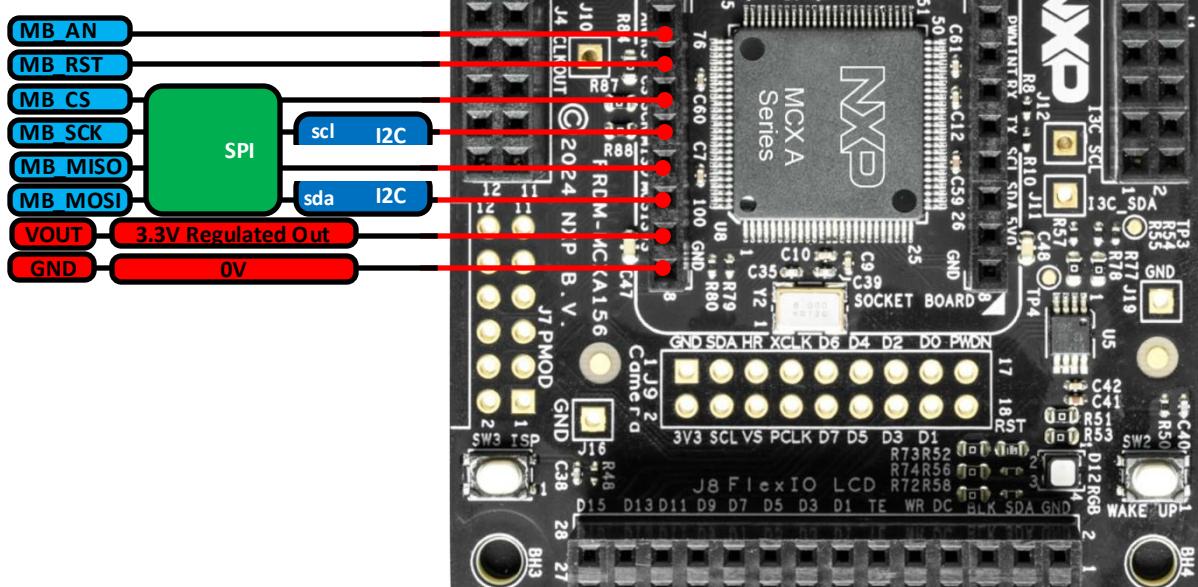
Example of using SPI on A156

```
#include "r01lib.h"
```

```
SPI spi( ARD_MOSI, ARD_MISO, ARD_SCK, ARD_CS );
```

```
#include "r01lib.h"
```

```
SPI spi( MB_MOSI, MB_MISO, MB_SCK, MB_CS );
```



To use SPI on Arduino pins, short pins 2 and 3 on jumper setting by R59 and R60

After changing R59 and R60, "D10" and "D11" are no longer can't be used.
Use "ARD_CS" and "ARD_MOSI" for newly routed pins

03

r01device

R01 product operation
sample library



Library for R01 products operation on MCUXpresso

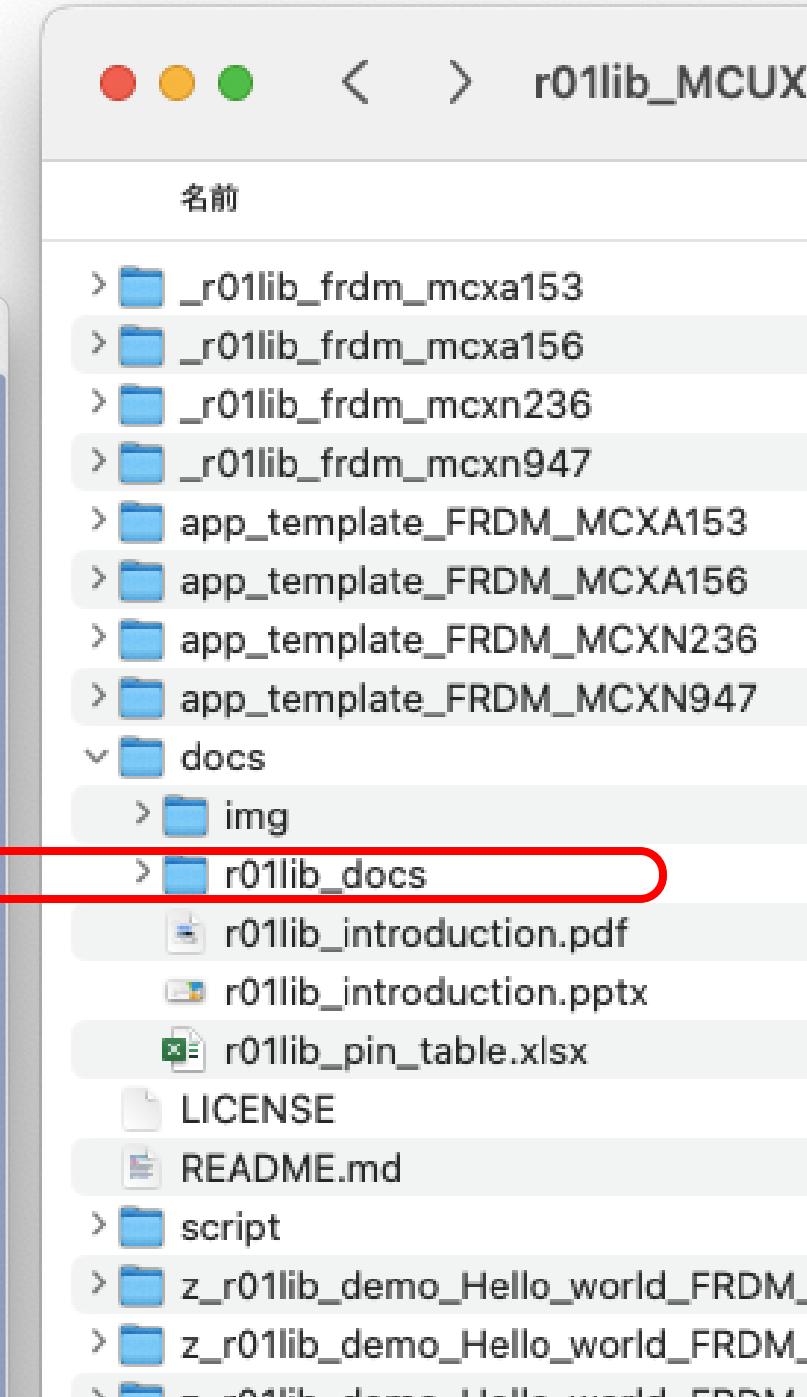
Simple interface to write sample code

- **r01device** = A class driver correction for **r01device** operations
- Delivered as a part of **r01lib**
- Abstracting device operation
 - To present devices' main features with simple interfaces
 - User don't need to care register level operation
 - If user need to access register, it can be done through register access APIs

Available device classes

All available classes can be found on online document

The screenshot shows a web-based documentation interface for the `r01lib_0.x` project. The title bar indicates the file path: `file:///Users/tedd/dev/mcuxpresso/r01projects/_r01lib_frdm_r...`. The main content area is titled "Class Hierarchy" and displays a list of C++ classes. The classes listed include `_gpio_pin`, `BusInOut`, `GPIO_base` (containing `PCA9554` and `PCA9555`), `PCAL6xxx_base` (containing `PCAL6408A` and `PCAL6416A`), `PCAL6524`, `PCAL6534`, `PCAL97xx_base` (containing `PCAL9722`), `GradationControl`, `I3C_Device` (containing `P3T1755`), `LED`, and `LEDDriver`.



04

r01device operation sample

Simple API

Sample 1: P3T1755

Interface to temp sensor

```
#include "r01lib.h"

I3C      i3c( I3C_SDA, I3C_SCL );
P3T1755 p3t1755( i3c );

int main(void)
{
    float temp;

    i3c.ccc_broadcast( CCC::BROADCAST_RSTDAA, NULL, 0 );
    i3c.ccc_set( CCC::DIRECT_SETDASA, 0x48, 0x08 << 1 );
    p3t1755.address_overwrite( 0x08 );

    while ( true )
    {
        temp = p3t1755;
        printf( "Temperature: %8.4f°C\r\n", temp );
        wait( 1 );
    }
}
```

- P3T1755 class makes an interface for the I3C device
- Register level access is abstracted
- This sample is using CCC interface in I3C class

Sample 2 : PCA9955B Interface to LED driver

```
#include "r01lib.h"

#include "led/PCA9955B.h"

I2C      i2c( I2C_SDA, I2C_SCL );
PCA9955B ledd( i2c );

int main(void)
{
    ledd.begin( 1.0, PCA9955B::ARDUINO_SHIELD );

    while ( true )
    {
        ledd.pwm( 0, 1.0 );
        wait( 0.1 );
        ledd.pwm( 0, 0.0 );
        wait( 0.1 );
    }
}
```

- PCA9955B class makes an interface for the LED driver
- PWM can be controlled through instance method

Sample 3 : PCF2131

Interface to RTC

```
#include "r01lib.h"
#include <time.h>
#include "rtc/PCF2131_I2C.h"

I2C      i2c( I2C_SDA, I2C_SCL );
PCF2131_I2C rtc( i2c );

int main(void)
{
    while ( true )
    {
        time_t current_time = rtc.time( NULL );

        printf( "time: %s", ctime(&current_time) );
        wait( 1 );
    }
}
```

- PCF2131 class makes an interface for the RTC
- The interface data format is compatible with “time.h” in C standard lib.

Repository

Access to the code

Class library and sample code available for these ARD boards

category	type#
Bus repeater	PCA9617A
GPIO expander	PCAL6408
GPIO expander	PCAL6416
GPIO expander	PCAL6524
GPIO expander	PCAL6534
LCD driver	PCA8561
LED controller	PCA9955B
LED controller	PCA9957
LED controller	PCA9959
Mux/Sw	PCA9846
RTC	PCF2131
RTC	PCF85053A
RTC	PCF85063A
RTC	PCF85063TP
RTC	PCF85263A
Temp sensor	P3T1035 / P3T2030
Temp sensor	P3T1085 / P3T1755
Temp sensor	PCT2075
VLT	NTS0304
AFE	NAFE13388



NXP

マイコン純正SDK(C/C++)だけではない Arduino®や MicroPython で評価・試作

Arduino®シールド ソリューション

MicroPython / Arduino SDK対応
ドライバ&サンプルコードで
簡単評価、高速PoC作成を可能に

NXPジャパン株式会社
2025年2月27日

より簡単に



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温度センサ評価基板: P3T1755-ARDを、
LPC860-MAXで動かしてみる

教育やホビー用途で根強い人気のあるArduino®。このArduino® SDKに対応したマイコンがあれば、その通信APIを介してハードウェアにアクセスできます。動作確認までの手順は、ライブラリ・マニュアルで型番を検索して、IDEにインストール、そのままサンプルコードを選択して実行するだけで動作します。

Repo

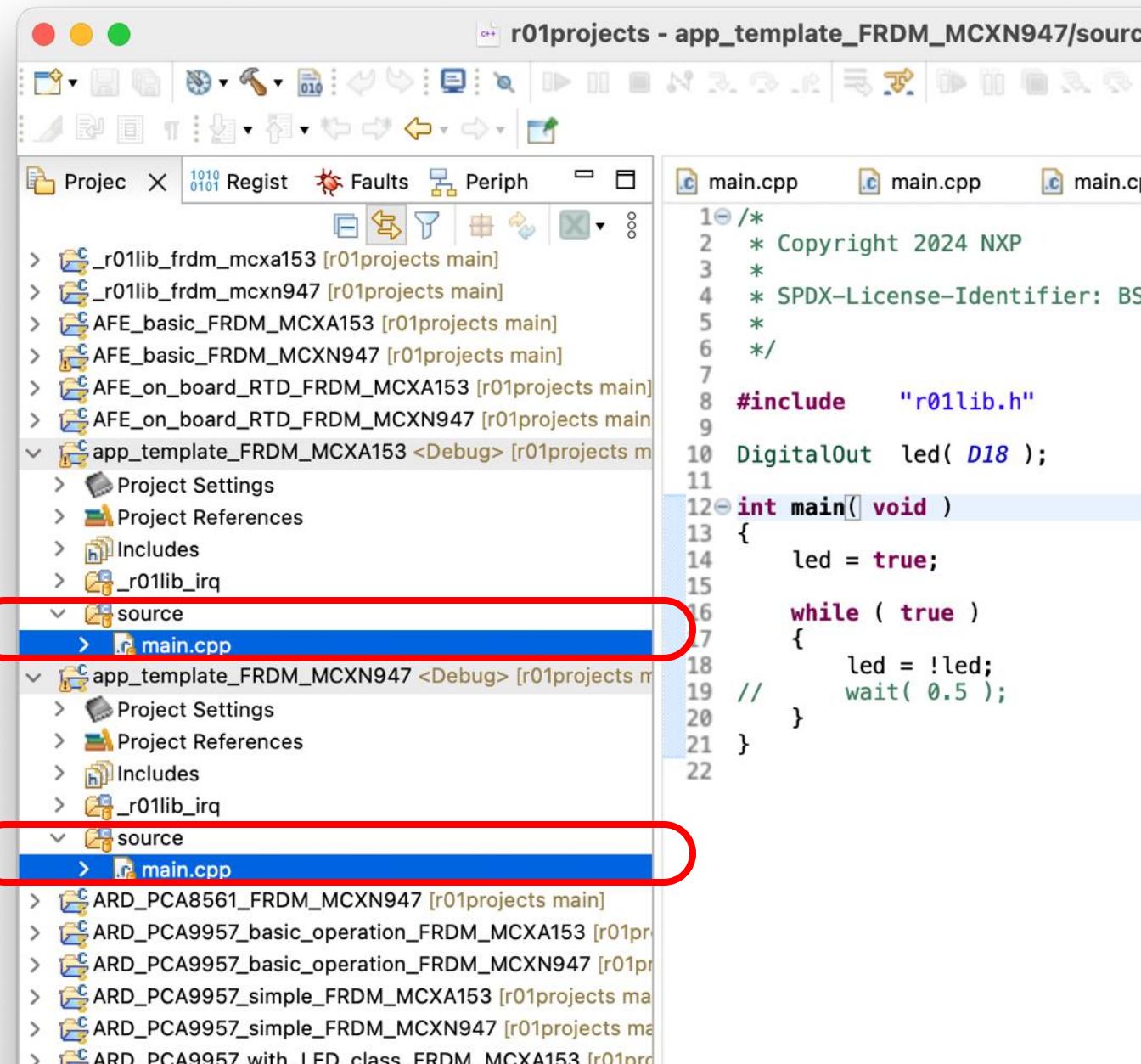
- https://github.com/teddokano/r01lib_MCUXpresso
 - Including both r01lib and r01device source code
 - This repo including sample/test code for available features
 - DigitalInOut, DigitalIn, DigitalOut, BusInOut, BusIn, BusOut, InterruptIn, Ticker, I3C, I2C, SPI classes
- The device usage samples with 'r01device' are available in
https://github.com/teddokano/arduino_shields_on_mcx
 - Sample code to operate ARD boards

How to start writing your own code

Write your code

Choose template project and overwrite **source/main.cpp**.

If needed, new files (.c/.cpp/.h) can be added in **source/** folder.



The screenshot shows a software interface for managing NXP projects. The top bar indicates the project is named "r01projects - app_template_FRDM_MCXN947/source". The left pane is a "Project X" view showing a hierarchy of projects, with "app_template_FRDM_MCXA153" expanded to show "Project Settings", "Project References", "Includes", and "source". Within the "source" folder, "main.cpp" is selected and highlighted with a red oval. Another red oval highlights the "source" folder itself. The right pane displays the content of the selected "main.cpp" file:

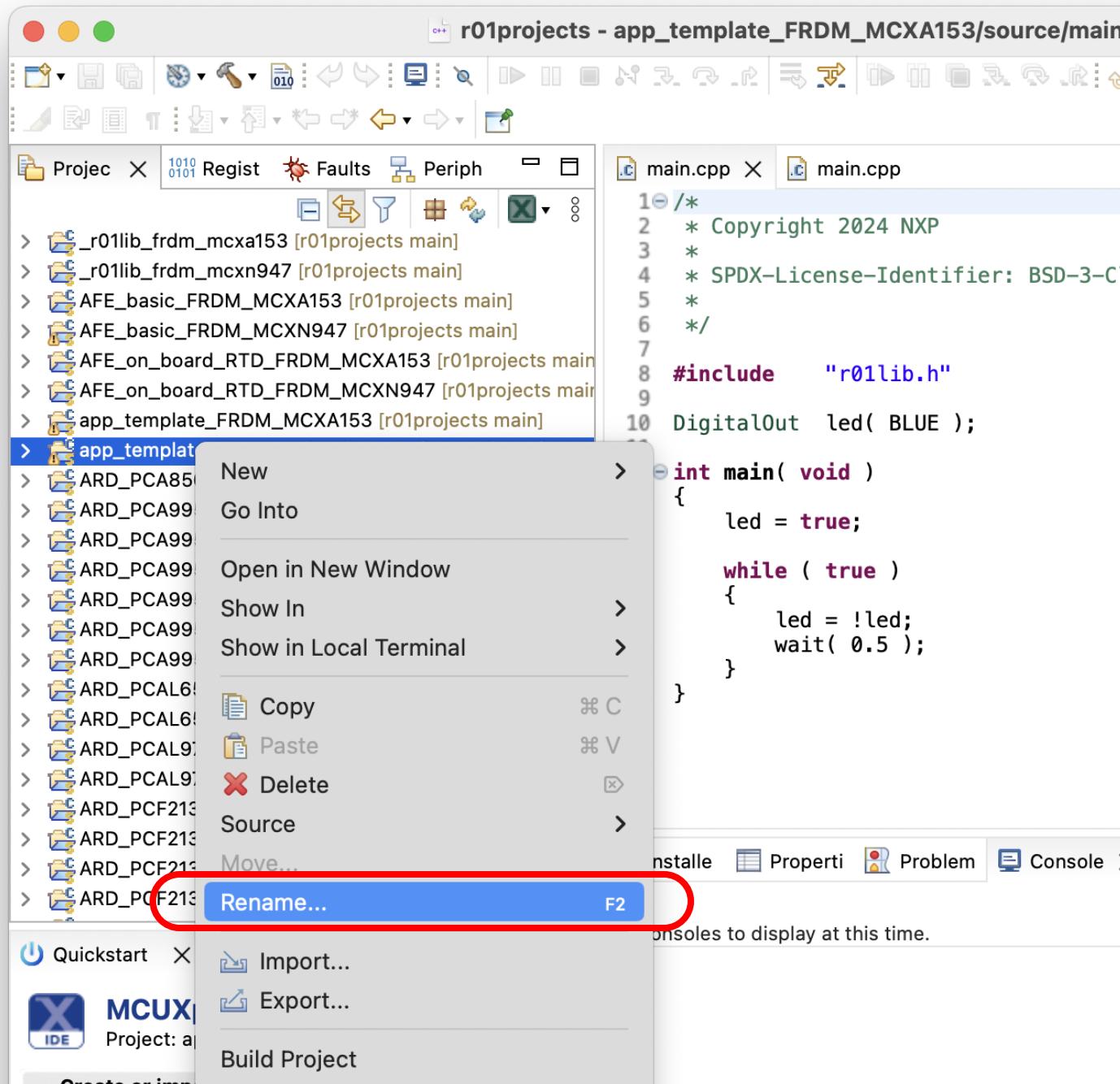
```
1 /*  
2  * Copyright 2024 NXP  
3  *  
4  * SPDX-License-Identifier: BS  
5  *  
6  */  
7  
8 #include "r01lib.h"  
9  
10 DigitalOut led( D18 );  
11  
12 int main() void  
13 {  
14     led = true;  
15  
16     while ( true )  
17     {  
18         led = !led;  
19         // wait( 0.5 );  
20     }  
21 }  
22
```

How to start writing your own code

Code exporting: step1

Rename the project

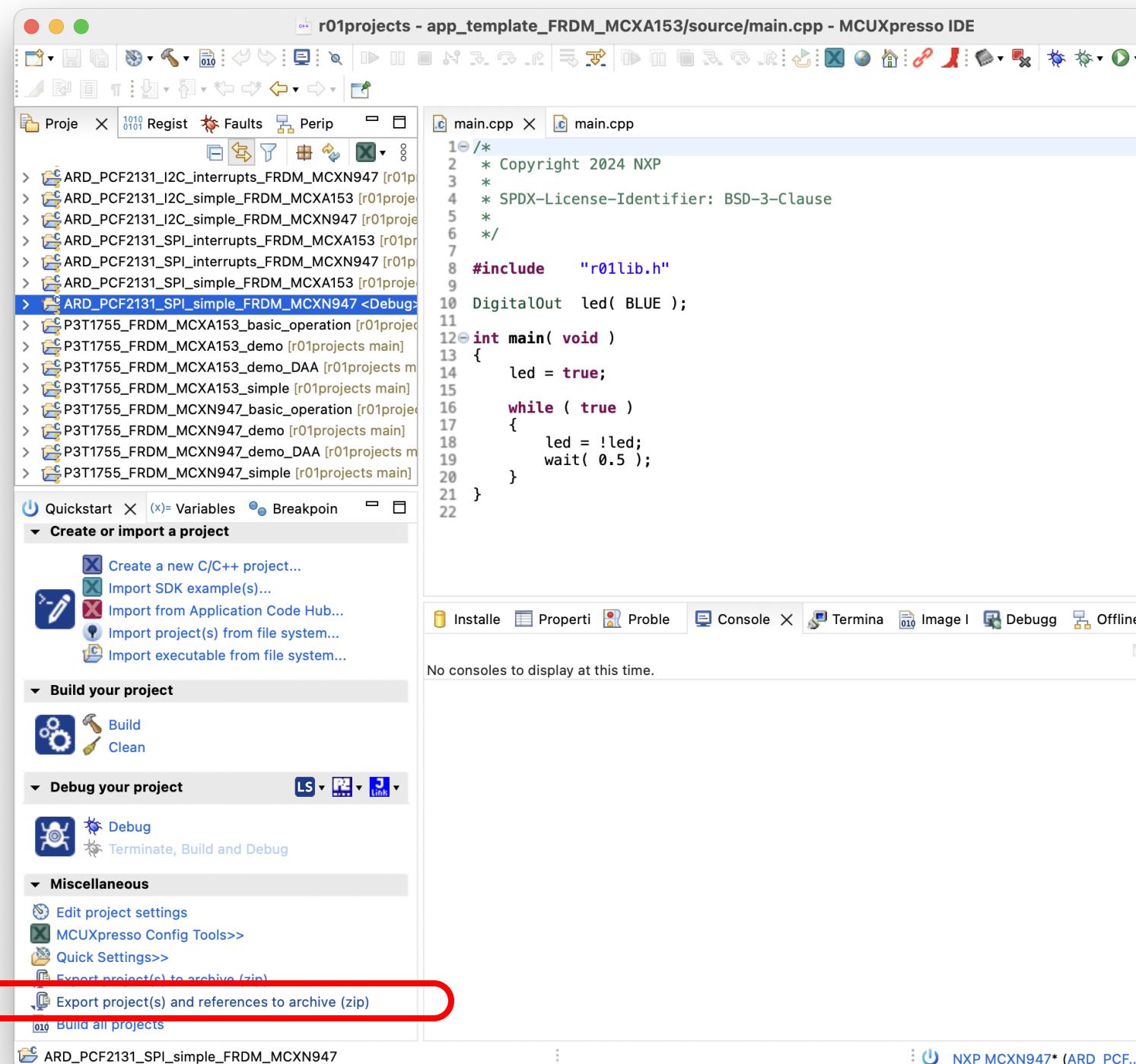
Right click on the project and choose "Rename..." from pop-up menu



Code distribution: step2

Choose the project(s)

Click on “Export project(s) and reference to archive (zip)”



06

History



Document revision history

Date	Updates
2024 Mar 21	Initial version
2024 May 29	Pin name information added
2024 Jul 17	FRDM-MCXN236 support added
2024 Dec 09	FRDM-MCXA156 support added
2024 Dec 10	Available pins tables updated to clarify the pins which have multiple names
2024 Dec 13	Picture of "How will it be looked like?" and "API documents are available" pages are replaced
2025 Sep 18	FRDM-MCXA156 SPI support on Arduino pins added
2025 Sep 24	Repository information update. Available ARD sample code list added
2025 Sep 26	Supported ARD board list is corrected
2025 Dec 28	FRDM-MCXC444 support added



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