

UM12439

FRDM-MCXA266 Board User Manual

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User manual

Document information

| Information | Content |
|-------------|---|
| Keywords | UM12439, FRDM-MCXA266, MCX A266, MCX A, Freedom, Arduino, mikroBUS, Pmod, MCU-Link |
| Abstract | The FRDM-MCXA266 board is a design and evaluation platform based on the NXP MCX A266 MCU. |



1 Board overview

The FRDM-MCXA266 board is a design and evaluation platform based on the NXP MCX A266 microcontroller (MCU). The MCX A266 MCU is a low-power microcontroller for industrial and consumer Internet of Things (IoT) applications. It has one Arm Cortex-M33 core running at speeds of up to 240 MHz. It supports industrial communication protocol, Brushless Direct Current (BLDC) motor / Permanent Magnet Synchronous Motor (PMSM) control, and integrated sensor interfaces (MIPI-I3C, I²C, and SPI).

The board is compatible with Arduino boards (Arduino UNO R3 and Arduino A4/A5), motor control boards (FRDM-MC-LVBLDC and FRDM-MC-LVPMSM), Mikroe click boards, and Pmod boards. It can be used with a wide range of development tools, including NXP MCUXpresso IDE, IAR Embedded Workbench, and Arm Keil MDK. The board is lead-free and RoHS-compliant.

For debugging the MCX A266 MCU, the FRDM-MCXA266 board uses an Onboard (OB) debug probe, MCU-Link OB, which is based on another NXP MCU: LPC55S16. For simplicity, the MCX A266 MCU and the LPC55S16 MCU are respectively referred to as "target MCU" and "debugger MCU" at some places in this document.

This document provides details about the FRDM-MCXA266 board interfaces, power supplies, clocks, connectors, jumpers, push buttons, LEDs, and MCU-Link OB.

1.1 Block diagram

[Figure 1](#) shows the FRDM-MCXA266 board block diagram.

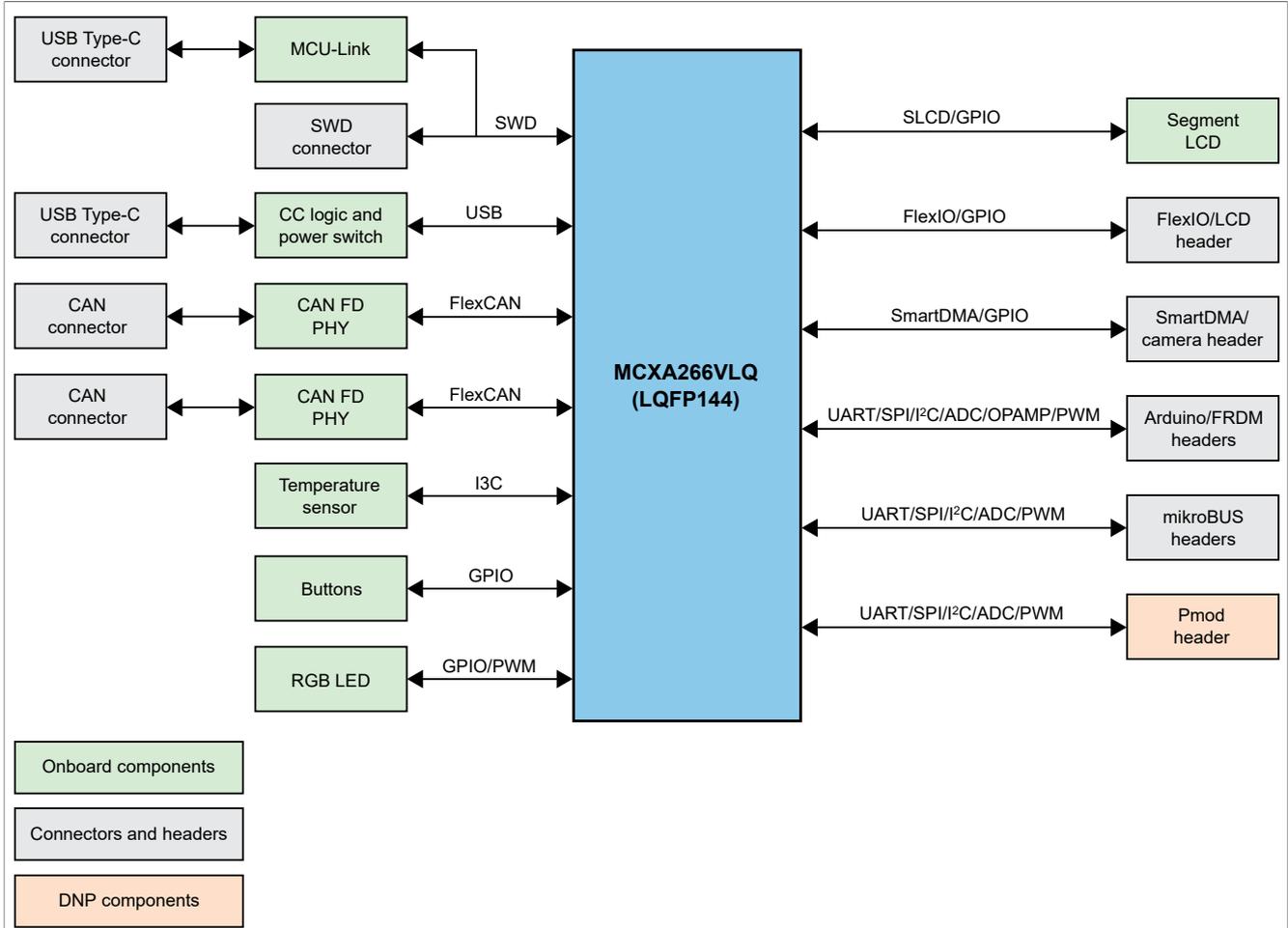


Figure 1. FRDM-MCXA266 block diagram

1.2 Board features

Table 1 lists the features of the FRDM-MCXA266 board.

Table 1. FRDM-MCXA266 features

| Board feature | Target MCU features used | Description |
|----------------------------|--------------------------|---|
| MCU (target MCU) | | NXP MCX A266 MCU (part number: MCXA266VLQ) based on an Arm Cortex-M33 core, running at speeds of up to 240 MHz. Note: For details on the MCX A266 MCU, see MCX A175, A176, A185, A186, A255, A256, A265 and A266 Reference Manual and MCXA175/176/185/186/255/256/265/266 Data Sheet. |
| USB interface (target MCU) | USBFS0 module | <ul style="list-style-type: none"> Supports a USB full-speed connection through a USB 2.0 Type-C connector J10 Support Device and Host modes |
| FlexCAN interface | CAN0 module | Provides a high-speed CAN FD transceiver accessible through a 2x2-pin header J16 |
| | CAN1 module | Provides a high-speed CAN FD transceiver accessible through a 2x2-pin header J17 |

Table 1. FRDM-MCXA266 features...continued

| Board feature | Target MCU features used | Description |
|-----------------------|---|--|
| LPUART interface | LPUART2 module | <ul style="list-style-type: none"> Supports a USB-to-UART bridge connection using MCU-Link Supports an external UART connection through the Arduino socket connector J1 |
| | LPUART3 module | Supports an external UART connection through the mikroBUS socket connector J5 |
| LPSPI interface | LPSPI0 module | Supports an external SPI connection through the mikroBUS socket connector J6 or the Pmod connector J7 (DNP) |
| | LPSPI1 module | Supports an external SPI connection through the Arduino socket connector J2 |
| LPI2C interface | LPI2C0 module | Provides an I ² C connection to the segment LCD connector J19 (DNP) |
| | LPI2C1 module | Provides an I ² C connection to the Arduino socket connector J4 |
| | LPI2C2 module | <ul style="list-style-type: none"> Provides an I²C connection to the Arduino socket connector J2 and the camera connector J9 Supports a USB-to-I²C bridge connection using MCU-Link |
| | LPI2C3 module | Provides an I ² C connection to the mikroBUS socket connector J5 and the Pmod connector J7 (DNP) |
| I3C interface | I3C0 module | Supports a digital temperature sensor (P3T1755DP) |
| Camera interface | SmartDMA module | Supports a SmartDMA connection through the camera connector J9 |
| LCD interface | FLEXIO0 module | Supports a FlexIO connection through the FlexIO/LCD connector J8 |
| Segment LCD interface | SLCD module | Supports an SLCD connection through a segment LCD device (added on the board) or the segment LCD connector J19 (DNP) |
| ADC interface | ADC0 module | Accepts ADC inputs through the Arduino socket connectors J2 and J4, the mikroBUS socket connector J6, and the segment LCD connector J19 (DNP) |
| | ADC1 module | Accepts ADC inputs through the Arduino socket connectors J2, J3, and J4 and the FlexIO/LCD connector J8 |
| OPAMP interface | OPAMP0 module | Connects to the test points TP15 (INP), TP18 (INN), and TP16 (OUT) |
| Arduino socket | LPUART2, LPSPI1, LPI2C1, LPI2C2, I3C0, ADC0, ADC1, PWM0, and PWM1 modules | Arduino socket with four connectors J1, J2, J3, and J4 |
| mikroBUS socket | LPUART3, LPSPI0, LPI2C3, ADC0, and CTIMER1 modules | mikroBUS socket with a pair of connectors J5 and J6 |
| Pmod connector | LPSPI0 and LPI2C3 modules | Pmod connector J7 (DNP) |
| Debug interface | LPUART2 module | Onboard MCU-Link debug probe with the USB Type-C connector J15 for debugging the MCX A266 MCU |
| Power supply | | <p>The FRDM-MCXA266 board is powered with a 5 V power supply (P5V0) using one of the following source options:</p> <ul style="list-style-type: none"> P5V_USB supply from MCX A266 USB Type-C connector J10 P5V_MCU_LINK supply from MCU-Link USB Type-C connector J15 |

Table 1. FRDM-MCXA266 features...continued

| Board feature | Target MCU features used | Description |
|-----------------------|--------------------------|---|
| | | <ul style="list-style-type: none"> P5V_HDR_IN supply from 5 V regulator populated at 3-pin connector J18 (not populated by default) P5V0 supply from Arduino shield compatible header J3 (pin 10), CAN0 connector J16 (pin 3), CAN1 connector J17 (pin 3), mikroBUS socket connector J5 (pin 7), and power test point TP5 |
| Clocks | | <ul style="list-style-type: none"> 8 MHz clock for the MCX A266 MCU 16 MHz clock for the LPC55S16 MCU |
| Orderable part number | | FRDM-MCXA266 |

1.3 Kit contents

Table 2 lists the items included in the FRDM-MCXA266 board hardware kit.

Table 2. Kit contents

| Item | Quantity |
|--------------------------------------|----------|
| FRDM-MCXA266 board hardware assembly | 1 |
| FRDM-MCXA266 Quick Start Guide | 1 |

1.4 Board pictures

Figure 2 shows the top-side view of the FRDM-MCXA266 board with the MCX A266 MCU (target MCU), the LPC55S16 MCU (debugger MCU), the segment LCD, and the CAN FD transceivers highlighted.

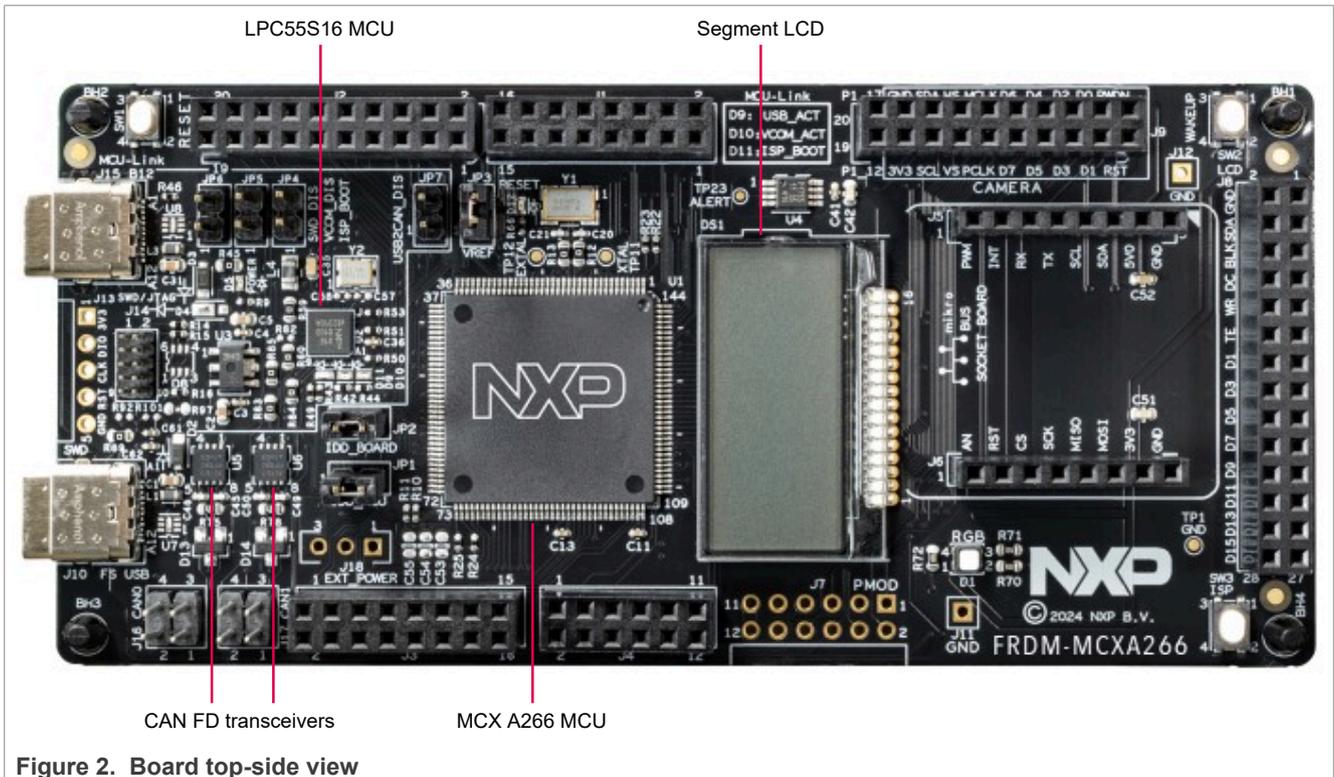


Figure 2. Board top-side view

Figure 3 shows the bottom-side view of the FRDM-MCXA266 board.

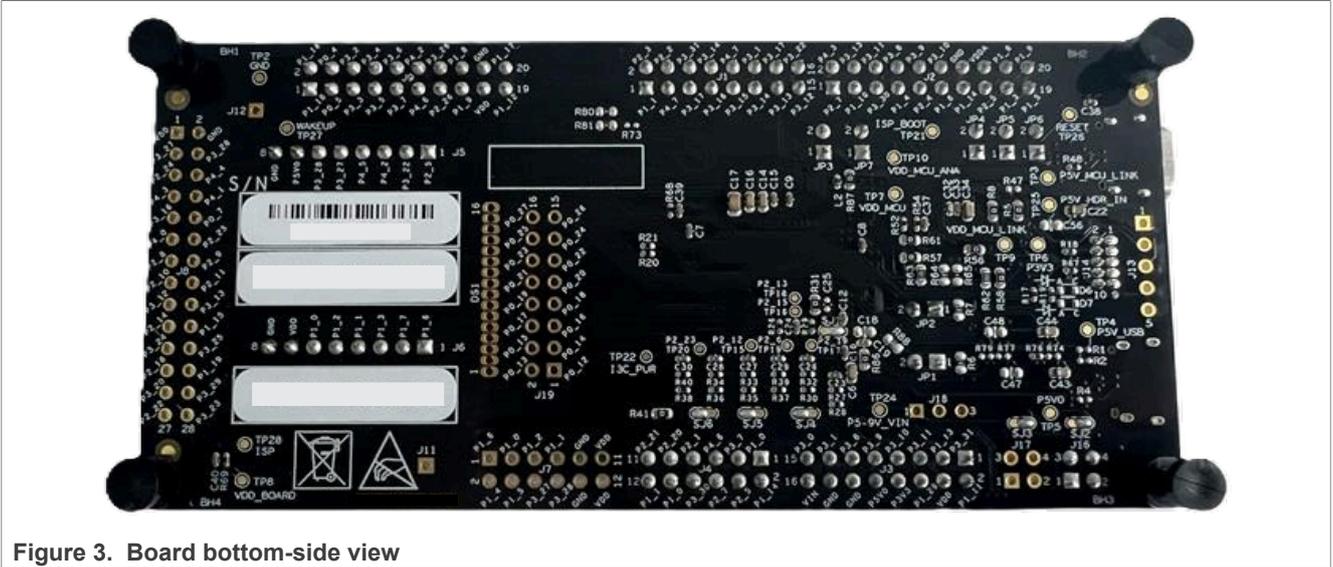


Figure 3. Board bottom-side view

1.5 Connectors

Figure 4 shows the FRDM-MCXA266 connectors.

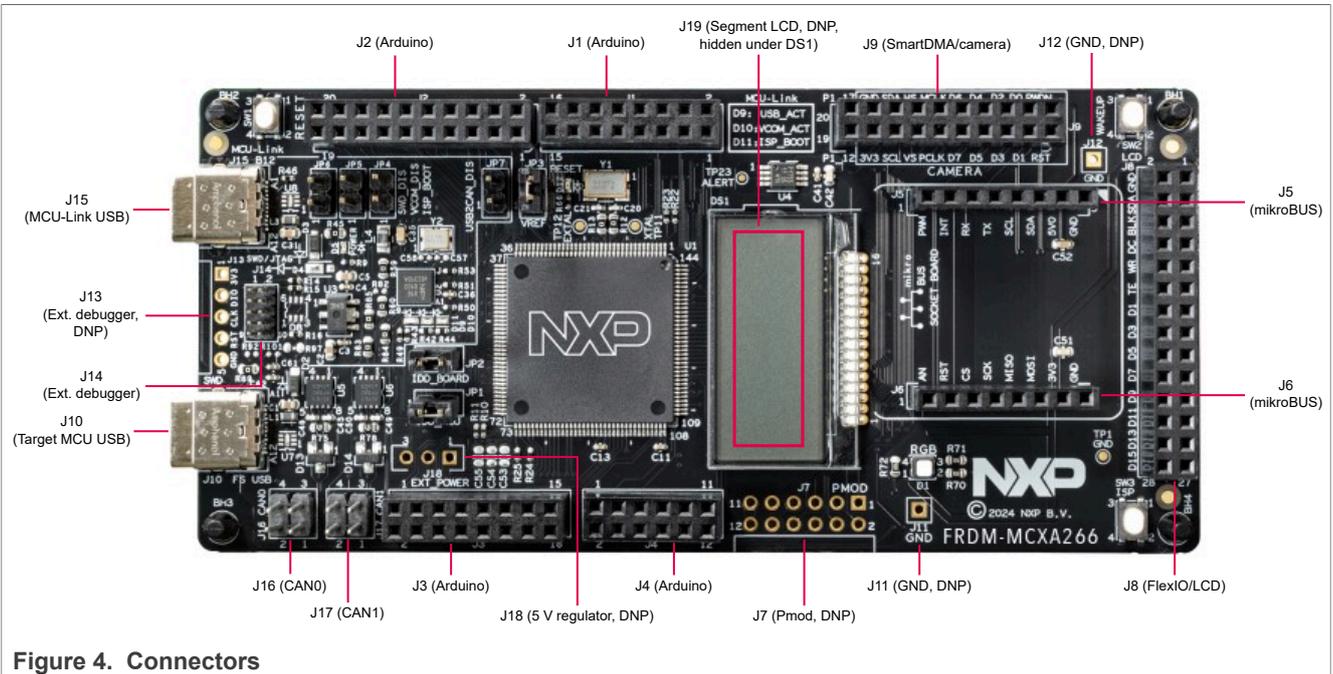


Figure 4. Connectors

Table 3 describes the connectors available on the FRDM-MCXA266 board.

Table 3. FRDM-MCXA266 connectors

| Part identifier | Connector type | Description | Reference section |
|-----------------|--------------------------|---------------------------|------------------------------|
| J1 | 2x8-position receptacle | Arduino socket connectors | Section 2.14 |
| J2 | 2x10-position receptacle | | |

Table 3. FRDM-MCXA266 connectors...continued

| Part identifier | Connector type | Description | Reference section |
|-----------------|----------------------------|---|--|
| J3 | 2x8-position receptacle | | |
| J4 | 2x6-position receptacle | | |
| J5 | 1x8-position receptacle | mikroBUS socket connectors | Section 2.15 |
| J6 | 1x8-position receptacle | | |
| J7 (DNP) | 2x6-position receptacle | Pmod connector | Section 2.16 |
| J8 | 2x14-position receptacle | FlexIO/LCD connector | Section 2.10 |
| J9 | 2x10-position receptacle | Camera connector | Section 2.9 |
| J10 | USB Type-C connector | MCX A266 USB full-speed connector | Section 2.3 |
| J11 (DNP) | 1-pin/position connector | GND test point | For more information on these connectors, see the FRDM-MCXA266 board schematics. |
| J12 (DNP) | 1-pin/position connector | GND test point | |
| J13 (DNP) | 1x5-pin header | 5-pin, 2.54 mm target MCU (MCX A266) external debugger connector | Section 3.2 |
| J14 | 2x5-pin header | 10-pin, 1.27 mm target MCU (MCX A266) external debugger connector | |
| J15 | USB Type-C connector | MCU-Link USB connector | Section 3.6 |
| J16 | 2x2-pin header | MCX A266 CAN0 header | Section 2.4 |
| J17 | 2x2-pin header | MCX A266 CAN1 header | |
| J18 (DNP) | 1x3-pin/position connector | 5 V DC voltage regulator connector | Section 2.1 |
| J19 (DNP) | 2x8-position receptacle | Segment LCD connector | Section 2.11 |

1.6 Jumpers

[Figure 5](#) shows the FRDM-MCXA266 board jumpers.

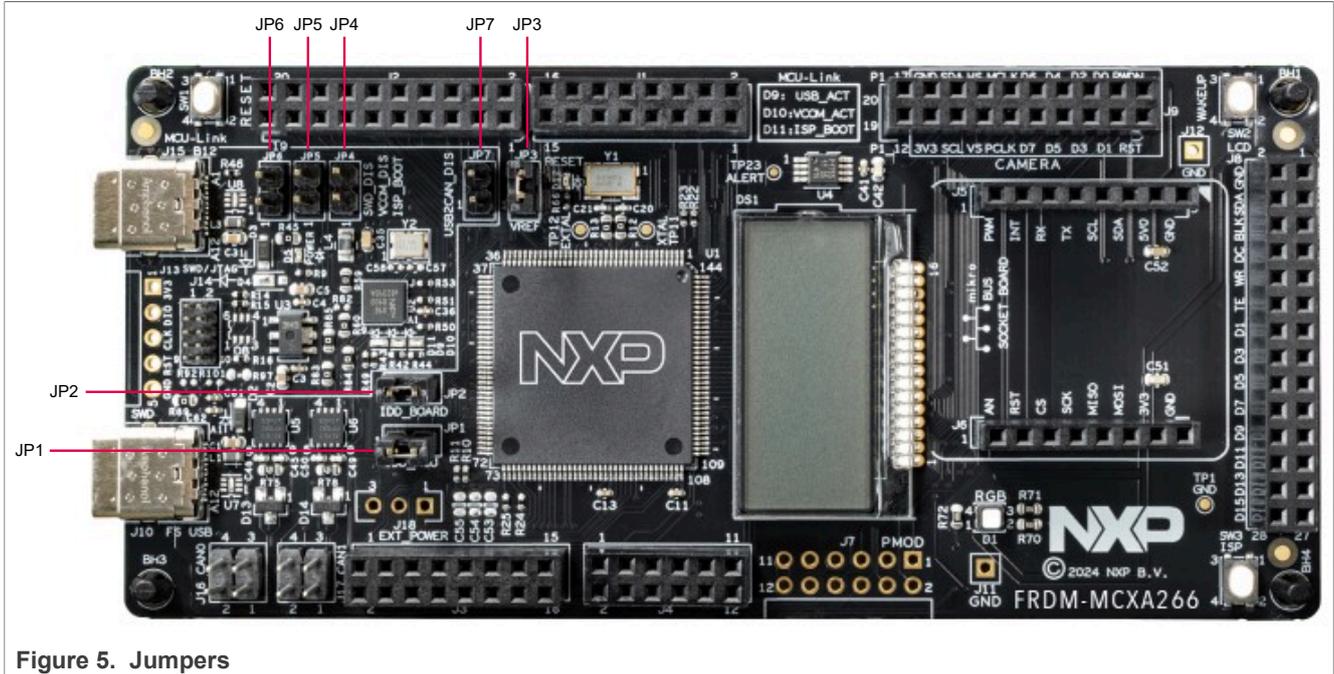


Figure 5. Jumpers

Table 4 describes the FRDM-MCXA266 board jumpers.

Table 4. FRDM-MCXA266 jumpers

| Part identifier | PCB label | Jumper type | Description | Reference section |
|-----------------|-----------|----------------|--|-----------------------------|
| JP1 | IDD_MCU | 1x2-pin header | Target MCU (MCX A266) digital power (VDD_MCU) measurement jumper: <ul style="list-style-type: none"> Open: The VDD_MCU supply is OFF initially. JP1 can be used to measure the current consumption of the MCX A266 digital IPs (see Section 2.1.1 for more details). Shorted (default setting): JP1 produces the VDD_MCU supply. | Section 2.1 |
| JP2 | IDD_BOARD | 1x2-pin header | Board power (VDD_BOARD) measurement jumper: <ul style="list-style-type: none"> Open: The VDD_BOARD supply is OFF initially. JP2 can be used to measure the current for the VDD_BOARD supply (see Section 2.1.1 for more details). Shorted (default setting): JP2 produces the VDD_BOARD supply. | |
| JP3 | VREF | 1x2-pin header | Target MCU (MCX A266) analog reference power (VREFH) measurement jumper: <ul style="list-style-type: none"> Open: The VREFH power source for the target MCU is OFF initially. JP3 can be used to measure the current consumption of the MCX A266 analog reference power (VREFH) (see Section 2.1.1 for more details). Shorted (default setting): The VDD_MCU_ANA supply sources the MCX A266 analog reference power (VREFH) through JP3. | |
| JP4 | ISP_BOOT | 1x2-pin header | MCU-Link (LPC55S16) ISP mode enable jumper: | Section 3.4 |

Table 4. FRDM-MCXA266 jumpers...continued

| Part identifier | PCB label | Jumper type | Description | Reference section |
|-----------------|-------------|----------------|---|-----------------------------|
| | | | <ul style="list-style-type: none"> Open (default setting): MCU-Link follows the normal boot sequence (MCU-Link boots from its internal flash if a boot image is found). With the internal flash erased, the MCU-Link normal boot sequence falls through to In-System Programming (ISP) boot mode. Shorted: MCU-Link is forced to ISP mode (USB1). Use this jumper setting to reprogram the MCU-Link internal flash with a new image by using the MCUXpresso IDE with the CMSIS-DAP protocol. <p>Note: By default, the MCU-Link internal flash is preprogrammed with a version of the CMSIS-DAP firmware.</p> | |
| JP5 | VCOM_DIS | 1x2-pin header | <p>MCU-Link VCOM port disable jumper:</p> <ul style="list-style-type: none"> Open (default setting): The MCU-Link virtual communication (VCOM) port (USB-to-UART bridge) is enabled. Shorted: The MCU-Link VCOM port (USB-to-UART bridge) is disabled. | Section 3.7 |
| JP6 | SWD_DIS | 1x2-pin header | <p>MCU-Link SWD disable jumper:</p> <ul style="list-style-type: none"> Open (default setting): The MCU-Link serial wire debug (SWD) feature is enabled. MCU-Link can be used to drive the SWD of the target MCU. Shorted: The MCU-Link SWD feature is disabled. This jumper setting can be used for debugging the target MCU, using an external debugger connected through the connector J14 or J13 (DNP). | Section 3.2 |
| JP7 | USB2CAN_DIS | 1x2-pin header | <p>MCU-Link USB2CAN port disable jumper:</p> <ul style="list-style-type: none"> Open (default setting): The MCU-Link USB-to-CAN^[1] bridge is enabled. Shorted: The MCU-Link USB-to-CAN bridge is disabled. | |

[1] The USB-to-CAN feature is not currently supported by MCU-Link.

1.7 Push buttons

[Figure 6](#) shows the FRDM-MCXA266 board push buttons.



Figure 6. Push buttons

Table 5 describes the FRDM-MCXA266 board push buttons.

Table 5. FRDM-MCXA266 push buttons

| Part identifier | PCB label | Name/function | Description |
|-----------------|-----------|----------------|--|
| SW1 | RESET | Reset button | Pressing SW1 asserts the MCX A266 MCU pin P1_29 (RESET_B), which wakes up the MCU from a low-power mode. Pressing SW1 turns on the reset LED D12. |
| SW2 | WAKEUP | Wake-up button | Pressing SW2 asserts the MCX A266 MCU pin P1_7 (WUU0_IN9), which can be configured through software to wake up the MCU from a low-power mode. |
| SW3 | ISP | ISP button | Pressing SW3 asserts the MCX A266 MCU pin P0_6 (ISPMODE_N), which forces the MCU extended bootloader to run in In-System Programming (ISP) mode. To boot the MCU in ISP mode, hold down SW3 while pressing SW1 (reset button) or while supplying power to the board. For more details on the MCX A266 MCU ISP mode, refer to <i>MCX A175, A176, A185, A186, A255, A256, A265 and A266 Reference Manual</i> . |

1.8 LEDs

The FRDM-MCXA266 board provides light-emitting diodes (LEDs) for monitoring system status. The information collected from the LEDs can be used for debugging purposes.

Figure 7 shows the FRDM-MCXA266 board LEDs.

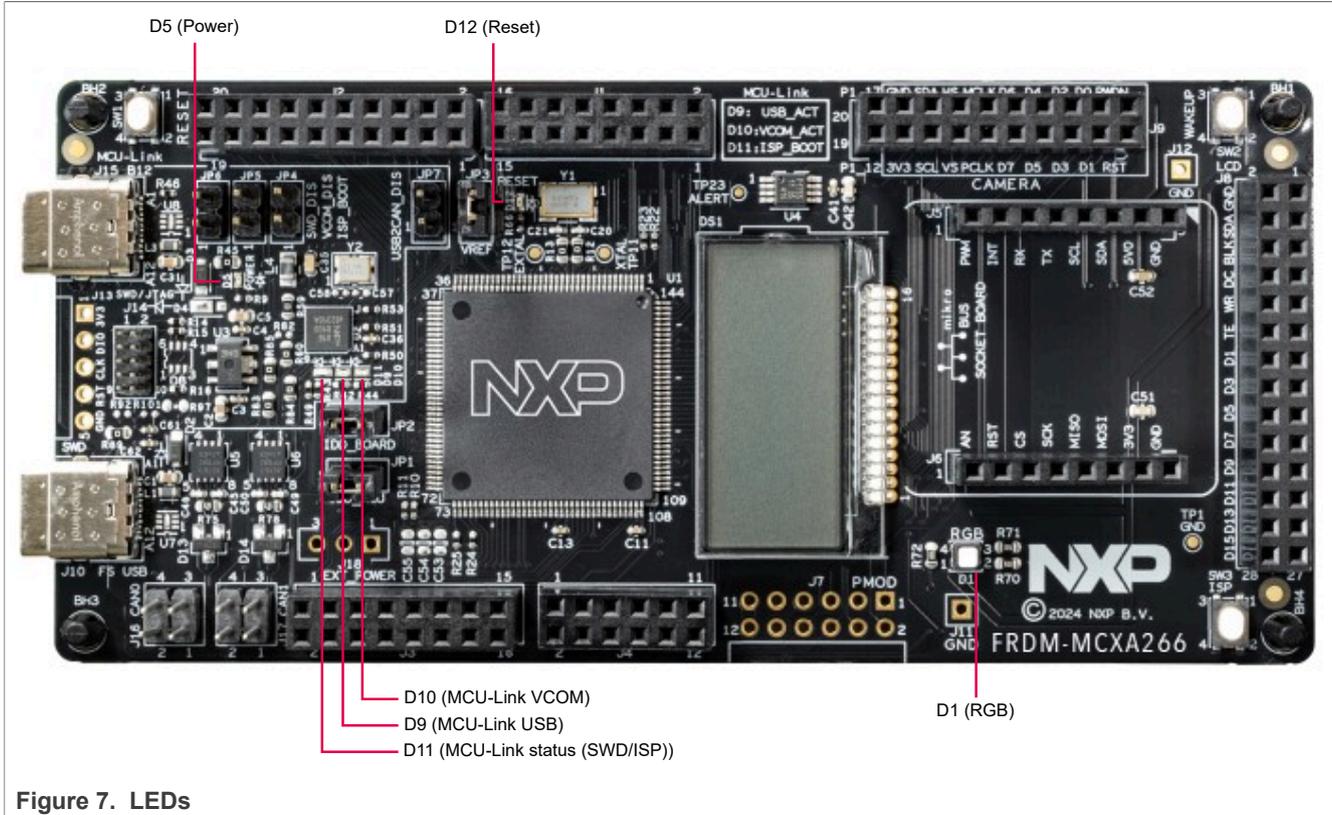


Figure 7. LEDs

Table 6 describes the FRDM-MCXA266 board LEDs except for MCU-Link-specific LEDs, which are described in Section 3.9.

Table 6. FRDM-MCXA266 LEDs

| Part identifier | PCB label | LED colors | Description (when LED is on) |
|-----------------|-----------|----------------------|--|
| D5 | POWER | Green | Indicates that the LDO 3.3 V (P3V3) supply is available. |
| D12 | RESET | Red | Indicates system reset activity. When board reset is initiated, for example, by pressing the reset button (SW1), D12 turns on. |
| D1 | RGB | Red, green, and blue | <p>This LED can be used for user-defined indications in application software. Each color channel (red, green, and blue) of the RGB LED is connected to a specific GPIO pin of the MCX A266 MCU as follows:</p> <ul style="list-style-type: none"> Red LED: P3_18 Green LED: P3_19 Blue LED: P3_21 <p>Driving a low level on any of these pins turns on the corresponding LED color, as the LEDs are typically connected in an active-low configuration.</p> |

Note: MCU-Link-specific LEDs D9, D10, and D11 are described in Section 3.9.

2 Functional description

This section contains the following subsections:

- [Section 2.1 "Power supplies"](#)
- [Section 2.2 "Clocks"](#)
- [Section 2.3 "USB interface"](#)
- [Section 2.4 "FlexCAN interface"](#)
- [Section 2.5 "LPUART interface"](#)
- [Section 2.6 "LPSPI interface"](#)
- [Section 2.7 "LPI2C interface"](#)
- [Section 2.8 "I3C interface"](#)
- [Section 2.9 "SmartDMA/camera interface"](#)
- [Section 2.10 "FlexIO/LCD interface"](#)
- [Section 2.11 "Segment LCD interface"](#)
- [Section 2.12 "ADC interface"](#)
- [Section 2.13 "OPAMP interface"](#)
- [Section 2.14 "Arduino socket"](#)
- [Section 2.15 "mikroBUS socket"](#)
- [Section 2.16 "Pmod connector"](#)

2.1 Power supplies

The FRDM-MCXA266 board is powered with a 5 V power supply (P5V0) using one of the following source options:

- P5V_USB supply from MCX A266 USB Type-C connector J10
- P5V_MCU_LINK supply from MCU-Link USB Type-C connector J15
- P5V_HDR_IN supply from 5 V regulator populated at 3-pin connector J18 (not populated by default)
- P5V0 supply from Arduino shield compatible header J3 (pin 10), CAN0 connector J16 (pin 3), CAN1 connector J17 (pin 3), mikroBUS socket connector J5 (pin 7), and power test point TP5

The primary power supply is used to produce secondary power supplies for powering other board components. These components include the MCX A266 MCU, the LPC55S16 MCU, CAN FD transceivers, CAN connectors, Arduino socket, mikroBUS socket, Pmod connector, camera connector, FlexIO/LCD connector, and external debugger connectors.

[Table 7](#) describes the FRDM-MCXA266 board power supplies.

Table 7. FRDM-MCXA266 power supplies

| Power source | Manufacture and part number | Power supply | Description |
|---|-----------------------------|--------------------|---|
| External supply through the MCX A266 USB Type-C connector J10 | | P5V_USB (5 V) | <ul style="list-style-type: none"> • One of the five power source options for the system 5 V power supply (P5V0) • Test point TP4 is provided for P5V_USB power supply measurement. |
| External supply through the MCU-Link USB Type-C connector J15 | | P5V_MCU_LINK (5 V) | <ul style="list-style-type: none"> • Another power source option for the system 5 V power supply (P5V0) • Provides the USB1_VBUS power to the LPC55S16 MCU (MCU-Link) |

Table 7. FRDM-MCXA266 power supplies...continued

| Power source | Manufacture and part number | Power supply | Description |
|--|-------------------------------------|-------------------|---|
| | | | <ul style="list-style-type: none"> Test point TP3 is provided for P5V_MCU_LINK power supply measurement. |
| Arduino socket connector J3 (pin 16), CAN0 connector J16 (pin 3), or CAN1 connector J17 (pin 3) Note: Getting the P5-9V_VIN supply at pin 3 of CAN0 connector J16 / CAN1 connector J17 requires changing the SJ2/SJ3 setting from 1-2 shorted to 2-3 shorted. | | P5-9V_VIN (5–9 V) | <ul style="list-style-type: none"> Supplies power to the 5 V DC voltage regulator connector J18 (not populated) Acts as an alternative power supply for the CAN0 connector J16 (pin 3) and CAN1 connector J17 (pin 3) |
| 5 V DC voltage regulator attached to the connector J18 (DNP) | | P5V_HDR_IN (5 V) | A third power source option (disabled by default) for the system 5 V power supply (P5V0) Note: An external 5 V power at pin 3 of the CAN0 connector J16 or CAN1 connector J17 can also produce the system 5 V power supply (P5V0). Getting the P5V0 supply at pin 3 of CAN0 connector J16 / CAN1 connector J17 requires SJ2/SJ3 to be configured as 1-2 shorted (default setting). |
| From the P5V_USB / P5V_MCU_LINK / P5V_HDR_IN supply or external supply through the CAN0 connector J16 (pin 3) / CAN1 connector J17 (pin 3) Note: By default, the option to produce the P5V0 supply from the P5V_HDR_IN supply is disabled. Note: Getting the P5V0 supply at pin 3 of CAN0 connector J16 / CAN1 connector J17 requires SJ2/SJ3 to be configured as 1-2 shorted (default setting). | | P5V0 (5 V) | <ul style="list-style-type: none"> Provides the VCC power to the CAN FD transceivers U5 and U6 Acts as the default power supply for the CAN0 connector J16 (pin 3) and CAN1 connector J17 (pin 3) Supplies power to the LDO voltage regulator U3, the Arduino socket connector J3 (pin 10), and the mikroBUS socket connector J5 (pin 7) Test point TP5 is provided for P5V0 power supply measurement. |
| LDO voltage regulator U3 | Torex Semiconductor XC6227C331 PR-G | P3V3 (3.3 V) | <ul style="list-style-type: none"> Produces the VDD_MCU (3.3 V) supply through either the jumper JP1 or the 0 Ω resistor R6 (not populated) Produces the VDD_BOARD (3.3 V) supply through either the jumper JP2 or the 0 Ω resistor R7 (not populated) Produces the VDD_MCU_LINK (3.3 V) supply through the 0 Ω resistor R8 Supplies power to the Arduino socket connector J3 (pin 8) and the power LED D5 Test point TP6 is provided for P3V3 power supply measurement. |

Table 7. FRDM-MCXA266 power supplies...continued

| Power source | Manufacture and part number | Power supply | Description |
|--|-----------------------------|----------------------|---|
| From the P3V3 supply through the jumper JP1 or the resistor R6 (DNP) | | VDD_MCU (3.3 V) | <ul style="list-style-type: none"> • Produces the VDD_MCU_ANA supply through the 0 Ω resistor R104 • Provides the VDD power to the MCX A266 MCU through the 0 Ω resistor R103 • Provides the VDD_USB power to the MCX A266 MCU through the 0 Ω resistor R105 • Supplies power to the SWD connector J13 (DNP) • Test point TP7 is provided for VDD_MCU power supply measurement. |
| From the VDD_MCU supply through the resistor R104 | | VDD_MCU_ANA (3.3 V) | <ul style="list-style-type: none"> • Provides the VDD_ANA power to the MCX A266 MCU • Provides the VREFH power to the MCX A266 MCU through the jumper JP3. Alternatively, you can open JP3 and connect to its pin 2 an external VREF source for the MCX A266 MCU. • Supplies power to the Arduino socket connector J2 (pin 16) |
| From the P3V3 supply through the jumper JP2 or the resistor R7 (DNP) | | VDD_BOARD (3.3 V) | <ul style="list-style-type: none"> • Provides the VIO power to CAN FD transceivers U5 and U6 • Supplies power to: <ul style="list-style-type: none"> – Temperature sensor U4 – Arduino socket connector J3 (pin 4) – mikroBUS socket connector J6 – Pmod connector J7 (not populated) – FlexIO/LCD connector J8 – Camera connector J9 – External debugger connector J14 – Push buttons SW1, SW2, and SW3 – Reset LED D12 and RGB LED D1 • Test point TP8 is provided for VDD_BOARD power supply measurement. |
| From the P3V3 supply through the 0 Ω resistor R8 | | VDD_MCU_LINK (3.3 V) | <ul style="list-style-type: none"> • Supplies power to the LPC55S16 MCU (MCU-Link) and MCU-Link LEDs D9, D10, and D11 • Test point TP9 is provided for VDD_MCU_LINK power supply measurement. |

2.1.1 Current measurement

The FRDM-MCXA266 board supports current measurement using an ampere meter (ammeter) on the power supplies shown in [Table 8](#).

Note: By default, the VDD_MCU supply is connected to the debugger MCU (LPC55S16) through the resistor R52. Due to some current leakage between R52 and the debugger MCU, the target MCU current is slightly higher than its expected value. To fix this issue, perform a board rework by connecting R52 to the VDD_MCU_LINK supply.

Table 8. Power supplies with current measurement support

| Source power supply | Power supply to be measured | Jumper (2-pin) | Resistor | Current measurement steps |
|---------------------|--|----------------|----------|--|
| P3V3 | VDD_MCU: Target MCU total power (analog + digital) | JP1 | R6 (DNP) | <ol style="list-style-type: none"> 1. Open the jumper (JP1). 2. Connect an ammeter to the jumper pins 1 and 2. |

Table 8. Power supplies with current measurement support...continued

| Source power supply | Power supply to be measured | Jumper (2-pin) | Resistor | Current measurement steps |
|---------------------|--------------------------------------|----------------|----------|--|
| | VDD_BOARD: Board power | JP2 | R7 (DNP) | <ol style="list-style-type: none"> 1. Open the jumper (JP2). 2. Connect an ammeter to the jumper pins 1 and 2. |
| VDD_MCU | Target MCU digital power | | R103 | <ol style="list-style-type: none"> 1. Remove the resistor R103. 2. Connect an ammeter to the resistor R103 pins 1 and 2. |
| | VDD_MCU_ANA: Target MCU analog power | | R104 | <ol style="list-style-type: none"> 1. Remove the resistor R104. 2. Connect an ammeter to the resistor R104 pins 1 and 2. |
| VDD_MCU_ANA | Target MCU analog reference power | JP3 | | <ol style="list-style-type: none"> 1. Open the jumper (JP3). 2. Connect an ammeter to the jumper pins 1 and 2. |

2.2 Clocks

Table 9 provides details about inputs clocks on the FRDM-MCXA266 board.

Table 9. FRDM-MCXA266 clocks

| Clock generator | Manufacturer and part number | Clock | Frequency | Destination |
|-----------------|------------------------------|-------------------|-----------|--------------|
| Crystal Y1 | Würth Elektronik 830055663 | XTAL48M, EXTAL48M | 8 MHz | MCX A266 MCU |
| Crystal Y2 | Würth Elektronik 830064296 | XTAL32M_[P, N] | 16 MHz | LPC55S16 MCU |

On the FRDM-MCXA266 board, you can generate a clock output (CLKOUT) using the MCX A266 MCU pin P3_6 or P4_2. With MCU pin P3_6 configured for a clock output, you can get the clock output at pin 10 of the camera connector J9. With MCU pin P4_2 configured for a clock output, you can get the clock output at pin 12 of the camera connector J9 or at pin 3 of the mikroBUS connector J5.

2.3 USB interface

The MCX A266 MCU has one Universal Serial Bus (USB) Full Speed (FS) module, USBFS0, and one USB FS PHY. The USBFS0 module supports both Host and Device modes.

The FRDM-MCXA266 board supports communication with the USBFS0 module. Figure 8 shows the FRDM-MCXA266 USB diagram.

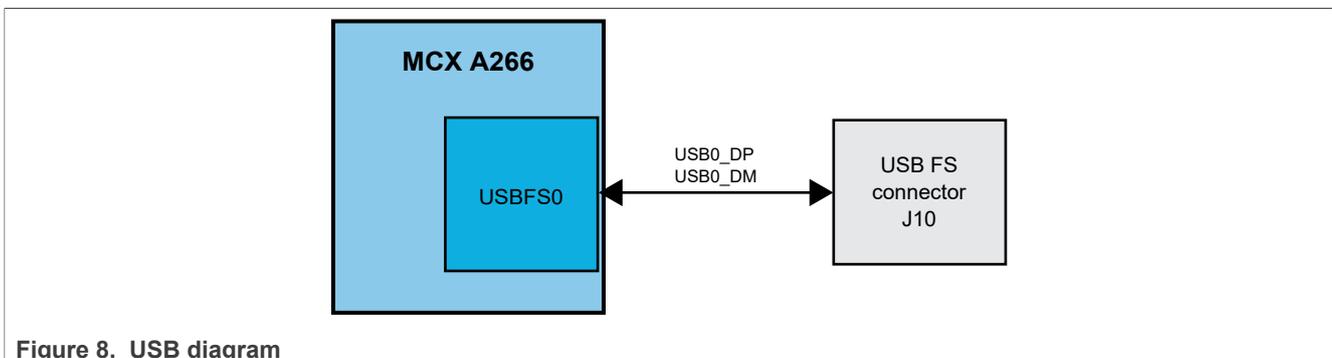


Figure 8. USB diagram

Table 10 describes the FRDM-MCXA266 USB connections.

Table 10. USB connections

| USB module | Peripheral devices | |
|------------|--------------------|---|
| | Part identifier | Description |
| USBFS0 | J10 | A USB 2.0 (FS) Type-C connector that allows communication with the USBFS0 module of the MCX A266 MCU using a USB Type-C cable. It can operate in Host or Device mode. It also serves as a 5 V power source to power up the board. |

2.4 FlexCAN interface

The MCX A266 MCU has two Flexible Data Rate Controller Area Network (FlexCAN) modules: CAN0 and CAN1. The FRDM-MCXA266 board supports communication with both the FlexCAN modules. [Figure 9](#) shows the FRDM-MCXA266 FlexCAN diagram.

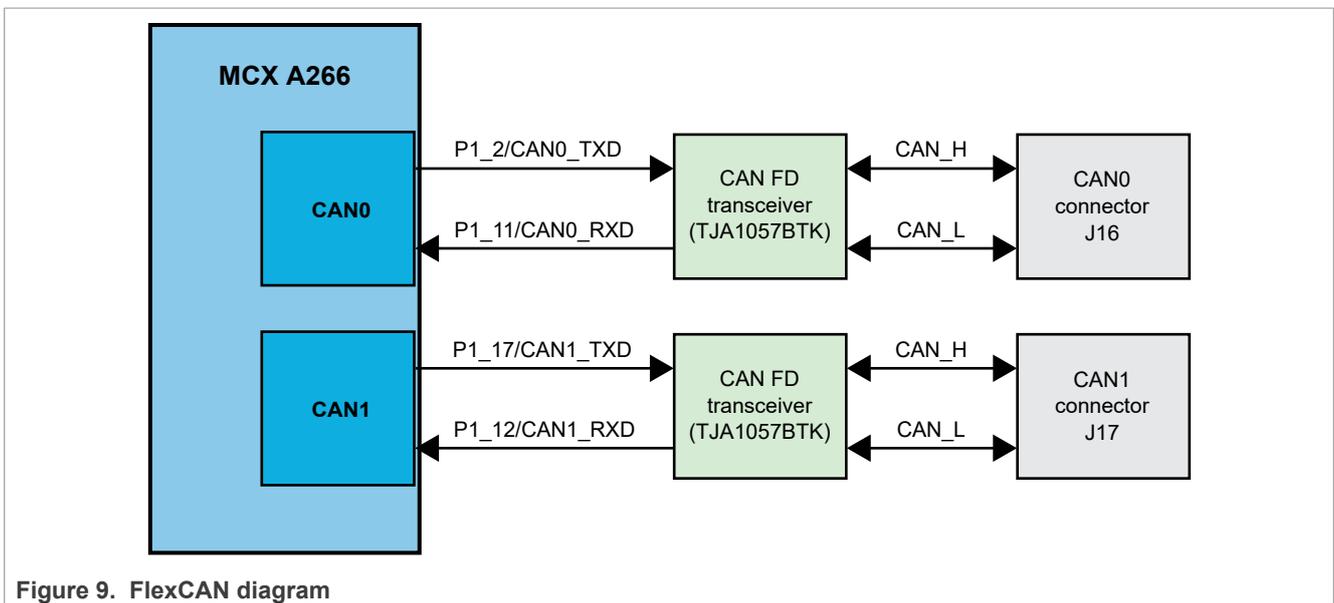


Figure 9. FlexCAN diagram

[Table 11](#) describes the FRDM-MCXA266 FlexCAN connections.

Table 11. FlexCAN connections

| FlexCAN module | Peripheral devices | | |
|----------------|--------------------|------------------------------|---|
| | Part identifier | Manufacturer and part number | Description |
| CAN0 | U5 | NXP TJA1057BTK | A high-speed CAN Flexible Data rate (FD) transceiver, which drives CAN signals between the CAN0 module of the MCX A266 MCU and a physical two-wire CAN bus. It performs the following functions: <ul style="list-style-type: none"> • Receives digital data from the MCU, converts it into analog data, and sends it to CAN bus lines. • Receives analog data from the CAN bus lines, converts it into digital data, and sends it to the MCU. |
| | J16 | | A 2x2-pin header that allows external CAN connection with the CAN bus. It has the following pinout: <ul style="list-style-type: none"> • Pin 1: High-level CAN bus line connection • Pin 2: Low-level CAN bus line connection • Pin 3: Power connection (P5V0 (default) / P5-9V_VIN (alternative)) |

Table 11. FlexCAN connections...continued

| FlexCAN module | Peripheral devices | | |
|----------------|--------------------|------------------------------|--|
| | Part identifier | Manufacturer and part number | Description |
| | | | <ul style="list-style-type: none"> Pin 4: Ground |
| CAN1 | U6 | NXP TJA1057BTK | Another high-speed CAN FD transceiver, which drives CAN signals between the CAN0 module of the MCX A266 MCU and a physical two-wire CAN bus. It performs the following functions: <ul style="list-style-type: none"> Receives digital data from the MCU, converts it into analog data, and sends it to CAN bus lines. Receives analog data from the CAN bus lines, converts it into digital data, and sends it to the MCU. |
| | J17 | | Another 2x2-pin header that allows external CAN connection with the CAN bus. It has the following pinout: <ul style="list-style-type: none"> Pin 1: High-level CAN bus line connection Pin 2: Low-level CAN bus line connection Pin 3: Power connection (P5V0 (default) / P5-9V_VIN (alternative)) Pin 4: Ground |

Note: NXP recommends you to use the TAJ1057BTK CAN transceiver for new designs, in place of TJA1057GTK/3Z.

2.5 LPUART interface

The MCX A266 MCU has six Low-Power Universal Asynchronous Receiver/Transmitter (LPUART) modules: LPUART0, LPUART1, LPUART2, LPUART3, LPUART4, and LPUART5. The FRDM-MCXA266 board supports communication with the LPUART0, LPUART2, LPUART3, LPUART4, and LPUART5 modules.

[Figure 10](#) shows the FRDM-MCXA266 LPUART diagram.

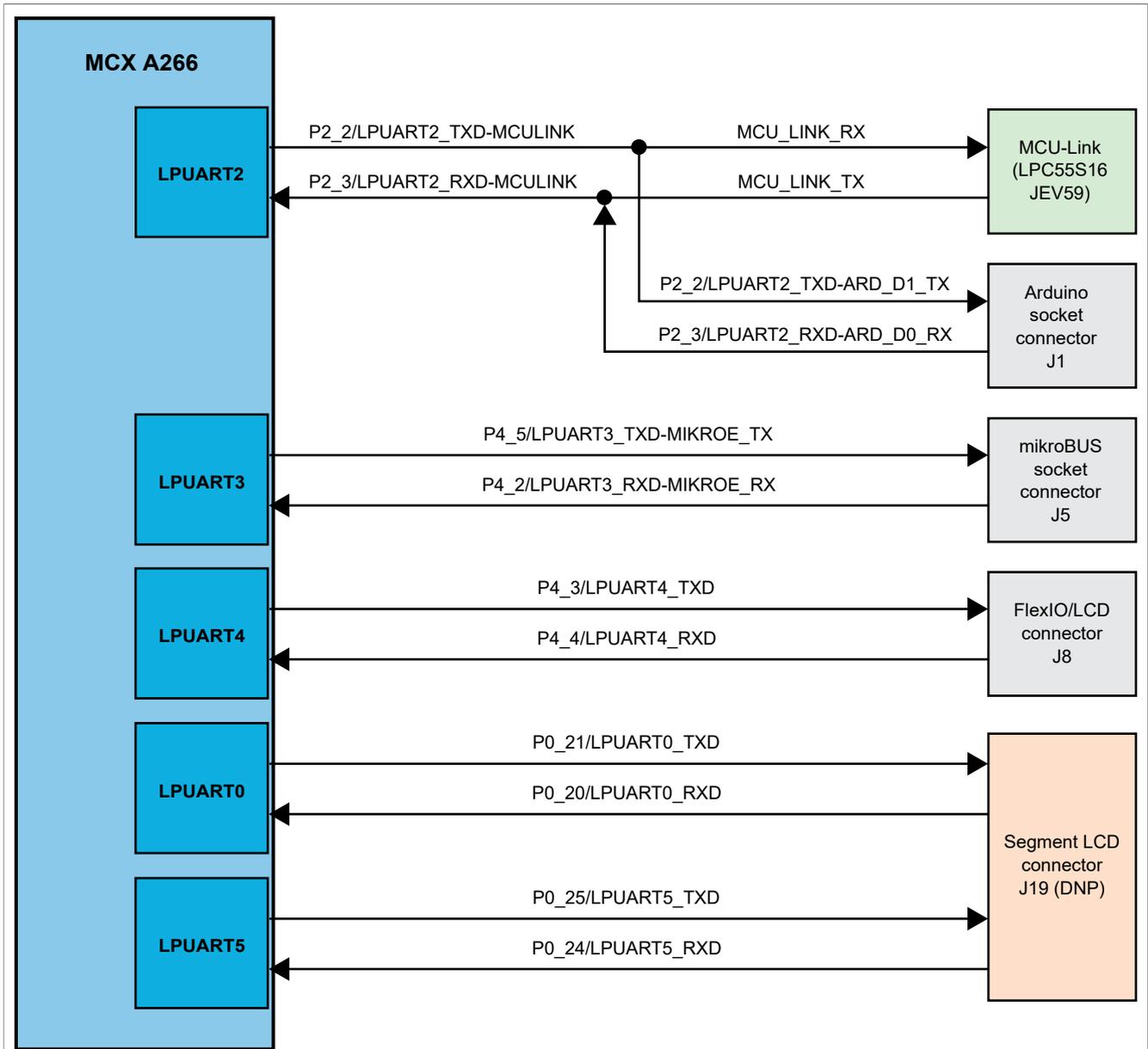


Figure 10. LPUART diagram

Table 12 describes the FRDM-MCXA266 LPUART connections.

Table 12. LPUART connections

| LPUART modules | Peripheral devices | | |
|----------------|--------------------|------------------------------|---|
| | Part identifier | Manufacturer and part number | Description |
| LPUART2 | U2 | NXP LPC55S16JEV59 | MCU-Link, which is a 32-bit MCU based on the Arm Cortex-M33 core running at speeds of up to 150 MHz. MCU-Link can be used as a USB-to-UART bridge to debug the target MCU (MCX A266) through a Virtual Communication (VCOM) port. |

Table 12. LPUART connections...continued

| LPUART modules | Peripheral devices | | |
|---------------------|--------------------|------------------------------|---|
| | Part identifier | Manufacturer and part number | Description |
| | J1 | | A 2x8-position Arduino socket connector that allows the plugged-in Arduino board to communicate with the MCX A266 MCU through a UART connection. |
| LPUART3 | J5 | | A 1x8-position mikroBUS socket connector that allows the plugged-in mikroBUS click board to communicate with the MCX A266 MCU through a UART connection |
| LPUART4 | J8 | | A 2x14-position FlexIO/LCD connector that allows the external module board to communicate with the MCX A266 MCU through a UART connection. J8 pins 6 and 7 are connected to LPUART4. |
| LPUART0 and LPUART5 | J19 (DNP) | | A 2x8-position segment LCD connector that allows the external module board to communicate with the MCX A266 MCU through a UART connection. J19 pins 9 and 10 are connected to LPUART0. J19 pins 13 and 14 are connected to LPUART5. |

2.6 LPSPI interface

The MCX A266 MCU has two Low-Power Serial Peripheral Interface (LPSPI) modules: LPSPI0 and LPSPI1.

Each LPSPI module supports two modes:

- Controller mode, with support for up to four Peripheral Chip Selects (PCSEs)
- Peripheral mode

The FRDM-MCXA266 board supports communication with both LPSPI modules of the MCX A266 MCU.

[Figure 11](#) shows the FRDM-MCXA266 LPSPI diagram.

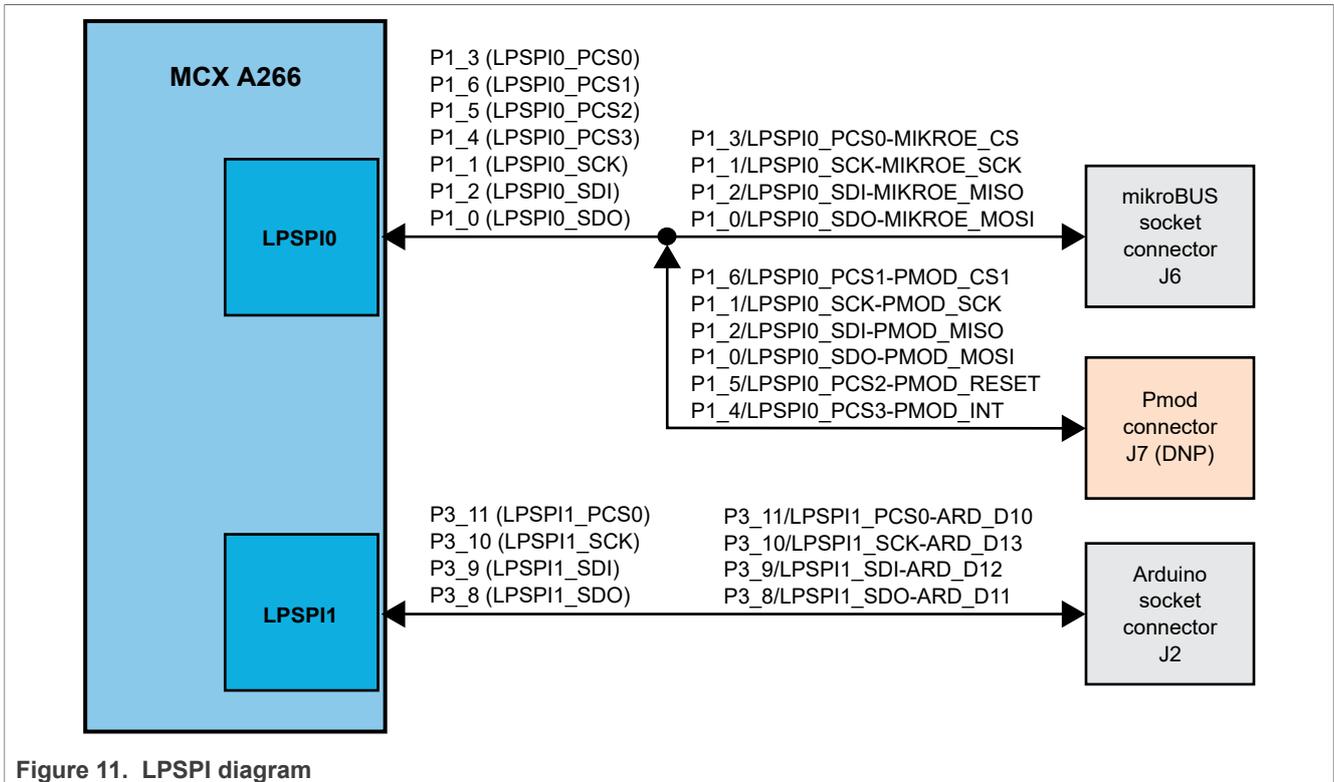


Figure 13 describes the FRDM-MCXA266 LPSPI connections.

Table 13. LPSPI connections

| LPSPI module | Peripheral chip select | Peripheral devices | |
|--------------|------------------------|--------------------|--|
| | | Part identifier | Description |
| LPSPI0 | PCS0 | J6 | A 1x8-position mikroBUS socket connector that allows the plugged-in mikroBUS click board to communicate with the MCX A266 MCU through an SPI connection |
| | PCS1 | J7 (DNP) | A 2x6-pin/position Pmod connector that allows the plugged-in Pmod board to communicate with the MCX A266 MCU through an SPI connection. J7 also supports LPSPI0 working in Quad SPI mode. By default, J7 is not populated on the board. |
| LPSPI1 | PCS1 | J2 | A 2x10-position Arduino socket connector that allows the plugged-in Arduino board to communicate with the MCX A266 MCU through an SPI connection. |

2.7 LPI2C interface

The MCX A266 MCU has four Low-Power Inter-Integrated Circuit (LPI2C) modules: LPI2C0, LPI2C1, LPI2C2, and LPI2C3. Each LPI2C module supports serial I²C communication through a pair of control and data signals and can act as a controller or target.

The FRDM-MCXA266 board supports communication with all the LPI2C modules. [Figure 12](#) shows the FRDM-MCXA266 LPI2C diagram.

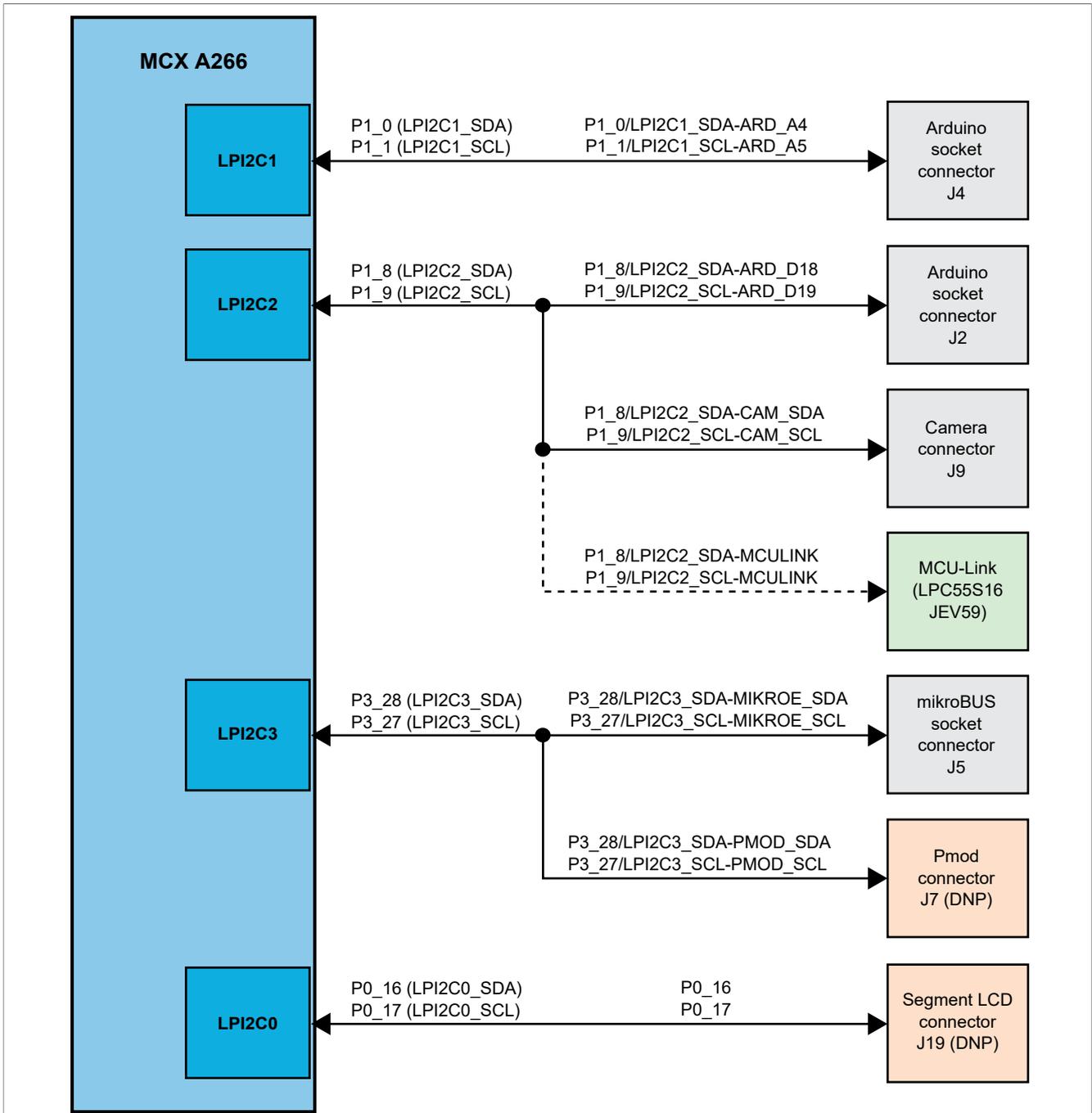


Figure 12. LPI2C diagram

Table 14 describes the FRDM-MCXA266 LPI2C devices. The I²C address of each device (except MCU-Link, which acts as an I²C controller) depends on the plugged-in board/module.

Table 14. LPI2C devices

| LPSPi module | Peripheral devices | | |
|--------------|--------------------|------------------------------|---|
| | Part identifier | Manufacturer and part number | Description |
| LPI2C1 | J4 | | A 2x6-position Arduino socket connector that allows the plugged-in Arduino board to communicate with the MCX A266 MCU through an I ² C connection. Note: This I ² C connection is shared with SPI functions (SCK and MOSI) of the mikroBUS socket connector J6 and the Pmod connector J7 (DNP). |
| LPI2C2 | J2 | | A 2x10-position Arduino socket connector that allows the plugged-in Arduino board to communicate with the MCX A266 MCU through an I ² C connection |
| | J9 | | A 2x10-position camera connector that allows the external module board to communicate with the MCX A266 MCU through an I ² C connection. Pins 15 and 16 of J9 are connected to the SCL and SDA signals, respectively, of LPI2C2. |
| | U2 | NXP LPC55S16JEV59 | MCU-Link, which is a 32-bit MCU based on the Arm Cortex-M33 core running at speeds of up to 150 MHz. MCU-Link can be used as a USB-to-I ² C bridge to debug the target MCU (MCX A266) through a USB port. |
| LPI2C3 | J5 | | A 1x8-position mikroBUS socket connector that allows the plugged-in mikroBUS click board to communicate with the MCX A266 MCU through an I ² C connection |
| | J7 (DNP) | | A 2x6-pin/position Pmod connector that allows the plugged-in Pmod board to communicate with the MCX A266 MCU through an I ² C connection. By default, J7 is not populated on the board. |
| LPI2C0 | J19 (DNP) | | A 2x8-position segment LCD connector that allows the external module board to communicate with the MCX A266 MCU through an I ² C connection |

2.8 I3C interface

The Improved Inter-Integrated Circuit (I3C) specification from Mobile Industry Processor Interface (MIPI) Alliance brings major improvements over I²C in terms of use and power. It also provides an alternative to SPI for mid-speed applications.

The MCX A266 MCU has one I3C module, I3C0, which acts as the I3C controller for the target devices (for example, a temperature sensor) placed on the I3C bus. The I3C module dynamically assigns I3C addresses to the I3C targets; the targets do not need static I3C addresses. However, a target can have an I²C static address assigned at startup, so that the target can operate on an I²C bus.

The FRDM-MCXA266 board supports communication with the I3C0 module of the MCX A266 MCU. [Figure 13](#) shows the FRDM-MCXA266 I3C diagram.

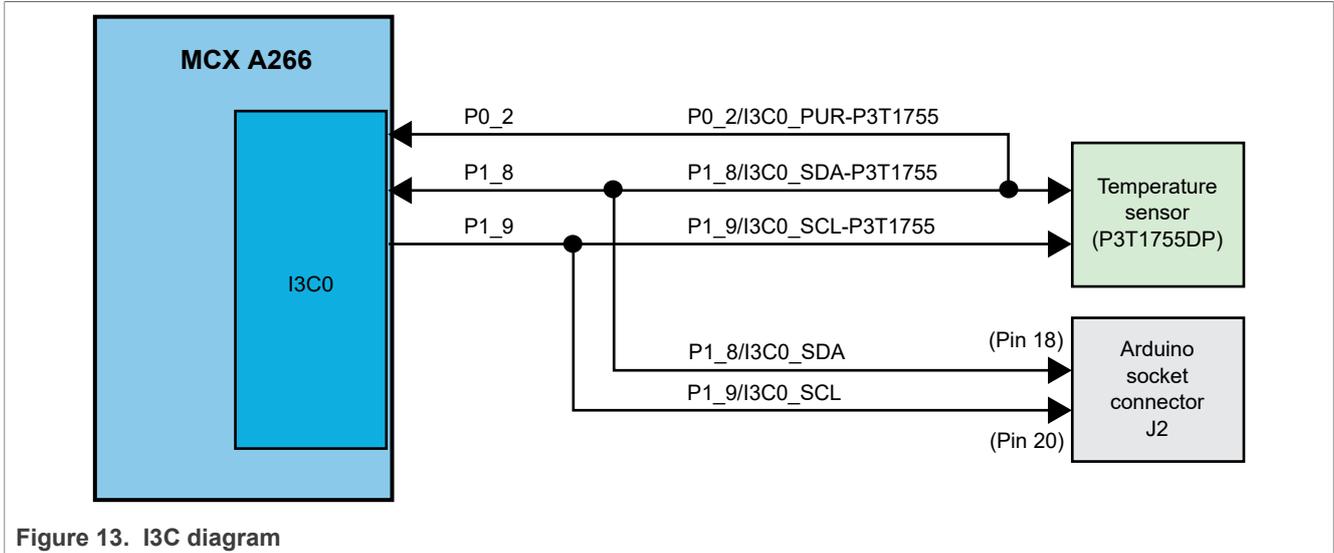


Figure 13. I3C diagram

Table 15 describes the FRDM-MCXA266 I3C connections.

Table 15. I3C connections

| I3C module | Peripheral devices | | |
|------------|---------------------|------------------------------|--|
| | Part identifier | Manufacturer and part number | Description |
| I3C0 | U4 | NXP P3T1755DP | A digital temperature sensor with support for over-temperature detection. It can measure temperature in the range from -40 °C to +125 °C with ±0.5 °C accuracy. It has an on-chip band gap temperature sensor and uses the analog-to-digital conversion technique. It has a temperature register to store the digital temperature reading that can be read by a controller via the 2-wire serial I3C (up to 12.5 MHz) or I ² C (up to 3.4 MHz) interface. For more information on P3T1755DP, visit nxp.com . |
| | J2 (pins 18 and 20) | | A 2x10-position Arduino socket connector that allows the plugged-in Arduino board to communicate with the MCX A266 MCU through an I3C connection |

2.9 SmartDMA/camera interface

The MCX A266 MCU has one Smart DMA Controller (SmartDMA) core that supports unique, reduced instruction sets. It operates in a way similar to an Arm core. It provides emulation of various serial or parallel communication protocols, such as:

- UART
- SPI
- I²C
- LCD interface
- Camera interface

The FRDM-MCXA266 board supports communication with the SmartDMA module through a 2x10-position camera connector J9. The connector supports a camera module based on the OmniVision OV7670 image sensor.

Figure 14 shows the FRDM-MCXA266 SmartDMA/camera diagram.

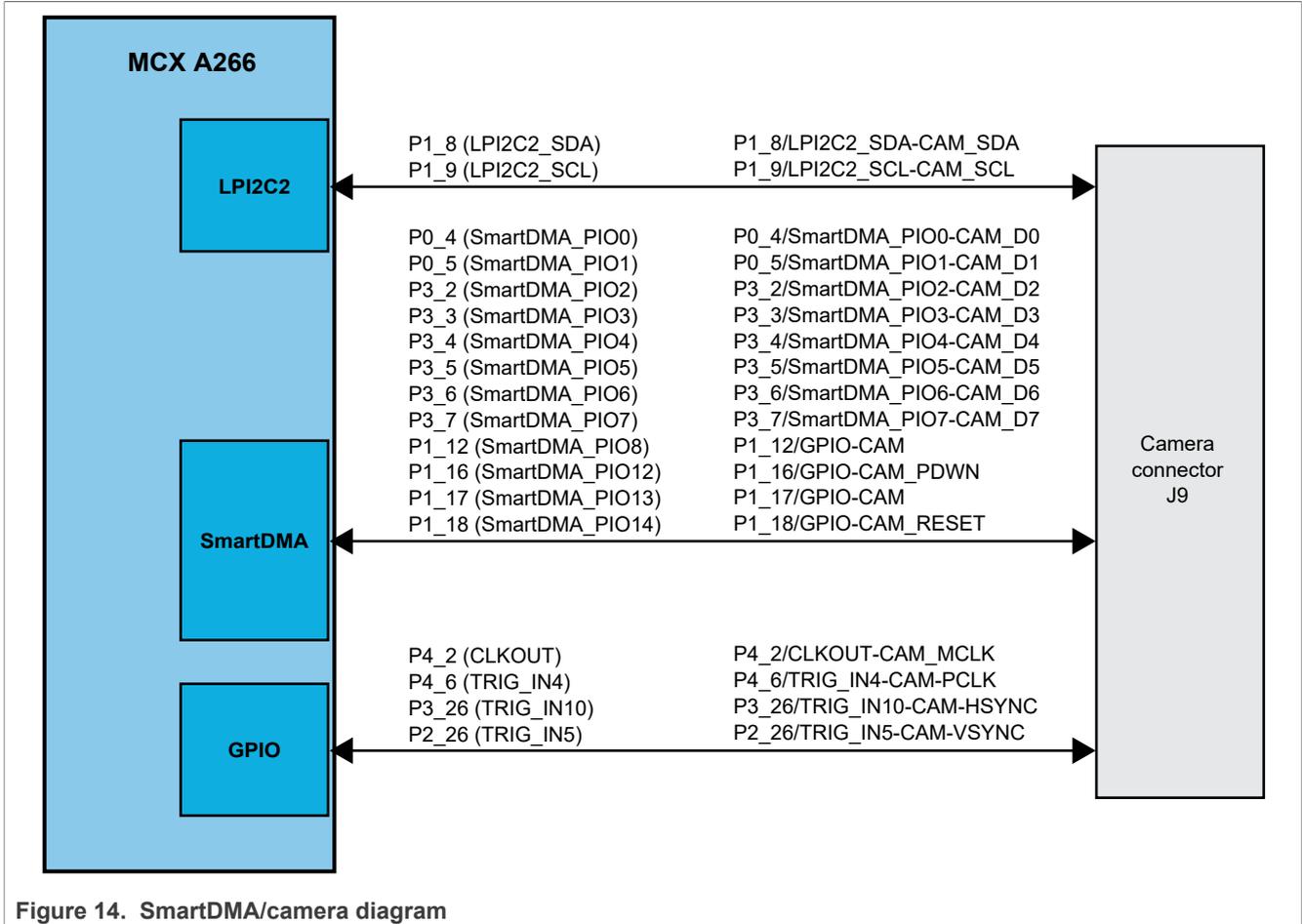


Figure 14. SmartDMA/camera diagram

Table 16 shows the pinout of the SmartDMA camera connector J9.

Table 16. Camera connector pinout

| Pin number | Signal name | Description |
|------------|---------------------------|-----------------------------|
| 1 | P1_18/GPIO-CAM_RESET | Camera reset signal |
| 2 | P1_16/GPIO-CAM_PDWN | Camera power-down signal |
| 3 | P0_5/SmartDMA_PIO1-CAM_D1 | Camera data signals |
| 4 | P0_4/SmartDMA_PIO0-CAM_D0 | |
| 5 | P3_3/SmartDMA_PIO3-CAM_D3 | |
| 6 | P3_2/SmartDMA_PIO2-CAM_D2 | |
| 7 | P3_5/SmartDMA_PIO5-CAM_D5 | |
| 8 | P3_4/SmartDMA_PIO4-CAM_D4 | |
| 9 | P3_7/SmartDMA_PIO7-CAM_D7 | |
| 10 | P3_6/SmartDMA_PIO6-CAM_D6 | |
| 11 | P4_6/TRIG_IN4-CAM_PCLK | Camera pixel clock signal |
| 12 | P4_2/CLKOUT-CAM_MCLK | Camera input clock signal |
| 13 | P2_26/TRIG_IN5-CAM_VSYNC | Camera vertical sync signal |

Table 16. Camera connector pinout...continued

| Pin number | Signal name | Description |
|------------|---------------------------|------------------------------------|
| 14 | P3_26/TRIG_IN10-CAM_HSYNC | Camera horizontal reference signal |
| 15 | P1_9/LPI2C2_SCL-CAM_SCL | I ² C signals |
| 16 | P1_8/LPI2C2_SDA-CAM_SDA | |
| 17 | VDD | Power supply |
| 18 | GND | Ground |
| 19 | P1_12/GPIO-CAM | Reserved GPIO |
| 20 | P1_17/GPIO-CAM | Reserved GPIO |

2.10 FlexIO/LCD interface

The MCX A266 MCU has one Flexible Input/Output (FlexIO) / Liquid-Crystal Display (LCD) module, FLEXIO0, which provides emulation of various serial or parallel communication protocols, including:

- UART
- SPI
- I²C
- I2S
- LCD interface
- Camera interface
- PWM or waveform generation

The FRDM-MCXA266 board supports communication with the FLEXIO0 module through a 2x14-position FlexIO/LCD connector J8.

[Figure 15](#) shows the FRDM-MCXA266 FlexIO/LCD diagram.

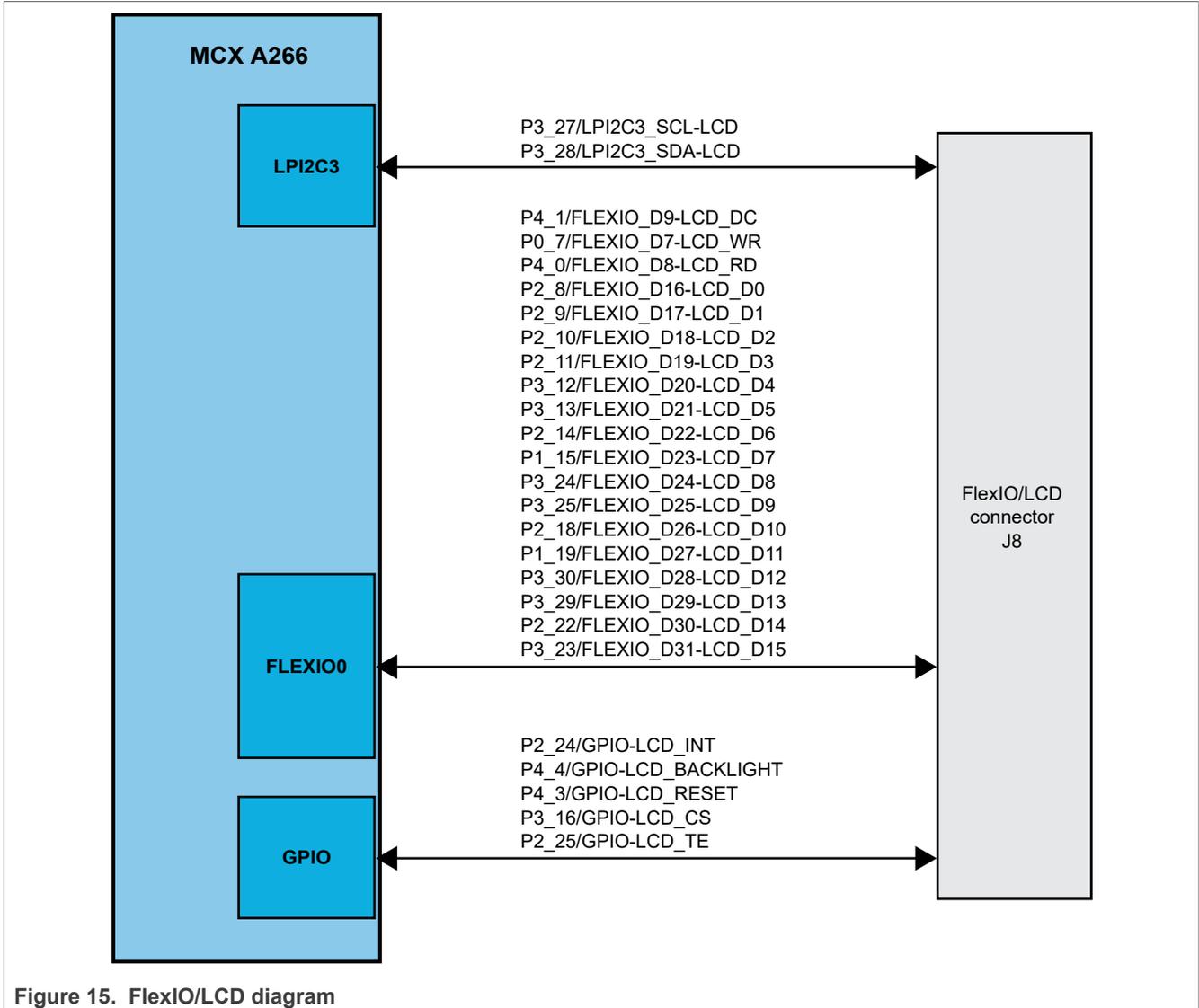


Figure 15. FlexIO/LCD diagram

Table 17 shows the pinout of the connector J8.

Table 17. FlexIO/LCD connector pinout

| Pin number | Signal name | Description |
|------------|-------------------------|------------------------------|
| 1 | VDD_BOARD | Power supply |
| 2 | GND | Ground |
| 3 | P3_27/LPI2C3_SCL-LCD | I ² C signals |
| 4 | P3_28/LPI2C3_SDA-LCD | |
| 5 | P2_24/GPIO-LCD_INT | LCD interrupt signal |
| 6 | P4_4/GPIO-LCD_BACKLIGHT | LCD backlight signal |
| 7 | P4_3/GPIO-LCD_RESET | LCD reset signal |
| 8 | P4_1/FLEXIO0_D9-LCD_DC | LCD Data/Command (DC) signal |
| 9 | P3_16/GPIO-LCD_CS | LCD Chip Select (CS) signal |

Table 17. FlexIO/LCD connector pinout...continued

| Pin number | Signal name | Description |
|------------|---------------------------|--------------------------------|
| 10 | P0_7/FLEXIO0_D7-LCD_WR | LCD write data signal |
| 11 | P4_0/FLEXIO0_D8-LCD_RD | LCD read data signal |
| 12 | P2_25/GPIO-LCD_TE | LCD Tearing Effect (TE) signal |
| 13 | P2_8/FLEXIO0_D16-LCD_D0 | LCD data signals |
| 14 | P2_9/FLEXIO0_D17-LCD_D1 | |
| 15 | P2_10/FLEXIO0_D18-LCD_D2 | |
| 16 | P2_11/FLEXIO0_D19-LCD_D3 | |
| 17 | P3_12/FLEXIO0_D20-LCD_D4 | |
| 18 | P3_13/FLEXIO0_D21-LCD_D5 | |
| 19 | P2_14/FLEXIO0_D22-LCD_D6 | |
| 20 | P1_15/FLEXIO0_D23-LCD_D7 | |
| 21 | P3_24/FLEXIO0_D24-LCD_D8 | |
| 22 | P3_25/FLEXIO0_D25-LCD_D9 | |
| 23 | P2_18/FLEXIO0_D26-LCD_D10 | |
| 24 | P1_19/FLEXIO0_D27-LCD_D11 | |
| 25 | P3_20/FLEXIO0_D28-LCD_D12 | |
| 26 | P3_29/FLEXIO0_D29-LCD_D13 | |
| 27 | P2_22/FLEXIO0_D30-LCD_D14 | |
| 28 | P3_23/FLEXIO0_D31-LCD_D15 | |

2.11 Segment LCD interface

The MCX A266 MCU has one segment LCD module: SLCD. The FRDM-MCXA266 board supports communication with the SLCD module through one of the following components:

- An onboard segment LCD device from Orient Display: DS1
- A 2x8-position connector: J19 (not populated)

Note: Because DS1 (populated by default) and J19 (DNP) share the same footprint, only one of them can be populated at a time.

[Figure 16](#) shows the FRDM-MCXA266 segment LCD diagram.

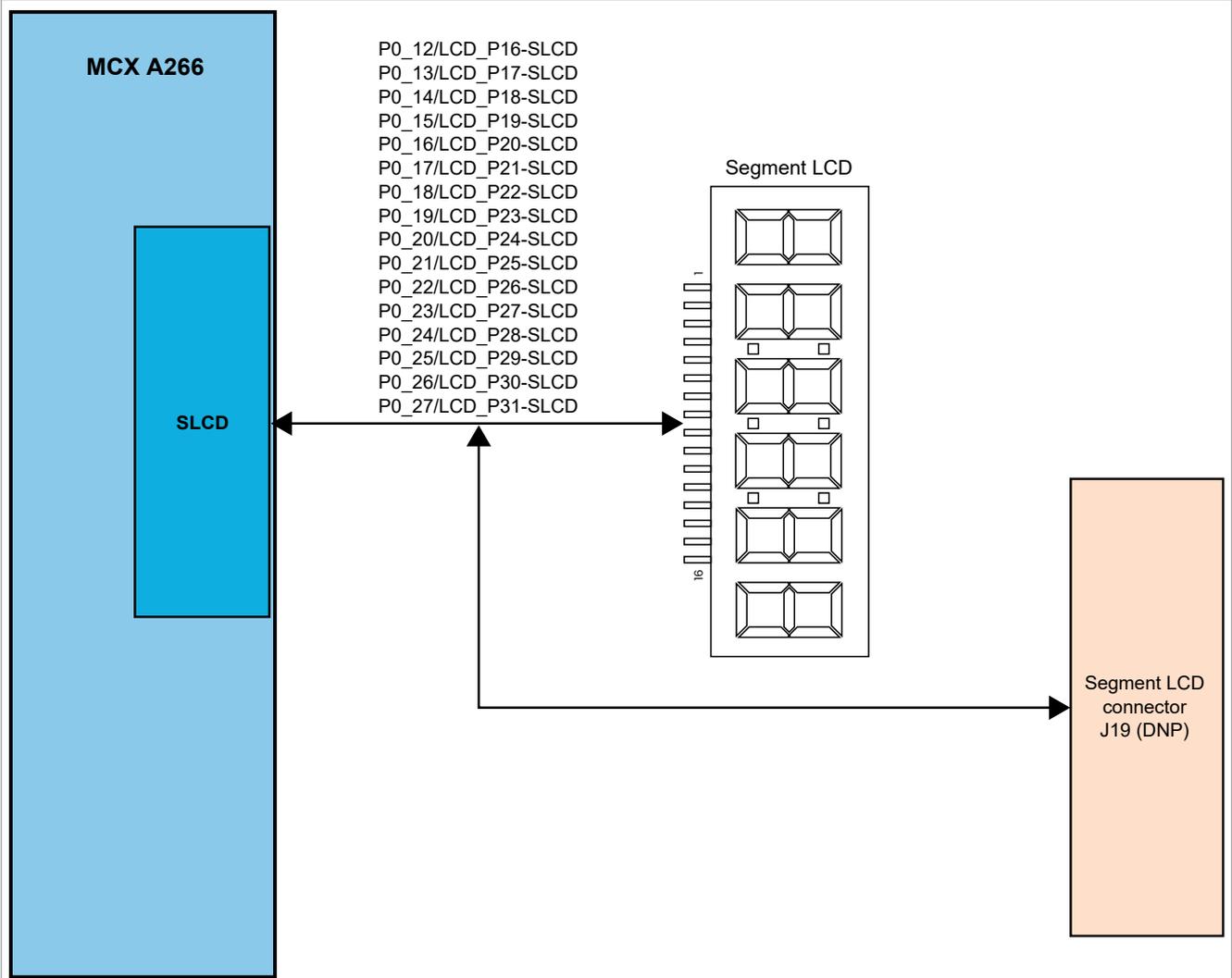


Figure 16. Segment LCD diagram

Table 18 shows the pinout of the connector J19 (DNP).

Table 18. Segment LCD connector pinout

| Pin number | Signal name | Description |
|------------|--------------------|---|
| 1 | P0_12/LCD_P16-SLCD | Signals that allow communication between the SLCD module of the MCX A266 MCU and an external segment LCD device |
| 2 | P0_13/LCD_P17-SLCD | |
| 3 | P0_14/LCD_P18-SLCD | |
| 4 | P0_15/LCD_P19-SLCD | |
| 5 | P0_16/LCD_P20-SLCD | |
| 6 | P0_17/LCD_P21-SLCD | |
| 7 | P0_18/LCD_P22-SLCD | |
| 8 | P0_19/LCD_P23-SLCD | |
| 9 | P0_20/LCD_P24-SLCD | |
| 10 | P0_21/LCD_P25-SLCD | |

Table 18. Segment LCD connector pinout...continued

| Pin number | Signal name | Description |
|------------|--------------------|-------------|
| 11 | P0_22/LCD_P26-SLCD | |
| 12 | P0_23/LCD_P27-SLCD | |
| 13 | P0_24/LCD_P28-SLCD | |
| 14 | P0_25/LCD_P29-SLCD | |
| 15 | P0_26/LCD_P30-SLCD | |
| 16 | P0_27/LCD_P31-SLCD | |

2.12 ADC interface

The MCX A266 MCU has two 16-bit Analog-to-Digital Converter (ADC) modules: ADC0 and ADC1. The FRDM-MCXA266 board supports communication with both the ADC modules of the MCX A266 MCU.

[Table 19](#) describes the FRDM-MCXA266 ADC connections.

Table 19. ADC connections

| ADC modules | ADC input connections | | Peripheral devices | |
|---------------|-----------------------|--------------|--------------------|---|
| | MCX A266 I/O number | ADC function | Part identifier | Description |
| ADC0 and ADC1 | P2_4 | ADC0_A1 | J2 | A 2x10-position Arduino socket connector that allows the plugged-in Arduino board to communicate with the MCX A266 MCU through an ADC connection |
| | P2_7 | ADC0_A7 | | |
| | P1_3 | ADC0_A19 | | |
| | P1_4 | ADC0_A20 | | |
| | P1_5 | ADC0_A21 | | |
| | P1_6 | ADC0_A22 | | |
| | P2_5 | ADC1_A1 | | |
| | P1_10 | ADC1_A8 | | |
| | P1_14 | ADC1_A12 | | |
| ADC1 | P1_11 | ADC1_A9 | J3 | A 2x8-position Arduino socket connector that allows the plugged-in Arduino board to communicate with the MCX A266 MCU through an ADC connection |
| ADC0 and ADC1 | P2_8 | ADC0_A7 | J4 | A 2x6-position Arduino socket connector that allows the plugged-in Arduino board to communicate with the MCX A266 MCU through an ADC connection |
| | P1_0 | ADC0_A16 | | |
| | P1_1 | ADC0_A17 | | |
| | P2_5 | ADC1_A1 | | |
| | P1_14 | ADC1_A12 | | |
| | P3_30 | ADC1_A21 | | |
| ADC0 | P1_6 | ADC0_A22 | J6 | A 1x8-position mikroBUS socket connector that allows the plugged-in mikroBUS click board to communicate with the MCX A266 MCU through an ADC connection |

Table 19. ADC connections...continued

| ADC modules | ADC input connections | | Peripheral devices | |
|-------------|-----------------------|--------------|--------------------|---|
| | MCX A266 I/O number | ADC function | Part identifier | Description |
| ADC1 | P1_15 | ADC1_A13 | J8 | A 2x14-position FlexIO/LCD connector that allows the external module board to communicate with the MCX A266 MCU through an ADC connection |
| | P1_19 | ADC1_A17 | | |
| | P3_29 | ADC1_A22 | | |
| ADC0 | P0_18 | ADC0_A8 | J19 (DNP) | A 2x8-position segment LCD connector that allows the external module board to communicate with the MCX A266 MCU through an ADC connection |
| | P0_19 | ADC0_A9 | | |
| | P0_20 | ADC0_A10 | | |
| | P0_21 | ADC0_A11 | | |
| | P0_22 | ADC0_A12 | | |
| | P0_23 | ADC0_A13 | | |

2.13 OPAMP interface

The MCX A266 MCU has one Operational Amplifier (OPAMP) module (without PGA): OPAMP0. The FRDM-MCXA266 board supports communication with the OPAMP module of the MCX A266 MCU.

[Table 20](#) describes the FRDM-MCXA266 OPAMP connections.

Table 20. OPAMP connections

| OPAMP module | MCU pin | OPAMP I/O function | Description |
|--------------|---------|--------------------|---|
| OPAMP0 | P2_12 | OPAMP0_INP | OPAMP0 does not connect to any connectors. It is only connected to the test points TP15 (INP), TP18 (INN), and TP16 (OUT), which are on the bottom side of the PCB. |
| | P2_13 | OPAMP0_INN | |
| | P2_25 | OPAMP0_OUT | |

2.14 Arduino socket

The FRDM-MCXA266 board has an Arduino socket with the following four connectors:

- J1: 2x8-position receptacle
- J2: 2x10-position receptacle
- J3: 2x8-position receptacle
- J4: 2x6-position receptacle

The two 2x8-position receptacles are placed diagonally opposite to each other. [Figure 17](#) shows the pinouts of the Arduino socket connectors.

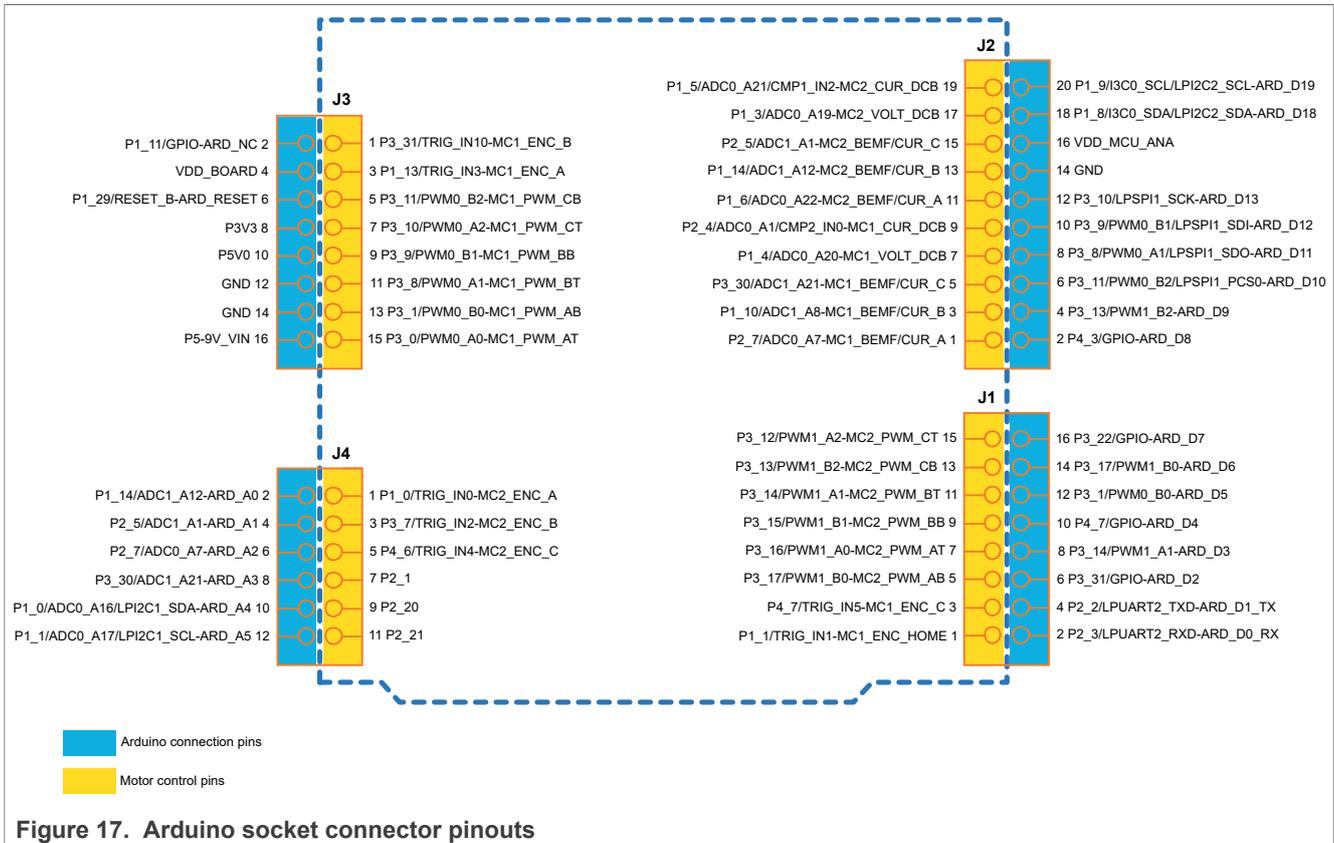


Figure 17. Arduino socket connector pinouts

The Arduino socket allows communication with the following modules of the MCX A266 MCU:

- Low-Power Universal Asynchronous Receiver/Transmitter 2 (LPUART2)
- Low-Power Serial Peripheral Interface 1 (LPSP11)
- Low-Power Inter-Integrated Circuit 1 (LPI2C1)
- Low-Power Inter-Integrated Circuit 2 (LPI2C2)
- Improved Inter-Integrated Circuit 0 (I3C0)
- Analog-to-Digital Converter 0 (ADC0)
- Analog-to-Digital Converter 1 (ADC1)
- Pulse Width Modulator 0 (PWM0)
- Pulse Width Modulator 1 (PWM1)

The Arduino socket is pin-compatible with the following Arduino and motor control boards:

- Arduino Uno revision 3 (R3)
- Arduino A4/A5
- FRDM-MC-LVBLDC
- FRDM-MC-LVPMMS

2.15 mikroBUS socket

A mikroBUS socket is a pair of 1x8-position receptacles (connectors) with a proprietary pin configuration and silkscreen markings. The benefit of a mikroBUS socket is that it provides many hardware expansion options with few pins.

The FRDM-MCXA266 board has a mikroBUS socket with a pair of 1x8-position receptacles, J5 and J6.

[Figure 18](#) shows the pinouts of the mikroBUS socket connectors.

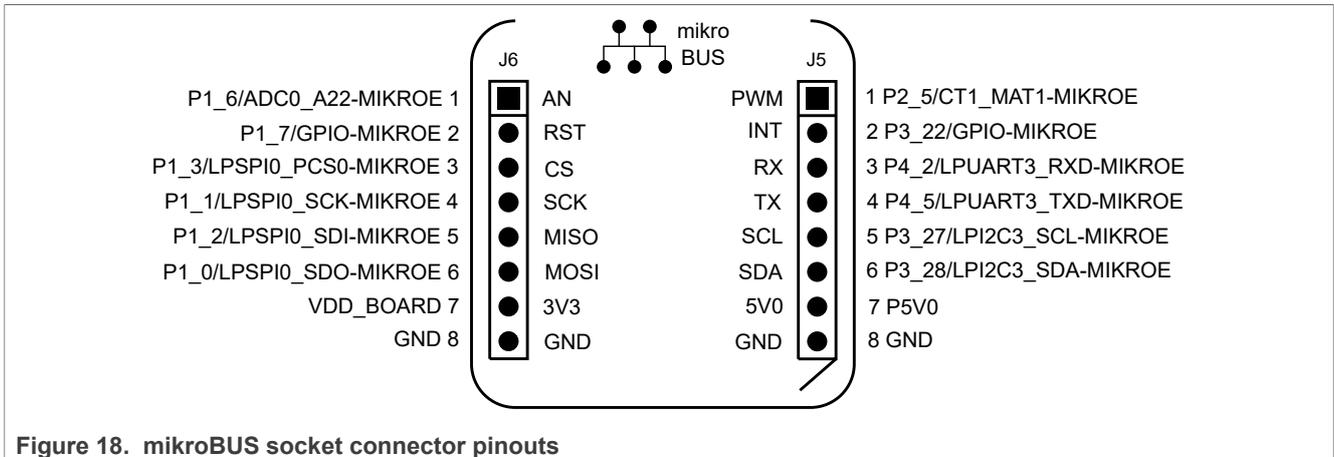


Figure 18. mikroBUS socket connector pinouts

The mikroBUS socket allows communication with the following modules of the MCX A266 MCU:

- Low-Power Universal Asynchronous Receiver/Transmitter 3 (LPUART3)
- Low-Power Serial Peripheral Interface 0 (LPSPi0)
- Low-Power Inter-Integrated Circuit 3 (LPI2C3)
- Analog-to-Digital Converter 0 (ADC0)
- Standard asynchronous Counter/Timer 1 (CTIMER1)

An add-on board, called click board, can be installed on a mikroBUS socket. A click board provides a plug-and-play solution for adding new functionality to a board design. A click board has a pair of 1x8-pin headers that connects to the pair of receptacles on a mikroBUS socket. MikroElektronika (MIKROE) is one of the manufacturers of click boards. To find some examples click boards for the FRDM-MCXA266 mikroBUS socket, visit [MIKROE website](http://www.mikroe.com).

2.16 Pmod connector

Peripheral module (Pmod) devices are small input/output interface boards that can be easily integrated with embedded control boards for expanding their capabilities.

The FRDM-MCXA266 board supports a Pmod connector J7 (Digilent PPPC062LJBN-RC) for expanding the capabilities of the board. J7 is not populated on the board. If populated, it can be used to work with a remote host, or as an interface to a Pmod expansion board.

[Table 21](#) shows the pinout of the Pmod connector J7.

Table 21. Pmod connector pinout

| Pin numbers | Signal name | Description |
|-------------|-----------------------------|--------------------------|
| 1 | P1_6/LPSPi0_PCS1-PMOD_CS1 | SPI signals |
| 3 | P1_0/LPSPi0_SDO-PMOD_MOSI | |
| 5 | P1_2/LPSPi0_SDI-PMOD_MISO | |
| 7 | P1_1/LPSPi0_SCK-PMOD_SCK | |
| 2 | P1_4/LPSPi0_PCS3-PMOD_INT | GPIO signals |
| 4 | P1_5/LPSPi0_PCS2-PMOD_RESET | |
| 6 | P3_27/LPI2C3_SCL-PMOD_SCL | I ² C signals |
| 8 | P3_28/LPI2C3_SDA-PMOD_SDA | |
| 11, 12 | VDD_BOARD | Power supply |

Table 21. Pmod connector pinout...continued

| Pin numbers | Signal name | Description |
|-------------|-------------|-------------|
| 9, 10 | GND | Ground |

The Pmod connector allows communication with the following modules of the MCX A266 MCU:

- Low-Power Serial Peripheral Interface 0 (LPSPI0)
- Low-Power Inter-Integrated Circuit 3 (LPI2C3)

Note: In Quad SPI mode, the MCX A266 pins P1_0, P1_1, P1_2, P1_4, P1_5, and P1_6 can act as LPSPI0. For details, refer to the "Low Power Serial Peripheral Interface (LPSPI)" chapter of MCX A175, A176, A185, A186, A255, A256, A265 and A266 Reference Manual.

3 MCU-Link OB debug probe

MCU-Link is a debug probe architecture jointly developed by NXP and Embedded Artists. It can be configured to support different debug feature options.

The MCU-Link architecture is used in:

- Standalone debug probes, such as MCU-Link Pro
- Onboard debug probes implemented on NXP evaluation boards, such as FRDM-MCXA266. The onboard implementation of MCU-Link is referred to as MCU-Link OB.

In the FRDM-MCXA266 board, the MCU-Link architecture is based on the NXP LPC55S16 MCU, which is based on an Arm Cortex-M33 core. The board implements a subset of the MCU-Link architecture features, as mentioned in [Section 3.1](#). For more details on the MCU-Link architecture, visit the [MCU-Link Debug Probe Architecture](#) page.

The MCU-Link OB on the FRDM-MCXA266 board is factory-programmed with the firmware based on the NXP CMSIS-DAP protocol. The firmware also supports all other features supported in the hardware. A custom version of the J-Link firmware is also available to make the MCU-Link OB compatible with J-Link LITE. However, this firmware version only supports limited features, including debug/SWO and VCOM. For information on how to update the firmware, see [Section 3.4](#).

3.1 Supported MCU-Link features

MCU-Link includes several mandatory and optional features. [Table 22](#) summarizes the MCU-Link features supported on the FRDM-MCXA266 board.

Table 22. Supported MCU-Link features

| Feature | Description |
|--|--|
| Serial Wire Debug (SWD) / Serial Wire Output (SWO) | MCU-Link allows SWD-based debugging with SWO for profiling and/or low overhead debug standard I/O communication. |
| Virtual Communication (VCOM) serial port | MCU-Link adds a serial COM port on the host computer and connects it to the target MCU, while acting as a USB-to-UART bridge. |
| USB Serial Input/Output (USBSIO) ^[1] port | MCU-Link adds a USB serial I/O port on the host computer and connects it to the target MCU, while acting as a USB-to-I ² C or USB-to-CAN ^[2] bridge. |
| External debug probe support | The MCU-Link interface supports debugging the target MCU (MCX A266) using an external debug probe, instead of MCU-Link. To enable support for an external debug probe, disable the SWD feature by shorting the jumper JP6. |

[1] J-Link firmware does not support this feature.

[2] The USB-to-CAN feature is not currently supported by MCU-Link.

3.2 Supported debug scenarios

[Table 23](#) describes the debug scenarios supported on the FRDM-MCXA266 board.

Table 23. Supported debug scenarios

| Debug scenario | MCU-Link feature enabled/disabled? | Note |
|---|---|---|
| Target MCU (MCX A266 MCU) debugging with MCU-Link | <ul style="list-style-type: none"> • SWD: Enabled if the jumper JP6 is open (default setting). • VCOM: Enabled if the jumper JP5 is open (default setting). • USB-to-CAN^[1]: Enabled if the jumper JP7 is open (default setting). | Target MCU external debugger connector J14 or J13 (DNP) is not used for an external connection. |

Table 23. Supported debug scenarios...continued

| Debug scenario | MCU-Link feature enabled/disabled? | Note |
|--|---|--|
| Target MCU debugging with an external debugger | <ul style="list-style-type: none"> • SWD: Disabled • VCOM: Disabled • USB-to-CAN: Disabled | Target MCU external debugger connector J14 or J13 (DNP) is used to connect an external debugger. |

[1] The USB-to-CAN feature is not currently supported by MCU-Link.

3.3 MCU-Link firmware update utility installation

The MCU-Link debug probe is supported on a host computer running a Windows 10/11, MacOS X, or Ubuntu Linux Operating System (OS). The debug probe works with standard OS drivers. For Windows, the MCU-Link firmware installation program also includes information files to provide user-friendly device names.

Support for MCU-Link can be enabled using the LinkServer utility, which is an NXP GDB server and flash utility that supports many NXP debug probes. For more details on this utility, visit the <https://nxp.com/linkserver> page.

Running the LinkServer installer also installs a firmware update utility and the drivers (information files) required for MCU-Link. NXP recommends you to use the LinkServer installer for installing the MCU-Link firmware update utility.

Note: If the MCU-Link firmware version is 3.155 or later, an automatic firmware update can be done using LinkServer installer version 24.12.15 or later. For more details on automatic firmware update, refer to the Readme mark-down file in the LinkServer installation package. However, if the current firmware version is earlier than 3.155, you require to run the MCU-Link firmware update utility manually. The utility is included in the LinkServer installation package. To update the MCU-Link firmware using the firmware update utility, see [Section 3.4](#).

To work with MCU-Link, NXP recommends using the latest MCU-Link firmware. The steps to update the MCU-Link firmware manually is provided in [Section 3.4](#). Before updating the MCU-Link firmware, check the versions of the MCUXpresso IDE and LIBUSBIO (if you are using these tools) installed on your host computer. Then, check the compatibility of these tools with the MCU-Link firmware by referring to [Table 24](#). If you are using the MCUXpresso for Visual Studio Code extension or a third-party IDE from IAR or Keil, get the latest MCU-Link firmware version.

Table 24. Compatibility check between MCUXpresso IDE and MCU-Link firmware

| MCUXpresso IDE version | Supported MCU-Link firmware version | USB driver type | CMSIS-SWO support | FreeMASTER support via | |
|-------------------------------|-------------------------------------|-----------------|-------------------|------------------------|----------------------------|
| | | | | SWD / JTAG | USB bridge |
| MCUXpresso 11.3 or later | V1.xxx and V2.xxx | HID | No | Yes | Yes |
| MCUXpresso 11.7.0 or later | V3.xxx (up to and including V3.108) | WinUSB | No | Yes | FreeMASTER V3.2.2 or later |
| MCUXpresso 11.7.1 or later | V3.117 and later | WinUSB | Yes | Yes | FreeMASTER V3.2.2 or later |
| MCUXpresso 24.12.100 or later | V3.155 and later | WinUSB | YES | Yes | FreeMASTER V3.2.2 or later |

3.4 Updating MCU-Link firmware using firmware update utility

To update the MCU-Link firmware using the firmware update utility included in the LinkServer installation package, the MCU-Link must be powered up in ISP mode. To configure MCU-Link in ISP mode and update MCU-Link firmware, follow these steps:

1. Disconnect the board from the host computer, short the jumper JP4, and reconnect the board. The red MCU-Link status LED D11 (color: red) lights up and stays on. For more details on MCU-Link LEDs, see [Section 3.9](#).
2. Download the LinkServer installation package from <https://nxp.com/linkserver> and install the LinkServer utility. For example, download and install "Linkserver 24.12.15 installer for Windows".
3. Navigate to the MCU-LINK_installer_Vx_xxx directory, where Vx_xxx indicates the version number, for example, V3.155.
4. Follow the instructions in the `Readme.txt` file to find and run the firmware update utility for CMSIS-DAP or J-Link firmware version.
5. Disconnect the board from the host computer, open the jumper JP4, and reconnect the board. The board is enumerated on the host computer as a WinUSB or HID device (depending on the firmware version, see [Table 24](#)).

Note: Starting version V3.xxx, the MCU-Link firmware uses WinUSB (instead of HID) for higher performance. However, it is not compatible with MCUXpresso IDE versions earlier than 11.7.0.

Note: To enable SWO-related features in non-NXP IDEs, CMSIS-SWO support was introduced in firmware version V3.117.

3.5 Using MCU-Link with development tools

The MCU-Link debug probe can be used with IDEs supported within the MCUXpresso ecosystem, such as:

- MCUXpresso IDE
- MCUXpresso for Visual Studio Code
- IAR Embedded Workbench
- Arm Keil MDK

3.5.1 Using MCU-Link with MCUXpresso IDE

The MCUXpresso IDE recognizes any type of MCU-Link probe that uses either the CMSIS-DAP or J-Link firmware. When you start a new debug session, the IDE checks for all the available debug probes. For all the probes it finds, the IDE displays the probe types and unique identifiers in the **Probes discovered** dialog box.

If a debug probe requires a firmware update, the probe is displayed with a warning in the **Probes discovered** dialog box. For each such probe, the latest firmware version is indicated and a link to download the latest firmware package is provided. To update the firmware for the MCU-Link debug probe, see the instructions provided in [Section 3.4](#).

You are advised to use the latest MCU-Link firmware to take the benefit of the latest MCU-Link functionality. However, the MCU-Link firmware version that you can use depends on the MCUXpresso IDE installed on your host computer. To check the compatibility of the MCU-Link firmware you want to use with your MCUXpresso IDE, see [Table 24](#).

3.5.2 Using MCU-Link with MCUXpresso for Visual Studio Code

The MCU-Link debug probe can be used with the MCUXpresso for Visual Studio Code extension from NXP. This extension uses the LinkServer debug server. To work with MCUXpresso for Visual Studio Code, install the LinkServer utility using the MCUXpresso Installer tool or as described in [Section 3.3](#). For more details on MCUXpresso for Visual Studio Code, visit the [MCUXpresso for Visual Studio Code](#) page.

3.5.3 Using MCU-Link with third-party IDEs

The MCU-Link debug probe can be used with third-party IDEs, such as IAR Embedded Workbench and Arm Keil MDK. For more details, refer to the third-party tool documentation that covers the use of generic CMSIS-DAP probes or J-Link probes (depending on the firmware image you are using).

3.6 MCU-Link USB connector

The FRDM-MCXA266 board has a USB Type-C connector J15, which allows you to connect MCU-Link with your host computer. It can also be used to supply 5 V power to the board.

3.7 VCOM port (USB to target UART bridge)

MCU-Link supports a feature, known as Virtual Communication (VCOM) serial port. This feature allows MCU-Link to add a serial COM port on the host computer and connect it to the target MCU. In this setup, MCU-Link acts as a USB-to-UART bridge.

In the FRDM-MCXA266 board, MCU-Link is connected to the LPUART2 module of the target MCU.

To use MCU-Link as a USB-to-UART bridge, follow these steps:

1. Ensure that the jumper JP4 is open (MCU-Link boots normally).
2. Ensure that the jumper JP5 is open (MCU-Link VCOM port is enabled).
3. Connect the MCU-Link USB connector J15 to the USB port of the host computer.

When you boot the FRDM-MCXA266 board, a VCOM port with the name MCU-Link Vcom Port (COMxx) is enumerated on the host computer, where “xx” may vary from one computer to another. Each MCU-Link-based board has a unique VCOM number associated with it.

To disable the VCOM function, short the jumper JP5 before powering up the board. Changing the JP5 setting (open/short) after powering up the board does enable/disable the MCU-Link VCOM feature.

3.8 USBSIO port (USB to target I²C bridge)

MCU-Link supports a feature, known as USB Serial Input/Output (USBSIO) port. This feature allows MCU-Link to add a USB serial I/O port on the host computer and connect it to the target MCU. In this setup, MCU-Link acts as a USB-to-I²C bridge.

Support for the USBSIO feature can be enabled on the host computer using the libusbsio library, which is a free host library from NXP for Windows/Linux/macOS systems. For more details on the libusbsio library, see <http://www.nxp.com/libusbsio>.

The FRDM-MCXA266 board supports connecting MCU-Link to the LPI2C2 module of the target MCU. By default, this I²C connection is disabled. It can be enabled by populating the 0 Ω resistors R64 and R65.

To use MCU-Link as a USB-to-I²C bridge, the board must be connected to the host computer through a USB cable from its J15 connector. A USB-to-I²C bridge can be used to emulate the host system / board peripherals.

By default, the USBSIO feature is disabled for I²C on the FRDM-MCXA266 board, allowing the target MCU I²C port to be used for other purposes. Disabling the USBSIO feature instructs the firmware not to enumerate the USB endpoint for USBSIO (which is called “MCU-Link LPCSIO” for backward compatibility reasons). Disabling the USBSIO feature also frees more USB bandwidth for the SWO profiling feature and energy measurement feature (not supported on this board) of MCU-Link.

3.9 MCU-Link status LEDs

The FRDM-MCXA266 board has three status indicator LEDs for MCU-Link. [Table 25](#) lists these LEDs and describes how each LED behaves in different MCU-Link modes.

Table 25. MCU-Link LEDs

| Part identifier | PCB label | LED color | LED function | | |
|-----------------|-----------|-----------|--|---|---|
| | | | Normal operation (with CMSIS-DAP) | Normal operation (with J-Link) | ISP (firmware update) mode |
| D9 | USB_ACT | Green | Indicates USB communication. The LED lights up after successful USB enumeration at startup, and then stays ON. | The LED remains OFF. | The LED remains OFF. |
| D10 | VCOM_ACT | Green | Indicates if the VCOM port is receiving/sending data. The LED lights up when MCU-Link boots, and then blinks when debug activity happens. | Indicates if the VCOM port is receiving/sending data. The LED lights up when MCU-Link boots, and then blinks when debug activity happens. | The LED remains OFF. |
| D11 | ISP_BOOT | Red | Indicates MCU-Link status / SWD activity. It acts as a heartbeat LED (fades in/out repeatedly), with SWD activity overlaid. If an error occurs at startup, the LED D11 blinks rapidly. | The LED remains OFF. | The LED lights up when MCU-Link (LPC55S16) boots in ISP mode. |

4 Board errata

This section describes the errata applicable to the FRDM-MCXA266 board.

4.1 Erratum: Resistor R52 affects MCX A266 power consumption measurement

Description

By default, the VDD_MCU supply is connected to the debugger MCU (LPC55S16) through the resistor R52. Due to some current leakage between R52 and the debugger MCU, the target MCU current is slightly higher than its expected value.

Workaround

Rework the FRDM-MCXA266 board by connecting R52 to the VDD_MCU_LINK supply.

5 Related documentation

[Table 26](#) lists some additional documents and resources that you can refer to for more information on the FRDM-MCXA266 board. Some of these documents may only be available under a Non-Disclosure Agreement (NDA). To access such a document, contact a local NXP Field Applications Engineer (FAE) or sales representative.

Table 26. Related documentation

| Document | Description | Link / how to obtain |
|--|---|---|
| MCX A175, A176, A185, A186, A255, A256, A265 and A266 Reference Manual | Provides a detailed description about the MCX A175/176/185/186/255/256/265/266 MCU and its features, including memory maps, power supplies, and clocks. | MCXAP144M240F61RM.pdf |
| MCXA175/176/185/186/255/256/265/266 Data Sheet | Describes the features, electrical characteristics, packaging information, and ordering details about the MCX A175/176/185/186/255/256/265/266 MCU. | MCXAP144M240F61.pdf |
| FRDM-MCXA266 board schematics | Provides a circuit representation showing the functionality and connectivity of the FRDM-MCXA266 board components. | Contact an NXP FAE / sales representative |
| LPC55S1x/LPC551x User Manual (UM11295) | Provides a detailed description about the LPC55S1x/LPC551x MCU and its features, including memory maps, power supplies, and clocks. | UM11295.pdf |

6 Acronyms

[Table 27](#) lists the acronyms used in this document.

Table 27. Acronyms

| Acronym | Description |
|------------------|---|
| ADC | Analog-to-Digital Converter |
| BLDC | Brushless Direct Current |
| CAN | Controller Area Network |
| CMSIS | Cortex Microcontroller Software Interface Standard |
| CS | Chip Select |
| CTIMER | Counter/Timer |
| DAP | Debug Authentication Protocol |
| DC | Data/Command |
| DMA | Direct Memory Access |
| DNP | Do Not Populate / Do Not Place |
| FD | Flexible Data rate |
| FlexCAN | Flexible Controller Area Network |
| FlexIO | Flexible Input/Output |
| FlexPWM | Flex Pulse Width Modulator |
| FS | Full Speed |
| GND | Ground |
| GPIO | General-Purpose Input/Output |
| HID | Human Interface Device |
| I ² C | Inter-Integrated Circuit |
| I3C | Improved Inter-Integrated Circuit |
| I2S | Inter-IC Sound |
| IDE | Integrated Development Environment |
| I/O | Input/Output |
| IoT | Internet of Things |
| ISP | In-System Programming |
| JTAG | Joint Test Action Group |
| LCD | Liquid-Crystal Display |
| LDO | Low-Dropout Regulator |
| LED | Light-Emitting Diode |
| LPI2C | Low-Power Inter-Integrated Circuit |
| LPSPi | Low-Power Serial Peripheral Interface |
| LPUART | Low-Power Universal Asynchronous Receiver/Transmitter |
| MCU | Microcontroller Unit |

Table 27. Acronyms...continued

| Acronym | Description |
|---------|---|
| MIPI | Mobile Industry Processor Interface |
| OB | Onboard |
| OPAMP | Operational Amplifier |
| OS | Operating System |
| PCB | Printed-Circuit Board |
| PCS | Peripheral Chip Select |
| PGA | Programmable Gain Amplifier |
| PHY | Physical layer |
| Pmod | Peripheral module |
| PMSM | Permanent Magnet Synchronous Motor |
| PWM | Pulse Width Modulator |
| RoHS | Restriction of Hazardous Substances |
| SCL | Serial Clock |
| SCK | Serial clock |
| SDA | Serial Data |
| SPI | Serial Peripheral Interface |
| SWD | Serial Wire Debug |
| SWO | Serial Wire Output |
| TE | Tearing Effect |
| UART | Universal Asynchronous Receiver/Transmitter |
| USB | Universal Serial Bus |
| USBSIO | USB Serial Input/Output |
| VCOM | Virtual Communication |
| VREF | Voltage Reference |

7 Revision history

[Table 28](#) summarizes the revisions to this document.

Table 28. Revision history

| Document ID | Release date | Description |
|---------------|-----------------|------------------------|
| UM12439 v.1.0 | 13 January 2026 | Initial public release |

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