UM12121

FRDM-MCXA156 Board User Manual

Rev. 1 — 22 July 2024   **User manual**

Document information

Information	Content
Keywords	UM12121, FRDM-MCXA156, MCXA156, Arduino, mikroBUS, Pmod, MCU-Link
Abstract	The FRDM-MCXA156 board is a design and evaluation platform based on the NXP MCXA156 MCU.

1 Board overview

The FRDM-MCXA156 board is a design and evaluation platform based on the NXP MCXA156 microcontroller (MCU). The MCXA156 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 96 MHz. It supports industrial communication protocol, brushless direct current (BLDC) motor / permanent magnet synchronous motor (PMSM) control, and integrated sensor interfaces (MIPI I3C, I^2C, 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 MCXA156 MCU, the FRDM-MCXA156 board uses an onboard (OB) debug probe, MCU-Link OB, which is based on another NXP MCU: LPC55S69. For simplicity, the MCXA156 MCU and the LPC55S69 MCU are respectively referred to as "target MCU" and "debug MCU" at some places in this document.

This document provides details about the FRDM-MCXA156 board interfaces, power supplies, clocks, connectors, jumpers, push buttons, LEDs, and MCU-Link OB.

1.1 Block diagram

Figure 1 shows the FRDM-MCXA156 board block diagram.

Figure 1. FRDM-MCXA156 block diagram
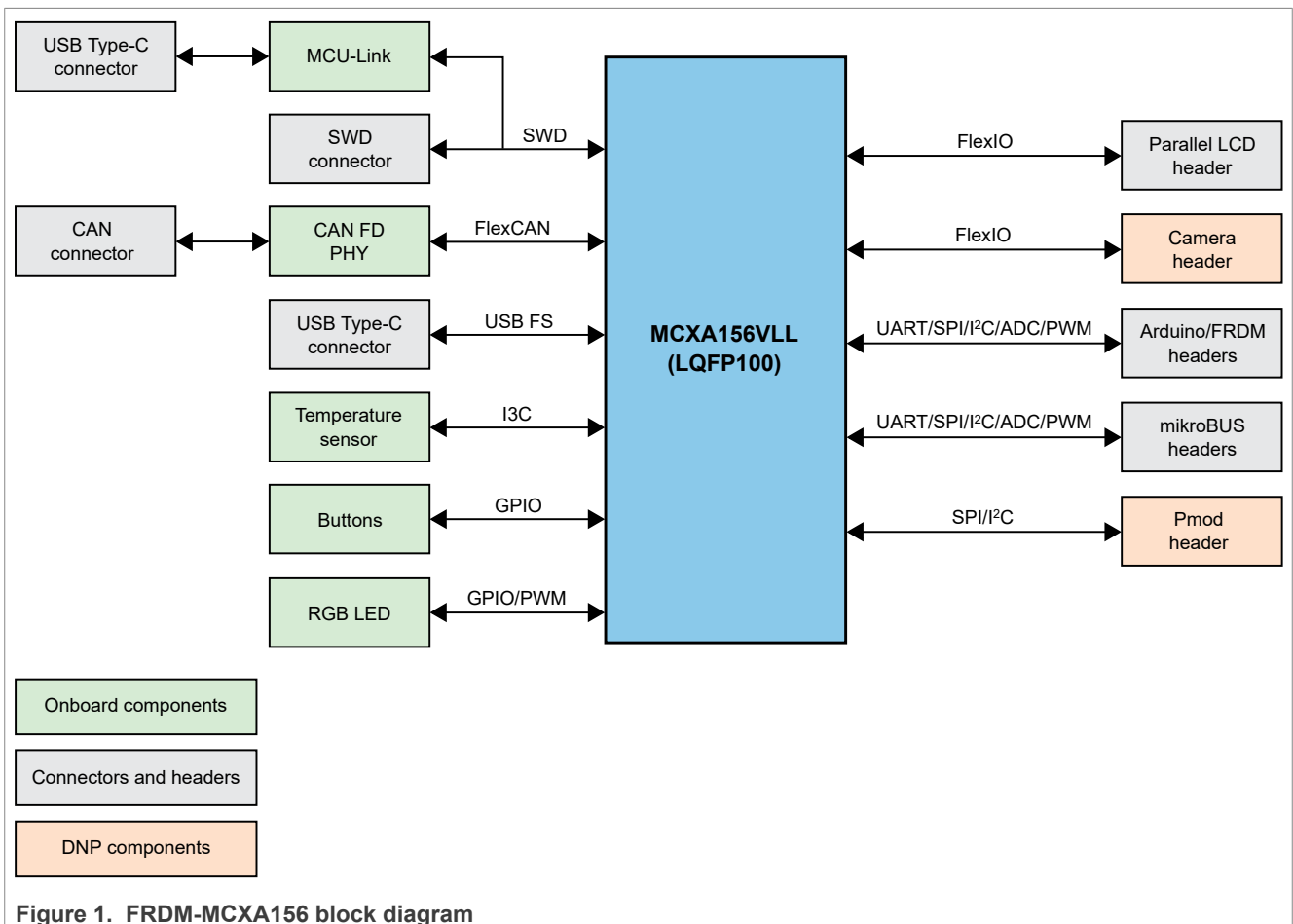
1.2 Board features

Table 1 lists the features of the FRDM-MCXA156 board.

Table 1. FRDM-MCXA156 features

Board feature	Target MCU features used	Description
MCU (target MCU)		NXP MCXA156 MCU (part number: MCXA156VLL) based on an Arm Cortex-M33 core, running at speeds of up to 96 MHz. **Note:** *For details on the MCXA156 MCU, see MCXA156, A155, A154, A146, A145, A144 Reference Manual and MCXA156, A155, A154, A146, A145, A144 Data Sheet.*
USB interface	USBFS0 module	Supports a USB full-speed connection through a USB 2.0 Type-C connector J23
FlexCAN interface	CAN0 module	Provides a high-speed CAN FD transceiver accessible through a 2x2-pin header J22
LPUART interface	LPUART0 module	Supports a USB-to-UART bridge connection using MCU-Link
	LPUART1 module	Supports an external UART connection through mikroBUS socket connector J5
	LPUART2 module	Supports an external UART connection through Arduino socket connector J1
LPSPI interface	LPSPI0 module	Supports an external SPI connection through mikroBUS socket connector J6 or Pmod connector J7 (DNP)
	LPSPI1 module	Supports an external SPI connection through Arduino socket connector J2
LPI2C interface	LPI2C0 module	Provides an I^2C connection to Arduino socket connector J2
	LPI2C2 module	Provides an I^2C connection to FlexIO LCD connector J8 and camera connector J9 (DNP)
	LPI2C3 module	Provides an I^2C connection to mikroBUS socket connector J5 and Pmod connector J7 (DNP)
I3C interface	I3C0 module	Supports a digital temperature sensor (P3T1755DP)
FlexIO interface	FLEXIO0 module	Supports FlexIO LCD connector J8 and camera connector J9 (DNP)
ADC interface	ADC0 module	Accepts ADC inputs through Arduino socket connector J2
	ADC1 module	Accepts ADC inputs through Arduino socket connector J2, Arduino socket connector J4, and mikroBUS socket connector J6
Arduino socket	LPUART2, LPSPI1, LPI2C0, ADC0, ADC1, PWM0, and PWM1 modules	Arduino socket with four connectors J1, J2, J3, and J4
mikroBUS socket	LPUART1, LPSPI0, LPI2C3, ADC1, and PWM0 modules	mikroBUS socket with a pair of connectors J5 and J6
Pmod connector	LPSPI0 and LPI2C3 modules	Pmod connector J7 (DNP)
Debug interface	LPUART0 module	Onboard MCU-Link debug probe with USB Type-C connector J21 for debugging the MCXA156 MCU

Table 1. FRDM-MCXA156 features...*continued*

Board feature	Target MCU features used	Description
Power supply		The following options are available to power up the board: • External 5 V power through USB Type-C connector J23 • External 5 V power through USB Type-C connector J21 • 5-9 V power from Arduino socket connector J3, pin 16
Clocks		• 8 MHz clock for the MCXA156 MCU • 16 MHz clock for the LPC55S69 MCU
Orderable part number		FRDM-MCXA156

1.3 Kit contents

Table 2 lists the items included in the FRDM-MCXA156 board hardware kit.

Table 2. Kit contents

Item	Quantity
FRDM-MCXA156 board hardware assembly	1
USB 2.0 Type-A to Type-C cable, 1 meter	1
FRDM-MCXA156 Quick Start Guide	1

1.4 Board pictures

Figure 2 shows the top-side view of the FRDM-MCXA156 board with MCXA156 MCU (target MCU), LPC55S69 MCU (debug MCU), temperature sensor, and CAN FD transceiver highlighted.
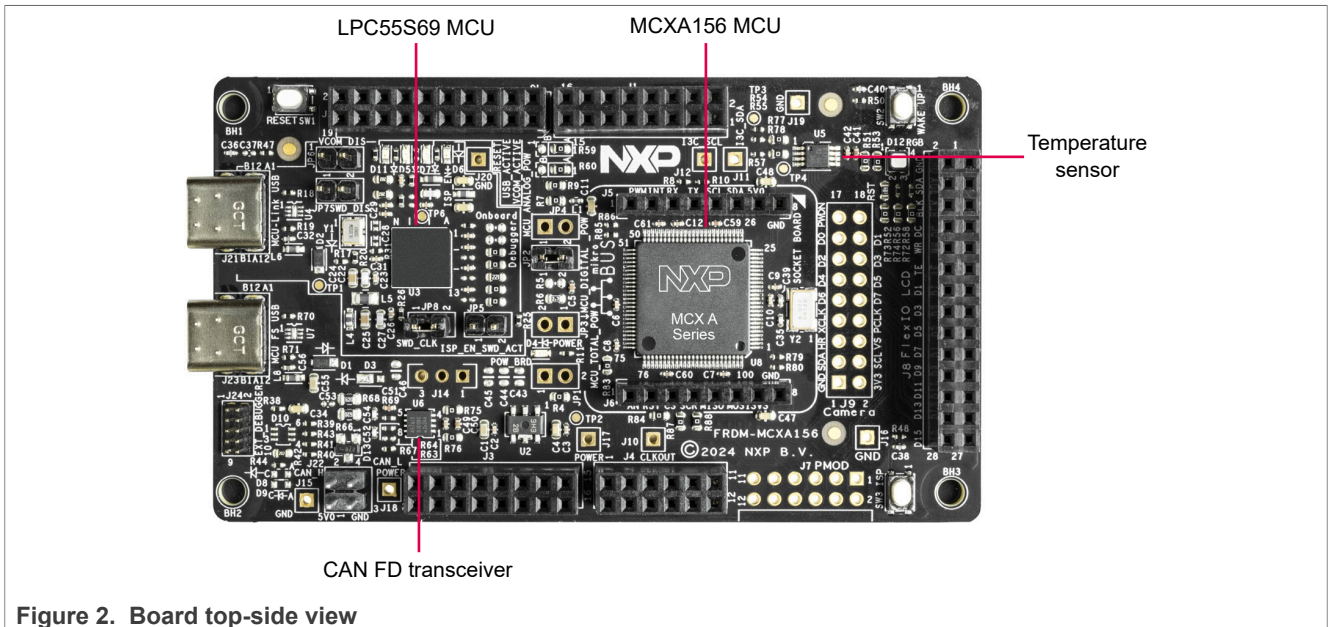

Figure 2. Board top-side view

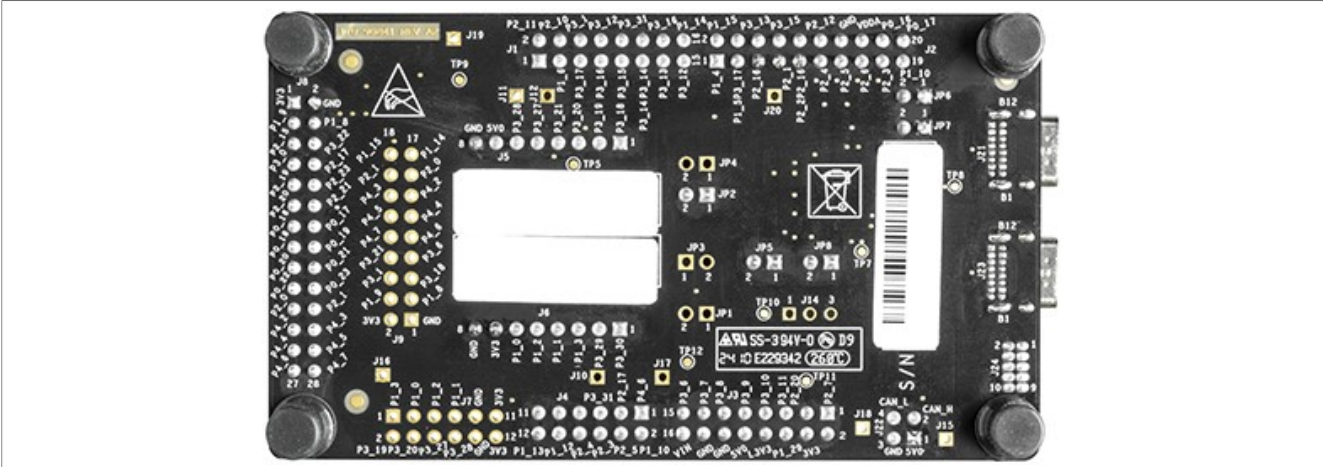Figure 3 shows the bottom-side view of the FRDM-MCXA156 board.

Figure 3. Board bottom-side view

1.5 Connectors
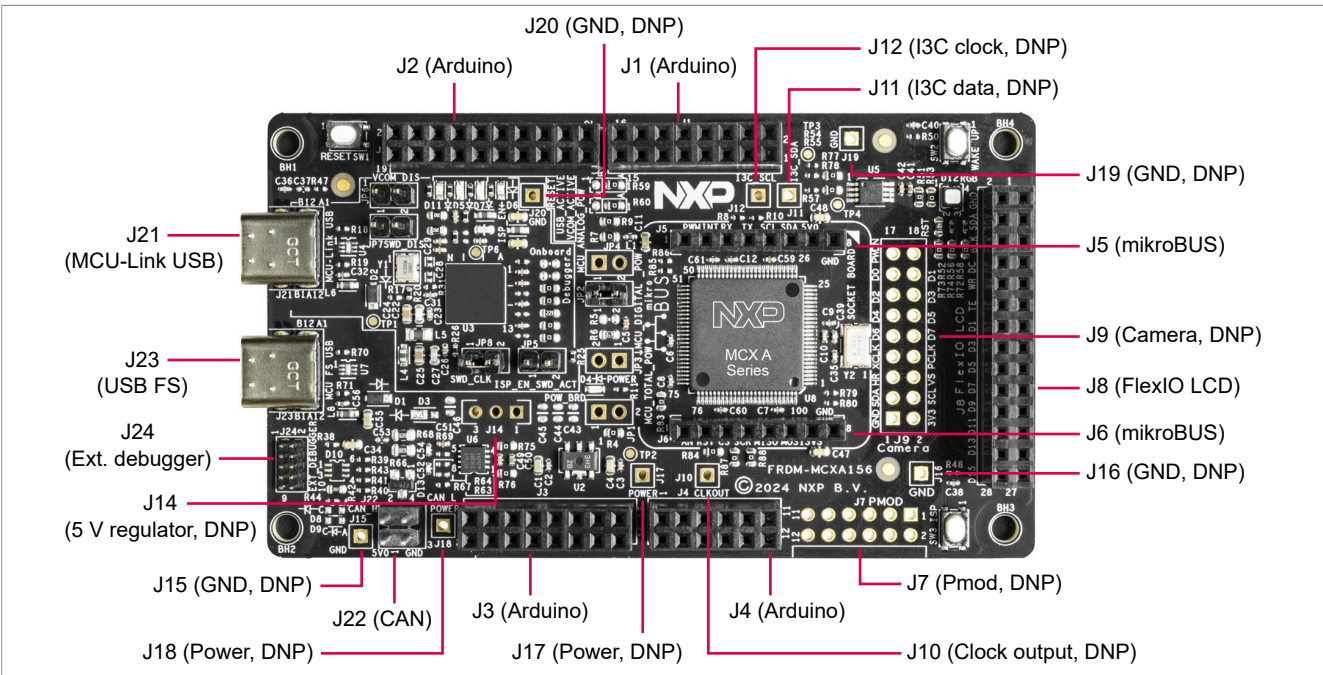
Figure 4 shows the FRDM-MCXA156 board connectors.

Figure 4. Connectors

Table 3 describes the connectors available on the FRDM-MCXA156 board.

Table 3. FRDM-MCXA156 connectors

Part identifier	Connector type	Description	Reference section
J1	2x8-position receptacle	Arduino socket connectors	Section 2.11
J2	2x10-position receptacle		
J3	2x8-position receptacle		
J4	2x6-position receptacle		

Table 3. FRDM-MCXA156 connectors...*continued*

Part identifier	Connector type	Description	Reference section
J5	1x8-position receptacle	mikroBUS socket connectors	Section 2.12
J6	1x8-position receptacle		
J7 (DNP)	2x6-pin/position connector	Pmod connector	Section 2.13
J8	2x14-position receptacle	FlexIO parallel LCD connector	Section 2.9
J9 (DNP)	2x9-pin/position connector	Camera connector	
J10 (DNP)	1-pin/position connector	Clock output test point	Section 2.2
J11 (DNP)	1-pin/position connector	I3C data test point	Section 2.8
J12 (DNP)	1-pin/position connector	I3C clock test point	
J14 (DNP)	1x3-pin/position connector	5 V DC voltage regulator connector	Section 2.1
J15 (DNP)	1-pin/position connector	GND test points	For more information on these connectors, see FRDM-MCXA156 board schematics.
J16 (DNP)	1-pin/position connector		
J19 (DNP)	1-pin/position connector		
J20 (DNP)	1-pin/position connector		
J17 (DNP)	1-pin/position connector	Power supply test points	
J18 (DNP)	1-pin/position connector		
J21	USB Type-C connector	MCU-Link USB connector	Section 3.6
J22	2x2-pin header	CAN header	Section 2.4
J23	USB Type-C connector	MCXA156 USB full-speed (FS) connector	Section 2.3
J24	2x5-pin header	Target MCU (MCXA156) external debugger connector	Section 3.2

1.6 Jumpers
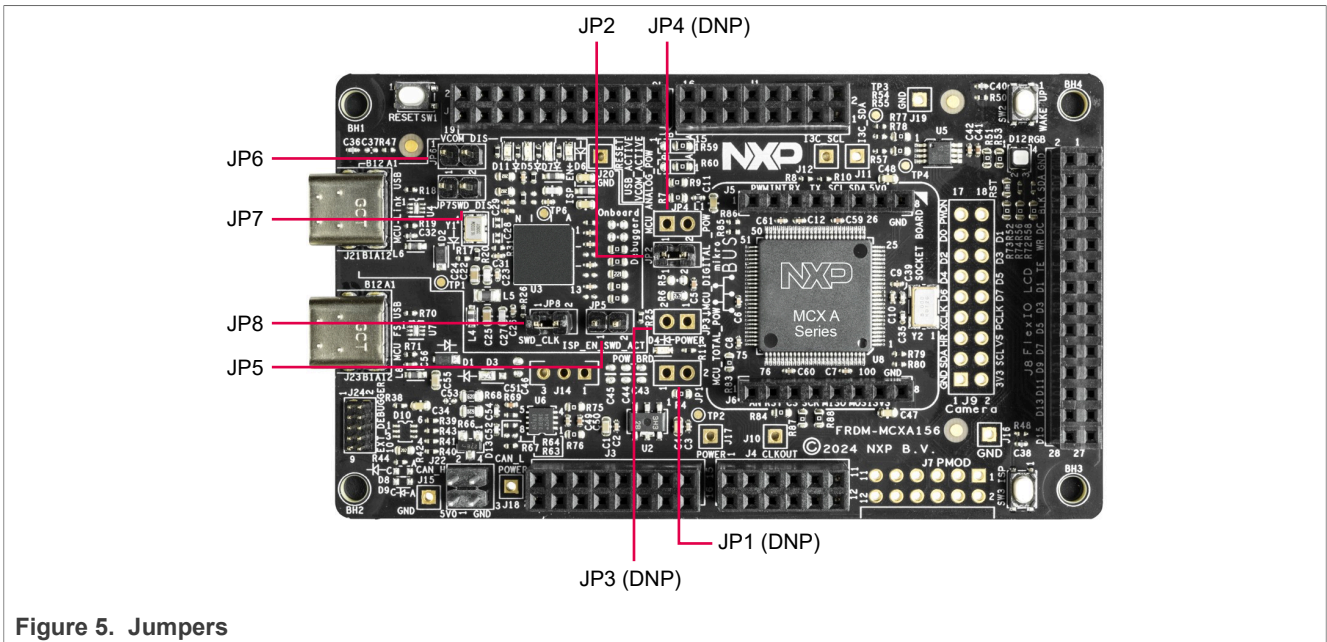
Figure 5 shows the FRDM-MCXA156 board jumpers.

Figure 5. Jumpers

Table 4 describes the FRDM-MCXA156 board jumpers.

Table 4. FRDM-MCXA156 jumpers

Part identifier	PCB label	Jumper type	Description	Reference section
JP1 (DNP)	POW_BRD	1x2-pin header	Board power (VDD_BOARD) measurement jumper. JP1 is not populated on the board by default. It can be populated to measure the current for the VDD_BOARD supply. When populating JP1, ensure to remove the 0 Ω resistor R4. When open, JP1 can be used to measure the current for the VDD_BOARD supply (see Section 2.1.1 for more details). When shorted, JP1 produces the VDD_BOARD supply.	Section 2.1
JP2	MCU_DIGITAL _POW	1x2-pin header	Target MCU (MCXA156) digital power (VDD_ MCU) measurement jumper: • Open: The VDD_MCU supply is OFF initially. JP2 can be used to measure the current consumption of the MCXA156 digital IPs (see Section 2.1.1 for more details). • Shorted (default setting): JP2 produces the VDD_MCU supply.	
JP3 (DNP)	MCU_TOTAL_ POW	1x2-pin header	Target MCU total power (analog + digital) (MCU_VDD_P3V3) measurement jumper. JP3 is not populated on the board by default. It can be populated to measure the total current consumption of the target MCU. When populating JP3, ensure to remove the 2.7 Ω resistor R6. When open, JP3 can be used to measure the current for the target MCU total power (MCU_ VDD_P3V3) (see Section 2.1.1 for more details).	

Table 4. FRDM-MCXA156 jumpers...*continued*

Part identifier	PCB label	Jumper type	Description	Reference section
			When shorted, JP3 produces the MCU_VDD_P3 V3 supply.	
JP4 (DNP)	MCU_ ANALOG_ POW	1x2-pin header	Target MCU (MCXA156) analog power (VDDA_ MCU) measurement jumper. JP4 is not populated on the board by default. It can be populated to measure the current consumption of the MCXA156 analog IPs. When populating JP4, ensure to remove the 0 Ω resistor R7. When open, JP4 can be used to measure the current consumption of the MCXA156 analog IPs (see Section 2.1.1 for more details). When shorted, JP4 produces the VDDA_MCU supply.	
JP5	ISP_EN_SWD_ ACT	1x2-pin header	MCU-Link (LPC55S69) ISP mode enable jumper: • 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 setting to reprogram the MCU-Link internal flash with a new image or use the MCUXpresso IDE with the CMSIS-DAP protocol. ***Note:*** *By default, the MCU-Link internal flash is preprogrammed with a version of the CMSIS-DAP firmware.*	Section 3.4
JP6	VCOM_DIS	1x2-pin header	MCU-Link VCOM port disable jumper: • 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
JP7	SWD_DIS	1x2-pin header	MCU-Link SWD disable jumper: • 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 connector J24.	Section 3.2
JP8	SWD_CLK	1x2-pin header	MCU-Link SWD clock enable jumper: • Open: The MCU-Link SWD clock is disabled. • Shorted (default setting): The MCU-Link SWD clock is enabled. MCU-Link drives SWD of the target MCU.	For more information on this jumper, see FRDM-MCXA156 board schematics.

1.7 Push buttons

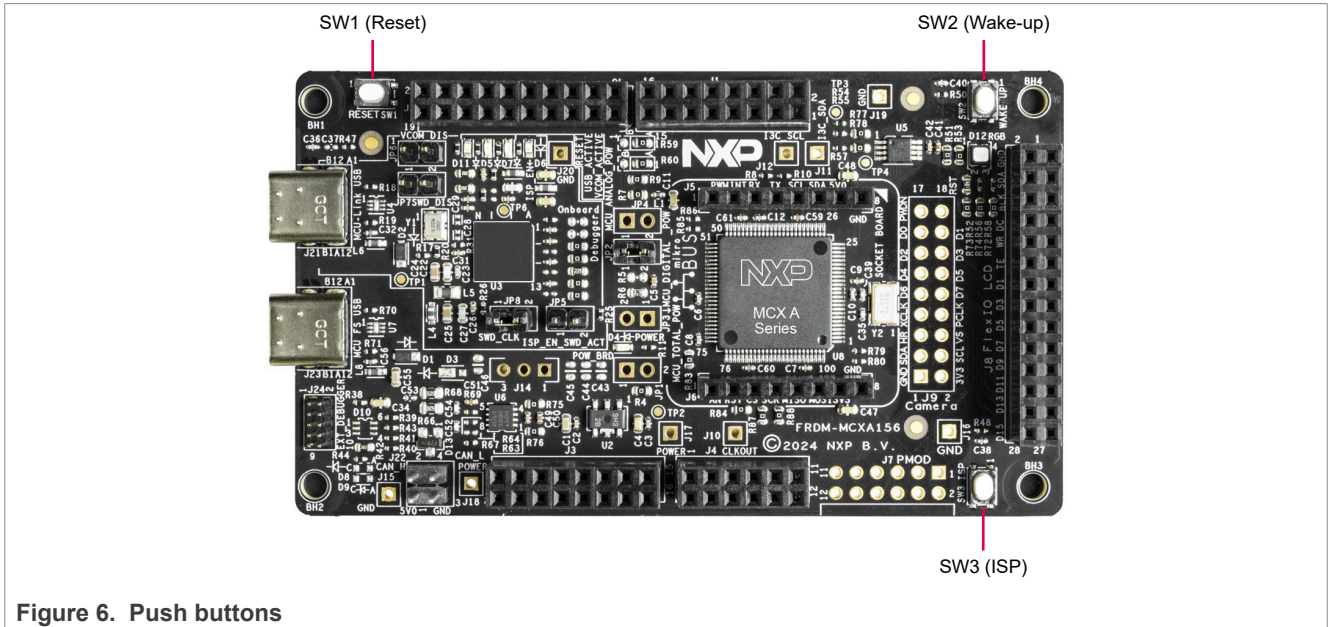Figure 6 shows the FRDM-MCXA156 board push buttons.

Figure 6. Push buttons

Table 5 describes the FRDM-MCXA156 board push buttons.

Table 5. FRDM-MCXA156 push buttons

Part identifier	PCB label	Name/function	Description
SW1	RESET	Reset button	Pressing SW1 asserts the MCXA156 MCU pin P1_29 (RESET_B), which wakes up the MCU from any mode. When SW1 is pressed, the reset LED D11 turns ON.
SW2	WAKE UP	Wake-up button	Pressing SW2 asserts the MCXA156 MCU pin P1_7, which can be configured through software to wake up the MCU from low-power modes.
SW3	ISP	ISP button	Pressing SW3 asserts the MCXA156 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 information on the MCXA156 MCU ISP mode, see *MCXA156, A155, A154, A146, A145, A144 Reference Manual*.

1.8 LEDs

The FRDM-MCXA156 board provides light-emitting diodes (LEDs) for monitoring system status. The information collected from the LEDs can be used for debugging purposes.

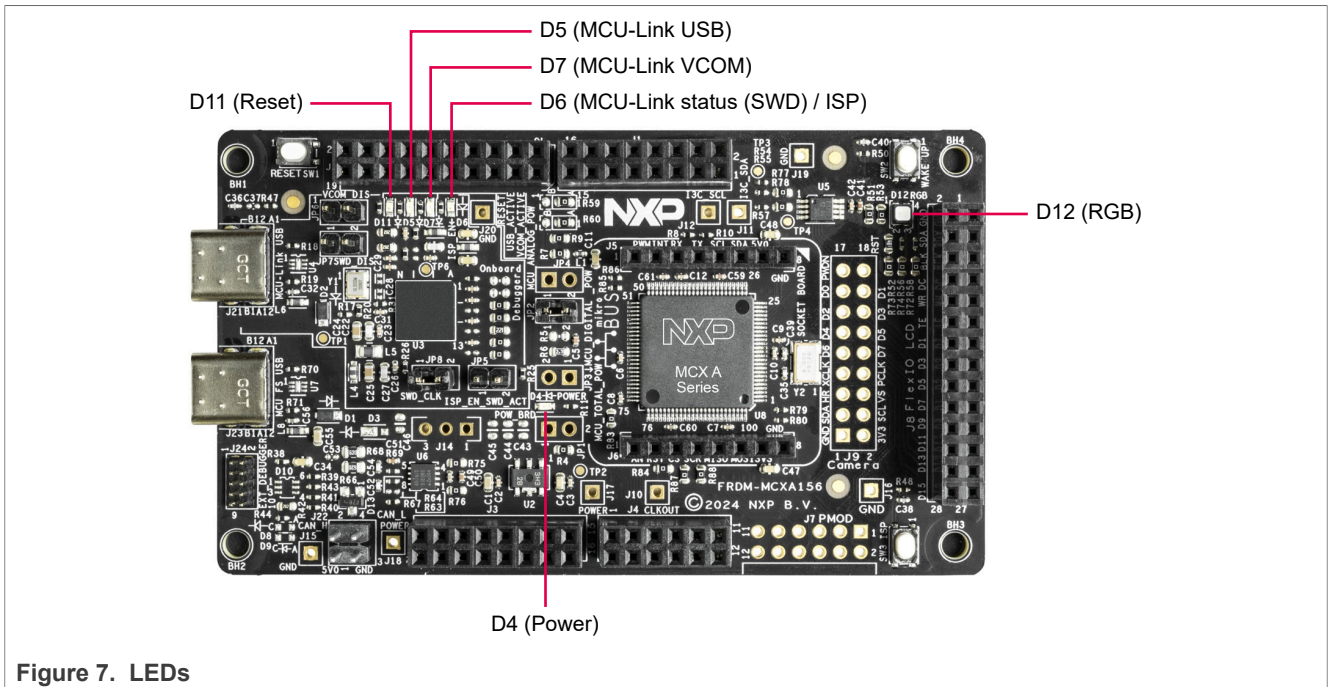Figure 7 shows the FRDM-MCXA156 board LEDs.

Figure 7. LEDs

[Table 6](#) describes the FRDM-MCXA156 board LEDs except for MCU-Link-specific LEDs, which are described in [Section 3.8](#).

Table 6. FRDM-MCXA156 LEDs

Part identifier	PCB label	LED color	Description (when LED is ON)
D4	POWER	Green	The LDO_3V3 supply is available.
D11	RESET	Red	Indicates system reset activity. When board reset is initiated, for example, by pressing the reset button (SW1), D11 turns ON.
D12	RGB	Red/green/blue	User-defined LED, which can be controlled through a user application.

Note: *MCU-Link-specific LEDs D5, D6, and D7 are described in* [Section 3.8](#)*.*

2   Functional description

This section contains the following subsections:

2.1   Power supplies

The FRDM-MCXA156 board is powered up using one of the following primary power supply options:

- External 5 V power through USB Type-C connector J23
- External 5 V power through USB Type-C connector J21
- 5-9 V power from Arduino socket connector J3, pin 16

The primary power supply is used to produce secondary power supplies on the board. The secondary power supplies provide power to board components, including the MCXA156 MCU, MCU-Link, temperature sensor, CAN FD transceiver, CAN connector, Arduino socket, mikroBUS socket, Pmod connector, FlexIO LCD connector, camera connector, and external debugger connector.

Table 7 describes the FRDM-MCXA156 board power supplies.

Table 7. FRDM-MCXA156 power supplies

Power source	Manufacturer and part number	Power supply	Description
External supply through USB Type-C connector J23		P5V_USB_FS (5 V)	One of the three power source options for the SYS_5V0 supply
External supply through USB Type-C connector J21		P5V_MCU_LINK_USB (5 V)	- Second power source option for the SYS_5V0 supply - Provides the USB1_VBUS power to the LPC55S69 MCU (MCU-Link)
Arduino socket connector J3, pin 16		P5-9V_VIN (5-9 V)	Supplies power to 5 V DC voltage regulator connector J14 (not populated)
DC voltage regulator attached to connector J14 (DNP)		P5V_HDR_IN (5 V)	Third power source option for the SYS_5V0 supply (disabled by default)
From the P5V_USB_FS / P5V_MCU_LINK_USB / P5V_HDR_IN supply		SYS_5V0 (5 V)	- Provides the VCC power to CAN FD transceiver U6 - Supplies power to LDO voltage regulator U2, CAN connector J22, Arduino socket connector J3 (pin 10), and mikroBUS socket connector J5

Table 7. **FRDM-MCXA156 power supplies**...*continued*

Power source	Manufacturer and part number	Power supply	Description
Note: *By default, the option to produce the SYS_5V0 supply from the P5V_HDR_ IN supply is disabled.*			
LDO voltage regulator U2	Torex Semiconductor XC6227C331PR-G	LDO_3V3 (3.3 V)	• Produces the MCU_VDD_P3V3 supply through either 2.7 Ω resistor R6 or jumper JP3 (not populated) • Produces the VDD_BOARD supply through either 0 Ω resistor R4 or jumper JP1 (not populated) • Supplies power to Arduino socket connector J3 (pin 8), power LED D4, and power test points J17 (DNP) and J18 (DNP)
From the LDO_3V3 supply through resistor R6 or jumper JP3 (DNP)		MCU_VDD_ P3V3 (3.3 V)	• Produces the VDD_MCU supply through either 0 Ω resistor R5 (not populated) or jumper JP2 • Produces the VDDA_MCU supply through either 0 Ω resistor R7 or jumper JP4 (not populated) • Produces the VDD_USB supply through 0 Ω resistor R9
From the MCU_ VDD_P3V3 supply through resistor R5 (DNP) or jumper JP2		VDD_MCU	Provides the VDD and VDD_P3 powers to the MCXA156 MCU
From the MCU_ VDD_P3V3 supply through resistor R7 or jumper JP4 (DNP)		VDDA_MCU	• Provides the VDD_ANA and VREFH powers to the MCXA156 MCU • Supplies power to Arduino socket connector J2 (pin 16)
From the MCU_ VDD_P3V3 supply		VDD_USB	Provides the VDD_USB power to the MCXA156 MCU

From the LDO_3V3 supply through resistor R4 or jumper JP1 (DNP)		VDD_BOARD (3.3 V)	• Produces the following power supplies:
			  – VDD_P3T
			  – MCU_LINK_3V3
			  – VREF_MCULINK
			• Provides the VIO power to CAN FD transceiver U6
			• Provides the VDDA power to the LPC55S69 MCU (MCU-Link)
			• Supplies power to:
			  – Arduino socket connector J3 (pin 4)
			  – mikroBUS socket connector J6
			  – Pmod connector J7 (not populated)
			  – FlexIO LCD connector J8
			  – Camera connector J9 (not populated)
			  – External debugger connector J24
			  – Push buttons SW1, SW2, and SW3
			  – Reset LED D11 and RGB LED D12
			  – MCU-Link LEDs D5, D6, and D7

From the VDD_ BOARD supply		VDD_P3T	Supplies power to temperature sensor U5
		MCU_LINK_3 V3 (3.3 V)	Provides the VDD, USB0_3V3, and USB1_3V3 powers to the LPC55S69 MCU (MCU-Link)

Table 7. FRDM-MCXA156 power supplies...*continued*

Power source	Manufacturer and part number	Power supply	Description
		VREF_ MCULINK	Provides the VREFP power to the LPC55S69 MCU (MCU-Link)

2.1.1 Current measurement

The FRDM-MCXA156 board supports current measurement using an ampere meter (ammeter) on the power supplies shown in Table 8.

Table 8. Power supplies with current measurement support

Power supply	Description	Jumper (2-pin)	Resistor	Current measurement steps
VDD_MCU	Target MCU (MCXA156) digital power	JP2	R5 (DNP)	1. Open the jumper (JP2). 2. Connect an ammeter to the jumper pins 1 and 2.
VDD_BOARD	Board power	JP1 (DNP)	R4	1. Remove the corresponding resistor.
MCU_VDD_P3 V3	Target MCU total power (analog + digital)	JP3 (DNP)	R6	2. Populate the corresponding jumper (2-pin).
VDDA_MCU	Target MCU analog power	JP4 (DNP)	R7	3. Connect an ammeter to the jumper pins 1 and 2.

2.2 Clocks

Table 9 provides details about inputs clocks on the FRDM-MCXA156 board.

Table 9. FRDM-MCXA156 clocks

Clock generator	Manufacturer and part number	Clock	Frequency	Destination
Crystal Y1	Würth Elektronik 830064296	MCU_LINK_[P, N]_16 MHz	16 MHz	LPC55S69 MCU
Crystal Y2		XTAL48M, EXTAL48M	8 MHz	MCXA156 MCU

The MCXA156 MCU also provides a clock output CLKOUT, which can be accessed by populating clock output test point J10.

2.3 USB interface

The MCXA156 MCU has one Universal Serial Bus (USB) Full Speed (FS) module, USBFS0, and one USB FS PHY. The USBFS0 module only supports Device mode operation.

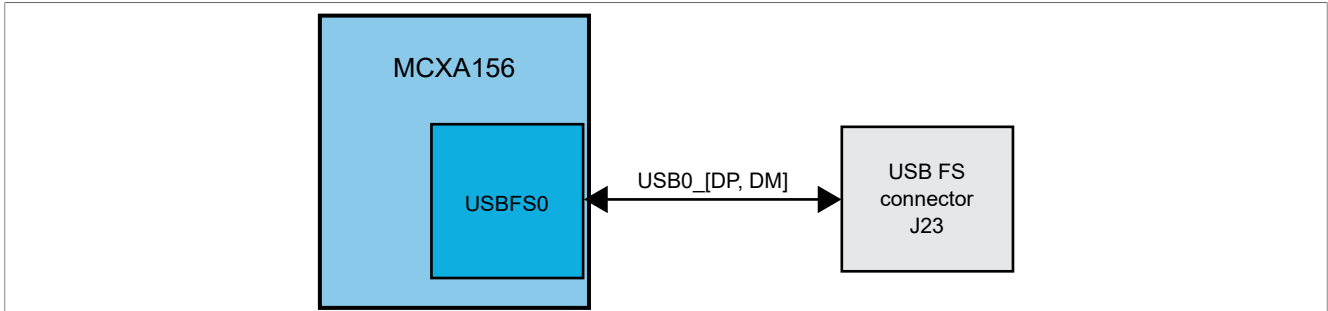The FRDM-MCXA156 board supports communication with the USBFS0 module. Figure 8 shows the FRDM-MCXA156 USB diagram.

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Figure 8. USB diagram

Table 10 describes the FRDM-MCXA156 USB connections.

Table 10. USB connections

USB module	Peripheral devices	
	Part identifier	**Description**
USBFS0	J23	USB 2.0 (FS) Type-C connector J23, which allows communication with the USBFS0 module of the MCXA156 MCU through a USB Type-C cable. It operates in Device mode. It also serves as a 5 V power source to power up the board.

2.4 FlexCAN interface

The MCXA156 MCU has a Flexible Data Rate Controller Area Network (FlexCAN) module: CAN0. The FRDM-MCXA156 board supports communication with the CAN0 module. Figure 9 shows the FRDM-MCXA156 FlexCAN diagram.
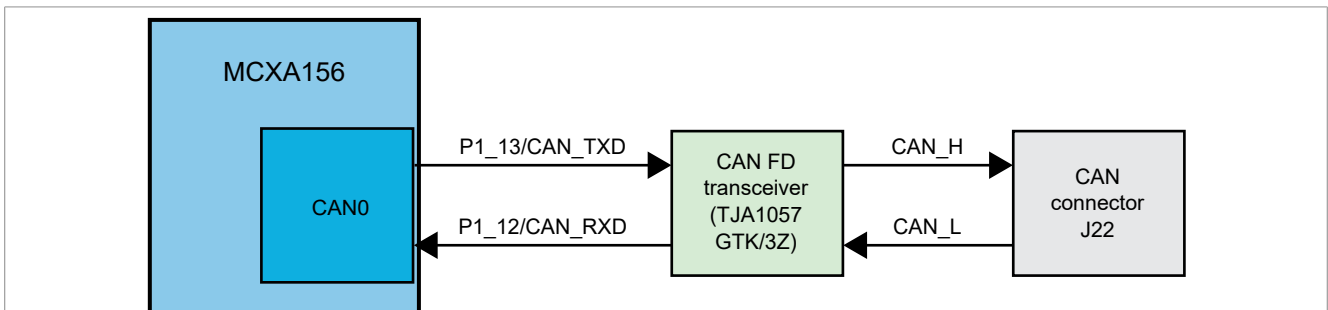

Figure 9. FlexCAN diagram

Table 11 describes the FRDM-MCXA156 FlexCAN connections.

Table 11. FlexCAN connections

FlexCAN module	Peripheral devices		
	Part identifier	**Manufacturer and part number**	**Description**
CAN0	U6	NXP TJA1057GTK/3Z	A high-speed CAN flexible data rate (FD) transceiver, which drives CAN signals between the CAN0 module of the MCXA156 MCU and a physical two-wire CAN bus. It performs the following functions: • 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.

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Table 11. FlexCAN connections...*continued*

FlexCAN module	Peripheral devices		
	Part identifier	Manufacturer and part number	Description
	J22		A 2x2-pin header that allows external CAN connection with the CAN bus. It has the following pinout: • Pin 1: Power connection (SYS_5V0) • Pin 2: High-level CAN bus line connection • Pin 3: Ground • Pin 4: Low-level CAN bus line connection

2.5 LPUART interface

The MCXA156 MCU has five Low-Power Universal Asynchronous Receiver/Transmitter (LPUART) modules: LPUART0, LPUART1, LPUART2, LPUART3, and LPUART4.

The FRDM-MCXA156 board only supports communication with the LPUART0, LPUART1, and LPUART2 modules. Figure 10 shows the FRDM-MCXA156 LPUART diagram.

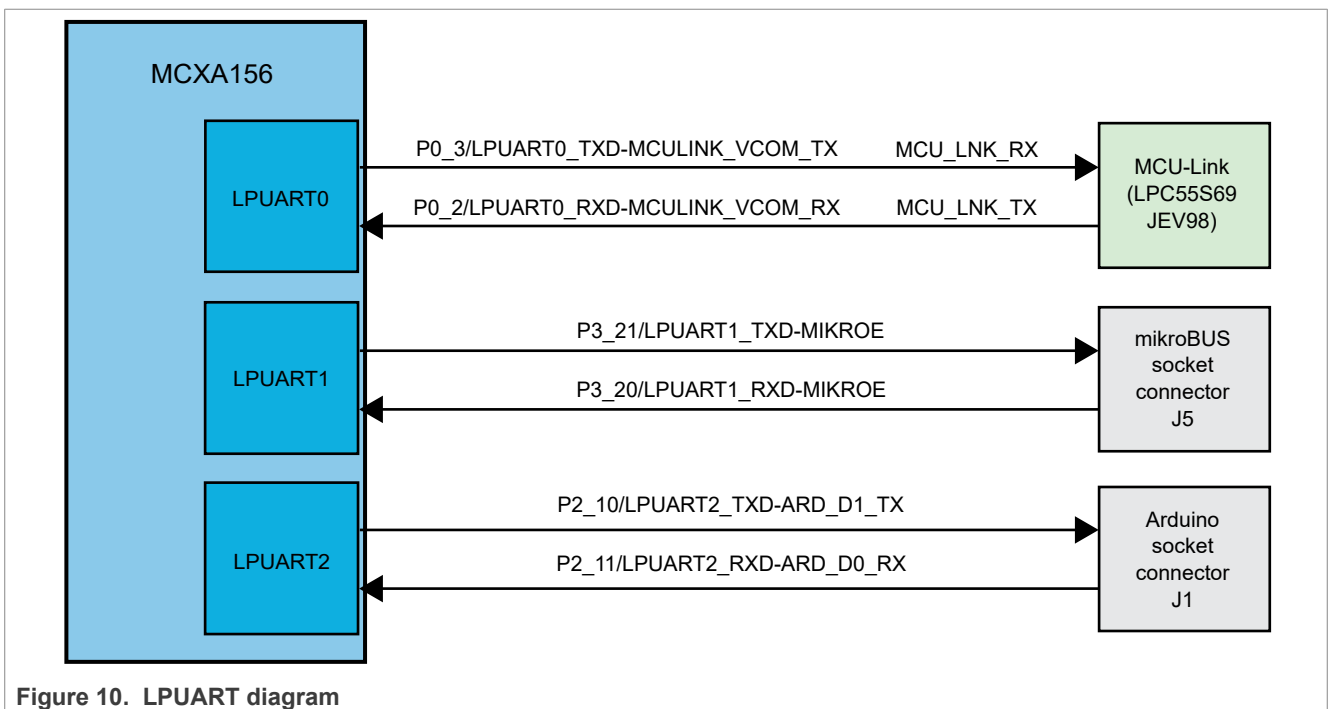**Figure 10. LPUART diagram**

Table 12 describes the FRDM-MCXA156 LPUART connections.

Table 12. LPUART connections

LPUART module	Peripheral devices		
	Part identifier	Manufacturer and part number	Description
LPUART0	U3	NXP LPC55S69JEV98	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 (MCXA156) through a virtual communication (VCOM) port.

Table 12. LPUART connections...*continued*

LPUART module	Peripheral devices		
	Part identifier	Manufacturer and part number	Description
LPUART1	J5		1x8-position mikroBUS socket connector that allows the plugged-in mikroBUS click board to communicate with the MCXA156 MCU through a UART connection.
LPUART2	J1		2x8-position Arduino socket connector that allows the plugged-in Arduino board to communicate with the MCXA156 MCU through a UART connection.

2.6 LPSPI interface

The MCXA156 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 (PCSs)
- Peripheral mode

The FRDM-MCXA156 board supports communication with both LPSPI modules of the MCXA156 MCU. Figure 11 shows the FRDM-MCXA156 LPSPI diagram.
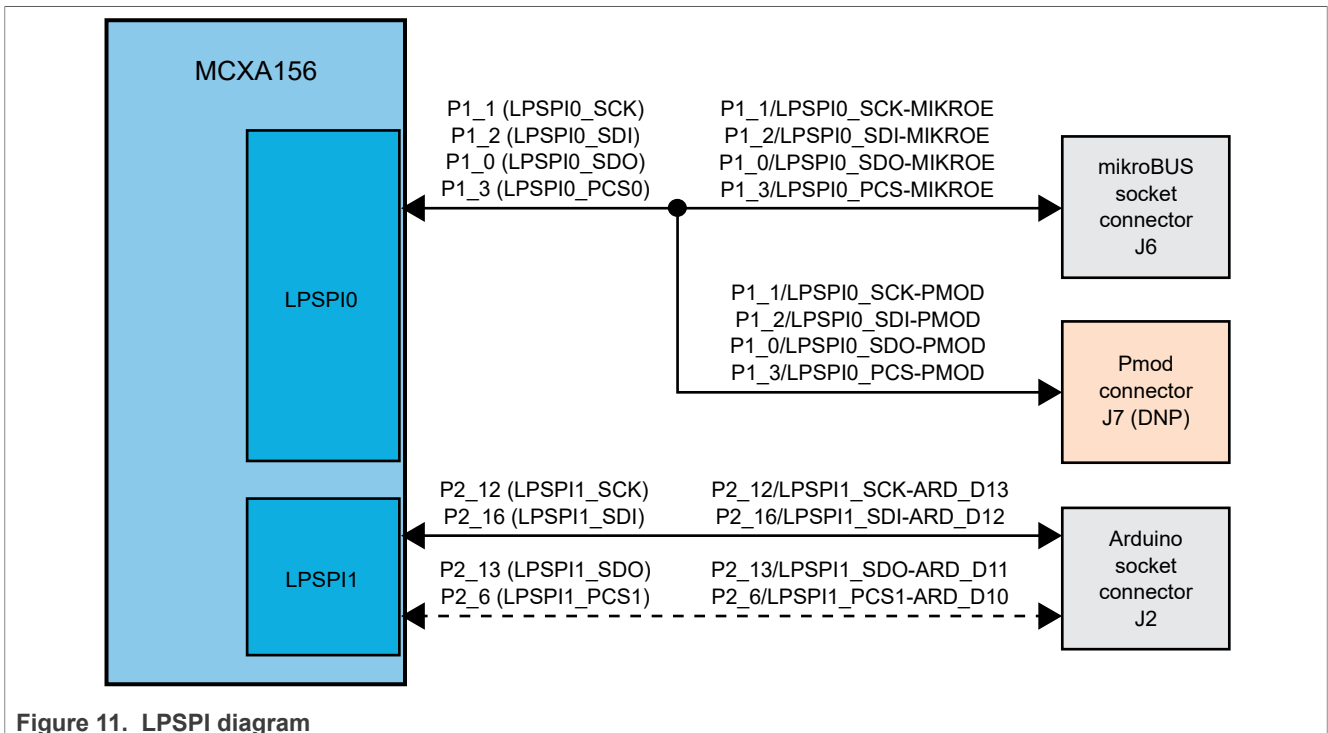

Figure 11. LPSPI diagram

Table 13 describes the FRDM-MCXA156 LPSPI connections.

Table 13. LPSPI connections

LPSPI module	Peripheral chip select	Peripheral devices	
		Part identifier	**Description**
LPSPI0	PCS0	J6	1x8-position mikroBUS socket connector that allows the plugged-in mikroBUS click board to communicate with the MCXA156 MCU through an SPI connection.
		J7 (DNP)	2x6-pin/position Pmod connector that allows the plugged-in Pmod board to communicate with the MCXA156 MCU through an SPI connection. By default, J7 is not populated on the board.
LPSPI1	PCS1	J2	2x10-position Arduino socket connector that allows the plugged-in Arduino board to communicate with the MCXA156 MCU through an SPI connection.
			By default, the SPI1_PCS1 and SPI1_SDO signals between the MCXA156 MCU and the J2 connector are disabled. You can enable these signals as follows:
			• To enable the SPI1_PCS1 signal, move the 0 Ω resistor R59 from position A to position B.
			• To enable the SPI1_SDO signal, move the 0 Ω resistor R60 from position A to position B.

2.7 LPI2C interface

The MCXA156 MCU has four Low-Power Inter-Integrated Circuit (LPI2C) modules: LPI2C0, LPI2C1, LPI2C2, and LPI2C3. Each LPI2C module supports serial I^{2}C communication through a pair of control and data signals, and can act as a controller or target.

The FRDM-MCXA156 board only supports communication with the LPI2C0, LPI2C2, and LPI2C3 modules. Figure 12 shows the FRDM-MCXA156 LPI2C diagram.
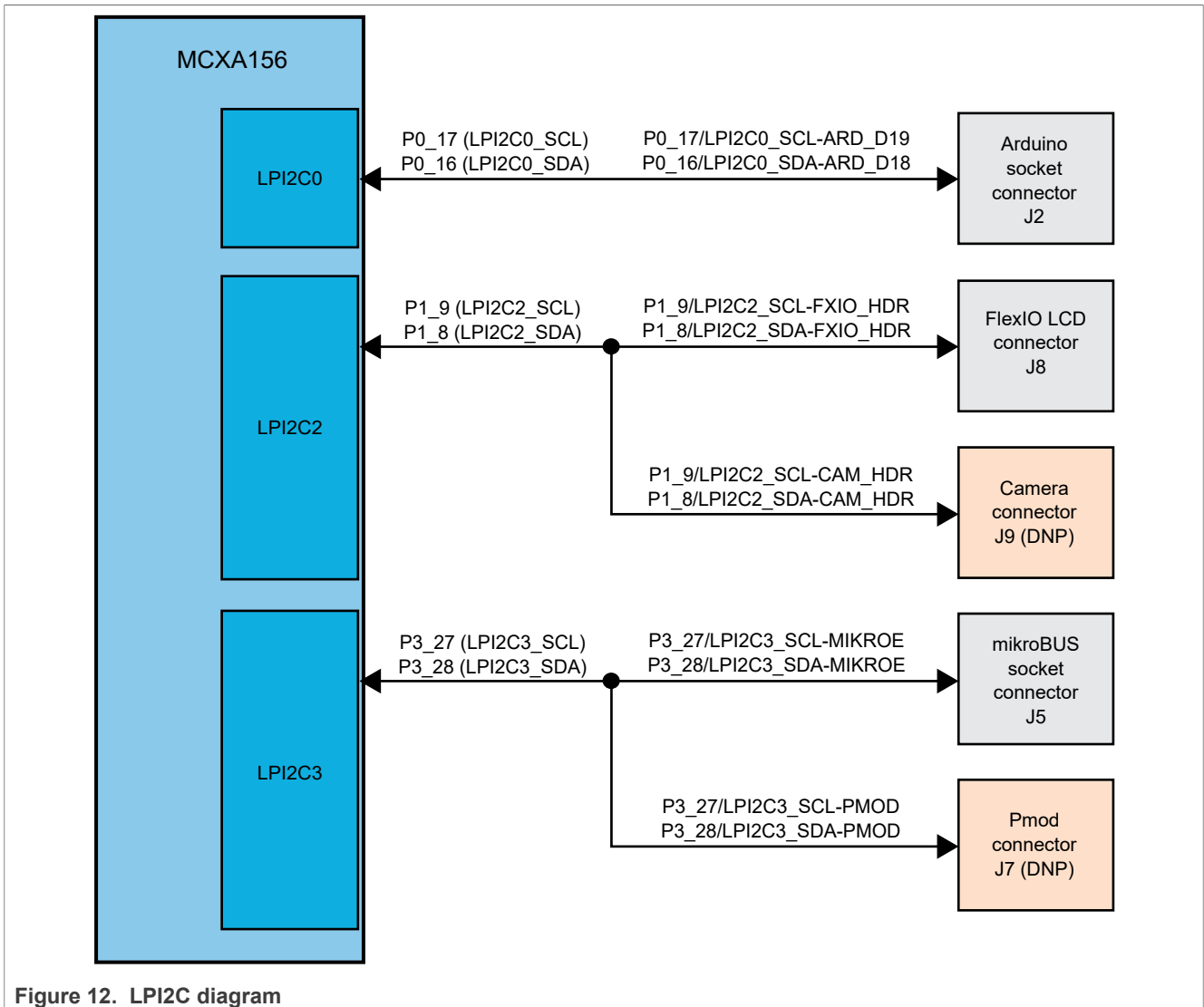
Figure 12. LPI2C diagram

Table 14 describes the FRDM-MCXA156 LPI2C devices. The I^{2}C address of each device depends on the plugged-in board/module.

Table 14. LPI2C devices

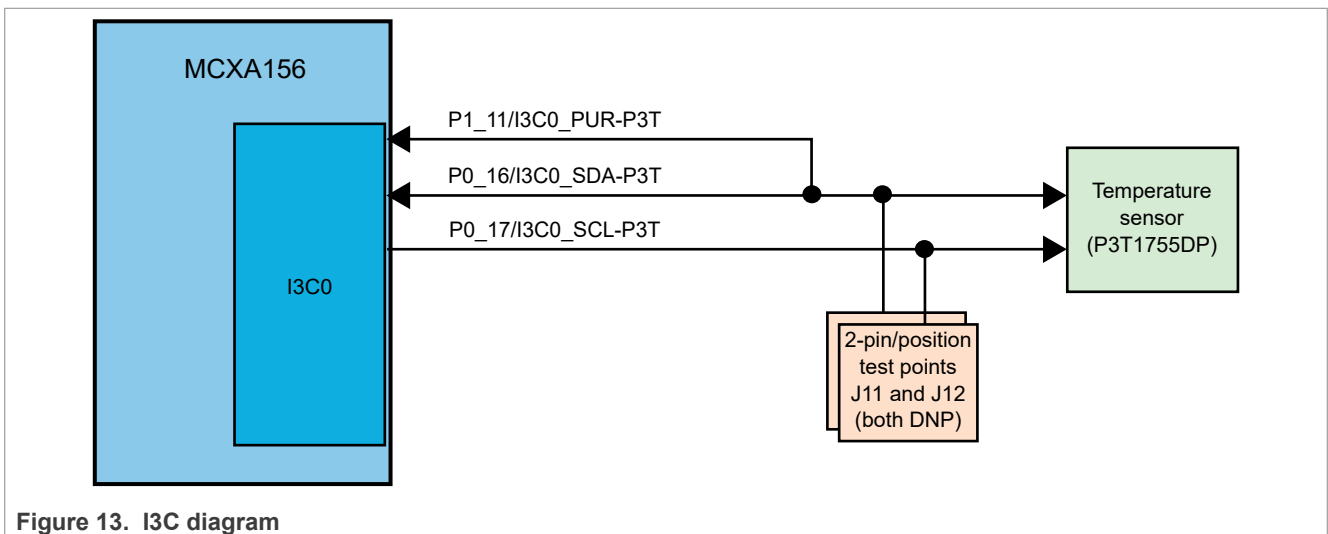| LPSPI module	Peripheral devices	
	Part identifier	**Description**
LPI2C0	J2	2x10-position Arduino socket connector that allows an I^{2}C connection between the MCXA156 MCU and the plugged-in Arduino board.
LPI2C2	J8	2x14-position FlexIO LCD connector that allows an I^{2}C connection between the MCXA156 MCU and the plugged-in LCD module.
	J9 (DNP)	2x9-pin/position camera connector that allows an I^{2}C connection between the MCXA156 MCU and the plugged-in camera module. By default, J9 is not populated on the board.
LPI2C3	J5	1x8-position mikroBUS socket connector that allows an I^{2}C connection between the MCXA156 MCU and the plugged-in mikroBUS click board.

Table 14. LPI2C devices...*continued*

LPSPI module	Peripheral devices	
	Part identifier	**Description**
	J7 (DNP)	2x6-pin/position Pmod connector that allows an I^{2}C connection between the MCXA156 MCU and the plugged-in Pmod board. By default, J7 is not populated on the board.

2.8 I3C interface

The Improved Inter-Integrated Circuit (I3C) specification from Mobile Industry Processor Interface (MIPI) Alliance brings major improvements over I^{2}C in terms of use and power. It also provides an alternative to SPI for mid-speed applications.

The MCXA156 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 I^{2}C static address assigned at startup, so that the target can operate on an I^{2}C bus.

The FRDM-MCXA156 board supports communication with the I3C0 module of the MCXA156 MCU. Figure 13 shows the FRDM-MCXA156 I3C diagram.

Figure 13. I3C diagram

Table 15 describes the FRDM-MCXA156 I3C connections.

Table 15. I3C connections

I3C module	Peripheral devices		
	Part identifier	**Manufacturer and part number**	**Description**
I3C0	U5	NXP P3T1755DP	A digital temperature sensor with support for over-temperature detection. It can measure temperature in the range from -40 ℃ to +125 ℃ with ±0.5 ℃ 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.
			On the FRDM-MCXA156 board, the U5 sensor can work in one of the following modes:

Table 15. I3C connections

I3C module	Peripheral devices		
	Part identifier	Manufacturer and part number	Description
			• I^2C mode (default mode): Populate resistors R57 and R55 (populated by default). The static I^2C address (7-bit) of the U5 sensor is 0x90. • I3C mode: Unpopulate (remove) resistors R57 and R55. The U5 sensor is assigned with an I3C address dynamically. The FRDM-MCXA156 board also provides test point support for the two I3C signals: • J11 (DNP): I3C data test point • J12 (DNP): I3C clock test point For more information on P3T1755DP, visit nxp.com.

2.9 FlexIO interface

The MCXA156 MCU has one Flexible Input/Output (FlexIO) module, FLEXIO0, which provides emulation of various serial or parallel communication protocols, including:

• UART
• SPI
• I^2C
• I2S
• Camera interface
• PWM or waveform generation

The FRDM-MCXA156 board supports communication with the FLEXIO0 module through the following connectors:

• J8: 2x14-position FlexIO parallel LCD connector
• J9 (DNP): 2x9-pin/position camera connector. It supports a camera module based on the OmniVision OV7670 image sensor.
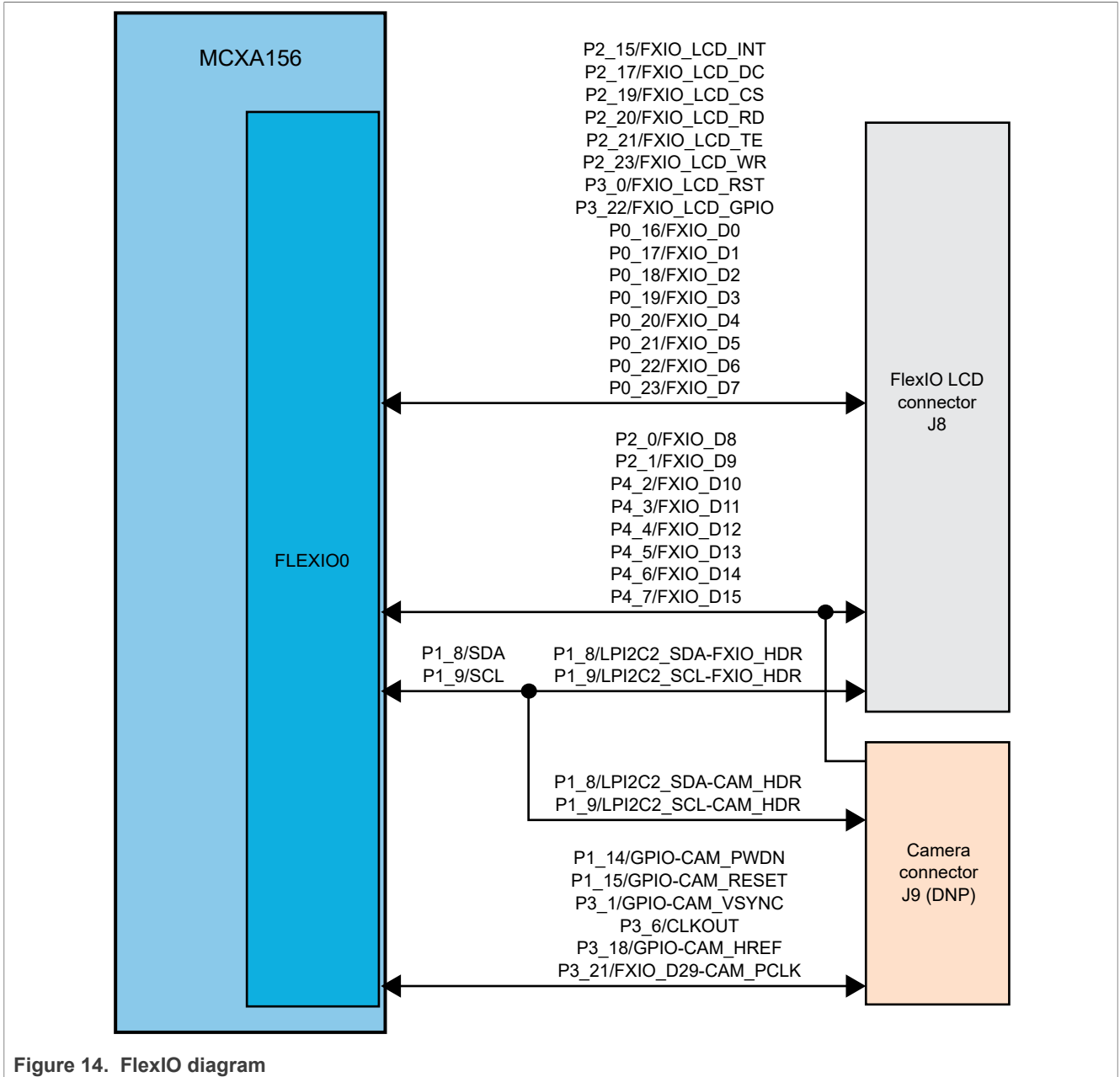
Figure 14 shows the FRDM-MCXA156 FlexIO diagram.

Figure 14. FlexIO diagram

[Table 16](#) shows the pinout of the FlexIO LCD connector J8.

Table 16. FlexIO LCD connector pinout

Pin number	Signal name	Description
3	P1_9/LPI2C2_SCL-FXIO_HDR	I^2C signals
4	P1_8/LPI2C2_SDA-FXIO_HDR	
5	P2_15/FXIO_LCD_INT	LCD interrupt signal
6	P3_22/FXIO_LCD_GPIO	LCD GPIO signal
7	P3_0/FXIO_LCD_RST	LCD reset signal
8	P2_17/FXIO_LCD_DC	LCD data/command selection signal

Table 16. FlexIO LCD connector pinout...*continued*

Pin number	Signal name	Description
9	P2_19/FXIO_LCD_CS	LCD chip select signal
10	P2_23/FXIO_LCD_WR	LCD write signal
11	P2_20/FXIO_LCD_RD	LCD read signal
12	P2_21/FXIO_LCD_TE	LCD tear enable signal
13	P0_16/FXIO_D0	Data signals
14	P0_17/FXIO_D1	
15	P0_18/FXIO_D2	
16	P0_19/FXIO_D3	
17	P0_20/FXIO_D4	
18	P0_21/FXIO_D5	
19	P0_22/FXIO_D6	
20	P0_23/FXIO_D7	
21	P2_0/FXIO_D8	
22	P2_1/FXIO_D9	
23	P4_2/FXIO_D10	
24	P4_3/FXIO_D11	
25	P4_4/FXIO_D12	
26	P4_5/FXIO_D13	
27	P4_6/FXIO_D14	
28	P4_7/FXIO_D15	
1	VDD_BOARD	Power supply
2	GND	Ground

Table 17 shows the pinout of the camera connector J9 (DNP).

Table 17. Camera connector pinout

Pin number	Signal name	Description
3	P1_8/LPI2C2_SDA-CAM_HDR	I^2C signals
4	P1_9/LPI2C2_SCL-CAM_HDR	
5	P3_18/GPIO-CAM_HREF	Camera horizontal reference signal
6	P3_1/GPIO-CAM_VSYNC	Camera vertical sync signal
7	P3_6/CLKOUT	Camera input clock signal
8	P3_21/FXIO_D29-CAM_PCLK	Camera pixel clock signal
9	P4_6/FXIO_D14	Data signals
10	P4_7/FXIO_D15	
11	P4_4/FXIO_D12	
12	P4_5/FXIO_D13	
13	P4_2/FXIO_D10	

Table 17. Camera connector pinout...*continued*

Pin number	Signal name	Description
14	P4_3/FXIO_D11	
15	P2_0/FXIO_D8	
16	P2_1/FXIO_D9	
17	P1_14/GPIO-CAM_PWDN	Camera power-down signal
18	P1_15/GPIO-CAM_RESET	Camera reset signal
2	VDD_BOARD	Power supply
1	GND	Ground

2.10 ADC interface

The MCXA156 MCU has two 12-bit Analog-to-Digital Converter (ADC) modules: ADC0 and ADC1.

The FRDM-MCXA156 board supports communication with both ADC modules of the MCXA156 MCU. Figure 15 shows the FRDM-MCXA156 ADC diagram.
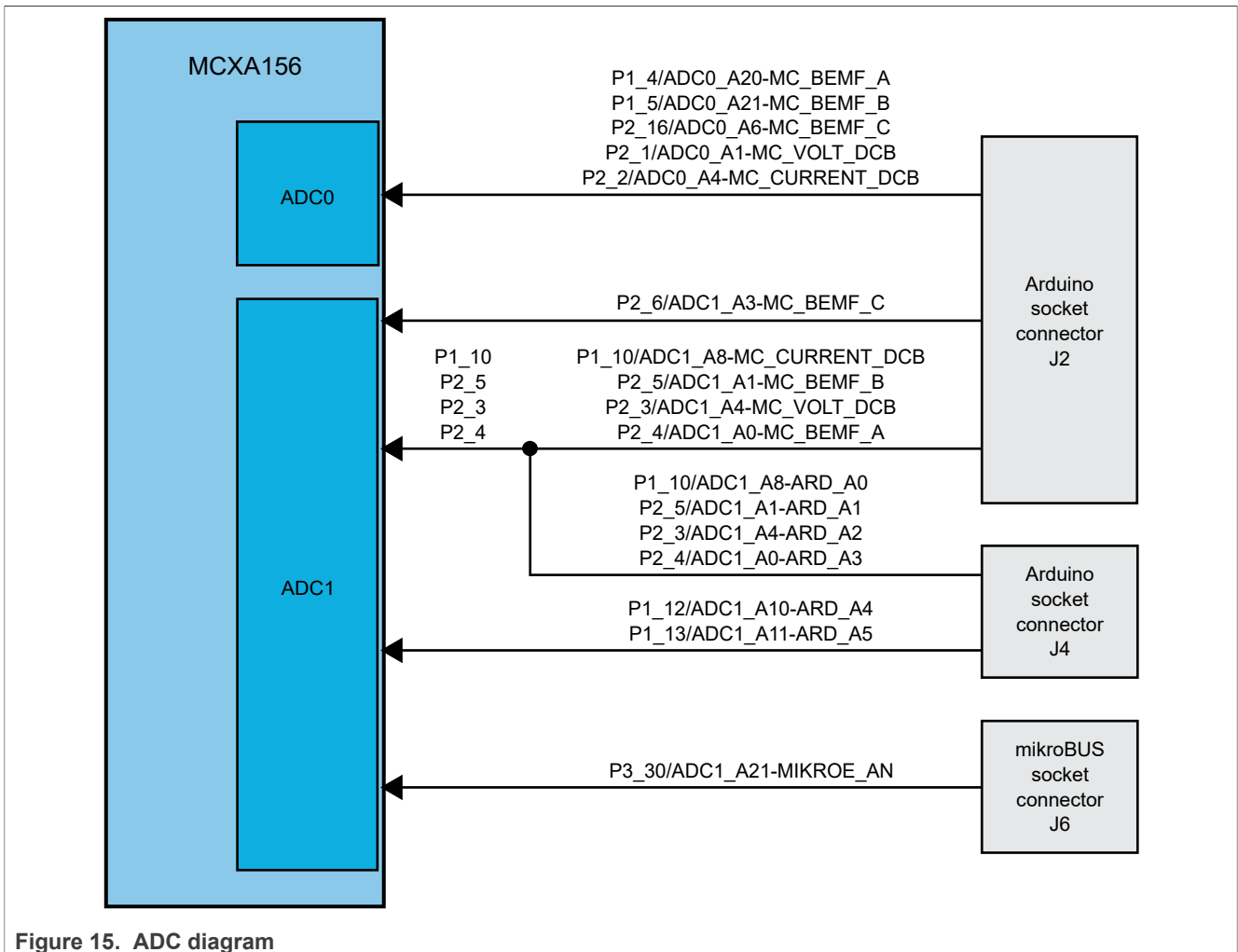

Figure 15. ADC diagram

Table 18 describes the FRDM-MCXA156 ADC connections.

Table 18. ADC connections

ADC module	ADC input connections	Peripheral devices	
		Part identifier	**Description**
ADC0, ADC1	ADC0_A1, ADC0_A4, ADC0_A6, ADC0_A20, ADC0_A21, ADC1_A0, ADC1_A1, ADC1_A3, ADC1_A4, ADC1_A8	J2	2x10-position Arduino socket connector that allows the plugged-in Arduino board to communicate with the MCXA156 MCU through an ADC connection.
ADC1	ADC1_A0, ADC1_A1, ADC1_A4, ADC1_A8, ADC1_A10, ADC1_A11	J4	2x6-position Arduino socket connector that allows the plugged-in Arduino board to communicate with the MCXA156 MCU through an ADC connection.
	ADC1_A21	J6	1x8-position mikroBUS socket connector that allows the plugged-in mikroBUS click board to communicate with the MCXA156 MCU through an ADC connection.

2.11 Arduino socket

The FRDM-MCXA156 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 16 shows the pinouts of the Arduino socket connectors.
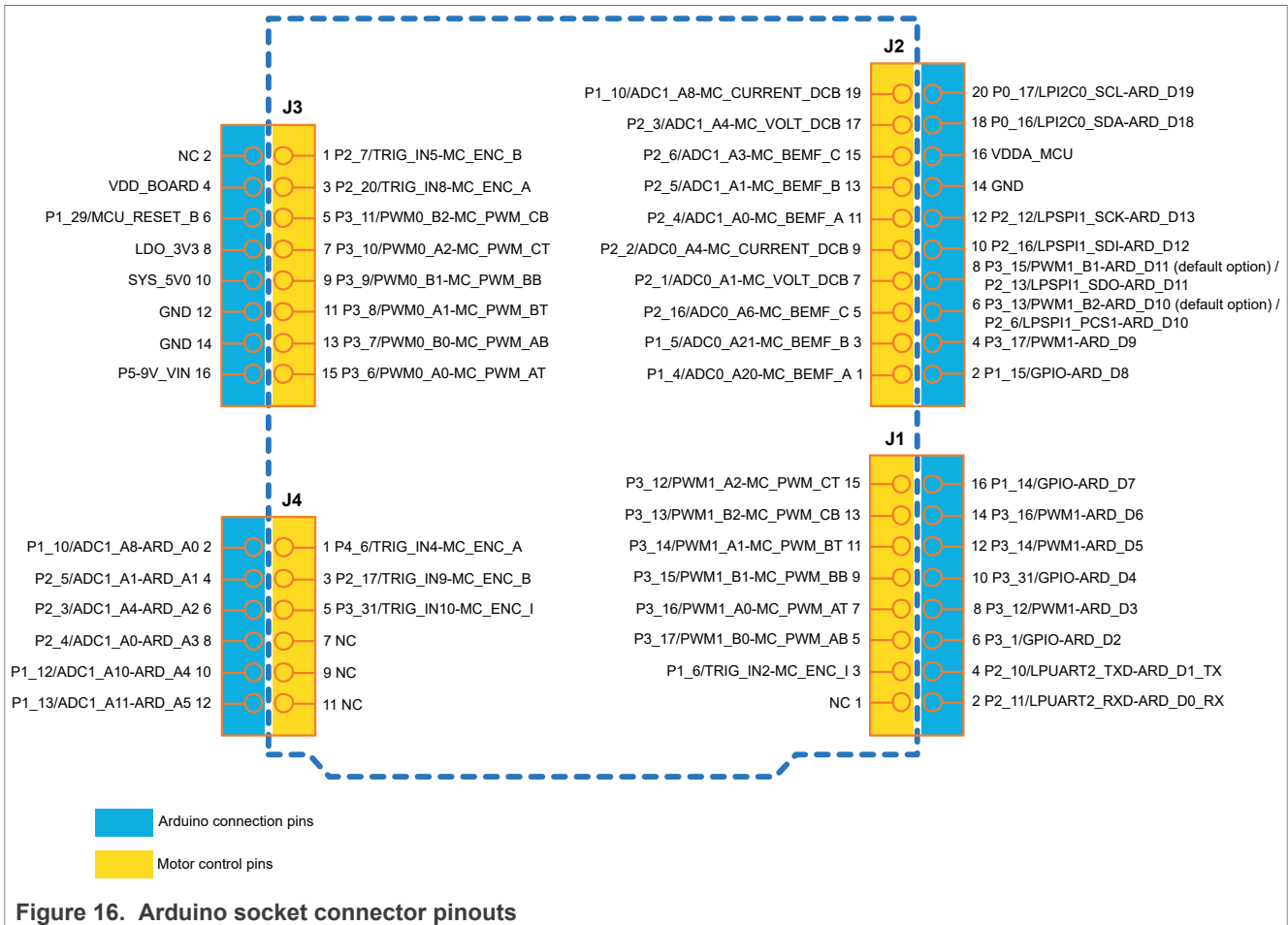
Figure 16. Arduino socket connector pinouts

The Arduino socket allows communication with the following modules of the MCXA156 MCU:

- Low-Power Universal Asynchronous Receiver/Transmitter 2 (LPUART2)
- Low-Power Serial Peripheral Interface 1 (LPSPI1)
- Low-Power Inter-Integrated Circuit 0 (LPI2C0)
- 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 boards:

- Arduino boards:
  - Arduino Uno revision 3 (R3)
  - Arduino A4/A5
    Note: *When using an Arduino A4/A5 board, remove resistors R75 and R76.*
- Motor control boards:
  - FRDM-MC-LVBLDC
  - FRDM-MC-LVPMSM

2.12 mikroBUS socket

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

The FRDM-MCXA156 board has a mikroBUS socket with a pair of 1x8-position receptacles, J5 and J6. Figure 17 shows the pinouts of the mikroBUS socket connectors.
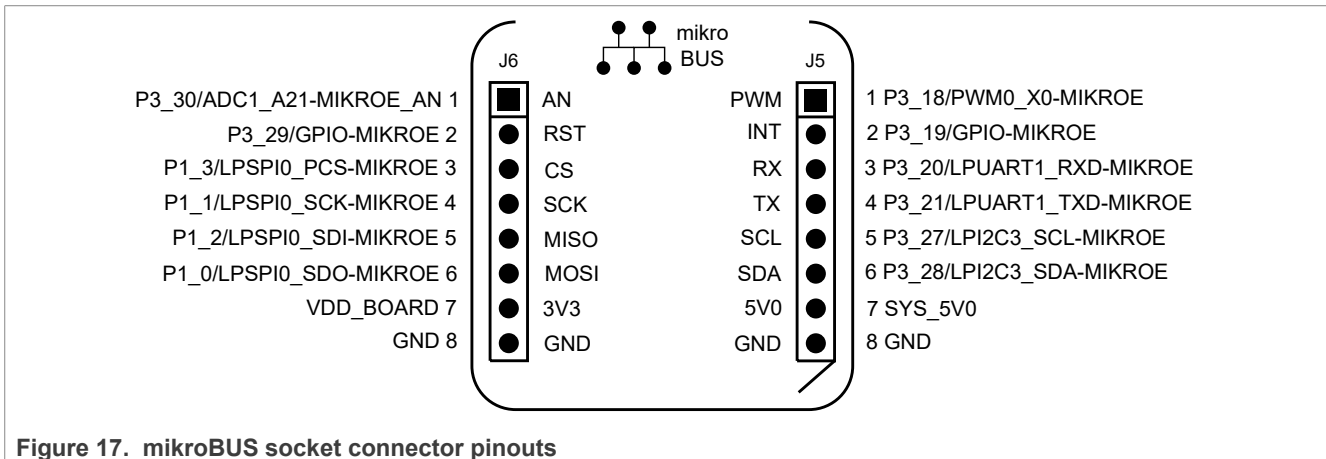

Figure 17. mikroBUS socket connector pinouts

The Arduino socket allows communication with the following modules of the MCXA156 MCU:

- Low-Power Universal Asynchronous Receiver/Transmitter 1 (LPUART1)
- Low-Power Serial Peripheral Interface 0 (LPSPI0)
- Low-Power Inter-Integrated Circuit 3 (LPI2C3)
- Analog-to-Digital Converter 1 (ADC1)
- Pulse Width Modulator 0 (PWM0)

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 example click boards for the FRDM-MCXA156 mikroBUS socket, visit MIKROE website.

2.13 Pmod connector

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

The FRDM-MCXA156 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 19 shows the pinout of the Pmod connector J7.

Table 19. Pmod connector pinout

Pin number	Signal name	Description
1	P1_3/LPSPI0_PCS-PMOD	SPI signals
3	P1_0/LPSPI0_SDO-PMOD	
5	P1_2/LPSPI0_SDI-PMOD	
7	P1_1/LPSPI0_SCK-PMOD	

Table 19. Pmod connector pinout...*continued*

Pin number	Signal name	Description
2	P3_19/GPIO-PMOD	GPIO signals
4	P3_20/GPIO-PMOD	
6	P3_27/LPI2C3_SCL-PMOD	I^{2}C signals
8	P3_28/LPI2C3_SDA-PMOD	
11, 12	VDD_BOARD	Power supply
9, 10	GND	Ground

The Pmod connector allows communication with the following modules of the MCXA156 MCU:

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

3 MCU-Link OB debug probe

MCU-Link is a debug probe architecture jointly developed by NXP and Embedded Artists. The MCU-Link architecture is based on the NXP LPC55S69 MCU, which is based on an Arm Cortex-M33 core. 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-MCXA156

The onboard implementation of MCU-Link is referred to as *MCU-Link OB*.

The FRDM-MCXA156 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-MCXA156 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 to make MCU-Link OB compatible with J-Link LITE is also available. 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 20 summarizes the MCU-Link features supported on the FRDM-MCXA156 board.

Table 20. Supported MCU-Link features

Feature	Description
Serial wire debug (SWD) / serial wire debug trace 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.
External debug probe support	The MCU-Link interface supports debugging the target MCU (MCXA156) using an external debug probe, instead of MCU-Link. Support for an external debug probe is enabled by disabling the SWD feature.

3.2 Supported debug scenarios

Table 21 describes the debug scenarios supported on the FRDM-MCXA156 board.

Table 21. Supported debug scenarios

Debug scenario	Feature support	Required jumper/connector settings
Use MCU-Link for debugging the MCXA156 MCU	SWD: Enabled	MCU-Link SWD disable jumper JP7 is open.
		External debugger connector J24 is not used for external connection.
	VCOM: Enabled	MCU-Link VCOM port disable jumper JP6 is open.
Use an external debugger for debugging the MCXA156 MCU	SWD: Not supported	Short JP7.
		Connect the external debugger to J24.
	VCOM: Supported	JP6 is open.

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 using the LinkServer installer for installing the MCU-Link firmware update utility, unless you are using MCUXpresso IDE version 11.6.1 or earlier.

Note: *To use MCU-Link with MCUXpresso IDE version 11.6.1 or earlier, you need MCU-Link firmware update utility version 2.263 (not included in the LinkServer installer). For Linux OS, MCU-Link installation package 2.263 is available for download at the following link:*

https://www.nxp.com/design/design-center/software/development-software/mcuxpresso-software-and-tools-/mcu-link-debug-probe:MCU-LINK#design-resources

Note: *If the MCU-Link firmware version is 3.122 or later, an automatic firmware update can be done using LinkServer installer version 1.4.85 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 3.122, you require to run manually the MCU-Link firmware update utility, which 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 are 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 22. If you are using the MCUXpresso for Visual Studio Code extension or a third-party IDE from IAR or Keil, NXP recommends using the latest MCU-Link firmware version.

Table 22. 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

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. Follow these steps to configure MCU-Link in ISP mode and update MCU-Link firmware:

1. Disconnect the board from the host computer, short jumper JP5, and reconnect the board. The red MCU-Link status LED D6 lights up and stays on. For more details on MCU-Link LEDs, see Section 3.8.
2. Download the LinkServer installation package from https://nxp.com/linkserver and install the LinkServer utility. For example, download and install "Linkserver 1.4.85 installer for Windows".
3. Navigate to the `MCU-LINK_installer_Vx_xxx` directory, where `Vx_xxx` indicates the version number, for example, `V3.117`.

4. Follow the instructions in the `Readme.txt` to find and run the firmware update utility for the CMSIS-DAP or J-Link firmware version.
5. Disconnect the board from the host computer, open jumper JP5, 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 22).

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 functionality. However, the MCU-Link firmware version 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 22.

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, covering 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-MCXA156 board has a USB Type-C connector J21, 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-MCXA156 board, MCU-Link is connected to the LPUART0 port of the target MCU. To use MCU-Link as a USB-to-UART bridge, follow these steps:

1. Ensure that jumper JP5 is open (MCU-Link boots normally).
2. Ensure that jumper JP6 is open (MCU-Link VCOM port is enabled).
3. Connect the MCU-Link USB connector J21 to the USB port of the host computer.

When you boot the FRDM-MCXA156 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.

The VCOM function can be disabled by shorting jumper JP6, before powering up the board. Changing the JP6 setting (open/short) after powering up the board has no impact on the MCU-Link VCOM function.

3.8 MCU-Link status LEDs

The FRDM-MCXA156 board has three status indicator LEDs for MCU-Link. Table 23 lists these LEDs and describes how each LED behaves in different MCU-Link modes.

Table 23. 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
D5	USB_ACTIVE	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.
D6	ISP_EN	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 D6 LED blinks rapidly.	The LED remains OFF.	The LED lights up when MCU-Link (LPC55S69) boots in ISP mode.
D7	VCOM_ACTIVE	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.

4   Board errata

Not applicable for the current board revision.

UM12121

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User manual

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Document feedback

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5 Related documentation

Table 24 lists some additional documents and resources that you can refer to for more information on the FRDM-MCXA156 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 24. Related documentation

Document	Description	Link / how to obtain
MCXA156, A155, A154, A146, A145, A144 Reference Manual	Provides a detailed description about the MCXA156/A155/A154/A146/A145/A144 MCU and its features, including memory maps, power supplies, and clocks.	Contact an NXP FAE / sales representative
MCXA156, A155, A154, A146, A145, A144 Data Sheet	Provides information about electrical characteristics, hardware design considerations, and ordering information.	
FRDM-MCXA156 board schematics	Provides a circuit representation showing the functionality and connectivity of the FRDM-MCXA156 board components.	

6 Acronyms

[Table 25](#) lists the acronyms used in this document.

Table 25. Acronyms

Acronym	Description
ADC	Analog-to-Digital Converter
BLDC	Brushless direct current
CAN	Controller Area Network
DNP	Do not populate / do not place
FD	Flexible data rate
FlexCAN	Flexible Data Rate Controller Area Network
FlexIO	Flexible Input/Output
FS	Full-speed
I^{2}C	Inter-Integrated Circuit
I2S	Integrated Inter-IC Sound
I3C	Improved Inter-Integrated Circuit
IoT	Internet of Things
IP	Intellectual property
ISP	In-System Programming
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
MIPI	Mobile Industry Processor Interface
OB	Onboard
PCS	Peripheral chip select
Pmod	Peripheral module
PMSM	Permanent magnet synchronous motor
PUR	Pull-up resistance
PWM	Pulse Width Modulator
SPI	Serial Peripheral Interface
SWD	Serial wire debug
SWO	Serial wire debug trace output
TPM	Timer/PWM Module
USB	Universal Serial Bus

Table 25. Acronyms...*continued*

Acronym	Description
USBFS	Universal Serial Bus Full Speed
UART	Universal Asynchronous Receiver/Transmitter
VCOM	Virtual communication

7 Revision history

Table 26 summarizes the revisions to this document.

Table 26. Revision history

Document ID	Release date	Description
UM12121 v.1	22 July 2024	Initial public release

Legal information

Definitions

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