UM12450

FRDM-IMXRT1186 Board User Manual

Rev. 1.0 — 20 January 2026 User manual

Document information

Information	Content
Keywords	UM12450, MIMXRT1186 MCU, FRDM-IMXRT1186 board, i.MX RT MCUs, MCU-Link
Abstract	The FRDM-IMXRT1186 board is a design and evaluation platform based on the NXP MIMXRT1186 MCU. This document describes the board features, interfaces, power supplies, connectors, jumpers, LEDs, debugging support, and other usage aspects.

1 Board overview

The FRDM-IMXRT1186 board is an evaluation and development platform for the LFBGA196 package NXP MIMXRT1186 crossover MCU, which uses the Arm Cortex-M7 and Cortex-M33 cores. The MCU is optimized for real-time performance and high integration for industrial and IoT applications including industrial Internet, EtherCAT, and time-sensitive networking (TSN).

The FRDM-IMXRT1186 board helps users to be familiar with the MIMXRT1186 MCU, before they invest a large amount of resources in more specific designs. The board is compatible with the Arduino UNO R3 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 has a small and low-cost package and is lead-free and RoHS-compliant.

This document provides details for using the FRDM-IMXRT1186 board. It describes the available board interfaces, power supplies, clocks, jumper configuration, connectors, user buttons, LEDs, and debugging features.

The FRDM-IMXRT1186 board uses an onboard debug probe, also known as MCU-Link OB for debugging the MIMXRT1186 MCU. MCU-Link OB (OB stands for `onboard`) is based on another MCU, LPC55S69.

Note: *This document uses the following conventions:*

- *The MIMXRT1186 crossover MCU is referred to as the target MCU.*
- *The MCU-Link OB is referred to as "MCU-Link debug probe" or just "MCU-Link".*

Further information about the MIMXRT1186 MCU is available on the URL: https://www.nxp.com/products/i.MX-RT1180.

This document provides details about the FRDM-IMXRT1186 board interfaces, EtherCAT, TSN switch, power supplies, clocks, connectors, jumpers, push buttons, LEDs, and MCU-Link OB.

1.1 Block diagram

Figure 1 shows the FRDM-IMXRT1186 board block diagram.

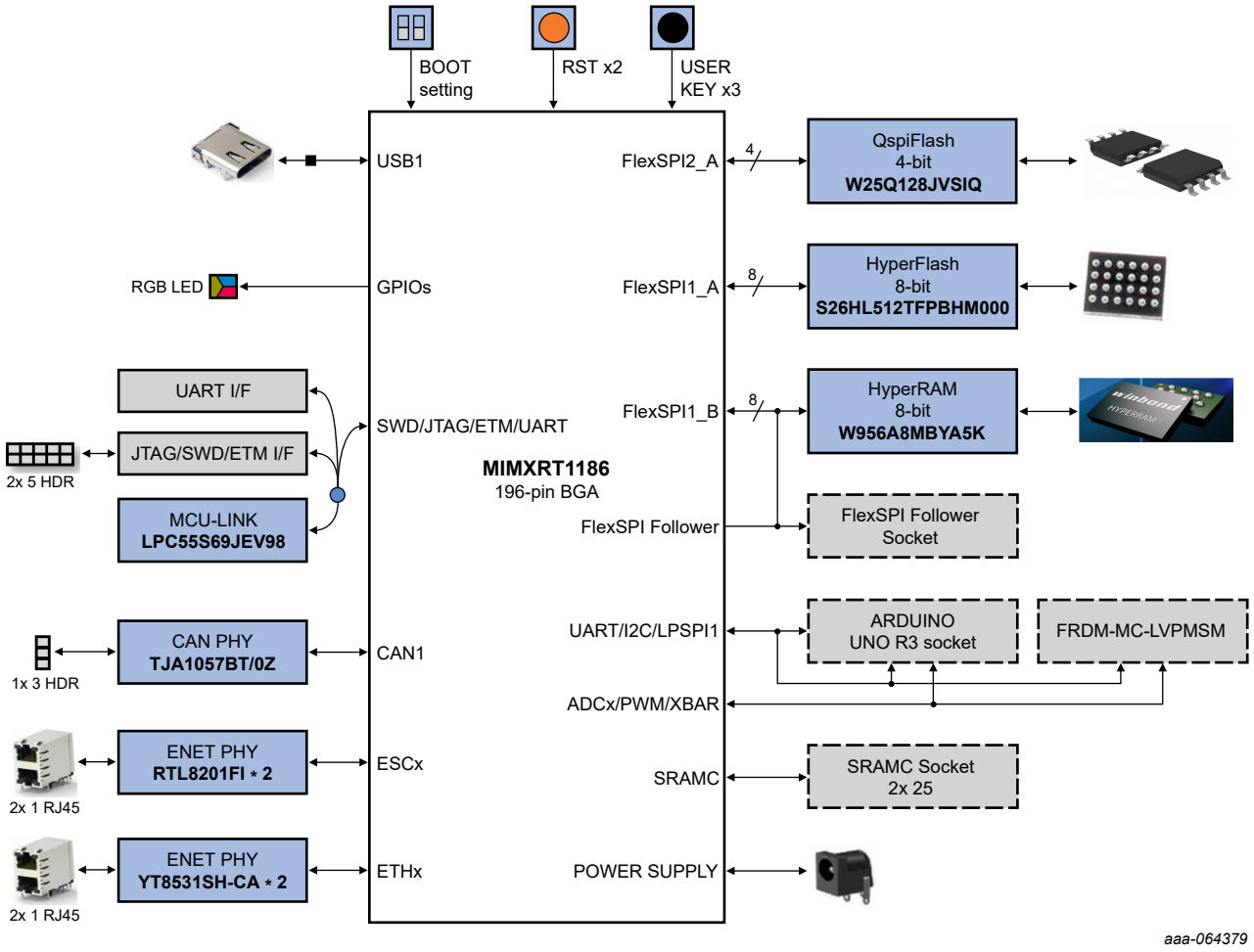

Figure 1. FRDM-IMXRT1186 board block diagram

1.2 Board features

Table 1 lists the features of the FRDM-IMXRT1186 board.

Table 1. FRDM-IMXRT1186 features

Board feature	Target MCU features used	Description
MCU (target MCU)		• NXP crossover MCU • Dual-core, real-time microcontroller • Features Arm Cortex-M7 (operating up to 800 MHz) and Arm Cortex-M33 core (running up to 300 MHz speed) for high performance and real-time functionality Note: For details on the MCU, refer to the i.MX RT1180 Reference Manual.
Power supply		To power up the FRDM-IMXRT1186 board, use any of the following (+5 V) sources: • External DC power supply connected to input power jack J6 • USB 2.0 Type-C connector J63 • USB 2.0 Type-C connector J23, for MCU-Link

Table 1. FRDM-IMXRT1186 features*...continued*

Board feature	Target MCU features used	Description
Clock		Four clock sources: • Four 25 MHz clock sources for four Ethernet PHYs • One 32.768 kHz RTC source for MIMXRT1186 MCU • One 24 MHz clock source for MIMXRT1186 MCU • One 16 MHz clock source for MCU-Link
Current measurement		Supports current measurement for MIMXRT1186 power domains (see Section 2.1.1)
FlexSPI	FLEXSPI1	• One 8 MB onboard HyperRAM memory, U18 • One flexspi follower socket, J39
	FLEXSPI2	• One 16 MB onboard QSPI NOR flash memory, U28 • One 64 MB onboard HyperFlash, U24
LPI2C	LPI2C3	LPI2C3 bus connects to EEPROM U38, CC logic control chip U40
Ethernet	ETH0	Supports a 10/100/1000 Mbit/s Reduced Gigabit Media Independent Interface (RGMII) Ethernet connection using an Ethernet PHY transceiver U21, accessible through the RJ45 connector J56A
	ETH2	Supports a 10/100/1000 Mbit/s RGMII Ethernet connection using an Ethernet PHY transceiver U29, accessible through the RJ45 connector J56B
Ethernet for Control Automation Technology (EtherCAT)	ECAT	• ECAT port 0 supports a 100 Mbit/s MII Ethernet connection using the Ethernet PHY transceiver U22, accessible through RJ45 connector J57A. • ECAT port 1 supports a 100 Mbit/s MII Ethernet connection using the Ethernet PHY transceiver U23, accessible through RJ45 connector J57B.
USB	One USB 2.0 OTG module with integrated PHY USB_OTG1	Supports high-speed (480 Mbit/s), full-speed (12 Mbit/s), and low-speed (1.5 Mbit/s) operations • One USB 2.0 Type-C connector operating in OTG mode: J63 (USB OTG1) with power switch U41
LPUART	LPUART1	LPUART1 connect to MCU-Link U20
	LPUART3	LPUART3 connect to MCU-Link U20
LPSPI	LPSPI2	Connect to motor card connector J3
CAN	FLEXCAN1	CAN1 connect to high-speed CAN transceiver U13
Debug		Supports the following options for debugging MIMXRT1186 MCU: • Using the onboard MCU-Link debug probe, U20 • Using the JTAG connector, J62 (SWD)
Arduino connectors		Headers compatible with Arduino expansion card
		Arduino connectors • Two 2x8 position receptacles J1 and J52 • A single 2x10 position receptacle J2 • A single 2x6 position receptacle J51
SRAMC		A 2x25 pin SRAMC socket J61 enables connection with a SRAM

Table 1. FRDM-IMXRT1186 features*...continued*

Board feature	Target MCU features used	Description
Orderable part number		FRDM-IMXRT1186

1.3 Kit contents

Table 2 lists the items included in the FRDM-IMXRT1186 board hardware kit.

Table 2. Kit contents

Item	Quantity
FRDM-IMXRT1186 board hardware assembly	1
USB 2.0 Type-A to Type-C cable, 1 meter	1
FRDM-IMXRT1186 Quick Start Guide	1

1.4 Board pictures

Figure 2 shows the top-side view of the FRDM-IMXRT1186 board.

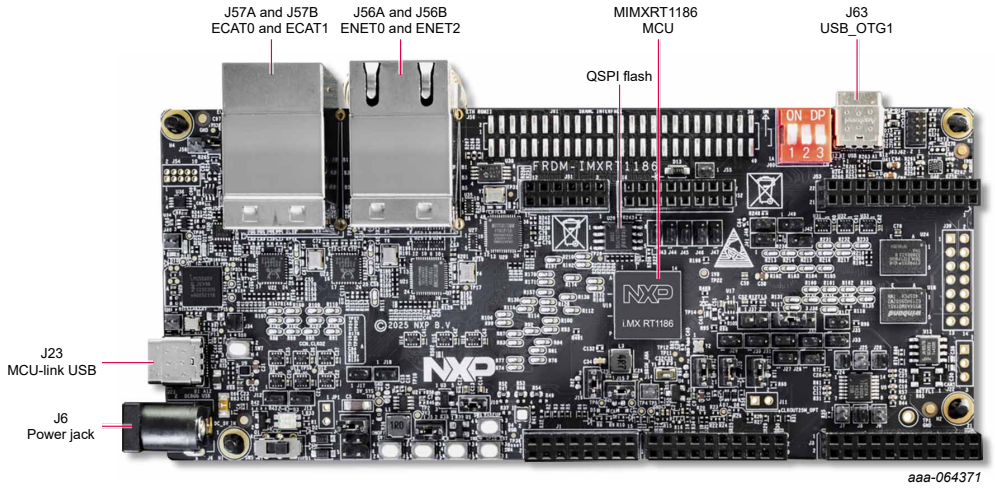

Figure 2. Top side view of the FRDM-IMXRT1186 board

Figure 3 shows the bottom-side view of the FRDM-IMXRT1186 board.

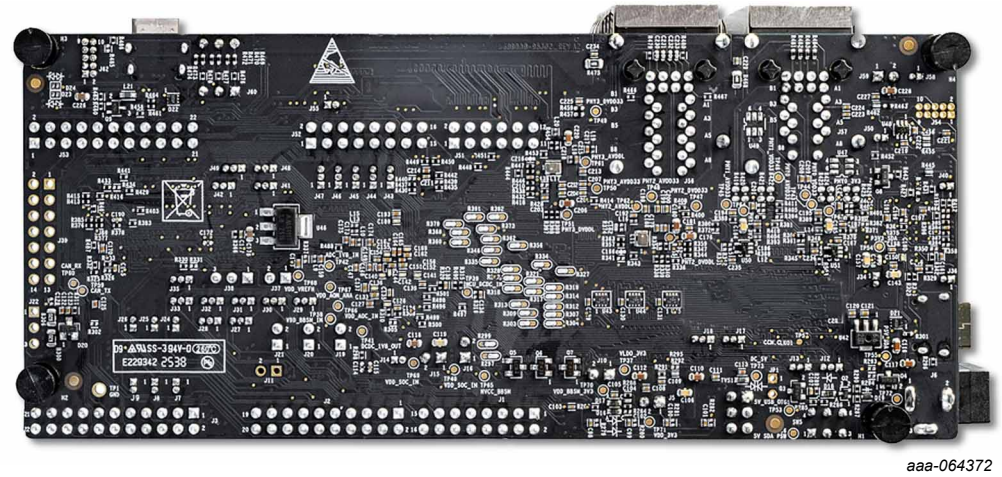

Figure 3. Bottom view of the FRDM-IMXRT1186 board

1.5 Connectors

Figure 4 shows the FRDM-IMXRT1186 board connectors and jumpers.

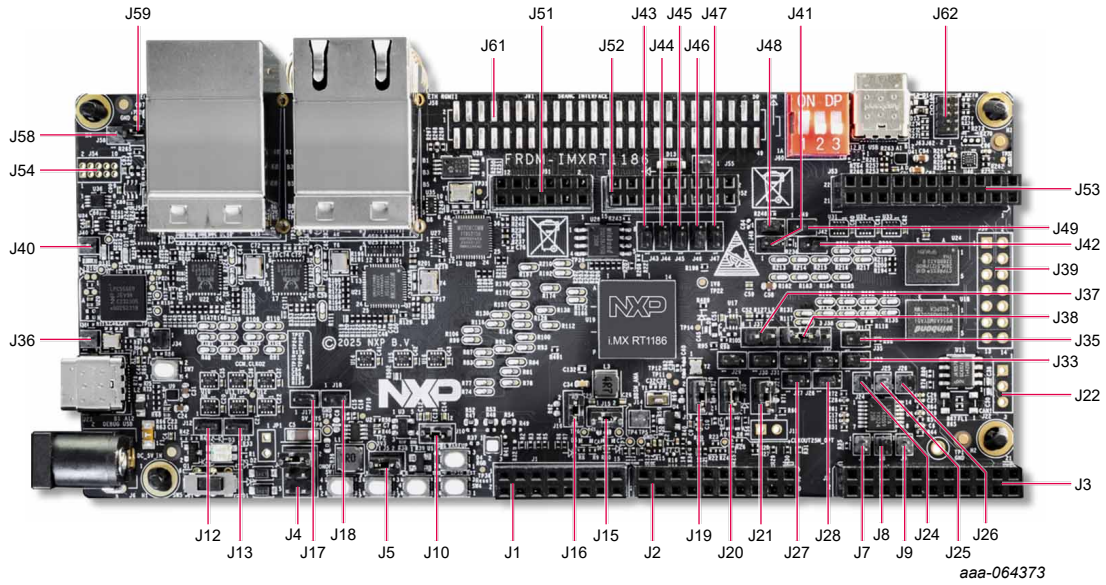

Figure 4. FRDM-IMXRT1186 board connectors and jumpers

Table 3 describes the connectors available on the FRDM-IMXRT1186 board.

Table 3. FRDM-IMXRT1186 connectors

Part identifier	Connector type	Description	Reference section
J1	2x8-position receptacle	I/O connectors compatible with the Arduino expansion card	Section 2.11
J2	2x10-position receptacle		
J51	2x6-position receptacle		
J52	2x8-position receptacle		
J3	2x11-position receptacle	Motor card connectors	

Table 3. FRDM-IMXRT1186 connectors*...continued*

Part identifier	Connector type	Description	Reference section
J53	2x11-position receptacle		
J6	DC power jack	V power supply connector	Section 2.1
J23	USB Type-C connector	MCU-Link USB connector (Debug USB)	Section 3.2
J56A, J56B	ENET port RJ45 connectors	ENET0 and ENET1 RGMII connector	Section 2.4
J57A, J57B	ECAT port RJ45 connectors	ECAT0 and ECAT1 MII connector	Section 2.5
J62	2x5-pin header	JTAG (SWD) connector for debugging MIMXRT1186	Section 3.1
J63	USB-Type C connector	USB OTG1	Section 2.6
J22 (DNP)	1x3-pin header	CAN connector	Section 2.7
J39 (DNP)	2x7-pin header	FlexSPI follower connector	Section 2.13
J54 (DNP)	2x5-pin header	Connector to connect an external debug probe or external target MCU	Table 26
J61 (DNP)	2x25-position receptacle	SRAMC connector	Section 2.12

1.6 Jumpers

Figure 4 shows the FRDM-IMXRT1186 board jumpers. Table 4 describes the FRDM-IMXRT1186 board jumpers.

Table 4. FRDM-IMXRT1186 jumpers

Part identifier	Jumper type	Description	Jumper Settings
J4	2x3-pin header	Main power supply (5V_SYS) source selection jumper	• Short pins 1 and 2: Selects the external DC power supply (5V_DC_IN) as the source power for the 5V_SYS supply. • Short pins 3 and 4: Selects the 5V_USB_OTG1 supply from the USB OTG1 connector (J63) as the source of power for the 5V_SYS supply. • Short pins 5 and 6 to select the 5V_SDA_PSW supply from the MCU-Link USB power switch (U9) as the source power for the 5V_SYS supply.
J5	1x2-pin header	VDD_3V3 supply enable jumper	• Open: VDD_3V3 supply is OFF. • Short (default setting): VDD_3V3 supply is produced from DCDC_3V3 supply.
J10	1x2-pin header	VDD_BBSM_3V3 supply enable jumper	• Open: VDD_BBSM_3V3 supply is OFF. • Short (default setting): VDD_BBSM_3V3 supply is produced from the output of voltage regulator U3.
J15	1x2-pin header	Current test point jumper to measure DC_DC_LP pins supply level	• Open: DC_DC_LP supply level of the MIMXRT1186 MCU can be measured by adding a current meter between points 1 and 2 of the jumper. • Short (default setting): DC_DC_LP supply of the MIMXRT1186 MCU is not used for current measurement.
J16	1x2-pin header	Current test point jumper to measure MCU_DCDC_IN supply	• Open: MCU_DCDC_IN supply of the target MCU can be measured by adding a current meter between points 1 and 2 of the jumper. • Short (default setting): MCU_DCDC_IN supply is not used for current measurement.

Table 4. FRDM-IMXRT1186 jumpers*...continued*

Part identifier	Jumper type	Description	Jumper Settings
J19	1x2-pin header	Current test point jumper to measure DCDC_1P8 voltage level	• Open: Test point to check the DCDC_1P8 voltage level by adding a current meter. • Short (default setting): DCDC_1V8_OUT is produced from DCDC_1P8 (internal LDO out from DCDC).
J20	1x2-pin header	Current test point jumper to measure VDD_BBSM_IN supply:	• Open: VDD_BBSM_IN supply is measured by adding a current meter between points 1 and 2 of the jumper. • Short (default setting): VDD_BBSM_IN supply is On.
J21	1x2-pin header	Current test point jumper to measure VDD_AON_IN supply	• Open: VDD_AON_IN supply is measured by adding a current meter between points 1 and 2 of the jumper. • Short (default setting): VDD_AON_IN LDO supply is not used for current measurement.
J38	1x3-pin header	ADC_1V8_IN supply selection jumper	• Short pins 1 and 2: ADC_1V8_IN is powered by VDD_1V8. • Short pins 2 and 3 (default setting): ADC_1V8_IN is powered by the MCU LDO output, VDD_AON_ANA.
J37	1x2-pin header	ADC VREFH supply selection jumper	• Open (default setting): The target MCU ADC_VREFH pin receives an internal VDD_VREFH voltage. • Short: The target MCU ADC_VREFH pin receives an external VREF voltage through VDD_1V8.
J11	1x2-pin header	Coin battery supply jumper	DNP
J27	1x3-pin header	Function pinmux jumper	• Pins 1 and 2 short (default setting): GPIO_AD_14 used as LPUART3_RXD. • Pins 2 and 3 short: GPIO_AD_14 connect to Arduino connector.
J28	1x3-pin header		• Pins 1 and 2 short (default setting): GPIO_AD_16 used as ECAT_LINK0. • Pins 2 and 3 short: GPIO_AD_16 connect to Arduino connector.
J29	1x3-pin header		• Pins 1 and 2 short (default setting): GPIO_AD_29 used as watchdog reset control pin. • Pins 2 and 3 short: GPIO_AD_29 connect to Arduino connector.
J30	1x3-pin header		• Pins 1 and 2 short (default setting): GPIO_AD_12 used as GPIO connect to the user button. • Pins 2 and 3 short: GPIO_AD_12 connect to Arduino connector.
J31	1x3-pin header		• Pins 1 and 2 short (default setting): GPIO_AD_18 used as LPI2C3_eCAT_SCL connect to U38 and U40. • Pins 2 and 3 short: GPIO_AD_18 connect to Arduino connector.
J32	1x3-pin header		• Pins 1 and 2 short (default setting): GPIO_AD_17 used as ECAT_LINK1. • Pins 2 and 3 short: GPIO_AD_17 connect to Arduino connector.
J33	1x3-pin header		• Pins 1 and 2 short (default setting): GPIO_AD_13 used as LPUART3_TXD.

Table 4. FRDM-IMXRT1186 jumpers*...continued*

Part identifier	Jumper type	Description	Jumper Settings
			• Pins 2 and 3 short: GPIO_AD_13 connect to Arduino connector.
J35	1x2-pin header		• Pins 1 and 2 short (default setting): GPIO_AD_19 used as LPI2C3_eCAT_SDA connect to U38 and U40. • Pins 2 and 3 short: GPIO_AD_19 connect to Arduino connector.
J41	1x3-pin header		• Pins 1 and 2 short(default setting): GPIO_AON_09 used as LPUART1_RXD. • Pins 2 and 3 short: GPIO_AON_09 connect to Arduino connector.
J43	1x3-pin header		• Pins 1 and 2 short (default setting): GPIO_AON_08 used as LPUART1_TXD. • Pins 2 and 3 short: GPIO_AON_08 connect to Arduino connector.
J44	1x3-pin header		• Pins 1 and 2 short (default setting): GPIO_AON_06 used as CAN1_TX. • Pins 2 and 3 short: GPIO_AON_06 used as SAI1_TX_BCLK connect to Arduino connector.
J45	1x3-pin header		• Pins 1 and 2 short (default setting): GPIO_AON_15 used as ETH0_RST_IO connect to U21. • Pins 2 and 3 short: GPIO_AON_15 connect to the Arduino connector.
J46	1x3-pin header		• Pins 1 and 2 short (default setting): GPIO_AON_07 used as CAN1_RX connect to U13. • Pins 2 and 3 short: GPIO_AON_07 used as SAI1_MCLK connect to Arduino connector.
J47	1x3-pin header		• Pins 1 and 2 short (default setting): GPIO_AON_04 used as ETH2_INT_IO connect to U29. • Pins 2 and 3 short: GPIO_AON_04 used as SAI1_TX_D0 connect to Arduino connector.
J48	1x3-pin header		• Pins 1 and 2 short (default setting): GPIO_AON_05 used as USB_OTG1_PWR. • Pins 2 and 3 short: GPIO_AON_05 used as CAN_STBY.
J42	1x3-pin header	ECAT1 SINC2 selection jumper	• Short pins 1 and 2: High signal on eCAT1_SINC2_SEL signal enables the signals on COM1 and COM2 to conduct with B1 and B2. • Pins 2 and 3 short (default setting): Low signal on eCAT1_SINC2_SEL signal enables the signals on COM1 and COM2 conduct with A1 and A2.
J49	1x3-pin header	ECAT1 enable jumper	• Short pins 1 and 2: OE_eCAT1_SINC2_EN signal is high, disabling the dual-channel 2:1 muxes (TMUX136 MRSER), U31, U32, and U33. • Short pins 2 and 3 (default setting): OE_eCAT1_SINC2_EN signal is low, enabling the muxes U31, U32, and U33.
J12	1x3-pin header	ECAT0 ETH0 selection jumper	• Short pins 1 and 2: High signal on NETC0_eCAT0_SEL signal enables the signals on COM1 and COM2 to conduct with B1 and B2 to enable ETH0 PHY.

Table 4. FRDM-IMXRT1186 jumpers*...continued*

Part identifier	Jumper type	Description	Jumper Settings
			• Short pins 2 and 3 (default setting): Low signal on NETC0_eCAT0_SEL signal enables the signals on COM1 and COM2 to conduct with A1 and A2 to enable ECAT0 PHY.
J13	1x3-pin header	ECAT0 enable jumper	• Pins 1 and 2 short: OE_NETC0_eCAT0_EN signal is high, disabling the dual-channel 2:1 muxes (TMUX136 MRSER), U6, U7, U8, U10, U11, and U12. • Short pins 2 and 3 shorted (default setting): OE_NETC0_eCAT0_EN signal is low, enabling the muxes U6, U7, U8, U10, U11, and U12.
J17	1x3-pin header	ECAT1 ETH2 selection jumper	• Short pins 1 and 2: High signal on NETC2_eCAT1_SEL signal enables the signals on COM1 and COM2 to conduct with B1 and B2 to enable ETH2 PHY. • Short pins 2 and 3 (default setting): Low signal on NETC2_eCAT1_SEL signal enables the signals on COM1 and COM2 to conduct with A1 and A2 to enable ECAT1 PHY.
J18	1x3-pin header	ECAT1 enable jumper	• Short pins 1 and 2: OE_NETC2_eCAT1_EN signal is high, disabling the dual-channel 2:1 muxes (TMUX136 MRSER), U14, U15, U16, U43, U44, and U45. • Short pins 2 and 3 (default setting): OE_NETC2_eCAT1_EN signal is low, enabling the muxes U14, U15, U16, U43, U44, and U45.
J8	1x2-pin header	HyperFlash reset signal enable jumper	• Open: HyperFlash reset signal is disconnected from reset circuit. • Short (default setting): The HyperFlash reset signal is connected to the reset circuit.
J24	1x2-pin header	SW2 reset enable jumper	• Open: Disconnects the POR_CTL signal from the trigger signal of the MIMXRT1186 MCU reset circuit. • Short (default setting): Connects the POR_CTLsignal from SW2 to trigger MIMXRT1186 MCU power-on reset.
J26	1x2-pin header	MCU-Link reset enable jumper	• Open: Disconnects reset signal from MCU-Link, TRG_RST, from triggering MIMXRT1186 MCU power-on reset. Also disables the MCU-Link reset to octal flash (U11). • Short (default setting): Connects the MCU-Link reset signal TRG_RST to trigger MIMXRT1186 MCU power-on reset. This setting also enables the MCU-Link reset to HyperFlash (U24) provided J8 is populated (default setting).
J7	1x2-pin header	Flash reset control jumper	• Open (default setting): Flash_RST signal from the MIMXRT1186 MCU is disconnected from the HyperFlash U24. • Short: Flash_RST signal from the MIMXRT1186 MCU initiates reset of HyperFlash, U24.
J9	1x2-pin header	Watchdog reset enable	• Open (default setting): The watchdog reset signal EWM_OUT_B does not trigger MIMXRT1186 MCU reset. • Short: The watchdog reset signal EWM_OUT_B triggers the MIMXRT1186 MCU reset.
J14	1x2-pin header	External reset enable jumper	• Open (default setting): Reset of the target MCU using an optional external reset circuit through the reset circuit U4 (UM803RS) is disabled.

Table 4. FRDM-IMXRT1186 jumpers*...continued*

Part identifier	Jumper type	Description	Jumper Settings
			• Short: Reset of MIMXRT1186 MCU using an optional external reset circuit through U4 is enabled.
J25	1x2-pin header	POR reset enable jumper	• Open (default setting): Disconnects the reset signal ST_TGTMCU_B from the SW3/Arduino header J52 from POR_PIN_RST_B signal (which enables the target MCU power-on reset). • Short: Connects the reset signal ST_TGTMCU_B from SW7 / Arduino header J52 to POR_PIN_RST_B signal for the target MCU power-on reset.
J34	1x2-pin header	MCU-Link VCOM port 2 disable jumper	• Open (default setting): MCU-Link VCOM port 2 (FC1) is enabled. • Short: MCU-Link VCOM port 2 is disabled.
J59	1x2-pin header	V_TGTMCU supply enable jumper	• Open: V_TGTMCU supply is OFF. • Short (default setting): V_TGTMCU supply is produced from VDD_3V3 supply.
J36	1x2-pin header	MCU-Link serial wire debug (SWD) disable jumper	• Open (default setting): MCU-Link SWD feature is enabled. MCU-Link drives SWD of onboard target MCU or external target MCU. • Short: MCU-Link SWD feature is disabled. This setting of J36 can be used when connecting an external debug probe for debugging the onboard target MCU.
J40	1x2-pin header	MCU-Link (LPC55S69) ISP control enable jumper	• Open (default setting): MCU-Link follows the normal boot sequence, and boots from internal flash if a boot image is found. With the internal flash erased, the MCU-Link normal boot sequence falls through to ISP boot mode. • Short: MCU-Link is forced to ISP mode (J23). In ISP mode, MCU-Link internal flash can be reprogrammed with a new image. Alternatively, MCU-Link internal flash can be reprogrammed using MCUXpresso IDE with the CMSIS-DAP protocol. ***Note:*** *By default, the CMSIS-DAP firmware is programmed.*
J50	1x2-pin header	USB-to-UART bridge disable jumper	• Open (default setting): MCU-Link VCOM is enabled as there is a high signal on the HW_VER_6 pin. • Short: MCU-Link VCOM is disabled as there is a low on the HW_VER_6 pin
J58	1x2-pin header	MCU-Link target selection jumper	• Open (default setting): MCU-Link can be used for debugging the MIMXRT1186. • Short: MCU-Link can be used for debugging an external target through connector J54. Meanwhile, J62 (JTAG connector) is used to debug RT1180 MCU (via SWD).

1.7 Push buttons

Figure 5 shows the FRDM-IMXRT1186 board push buttons, switch, and LEDs.

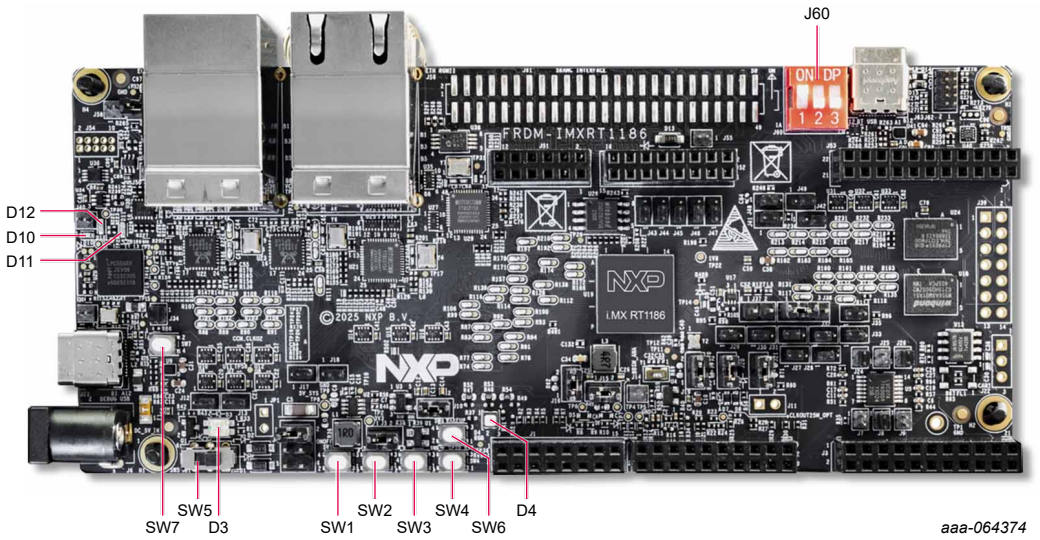

Figure 5. FRDM-IMXRT1186 board push buttons, switches, and LEDs

Table 5 describes the FRDM-IMXRT1186 board push buttons.

Table 5. FRDM-IMXRT1186 push buttons

Part identifier	Name/function	Description
SW1	CPU ONOFF button	This switch enables or disables the BBSM mode for MIMXRT1186 MCU. Pushing SW1 causes the MIMXRT1186 MCU to enter or exit the BBSM mode.
SW2	System reset button	This button is the power reset button to switch off or on the board. Pushing this button causes board peripherals to reset to their default states and execute the boot code.
SW3	POR_B pin reset button	POR pin reset button for the target MCU. Pressing SW3 in the power on state forces to reset the system power except the BBSM voltage domain.
SW4	GPIO Interrupt button	This button is provided for user-application-specific purposes.
SW6	CPU wake-up button	This button is the CPU wake-up + trigger wake-up button for the target MCU.
SW7	MCU-Link reset button	Pressing SW7 sends a reset signal to LPC55S69JEV98 (debug MCU).

1.8 DIP switch

FRDM-IMXRT1186 has one 3-pin dual inline package (DIP) switch (SW5) for controlling the boot mode of the MIMXRT1186 MCU.

Each pin of the DIP switch has two positions:

- OFF position (pin has value 0)
- ON position (pin has value 1)

A DIP switch pin can be moved manually from OFF position to ON position and vice versa. Table 6 describes the DIP switch settings.

Table 6. FRDM-IMXRT1186 DIP switch

Part identifier	Supported function	Description (when LED is ON)
J60	IMXRT1186 MCU boot mode selection	BOOT_MODE[2:0] = J60[3:1] • 000: Boot from internal fuses • 001: Serial downloader (USB1 or LPUART1)

Table 6. FRDM-IMXRT1186 DIP switch

Part identifier	Supported function	Description (when LED is ON)
		• 010: USDHC2 8-bit 1.8 V eMMC 5.1 • 011: USDHC1 4-bit SD 3.0 • 100: FlexSPI quad SPI serial NOR (or octal SPI NOR in quad SPI NOR mode) • 101: FlexSPI quad SPI serial NAND 2k page (or octal SPI NAND in quad SPI NOR mode) • 110: FlexSPI quad SPI serial NAND 4k page (or octal SPI NAND in quad SPI NOR mode) • 111: Test mode.

Note: *For more details on MIMXRT1186 boot modes and boot mode configuration, refer to the "System Boot" Chapter of the i.MX RT1180 Reference Manual.*

1.9 LEDs

The FRDM-IMXRT1186 board provides light-emitting diodes (LEDs) for monitoring system status. The information collected from the LEDs can be used for debugging purposes. Figure 5 shows the FRDM-IMXRT1186 board LEDs.

Table 7 describes the FRDM-IMXRT1186 board LEDs.

Table 7. FRDM-IMXRT1186 LEDs

Part identifier	PCB label	LED color	LED name/function	Description (when LED is ON)
D3	POWER	Red/green	Power-on indicator LED	Indicates system power-on status. When the board is powered up, D3 turns ON with green.
D4	RGB	Red/green/blue	RGB LED	User-defined LEDs, which can be controlled through a user application.

Note: *MCU-Link-specific LEDs D10, D11, and D12 are described in Table 28.*

2 Functional description

This section describes the power supplies, current measurement features, and clocks used by the board. It also describes the FlexSPI, EtherCAT, Ethernet, USB, FlexCAN, LPUART, LPSPI, LPI2C, and SRAMC interfaces. The Arduino socket, FlexSPI follower interface, and PCB information are also described.

2.1 Power supplies

The FRDM-IMXRT1186 board is powered up using one of the following (+5 V) sources:

- External DC power supply connected to input power jack, J6.
- External 5 V supply connected to USB 2.0 Type-C connector J63, operating in OTG mode.
- External 5 V supply connected to USB 2.0 Type-C connector J23, for MCU-Link.

A slide switch SW1 turns ON/OFF the 5 V external DC power supply connected to J2:

- If SW5 is set to 1-2/4-5, the 5 V power supply is ON.
- If SW5 is set to 2-3/5-6, the 5 V power supply is OFF.

Configure the jumper J4 to select the power supply that is used to power the board. Table 8 explains the J4 settings.

Table 8. Jumper J4 settings

Jumper settings	Selected power supply
Pins 1 and 2 short	DC_5V_IN power supply via J6
Pins 3 and 4 short	5V_USB_OTG1 power supply via J63
Pins 5 and 6 short	5V_SDA_PSW power supply via J23

Table 9 describes the FRDM-IMXRT1186 board power supplies.

Table 9. FRDM-IMXRT1186 power supplies

Power source	Manufacturer and part number	Power supply	Description
From an external power source through the input power jack J6	-	DC_5V_IN (5 V)	Primary power supply. It is one of the four power source options for producing 5V_SYS supply
From an external power source through the USB connector J63	-	5V_USB_OTG1 (5 V)	Second power source option for producing 5V_SYS supply
MCU-Link USB connector J23	-	P5V_SDA (5 V)	• Supplies power to power switch U52 • Supplies power to voltage regulator U62 • Supplies power to MCU-Link U55 (LPC55S69 JEV98)
Power switch U9	NX5P3090UK (NXP)	5V_SDA_PSW (5 V)	Third power source option for producing 5V_SYS supply
Voltage regulator U42	XC6206P332PR (UMW)	P3V3_SDA (3.3 V) Max current = 200 mA	• Supplies power to MCU-link U20 and MCU-Link LEDs D10, D11, and D12 • One of the two power supplies for dual-supply translating transceivers, U30, U34, U36, U37 and U48
Voltage Regulator U2	MP2143DJ (Monolithic Power Systems)	DCDC_3V3	Produces VDD_3V3 power supply through jumper J5

Table 9. FRDM-IMXRT1186 power supplies*...continued*

Power source	Manufacturer and part number	Power supply	Description
		(3.3 V)	
Voltage regulator U3	UM1750S-00 (Union Semiconductor)	VLDO_3V3 (3.3 V) Max. current: 350 mA	Default power source option for producing VDD_BBSM_3V3 supply
Voltage regulator U4	AMS1117-1.8 (Advanced Monolithic Systems)	VDD_1V8 (1.8 V)	Provides power supply for • Produces VDD_VREFH when jumper J37 is short • Alternative power source option to produce ADC_1V8_IN • Default power source for VDD_USB_1P8 of MIMXRT1186 MCU
MIMXRT1186 MCU	MIMXRT1186 CVJ8C(NXP)	VDD_SOC_IN (0.925 V to 1.3 V)	Internal SoC supply (core supplies input voltage)
MIMXRT1186 MCU	MIMXRT1186 CVJ8C(NXP)	VDD_AON_ANA	Default power source option to produce ADC_1 V8_IN supply
		VDD_BBSM_ ANA	Produces NVCC_BBSM supply, which is used to power push buttons SW1 and SW6
		VDD_AON_DIG	Internal LDO output
		VDDA_1P0	Internal LDO output

2.1.1 Current measurement

The FRDM-IMXRT1186 board supports current measurement using an ampere meter (ammeter) on the power supplies shown in Table 10.

Table 10. Power supplies with current measurement support

Power supply	Description	Jumper	Current measurement steps
VDD_BBSM_IN	MIMXRT1186 BBSM domain supply rail	J20	Open J20. Connect the ammeter between pins 1 and 2 of jumper J20.
VDD_AON_3V3	MIMXRT1186 AON domain supply rail	J21	Open J21. Connect the ammeter between pins 1 and 2 of jumper J21.
MCU_DCDC_IN	MIMXRT1186 DCDC domain supply rail	J16	Open J16. Connect the ammeter between pins 1 and 2 of jumper J16.
VDD_SOC_IN	MIMXRT1186 digital logic supply rail	J15	Open J15. Connect the ammeter between pins 1 and 2 of jumper J15.

2.2 Clocks

Table 11 describes the clocks available on the FRDM-IMXRT1186 board.

Table 11. FRDM-IMXRT1186 clocks

Clock generator	Clock	Frequency	Destination
Quartz crystal Y1	RTC_[XTALI, XTALO]	32.768 kHz	MIMXRT1186 MCU (RTC clock)
Quartz crystal Y2	XTALI, XTALO	24 MHz	MIMXRT1186 MCU
Quartz crystal Y3	XTAL32M_[P, N]	6 MHz	MCU-Link (LPC55S69 MCU)
Quartz crystal Y4	PHY2_[XTALI, XTALO]	25 MHz	RGMII Ethernet PHY U21(PHY2)
Quartz crystal Y5	PHY0_[XTAL1, XTAL2]	25 MHz	MII Ethernet PHY U22(PHY0)
Quartz crystal Y6	PHY1_[XTAL1, XTAL2]	25 MHz	MII Ethernet PHY U23(PHY1)
Quartz crystal Y7	PHY3_[XTALI, XTALO]	25 MHz	RGMII Ethernet PHY U29(PHY3)

2.3 FlexSPI interface

The MIMXRT1186 MCU has two Flexible Serial Peripheral Interface (FlexSPI) modules, FLEXSPI1 and FLEXSPI2. The FRDM-IMXRT1186 board supports communication with both the FlexSPI modules.

Table 12 describes the FRDM-IMXRT1186 FlexSPI connections.

Table 12. FlexSPI connections

FlexSPI controller	Connected devices		
	Part identifier	Manufacturer and part number	Description
FlexSPI1	U24	Infineon S26HL512 TFPBHM000	• Type: HyperFlash memory • Density: 512 Mbit (64 MB) • Operating voltage: 3.3 V
	U18	Winbond W956A8 MBYA5K	• Type: HyperRAM memory • Density: 64 Mbit (8 MB) • Operating voltage: 3.3 V
FlexSPI2	U28 (Default boot flash)	Winbond W25Q128 JVSIQ	• Type: Quad SPI NOR flash memory • Density: 128 Mbit (16 MB) • Operating voltage: 3.3 V

2.4 Ethernet interface

The MIMXRT1186 MCU has three Ethernet modules: ETH0, ETH2, and ETH4. The ports ETH0 and ETH2 are switch ports, whereas ETH4 is an ENETC0 port. The FRDM-IMXRT1186 board supports connections with the two ports belonging to the switch. ETH0 and ETH2 signals are multiplexed with ECAT signals on the MCU.

On the FRDM-IMXRT1186 board, by default, the ECAT1 connection is enabled. Multiplexing between ETH2 and ECAT (EtherCAT port 1) signals is implemented through a set of six muxes, U14, U15, U16, U43, U44, and U45. Similarly, the multiplexing between ETH0 and ECAT (EtherCAT port 0) signals is implemented through a set of six muxes, U6, U7, U8, U10, U11, and U12.

The FRDM-IMXRT1186 board supports two PHYs as described in Table 13. These PHYs use RJ45 connectors with link and activity status.

Table 13. Ethernet connections

MCU module used	Connected devices		
	Part identifier	Manufacturer and part number	Description
ETH0	U21 (PHY2)	Motorcomm YT8531SH-CA	Ethernet transceiver that complies with 10Base-T, 100 Base-TX, and 1000Base-T IEEE 802.3 standards. • Use RGMII for transmission/reception • Uses crystal Y4 for clock source • Uses muxes U6, U7, U8, U10, U11, and U12 to mux signals with PHY0 • Uses ESD protection devices (IP4292CZ10-TBR) U25 and U26
	J56A	-	RJ45 Ethernet connector for PHY0
	U6, U7, U8, U10, U11, and U12	TMUX136MRSER (Texas Instruments)	Muxes to enable multiplexing between ECAT0 and ETH0 signals • 2-channel analog switch • Operating voltage: 3.3 V
ETH2	U29 (PHY3)	Motorcomm YT8531SH-CA	Ethernet transceiver that complies with 10Base-T, 100 Base-TX, and 1000Base-T IEEE 802.3 standards. • Use RGMII for transmission/reception • Uses Crystal Y7 for clock source • Uses muxes U6, U7, U8, U10, U11, and U12 to mux signals with PHY0 • Uses ESD protection devices (IP4292CZ10-TBR) U27 and U35
	J56B	-	RJ45 Ethernet connector for PHY1
	U14, U15, U16, U43, U44, and U45	TMUX136MRSER (Texas Instruments)	Muxes to enable multiplexing between ECAT1 and ETH2 signals • 2-channel analog switch • Operating voltage: 3.3 V

2.5 EtherCAT interface

The MIMXRT1186 MCU has an EtherCAT (ECAT) module with two ports: ECAT0 and ECAT1. ECAT signals are multiplexed with ETH0 and ETH1 signals on the MIMXRT1186 MCU.

- Multiplexing between ETH2 signals and ECAT (EtherCAT port 1) is implemented through a set of six muxes. By default, the ECAT1 connection is enabled.
- Multiplexing between ETH0 signals and ECAT (EtherCAT port 0) is implemented through a set of six muxes. By default, the ECAT0 connection is enabled.

Table 14 describes the FRDM-IMXRT1186 EtherCAT connections.

Table 14. EtherCAT connections

MCU module used	Connected devices		
	Part identifier	Manufacturer and part number	Description
ECAT-PORT0	U22 (PHY0)	Realtek RTL8201FI-VC-CG	• Supports 10/100 Mbit/s IEEE 802.3 standards • Operating voltage: 3.3 V (PHY0_AVDD33 and PHY0_AVDD33) • Supports MII mode by default
	J57A	-	RJ45 Ethernet connector for PHY0
	U6, U7, U8, U10, U11, and U12	TMUX136MRSER (Texas Instruments)	Muxes to enable multiplexing between ECAT0 and ETH0 signals • 2-channel analog switch • Operating voltage: 3.3 V
ECAT-PORT1	U23 (PHY3)	Realtek RTL8201FI-VC-CG	• Supports 10/100 Mbit/s IEEE 802.3 standards • Operating voltage: 3.3 V (PHY0_AVDD33 and PHY0_AVDD33) • Supports MII mode by default
	J57B	-	RJ45 Ethernet connector for PHY1
	U14, U15, U16, U43, U44, and U45	TMUX136MRSER (Texas Instruments)	Muxes to enable multiplexing between ECAT1 and ETH2 signals • 2-channel analog switch • Operating voltage: 3.3 V

2.6 USB interface

The MIMXRT1186 MCU supports one USB 2.0 On-The-Go (OTG) module capable of operating at:

• Low-speed (LS) rate of 1.5 Mbit/s

• Full-speed (FS) rate of 12 Mbit/s

• High-speed (HS) rate of 480 Mbit/s

The OTG module can operate in Host mode and Device (Peripheral) mode.

The FRDM-IMXRT1186 board supports USB 2.0 On-The-Go (OTG) functionality through the USB Type-C connector (J63).

Table 15 describes the FRDM-IMXRT1186 USB connector.

Table 15. USB details

USB OTG module	Connected devices			
	Part identifier	Manufacturer and part number	Device/Connector type	Description
USB_OTG1	J63	-	USB connector	
	U40	PTN5150A	Type-C Port Controller	ID Pin behavior: • ID = GND → Host mode. • ID floating → Device mode.
	U41	NX5P309	Power switch	The switch enables or disables VBUS accordingly: • In **Host mode**, VBUS is driven out to the cable. • In **Device mode**, VBUS is not sourced; the board expects power from the host.

Role detection is managed by the PTN5150A Type-C Port Controller (U40) and the legacy ID pin logic:

- CC1/CC2 Monitoring:
  - DFP (Downstream Facing Port) → Host role.
  - UFP (Upstream Facing Port) → Device role.
  - DRP (Dual Role Port) → Supports dynamic role swapping.
- I2C Interface:
  - The PTN5150A exposes role and connection status via I²C.
  - ADR/CON_DET pin indicates connection state:
    - `0x7A` when a connection is detected.
    - `0x3A` when no connection.
- The EXT_SEL pin allows firmware to override default DRP behavior if required.

2.7 FlexCAN interface

The Flexible Controller Area Network (FlexCAN) module is a communication controller implementing the CAN protocol according to the CAN 2.0B protocol specification.

The FRDM-IMXRT1186 supports one high-speed CAN bus CAN1. The CAN1 bus connects the CAN transceiver, U13 (NXP TJA1057BT) to the FLEXCAN1 module in the MCU. This transceiver operates on 5V_SYS supply and provides an interface for the CAN ports to send and receive CAN signals to and from the MIMXRT1186 MCU. The MIMXRT1186 CAN ports are available for external connection through the CAN connector (1x3 pin header), J22. The connector is not populated on the board by default.

Table 16 describes the FRDM-IMXRT1186 FlexCAN connections.

Table 16. FlexCAN connections

FlexCAN module	Peripheral devices		
	Part identifier	Manufacturer and part number	Description
FLEXCAN1	U13	NXP TJA1057BT/0Z	A high-speed CAN transceiver,that drives CAN signals between the CAN0 module of the MIMXRT1186 MCU and a physical two-wire CAN bus. • Fully ISO 11898-2:2016, SAE J2284-1 to SAE • J2284-5 and SAE J1939-14 compliant

Table 16. FlexCAN connections*...continued*

FlexCAN module	Peripheral devices		
	Part identifier	Manufacturer and part number	Description
			• Optimized for use in 12 V automotive systems 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.
	J22 (DNP)	-	A 1x3-pin header that allows external CAN connection with the CAN bus. It has the following pinout: • Pin 1: high-level CAN bus line connection • Pin 2: GND • Pin 3: low-level CAN bus line connection

2.8 LPUART interface

The MIMXRT1186 MCU supports eight Low-Power Universal Asynchronous Receiver Transmitter (LPUART) modules: LPUART1 to LPUART8. However, only two of them (LPUART1 and LPUART3) are supported on the FRDM-IMXRT1186 board.

Table 17 describes the FRDM-IMXRT1186 LPUART connections.

Table 17. LPUART connections

LPUART module	Connected devices		
	Part identifier	Manufacturer and part number	Description
LPUART1 and LPUART3	U30	Nexperia 74AVC4TD245BQ	Voltage translator 4-bit, dual supply transceiver • Enables bidirectional level translation • Has eight 1-bit input-output ports • Uses P3V3_SDA (3.3 V) and V_TGTMCU (1.8 V) supply as input
	U20	NXP LPC55S69JEV98	Debug MCU, see Section 3.2. For details, refer LPC55S69JEV98. On the MIMXRT1180-EVK board, the MCU-Link supports the following two VCOM (USB-to-UART) ports: • Primary VCOM port (always available) with LPUART1 module of the MIMXRT1186 MCU • Secondary VCOM port (when jumper J34 is open; J34 is connected by default) with LPUART3 module of the MIMXRT1186 MCU

2.9 LPSPI interface

The MIMXRT1186 MCU has the following six Low-Power Serial Peripheral Interface (LPSPI) modules: LPSPI1 to LPSPI6. Each of the LPSPI modules of the MIMXRT1186 MCU supports four peripheral chip selects: PCS0, PCS1, PCS2, and PCS3. The FRDM-IMXRT1186 board only supports the LPSPI2 (with PCS0) module. See Table 18.

Table 18. LPSPI connections

LPSPI module	Connected devices	
	Part identifier	Description
LPSPI2	J3	2x11 connector using the PCS0

2.10 LPI2C interface

The MIMXRT1186 MCU supports four LPI2C modules: LPI2C1, LPI2C2, LPI2C3, and LPI2C6. The FRDM-IMXRT1186 board uses only the LPI2C3 module.

Table 19 shows the FRDM-IMXRT1186 I2C bus device map.

Table 19. I2C bus device map

I2C bus	7-bit I2C address[1]	Device	Description
LPI2C3	• 0xA0 = write address • 0xA1 = read address	EEPROM (U38)	Connected to the LPI2C3 bus
	0x7A	Type-C controller (U40)	Connected to the LPI2C3 bus

2.11 Arduino connectors

Table 20, Table 21, Table 22, and Table 23 list the pinouts for Arduino connectors.

Table 20. J1 pinouts

Pin number	Pin function	Target MCU port
2	D0/UART_RX	GPIO_AON_09
4	D1/UART_TX	GPIO_AON_08
6	D2/INT0	GPIO_EMC_B1_12
8	D3/INT1/PWM/OC2B	GPIO_EMC_B1_13
10	D4/T0/XCK	GPIO_EMC_B1_14
12	D5/TI/PWM	GPIO_EMC_B1_15
14	D6/AIN0/PWM/OC0A	GPIO_AD_12
16	D7/AIN1	GPIO_AD_13

Table 21. J51 pinouts

Pin number	Pin function	Target MCU port
2	A0/ADC0	GPIO_AD_15
4	A1/ADC1	GPIO_AD_16
6	A2/ADC2	GPIO_AD_17
8	A3/ADC3	GPIO_AD_14
10	A4/ADC4/SDA	GPIO_AD_19
12	A5/ADC5/SCL	GPIO_AD_18

Table 22. J2 pinouts

Pin number	Pin function	Target MCU port
2	D8/CLKO/ICP1	GPIO_EMC_B1_17
4	D9/OC1A/PWM	GPIO_EMC_B1_16
6	D10/SPI_CS/PWM	GPIO_EMC_B1_25
8	D11/OC2A/PWM/SPI_MOSI	GPIO_EMC_B1_24
10	D12/SPI_MISO	GPIO_EMC_B1_23
12	D13/SPI_CLK	GPIO_EMC_B1_22
14	GND	N/A
16	VDD_3V3	N/A
18	D14/I2C_SDA	GPIO_EMC_B2_19
20	D15/I2C_SCL	GPIO_EMC_B2_20

Table 23. J52 pinouts

Pin number	Pin function	Target MCU port
2	NC	-
4	IOREF	-
6	RESET_b	RST_TGTMCU_B
8	3.3 V	-
10	5 V	-
12	GND	-
14	GND	-
16	VIN	-

2.12 SRAMC interface

The MIMXRT1186 provides a parallel SRAM memory interface called SRAMC, which can connect to an asynchronous SRAM or an SRAM such as FPGA. FRDM-IMXRT1186 provides a header to connect to the SRAM or FPGA for reference.

The FRDM-IMXRT1186 board uses a DNP header J61 to connect to the external SRAM devices.

2.13 FlexSPI follower interface

The MIMXRT1186 provide a Serial Peripheral Interface (SPI) block working as an SPI follower. It communicates with other chips or with FPGA by using the SPI bus protocol. A remote chip with an SPI leader can read or write this block's internal registers. Alternatively, it can access the chip address via this block's AXI bus.

The FRDM-IMXRT1186 use a DNP header J39 to connect to the external SPI leader.

2.14 PCB information

The FRDM-IMXRT1186 board is based on the standard 6-layer technology. The material used is HTG FR-4 andthe board thickness is 1.6 mm. The PCB stack-up information is shown in Table 24.

Table 24. PCB stack-up information

Layer	Description	Copper (Oz)	Dielectric thickness (mil)
1	Signal	1	—
	Dielectric	—	3.48
2	GND	1	—
	Dielectric	—	3.94
3	Signal	1	—
	Dielectric	—	39
4	Power	1	—
	Dielectric	—	3.94
5	GND	1	—
	Dielectric	—	3.48
6	Signal	1	—

3 Debug functionality

FRDM-IMXRT1186 board supports debugging the MIMXRT1186 MCU through any of the following methods:

- Using the onboard MCU-Link debug probe, U20. (Refer Section 3.2.)
- Using the JTAG connector, J62 (SWD). (Refer Section 3.2.1.)
- Using an external debugger through J54 connector (Refer Section 3.2.2.)

Note: *The MCU-Link probe on the FRDM-IMXRT1186 board can also be used for debugging an external MCU connected through J54 connector, when J58 is shorted. Refer Section 3.2.2.*

3.1 JTAG connector

By default, the FRDM-IMXRT1186 board supports SWD debugging. MIMXRT1186 has four JTAG signals muxed with other pins, and one reset signal, JTAG_nTRST. The JTAG and reset signals are directly connected to the standard 10-pin JTAG connector, J62.

3.2 MCU-Link OB debug probe

This section describes the MCU-Link OB debug probe and how it can be used to debug the target MCU (MIMXRT1186). 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 the Arm Cortex-M33 core. NXP uses MCU-Link OB (OB stands for "onboard"), on its evaluation boards, for example, FRDM-IMXRT1186. For more information about the MCU-link debug probe, refer to MCU-Link documentation.

3.2.1 Supported MCU-Link features

MCU-Link includes several mandatory and optional features. Table 25 summarizes the MCU-Link features supported on the FRDM-IMXRT1186 board.

Table 25. Supported MCU-Link features

Debug scenario	Feature description
Serial wire debug (SWD) / serial wire debug trace output (SWO)	Allows SWD-based debugging with SWO for profiling and/or low overhead debug standard I/O communication.
Virtual communication (VCOM) serial port	Adds a serial COM port on the host computer, and connects it to the target MCU by using MCU-Link as a USB-to-UART bridge.
External debug probe support	Allows debugging the target MCU (MIMXRT1186) using an external debug probe, instead of MCU-Link. Support for external debug probe is enabled by disabling SWD feature.
External target support ***Note:*** *J-Link firmware does not support this feature.*	Allows debugging an external target MCU using MCU-Link.

3.2.2 Supported MCU-Link debug scenarios

Table 26 describes the debug scenarios supported on the FRDM-IMXRT1186 board.

Table 26. Supported MCU-Link features

Debug scenario	Feature support	Jumper or Connector setting required
Use MCU-Link as debugger for the target MCU (MIMXRT1186)	• SWD is enabled. • VCOM feature is enabled.	• Jumper J36 must be open. • Jumper J58 must be open.
Use an external debugger to debug the target MCU (MIMXRT1186)	• SWD is enabled. • VCOM feature is enabled.	• JumperJ36 must be open. • Jumper J58 must be short. • Connect the external debugger to the connector J54 (DNP).
Use MCU-Link as a debugger for an external target MCU	• SWD is enabled. • VCOM is not supported.	• Jumper J36 must be open. • Jumper J58 must be short. • Connect the external target MCU to the connector J54 (DNP).

3.2.3 MCU-Link host driver and 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.

Before updating the firmware by using the steps listed in Section 3.2.4 check the compatibility between the MCU-Link firmware and the MCUXpresso IDE (see Table 27).

Table 27. 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

3.2.4 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 the steps below:

1. Disconnect the board from the host computer, short jumper J40, and reconnect the board. The red MCU-Link status LED D10 lights up and stays on. For more details on MCU-Link LEDs, see Section 3.2.5.

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. To find and run the firmware update utility for CMSIS-DAP or J- Link firmware version, follow the instructions in the `Readme.txt`.
5. Disconnect the board from the host computer, open jumper J40, and reconnect the board.

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

Note: *To enable serial wire output (SWO) related features in non-NXP IDEs, CMSIS-SWO support was introduced in firmware version V3.117.*

3.2.5 MCU-Link status LEDs

The FRDM-IMXRT1186 board has three status indicator LEDs for MCU-Link. Table 28 lists these LEDs and describes how each LED behaves in different MCU-Link modes.

Table 28. MCU-Link LEDs

Part identifi	PCB label	LED color	LED function		
			Normal operation (with CMSIS-DAP)	Normal operation (with J-Link)	ISP (firmware update) mode
D10	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 D7 LED blinks rapidly.	The LED remains OFF.	The LED lights up when MCU-Link (LPC55S69) boots in ISP mode.
D11	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.
D12	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.

4 Board errata

This section documents the known issues and limitations identified in the current version of the FRDM-IMXRT1186 board. These errata are important for developers to consider during design and testing to avoid unexpected behavior.

5 Related documentation

Table 29 lists the documents and resources that you can refer to for more information on the FRDM-IMXRT1186 board. Some of these documents are available only under a non-disclosure agreement (NDA). To access such a document, contact a local NXP field applications engineer (FAE) or sales representative.

For the i.MX RT1180 product details, refer to the URL: i.MX-RT1180.

More documentation is available at the URL: i.MX-RT1180 Documentation.

Table 29. Related documentation

Document	Description	Link / how to obtain
i.MX RT1180 Reference Manual (document ID IMXRT1180RM)	This document provides a detailed description about the i.MX RT1180 and its features, including memory maps, power supplies, and clocks.	IMXRT1180RM
i.MX RT1180 Crossover Processors Data Sheet (document ID IMXRT1180EC)	This document provides information about electrical characteristics, hardware design considerations, and ordering information.	IMXRT1180EC
FRDM-IMXRT1186 Quick Start User Guide (document ID IMXRT1180QSG)	This document provides brief steps to get started with the FRDM-IMXRT1186 board.	IMXRT1180QSG
Board design resources	Schematics, layout files, and Gerber files (including Silkscreen)	i.MX RT1180 Design Resources

6 Acronyms

Table 30 lists the acronyms used in this document.

Table 30. Acronyms

Acronym	Description
AON	Always-On
ADC	Analog-to-Digital Converter
BBSM	Battery-Backed State Machine
CAN	Controller Area Network
DNP	Do Not Populate / Do Not Place
DUT	Device Under Test
ECAT	Ethernet for Control Automation Technology
FlexCAN	Flexible Controller Area Network
FlexSPI	Flexible Serial Peripheral Interface
FSK	Frequency Shift Keying
GFSK	Gaussian Frequency Shift Keying
GMSK	Gaussian Minimum Shift Keying
HID	Human Interface Device
I2C	Inter-Integrated Circuit
IoT	Internet of Things
ISP	In-System Programming
LCD	Liquid-Crystal Display
LDO	Low-Dropout Regulator
LE	Low Energy
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
MSK	Minimum Shift Keying
NMI	Non-Maskable Interrupt
OB	OnBoard
OS	Operating System
PCS	Peripheral Chip Select
PDA	Personal Digital Assistant
PWM	Pulse Width Modulator
RF	Radio Frequency
RGMII	Reduced Gigabit Media Independent Interface

Table 30. Acronyms...*continued*

Acronym	Description
RTC	Real-Time Clock
RX	Receive
SPI	Serial Peripheral Interface
SWD	Serial Wire Debug
SWO	Serial Wire Debug Trace Output
TFT	Thin-film Transistor
TPM	Timer / PWM Module
TX	Transmit
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus
USBSIO	USB Serial Input/Output
VCOM	Virtual Communication

7 Revision history

Table 31 summarizes the revisions to this document.

Table 31. Revision history

Document ID	Release date	Description
UM12450 v.1.0	20 January 2026	Initial public release

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