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MIMXRT1060-EVKB Board User Manual

Contents

Chapter 1
Overview

The MIMXRT1060-EVKB board provides a comprehensive platform for design and evaluation of most commonly used features of the NXP i.MX RT1060 application processor, in a small and low-cost package. MIMXRT1060-EVKB is an entry level development board, to familiarize user with the processor before investing a large amount of resources in more specific designs.

The i.MX RT1060 is a new processor family featuring NXP's advanced implementation of the high-performance Arm® Cortex®-M7 Core. It offers high-performance processing optimized for lowest power consumption and best real-time response.

The board is lead-free and RoHS-compliant.

This document provides detailed information about MIMXRT1060-EVKB board interfaces, power supplies, clocks, connectors, jumpers, user buttons, and LEDs.

For further information about MIMXRT1060-EVKB, see https://www.nxp.com/products/processors-and-microcontrollers/arm-microcontrollers/i-mx-rt-crossover-mcus/i-mx-rt1060-crossover-mcu-with-arm-cortex-m7-core:i.MX-RT1060.

1.1 Acronyms

The table below lists and explains the acronyms and abbreviations used in this document.

Table 1. Acronyms and abbreviations

Term	Description
ADC	Analog-to-digital converter
CLK	Clock
eLCDIF	Enhanced LCD Interface
FlexCAN	Flexible Controller Area Network
LPI2C	Low-power Inter-Integrated Circuit (I2C)
MCU	Microcontroller Unit
OpenSDA	Open-standard serial and debug adapter
PWM	Pulse Width Modulation
SWD	Serial Wire Debug
SEMC	Smart External Memory Controller
USB	Universal Serial Bus
UART	Universal Asynchronous Receiver Transmitter
DNP	Do not populate

1.2 Related documentation

The table below lists and explains the additional documents and resources that can be referred to for more information on MIMXRT1060-EVKB. Some of the documents listed below may be available only under a non-disclosure agreement (NDA). To request access to these documents, contact local field applications engineer (FAE) or sales representative.

Table 2. Related documentation

Document	Description	Link/how to access
i.MX RT1060 Processor Reference Manual	Intended for system software, hardware developers, and applications programmers who want to develop products with this device	IMXRT1060RM
i.MX RT1060 Crossover MCUs for Consumer Products Data Sheet	Provides information about electrical characteristics, hardware design considerations, and ordering information	IMXRT1060CEC
i.MX RT1060 Crossover MCUs for Industrial Products Data Sheet	Provides information about electrical characteristics, hardware design considerations, and ordering information	IMXRT1060IEC
Security Reference Manual for the i.MX RT106x Processor	Provides detail about various chip security components	Contact local field applications engineer (FAE) or sales representative.
Board design files	Schematics, layout files, and gerber files (including Silkscreen)	https://www.nxp.com/design/development-boards/i-mx-evaluation-and-development-boards/i-mx-rt1060-evaluation-kit:MIMXRT1060-EVK
MCUXpresso Software Development Kit (SDK) documentation	MCUXpresso Software Development Kit (SDK) is a comprehensive software enablement package designed to simplify and accelerate application development with NXP MCUs based on Arm® Cortex® -M cores.	MCUXpresso Software Development Kit (SDK) documentation

1.3 Kit contents

The table below lists the items included in the MIMXRT1060-EVKB kit.

Table 3. Hardware kit contents

Item	Quantity
MIMXRT1060-EVKB board	1
USB Type A to micro-B cable	1
Camera, CA111C based on MT9M114	1

NOTE

Power adapter, micro-SD card, and LCD module are not included in the board kit.

1.4 Block diagram

The figure below shows the MIMXRT1060-EVKB block diagram.

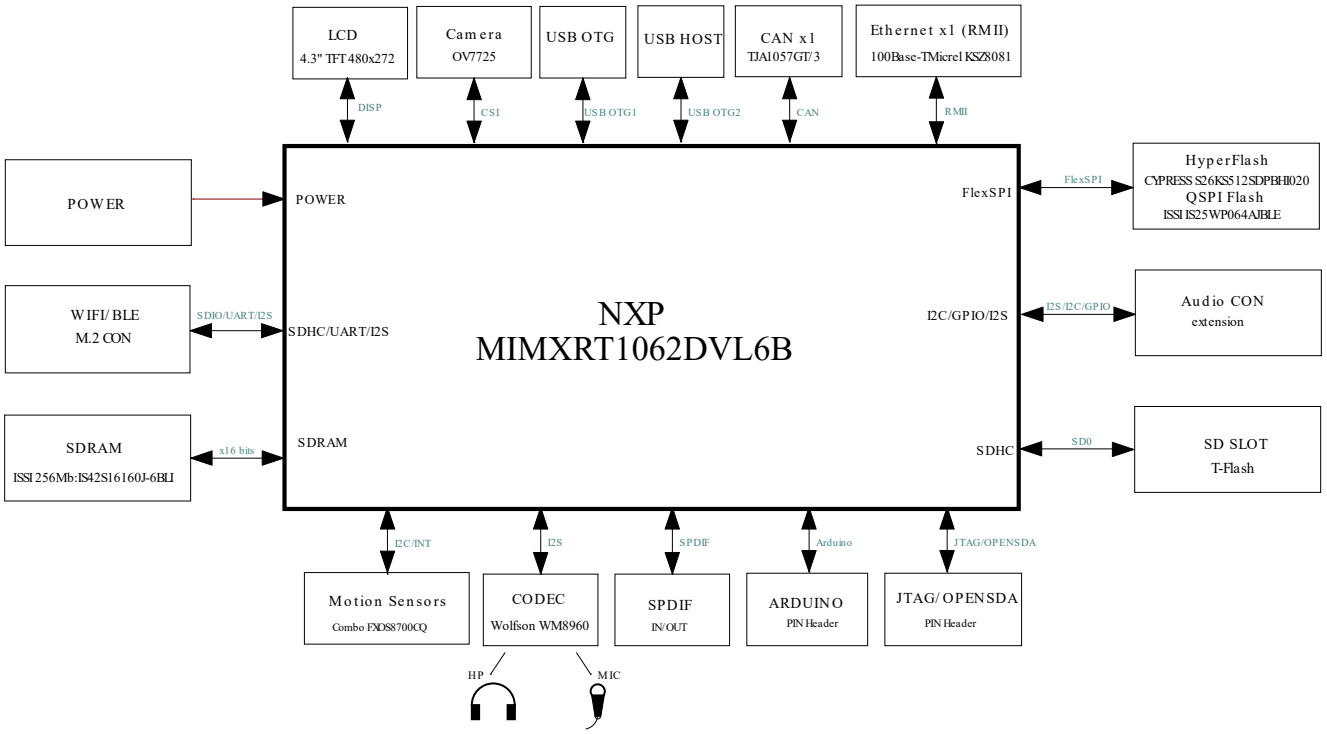
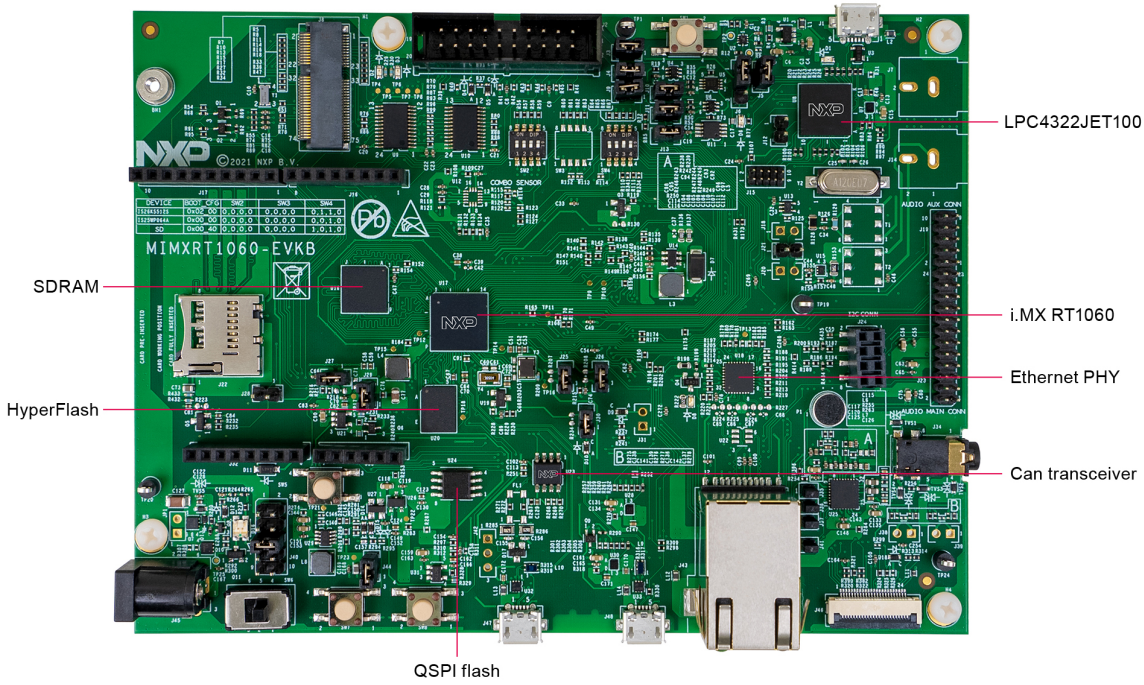


Figure 1. MIMXRT1060-EVKB block diagram

1.5 Board pictures

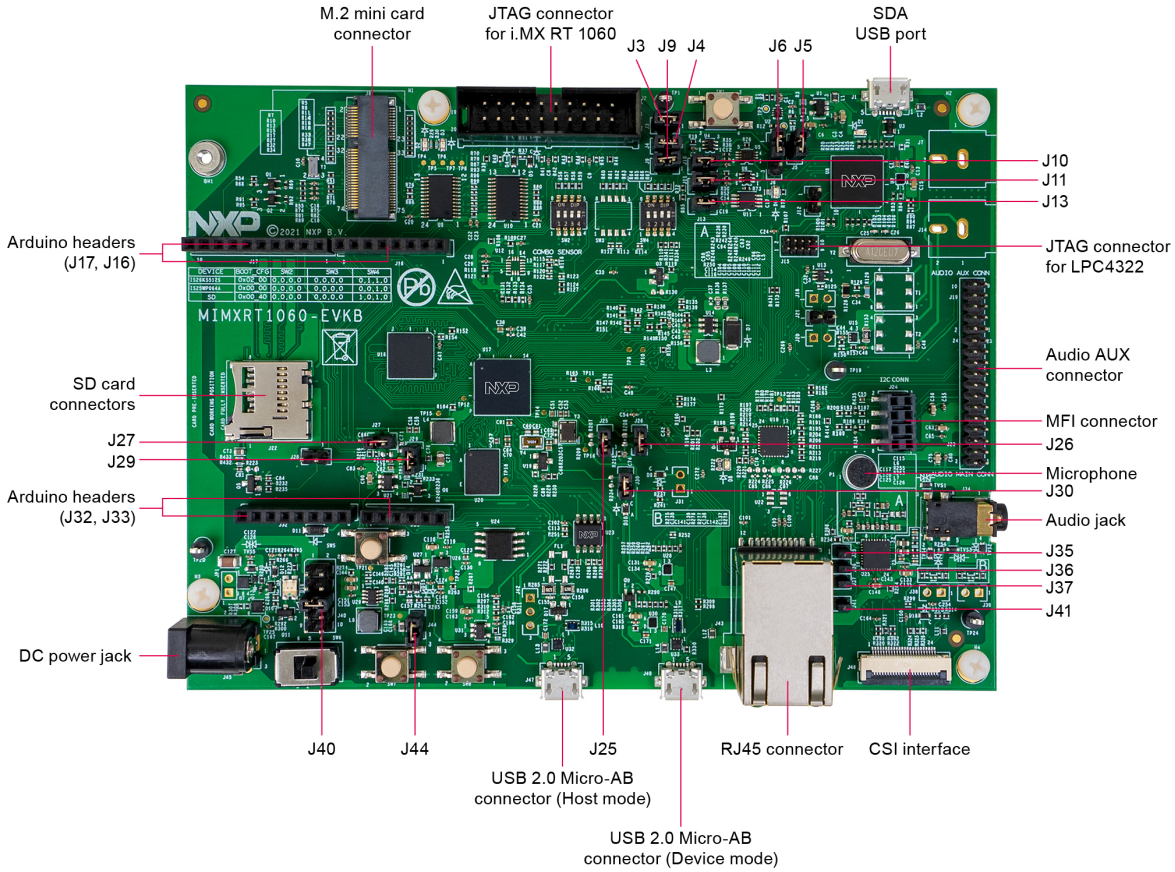
The figure below shows the top-side view of MIMXRT1060-EVKB.

Figure 2. MIMXRT1060-EVKB top view



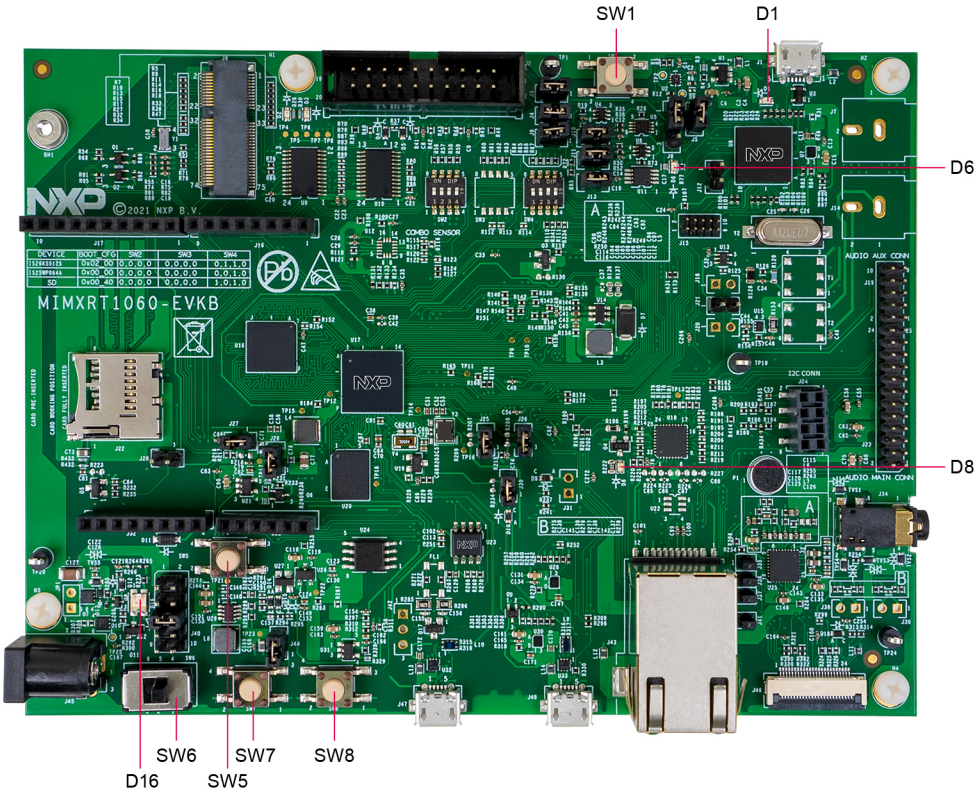
The figure below shows the onboard jumpers and connectors on MIMXRT1060-EVKB.

Figure 3. MIMXRT1060-EVKB jumpers and connectors



The figure below shows the LEDs and push buttons on MIMXRT1060-EVKB.

Figure 4. MIMXRT1060-EVKB LEDs and push buttons



1.6 Board features

The table below lists the features of MIMXRT1060-EVKB. Figure 2 shows different components of MIMXRT1060-EVKB.

Table 4. MIMXRT1060-EVKB features

MIMXRT1060-EVKB feature	Processor feature used	Description
Processor		MIMXRT1062DVL6B **NOTE** For details on the MIMXRT1062DVL6B processor, see i.MX RT1060 Processor Reference Manual. .
Power supply		MIMXRT1060-EVKB can be powered by any of the following (+5 V) sources: • External DC power supply connected to input power jack, J45 • USB 2.0 Micro-AB connector operating in Device mode, J48 • Micro-AB USB connector for OpenSDA, J1

Table continues on the next page...

Table 4. MIMXRT1060-EVKB features (continued)

MIMXRT1060-EVKB feature	Processor feature used	Description
SDRAM	SEMC	• Supports 256 Mbit SDRAM • Operates at 3.3 V with maximum frequency 166 MHz
SDHC	uSDHC1	• Supports a micro-SDHC connector, J22, for connecting an external micro-SD 3.0 card • Operates at 1.8 V
FlexSPI	FlexSPI	• 8 MB onboard QSPI NOR flash memory (1.8 V) - as boot source • 64 MB onboard HyperFlash NOR flash memory (1.8 V)
Ethernet	RMII interface	• Supports one 10Base-T/100Base-TX Ethernet port through one RJ45 connector with link and activity status
USB	Two USB 2.0 OTG controllers (OTG1 and OTG2) with integrated PHYs	• Supports high-speed (480 Mbit/s), full-speed (12 Mbit/s), and low-speed (1.5 Mbit/s) operations • Two USB 2.0 Micro-AB connectors operating in Host and Device modes
Audio	SAI, I2S, LPI2C3	• 3.5 mm audio jack for headset, J34 • One onboard MIC, P1 • S/PDIF connectors, J7 and J14 [DNP] • Connectors for speakers, J39 and J38 [DNP] • 2x12 audio main connector, J23 • 2x5 audio AUX connector, J19
Debug		• 10-pin JTAG connector, J15 for debugging LPC4322 • 20-pin JTAG connector, J2 for debugging i.MX RT1060 • LPC4322 microcontroller that can be used as CMSIS DAP on MIMXRT1060-EVKB
6-axis digital sensor [DNP]	I2C1	NXP FXOS8700CQ: • Supports motion sensing with NXP FXOS8700CQ • 6-axis sensor with integrated linear accelerometer and magnetometer
I/O headers		• J16, J33, J17, J32 headers compatible with Arduino daughter card
Camera	CSI	• Supports 24-pin FPC camera module connector, J46, to which the camera modules based on the MT9M114 or OV7725 sensors can be plugged in

Table continues on the next page...

Table 4. MIMXRT1060-EVKB features (continued)

MIMXRT1060-EVKB feature	Processor feature used	Description
LCD	eLCDIF	• Supports 1x40 + 1x 6 LCD connector, J49
M.2 connector and Wi-Fi/ Bluetooth module		• Supports M.2/NGFF Key E mini card 75-pin connector, J8
MFI	LPI2C3	• Supports 2x4 pin MFI connector, Samtec SSM-104-L-DV (J24)
CAN	FlexCAN	• Supports high-speed CAN transceiver (NXP TJA1057GT) to provide an interface for the CAN ports to send and receive CAN signals to and from the processor
PCB		11 cm x 15 cm 4-layer board

1.7 Push buttons

In addition to a Reset button for manually triggering a system reset, MIMXRT1060-EVKB supports 4 push buttons. The following table explains the push buttons on MIMXRT1060-EVKB. Figure 4 shows push buttons on MIMXRT1060-EVKB.

Table 5. Reset and Interrupt push buttons

Part identifier	Switch type	Description
SW6	Slide switch	Controls the power of the MIMXRT1060-EVKB board when the power supply is connected to J45 power jack. • ON position: Connects the 5 V power supply to the board main power system • OFF position: Turns off the board power immediately
SW8	Push button	ON/OFF button. • Short pressing in OFF mode causes the internal power management state machine to change state to ON. In ON mode, a short pressing generates an interrupt as a software-controllable power-down • Pressing the button for approximate 5 seconds or more causes a forced OFF. However, both the boot mode inputs can be disconnected
SW1 and SW7	Push button	Reset button • SW7 is the power-on reset button. Pressing SW7 in the power on state forces to reset the system power except SNVS domain. The processor immediately turns off and reinitiates a boot cycle from the processor power off state • SW1 asserts reset to i.MX RT1060
SW5	Push button	User button • SW5 is a User button (GPIO5-00). Pressing the User button can produce changes in high and low levels

1.8 Connectors

Connectors are onboard devices that allow to connect external devices to the board. Figure 3 shows the MIMXRT1060-EVKB connectors. The table below describes the connectors.

Table 6. MIMXRT1060-EVKB connectors

Part identifier	Connector type	Description	Reference section
P1	Microphone	Onboard microphone	Audio interface
J1	Micro-AB connector	Debug USB for OpenSDA. Provides 5 V power supply to the board and CMSIS DAP debug support. This also provides UART for console messages.	OpenSDA serial and debug adapter
J2	2x10 connector	JTAG connector for debugging i.MX RT1060	JTAG connector
J8	75-pin connector	M.2 mini card connector	M.2 connector and Wi-Fi/ Bluetooth module
J15	2x5 connector	JTAG connector for debugging LPC4322	JTAG connector
J16	1x8 connector	I/O headers compatible with the Arduino daughter card	Arduino connectors
J33	1x6 connector		
J17	1x10 connector		
J32	1x8 connector		
J19	2x5 connector	Audio AUX connector	Audio AUX and main connectors
J22		SD card connector	SDHC
J23	2x12 connector	Audio main connector	Audio AUX and main connectors
J24	8-pin	MFI connector	MFI interface
J34	Audio jack	Audio headset connector	Audio codec
J43	RJ45 jack	Ethernet connector	Ethernet interface
J45	5 V power supply connector	DC power jack	Power supply
J46	1x24 connector	FPC camera module connector for camera modules based on the MT9M114 or OV7725 sensors	Camera interface
J47	USB 2.0 Micro-AB connector	Operates in Host mode	USB interface
J48	USB 2.0 Micro-AB connector	Operates in Device mode	
J49	1X40 + 1X6 connector	LCD connector	LCD interface

1.9 Jumpers

Jumpers (or shorting headers) are small connectors that allow to choose from two or more options available. Jumpers are installed during board assembly and do not require any changes. In MIMXRT1060-EVKB, all jumpers are 2/3-pin connectors with two settings: open and shorted. Figure 3 highlights the MIMXRT1060-EVKB jumpers available for use. The table below describes the jumpers.

The following is a list of all of the jumper options on MIMXRT1060-EVKB.

Table 7. MIMXRT1060-EVKB jumpers

Part identifier	Jumper type	Description	Jumper settings
J3, J4	1x2 header	OpenSDA JTAG debug interface	• Open: Isolates the onboard processor from OpenSDA JTAG interface • Shorted: Connect the TDO_SWO and JTAG_TDI_L signals from OpenSDA to i.MX RT1060 (default setting)
J5	1x2 header	OpenSDA reset	• Shorted: OpenSDA sends reset to i.MX RT1060 (default setting)
J6	1x3 header	Reset selection	• 1-2: OpenSDA sends reset to i.MX RT1060 (default setting) • 2-3: SW1 sends reset to i.MX RT1060. This setting is to be used when OpenSDA is not powered
J9, J10	1x2 header	OpenSDA SWD debug interface	• Open: Isolates i.MX RT1060 from OpenSDA SWD interface • Shorted: Connect the TCK_SWCLK and TMS_SWDIO signals from OpenSDA to i.MX RT1060 (default setting)
J11, J13	1x2 header	UART	• Shorted: OpenSDA provides UART interface for i.MX RT1060 (default setting)
J25	1x2 header		• Shorted: Connects VDD_HIGH_IN_3V3 power supply to the processor
J26	1x2 header		• Shorted: Connects VDDA_ADC_3V3 power supply to the processor
J27	1x2 header		• Shorted: Connects MCU_DCDC_IN_3V3 power supply to the processor
J29	1x2 header		• Shorted: Connects VDD_SOC_IN power supply to the processor
J30	1x2 header		• Shorted: Connects VDD_SNVS_IN power supply to the processor
J35	1x2 header		• Shorted: Audio codec is connected to the SAI1_TX_BCLK signal routed to i.MX RT1060 and audio main connector, J23 (default setting)
J36	1x2 header		• Shorted: Audio codec is connected to the SAI1_TX_SYNC signal routed to i.MX RT1060 and audio main connector, J23 (default setting)
J37	1x2 header		• Shorted: Audio codec is connected to the SAI1_TXD signal routed to i.MX RT1060 and audio main connector, J23 (default setting)
J40	2x5 header	Power supply	• 1-2: 5V_SYS power supply via J45 • 3-4: 5V_USB_OTG power supply via J48 • 5-6 (Default setting): P5V_SDA_S power supply via J1
J41	1x2 header		• Shorted: Audio codec is connected to the SAI1_RXD signal routed to i.MX RT1060 and audio main connector, J23 (default setting)

Table continues on the next page...

Table 7. MIMXRT1060-EVKB jumpers (continued)

Part identifier	Jumper type	Description	Jumper settings
J44	1x2 header		• Shorted: Connects DCDC_3V3 power supply to the processor

1.10 LEDs

MIMXRT1060-EVKB has light-emitting diodes (LEDs) to monitor system functions, such as power-on, reset, board faults, and so on. The information collected from LEDs can be used for debugging purposes.

LEDs are highlighted in Figure 4. The table below describes the MIMXRT1060-EVKB LEDs.

Table 8. MIMXRT1060-EVKB LEDs

Part identifier	LED color	LED name	Description (When LED in ON)
D16	Green/Red	Main power supply	Main Power Supply (D16) • Green: 5 V DC main supply is working correctly • Red: J45 input voltage is over 5.6 V • Off: Board is not powered
D6	Red	Reset	Indicates Reset command is sent to i.MX RT1060 via OpenSDA or when SW1 is pressed
D1	Red	SDA	Indicates OpenSDA status • Blinking: When OpenSDA is in use • OFF: When OpenSDA is not in use
D8	Green	User LED	User configurable

Chapter 2
Functional description

2.1 Processor

The i.MX RT1060 is a new processor family featuring NXP advanced implementation of the Arm Cortex-M7 Core. It provides high CPU performance and best real-time response. i.MX RT1060 provides various memory interfaces, including SDRAM, Raw NAND flash, NOR flash, SD/eMMC, Quad SPI, HyperBus, and a wide range of other interfaces for connecting peripherals, such as WLAN, Bluetooth™, GPS, displays, and camera sensors. i.MX RT1060 has rich audio and video features, including LCD display, basic 2D graphics, camera interface, S/PDIF, and I2S audio interface.

The i.MX RT1060 applications processor can be used in areas such as industrial HMI, IoT, motor control, and home appliances. The flexibility of the architecture enables it to be used in a wide variety of other general embedded applications too. The i.MX RT1060 processor provides all interfaces necessary to connect peripherals such as WLAN, Bluetooth™, GPS, camera sensors, and multiple displays.

For more information about the processor, see the i.MX RT1060 Crossover MCUs for Consumer Products Data Sheet, i.MX RT1060 Crossover MCUs for Industrial Products Data Sheet, and i.MX RT1060 Processor Reference Manual at https://www.nxp.com/products/processors-and-microcontrollers/arm-microcontrollers/i-mx-rt-crossover-mcus/i-mx-rt1060-crossover-mcu-with-arm-cortex-m7-core:i.MX-RT1060

2.2 Boot mode configurations

i.MX RT1060 supports four boot modes (one is reserved for NXP use). The boot mode is selected based on the binary value stored in the internal `BOOT_MODE` register.

Switch, SW4[3:4], is used to select the boot mode on the MIMXRT1060-EVKB board.

For each switch:

- If the switch is ON, the value is '1'.
- If the switch is OFF, the value is '0'.

Table 9. Boot mode pin settings

BOOT_MODE[1:0] (SW4[3:4])	Boot type
00	Boot From Fuses
01	Serial Downloader
10	Internal Boot
11	Reserved

NOTE

For more details about the boot modes on i.MX RT1060, see chapter "System Boot" in i.MX RT1060 Processor Reference Manual.

The internal boot is selected for normal boot, which is configured by the external `BOOT_CFG` GPIOs. The following table explains the boot device settings for i.MX RT1060.

Table 10. i.MX RT1060 boot device settings

SW4[1]	SW4[2]	SW4[3]	SW4[4]	Boot Device
OFF	ON	ON	OFF	HyperFlash
OFF	OFF	ON	OFF	QSPI flash [Default setting]
ON	OFF	ON	OFF	SD card

NOTE

For more information about MIMXRT1060-EVKB boot device selection and configuration, see https://www.nxp.com/design/development-boards/i-mx-evaluation-and-development-boards/i-mx-rt1060-evaluation-kit:MIMXRT1060-EVK.

2.3 Power supply

MIMXRT1060-EVKB can be powered by any of the following (+5 V) sources:

- External DC power supply connected to input power jack, J45
- USB 2.0 Micro-AB connector operating in Device mode, J48
- Micro-AB USB connector for OpenSDA, J1

A slider switch SW6 turns ON/OFF the 5 V external DC power supply connected to J45:

- If SW6 is set to 2-3/5-6, the 5 V power supply is ON
- If SW6 is set to 1-2/4-5, the 5 V power supply is OFF

J40 is used to configure the power supply to be used to power the board. The following table explains the J40 settings.

Table 11. J40 - Pinouts

Pin	Power supply
1-2	5V_SYS power supply via J45
3-4	5V_USB_OTG power supply via J48
5-6 (Default setting)	P5V_SDA_S power supply via J1

The following figure shows the MIMXRT1060-EVKB power tree.

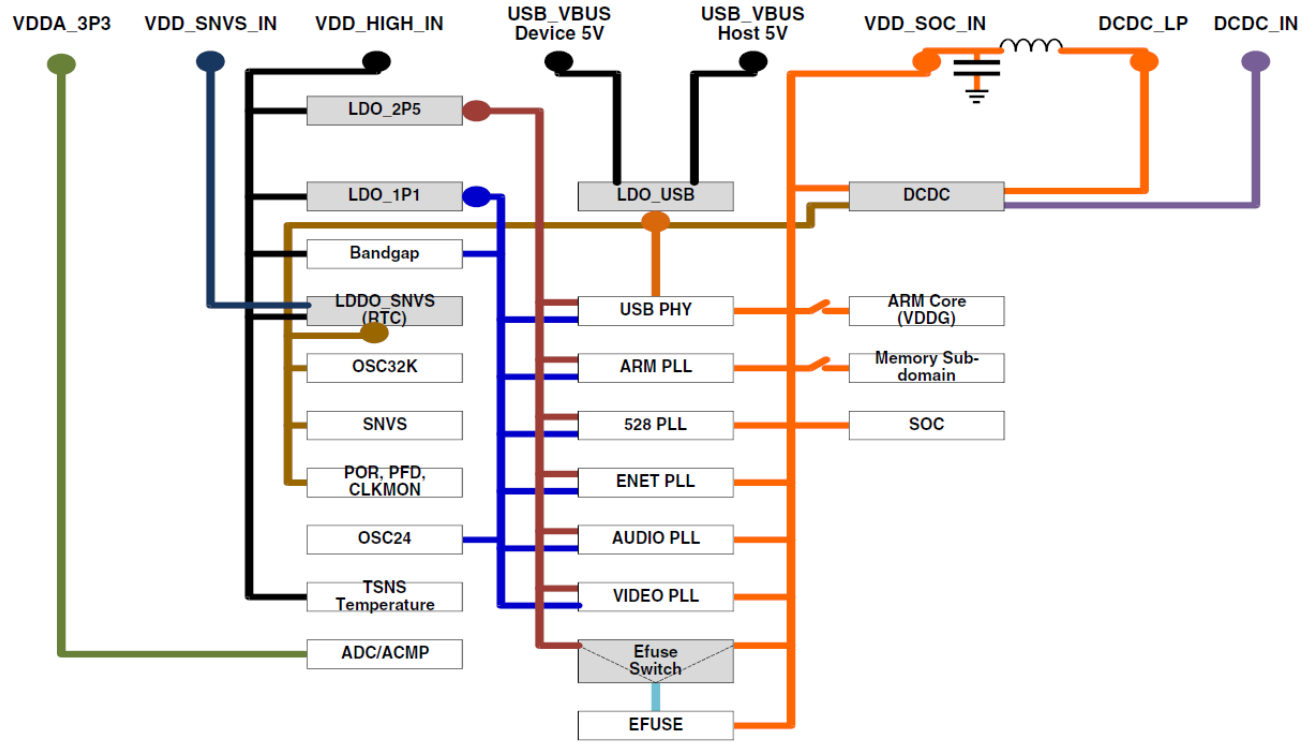


Figure 5. Power tree

The following diagram shows the power control logic of the MIMXRT1060-EVKB board.

- SNVS is powered first and then `PMIC_REQ_ON` is switched on to enable external DC/DC to power up other power domains
- ON/OFF button is used to switch ON/OFF `PMIC_REQ_ON` to control power modes
- RESET button and WDOG output are used to reset the system power

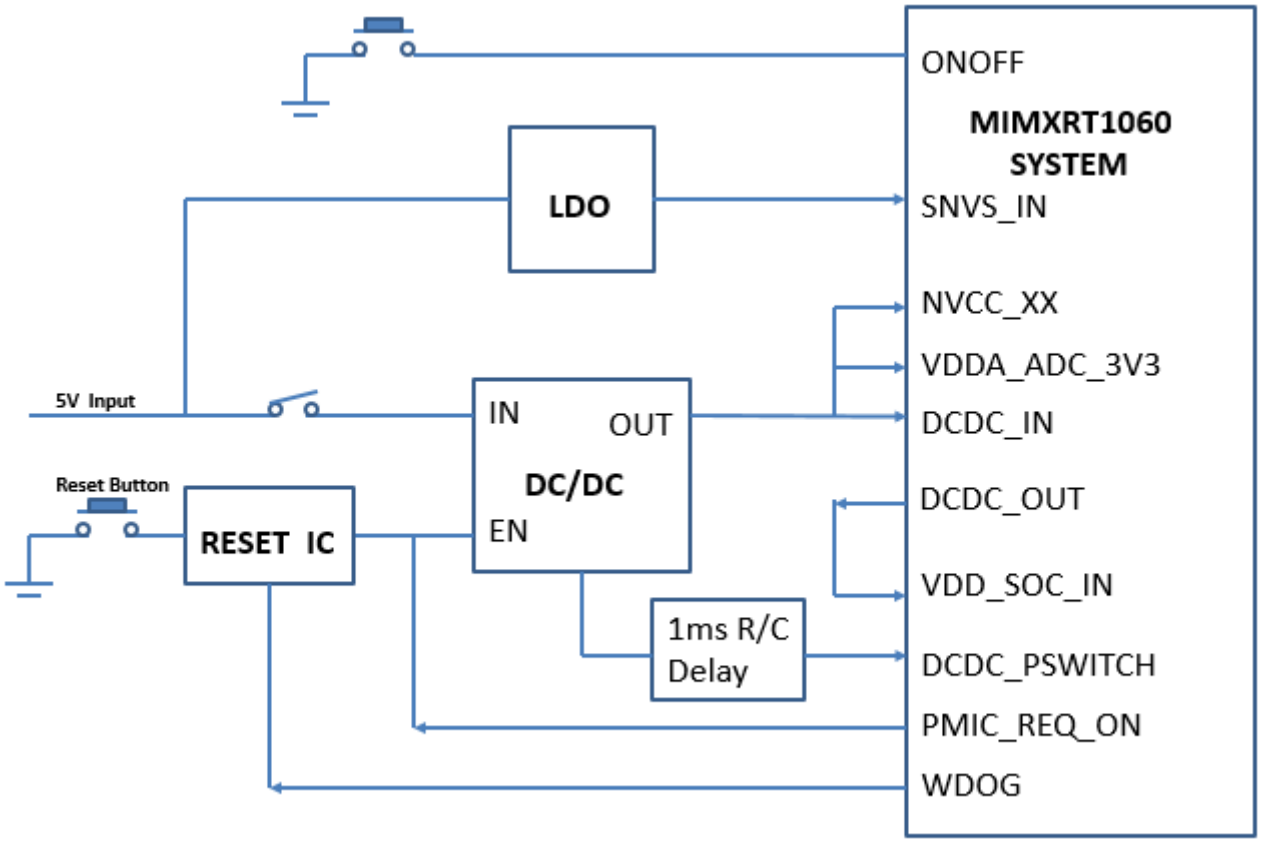


Figure 6. Power control diagram

The following table explains the power rails on the board.

Table 12. Power rails

Power Rail	MIN (V)	TYP (V)	MAX (V)	Description
VDD_SOC_IN	0.925	—	1.3	Core supplies input voltage
VDD_HIGH_IN	3	3.3	3.7	VDD_HIGH_IN supply voltage
DCDC_IN	3	3.3	3.6	Power for DCDC
VDD_SNVS_IN	2.4	3	3.6	Power for SNVS and RTC
USB_OTG1_VBUS USB_OTG2_VBUS	4.4	5	5.5	Power for USB VBUS
VDDA_ADC	3	3.3	3.6	Power for 12-bit ADC
NVCC_SD0	3	3.3	3.6	Power for GPIO in SDIO1 bank (3.3 V mode)
	1.65	1.8	1.95	Power for GPIO in SDIO1 bank (1.8 V mode)
NVCC_SD1	3	3.3	3.6	Power for GPIO in SDIO2 bank (3.3 V mode)

Table continues on the next page...

Table 12. Power rails (continued)

Power Rail	MIN (V)	TYP (V)	MAX (V)	Description
	1.65	1.8	1.95	Power for GPIO in SDIO2 bank (1.8 V mode)
NVCC_EMC	3	3.3	3.6	IO supply for GPIO in EMC bank (3.3 V mode)
	1.65	1.8	1.95	IO supply for GPIO in EMC bank (1.8 V mode)
NVCC_GPIO	3	3.3	3.6	IO power for GPIO

2.4 Clocks

MIMXRT1060-EVKB provides all the clocks required for the processor and peripheral interfaces.

The following table summarizes the specifications of each clock and the component that provides it.

Table 13. MIMXRT1060-EVKB clocks

Part identifier	Clock generator	Clock	Specifications	Destination
Y1	Crystal oscillator	SUSCLK_32KHZ	Frequency: 32.768 kHz	M.2 mini card connector, J19
Y2	Crystal oscillator	XTAL1 XTAL2	Frequency: 12 MHz	LPC4322JET100 (OpenSDA hardware)
Y3	Crystal oscillator	XTALI XTALO	Frequency: 24 MHz	Target processor
Y4	Crystal oscillator	RTC_XTALI RTC_XTALO	Frequency: 32.768 kHz	Target processor

2.5 SDRAM memory

i.MX RT1060 includes Smart External Memory Controller (SEMC), which is a multi-standard memory controller optimized for both high-performance and low pin-count. It can support multiple external memories in the same application with shared address and data pins.

SEMC on i.MX RT1060 supports SDRAM interface for:

- Both 8-bit, 16-bit modes
- Up to 512 Mb per each Chip Select (CS) and up to 4x CS

On MIMXRT1060-EVKB, SEMC is connected to 256 Mbit SDRAM (U16), operating at 3.3 V with maximum frequency 166 MHz.

SEMC_DQS is input/output when the processor writes data to the SDRAM, it outputs the DQS in the center of the data it is writing. When reading data, the SDRAM sends the DQS edge aligned with the data.

The recommendation is to leave the pin floating and internal loopback enabled as this is needed for SDRAM read and write operations at 166 MHz, otherwise performance will not be optimal.

2.6 SDHC

i.MX RT1060 supports two Ultra Secured Digital Host Controller (uSDHC) modules for SD/eMMC interface, uSDHC1 and uSDHC2. The uSDHC interface provides the interface between the host system and the SD/SDIO/MMC cards. The module acts as a bridge, passing host bus transactions to the SD/SDIO/MMC cards by sending commands and performing data accesses to/from the cards.

The MIMXRT1060-EVKB supports connections with the uSDHC1 interface of the i.MX RT1060 processor through a micro-SDHC connector that accepts an external micro-SD 3.0 card. The micro-SD card is one of the primary boot sources of the board.

The table below shows the pinout details of the micro-SDHC connector, J22.

Table 14. Micro-SDHC connector pinout

Pin number	SDHC signals	Direction with respect to i.MX RT1060
1	SD1_D2	Bidirectional
2	SD1_D3	Bidirectional
3	SD1_CMD	From i.MX RT1060
4	VSD_3V3	NA
5	SD1_CLK	From i.MX RT1060
6	GND	NA
7	SD1_D0	Bidirectional
8	SD1_D1	Bidirectional
9	SD_CD_SW	To i.MX RT1060

The `SD_CD_SW` signal of the micro-SDHC connector indicates presence/absence of card in the connector slot. This signal goes to uSDHC1 controller through the `GPIO_B1_12` pin of the controller.

For SD boot, SW4 [1:4] should be set to `ONOFFONOFF`, as explained in Table 10

2.7 PCB information

The MIMXRT1060-EVKB board uses the standard 4-layer technology. The material used is FR-4. The PCB stack-up information is shown in the following table.

Table 15. Board stack-up information

Layer	Description	Copper(Oz)	Dielectric Thickness(mil)
1	Signal	1	—
	Dielectric	—	3
2	GND	1	—
	Dielectric	—	52
3	Power	1	—
	Dielectric	—	3
4	Signal	1	—

2.8 FlexSPI interface

The MIMXRT1060-EVKB supports Flexible Serial Peripheral Interface (FlexSPI) host controller connections with the i.MX RT1060 processor through QSPI NOR flash and HyperFlash NOR flash memories.

The topics below describe the FlexSPI devices supported by MIMXRT1060-EVKB:

- HyperFlash NOR flash memory
- QSPI NOR flash memory

2.8.1 HyperFlash NOR flash memory

The table below describes the HyperFlash NOR flash memories supported on MIMXRT1060-EVKB.

Note that by default, the HyperFlash NOR flash memory is disabled on the board.

Table 16. HyperFlash NOR flash memory

Part identifier	Part number	Description	Board configuration to enable HyperFlash NOR flash memory	Boot settings
U20	S26KS512SDPBHI02	• Type: Onboard HyperFlash NOR flash memory • Density: 512 Mbit (64 MB) • Operating voltage: 1.8 V	1. Mount resistors: R403,R398,R401,R407,R408,R409, R412 2. DNP 0 Ω resistors: R402,R405,R406,R410,R411,R413	SW4 [1:4] = `OFFONONOFF`
	S27KS0641DPBHI023	• Type: HyperRAM • Density: 512 Mbit (64 MB) • Operating voltage: 1.8 V	To use HyperRAM, remove HyperFlash from the board, install HyperRAM, and configure following resistors. 1. Mount resistors: R385,R389 2. DNP resistors: R391, R394	NA

NOTE

For more details about i.MX RT1060 boot device settings, see Table 10.

2.8.2 QSPI NOR flash memory

MIMXRT1060-EVKB supports QSPI as the primary system boot source. By default, the QSPI NOR flash memory is enabled on the board. The table below describes the QSPI NOR flash memory supported on MIMXRT1060-EVKB.

Table 17. QSPI NOR flash memory

Part identifier	Part number	Description	Boot settings
U24	IS25WP064AJBLE	• Type: Onboard QSPI NOR flash memory • Density: 64 Mbit (8 MB) • Operating voltage: 1.8 V	SW4 [3:0] = `OFFOFFONOFF`

NOTE

For more details about i.MX RT1060 boot device settings, see Table 10.

2.9 Ethernet interface

The i.MX RT1060 processor supports two Ethernet MACs, which are connected to the Reduced MII (RMII) interface. The RMII interface is connected to an external Ethernet Physical Layer Transceiver (or PHY) (U18) and an RJ45 connector integrated with magnetics (J43) to provide copper-based Ethernet connection. The RJ45 connector is integrated with magnetic transformer, so it can be directly connected to PHY.

Ethernet port has a unique MAC address, which is fused into i.MX RT1060. The Ethernet connector is labeled clearly on the board.

2.10 USB interface

The i.MX RT1060 processor supports two USB 2.0 On-The-Go (OTG) controllers, 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 controllers can operate in Host mode and Device (Peripheral) mode. The table below describes the MIMXRT1060-EVKB USB connectors.

Table 18. USB ports

USB port	Connector type	Description
J48	USB 2.0 Micro-AB	Connects to the OTG1 connector of the target processor. This USB port operates in Device mode.
J47	USB 2.0 Micro-AB	Connects to the OTG2 connector of the target processor. This USB port operates in Host mode.

2.11 Audio interface

This topic explains:

- Audio codec
- Audio AUX and main connectors

2.11.1 Audio codec

MIMXRT1060-EVKB includes a low-power, high-quality audio codec for encoding/decoding audio data. The audio codec used on the board is Cirrus Logic WM8960, which can support 24-bit I2S data and 48 kHz sampling rate.

The audio codec is connected to an audio jack (J34), for audio input/output. The connector is a 3.5 mm audio-stereo headphone jack, which supports jack detect. The audio interface also includes:

- One onboard MIC, P1
- S/PDIF connectors, J7 and J14 [DNP]
- Connectors for speakers, J39 and J38 [DNP]

Communication between audio codec and target processor is enabled using I2C (for control signals) and SAI (for data signals).

2.11.2 Audio AUX and main connectors

MIMXRT1060-EVKB supports:

- 2x12 audio main connector, J23
- 2x5 audio AUX connector, J19

To use the Audio AUX connector (J19), mount the following resistors:

- R334, R335, R338, R339, R379, R341, R342

The audio main and AUX connectors are connected to the target processor through the LPI2C3 interface signals.

2.12 Arduino connectors

The connectors J16, J33, J17, J32 provide compatibility with Arduino daughter card and access to target processor signals for use in prototyping. Some ports used on these connectors are shared with other devices/connectors on the board. Refer to the schematic for further information.

The following tables explain pinouts for Arduino connectors.

Table 19. J16 pinouts

Pin	Pin function	Target processor port
1	UART_RX/D0	GPIO_AD_B1_07
2	UART_TX/D1	GPIO_AD_B1_06
3	D2/INT0	GPIO_AD_B0_11
4	D3/INT1/PWM/OC2B	GPIO_AD_B1_08
5	D4/T0/XCK	GPIO_AD_B0_09
6	D5/TI/PWM	GPIO_AD_B0_10
7	D6/AIN0/PWM/OC0A	GPIO_AD_B1_02
8	D7/AIN1/PWM	GPIO_AD_B1_03

Table 20. J33 pinouts

Pin	Pin function	Target processor port
1	A0/ADC0	GPIO_AD_B1_10
2	A1/ADC1	GPIO_AD_B1_11
3	A2/ADC2	GPIO_AD_B1_04
4	A3/ADC3	GPIO_AD_B1_05
5	A4/ADC4/SDA	GPIO_AD_B1_01
6	A5/ADC5/SCL	GPIO_AD_B1_00

Table 21. J17 pinouts

Pin	Pin function	Target processor port
1	D8/CLKO/ICP1	GPIO_AD_B0_03
2	D9/OC1A/PWM	GPIO_AD_B0_02
3	D10/SPI_CS	GPIO_SD_B0_01
4	D11/OC2A/PWM/SPI_MOSI	GPIO_SD_B0_02
5	D12/SPI_MISO	GPIO_SD_B0_03
6	D13/SPI_CLK	GPIO_SD_B0_00

Table continues on the next page...

Table 21. J17 pinouts (continued)

Pin	Pin function	Target processor port
7	GND	NA
8	AREF	NA
9	D14/I2C_SDA	GPIO_AD_B1_01
10	D15/I2C_SCL	GPIO_AD_B1_00

Table 22. J32 pinouts

Pin	Pin function
1	NC
2	IOREF
3	RESET_b
4	3.3 V
5	5 V
6	GND
7	GND
8	VIN

2.13 Camera interface

The i.MX RT1060 processor includes a Camera Serial Interface (CSI) receiver, which is a 24-bit parallel interface for image sensor. The CSI signals are connected to a 24-pin FPC camera module connector, J46, to which the camera modules based on the MT9M114 or OV7725 sensors can be plugged in.

MIMXRT1060-EVKB supports following camera modules:

- CA031C based on OV7725
- CA111C based on MT9M114

NOTE

J46 supports camera modules based on both MT9M114 and OV7725 sensors. However, 3.3 V is a violation to MT9M114 spec 3.1 V. For evaluation/demo, MT9M114 based camera modules can be used with 3.3 V supply. However, for the final product design, it is recommended to adjust DCDC output or add level shifter.

2.14 6-axis digital sensor

MIMXRT1060-EVKB supports motion sensing with NXP FXOS8700CQ (U12) 6-axis sensor with integrated linear accelerometer and magnetometer. FXOS8700CQ is a small, low-power, 3-axis, linear accelerometer and 3-axis, magnetometer combined into a single package.

FXOS8700CQ is connected to i.MX RT1060 through the I2C interface, I2C1. The I2C address for FXOS8700CQ is 0011 111.

NOTE

The sensor is not populated on some boards.

2.15 LCD interface

i.MX RT1060 supports a 24-bit parallel RGB enhanced Liquid Crystal Display interface (eLCDIF). eLCDIF is a general purpose display controller that is used to drive a wide range of display devices. These displays can vary in size and capability. There are other popular displays that support moving pictures and require the RGB interface mode (DOTCLK interface) for high-speed data transfers.

The major features of eLCDIF are as follows:

- Bus master interface to source frame buffer data for display refresh
- 8/16/18/24/32 bit LCD data bus support available depending on I/O MUX options
- Programmable timing and parameters for DOTCLK LCD interfaces

MIMXRT1060-EVKB includes 1x40 + 1x 6 LCD connector, J49. The LCD panels can be connected at J49 (A1-A40) and Capacitive Touch Panels (CPT) can be connected at J49 (B1-B6).

The board also supports UM1661, a step-up DC/DC converter that drives white LEDs with a constant current to provide backlight in LCD panels.

To purchase LCD modules, visit www.nxp.com.

For evaluation of an application with display, use the RK043FN02H-CT LCD module RK043FN02H-CT with MIMXRT1060-EVKB. RK043FN02H-CT is a 4.3 inch TFT 480*272 pixels with LED backlight and capacitive touch panel from Rocktech. This module contains two FPC cables.

2.16 M.2 connector and Wi-Fi/Bluetooth module

MIMXRT1060-EVKB supports M.2/NGFF Key E mini card 75-pin connector, J8. The M.2 mini card connector supports I2C, I2S, UART, GPIO, and optionally USB connections. The connector can be used for Wi-Fi/Bluetooth card.

The M.2 mini card connector is powered by the `WL_3V3` (3.3 V) power supply.

Table 23. M.2 mini card connector (J8) pinouts

M.2 mini card connector pin	Connection details
3V3_1, 3V3_2, 3V3_3, 3V3_4	Connected to `WL_3V3` power supply
LED1	Connected to Red WiFi LED, D3
LED2	Connected to Red Bluetooth LED, D2
SUSCLK	Connected to 32.768 kHz crystal clock generator, Y1
I2S_SCK	Connected to processor signal, `BT_PCM_BCLK` via voltage translator, 74AVC8T245PW (U9)
I2S_WS	Connected to processor signal, `BT_PCM_SYNC` via voltage translator, 74AVC8T245PW (U9)
I2S_SD_IN	Connected to processor signal, `BT_PCM_RXD` via voltage translator, 74AVC8T245PW (U10)
I2S_SD_OUT	Connected to processor signal, `BT_PCM_TXD` via voltage translator, 74AVC8T245PW (U9)
UART_WAKE	Connected to processor signal, `BT_WAKE_B_3V3`
UART_RXD	Connected to processor signal, `BT_UART_RXD` via voltage translator, 74AVC8T245PW (U10)

Table continues on the next page...

Table 23. M.2 mini card connector (J8) pinouts (continued)

M.2 mini card connector pin	Connection details
UART_TXD	Connected to processor signal, BT_UART_TXD via voltage translator, 74AVC8T245PW (U9)
UART_CTS	Connected to processor signal, BT_UART_CTS via voltage translator, 74AVC8T245PW (U9)
UART_RTS	Connected to processor signal, BT_UART_RTS via voltage translator, 74AVC8T245PW (U9)
W_DISABLE2	Connected to reset signal BT_RST#
W_DISABLE1	Connected to reset signal WL_RST#
I2C_DATA	Connected to processor signal I2C1_SDA_1V8
I2C_CLK	Connected to processor signal I2C1_SCL
USB_D+	Connected to OTG2_DP if R332 is populated
USB_D-	Connected to OTG2_DN if R331 is populated
SDIO_CLK	Connected to processor signal WIFI_SDIO_CLK
SDIO_CMD	Connected to processor signal WIFI_SDIO_CMD
SDIO_DATA0	Connected to processor signal WIFI_SDIO_D0
SDIO_DATA1	Connected to processor signal WIFI_SDIO_D1
SDIO_DATA2	Connected to processor signal WIFI_SDIO_D2
SDIO_DATA3	Connected to processor signal WIFI_SDIO_D3
SDIO_WAKE	Connected to processor signal WIFI_WAKE_B_3V3
SDIO_RST	Connected to processor signal WIFI_RST_B

2.17 MFI interface

MIMXRT1060-EVKB supports 2x4 pin MFI connector, J24. The MFI connector is connected to the target processor through the LPI2C3 interface signals.

2.18 CAN interface

i.MX RT1060 supports Flexible Controller Area Network (FLEXCAN) module, which is a communication controller implementing the CAN protocol according to the CAN 2.0B protocol specification.

On MIMXRT1060-EVKB, the i.MX RT1060 CAN ports are available for external connection through DNP CAN connector, J42. One high-speed CAN transceiver (NXP TJA1057GT) provides an interface for the CAN ports to send and receive CAN signals to and from the processor.

2.19 Debug

MIMXRT1060-EVKB consists of the i.MX RT1060 processor and the LPC4322 microcontroller, each of which have dedicated debug connectors.

- JTAG connector, J15 for debugging LPC4322
- JTAG connector, J2 for debugging i.MX RT1060

- LPC4322 microcontroller that can be used as CMSIS DAP on MIMXRT1060-EVKB. The CMSIS DAP provides low speed debug functionality for i.MX RT1060

2.19.1 OpenSDA serial and debug adapter

The MIMXRT1060-EVKB board includes an OpenSDA serial and debug adapter. OpenSDA provides a bridge between the computer (or other USB hosts) and the embedded target processor, which can be used for debugging, flash programming, and serial communication, all over a simple USB cable.

The OpenSDA hardware in the MIMXRT1060-EVKB board consists of a circuit featuring NXP LPC4322 microcontroller with an integrated USB controller connected to Micro-AB USB connector, J1. On the software side, it implements a mass storage device bootloader, which offers a quick and easy way to load OpenSDA applications, such as flash programmers, run-control debug interfaces, serial to USB converters, and more.

Two or more CMSIS-DAP applications can run simultaneously on OpenSDA. For example, run-control debug application and serial-to-USB converter can run in parallel to provide a virtual COM communication interface while allowing code debugging via CMSIS-DAP with single USB connection.

To update the OpenSDA firmware, press the SW1 and power on the board. There is a disk named **MAINTENANCE**. Drag/drop the new firmware to the **MAINTENANCE** and re-power the board. The firmware is updated.

2.19.2 JTAG connector

i.MX RT1060 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 20-pin 2.55 mm JTAG connector, J2. The four JTAG signals used by the processor are:

Table 24. JTAG signals

JTAG signal	Description
JTAG_TCK	TAP Clock
JTAG_TMS	TAP Machine State
JTAG_TDI	TAP Data In
JTAG_TDO	TAP Data Out

By default, the board supports SWD debugging. To debug i.MX RT1060 using the JTAG connector, remove the J9 and J10 jumpers.

The following figure shows the J2 connections. Refer to the schematic for further information.

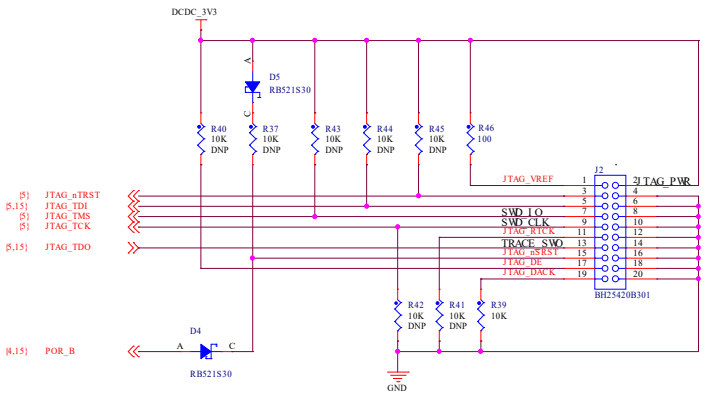


Figure 7. J2 pin definitions

MIMXRT1060-EVKB also supports JTAG connector, J15 for debugging LPC4322. Similar to i.MX RT1060, LPC4322 has four JTAG signals muxed with other pins, and one reset signal, `SDA_RST`. The JTAG and reset signals are directly connected to the standard 10-pin JTAG connector, J15. Refer to the schematic for further information.

Appendix A
Revision History

The table below summarizes the revisions to this document.

Table 25. Revision history

Revision	Date	Topic cross-reference	Change description
Rev. 0	7 Jan 2022		Initial public release

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