NXP Semiconductors
User's Guide

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MIMXRT1010 EVK Board Hardware User's Guide

Contents

Chapter 1
Introduction

This Hardware User's Guide for the MIMXRT1010 Evaluation Kit (EVK) is based on the NXP Semiconductor i.MX RT1010 Processor. This board is fully supported by NXP Semiconductor. The guide includes system setup and debugging, and provides detailed information on the overall design and usage of the EVK board from a hardware systems perspective.

1.1 Board overview

This EVK board is a platform designed to showcase the most commonly used features of the i.MX RT1010 Processor in a small, low cost package. The MIMXRT1010 EVK board is an entry level development board, which gives the developer the option of becoming familiar with the processor before investing a large amount or resources in more specific designs.

Features of the MIMXRT1010 EVK board are shown in Table 1

Board features

Table 1. Board features

Processor	NXP Processor	MIMXRT1011
DCDC	MPS	MP2144GJ
LDO	UNION	UM1750S-00
Mass Storage	128 Mbit Quad SPI Flash	
	4 Mbit LPSPI FLASH (DNP)	
USB	USB 2.0 OTG Connector	
Audio Connector	3.5 mm Audio Stereo Headphone Jack	
	Board-Mounted Microphone	
	Left & Right Speaker Out Connectors	
	SPDIF Interface (DNP)	
Debug Connector	JTAG 10-pin Connector (SWD by default)	
	OpenSDA with DAP-Link	
Sensor	FXOS8700CQ: 6-Axis Ecompass (3-Axis Mag, 3-Axis Accel) (DNP)	
User Interface Button	ON/OFF, POR Reset, POWER Reset, USER Button	
Led Indicator	Power Status, Reset, OpenSDA, USER LED	
Expansion Port	Arduino Interface	
PCB	3.346-inch x 3.543-inch (8.5cm x 9cm), 2-layer board	

1.2 MIMXRT1010 EVK Contents

The MIMXRT1010 EVK contains the following items:

- MIMXRT1010 EVK Board
- USB Cable (Micro B)

1.3 MIMXRT1010 EVK Board revision history

- Rev A: Prototype.
- Rev B: Prototype
- Rev C: Pilot.

Chapter 2
Specifications

This chapter provides detailed information about the electrical design and practical considerations of the EVK Board, and is organized to discuss each block in the following block diagram of the EVK board See Figure 1.

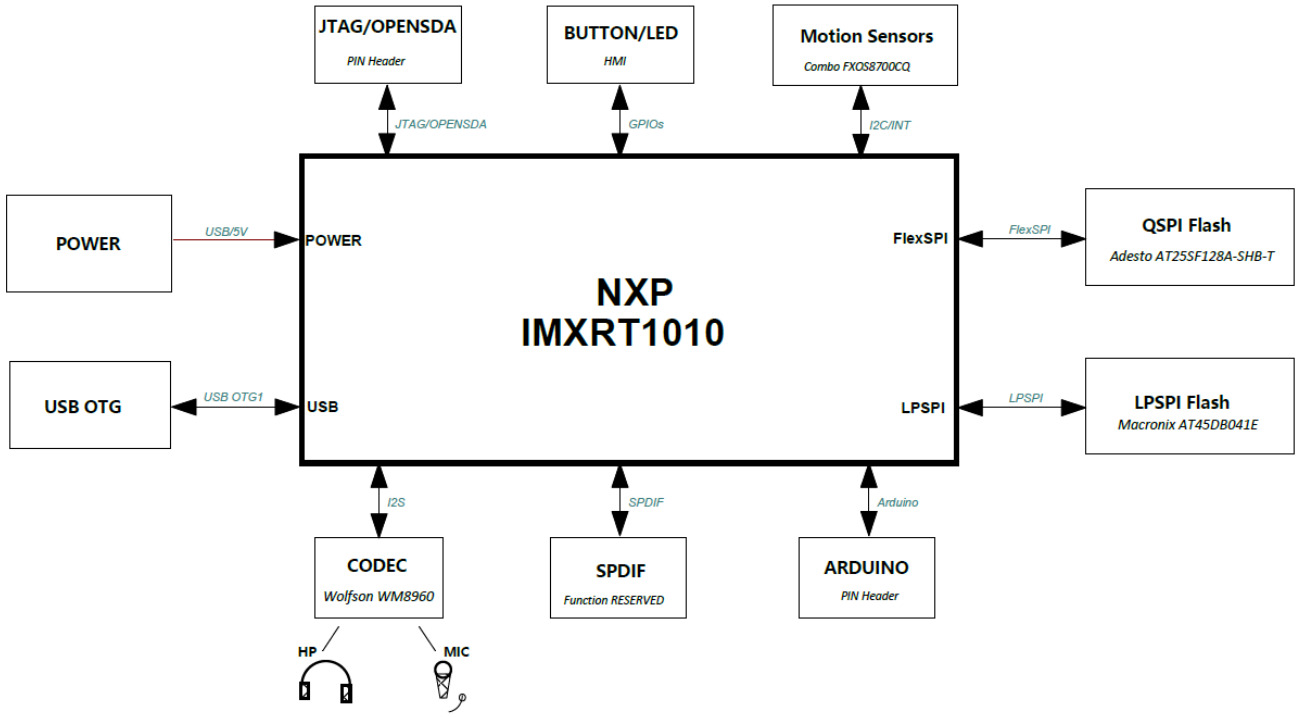

Figure 1. Block diagram

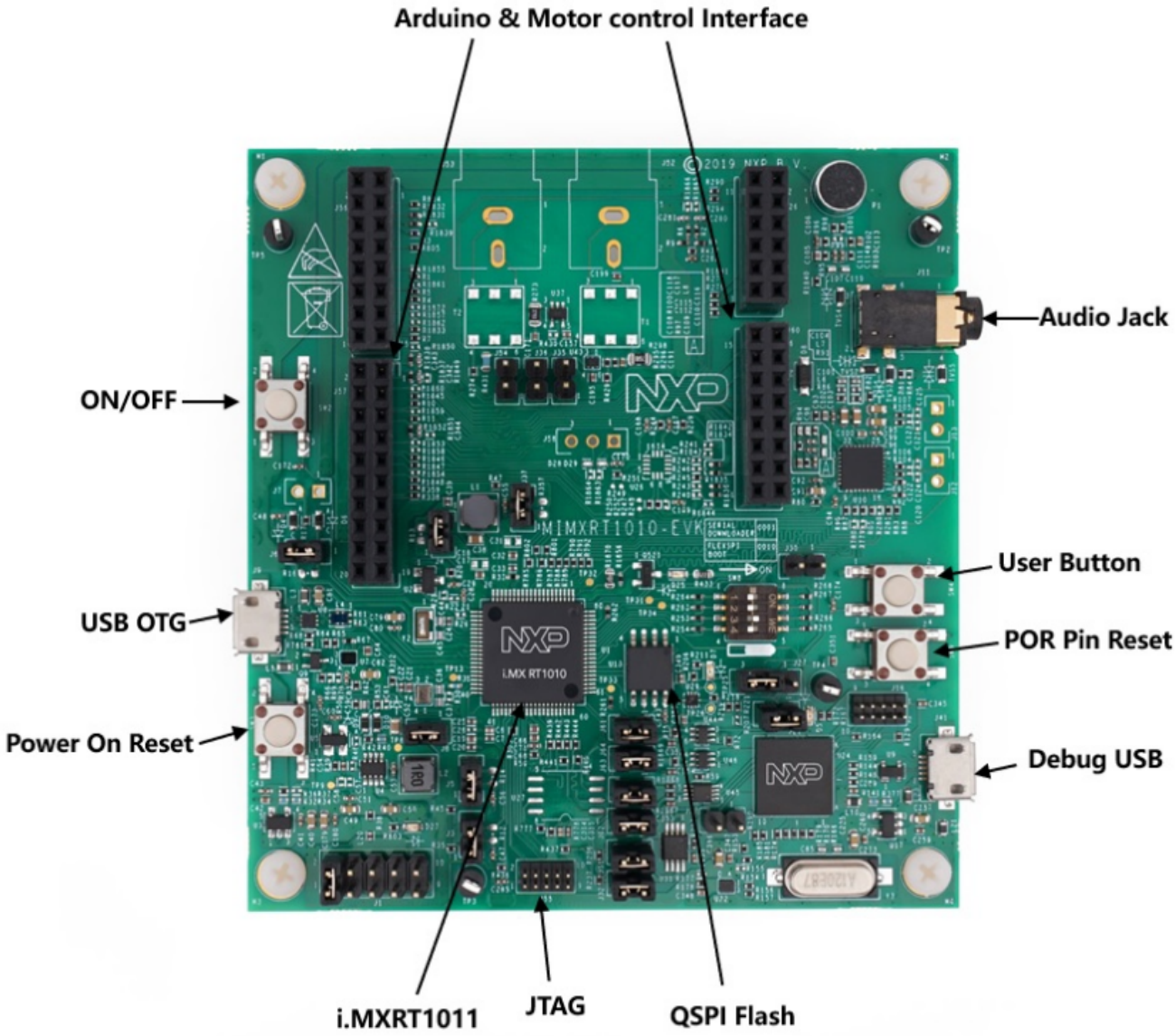

Figure 2. Overview of the MIMXRT1010 EVK Board (Front side)

The overview of the MIMXRT1010 EVK Board is shown in Figure 2.

2.1 i.MX RT1010 Processor

The i.MX RT1010 is a new processor family featuring NXP's advanced implementation of the ARM Cortex-M7 Core. It provides high CPU performance and best real-time response. The i.MX RT1010 provides various memory interfaces, including NOR FLASH, Quad SPI, HyperBus and a wide range of other interfaces for connecting peripherals, such as WLAN, Bluetooth ™ , GPS. Same as other i.MX processors, i.MX RT1010 also has rich audio features, including SPDIF and I2S audio interface.

The i.MX RT1010 applications processor can be used in areas such as industrial , IoT, motor control and home appliances , etc . The architecture's flexibility enables it to be used in a wide variety of other general embedded applications too. The i.MX processor provides all interfaces necessary to connect peripherals such as WLAN, Bluetooth™, GPS .

The more detail information about i.MX RT1010 can be found in the Datasheet and Reference Manual .

2.2 Boot Mode Configurations

The device has 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 (SW8-3 & SW8-4) is used to select the boot mode on the MIMXRT1010 EVK Board.

Table 2. Boot Mode pin settings

BOOT_MODE[1:0] (SW8-3 SW8-4)	BOOT Type
00	Boot From Fuses
01	Serial Downloader
10	Internal Boot
11	Reserved

Typically, the internal boot is selected for normal boot, which is configured by external BOOT_CFG GPIOs. The following Table 3 shows the typical Boot Mode and Boot Device settings.

Table 3. Typical Boot Mode and Boot Device settings

SW8-1	SW8-2	SW8-3	SW8-4	Boot Device
OFF	OFF	ON	OFF	QSPI Flash

NOTE

For more information about boot mode configuration, see the System Boot chapter of the MIMXRT1010 Reference Manual

For more information about MIMXRT1010 EVK boot device selection and configuration, see the main board schematic. (waiting for update)

2.3 Power Tree

J41 and J9 can be used to supply the EVK Board. A DC 5V external power supply also can be used to supply the EVK Board by connecting two pins in J1. Different power supply need to configure different Jumper setting of J1. Table 4 shows the details:

Table 4. Jumper settings of Power Supply

Power Supply	J1 Setting
J9	3-4
J41	1-2
External	5-6(7-8)

NOTE

For some computers' USB, it cannot support 500ma before establishing communication. In this case, it is recommended to replace the computer.

The power tree is shown in Figure 3.

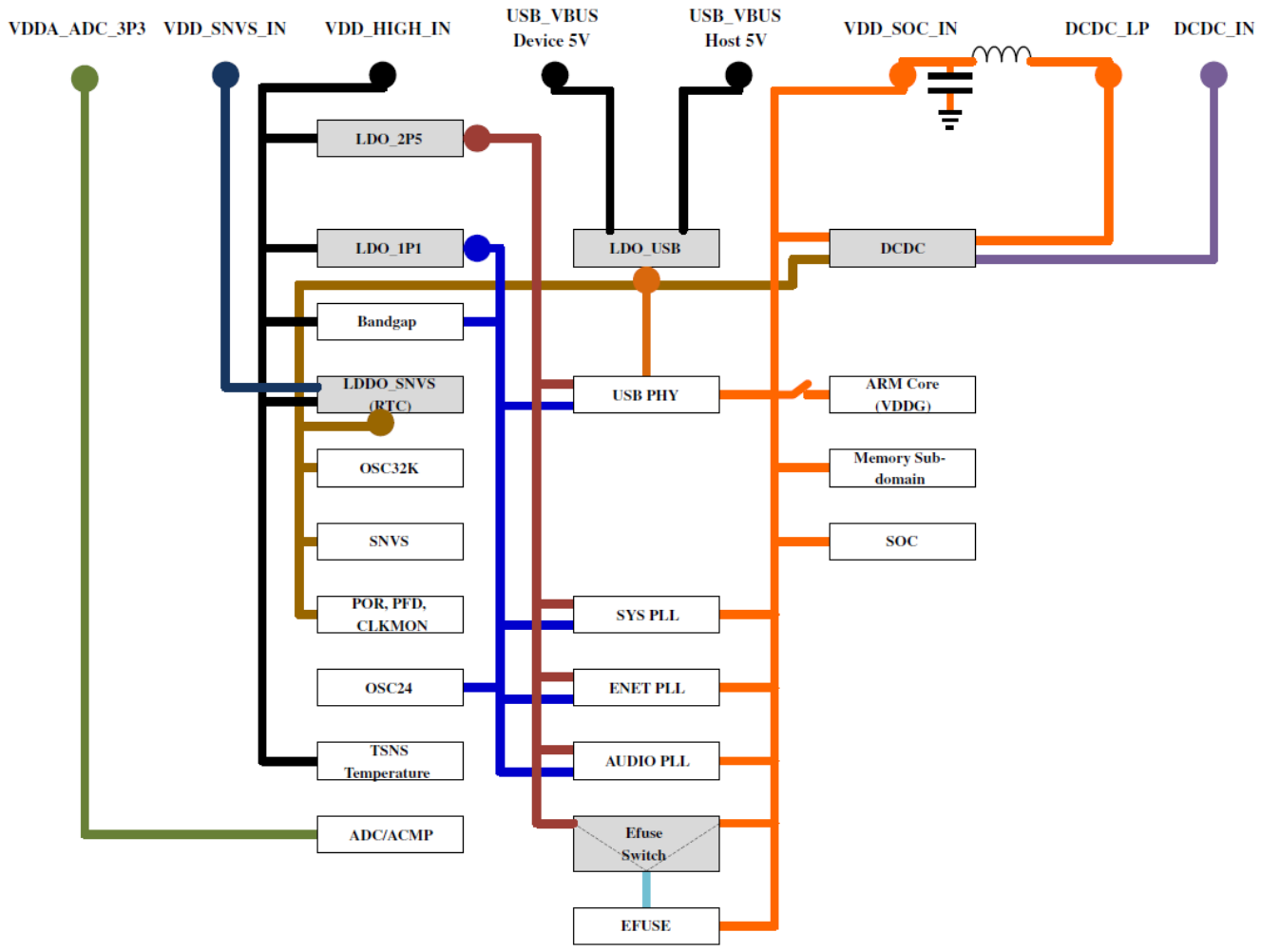

Figure 3. Power Tree

The power control logic of the MIMXRT1010 EVK board is shown in Figure 4:

- It will power up SNVS , and then PMIC_REQ_ON will be 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.

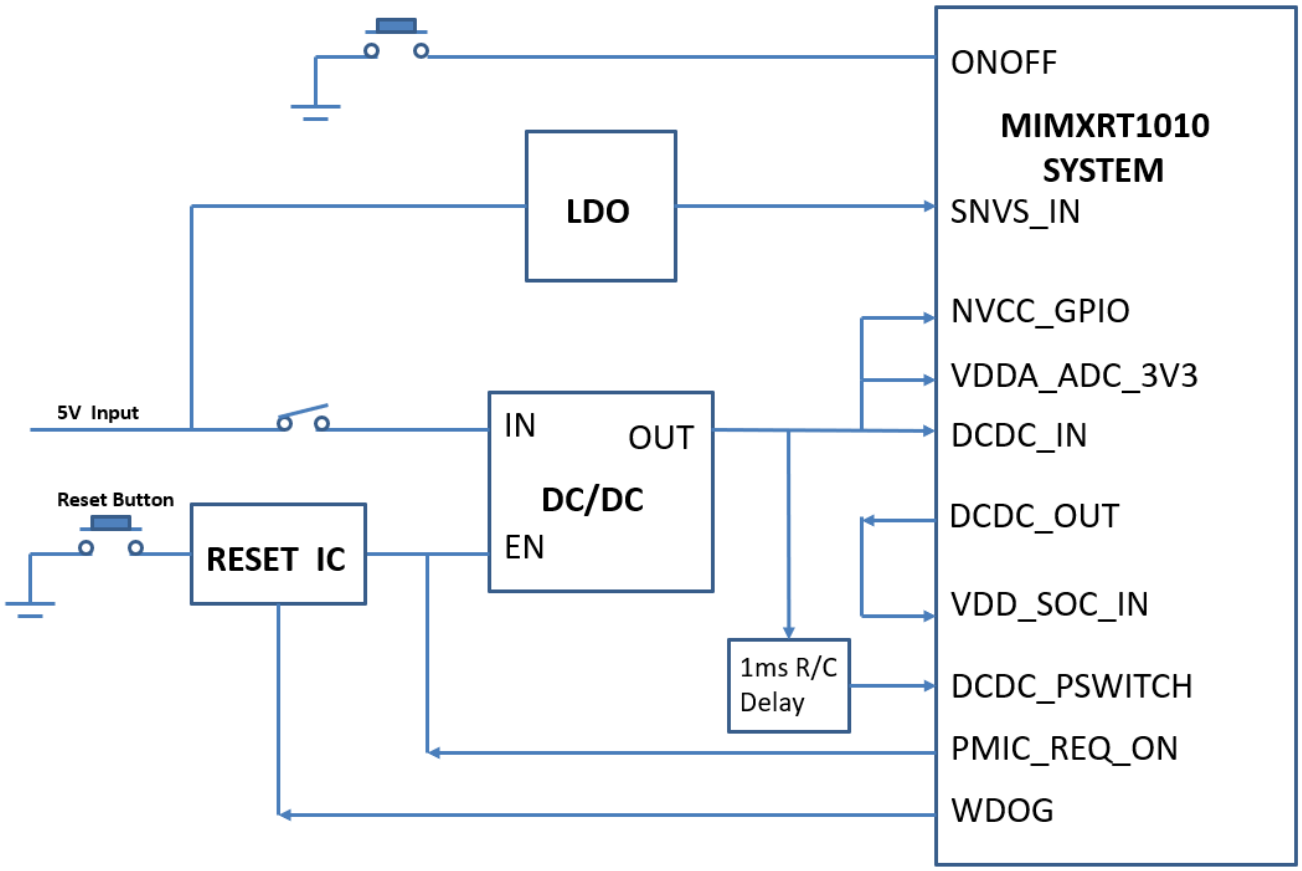

Figure 4. Power Control Diagram

The power rails on the board are shown in Table 5

Table 5. 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	3.6	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	4.4	5	5.5	Power for USB VBUS
VDDA_ADC	3	3.3	3.6	Power for 12-bit ADC
NVCC_GPIO	3	3.3	3.6	IO power for GPIO

2.4 QSPI Flash

A 128 Mbit QSPI Flash is used on the MIMXRT1010 EVK Board. If the developer wants to boot from the QSPI Flash, the boot device switch(SW8) settings should be: OFF, OFF, ON, OFF, as shown in Table 3.

2.5 USB PHY Connector

The MIMXRT1010 contains a integrated USB 2.0 PHYs capable of connecting to USB host/device systems at the USB low-speed (LS) rate of 1.5 Mbits/s, full-speed (FS) rate of 12 Mbits/s or at the USB 2.0 high-speed (HS) rate of 480 Mbits/s.

2.6 Audio input / output Connector

The Audio CODEC used on the MIMXRT1010 EVK Board is Wolfson's Low Power, high quality Stereo Codec, WM8960.The MIMXRT1010 EVK Board include one headphone interface (J11), one onboard MIC (P1), two speaker interfaces (J12, J13) , and the SPDIF interface (J52 & J53, DNP). J11 is a 3.5 mm audio stereo headphone jack, which supports jack detect.

2.7 OpenSDA circuit (DAP-Link)

The OpenSDA circuit (CMSIS–DAP) is an open-standard serial and debug adapter. It bridges serial and debug communications between a USB host and an embedded target processor.

CMSIS-DAP features a mass storage device (MSD) bootloader, which provides a quick and easy mechanism for loading different CMSIS-DAP Applications such as flash programmers, run-control debug interfaces, serial-to-USB converters, and more. Two or more CMSIS-DAP applications can run simultaneously. For example, run-control debug application and serial-to-USB converter runs in parallel to provide a virtual COM communication interface while allowing code debugging via CMSIS-DAP with just single USB connection.

For the MIMXRT1010 EVK Board, J41 is the connector between the USB host and the target processor. Jumper to serial downloader mode to use stable DAP-Link debugger function. If developer wants to make OpenSDA going to the bootloader mode, and press SW9 when power on. Meanwhile, the OpenSDA supports drag/drop feature for U-Disk. First, use the seral downloader mode and drag/drop the image file to U-Disk. Then select QSPI Flash as boot device and reset the Board, the image will run.

2.8 JTAG Connector

J55 is a standard 10-pin/1.27 mm Box Header Connector for JTAG. The pin definitions are shown in Figure 5 support SWD by default.

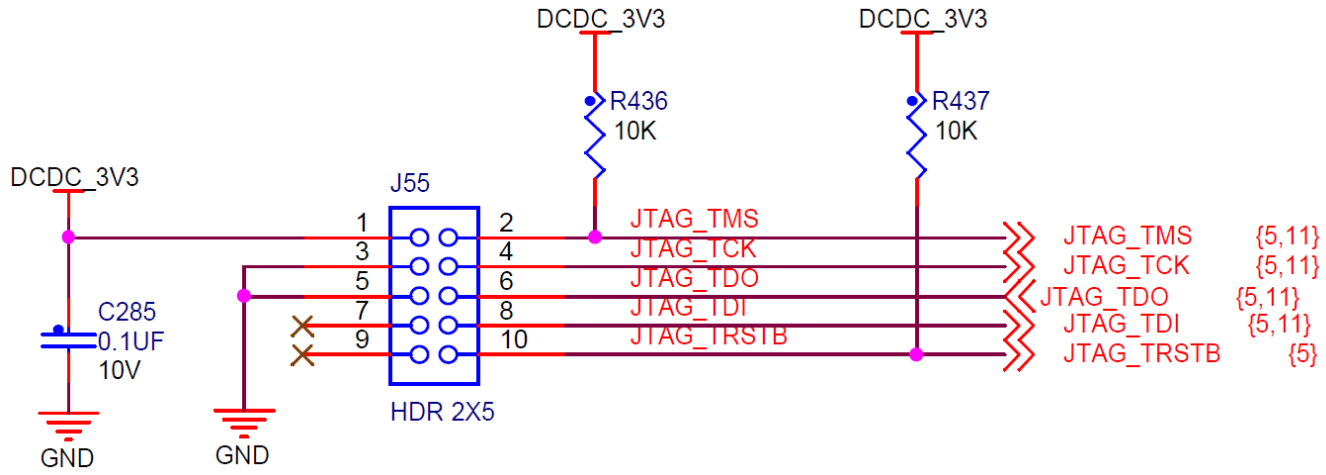

Figure 5. JTAG pin definitions

2.9 Arduino and Motor control Expansion Port

J26, J56, J57 are defined as Arduino Interface. The pin definitions of Arduino Interface are shown in Table 6.

Arduino Interface pin definitions

Table 6. Arduino Interface pin definitions

J26	
NC	A5/ADC5/SCL
NC	A4/ADC4/SDA
NC	A3/ADC3
NC	A2/ADC2
NC	A1/ADC1
NC	A0/ADC0

Table 7.

J56	
D0/UART_RX	NC
D1/UART_TX	ENC_I
D2/INT0	NC
D3/INT1/PWM/OC2B	NC
D4/T0/XCK	NC
D5/TI/PWM	NC
D6/AIN0/PWM/OC0A	NC
D7/AIN1/PWM	NC

Table 8.

J57	
CUR_A	D8/CLKO/ICP1
CUR_B	D9/OC1A/PWM
CUR_C	D10/SPI_CS
VOLT_DCB	D11/OC2A/PWM/SPI_MOSI

Table continues on the next page...

Table 8. (continued)

CUR_DCB	D12/SPI_MISO
NC	D13/SPI_CLK
NC	GND
NC	AREF
NC	D14/I2C_SDA
NC	D15/I2C_SCL

J60 is defined as Motor control Interface. The pin definitions of Motor control Interface are shown in below table. All the connectors support motor control.

Table 9.

J60	
PWM_AT	VIN
PWM_AB	GND
PWM_BT	GND
PWM_BB	5V
PWM_CT	3V3
PWM_CB	RESET_b
ENC_A	IOREF
ENC_B	NC

2.10 ON/OFF Button

SW2 is the ON/OFF button for MIMXRT1010 EVK Board. A 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 (intended to be a software-controllable(power-down). An approximate 5 seconds or more pressing causes a forced OFF.

2.11 Reset Button

There are two Reset Button on the EVK Board. SW9 is the Power Reset Button. Pressing the SW9 in the Power On state will force to reset the system power except SNVS domain. The Processor will be immediately turn off and reinitiate a boot cycle from the Processor Power Off state. SW3 is POR Reset Button.

2.12 USER Button

SW4 is the USER Button (GPIO_SD_05 by default and GPIO_00 is an option) to use by the developers. Press the button to produce changes in high and low levels.

2.13 User Interface LED Indicator

There are four LED status indicators located on the EVK Board. The functions of these LEDs include:

- Main Power Supply(D27)

Green: DC 5V main supply is normal.

Off: the board is not powered.

- Reset RED LED(D7)
- OpenSDA LED(D5)
- USER LED(D25)

Chapter 3
PCB Information

The MIMXRT1010 EVK Board is made using standard 2-layer technology. The material used was FR-4. The PCB stack-up information is shown in Table 10.

Table 10. Board stack-up information

Layer	Description	Copper(Oz)	Dielectric Thickness(mil)
Top	Signal, Power, GND	1	1.4
Dielectric	FR4	-	56
Bottom	Signal, Power, GND	1	1.4

Chapter 4
EVK Design Files

The schematics, layout files, and gerber files (including Silkscreen) can be downloaded from nxp.com/MIMXRT1010-EVK(waiting for update).

Chapter 5
Contents of the Evaluation Kit

Table 11. EVK contents

Item	Description
EVK Board	EVK Board with processor, memory, interfaces, etc
USB Cable	USB cable (Micro-B to Standard-A)

Chapter 6
Revision history

Below table summarizes the changes made to this document since the initial release.

Table 12. Revision history

Revision number	Date	Substantive changes
0	07/2019	Initial release

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