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NXP EVK9 Evaluation Kit User Guide

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NXP EVK9 Evaluation Kit

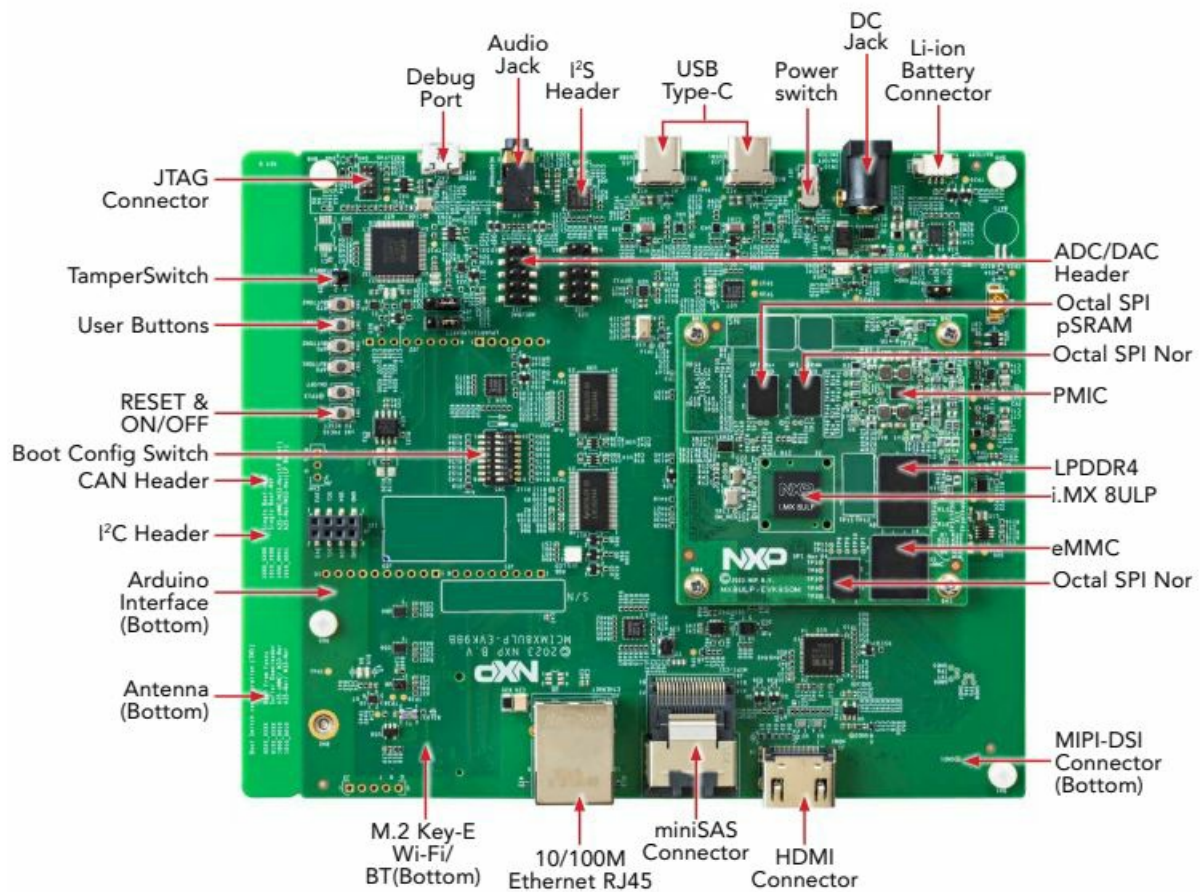# GET TO KNOW THE EVALUATION KIT BASED ON THE i.MX 8ULP APPLICATIONS PROCESSOR

Figure 1: Main interfaces of i.MX 8ULP EVK9

ABOUT THE EVALUATION KIT BASED ON i.MX8ULP

- The Evaluation Kit (EVK9) based on the i.MX 8ULP introduces developers to the i.MX 8ULP applications processor.
- The EVK9 enables HDMI output for simple out-of-the-box bring up but allows reconfiguration for MIPI displays.
- The EVK9 is designed as System-On-Module (SOM) board that connects to an associated baseboard. The SOM provides 2 GB LPDDR4, 32 MB Octal SPI Nor flash on RTD, 64 MB Octal SPI Nor flash on APD, 8MB

Octal SPI pSRAM on RTD, 32 GB eMMC and an NXP PCA9460A power management IC (PMIC).

- The baseboard provides additional capabilities, including an M.2 Key-E slot for Wi-Fi/ Bluetooth based on NXP IW416, an audio codec, multiple sensors, a 10/100M ethernet RJ45 connector, a miniSAS connector for camera, a parallel EPDC connector, two USB 2.0 OTG with Type C con-nectors, an HDMI connector, and an alternate MIPI display connector.
- Additionally, the EVK9 facilitates soft-ware development with the ultimate goal of faster time to market through the support of both Linux® OS and Android® rich operating systems, as well as FreeRTOSTM.
- Hardware design files, tools and Board Support Packages (BSPs) for Linux® and Android® are available at **www.nxp.com/iMX8ULPEVK9**.

FEATURES

The following features are available with the EVK based on the i.MX8ULP applications processor (9.4×9.4 package):

- i.MX 8ULP applications processor with dual 800MHz Arm® Cortex®-A35 core and a 216MHz Arm® Cortex®-M33 core
- 2 GB LPDDR4 DRAM, up to 533 MHz
- 32 MB Octal SPI Nor flash on RTD
- 64 MB Octal SPI Nor flash on APD
- 8MB Octal-SPI pSRAM on RTD
- 32 GB eMMC
- miniSAS connector for camera
- 10/100M ethernet RJ45 connector
- M.2 Key-E slot for WIFI/BT
- 2x USB Type-C connector
- HDMI Output connector
- MIPI-DSI connector
- CAN header
- 3.5 mm audio stereo headphone jack
- Tamper detect switch
- Li-ion battery socket
- User buttons
- RGB LED
- JTAG 10-pin 1.27 mm connector
- Arduino connector
- Debug port for Arm® Cortex®-A35/M33 core via USB micro-B connector
- Sensors including:
- Accelerometer / Gyroscope
- Precision pressure sensor

HOW TO GET STARTED

- This section describes how to use the evaluation kit and the required accessories to develop applications using

the evaluation kit 9.

Table 1 — Unpacking the Kit

- The evaluation kit is shipped with the items listed in Table 1. Ensure the items are available in the i.MX8ULP Evaluation Kit 9.

ITEM	DESCRIPTION
SOM board	SOM board with i.MX 8ULP applications processor, LPDDR4, PMIC, Octal SPI NOR flash, Octal SPI pSRAM and eMMC
Base Board	Peripherals and connectivity board
Documentation	Quick Start Guide
Power Supply	Output: 5 V/5 A, Plug: 2.1 mm x 5.5 mm
USB Cable	USB cables (micro-B to standard-A and type-C to standard-A)

Table 2 — Download Software and Tools
Download installation software and documentation under "Jump Start Your Design" at
www.nxp.com/iMX8ULPEVK9.

ITEM	DESCRIPTION
Documentation	• Schematics, layout and Gerber files • Quick Start Guide
Software development t ools	• Linux® and Android® BSPs • FreeRTOSTM SDK
Demo images	Copy of the latest Linux and Android BSP images that are available to program on to the eMMC

SETTING UP THE SYSTEM

1. Connect USB Debug Cable
    - Connect the micro-B end of the supplied USB cable into debug port J17 on the base board. Connect the other end of the cable to a PC acting as a host terminal. If needed, the serial to USB drivers can be found at **https://www.ftdichip.com/FTDrivers.htm**
    - Four COMs can be found in your PC. One is for A35 debug UART, another is for M33 debug UART, and please ignore the other two COMs.
    - Open the terminal window (i.e., PuTTY or Tera Term) and apply the following configuration:
    - **Baud rate:** 115200
    - **Data bits:** 8

- **Stop bit:** 1
- **Parity:** None

2. **Connect Power Supply**
    - Connect the plug of the 5V power supply to the DC power jack P1 on the base board and slide power switch SW10 to ON, then green LED (POWER OK) D33 on the base board light up. When power is connected to the EVK, it will automatically begin the boot sequence.

BOOT PROCESS FOR LINUX IMAGE

Boot Process

- Change SW5 on the base board to 1000_0000 (from MSB to LSB, 1-ON and 0- OFF) to boot from the eMMC0, as shown in Figure 2. After the board images are programmed and the boot switches are correctly configured, the system is ready to run.
- Power on the EVK board. During the boot process, the operating system status information will be scrolling on the terminal window of the PC (if connected).
- When the boot process is complete, the Linux® operating system splash screen will be displayed via HDMI connector.
- To work from the terminal window on the host PC, press 'Enter' at the terminal window to get the command prompt. Account name: root, password none. For details on running FreeRTOS™ on Arm® Cortex®-M33 core, please visit **www.nxp.com/iMXtools**.
- Run "NXP Demo Experience" application to explore the preinstalled demos. The NXP Logo is displayed on the top left-hand corner of screen, as shown in Figure 3, start the demo launcher by clicking this logo. Refer to user guide for details — **https://www.nxp.com/docs/en/user-guide/DEXPUG.pdf**.

Figure 2: SW5 setting for internal boot mode

Figure 3: NXP Demo Experience

DIP SWITCH CONFIGURATION

- Table 3 shows the switch configuration of boot mode for i.MX8ULP EVK9. Single Boot-eMMC is chosen as default.

BOOT MODE	D1 (LSB)	D2	D3	D4	D5	D6	D7	D8 (MSB)
Boot From Fuses	X	X	X	X	X	X	OFF	OFF
Serial Downloader	X*	X	X	X	X	X	ON	OFF
A35-eMMC/ M33-SPI NOR	OFF	ON	OFF	OFF	OFF	OFF	OFF	ON
A35- SPI NOR/ M33-SPI NOR	OFF	ON	OFF	OFF	OFF	ON	OFF	ON
Single Boot-eMMC	**OFF**	**OFF**	**X**	**X**	**OFF**	**OFF**	**OFF**	**ON**
Single Boot-SPI NOR	OFF	OFF	X	X	OFF	ON	OFF	ON
A35-eMMC/M33-SPI NOR (LP Boot)	ON	X	OFF	OFF	OFF	OFF	OFF	ON
A35- SPI NOR/M33-SPI NOR (LP Boot)	ON	X	OFF	OFF	OFF	ON	OFF	ON

- Set to OFF when the fuse [BT_FUSE_SEL] is not blown.
- **Table 3:** i.MX8ULP EVK9 DIP switch configuration (SW5 on BB)
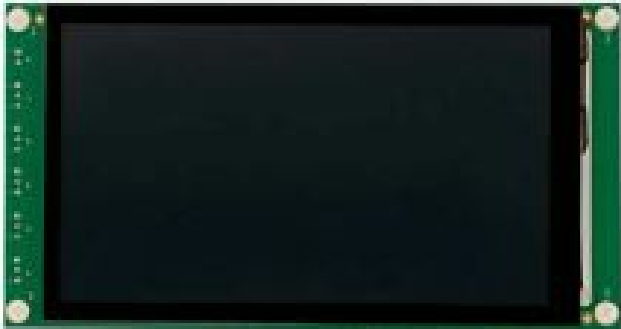
BUTTON FUNCTIONS

Table 4 shows the functions of the push buttons and switches on the board.

ITEM	DESCRIPTION
SW6 ON BB	Evaluation kit ON/OFF button • Short press and long press will only generate an interrupt. The usage can be defined by upper software. • Prolonged depress (>5 sec) will force an immediate hardware shutdown. • If board is in the **SHUTDOWN** state, short press of the button will restart (boot) the system. • If board is in the **STANDBY** state, short press of the button will bring the system out of standby (resume operations, no boot).
SW1 ON BB	Evaluation kit RESET button • Prolonged depress (>8 sec) will reset the system and begin a boot sequence.
SW2/3 ON BB	Evaluation kit switch • SW defined. SW2 connected to PTF7 and SW3 connected to PTF30.
SW7/8 ON BB	Evaluation kit switch • SW defined. SW7 connected to PTB13 and SW8 connected to PTB12.

Table 4: i.MX8ULP EVK board button operations

ADDITIONAL INFORMATION

Do more with Accessory Boards

RK055HDMIPI4MA0 **5.5-INCH TFT 720 x 1280 PIXELS PANEL**	MINISASTOCSI **MIPI-CSI CAMERA MODULE**
Use this LCD display for display and touchscreen support.	Use this MIPI-CSI camera module for machine vision, video streaming and recording.

FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Attention that changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
Note: This product has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This product generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur
in a particular installation. If this product does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment should be installed and operated with a minimum distance 20cm between the radiator and your body.
The following information is provided per Article 10.8 of the Radio Equipment Directive 2014/53/EU:

- **(a)** Frequency bands in which the equipment operates.
- **(b)** The maximum RF power transmitted.

PN	RF TECHNOLOGY	(A) FREQ RANGES (EU)	(B) MAX TRANSMITTED POWER
MCIMX8ULP-EVK	WLAN 2.4 GHz Mode 802.11b/g/n	2400 MHz – 2484 MHz	19.0 dBm
	WLAN 5 GHz Mode 802.11a/n	5150 MHz – 5850 MHz	18.0 dBm
	Bluetooth BLE/BR/EDR	2400 MHz – 2484 MHz	6.3 dBm

- EUROPEAN DECLARATION OF CONFORMITY (Simplified DoC per Article 10.9 of the Radio Equipment Directive 2014/53/EU)
- This apparatus, namely MCIMX8ULP-EVK, conforms to the Radio Equipment Directive 2014/53/EU.
- The full EU Declaration of Conformity for this apparatus can be found at this location:
  www.nxp.com/iMX8ULP

GET STARTED

- Download installation software and documentation at **www.nxp.com/iMX8ULPEVK9**

SUPPORT

- Visit **www.nxp.com/support** for a list of phone numbers within your region.

WARRANTY

- Visit **www.nxp.com/warranty** for complete warranty information.
- **www.nxp.com/iMX8ULPEVK**
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Documents / Resources

	NXP EVK9 Evaluation Kit [pdf] User Guide EVK9, EVK9 Evaluation Kit, Evaluation Kit, Kit

References

- ● **Drivers - FTDI**
- ■ **Automotive, IoT & Industrial Solutions | NXP Semiconductors**
- ■ **i.MX 8ULP Applications Processor Family | NXP Semiconductors**
- ■ **i.MX 8ULP Evaluation Kit | NXP Semiconductors**
- ■ **i.MX 8ULP Evaluation Kit 9 (EVK9) | NXP Semiconductors**
- ■ **i.MX Developer Resources | NXP Semiconductors**
- ■ **Support | NXP Semiconductors**
- ■ **Returns and Warranty Information | NXP Semiconductors**
- ● **Drivers - FTDI**