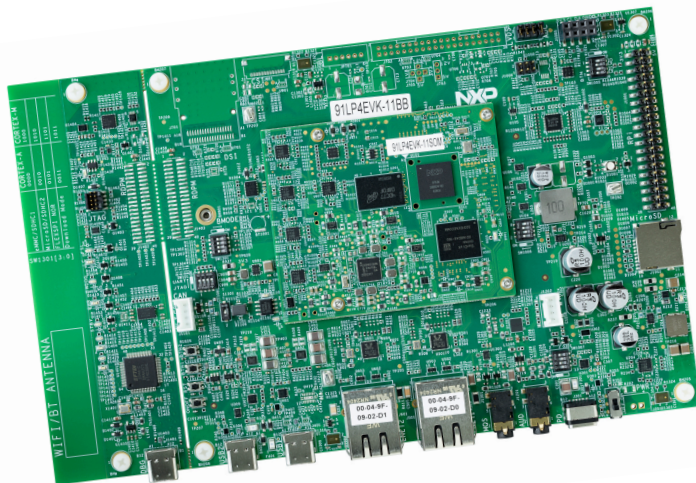# i.MX 91 Applications Processor

About the i.MX 91 EVK

The i.MX 91 family of applications processors enables the rapid creation of new Linux-based edge devices. It excels in advanced multimedia and industrial IoT applications etc. Elevating edge intelligence, i.MX 91 processors provide a solid foundation for devices in smart factory, smart home, smart office, medical device, metering, and cost-optimized system-on-module platforms.

Specifications

Compute card:

- i.MX 91 applications processor with:
  – 1x Arm® Cortex®-A55
- LPDDR4 16-bit 2 GB
- eMMC 5.1, 16 GB
- Power management IC (PMIC)
- Power measurement ADC

Base board:

- MicroSD 3.0 card slot
- Two USB 2.0 C connector
- One USB 2.0 C for Debug
- One USB C PD only
- M.2 Key-E for Wi-Fi/BT/802.15.4
- One CAN port
- Four channels for ADC
- 6-axis IMU w/ I3C support
- Two 1 Gbps Ethernet
  – Port1 supports TSN
  – Port2 supports ETER
- I²C Expansion connector
- Audio Codec support
- PDM MIC array support
- External RTC w/ coin cell
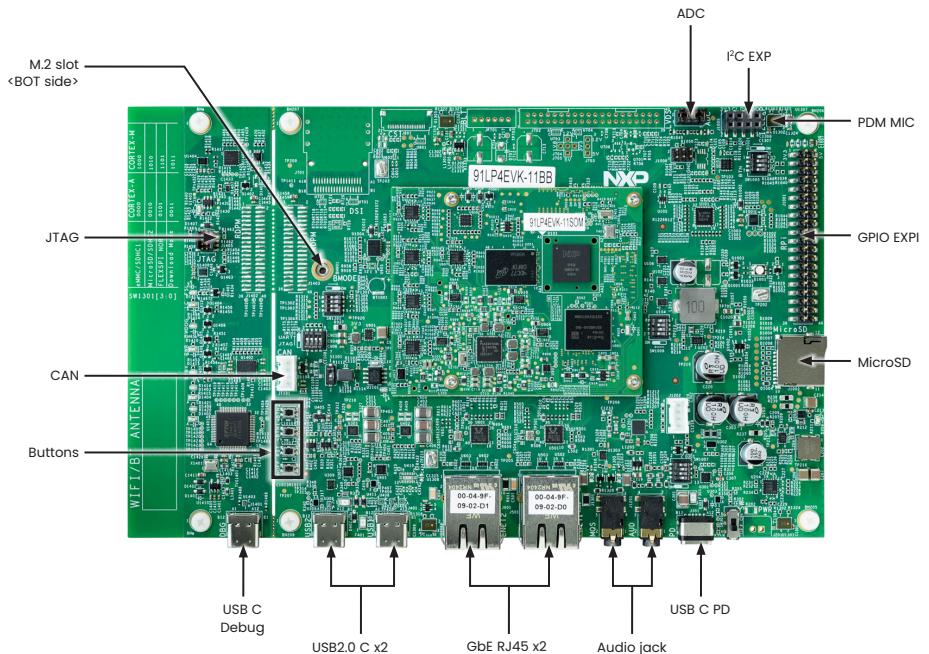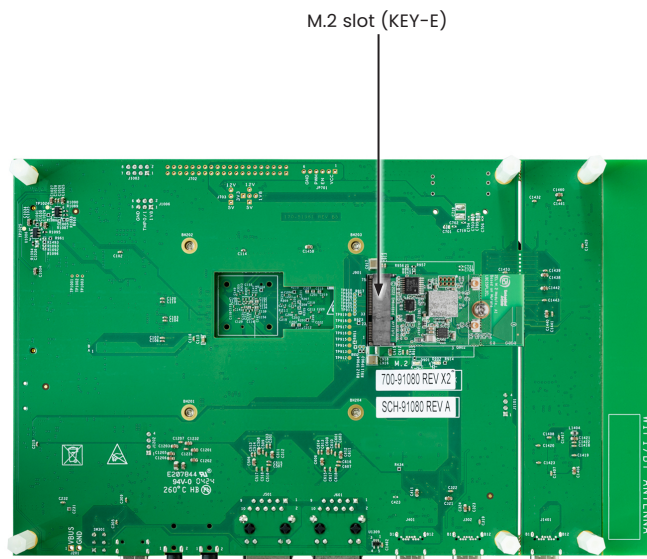- 2 x 20 Pin EXPI

Get to know the i.MX 91 EVK

Figure 1: Top view of the i.MX 91 EVK

Get to know the i.MX 91 EVK continued

M.2 slot (KEY-E)

Figure 2: Bottom view of the i.MX 91 EVK

Getting started

Unpack the kit

The i.MX 91 EVK is shipped with the items listed in Table 1.

Table 1 — Kit contents	
Item	**Description**
IMX91LP4EVK-11	IMX91LP4EVK-11 board
Power supply	USB C PD 45W, 5V/3A; 9V/3A; 15V/3A; 20V/2.25A supported
USB Type-C cable	USB 2.0 C male to USB 2.0 A male
M.2 module	PN: EAR00501; Wi-Fi 6 / Bluetooth LE 5.4 / 802.15.4 support, basing on NXP IW610G
Software	Linux BSP image programmed in eMMC
Documentation	Quick Start Guide

Prepare accessories

The following items in Table 2 are recommended to run the i.MX 91 EVK.

Table 2 — Customer supplied accessories	
Item	**Description**
TM050RDH03-41	Parallel LCD DISPLAY MODULE 5" TFT 800X480 RGB
M2-NAND-FLASH	M.2 NAND flash daughter card
M2-NOR-FLASH	M.2 NOR flash daughter card
Audio HAT	Audio expansion board with most of audio features
8MIC-RPI-MX8	8-microphone array proto board for voice enablement

Download software and tools

Installation software and documentation are available at **www.nxp.com/imx91evk**.
The following are available on the website:

Table 3 — Software and Tools

Item	Description
Documentation	• Schematics, layout and Gerber files • Quick Start Guide • Hardware Design Guide • i.MX 91 EVK Board user manual • Power consumption measurement
Software development	• Linux BSPs
Demo images	• Copy of the latest Linux images that are available to program on to the eMMC. • IMX91LP4EVK-11 software can be found at **nxp.com/imxsw**

Setting up the system

The following will describe how to run the pre-loaded Linux image on the IMX91LP4EVK-11 (i.MX 91).

1 Confirm boot switches

The boot switches should be set to boot from "eMMC", SW1301[4-1] (Figure 1) are used for boot, See table below:

BOOT Device	SW1301[4-1]
eMMC/uSDHC1	0000

Note: 1 = ON   0 = OFF

2 Connect USB debug cable

Connect the UART cable into the port JP1401 (Figure 1). Connect the other end of the cable to a PC acting as a host terminal. UART connections will appear on the PC, The third port will be used as A55 core system debugging.

Open the terminal window (i.e., Hyper Terminal or Tera Term), choose the right COM port number and apply the following configuration.

- Baud rate: 115200 bps
- Data bits: 8
- Parity: None
- Stop bits: 1

3 Connect parallel panel display

Plug the parallel LCD panel (TM050RDH03-41) into J1001 2x20 PIN EXPI.

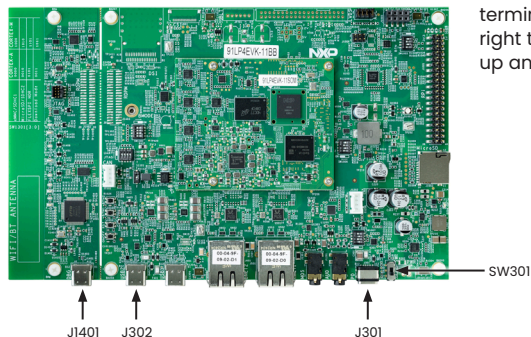Change DTB to "imx91-11x11-evk-tianma-wvga-panel.dtb" in u-boot phase.

4 Connect mouse

Connect the mouse to the USB2 C port connector J302 through USB C OTG cable.

Setting up the system continued

5 Connect power supply

Connect the USB C PD power supply to J301, then power up the board by SW301 switch.

J1401   J302   J301   SW301

6 Board boot up

As the board boots up, you will see 1 penguin appear in the upper left-hand corner of the monitor, and then you will see the Linux terminal Icon on the top left and timer on right top corner . Congratulations, you are up and running.

Additional information

Boot switches

SW1301[4-1] is the boot configuration switch, the default boot device is eMMC/uSDHC1, as shown in Table 4. If you want to try other boot devices, you need to change the boot switches to corresponding values as listed in Table 4.

Note: 1 = ON 0 = OFF

Table 4 — Boot device settings

BOOT MODE	SW1301-4	SW1301-3	SW1301-2	SW1301-1
From internal fuses	0	0	0	1
Serial downloader	0	0	1	1
USDHC1 8-bit eMMC 5.1	0	0	0	0
USDHC2 4-bit SD3.0	0	0	1	0
FlexSPI serial NOR	0	1	0	1
FlexSPI serial NAND 2K page	0	1	1	1
Reserved	0	1	0	0
Reserved	0	1	1	0

Additional information continued
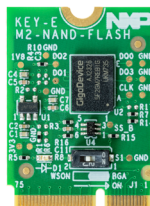
Do more with accessory boards

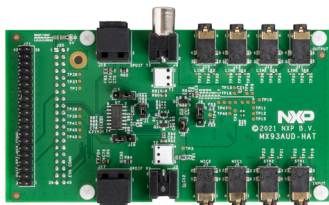|	
Parallel LCD: TM050RDH03-41 LCD DISPLAY MODULE 5" TFT 800X480, RGB, 120.7 mm x 75.8 mm	**M2-NAND-FLASH** QSPI NAND flash daughter card with M.2 interface. Winbond 256MB W25N02KWZEIR (WSON8X6) + GigaDevice 256MB GD5F2GM7REBIG (BGA24)
M2-NOR-FLASH QSPI NOR flash daughter card with M.2 interface. Micron 64MB MT25QU512ABB8E12-0AAT(BGA24)	**WiFi/BLE/IEEE802.15.4 M.2 Module (EAR00501)** Wi-Fi 6, IEEE 802.11a/b/g/n/ac + Bluetooth LE 5.4 + IEEE802.15.4, NXP IW610G chipset

Additional information continued

Audio board: MX93AUD-HAT	Microphone board: 8MIC-RPI-MX8
Audio expansion board with most of audio features	8-microphone array proto board for voice enablement.
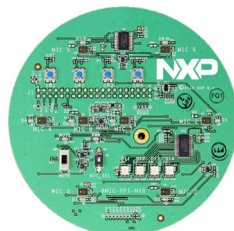
Support

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

Warranty

Visit **www.nxp.com/warranty** for complete warranty information.

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 B 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:

1. Frequency bands in which the equipment operates.

2. The maximum RF power transmitted.

PN	RF technology	(a) Frequency ranges (EU)	(b) Max transmitted power
	Bluetooth LE	2400 MHz – 2484 MHz	13 dBm
IMX91LP4EVK-11	Wi-Fi IEEE 802.11b/g/n	2400 MHz – 2484 MHz	19 dBm
	Wi-Fi IEEE 802.11a/n/ac/ax	5150 MHz – 5850 MHz	18 dBm

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