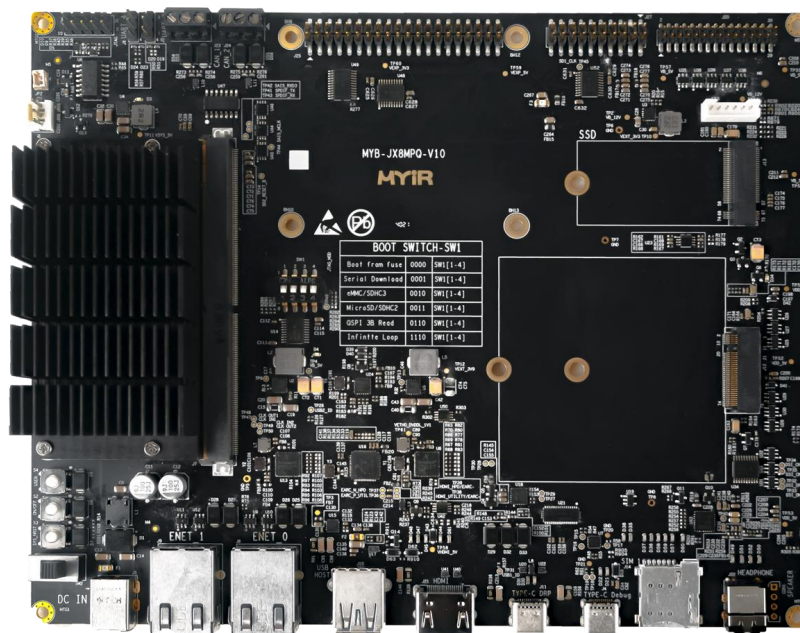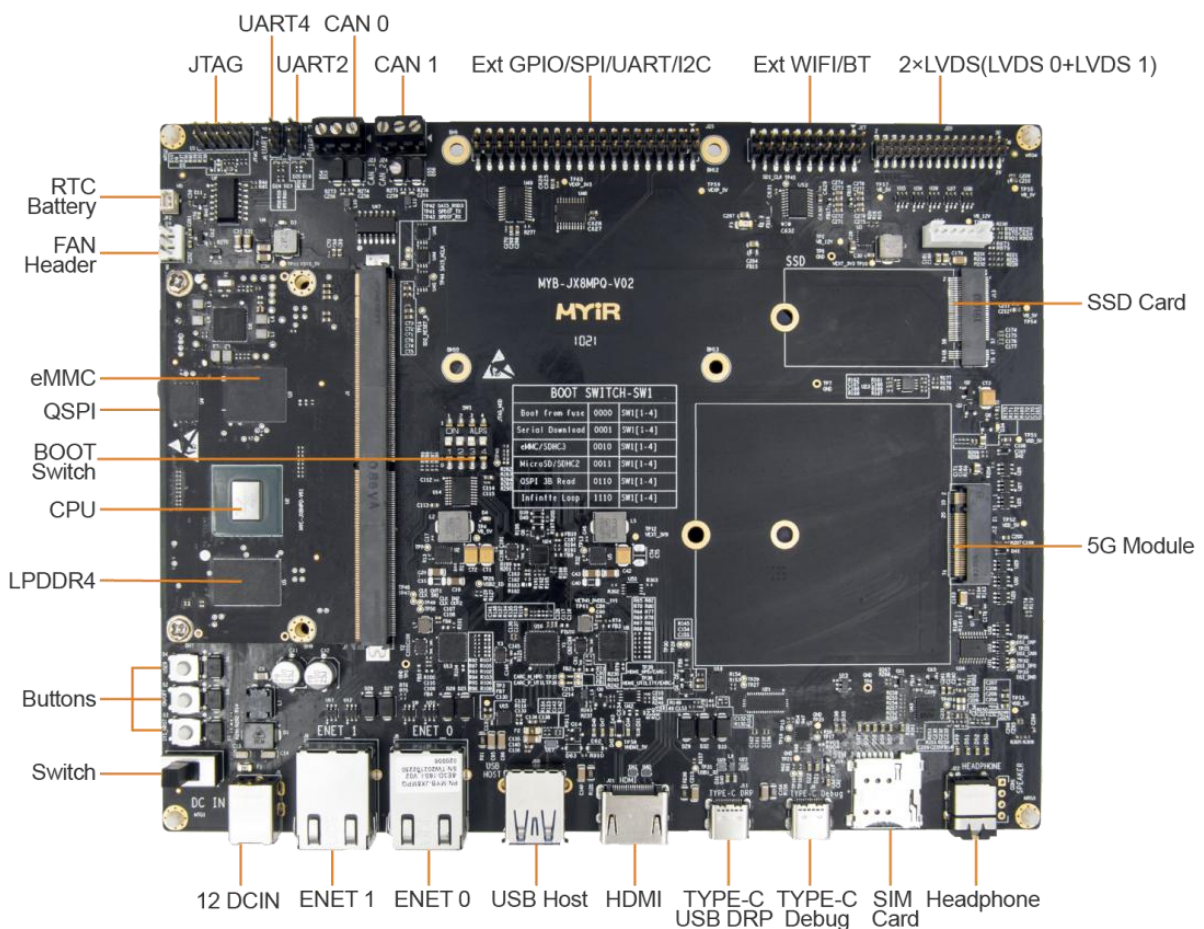# MYD-JX8MPQ Development Board Overview

- ✓ MYC-JX8MPQ CPU Module as Controller Board
- ✓ NXP i.MX 8M Plus Quad Application Processor based on 1.6 GHz Arm Cortex-A53 and 800MHz Cortex-M7 Cores
- ✓ Neural Processing Unit (NPU) operating at up to 2.3 TOPS
- ✓ 3GB LPDDR4, 8GB eMMC Flash, 32MB QSPI flash
- ✓ USB 3.0 Host, OTG, Dual Gigabit Ethernet, MIPI-CSI, MIPI-DSI, LVDS, HDMI, Audio, Micro SD…
- ✓ Extension Interfaces for WiFi/Bluetooth and UART/I2C/SPI/GPIO
- ✓ M.2 Sockets for 5G LTE Module and PCIe SSD and Dual CAN (Lite version -L doesn't support PCIe SSD and CAN)
- ✓ Supports Working Temperature Ranging from -40°C to 85°C
- ✓ Supports Running Linux L5.10.9

The **MYD-JX8MPQ Development Board** consists of a high-performance CPU Module **MYC-JX8MPQ** and a base board to provide a complete evaluation platform for NXP's **i.MX 8M Plus application processors** which features quad **Arm Cortex-A53** cores running at up to 1.8 GHz and an 800 MHz Cortex-M7 real-time co-processor, with an integrated **Neural Processing Unit (NPU)** operating at up to 2.3 TOPS, **800 MHz audio DSP, 1080p VPU, dual ISPs and 3D/2D GPU** to focus on machine learning and vision, Artificial Intelligence (AI), advanced multimedia and industrial automation fields.

The **MYC-JX8MPQ CPU Module** integrates a **NXP i.MX 8M Plus processor, LPDDR4, eMMC, QSPI Flash and PMIC**. It is mounted on the MYD-JX8MPQ base board through one **0.5mm pitch 314-pin MXM 3.0 gold-finger-edge-card** connector. The base board adopts double-sided layout and has extended various peripherals and signals to provide **two Gigabit Ethernet, one USB3.0 HOST, one USB3.0 OTG, two CAN, Micro SD, LVDS/MIPI-DSI, HDMI, two MIPI-CSI, AUDIO, etc**. It can support MYIR's **MY-WF005S** WIFI/Bluetooth module through one 10-pin extension header. 5G module and PCIe SSD can also be supported through the **M.2 sockets** on the board. The board has full version and lite version. The lite version (-L) doesn't support CAN and PCIe SSD.

The **MYD-JX8MPQ development board** is ready to run **Linux** OS and provided with Linux software package, documentations and delivered with necessary cable accessories for customer to easily start development as soon as getting it out-of-box. It would be a powerful and solid reference design for your development.

MYD-JX8MPQ Development Board Top-view (delivered with installed heatsink by default）
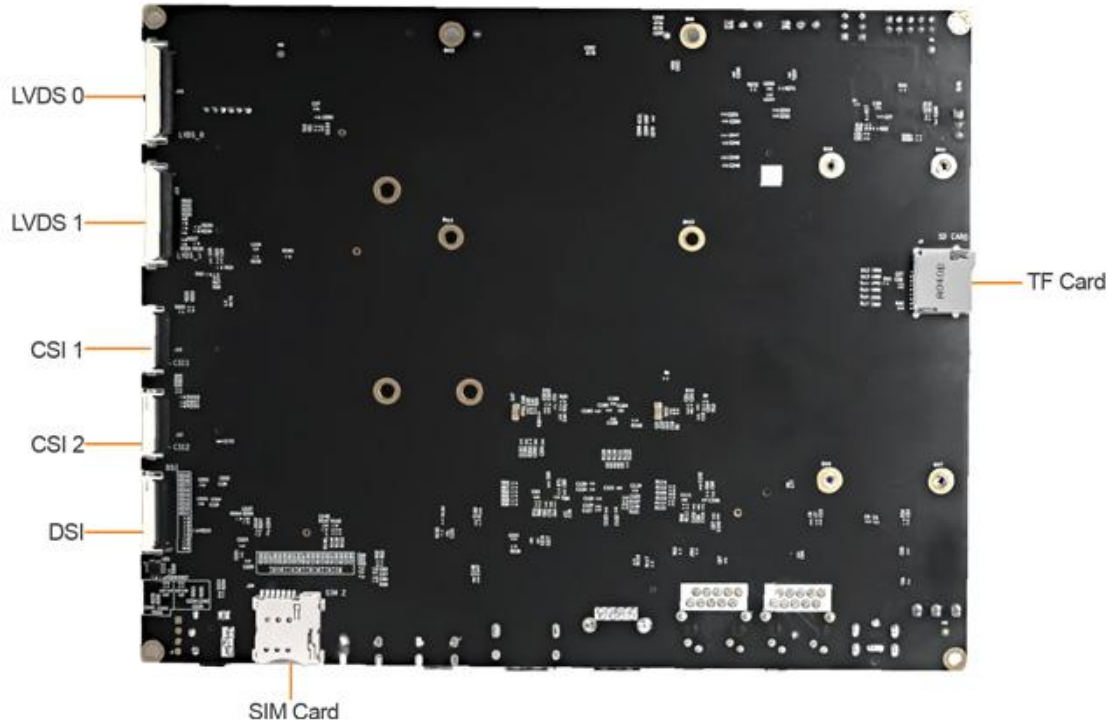
MYD-JX8MPQ Development Board Bottom-view

Hardware Specification

The **MYC-JX8MPQ CPU Module** mounted on the **MYD-JX8MPQ Development Board** is using NXP's 15 x 15 mm, 0.5 mm pitch, FCBGA bare die package i.MX 8M Plus Quad Application Processor (MIMX8ML8CVNKZAB) which is among the **i.MX 8M Plus family** and features as in below tables.
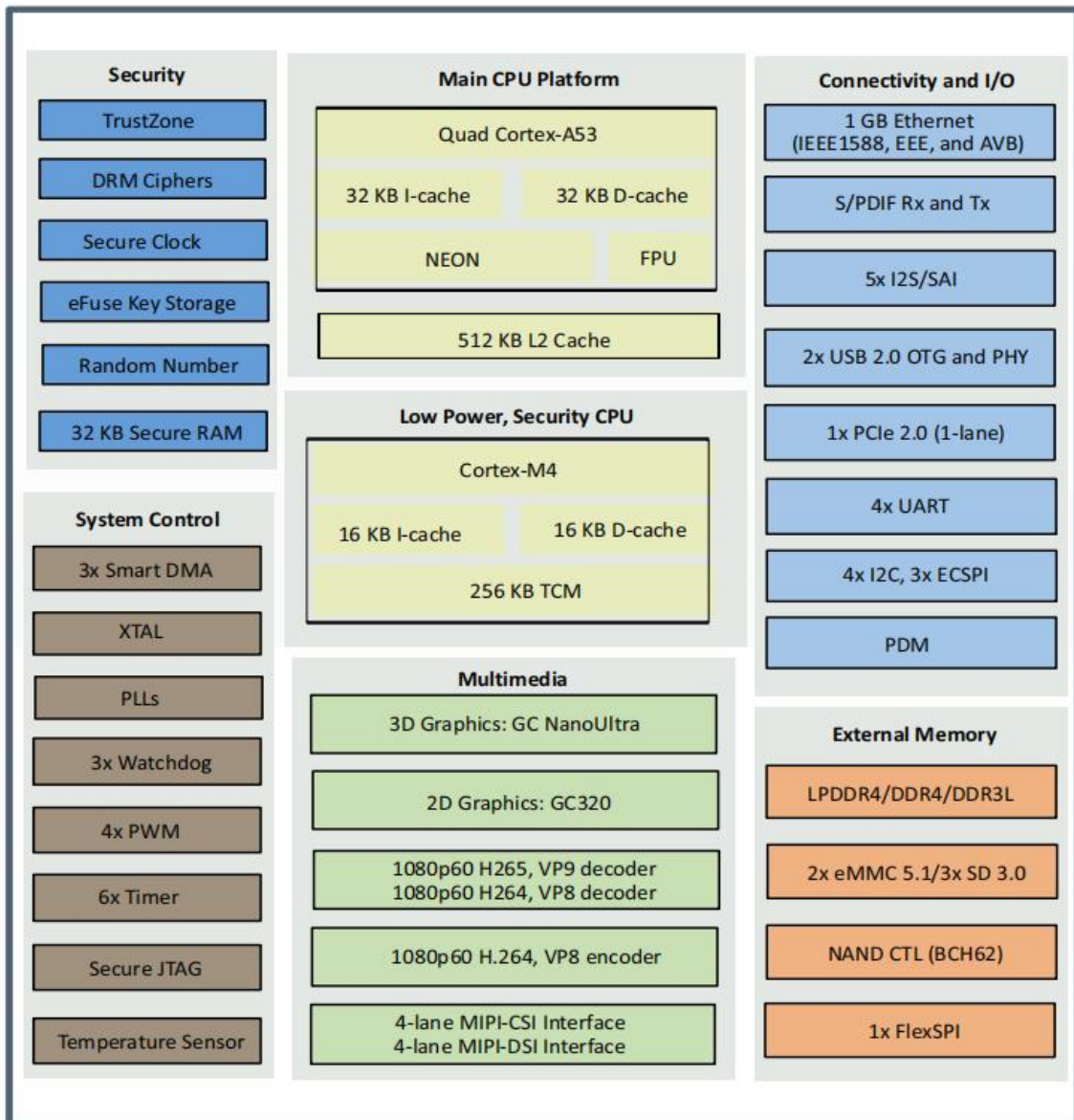
Family	Part Number	Configuration	Temperature
i.MX 8M Plus Quad	MIMX8ML8DVNLZAB	4x A53 (1.8Ghz), VPU, NPU, ISP	0℃ - +95℃
i.MX 8M Plus Quad	MIMX8ML6DVNLZAB	4x A53 (1.8Ghz), VPU, ISP	0℃ - +95℃
i.MX 8M Plus Quad Lite	MIMX8ML4DVNLZAB	4x A53 (1.8Ghz)	0℃ - +95℃
i.MX 8M Plus Dual	MIMX8ML3DVNLZAB	2x A53 (1.8Ghz), VPU, NPU, ISP	0℃ - +95℃
i.MX 8M Plus Quad	MIMX8ML8CVNKZAB	4x A53 (1.6Ghz), VPU, NPU, ISP, CAN-FD	-40℃ - +105℃
i.MX 8M Plus Quad	MIMX8ML6CVNKZAB	4x A53 (1.6Ghz), VPU, ISP, CAN-FD	-40℃ - +105℃
i.MX 8M Plus Quad Lite	MIMX8ML4CVNKZAB	4x A53 (1.6Ghz), CAN-FD	-40℃ - +105℃
i.MX 8M Plus Dual	MIMX8ML3CVNKZAB	2x A53 (1.6Ghz), VPU, NPU, ISP, CAN-FD	-40℃ - +105℃

i.MX 8M Plus Family Application Processors

● ARM Cortex-A53, frequency up to 1.8Ghz; 800Mhz ARM Cortex-M7
● 16/32-bit DRAM interface, support LPDDR4-4000, DDR4-3200, DDR3L-1600
● x1, 8-bit NAND Flash
● x2, eMMC 5.1 Flash
● x3, SPI NOR FLASH
● x1, PCIe Gen3
● x2 USB 3.0 Type C controllers with integrated PHY (also supported USB 2.0) interfaces
● x3 uSDHC interface with eMMC 5.1 compliance
● x2 Gigabit Ethernet controller
● x4 UART, x6 I2C, x3 SPI

● Video Processing Unit
    1080p60 HEVC/H.265 Main, Main 10 (up to level 5.1)
    1080p60 VP9 Profile0,2
    1080p60 AVC/H.264 Baseline, Main, High decoder
    1080p60 AVC/H.264 encoder
    1080p60 HEVC/H.265 encoder

● Graphic Processing Unit
    GC7000UL with OpenCL and Vulkan support
    166 million triangles/sec
    Supports OpenGL ES 1.1, 2.0, 3.0, OpenCL 1.2, Vulkan
    GC520L for 2D acceleration

● LCDIF Display Controller
    Support up to 1080p60 display per LCDIF if no more than 2 instances used simultaneously,
    or 1x 1080p60 + 2x 720p60 if all 3 instances used simultaneously.
    One LCDIF drives MIPI DSI
    One LCDIF drives LVDS Tx
    One LCDIF drives HDMI Tx

● MIPI Interface
    4-lane MIPI DSI interface
    Two instances of 4-lane MIPI CSI interface and HDR ISP

● Audio   HiFi4 Audio DSP, SPDIF input and output，x6 SAI
● FCBGA, 0.5mm pitch, 15x15mm

Features of i.MX 8M Plus Application Processor

Security	Main CPU Platform	Connectivity and I/O
TrustZone	Quad Cortex-A53	1 GB Ethernet (IEEE1588, EEE, and AVB)
DRM Ciphers	32 KB I-cache / 32 KB D-cache	S/PDIF Rx and Tx
Secure Clock	NEON / FPU	5x I2S/SAI
eFuse Key Storage	512 KB L2 Cache	2x USB 2.0 OTG and PHY
Random Number	**Low Power, Security CPU**	1x PCIe 2.0 (1-lane)
32 KB Secure RAM	Cortex-M4	4x UART
System Control	16 KB I-cache / 16 KB D-cache	4x I2C, 3x ECSPI
3x Smart DMA	256 KB TCM	PDM
XTAL	**Multimedia**	**External Memory**
PLLs	3D Graphics: GC NanoUltra	LPDDR4/DDR4/DDR3L
3x Watchdog	2D Graphics: GC320	2x eMMC 5.1/3x SD 3.0
4x PWM	1080p60 H265, VP9 decoder / 1080p60 H264, VP8 decoder	NAND CTL (BCH62)
6x Timer	1080p60 H.264, VP8 encoder	1x FlexSPI
Secure JTAG	4-lane MIPI-CSI Interface / 4-lane MIPI-DSI Interface	
Temperature Sensor		

i.MX 8M Plus System Block Diagram

The MYD-JX8MPQ Development Board is using MYC-JX8MPQ CPU Module as core controller board. It takes full features of i.MX 8M Plus Quad processor and the main features are characterized as below:

Mechanical Parameters
- Dimensions: 200mm x 160mm (base board), 45mm x 82mm (CPU Module)
- PCB Layers: 6-layer design (base board), 8-layer design (CPU Module)
- Power supply: +12V/2A (base board), +5V/1.1A (max, CPU Module)
- Working temperature: 0~70 Celsius (commercial grade) or 40~85 Celsius (industrial grade)

The MYD-JX8MPQ Controller Board (MYC-JX8MPQ CPU Module)

LPDDR4

CPU

QSPI

PMIC

eMMC

MYC-JX8MPQ CPU Module

Processor

- NXP i.MX 8M Plus Quad Processor
  - 1.6 GHz Quad-core ARM Cortex-A53 CPU (MIMX8ML8CVNKZAB)
  - 800MHz Real-time ARM Cortex-M7 co-processor
  - Integrated 2.3 TOPS Neural Processing Unit (NPU)
  - Integrated 2D/3D GPU and 1080p VPU
  - Dual image signal processors (ISP) and two camera inputs

Memory

- 3GB DDR4 (supports up to 6GB DDR4)
- 8GB eMMC Flash (supports up to 128GB eMMC)
- 32MB QSPI Flash

Peripherals and Signals Routed to Pins

- Power Management IC
- 0.5mm pitch 314-pin MXM 3.0 Gold-finger-edge-card Connector
  - 2 x 10/100/1000Mbps Ethernet
  - 1 x MIPI DSI
  - 2 x MIPI CSI
  - 4 x UART
  - 2 x USB 3.0
  - 6 x I2C
  - 3 x SPI
  - 2 x LVDS
  - 1 x HDMI
  - 1 x HiFi4 Audio DSP
  - 1 x PCIE3.0
  - 2 x CAN
  - 2 x uSDHC (uSDHC1:8bit width, uSDHC2:4bit width)

Note: the peripheral signals brought out to the expansion interface are listed in maximum number. Some signals are reused. Please refer to the processor datasheet.
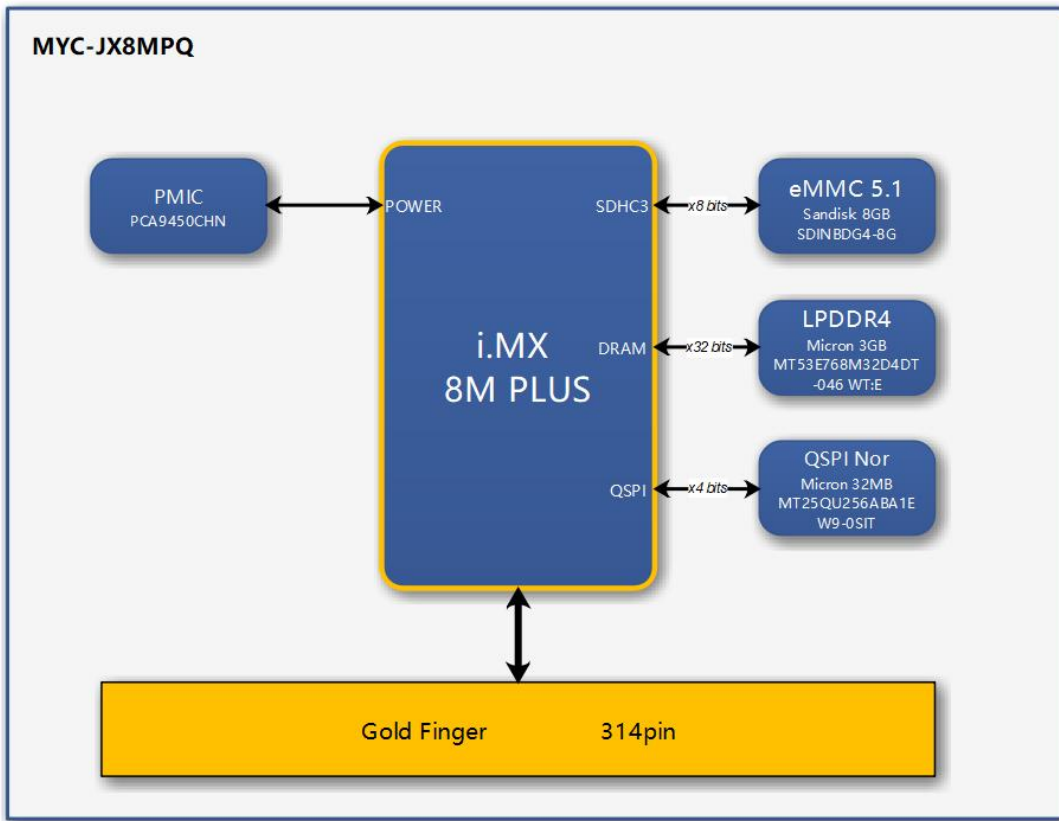
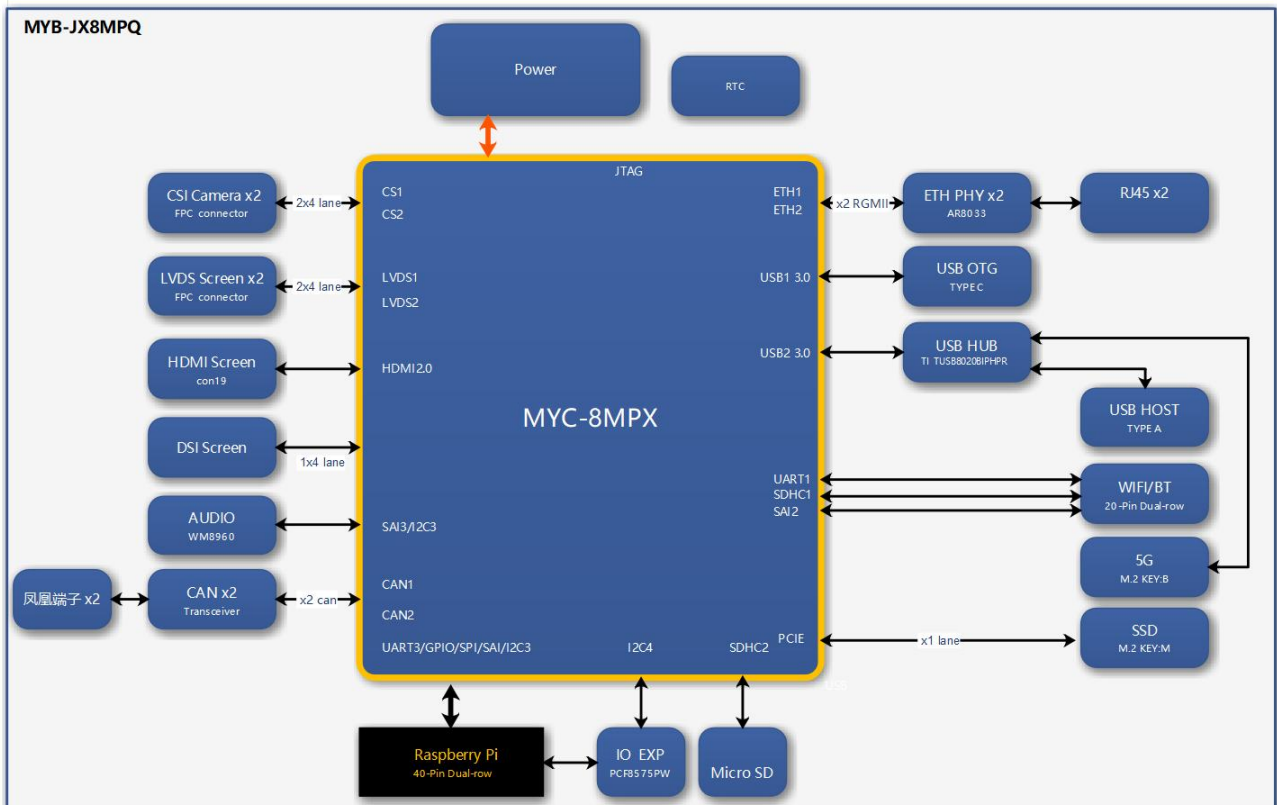**The MYD-JX8MPQ Development Board Base Board**
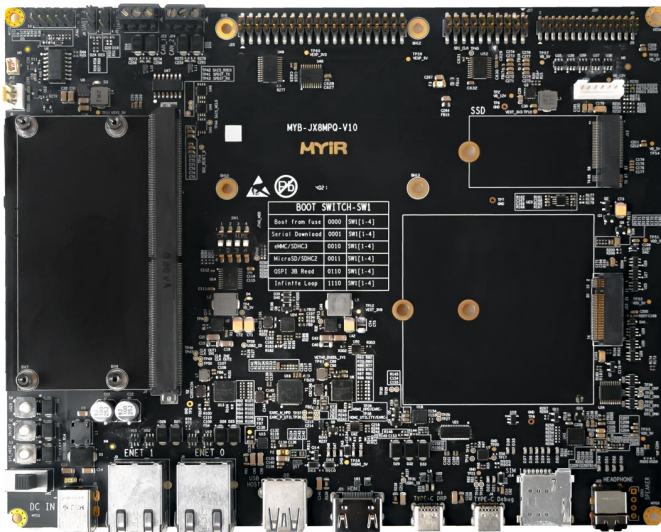
MYD-JX8MPQ Development Board Base Board

- Serial ports
    - Debug serial port (USB Type C)
    - 1 x TTL serial ports (UART4)
- USB
    - 1 x USB3.0 Host port (Type A)
    - 1 x USB3.0 OTG port (DRP, Type C)
- 1 x SIM card slot
- 2 x 10/100/1000 Mbps Ethernet interface (RJ45)
- 2 x CAN (3-pin phoenix terminal, -L lite version doesn't support)
- 1 x Micro SD card slot
- 2 x MIPI-CSI Camera interfaces (J15 & J16, 24-pin 0.5mm pitch FPC connectors)
- 1 x MIPI-DSI Display Interface (J17, 30-pin 0.5mm pitch FPC connector)
- 1 x Single-channel LVDS Display interface (J18 & J19, 40-pin 0.5mm pitch FPC connector)
- 1 x Dual-channel LVDS Display interface (J20, 30-pin 2.0mm pitch header connector)
- 1 x HDMI (supports 4K resolution)
- 1 x 3.5mm Headphone/Mic Jack
- 1 x RTC Battery Connector (JP2, 1.25mm pitch 2-pin male header)
- 3 x Buttons (one for RESET, one for ON/OFF and one for USER)
- 1 x 2.54mm 2 x 20-pin male expansion header (GPIO/SPI/UART/I2C/SAI, compatible with Raspberry PI standard 40-pin extension interface)
- 1 x 2.54mm 2 x 10-pin male header (supports MYIR MY-WF005S WIFI/Bluetooth module)
- 2 x M.2 sockets (one for PCIe SSD and another for 5G module, -L lite version doesn't support)
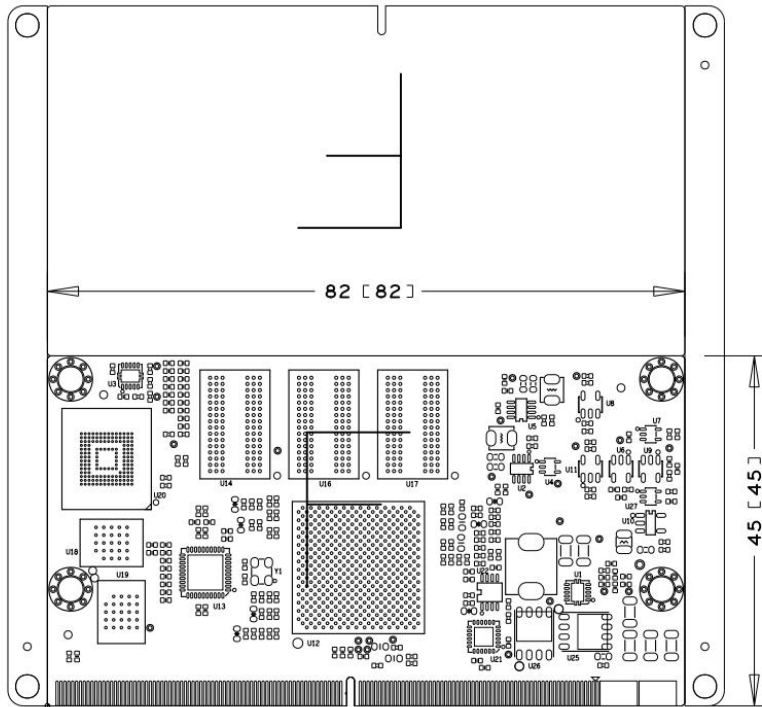
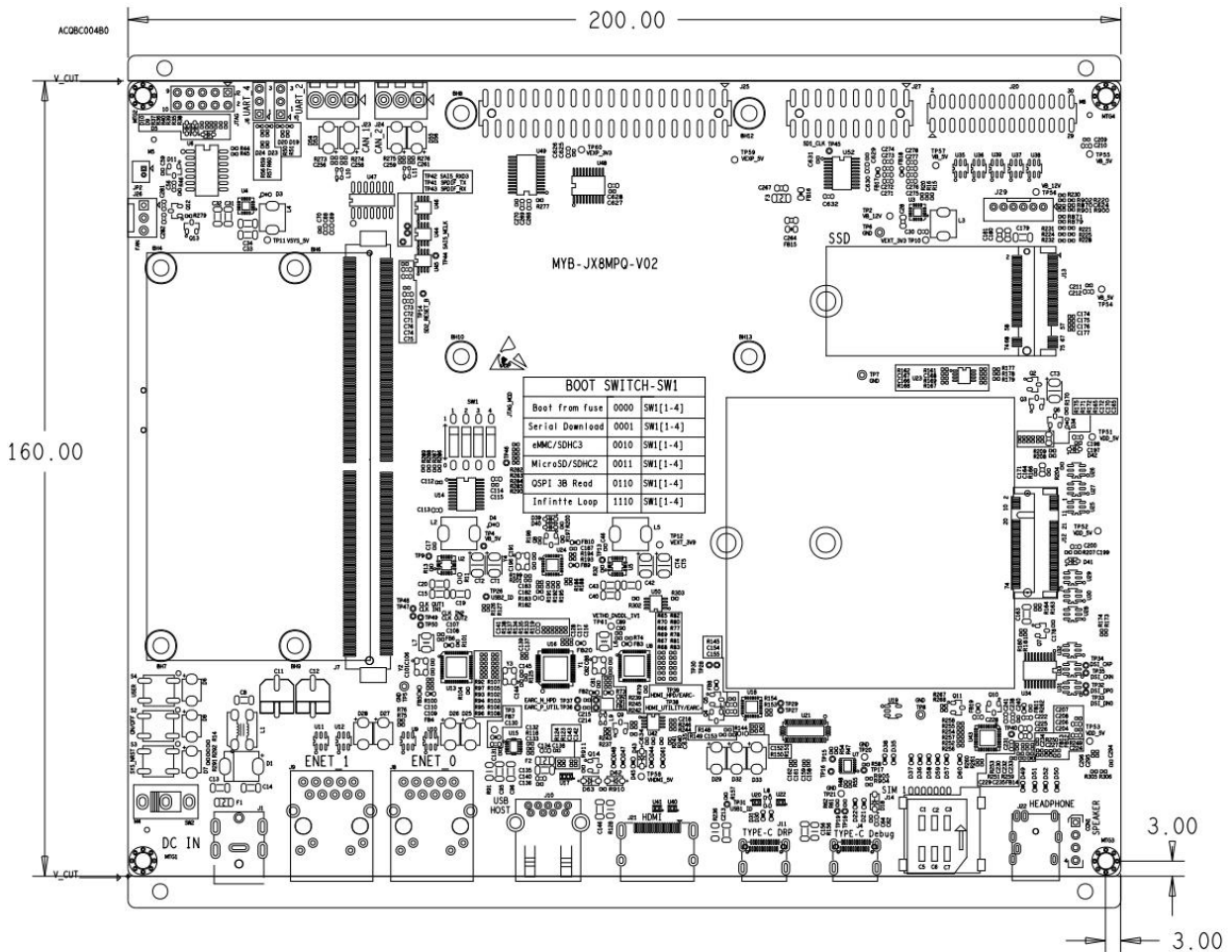*MYC-JX8MPQ CPU Module Function Block Diagram*

MYD-JX8MPQ Development Board Function Block Diagram

MYC-JX8MPQ CPU Module Dimensions Chart

MYD-JX8MPQ Development Board Dimensions Chart

Software Features

MYIR's MYD-JX8MPQ development board is ready to run Linux which is provided with software package. Many peripheral drivers are in source code to help accelerate customer's designs. The software package provided is characterized as following:

Item	Features	Description	Source Code Provided
Bootstrap program	u-boot	The primary bootstrap based on U-boot 2020.04	YES
Linux kernel	Image	Based on Linux L5.10.9	YES
Drivers	PMIC	pca9450 PMIC driver	YES
	USB Host	USB Host driver	YES
	USB OTG	USB OTG driver	YES
	I2C	I2C Bus driver	YES
	SPI	SPI Bus driver	YES
	Ethernet	10/100/1000M Ethernet driver	YES
	MMC	MMC/eMMC/TF card driver	YES
	PWM	PWM driver	YES
	RTC	RTC driver	YES
	IO	GPIO driver	YES
	Touch	Capacitive touch screen driver	YES
	Audio	WM8960 driver	YES
	Camera	OV5640 driver	YES
	WIFI/BT	AP6212 driver	YES
	Watchdog	Watchdog driver	YES
	5G LTE MODULE	EC20/RM500-Q	YES
	M.2	NVME driver	YES
File System	Yocto rootfs	Yocto 3.2.1 includes QT5.15.0, armnn, tensorflow-lite	YES
Application Programs	GPIO KEY	KEY example	YES
	NET	TCP/IP socket C/S example	YES
	RTC	RTC example	YES
	UART	UART example	YES
	Audio	Audio example	YES
	Camera	Camera display example	YES
Compiler Tool Chain	Cross compiler	Yocto GCC 7.5.0	YES

Linux Software Features