MYD-J1028X Development Board

➢ *MYC-J1028X CPU Module as Controller Board*
➢ *1.5 GHz NXP Layerscape LS1028A Application Processor based on Dual ARM Cortex-A72 Cores*
➢ *2GB DDR4, 8GB eMMC Flash, 32Kbit EEPROM*
➢ *1 x USB3.0 Host, 5 x Gigabit TSN Ethernet, , 1 x WIFI Module interface, 1 x 5G Module interface*
➢ *1 x SSD Module Interface, 1 x Micro SD Card Slot*
➢ *1 x DP Display Interface, 1 x Audio out,*
➢ *Supports Ubuntu and Real-time Edge Images based on Linux Kernel*
➢ *Optional USB Camera Module and RPI Module*

Figure 1-1 MYD-J1028X Development Board

The **MYD-J1028X development board** consists of the high-performance **MYC-J1028X CPU Module** and a base board to provide a complete evaluation platform for **NXP LS1028A** Processor which features dual Arm Cortex-A72 cores, with integrated 3D GPU for HMI, and a time-sensitive networking (TSN) -enabled Ethernet switch and Ethernet controllers to support converged IT and OT networks. Typical applications are industrial router, industrial control, edge computing, automotive electronics, industrial IoT and other scenes requiring high reliability, powerful communication and display capabilities.

The **MYC-J1028X CPU Module** is an ARM SoM with **Layerscape LS1028A** SoC, 2G DDR4, 8GB eMMC, 32Kbit EEPROM and a temperature sensor. It is connected to the base board of MYD-J1028X through one 0.5mm pitch 314-pin MXM 3.0 gold-finger-edge-card connector. The base board has brought out rich peripherals through connectors and headers such as 5G Module interface, one M.2 Key B based SSD Module interface, one DP display port, one Audio output port, one Micro SD card slot as well as two SIM card slots and more others.

The **MYD-J1028X development board** is delivered with one Quick Start Guide, one Type-C cable, one 12V/2A power adapter and one DC power jack adapter to provide user a complete platform for evaluating and prototyping based on LS1028A processor. MYIR also offers **MY-CAM002U USB Camera Module** and **MY-WIREDCOM RPI Module (RS232/RS485/CAN)** as options for the board.

The MYD-J1028X is capable of supporting Ubuntu and Real-time Edge images based on Linux kernel. Driver source code and compilation tools are provided to enable users to start their development rapidly and easily.
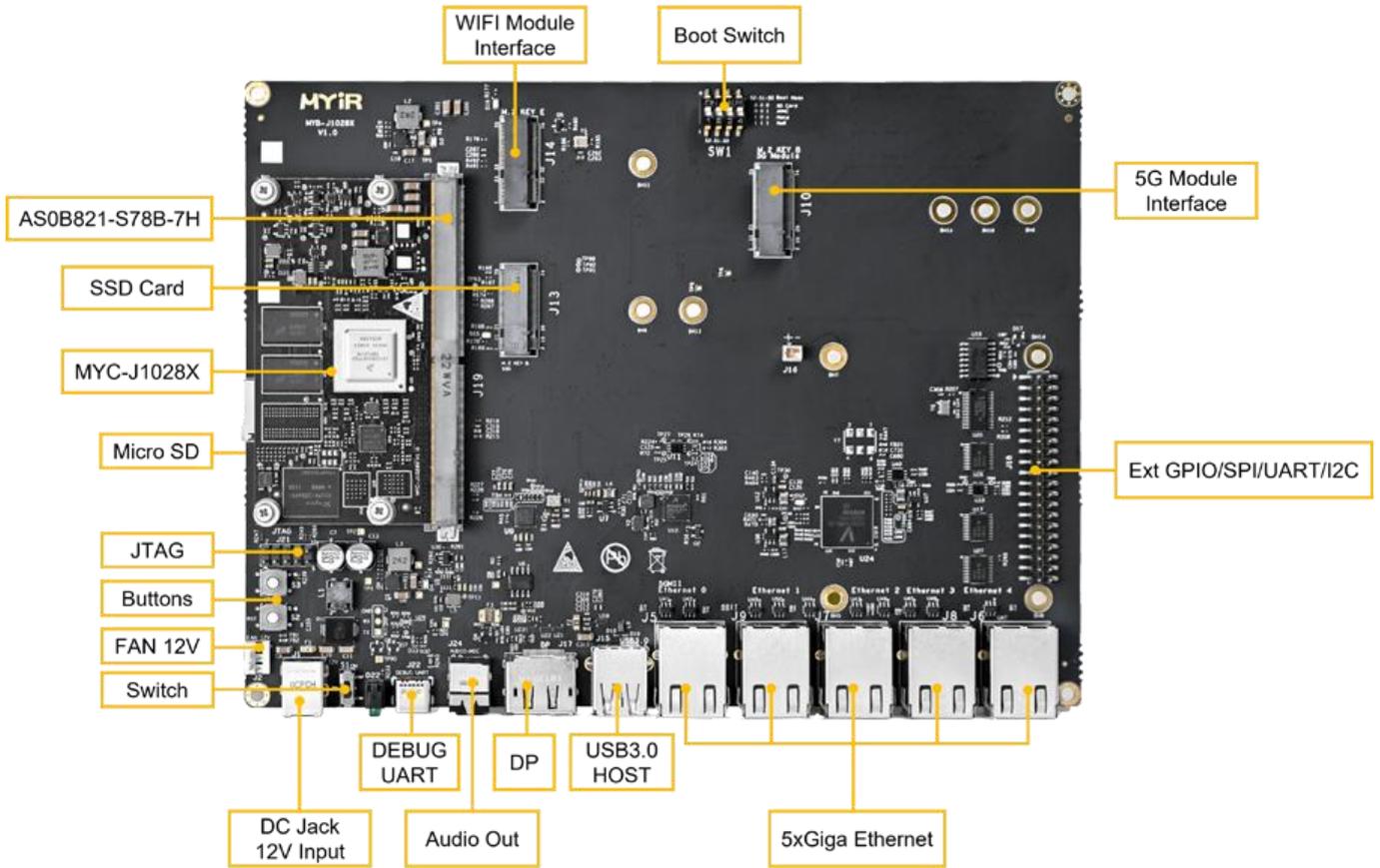
WIFI Module Interface

Boot Switch

5G Module Interface

AS0B821-S78B-7H

SSD Card

MYC-J1028X

Micro SD

Ext GPIO/SPI/UART/I2C

JTAG

Buttons

FAN 12V

Switch

DEBUG UART

DP

USB3.0 HOST

DC Jack 12V Input

Audio Out

5xGiga Ethernet

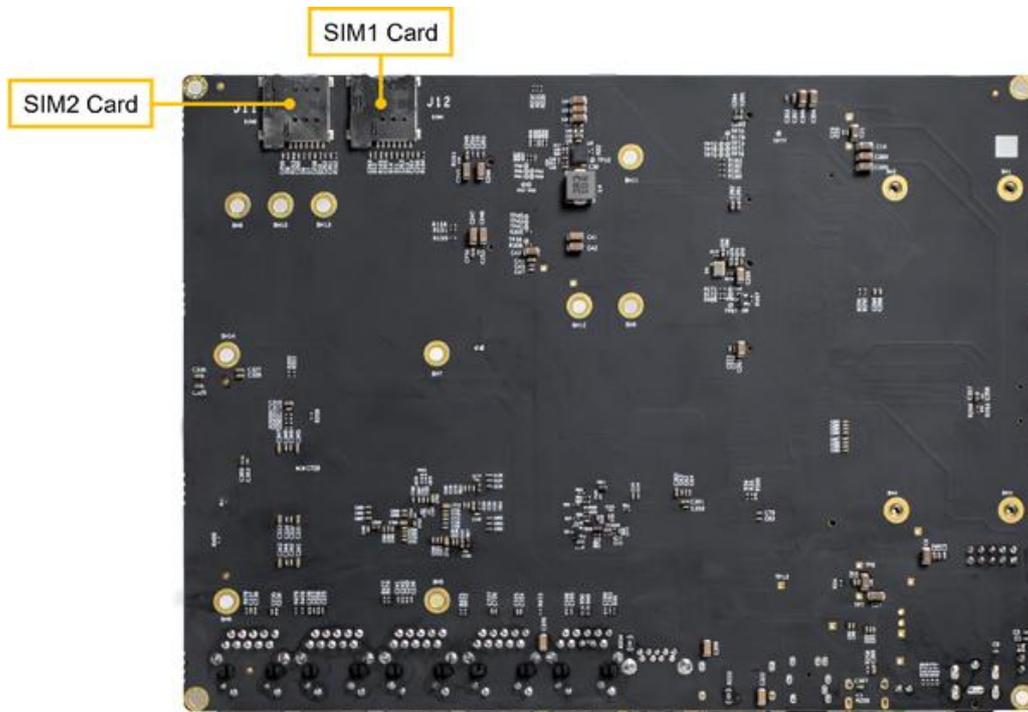*Figure 1-2 MYD-J1028X Development Board Top-view*

SIM1 Card

SIM2 Card

Figure 1-3 MYD-J1028X Development Board Bottom-view

Hardware Specification

The **MYC-J1028X CPU Module** is using NXP's 17 x 17 x 2.46 mm, 0.75 mm pitch, FBGA448 of fine-pitch ball grid array package **Layerscape LS1028A** dual-core application processor (LS1028AXN7PQA). The LS1028A processor is equipped with TSN-enabled Ethernet switches and Ethernet controllers to support converged IT and OT networks. Two 64-bit Arm v8 cores provide industrial-controlled real-time processing and virtualization support for IoT edge computing. Integrated GPU and LCD controllers enable human-machine interface (HMI) systems to support new high-speed interfaces.

The main features of Layerscape LS1028A processor are as follows:
- Dual Arm v8 Processors for Industrial Applications
- 4 port Time-Sensitive Networking enabled switch
- 2 Time-Sensitive Networking-capable Ethernet controllers
- GPU and LCD Controller
- Configurable cryptographic offload engines
- Integrated trust architecture
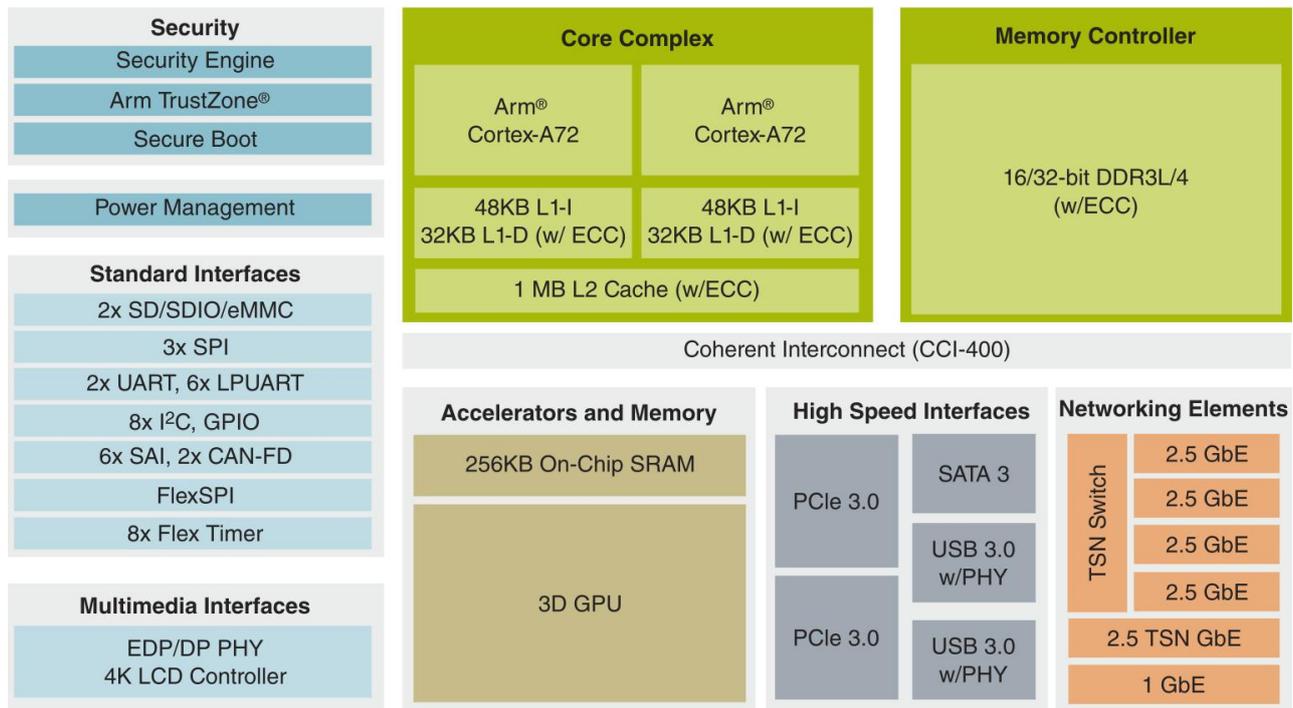- PCI Express
- CAN Bus

Figure 1-4 Layerscape LS1028A System Block Diagram

The MYD-J1028X Development Board is using MYC-J1028X CPU Module as core controller board. It takes full features of NXP LS1028A processor and the main features are characterized as below:

Mechanical Parameters

- Dimensions: 150mm x 200mm (base board), 82mm x 45mm (CPU Module)
- PCB Layers: 4-layer design (base board), 12-layer design (CPU Module)
- Power supply: +12V/2A (base board), 5V/2A (CPU Module)
- Working temperature: -40~85 Celsius (industrial grade)

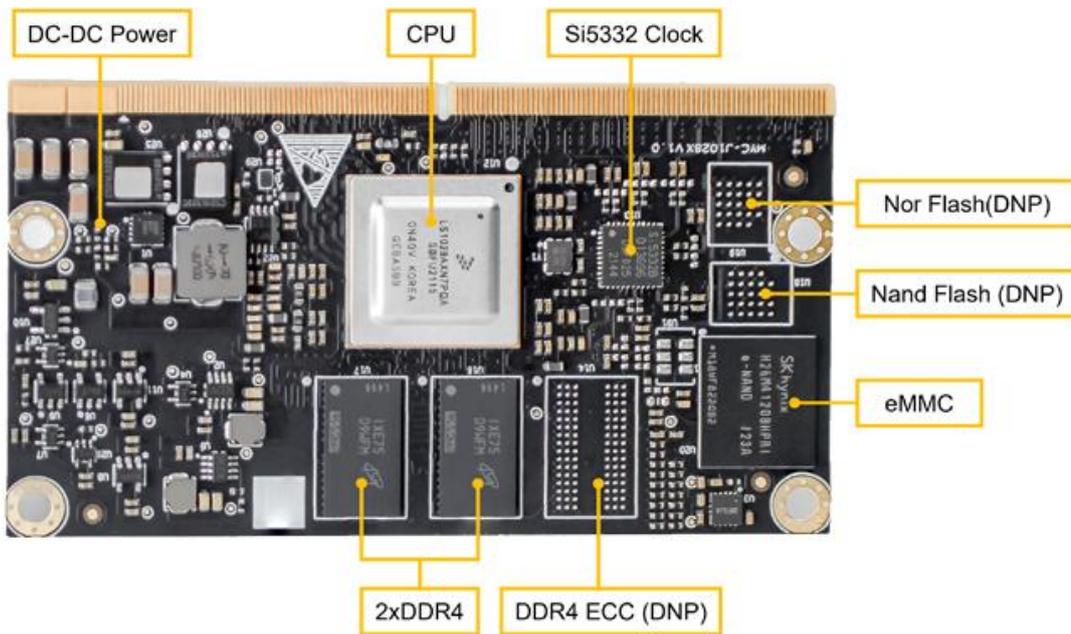**The MYD-J1028X Controller Board (MYC-J1028X CPU Module)**

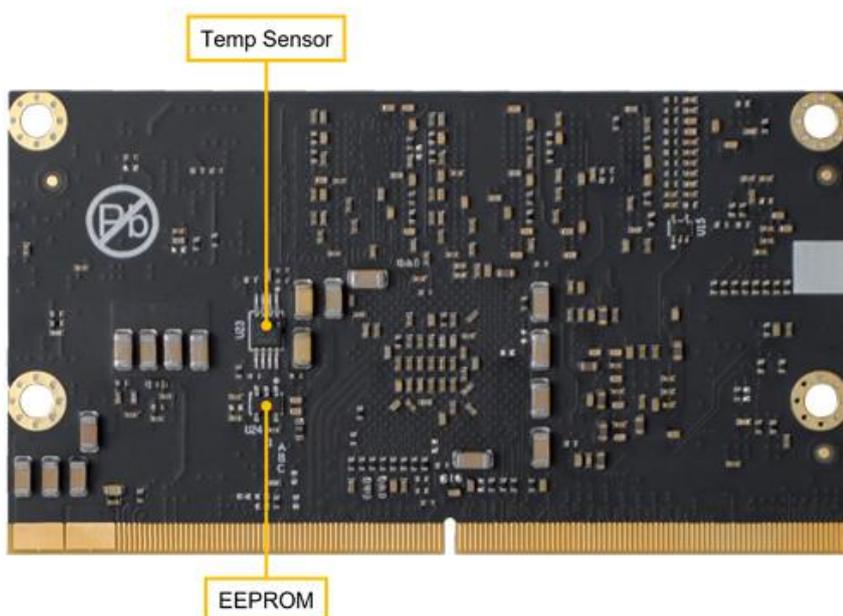

Figure 1-5 MYC-J1028X CPU Module Top-view

Figure 1-6 MYC-J1028X CPU Module Bottom-view

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Processor

- NXP Layerscape LS1028A Dual-core Processor

  -1.5 GHz Dual-core ARM Cortex-A72 CPU (LS1028AXN7PQA, industrial grade)

  - Integrated TSN Ethernet switches and Ethernet controllers

  - Integrated GPU and LCD controller

Memory

- 2GB DDR4 (supports 3GB / 4GB DDR4)
- 8GB eMMC Flash (supports 16GB / 32GB eMMC)
- 32Kbit EEPROM
- QSPI Nand Flash (DNP by default)
- XSPI NOR Flash (DNP by default)

Peripherals and Signals Routed to Pins

- Temperature Sensor
- 0.5mm pitch 314-pin MXM 3.0 Gold-finger-edge-card Connector

  - 1 x SGMII signal and 1 x QSGMII signal

  - 2 x PCIe 3.0 and 1 x SATA 3.0

  - 2 x CAN-FD

  - 2 x USB3.0

  - 8 x I2C and 3 x SPI

  - 2 x SDIO

  - 2 x UART and 6 x LPUART

  - 1 x DP1.3/eDP1.4 (supports 4K@60fps)

  - 1 x JTAG

  - 6 x SAI

  - GPIOs

  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.

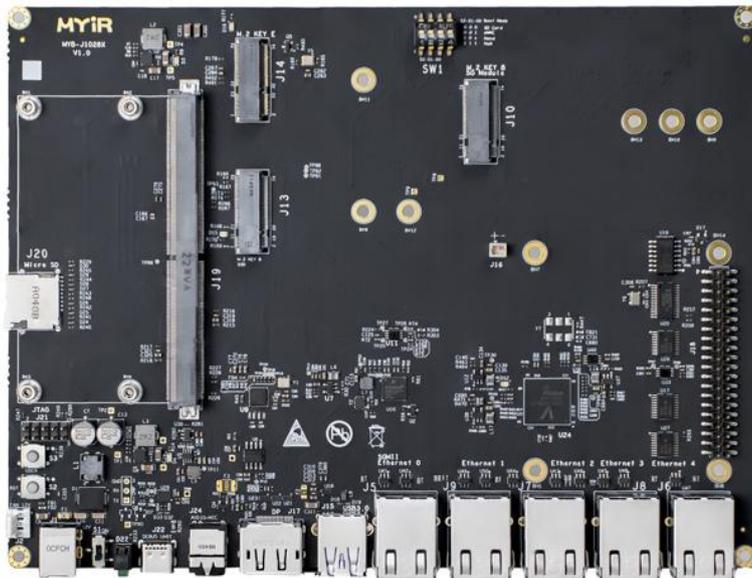**The MYD-J1028X Development Board Base Board**

Figure 1-6 MYD-J1028X Development Board Base Board

- 1 x Power Jack
- 1 x Power Switch
- Serial ports
  - 1 x Debug UART (TTL, USB Type-C connector)
  - 2 x TTL serial ports (brought out from expansion header)
  USB
  - 1 x USB 3.0 Host port
  - 1 x USB 3.0 based M.2 Key B 5G Module interface (J10)
- 2 x SIM card slots
- 5 x 10/100/1000 Mbps TSN Ethernet interfaces (RJ45)
- 1 x M.2 Key E PCIe 3.0 based WiFi module interface (J14)
- 1 x M.2 Key B SATA 3.0 based SSD Module interface (J13)
- 1 x Micro SD card slot
- 1 x DP Display port (supports DP1.3 and eDP1.4, resolution up to 4K@60FPS)
- 1 x 3.5mm Audio Output interface
- 1 x 2.54mm 2 x 20-pin male expansion header (J18, GPIO/I2C/SPI/UART/CAN, compatible with Raspberry PI standard 40-pin extension interface)
  Supports MYIR's MY-WIREDCOM RPI Module through J18 to extend RS232, RS485 and RS232 functions
- 2 x Buttons (one for Reset and one for User)
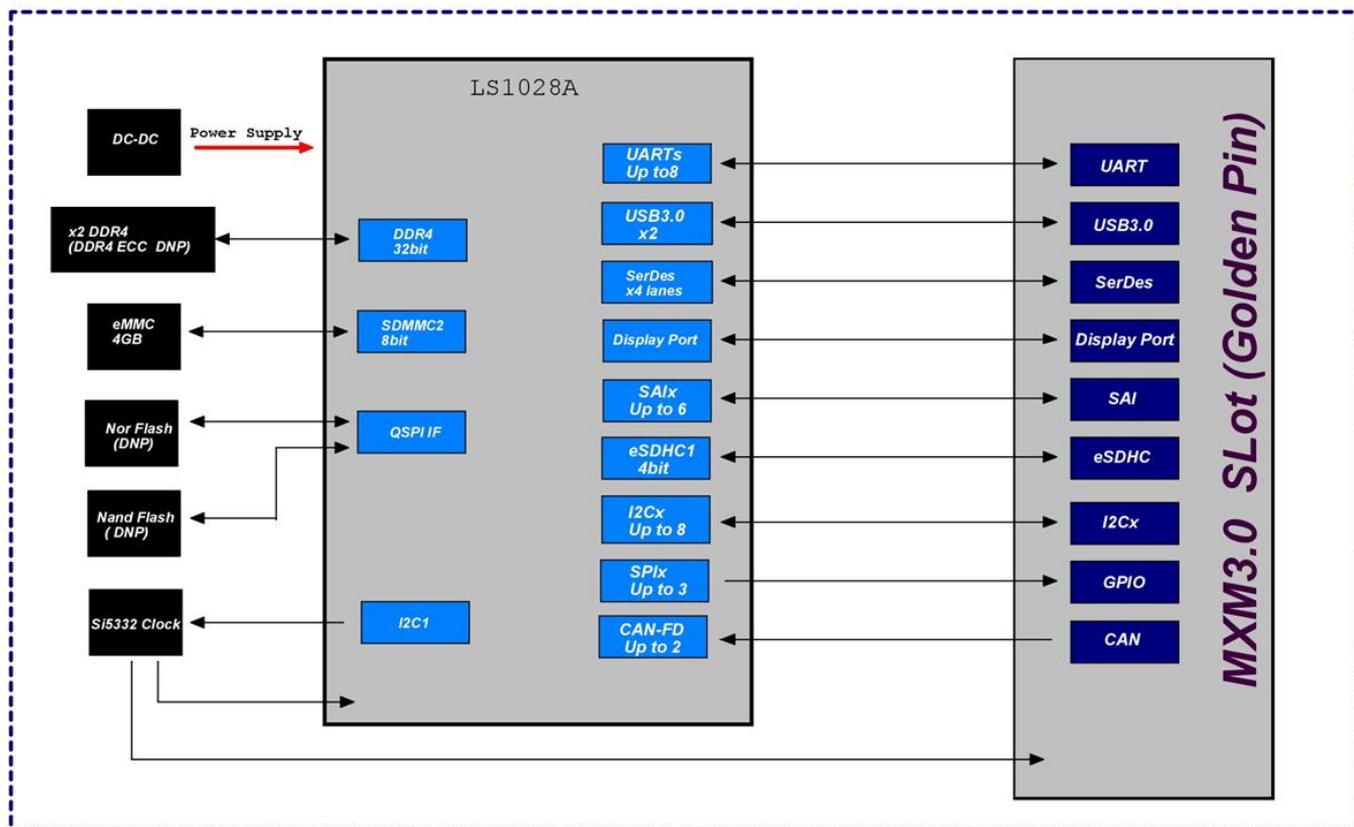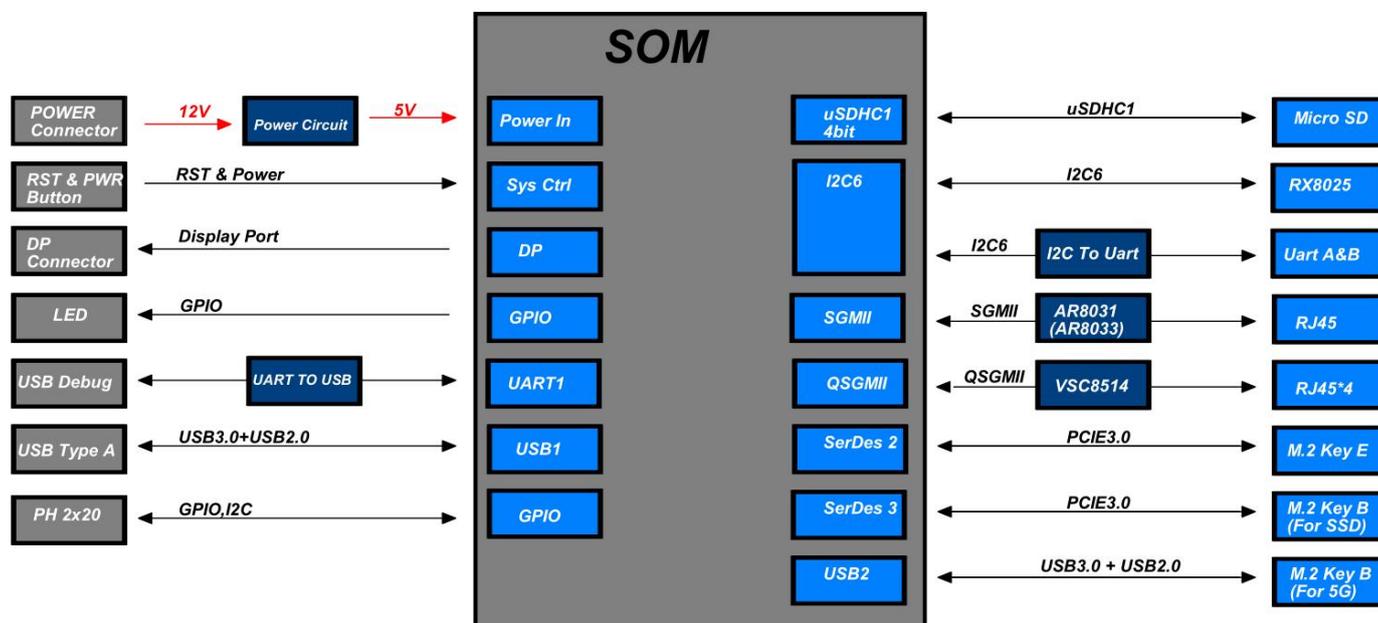- 1 x LED (Power on indicator: Green)

Figure 1-7 MYC-J1028X CPU Module Function Block Diagram

Carrier Board

Figure 1-8 MYD-J1028X Development Board Function Block Diagram
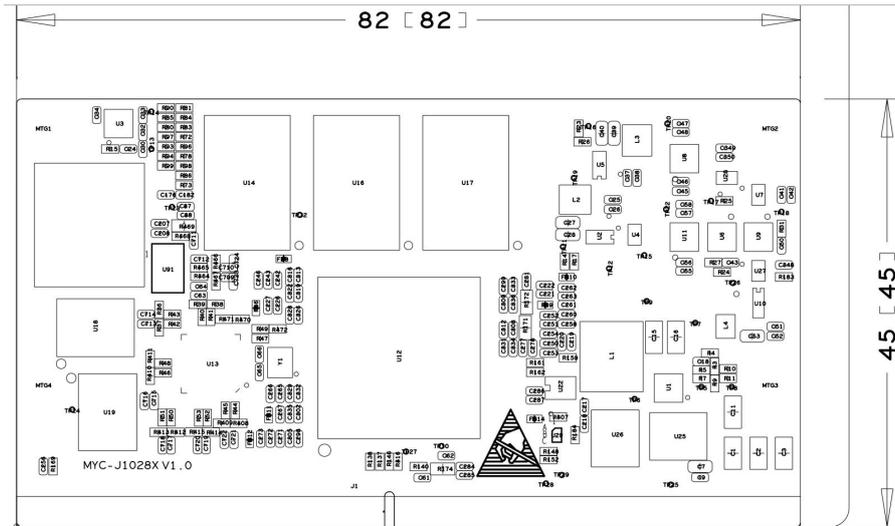
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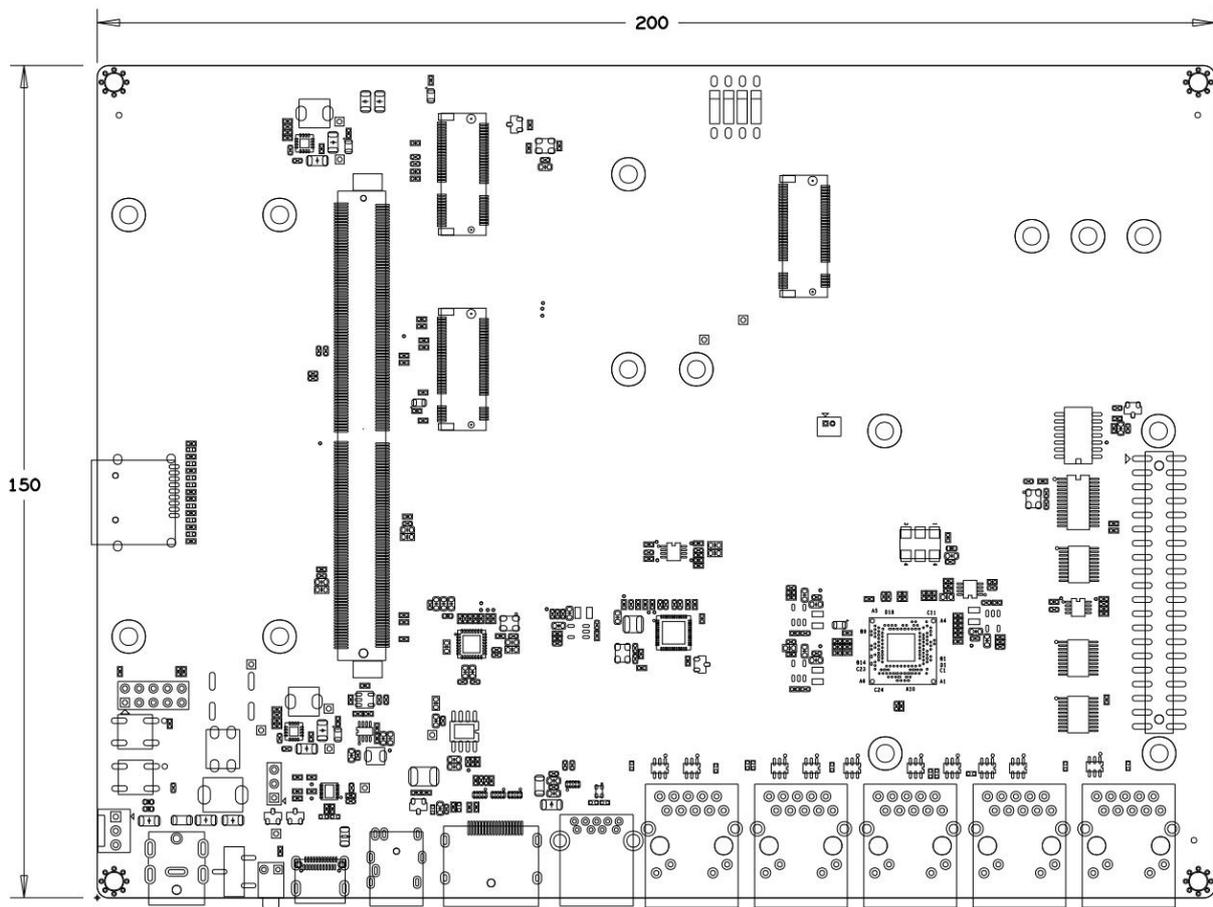*Figure 1-9 MYC-J1028X Dimensions Chart (Unit: MM)*

Figure 1-10 MYD-J1028X Base Board Dimensions Chart (Unit: MM)

Software Features

The MYD-J1028X 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	RCW	Initializing system clocks, PIN MUX	YES
	ATF	Switching between secure and unsafe environments, DDR initialization	YES
	uboot	u-boot 2020.04	YES
Linux kernel	Image	Customized based on official Kernel_5.4.47 (Ubuntu)	YES
		Custom based on official Kernel 5.10.9 (Edge)	YES
Drivers	MMC	eSDHC driver	YES
	SPI	SPI driver	YES
	I2C	I2C driver	YES
	USB Host	USB driver	YES
	Ethernet	Gigabit Ethernet driver	YES
	DSA Switch	Switch driver	YES
	TSN	TSN driver	YES
	XPSI	XPSI driver	YES
	UART	Serial driver	YES
	CAN	CAN driver	YES
	GPIO	GPIO driver	YES
	RTC	RTC driver	YES
	SATA	SATA driver	YES
	PCIE	PCIE driver	YES
	SAI	SAI driver	YES
	DP	DP driver	YES
File System	Ubuntu	Ubuntu file system built on LSDK 20.12	YES
	myir-image-full	Edge file system built on Yocto 3.2.1	YES
Compiler Tool Chain	Cross compiler	aarch64-linux-gnu-gcc	BINARY

Table 1-1 Linux Software Features

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Order Information

Product Item	Part No.	Packing List
MYD-J1028X Development Board	MYD-J1028N-8E2D-150-I	➢ One MYD-J1028X Development Board (including MYC-J1028X CPU Module) ➢ One USB Type-A to Type-C cable ➢ One 12V/2A Power adapter ➢ One DC power jack adapter ➢ One Quick Start Guide
MYC-J1028X CPU Module	MYC-J1028N-8E2D-150-I	**Add-on Options** ➢ MYC-J1028X CPU Module ➢ MY-CAM002U USB Camera Module ➢ MY-WIREDCOM RPI Module
MY-CAM002U USB Camera	MY-CAM002U	
MY-WIREDCOM RPI Module (RS232/RS485/CAN)	MY-WIREDCOM	

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