

MYC-J1028X CPU Module

- 1.5 GHz NXP Layerscape LS1028A Application Processor based on Dual ARM Cortex-A72 Cores
- 2GB DDR4, 8GB eMMC Flash, 32Kbit EEPROM
- Temperature Sensor
- 0.5mm pitch 314-pin MXM 3.0 Gold-finger-edge-card Connector
- Supports Working Temperature Ranging from -40°C to 85°C
- Supports Ubuntu and Real-time Edge Images based on Linux Kernel

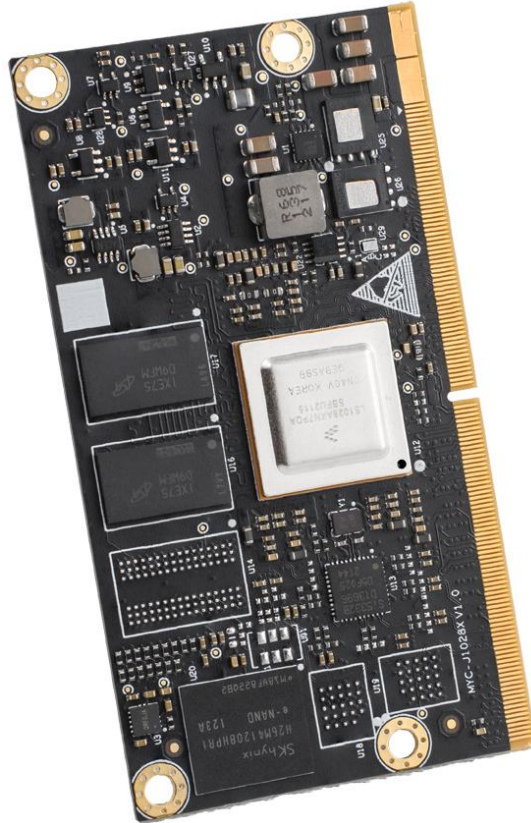


Figure 1-1 MYC-J1028X CPU Module (delivered with heatsink by default)

Measuring 45mm by 82mm, the [MYC-J1028X CPU Module](#) is a high-performance embedded ARM SoM for industrial and automotive applications. It is based on [NXP LS1028A](#) SoC of the Layerscape family and features 1.5 GHz 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. The MYC-J1028X has 2GB DDR4 and supports multiple external memory options including 8GB eMMC (default), QSPI NAND Flash (DNP) and XSPI NOR Flash (DNP). It has 32Kbit EEPROM and one temperature sensor on the rear of the board. A number of peripheral and IO signals are access through one 0.5mm pitch 314-pin MXM 3.0 gold-finger-edge-card connector. It is capable of supporting Ubuntu and Real-time Edge images based on Linux kernel.

The [MYD-J1028X Development Board](#) is using the MYC-J1028X as core controller board and has explored the features of the LS1028A processor to serve as an solid reference design for customer's development. The base board has brought out rich peripherals through connectors and headers such as one USB3.0 Host, five Gigabit TSN Ethernet, one M.2 Key E based WiFi module interface, one USB 3.0 M.2 Key B based 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.

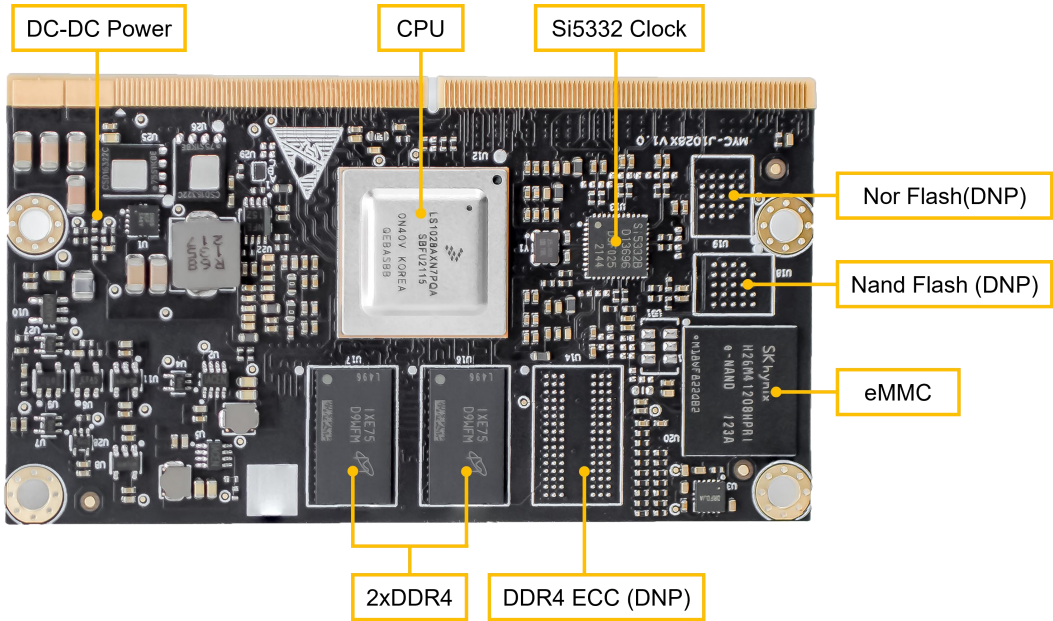


Figure 1-2 MYC-J1028X CPU Module Top-view

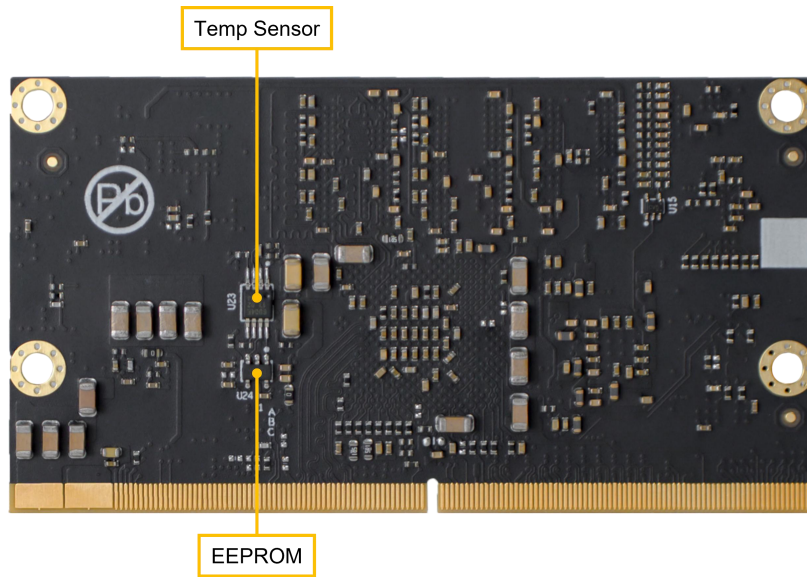


Figure 1-3 MYC-J1028X CPU Module Bottom-view

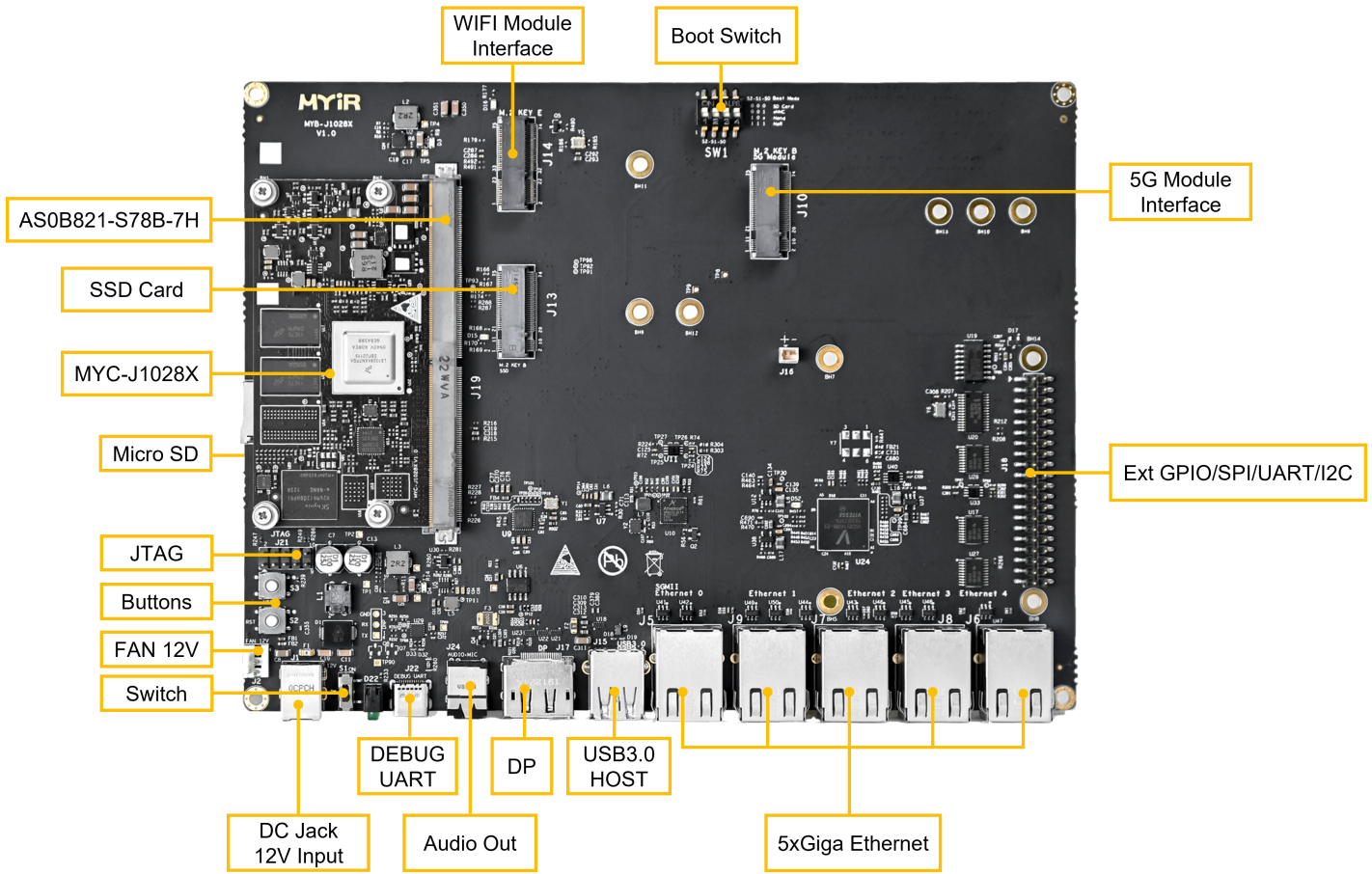


Figure 1-4 MYD-J1028X Development Board Top-View

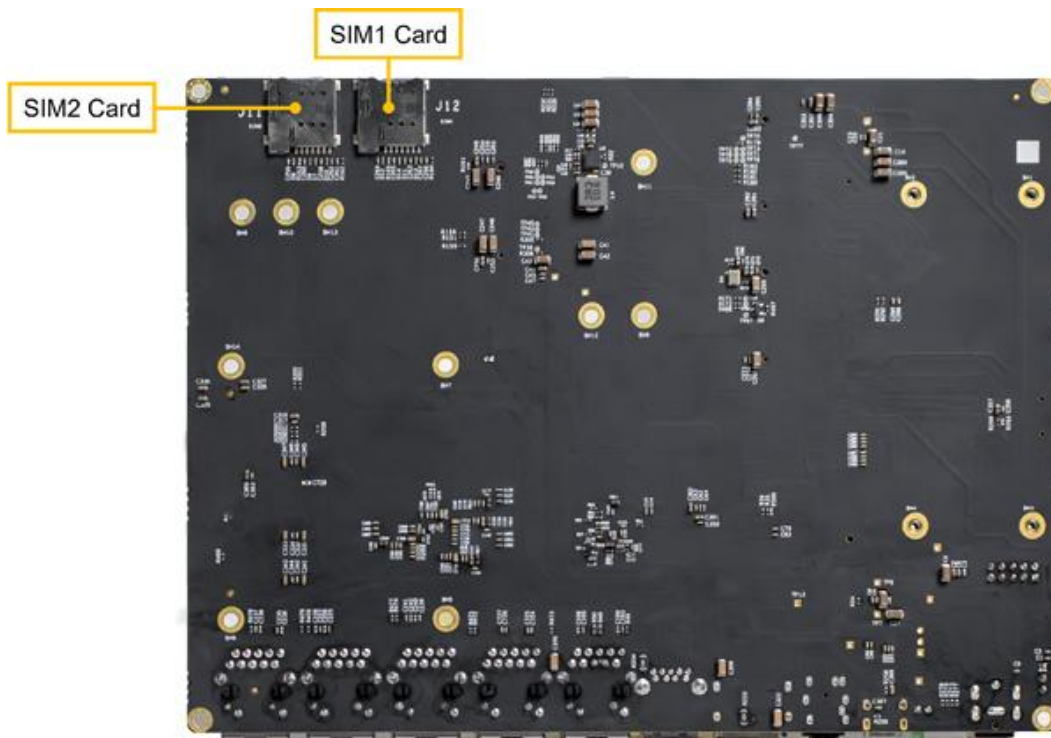


Figure 1-5 MYD-J1028X Development Board Bottom-View

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

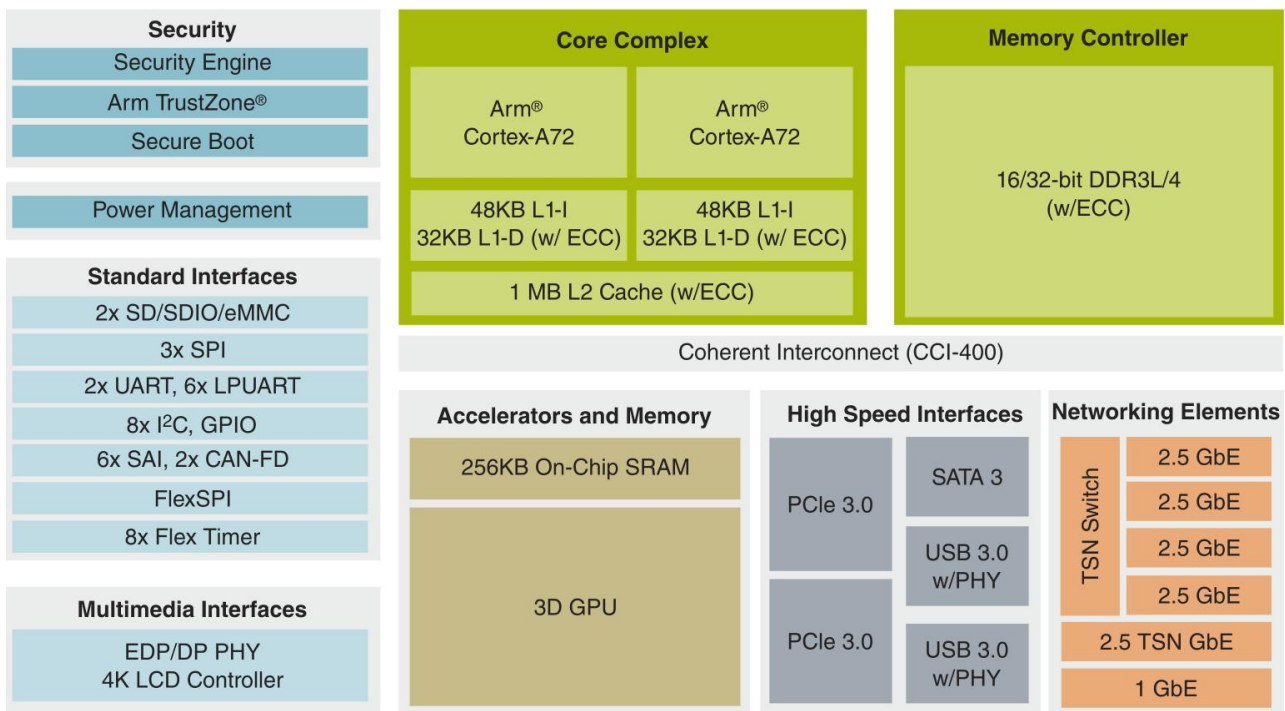


Figure 1-5 Layerscape LS1028A System Block Diagram

Mechanical Parameters

- Dimensions: 45mm x 82mm
- PCB Layers: 12-layer design
- Power supply: +5V/2A
- Working temperature: -40~+85 Celsius (industrial grade)

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
 - 1 x QSGMII signal
 - 2 x PCIe 3.0
 - 1 x SATA 3.0
 - 2 x CAN-FD
 - 2 x USB3.0
 - 8 x I2C
 - 3 x SPI
 - 2 x SDIO
 - 2 x UART
 - 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.

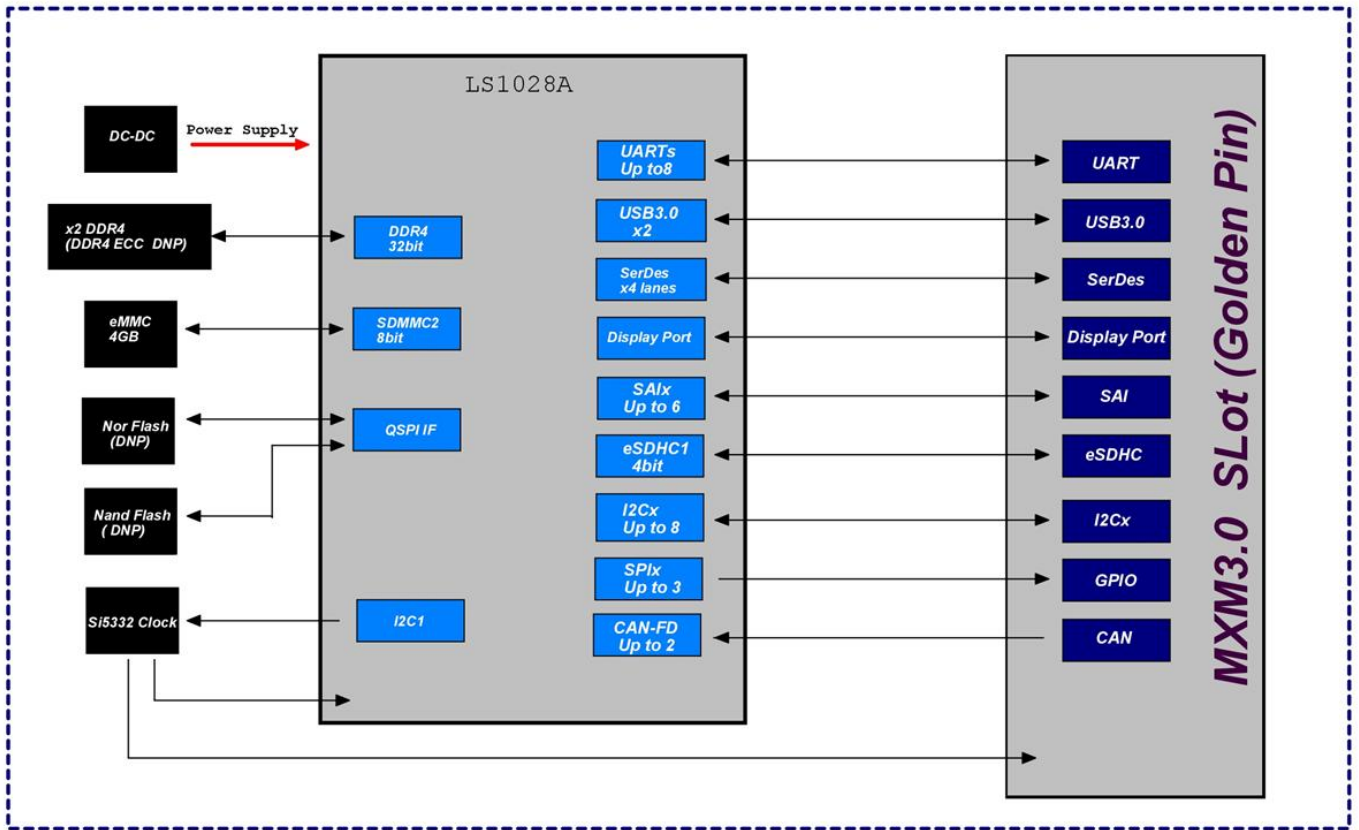


Figure 1-6 MYC-J1028X CPU Module Function Block Diagram

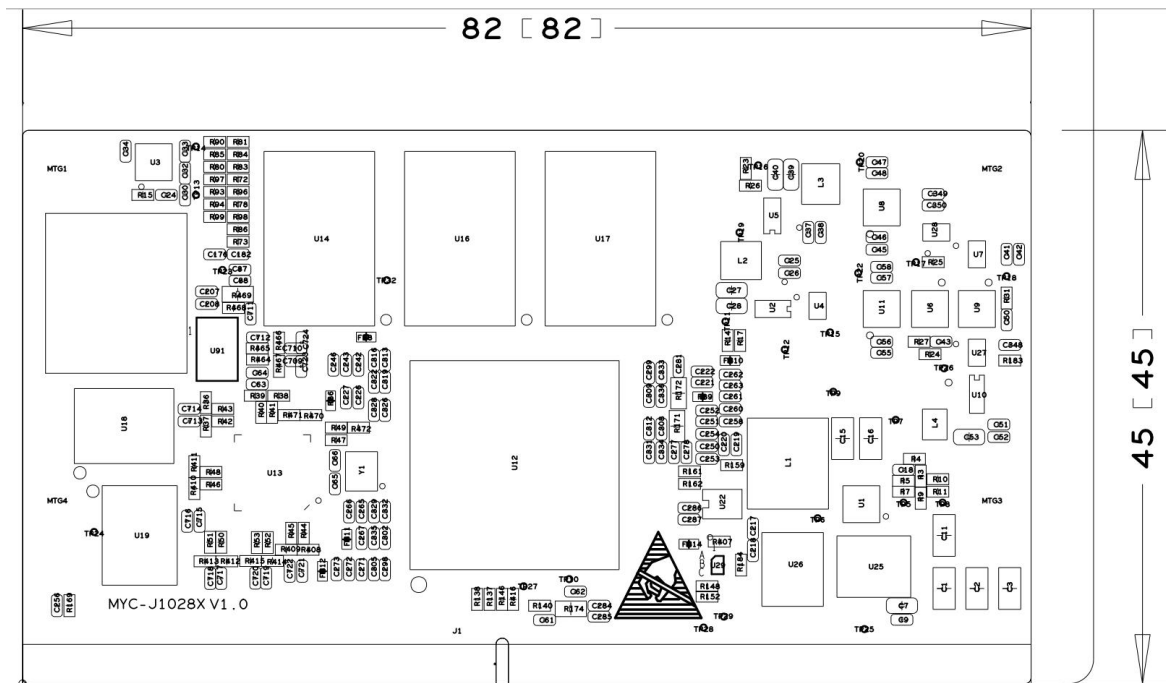


Figure 1-7 MYC-J1028X Dimensions Chart (Unit: MM)

Software Features

MYIR's MYC-J1028X CPU module 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