IAC-IMX93XX-CM

Hardware Manual

Version No.：V1.0

2025.01

Company Profile

Zhejiang Qiyang Intelligent Technology Co., Ltd., established in 2007, which locates in Hangzhou, Zhejiang, PRC. It is a high-end technological enterprise that specializes in exploitation, fabrication, and selling embedded computer mainboards . With 10 years of experiences, Qiyang has established the completed service chain from the design concept to mass production successfully.

The R&D team is organized by 30 more technical engineers. Qiyang focus on providing functional embedded hardware, software tool and customization solutions. It has been applied to Industrial Control, Internet of Things, New Retail, Smart Medical, Electricity Device, Environmental Surveillance, Charging Pile etc.

With the growth of the business, Qiyang has set up an SMT factory in Zhuji, Zhejiang province, which is 5000 ㎡, with a 2xSMT production line. The SMT factory performs the ISO9001 Quality Management System strictly. Relying on the solid production ability, the SMT factory's annual capacity is about a million sets, which totally guarantee the delivery date.

Qiyang has a thorough sales marketing network, professional sales ,and after-sales team to provide full technical support and service. The business has spread over 120 countries and areas, it helps the clients to introduce the products into the market efficiently and successfully.The combination and extension of research and development, production capacity, and market, that provide a solid foundation for Qiyang to provide specialized, globalized embedded hardware and software.

We offer:

I.Software/Hardware Mainboard

Based on the CPU solution from NXP,Rockchip,MTK,Renesas,TI,Atmel,Cirrus Logic etc, Qiyang provides the ARM development kit/system on module/industrial board and periphery products, paired tools and software for the user do further exploitation.

2.Customization Service

Fully taking the advantage of the technical accumulation on the ARM platform and Linux, Android, Ubuntu OS, Qiyang provides the efficient OEM/ODM service to the users.

Sincerely thanks for using Qiyang's product, we will try our best to offer you the technical supports!

Technical Support

Please contact us, if any doubt. (Monday to Friday 8:30-12:00, 13:30-17:30):

Technical Email: supports@qiyangtech.com

Technical support Phone.: 0571-87858811-805

Official website: www.qiytech.com (Chinese)/ www.qiyangtech.com (English)

Information update and access

1、 Information Updating

Product-related information will be constantly improved and updated. When you use these contents, please make sure that it is up to date.

2、Update Notification

Qiyang product information updates will be notified via WeChat public account, so stay tuned!

3、How to obtain information

After purchasing, please contact the relevant sales staff of our company to obtain it.

4、Provided materials

Software: factory image, related kernel source code, interface test source code, cross compiler.

Hardware: corresponding baseboard schematic, PCB source file (Allegro16.6).

Files: hardware manual, test manual, user manual, environment construction manual, IO pin comparison table, core board, baseboard structure dimension drawing (dxf), chip information.

Usage suggestions:

1) before using the board, be sure to read the hardware manual first;

2) please check the packing list carefully before use and check whether there are any missing files;

3) understand the basic structure and composition of the development kit, including the allocation of hardware resources, the definition of each pin of the core board and the carrier board, and the definition of the expansion pins, etc.;

4) we accept bulk orders for the IAC-IMX93XX-CM SOM module.

Version Record

Version No.	Hardware Platform	Date	Description	Revised by
V1.0	IAC-IMX93XX-CM V1_10	2025-01	Initial version	Maoh

Contents

NOTE: The manual mainly introduces the hardware interface of the IAC-IMX95XX-CM SOM module.

I. System Composition

1.1.Chip Overview

IAC-IMX93XX-CM SOM module adopts NXP I.MX93 application processors, it delivers efficient machine learning (ML) acceleration, energy flex architecture and state-of-the-art security to support energy-efficient edge computing.i.MX 93 processors offer fast and efficient ML inferencing along with a rich set of peripherals and high-performance application cores for automotive, industrial and consumer IoT market segments.

The i.MX 93 applications processors are the first in the i.MX portfolio to integrate the scalable Arm® Cortex®-A55 core, bringing best-in-class performance and energy efficiency to Linux-based edge applications. Based on Arm's DynamIQ technology, the A55 core features the latest Armv8-A architecture extensions with dedicated instructions to accelerate machine learning (ML). The operating speed reaches up to 1.7Ghz, and it integrates a 0.5TOPS NPU unit, significantly accelerating machine learning inference.

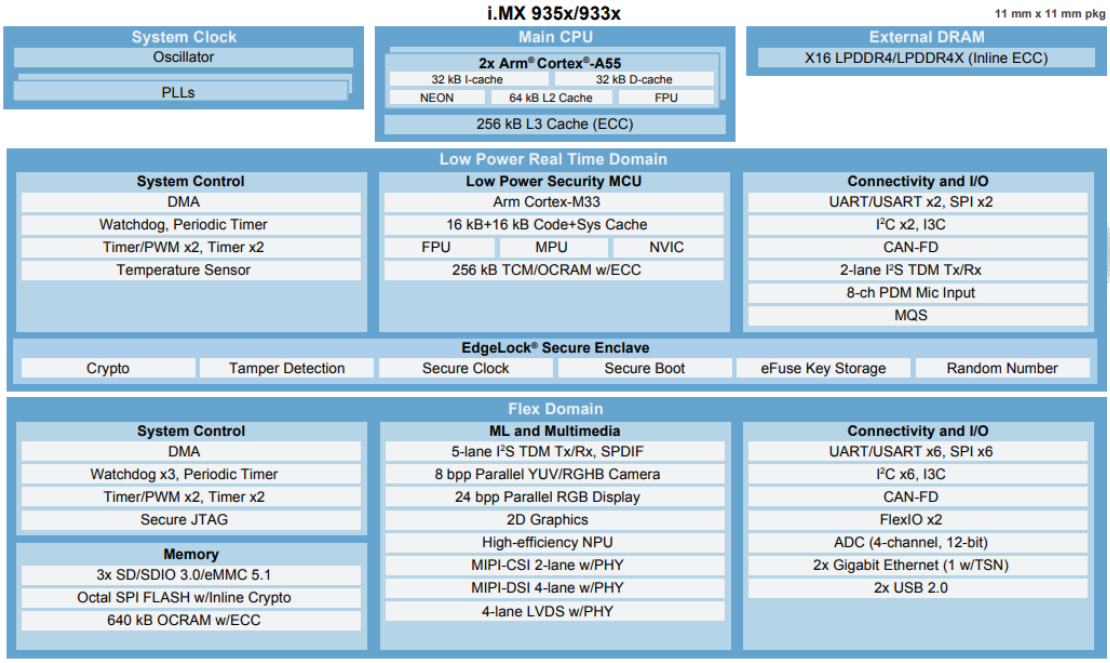
The i.MX 93 family contains MIPI-CSI and parallel image sensor interfaces along with the NPU to support both monochrome and RGB (color) vision applications. The i.MX93 application processor offers a 2-lane MIPI-CSI camera interface capable of supporting 1080p@60 resolution and enables direct connection to external camera module and ISP. The application processors offer capabilities including down scaling, color space conversion, de-interlacing, alpha insertion, cropping and rotation of images for machine vision and other ML-related applications.

The i.MX 93 applications processors contain a 4-lane MIPI-DSI capable of supporting 1080p60 resolution, a 4-lane LVDS and parallel display interfaces capable of 720p60 resolution. Additionally, it features a high-efficiency pixel pipeline to perform 2D graphics processing to realize cost-effective GUI solutions. It is capable of image rotation (90°, 180°, 270°), image resize, color space conversion, multiple pixel format support (RGB, YUV444, YUV422, YUV420, YUV400) and standard 2D-DMA operations.

A 250 MHz Arm® Cortex®-M33 processor performs time critical real-time compute and control. The integrated Cortex-M33 core associated with the

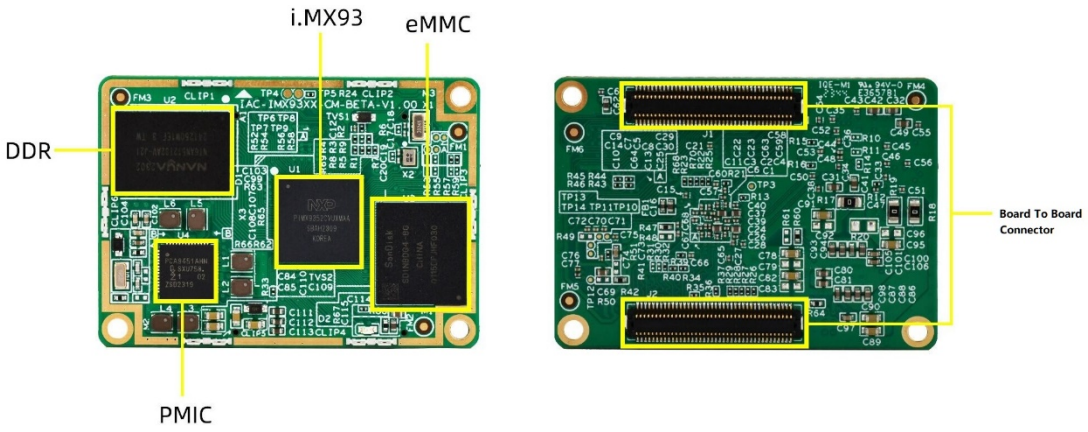
CAN FD interfaces provides a robust local control network for industrial applications. Additionally, the built-in Arm Cortex M33 in conjunction with the NPU can be used for low-power wake-word detection.

i.MX 935X/933X BLOCK DIAGRAM:



1.2. SOM Overview

IAC-IMX93XX-CM SOM adopts 6-layer PCB board high-precision immersion gold technology, high TG board, with reliable electrical performance and anti-interference performance. It integrated with CPU, LPDDR4, eMMC, power management chip, etc. The board-to-board connector leads to 160 pins, which fully expand the hardware resources of i.MX93, and it can be multiplexed as different signals, which the users could make the carrier board on their own needs.



Top Side

Bottom Side

◆Onboard with NXP I.MX93 processor

◆Onboard with 1GB LPDDR4,8GB eMMC(Standard)

◆Adopts 6-layer PCB high precision gold immersion process

◆SOM Size:49mm*35mm, it suits for various embedded applications

◆Adopts 2*80Pin board to board connector to draw out the SOM resources

◆Adopts 5V,nboard with power management chipset

◆OS:Linux6.1.22, QT6.5.0

1.3.SOM Resources

Hardware information	CPU	NXP i.MX93 processor
	Core	i.MX93 Dual ARM® Cortex™-A55 @1.7Ghz+ 1*Cortex-M33@ 250 MHz
	NPU	Neural Processing Unit: 0.5TOPS
	ISI	Resolution is up to 2K
	RAM	1GB LPDDR4
	Flash	8GB eMMC (16GB eMMC,32GB eMMC optional)
	PMIC	NXP PCA9451 PMU
	Ethernet	2-ch network chipset adopts RGMII mode to support 10M/100M/1000Mbps Ethernet perfectly.
	Communication	7xUART，including 2x Debug UART
		2xSDIO
		2xCANFD
		1xJTAG
	Display	1x4-lane MIPI_DSI, resolution is up to 1920x1080@60.
		1-ch single LVDS display interface, the resolution is up to 1366x768@60
	Audio	1xSAI
	USB	1xUSB2.0 OTG 1xUSB2.0 HOST
	Camera	1XMIPI-CSI（2-lane），support 1080p@30fps.
	Input	I2C*2 SPI*1
	Others	Serial GPIOs（1.8V）
	Power Input	+5VDC
Electrical characteristics	Layer/ Size	SOM Size:49mm*35mm,6-layer board high-precision immersion gold process
	Power Consumption	Power consumption ≤5W (No loaded consumption).
	Operation Temperature	-40℃ ~ +85℃
	Storage Temperature	-40℃ ~ +85℃
	Working Humidity	5% to 95%, non-condensing
	SOM Option1	1GB DDR/8GB eMMC（-40℃ ~ +85℃）

1.4.PIN Definition

J1A: (Pin Definition from SOM to Carrier Board through Board To Board Connector)

Multiplexing GPIO	Signal Name	PIN #	PIN#	Signal Name	Multiplexing GPIO
	MIPI_DSI_CLK_P	1	2	LVDS_D3_P	
	MIPI_DSI_CLK_N	3	4	LVDS_D3_N	
	MIPI_DSI_D0_P	5	6	LVDS_D2_P	
	MIPI_DSI_D0_N	7	8	LVDS_D2_N	
	MIPI_DSI_D1_P	9	10	LVDS_CLK_P	
	MIPI_DSI_D1_N	11	12	LVDS_CLK_N	
	MIPI_DSI_D2_P	13	14	LVDS_D1_P	
	MIPI_DSI_D2_N	15	16	LVDS_D1_N	
	MIPI_DSI_D3_P	17	18	LVDS_D0_P	
	MIPI_DSI_D3_N	19	20	LVDS_D0_N	
	GND	21	22	GND	
	MIPI_CSI_CLK_P	23	24	USB1_VBUS_3V3	
	MIPI_CSI_CLK_N	25	26	USB1_D_N	
	MIPI_CSI_D1_P	27	28	USB1_D_P	
	MIPI_CSI_D1_N	29	30		
	MIPI_CSI_D0_P	31	32	GND	
	MIPI_CSI_D0_N	33	34	USB2_D_N	
	GND	35	36	USB2_D_P	
		37	38	GND	
	CPU_ONOFF	39	40	CAN1_TXD	GPIO1_IO08
	GND	41	42	CAN1_RXD	GPIO1_IO09
GPIO_IO06	GPIO_WDT_EN	43	44	UART6_RXD	GPIO_IO05

GPIO_IO07	GPIO_WDT_FEED	45	46	UART6_TXD	GPIO_IO04
GPIO_IO09	UART7_RXD	47	48	UART7_TXD	GPIO_IO08
GPIO_IO03	GPIO_TP_nRST	49	50	GPIO_HUB_nRST	GPIO_IO10
GPIO_IO02	GPIO_TP_nINT	51	52	UART7_nRTS	GPIO_IO11
GPIO_IO01	UART5_RXD	53	54	GPIO_AUD_AMP_nSD	GPIO_IO13
GPIO_IO00	UART5_TXD	55	56	GPIO_RUN_LED	GPIO_IO012
	I2C1_SCL	57	58	UART4_RXD	GPIO_IO15
	I2C1_SDA	59	60	UART4_TXD	GPIO_IO14
	I2C2_SCL	61	62	UART4_nRTS	GPIO_IO17
	I2C2_SDA	63	64	UART4_nCTS	GPIO_IO16
GPIO1_IO12	SAI1_TXC	65	66	GPIO_4G_PWR_EN	GPIO_IO19
GPIO1_IO14	SAI1_RXD0	67	68	GPIO_4G_nDIS	GPIO_IO18
GPIO1_IO13	SAI1_TXD0	69	70	GPIO_4G_nRST	GPIO_IO20
GPIO1_IO111	SAI1_TXFS	71	72	GPIO_BL_EN	GPIO_IO21
	UART1_TXD	73	74	GPIO_BL_PWR_EN	GPIO_IO22
	UART1_RXD	75	76	PWM_OUT	GPIO_IO23
GPIO1_IO07	UART2_TXD	77	78	CAN2_RXD	GPIO_IO27
GPIO1_IO06	UART2_RXD	79	80	CAN2_TXD	GPIO_IO25

J1B:(Pin Definition from SOM to Carrier Board through Board To Board Connector）

Multiplexing GPIO	Signal Name	PIN #	PIN#	Signal Name	Multiplexing GPIO
	VCC_SYS_5V0	1	2	VCC_SYS_5V0	
	VCC_SYS_5V0	3	4	VCC_SYS_5V0	
	G VCC_SYS_5V0	5	6	VCC_SYS_5V0	
	GND	7	8	GND	
	GND	9	10	GND	

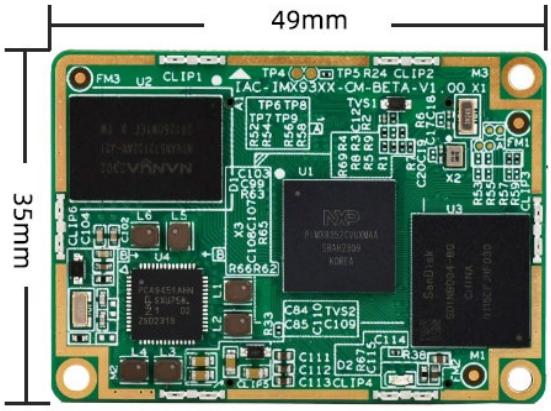
	GND	11	12	GND	
	VCC_SYS_1V8	13	14	VCC_SYS_3V3	
	VCC_SYS_1V8	15	16	VCC_SYS_3V3	
	GND	17	18	GND	
	PMIC_nRST	19	20	GND	
	WDT_nRST	21	22	PMIC_CLK_32K	
GPIO3_IO28	GPIO_WIFI_nINT	23	24	GPIO_WIFI_REG_ON	GPIO3_IO26
GPIO3_IO29	GPIO_BT_nINT	25	26	GPIO_BT_REG_ON	GPIO3_IO27
GPIO3_IO30	GPIO_CAM_nRST	27	28	GPIO_WAKE_BT	GPIO3_IO28
GPIO3_IO31	GPIO_CAM_PWDN	29	30	GPIO_CAM_PWR_EN	GPIO3_IO29
	GND	31	32	GND	
GPIO4_IO23	ENET2_RXC	33	34	ENET2_TXC	GPIO4_IO21
GPIO4_IO22	ENET2_RX_CTL	35	36	ENET2_TX_CTL	GPIO4_IO20
GPIO4_IO24	ENET2_RD0	37	38	ENET2_TD0	GPIO4_IO19
GPIO4_IO25	ENET2_RD1	39	40	ENET2_TD2	GPIO4_IO17
GPIO4_IO26	ENET2_RD2	41	42	ENET2_TD1	GPIO4_IO18
GPIO4_IO27	ENET2_RD3	43	44	ENET2_TD3	GPIO4_IO16
GPIO4_IO14	ENET2_MDC	45	46	ENET1_MDC	GPIO4_IO00
GPIO4_IO15	ENET2_MDIO	47	48	ENET1_MDIO	GPIO4_IO01
GPIO4_IO09	ENET1_RXC	49	50	ENET1_TXC	GPIO4_IO07
GPIO4_IO08	ENET1_RX_CTL	51	52	ENET1_TX_CTL	GPIO4_IO06
GPIO4_IO10	ENET1_RD0	53	54	ENET1_TD1	GPIO4_IO04
GPIO4_IO11	ENET1_RD1	55	56	ENET1_TD3	GPIO4_IO02
GPIO4_IO12	ENET1_RD2	57	58	ENET1_TD0	GPIO4_IO05
GPIO4_IO13	ENET1_RD3	59	60	ENET1_TD2	GPIO4_IO03
	GND	61	62	SD2_nCD	GPIO3_IO00
GPIO3_IO25	SD3_DATA3	63	64	SD2_CLK	GPIO3_IO01

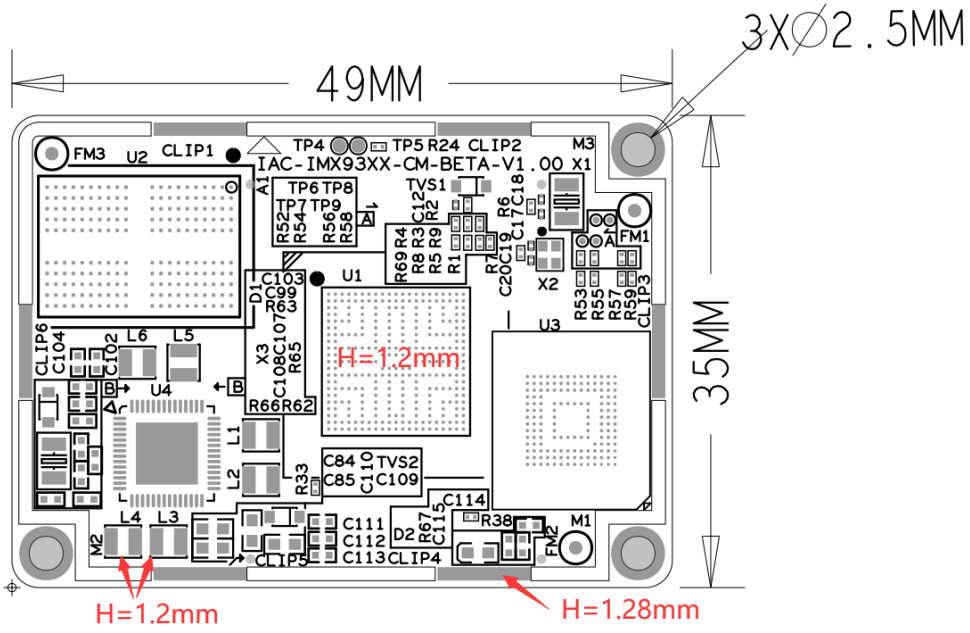
GPIO3_IO24	SD3_DATA2	65	66	SD2_CMD	GPIO3_IO02
GPIO3_IO23	SD3_DATA1	67	68	SD2_DATA1	GPIO3_IO04
GPIO3_IO22	SD3_DATA0	69	70	SD2_DATA3	GPIO3_IO06
GPIO3_IO21	SD3_CMD	71	72	SD2_DATA0	GPIO3_IO03
GPIO3_IO20	SD3_CLK	73	74	SD2_DATA2	GPIO3_IO05
	VCC_SD2	75	76	VCC_SD_3V3	
GPIO_IO29	GPIO_ENET2_nRST	77	78	GPIO_ENET1_nRST	GPIO_IO26
GPIO_IO28	GPIO_ENET2_nINT	79	80	GPIO_ENET1_nINT	GPIO0_IO24

II. Structure & Size:

Unit of measurement: mm, if needs the receptacle's size, please email us : supports@qiyangtech.com;

2.1.SOM Dimension





III. Electrical Property

Items	Parameters
Operation Temp.	-40℃ ~ +85℃
Storage Temp.	-40℃ ~ +85℃
Humidity	5%~95%, non-condensing
SOM Dimension	49mm*35mm,6-layer high precision immersion gold process
Power Consumption	5W, non-loaded consumption
Power	DC5V/3A

IV. Remark

1. Before connecting to LCD, please confirm LCD power specification.

2. Please use the original connecting accessories to avoid damaging the main board.

3. We ensure offering communication technology support through E-mail, telephone for lifelong technical support service.

4. We ensure offering 6-months repair service for free, if malfunction occurs in warranty because of quality problem. Under that circumstance, please contact our retailer or our company with purchase receipt within warranty period, we are willing to repair or replace.

5. Under these circumstances, we do not offer repair for free:

- Over warranty time;
- Do not attach purchase receipt;
- Liquid inlet, damp or mold;
- Malfunction and damage is not due to product quality but drops, intense sharking, arbitrarily modify, disoperation after purchase;
- Damage of force majeure.

6. We reserve intellectual property for the software and hardware technical data of **IAC-IMX93-CM**; users can only use them for teaching, testing,

researching. Shall not be engaged in any commercial purpose. Shall not distribute them on the Internet. Shall not intercept, modify them to tamper copyright.

7. We accept batch order; we can offer technical support and service.