



uCOM-IMX93

SMARC Module

User's Manual 1st Ed

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Packing List

Before setting up your product, please make sure the following items have been shipped:

Item	Quantity
● uCOM-IMX93	1

If any of these items are missing or damaged, please contact your distributor or sales representative immediately.

About this Document

This User's Manual contains all the essential information, such as detailed descriptions and explanations on the product's hardware and software features (if any), its specifications, dimensions, jumper/connector settings/definitions, and driver installation instructions (if any), to facilitate users in setting up their product.

Users may refer to the product page on AAEON.com for the latest version of this document.

Safety Precautions

Please read the following safety instructions carefully. It is advised that you keep this manual for future references

1. All cautions and warnings on the device should be noted.
2. Make sure the power source matches the power rating of the device.
3. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
4. Always completely disconnect the power before working on the system's hardware.
5. No connections should be made when the system is powered as a sudden rush of power may damage sensitive electronic components.
6. If the device is not to be used for a long time, disconnect it from the power supply to avoid damage by transient over-voltage.
7. Always disconnect this device from any AC supply before cleaning.
8. While cleaning, use a damp cloth instead of liquid or spray detergents.
9. Make sure the device is installed near a power outlet and is easily accessible.
10. Keep this device away from humidity.
11. Place the device on a solid surface during installation to prevent falls
12. Do not cover the openings on the device to ensure optimal heat dissipation.
13. Watch out for high temperatures when the system is running.
14. Do not touch the heat sink or heat spreader when the system is running
15. Never pour any liquid into the openings. This could cause fire or electric shock.
16. As most electronic components are sensitive to static electrical charge, be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and contain all electronic components in any static-shielded containers.

17. If any of the following situations arises, please the contact our service personnel:
 - i. Damaged power cord or plug
 - ii. Liquid intrusion to the device
 - iii. Exposure to moisture
 - iv. Device is not working as expected or in a manner as described in this manual
 - v. The device is dropped or damaged
 - vi. Any obvious signs of damage displayed on the device
18. **DO NOT LEAVE THIS DEVICE IN AN UNCONTROLLED ENVIRONMENT WHERE THE STORAGE TEMPERATURE IS BELOW -40°C (-40°F) OR ABOVE 85°C (185°F) TO PREVENT DAMAGE.**

FCC Statement

Warning!



This device complies with Part 15 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.

Caution:

There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions and your local government's recycling or disposal directives.

Attention:

Il y a un risque d'explosion si la batterie est remplacée de façon incorrecte. Ne la remplacer qu'avec le même modèle ou équivalent recommandé par le constructeur. Recycler les batteries usées en accord avec les instructions du fabricant et les directives gouvernementales de recyclage.

China RoHS Requirements (CN)

产品中有毒有害物质或元素名称及含量

AAEON 主板/子板/背板

QQ4-381 Rev.A2

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板 及其电子组件	×	○	○	○	○	○
外部信号 连接器及线材	×	○	○	○	○	○
本表格依据 SJ/T 11364 的规定编制。 ○：表示该有毒有害物质在该部件所有均质材料中的含量均在GB/T 26572标准规定的限量要求以下。 ×：表示该有害物质的某一均质材料超出了GB/T 26572的限量要求，然而该部件仍符合欧盟指令2011/65/EU 的规范。 环保使用期限(EFUP (Environmental Friendly Use Period)) : 10年 备注：此产品所标示之环保使用期限，系指在一般正常使用状况下。						

China RoHS Requirement (EN)

Name and content of hazardous substances in product

AAEON Main Board/Daughter Board/Backplane

QO4-381 Rev.A2

Part Name	Hazardous Substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
PCB Assemblies	×	○	○	○	○	○
Connector and Cable	×	○	○	○	○	○
The table is prepared in accordance with the provisions of SJ/T 11364. ○: Indicates that said hazardous substance contained in all of the homogenous materials for this product is below the limit requirement of GB/T 26572. ×: Indicates that said hazardous substance contained in at least one of the homogenous materials used for this part is above the limit requirement of GB/T 26572. But this product still be compliance with 2011/65/EU Directive (allowed with 2011/65/EU Annex III of RoHS exemption with number 6(c),7(a),7(c)-1). EFUP (Environment Friendly Use Period) value: 10 years Notes: This product defined period of use is under normal condition.						

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Chapter 1

Product Specifications

1.1 Specifications

System	
Form Factor	SMARC 2.1
CPU	NXP i.MX 93: Arm® Cortex®-A55 x 2, 1.7 GHz Arm® Cortex®-M33, 250 MHz
Chipset	-
Memory	Onboard LPDDR4, up to 2GB
Storage	eMMC 5.1, 16GB/32GB/64GB (optional) SDIO 3.0 x 1 (for SD Card)
BIOS	-
MTBF (Hours)	3,896,445
Wake on LAN	-
Watchdog Timer	Yes
Real Time Clock	RTC x 1
Boot Select	Carrier SD Card Module eMMC Flash Universal Update Utility (UUU) Serial Download Mode
Security	TPM 2.0 (optional)
Display	
Graphics Controller	NXP Integrated 2D Graphic Acceleration
Video Output	HDMI x 1, 1920 x 1080, 1280 x 720 (optional w/I2S) LVDS 4-Lane x 1 (18/24bit) MIPI-DSI 4-Lane x 1 (by request)

I/O

Ethernet	Gigabit Ethernet x 2 (TSN x 1)
USB	USB 2.0 x 4 (Host)
	USB 2.0 x 1 (OTG)
Serial Port	UART x 2 (4-wire, 1.8V)
	UART x 2 (2-wire, 1.8V, SER1 for A55 Debug Port)
Audio	I2S x 1 (optional w/ HDMI)
PCIe	-
CANBus	CAN 2.0 FD x 2, (1.8V)
MIPI-CSI	MIPI CSI 2 Lane x 1
GPIO	8-bit (one for PWM)
Other Interfaces	SPI x 2 (SPI1 colay with TPM)
	I2C x 4 (See I2C Notes)

I2C Notes

On SMARC:

- RTC: Co-located with I2C_CAM0
- EEPROM: Co-located with I2C_GP
- PMIC: Co-located with I2C_PM

On Software:

Device Tree	I2C device control
I2C1	/dev/i2c-0
I2C2	/dev/i2c-1
I2C3	/dev/i2c-2
I2C5	/dev/i2c-4

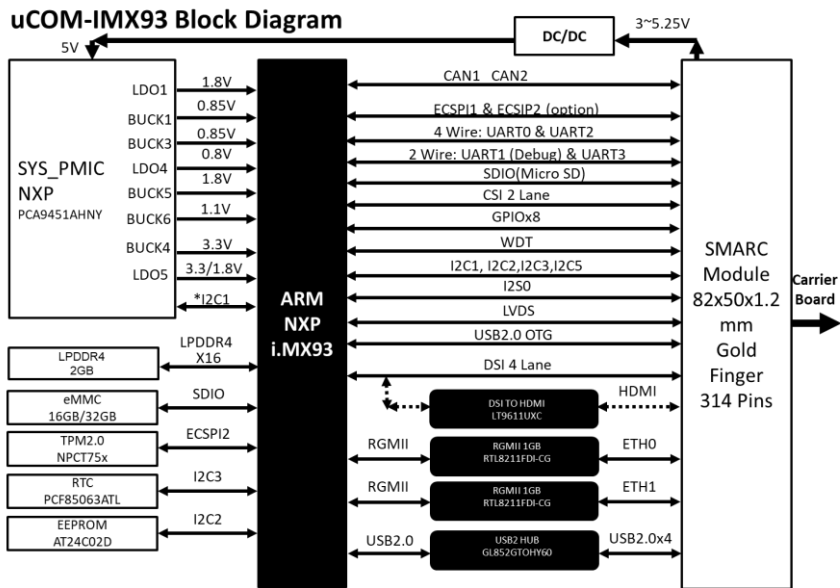
Power

Power Requirement	DC 3.3V ~ 5.25V
Power Consumption	13.8W (Full Loading)

Environmental

Dimensions	3.23" x 1.97" (82mm x 50mm)
Weight	0.03 lb. (0.016Kg)
Operating Temperature	-40°F ~ 185°F (-40°C ~ 85°C) Optional: 32°F ~ 140°F (0°C ~ 60°C)
Storage Temperature	-40°F ~ 185°F (-40°C ~ 85°C)
Operating Humidity	0% ~ 90% relative humidity, non-condensing
Certification	CE/FCC Class A
OS Support	Yocto 5.0 (Kernel 6.6.23) Ubuntu 22.04 (Kernel 6.6.23-LTS-next, by request) Windows 11 IoT (by request)
Support Protocols	By request

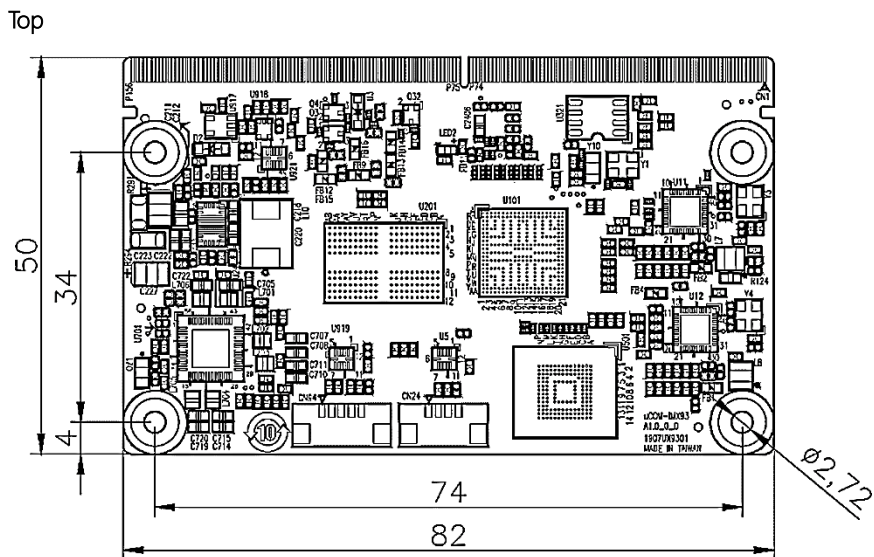
1.2 Function Block Diagram



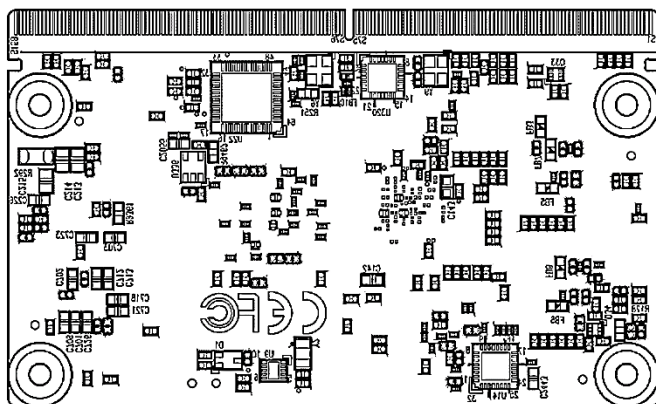
Chapter 2

Hardware Information

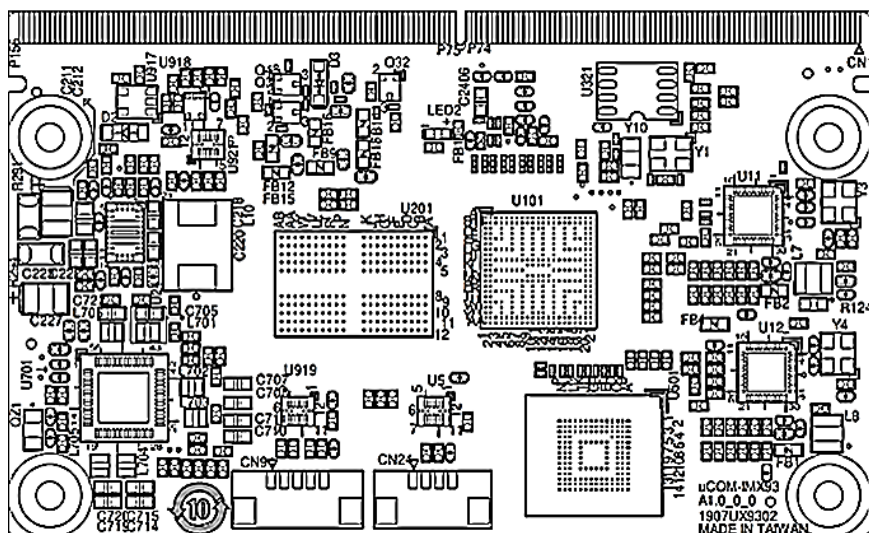
Top



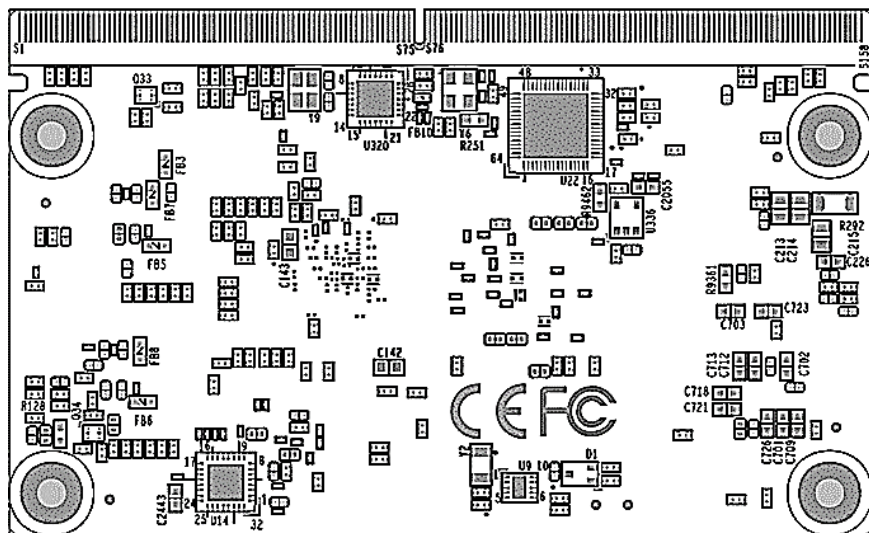
Bottom



Top Side



Bottom Side



2.3 MXM Gold Finger (CN1)

Pin	Pin Name	Pin	Pin Name
P1	NC	S1	I2C_CAM1_CK
P2	GND	S2	I2C_CAM1_DAT
P3	CSI1_CK+	S3	GND
P4	CSI1_CK-	S4	NC
P5	GBE1_SDP	S5	I2C_CAM0_CK
P6	GBE0_SDP	S6	NC
P7	CSI1_RX0+	S7	I2C_CAM0_DAT
P8	CSI1_RX0-	S8	NC
P9	GND	S9	NC
P10	CSI1_RX1+	S10	GND
P11	CSI1_RX1-	S11	NC
P12	GND	S12	NC
P13	NC	S13	GND
P14	NC	S14	NC
P15	GND	S15	NC
P16	NC	S16	GND
P17	NC	S17	GBE1_MDI0+
P18	GND	S18	GBE1_MDI0-
P19	GBE0_MDI3-	S19	GBE1_LINK100#
P20	GBE0_MDI3+	S20	GBE1_MDI1+
P21	GBE0_LINK100#	S21	GBE1_MDI1-
P22	GBE0_LINK1000#	S22	GBE1_LINK1000#
P23	GBE0_MDI2-	S23	GBE1_MDI2+
P24	GBE0_MDI2+	S24	GBE1_MDI2-
P25	GBE0_LINK_ACT#	S25	GND
P26	GBE0_MDI1-	S26	GBE1_MDI3+
P27	GBE0_MDI1+	S27	GBE1_MDI3-
P28	NC	S28	NC
P29	GBE0_MDI0-	S29	NC
P30	GBE0_MDI0+	S30	NC
P31	NC	S31	GBE1_LINK_ACT#
P32	GND	S32	NC
P33	SDIO_WP	S33	NC
P34	SDIO_CMD	S34	GND
P35	SDIO_CD#	S35	USB4+
P36	SDIO_CK	S36	USB4-

Pin	Pin Name	Pin	Pin Name
P37	SDIO_PWR_EN	S37	USB3_VBUS_DET
P38	GND	S38	AUDIO_MCK
P39	SDIO_D0	S39	I2S0_LRCK
P40	SDIO_D1	S40	I2S0_SDOUT
P41	SDIO_D2	S41	I2S0_SDIN
P42	SDIO_D3	S42	I2S0_CK
P43	SPI0_CS0#	S43	NC
P44	SPI0_CK	S44	NC
P45	SPI0_DIN	S45	NC
P46	SPI0_DO	S46	NC
P47	GND	S47	GND
P48	NC	S48	I2C_GP_CK
P49	NC	S49	I2C_GP_DAT
P50	GND	S50	NC
P51	NC	S51	NC
P52	NC	S52	NC
P53	GND	S53	NC
P54	QSPI_CS0#	S54	NC
P55	NC	S55	NC
P56	QSPI_CK	S56	NC
P57	QSPI_IO_1	S57	NC
P58	QSPI_IO_0	S58	NC
P59	GND	S59	NC
P60	USB0+	S60	NC
P61	USB0-	S61	GND
P62	USB0_EN_OC#	S62	NC
P63	USB0_VBUS_DET	S63	NC
P64	USB0_OTG_ID	S64	GND
P65	USB1+	S65	NC
P66	USB1-	S66	NC
P67	USB1_EN_OC#	S67	GND
P68	GND	S68	USB3+
P69	USB2+	S69	USB3-
P70	USB2-	S70	GND
P71	USB2_EN_OC#	S71	NC
P72	NC	S72	NC-
P73	NC	S73	GND
P74	USB3_EN_OC#	S74	NC
P75	NC	S75	NC

Pin	Pin Name	Pin	Pin Name
P76	USB4_EN_OC#	S76	NC
P77	NC	S77	NC
P78	NC	S78	NC
P79	GND	S79	NC
P80	NC	S80	GND
P81	NC	S81	NC
P82	GND	S82	NC
P83	NC	S83	GND
P84	NC	S84	NC
P85	GND	S85	NC
P86	NC	S86	GND
P87	NC	S87	NC
P88	GND	S88	NC
P89	NC	S89	GND
P90	NC	S90	NC
P91	GND	S91	NC
P92	HDMI_D2+	S92	GND
P93	HDMI_D2-	S93	NC
P94	GND	S94	NC
P95	HDMI_D1+	S95	NC
P96	HDMI_D1-	S96	NC
P97	GND	S97	NC
P98	HDMI_D0+	S98	NC
P99	HDMI_D0-	S99	NC
P100	GND	S100	NC
P101	HDMI_CK+	S101	GND
P102	HDMI_CK-	S102	NC
P103	GND	S103	NC
P104	HDMI_HPD	S104	USB3_OTG_ID
P105	HDMI_CTRL_CK	S105	NC
P106	HDMI_CTRL_DAT	S106	NC
P107	HDMI_CEC	S107	LCD1_BKLT_EN
P108	GPIO0	S108	DSI1_CLK+
P109	GPIO1	S109	DSI1_CLK-
P110	GPIO2	S110	GND
P111	GPIO3	S111	DSI1_D0+
P112	GPIO4/HDA_RST#	S112	DSI1_D0-
P113	GPIO5	S113	NC
P114	GPIO6	S114	DSI1_D1+

Pin	Pin Name	Pin	Pin Name
P115	GPIO7	S115	DSI1_D1-
P116	NC	S116	LCD1_VDD_EN
P117	NC	S117	DSI1_D2+
P118	NC	S118	DSI1_D2-
P119	NC	S119	GND
P120	GND	S120	DSI1_D3+
P121	I2C_PM_CK	S121	DSI1_D3-
P122	I2C_PM_DAT	S122	LCD1_BKLT_PWM
P123	BOOT_SEL0#	S123	GPIO13
P124	BOOT_SEL1#	S124	GND
P125	BOOT_SEL2#	S125	LVDS0_0+
P126	RESET_OUT#	S126	LVDS0_0-
P127	RESET_IN#	S127	LCD0_BKLT_EN
P128	POWER_BTN#	S128	LVDS0_1+
P129	SER0_TX	S129	LVDS0_1-
P130	SER0_RX	S130	GND
P131	SER0_RTS#	S131	LVDS0_2+
P132	SER0_CTS#	S132	LVDS0_2-
P133	GND	S133	LCD0_VDD_EN
P134	SER1_TX	S134	LVDS0_CK+
P135	SER1_RX	S135	LVDS0_CK-
P136	SER2_TX	S136	GND
P137	SER2_RX	S137	LVDS0_3+
P138	SER2_RTS#	S138	LVDS0_3-
P139	SER2_CTS#	S139	I2C_LCD_CK
P140	SER3_TX	S140	I2C_LCD_DAT
P141	SER3_RX	S141	LCD0_BKLT_PWM
P142	GND	S142	GPIO12
P143	CAN0_TX	S143	GND
P144	CAN0_RX	S144	NC
P145	CAN1_TX	S145	WDT_TIME_OUT#
P146	CAN1_RX	S146	NC
P147	VDD_IN	S147	VDD_RTC
P148	VDD_IN	S148	NC
P149	VDD_IN	S149	SLEEP#
P150	VDD_IN	S150	VIN_PWR_BAD#
P151	VDD_IN	S151	NC
P152	VDD_IN	S152	NC
P153	VDD_IN	S153	CARRIER_STBY#

Pin	Pin Name	Pin	Pin Name
P154	VDD_IN	S154	CARRIER_PWR_ON
P155	VDD_IN	S155	FORCE_RECOV#
P156	VDD_IN	S156	BATLOW#
		S157	NC
		S158	GND

Chapter 3

Product Setup and Configuration

3.1 System Account Management

3.1.1 Boot Mode Selection

On SMARC module, please refer to MXM Gold Finger (CN1).

Pin	Pin Name
P123	BOOT_SEL0#
P124	BOOT_SEL1#
P125	BOOT_SEL2#

Boot Mode	BOOT_SEL0#	BOOT_SEL1#	BOOT_SEL2#
EMMC	Low	High	Low
SD Card	High	Low	Low
Serial Download	High	Low	High

On ECB-960T, please refer to Boot Select (SW5).

Boot Mode	Pin 1	Pin 2	Pin 3
EMMC	ON	OFF	ON
SD Card	OFF	ON	ON
Serial Download	OFF	ON	OFF

3.1.2 Debug Console

On ECB-960T, please refer to section SER1/UART1 with the following pin configuration:

Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
3.3V	TX	RX	GND	GND

3.1.2.2 User & Login

Ubuntu:

User: root

Password: Pw#12345

3.2 I/O Control Command and Examples

3.2.1 CANBus

On SMARC module, please refer to MXM Gold Finger (CN1).

Pin	Pin Name
P143	CAN0_TX
P144	CAN0_RX
P145	CAN1_TX
P146	CAN1_RX

On ECB-960T, please refer to CN25 (CAN0) and CN18 (CAN1).

Pin 1	Pin 2	Pin 3	Pin 4
CANH	GND	CANL	NA

Step 1: Connect CN25 pin 1 to CN18 pin 1, CN25 pin 3 to CN18 pin 3 (on ECB-960T).

Step 2: Set CAN0 and CAN1 up.

```
root@uCOM-IMX93:~# ip link set can0 type can bitrate 1000000 dbitrat
4000000 fd on
root@uCOM-IMX93:~# ifconfig can0 up
root@uCOM-IMX93:~# ip link set can1 type can bitrate 1000000 dbitrat
4000000 fd on
root@uCOM-IMX93:~# ifconfig can1 up
```

Step 3: candump CAN0

```
root@uCOM-IMX93:~# candump can0 &
```

Step 4: cansend CAN1

```
root@uCOM-IMX93:~# cansend can1 5A1#11.2233.44556677.88
can0  5A1  [8] 11 22 33 44 55 66 77 88
```

3.2.2 DIO

There are two ways to access the DIO.

On SMARC module, please refer to MXM Gold Finger (CN1), please note that uCOM-IMX93 only supports up to 8 GPIOs.

Pin	Pin Name	Notes
P108	GPIO0/CAM0_PWR#	
P109	GPIO1/CAM1_PWR#	
P110	GPIO2/CAM0_RST#	
P111	GPIO3/CAM1_RST#	
P112	GPIO4/HDA_RST#	Default tested on ECB-960T as audio codec hda_rst
P113	GPIO5/PWM_OUT	
P114	GPIO6/TACHIN	Default used as HDMI Interrupt
P115	GPIO7	Default used as PMIC IRQ

Output Mode

Configure the GPIO pins for output using the following commands:

Name	Commands
GPIO0/CAM0_PWR#	gpioset -c 1 23=0 gpioset -c 1 23=1
GPIO1/CAM1_PWR#	gpioset -c 3 14=0 gpioset -c 3 14=1
GPIO2/CAM0_RST#	gpioset -c 1 21=0 gpioset -c 1 21=1
GPIO3/CAM1_RST#	gpioset -c 1 22=0 gpioset -c 1 22=1
GPIO4/HDA_RST#	gpioset -c 1 20=0 gpioset -c 1 20=1
GPIO5/PWM_OUT	gpioset -c 1 25=0 gpioset -c 1 25=1
GPIO6/TACHIN	gpioset -c 3 12=0 gpioset -c 3 12=1
GPIO7	gpioset -c 1 24=0 gpioset -c 1 24=1

Input Mode

To read the state of GPIO pins:

Name	Commands
GPIO0/CAM0_PWR#	gpioget -c 1 23
GPIO1/CAM1_PWR#	gpioget -c 3 14
GPIO2/CAM0_RST#	gpioget -c 1 21
GPIO3/CAM1_RST#	gpioget -c 1 22
GPIO4/HDA_RST#	gpioget -c 1 20
GPIO5/PWM_OUT	gpioget -c 1 25
GPIO6/TACHIN	gpioget -c 3 12
GPIO7	gpioget -c 1 24

On ECB-960T, please refer to section 2.4.27 (CN29, CN30).

Output Mode

Configure the GPIO pins for output using the following commands:

CN29	Name	Commands
Pin 1	GPIO 0	gpioset -c 1 23=0 gpioset -c 1 23=1
Pin 2	GPIO 1	gpioset -c 3 14=0 gpioset -c 3 14=1
Pin 3	GPIO 2	gpioset -c 1 21=0 gpioset -c 1 21=1
Pin 4	GPIO 3	gpioset -c 1 22=0 gpioset -c 1 22=1
Pin 5	GPIO 4	gpioset -c 1 20=0 gpioset -c 1 20=1
Pin 6	GPIO 5	gpioset -c 1 25=0 gpioset -c 1 25=1
Pin 7	GPIO 6	gpioset -c 3 12=0 gpioset -c 3 12=1

CN30	Name	Commands
Pin 1	GPIO 7	gpioset -c 1 24=0 gpioset -c 1 24=1

Input Mode

To read the state of GPIO pins:

CN29	Name	Commands
Pin 1	GPIO 0	gpioget -c 1 23
Pin 2	GPIO 1	gpioget -c 3 14
Pin 3	GPIO 2	gpioget -c 1 21
Pin 4	GPIO 3	gpioget -c 1 22
Pin 5	GPIO 4	gpioget -c 1 20
Pin 6	GPIO 5	gpioget -c 1 25
Pin 7	GPIO 6	gpioget -c 3 12

CN30	Name	Commands
Pin 1	GPIO 7	gpioget -c 1 24

3.2.3 Ethernet

On SMARC module, please refer to MXM Gold Finger (CN1).

Pin	Pin Name
P6	GBE0_SDP
S17	GBE1_MDI0+
S18	GBE1_MDI0-
P27	GBE0_MDI1+
P26	GBE0_MDI1-
P24	GBE0_MDI2+
P23	GBE0_MDI2-
P20	GBE0_MDI3+
P19	GBE0_MDI3-
P21	GBE0_LINK100#
P22	GBE0_LINK1000#
P25	GBE0_LINK_ACT#
P5	GBE1_SDP
S20	GBE1_MDI1+
S21	GBE1_MDI1-
S23	GBE1_MDI2+
S24	GBE1_MDI2-
S26	GBE1_MDI3+

Pin	Pin Name
S27	GBE1_MDI3-
S19	GBE1_LINK100#
S22	GBE1_LINK1000#
S31	GBE1_LINK_ACT#

On ECB-960T, please refer to section 2.4.32 (CN40).

Step 1: Check the Ethernet interface

Command:

```
root@uCOM-IMX93:~# ifconfig
```

```
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
    inet 172.16.17.99  netmask 255.255.255.0  broadcast 172.16.17.255
    inet6 fe80::56a9:6bd1:8fb8:4010  prefixlen 64  scopeid 0x20<link>
    inet6 fe80::42d:20ff:fe83:3507  prefixlen 64  scopeid 0x20<link>
    ether 06:2d:20:83:35:07  txqueuelen 1000  (Ethernet)
    RX packets 23  bytes 4568 (4.4 KiB)
    RX errors 0  dropped 2  overruns 0  frame 0
    TX packets 45  bytes 6991 (6.8 KiB)
    TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

```
eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
    inet 172.16.17.90  netmask 255.255.255.0  broadcast 172.16.17.255
    inet6 fe80::7b28:9a7b:4d1e:b320  prefixlen 64  scopeid 0x20<link>
    inet6 fe80::d0bc:6aff:fe76:56cc  prefixlen 64  scopeid 0x20<link>
    ether d2:bc:6a:76:56:cc  txqueuelen 1000  (Ethernet)
    RX packets 3794  bytes 288753 (281.9 KiB)
    RX errors 0  dropped 1  overruns 0  frame 0
    TX packets 86  bytes 10868 (10.6 KiB)
    TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
    device interrupt 110
```

```
lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
    inet 127.0.0.1  netmask 255.0.0.0
    inet6 ::1  prefixlen 128  scopeid 0x10<host>
    loop  txqueuelen 1000  (Local Loopback)
    RX packets 90  bytes 7662 (7.4 KiB)
    RX errors 0  dropped 0  overruns 0  frame 0
    TX packets 90  bytes 7662 (7.4 KiB)
    TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Step 2: Ping test

```
root@uCOM-IMX93:~# ping google.com -I eth0 -c 1
```

```
PING google.com (142.250.198.78) from 172.16.17.104 eth0: 56(84) bytes of data.  
64 bytes from lctsaa-ab-in-f14.1e100.net (142.250.198.78): icmp_seq=1 ttl=56 time=11.8  
ms
```

```
--- google.com ping statistics ---  
1 packets transmitted, 1 received, 0% packet loss, time 0ms  
rtt min/avg/max/mdev = 11.770/11.770/11.770/0.000 ms
```

```
root@ uCOM-IMX93:~# ping google.com -I eth1 -c 1  
PING google.com (142.250.77.14) from 172.16.17.91 eth1: 56(84) bytes of data.  
64 bytes from nctsaa-ab-in-f14.1e100.net (142.250.77.14): icmp_seq=1 ttl=56 time=5.60  
ms
```

```
--- google.com ping statistics ---  
1 packets transmitted, 1 received, 0% packet loss, time 0ms  
rtt min/avg/max/mdev = 5.600/5.600/5.600/0.000 ms
```

3.2.4 RTC

Command:

```
root@uCOM-IMX93:~# hwclock -r
```

Output:

```
2024-11-01 06:29:36.025245+00:00
```

Synchronize the System Time to the RTC:

```
root@uCOM-IMX93:~# date 110110302024 && hwclock -w && date
```

Output:

```
Fri Nov 1 10:30:00 UTC 2024
```

```
Fri Nov 1 10:30:01 UTC 2024
```

3.2.5 Serial

3.2.5.1 Pin Definition

UART	Pin 1	Pin 2	Pin 3	Pin 4	Pin5
0	RTS	TX	RX	CTS	GND
1 (debug console)	3.3V	TX	RX	GND	GND
2	RTS	TX	RX	CTX	GND
3	3.3V	TX	RX	GND	GND

3.2.5.2 Device Name

UART	Device Name
0	/dev/ttyLP4
1 (debug console)	/dev/ttyLP0
2	/dev/ttyLP5
3	/dev/ttyLP1

3.2.5.3 UART 0 (/dev/ttyLP4)

Connect UART 0 pin 2 to pin 3

Command:

```
root@uCOM-IMX93:~# stty -F /dev/ttyLP4 -echo
root@uCOM-IMX93:~# cat /dev/ttyLP4 &
[1] 3094
root@uCOM-IMX93:~# echo "aaeon" > /dev/ttyLP4
root@uCOM-IMX93:~# aaeon
```

3.2.5.4 UART 2 (/dev/ttyLP5)

Connect UART 2 pin 2 to pin 3

Command:

```
root@uCOM-IMX93:~# stty -F /dev/ttyLP5 -echo
root@uCOM-IMX93:~# cat /dev/ttyLP5 &
[1] 3313
root@uCOM-IMX93:~# echo "aaeon" > /dev/ttyLP5
root@uCOM-IMX93:~# aaeon
```

3.2.5.5 UART 3 (/dev/ttyLP1)

Connect UART 3 pin 2 to pin 3

Command:

```
root@uCOM-IMX93:~# stty -F /dev/ttyLP1 -echo
root@uCOM-IMX93:~# cat /dev/ttyLP1 &
[1] 3390
root@uCOM-IMX93:~# echo "aaeon" > /dev/ttyLP1
root@uCOM-IMX93:~# aaeon
```

3.2.6 TPM

This command is used to query and list all Non-Volatile (NV) indexes on a TPM (Trusted Platform Module) device, it will display a list of all active NV index handles stored on the TPM.

Command:

```
root@uCOM-IMX93:~# tpm2_getcap handles-nv-index
```

Output:

```
- 0x1C00002
- 0x1C0000A
```

3.2.7 USB

Note: On ECB-960T, USB2N_4 is not supported.

Command:

```
root@uCOM-IMX93:~# lsusb -t
```

Output:

```
/: Bus 02.Port 1: Dev 1, Class=root_hub, Driver=ci_hdrc/1p, 480M
  |__ Port 1: Dev 2, If 0, Class=Hub, Driver=hub/4p, 480M
    |__ Port 1: Dev 4, If 0, Class=Mass Storage, Driver=usb-storage, 480M
    |__ Port 2: Dev 5, If 0, Class=Mass Storage, Driver=usb-storage, 480M
    |__ Port 3: Dev 3, If 0, Class=Mass Storage, Driver=usb-storage, 480M
    |__ Port 4: Dev 6, If 0, Class=Mass Storage, Driver=usb-storage, 480M
/: Bus 01.Port 1: Dev 1, Class=root_hub, Driver=ci_hdrc/1p, 480M
  |__ Port 1: Dev 2, If 0, Class=Mass Storage, Driver=usb-storage, 480M
```

3.2.8 Watchdog Timer

Save the following content to the file "wdt.c"

```
#include <stdio.h>
#include <errno.h>
#include <fcntl.h>
#include <linux/watchdog.h>
#include <sys/ioctl.h>
#include <unistd.h>
#include <stdlib.h>

int main(int argc, char *argv[])
{
    int fd, timeout;
    // open watchdog
    fd = open("/dev/watchdog", O_RDWR);
    // set timeout seconds —
    timeout = 3;
    // enable watchdog
    ioctl(fd, WDIOC_SETTIMEOUT, &timeout);
    printf("Watchdog start. System will reboot after %d seconds\n", timeout);
    while(1) {
```

```
#if 0
    // clear watchdog
    printf("Clear watchdog\n");
    ioctl(fd , WDIOC_KEEPALIVE,0);
#endif
    sleep(1);
    system("date");
}
close (fd);
return 0;
}
```

Command:

```
root@uCOM-IMX93:~# gcc wdt.c -o wdt
```

```
root@uCOM-IMX93:~# ./wdt
```

The system will reboot after 3 seconds.

3.2.9 SD Card

Device name `"/dev/mmcblk1"`

Command:

```
root@uCOM-IMX93:~# lsblk |grep mmcblk1
```

Output:

```
mmcblk1      179:96    0 29.7G    0 disk
|-mmcblk1p1  179:97    0 83.2M    0 part
`-mmcblk1p2  179:98    0  5.1G    0 part /
```

3.2.10 eMMC

device name `"/dev/mmcblk0"`

Command:

```
root@uCOM-IMX93:~# lsblk |grep mmcblk0
```

Output:

```
mmcblk0      179:0     0 14.7G    0 disk
|-mmcblk0p1  179:1     0  128M    0 part /run/media/boot-mmcblk0p1
`-mmcblk0p2  179:2     0 14.5G    0 part /run/media/rootfs-mmcblk0p2
mmcblk0boot0 179:32    0   4M     1 disk
mmcblk0boot1 179:64    0   4M     1 disk
```

3.2.11 I2C

Command:

```
root@uCOM-IMX93:~# i2cdetect -l
```

Output:

i2c-0	i2c	44340000.i2c	I2C adapter
i2c-1	i2c	44350000.i2c	I2C adapter
i2c-2	i2c	42530000.i2c	I2C adapter
i2c-4	i2c	426b0000.i2c	I2C adapter

3.2.12 EEPROM

Command:

```
root@uCOM-IMX93:~# i2cdetect -r -y 1
```

Output:

```
root@uCOM-IMX93:~# i2cdetect -r -y 1
      0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
10:  --  --  --  --  --  --  --  --  --  --  UU  --  --  --  --
20:  --  --  --  --  --  UU  --  --  --  --  --  --  --  --  --
30:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
40:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
50:  UU  --  --  --  --  --  --  --  58  --  --  --  --  --  --
60:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
70:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
```

3.2.13 Audio

Connect the audio cable (PN:170X000156) to connector “I2S” & plug signal & devices to LINE-IN, LINE-OUT & MIC.

Command:

```
root@uCOM-IMX93:~# amixer cset numid=15 100
root@uCOM-IMX93:~# amixer cset numid=64 1 && amixer cset numid=65 1
root@uCOM-IMX93:~# amixer cset numid=70 1 && amixer cset numid=71 1
root@uCOM-IMX93:~# arecord -Dhw:0,0 -r 48000 -c 2 --period-size=64 -f S16_LE |
aplay -Dhw:0,0
```

Audio Codec: TI TLV320AIC3106

Ref: [TLV320AIC3106 data sheet, product information and support | TI.com](#)

3.2.14 SPI

On SMARC module, please refer to MXM Gold Finger (CN1).

Pin	Pin Name
P43	SPI0_CS0#
S44	SPI0_CK
P45	SPI0_DIN
P46	SPI0_DO

Test on SPI device (Winbond, W25Q80)

Command:

```
root@uCOM-IMX93:~# printf "\x90\x00\x00\x00\xff\xff" | spi-pipe -d /dev/spidev1.0
-s 50000 -b 6 -n 1 | hexdump -C
```

Output got manufacture device ID EF13

```
00000000  00  00  00  00  ef  13          | . . . . . |
00000006
```

3.3 OS Installation

3.3.1 Flash SD Card to eMMC

Command:

```
root@uCOM-IMX93:~# ucom-imx93-emmc-flasher.sh
```

3.3.2 Check Version

Command:

```
root@uCOM-IMX93:~# cat /etc/os-release
```

Output:

```
PRETTY_NAME="NXP i.MX Release Distro 6.6-nanbiel (nanbiel)"
NAME="YOCTO 4.3/Linux"
VERSION="6.6-nanbiel (nanbiel)"
VERSION_ID=6.6-nanbiel
VERSION_CODENAME="nanbiel"
CPE_NAME="cpe:/o:openembedded:fsl-imx-xwayland:6.6-nanbiel"
ID=YOCTO
PROJECT="uCOM-IMX93"
IMAGE_VERSION="ucom_imx93_yocto_a10_0002.img"
HW_INFO="2G RAM MT53D512M32D2DS"
CREATE_DATE="2025/01/06"
```