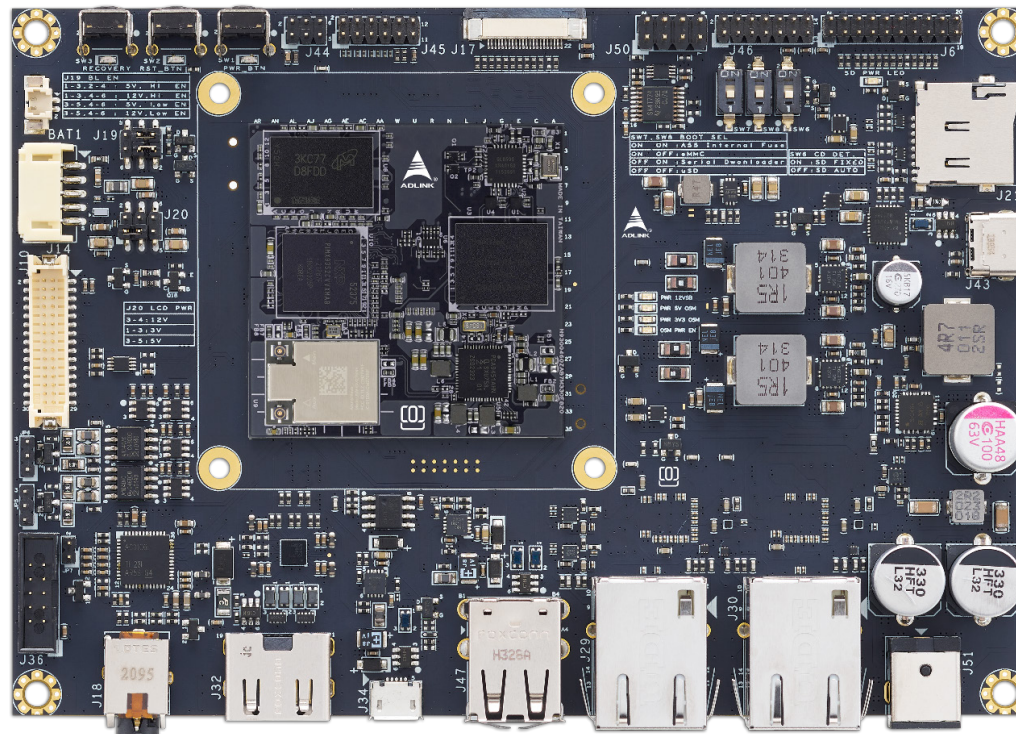


SBC3-IMX93

User's Guide



Revision: Rev. 1.1
Date: 2025-11-25
Part Number: 50M-77A09-1010



Revision History

Revision	Description	Date	Author
1.0	Initial release	2025-01-10	AL
1.1	Specifications, block diagram pinout and signal descriptions, and onboard jumpers and switches updated	2025-11-25	AL

Preface

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Safety Instructions

For user safety, please read and follow all Instructions, **WARNINGS**, **CAUTIONS**, and **NOTES** marked in this manual and on the associated equipment before handling/operating the equipment.

Read these safety instructions carefully.

- Keep this manual for future reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- Turn off power and unplug any power cords/cables when installing/mounting or un-installing/removing equipment.
- To avoid electrical shock and/or damage to equipment:
- Keep equipment away from water or liquid sources;
- Keep equipment away from high heat or high humidity;
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- Make sure to use recommended voltage and power source settings;
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- Only install/attach and operate equipment on stable surfaces and/or recommended mountings;
- If the equipment will not be used for long periods of time, turn off the power source and unplug the equipment.

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Note: This information adds clarity or specifics to text and illustrations.



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1. Introduction

1.1. The OSM Form Factor

The OSM ("Open Standard Module") Open Standard Module™ specification facilitates the development, production, and distribution of embedded modules tailored for renowned MCU32, ARM, and x86 architectures. This standard is increasingly relevant for IoT applications, as it merges the benefits of modular embedded computing with the growing demands for cost efficiency, compactness, and versatile interfaces.

The modules serve as building blocks for portable and stationary embedded systems. They integrate the core CPU and support circuits, including DRAM, boot flash, power sequencing, and CPU power supplies. The modules are used with application-specific carrier boards to implement features such as audio CODECs, touch controllers, wireless devices, PHY, and more. The modular design not only promotes scalability and fast time to market but also ensures upgradability, all while maintaining low costs, low power consumption, and a compact physical size.



OSM module and carrier specifications are available online at: <https://sget.org/standards/osm/>

1.2. Product Brief

The SBC3-IMX93 is a 3.5-inch single-board computer designed for industrial applications that require extended temperature ranges and shock-resistant durability. Powered by the advanced i.MX93 microprocessor, it offers enhanced security features and high-performance Cortex-A55 cores.

2. Specifications

2.1. Board Specifications

Form factor

3.5" form factor

Power supply

Voltage range: from 15 to 30 VDC

Graphics

HDMI over DSI to HDMI bridge (ADV7535)

LVDS single-channel

USB

3 USB2.0 interfaces (2x type A, 1x microUSB)

Communication

2 Gbe ethernet port with TI DP83867IR phy

Slow-speed signals

4x PWM / 2x ADC on header (J50)

2x CAN header (JP5 & JP6)

2x I2C on header (J44)

2x SPI on header (J45)

14x GPIO on header (J6)

3x UART on header (J46)

2.2. Module Interface

1x LGA Footprint: Supports OSM LGA-type modules

2.3. Graphics and Video

HDMI Port: Routed through a DSI to HDMI bridge

LVDS Output: Single-channel LVDS to Hirose connector

2.4. USB Interfaces

3x USB ports:

- 1x OTG (On-The-Go)
- 2x Host USB 2.0

2.5. Backlight Power

Selectable 5V or 12V, switchable via jumper

2.6. LCD Power

3V, 5V, or 12V DC for LCD

2.7. Networking

LAN0 & LAN1: Connected to RJ45 connectors via a PHY.

2.8. Storage

microSD Slot: Connected to SDIO A.

2.9. Camera Interface

CSI Interface: Routed to a 22-pin CSI connector, with 2 lanes available.

2.10. Audio

TI TLV320AIC3106 Audio Codec: Connected to I²S A

2.11. Communication

Dual CAN Interface: Equipped with CAN transceivers on the board for communication.

2.12. Power Supply

The board is powered by a Barrel type connector, accepting 15 to 30 VDC.

2.13. Mechanical and Environmental

Form Factor solder down module

SGET OSM Specifications 1.1 Size L

Carrier dimension

3.5" standard

Operating temperature

Standard: 0°C to 60°C / -40°C to 85°C

Humidity

5-90% RH operating, non-condensing

5-95% RH storage (and operating with conformal coating)

Shock and vibration

IEC 60068-2-64 and IEC-60068-2-27, MIL-STD-202 F, Method 213B, Table 213-I,

Condition A and Method 214A, Table 214-I, Condition D

3. Block Diagram

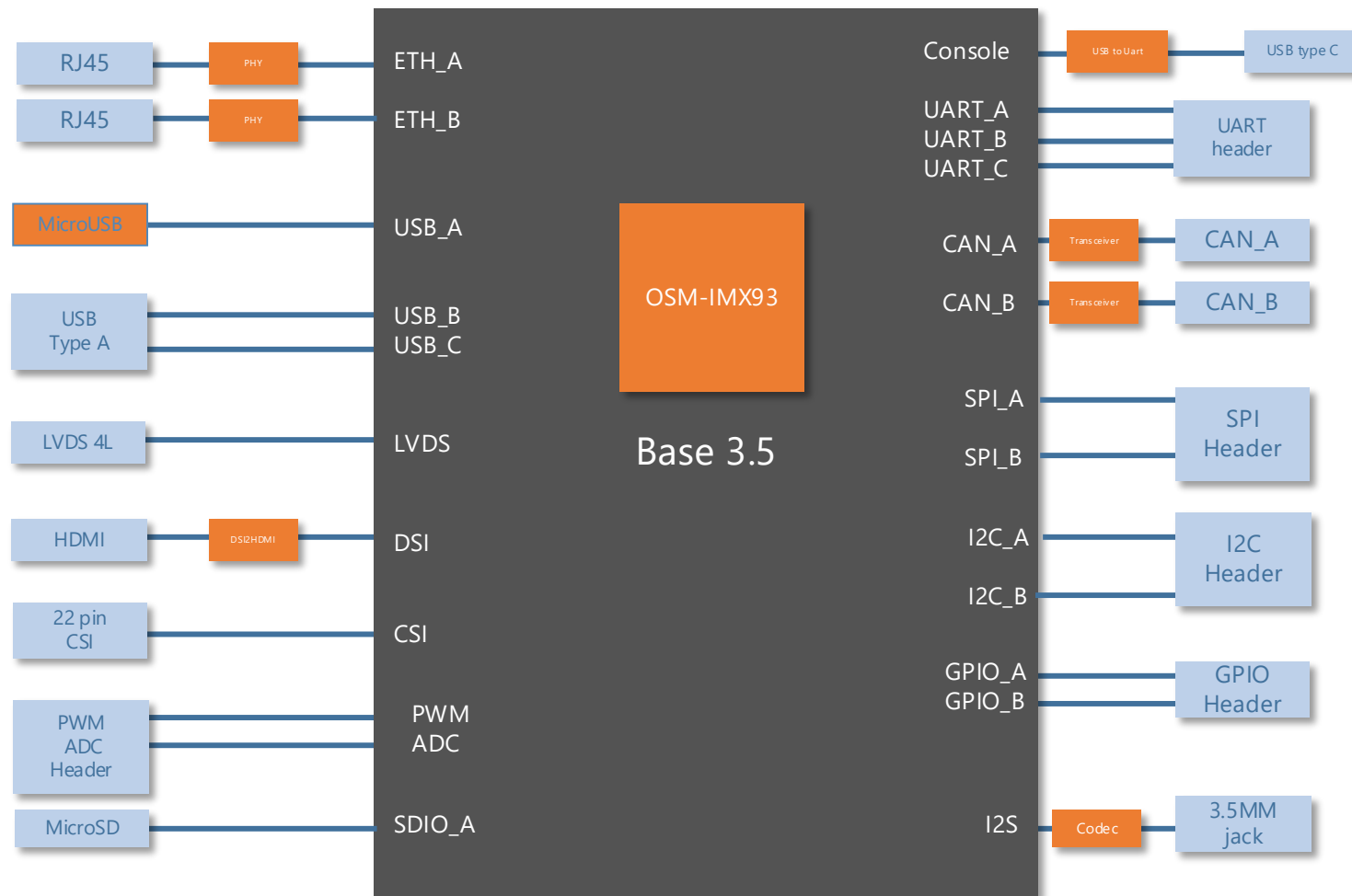


Figure 1 – Module function diagram

4. Pinout and Signal Descriptions

4.1. Pin Summary

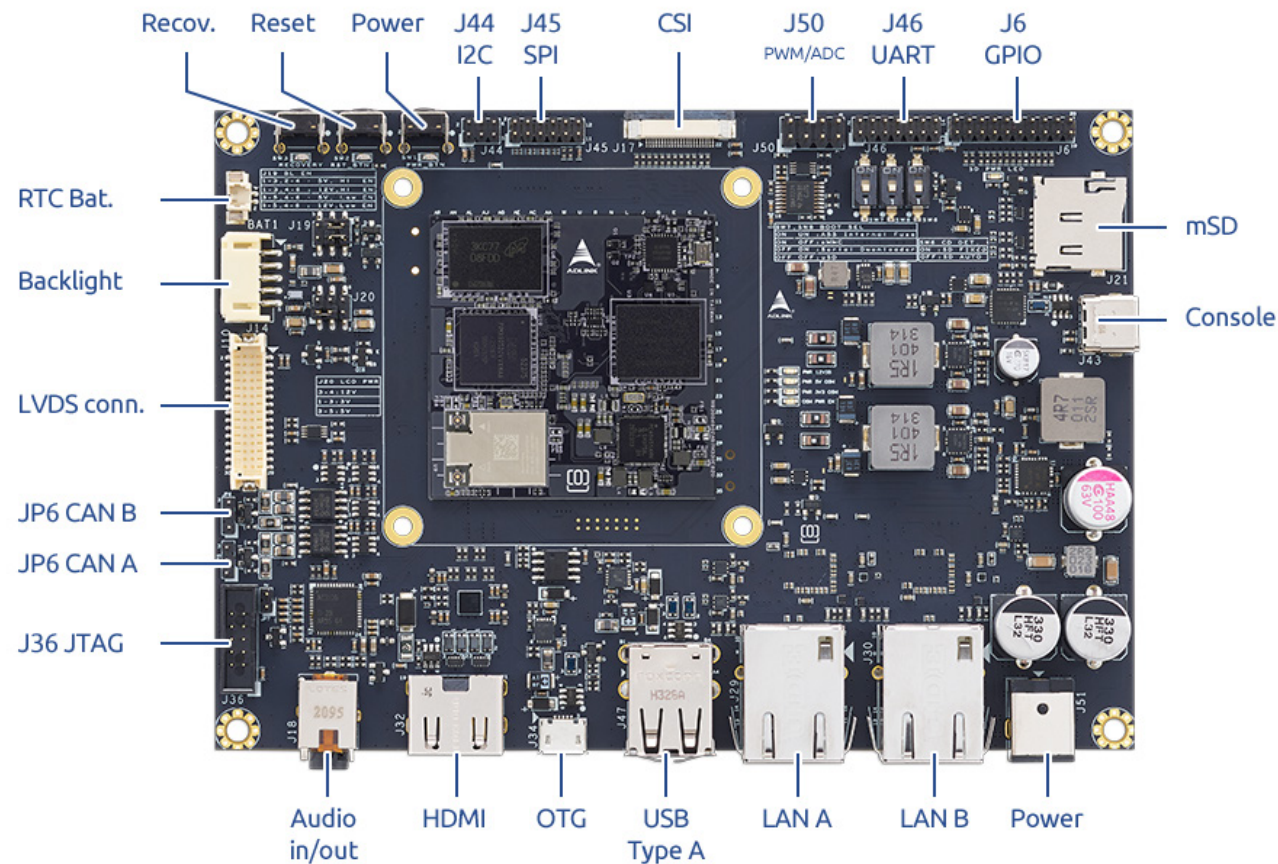


Figure 2 –SBC3-IMX93 (Top)

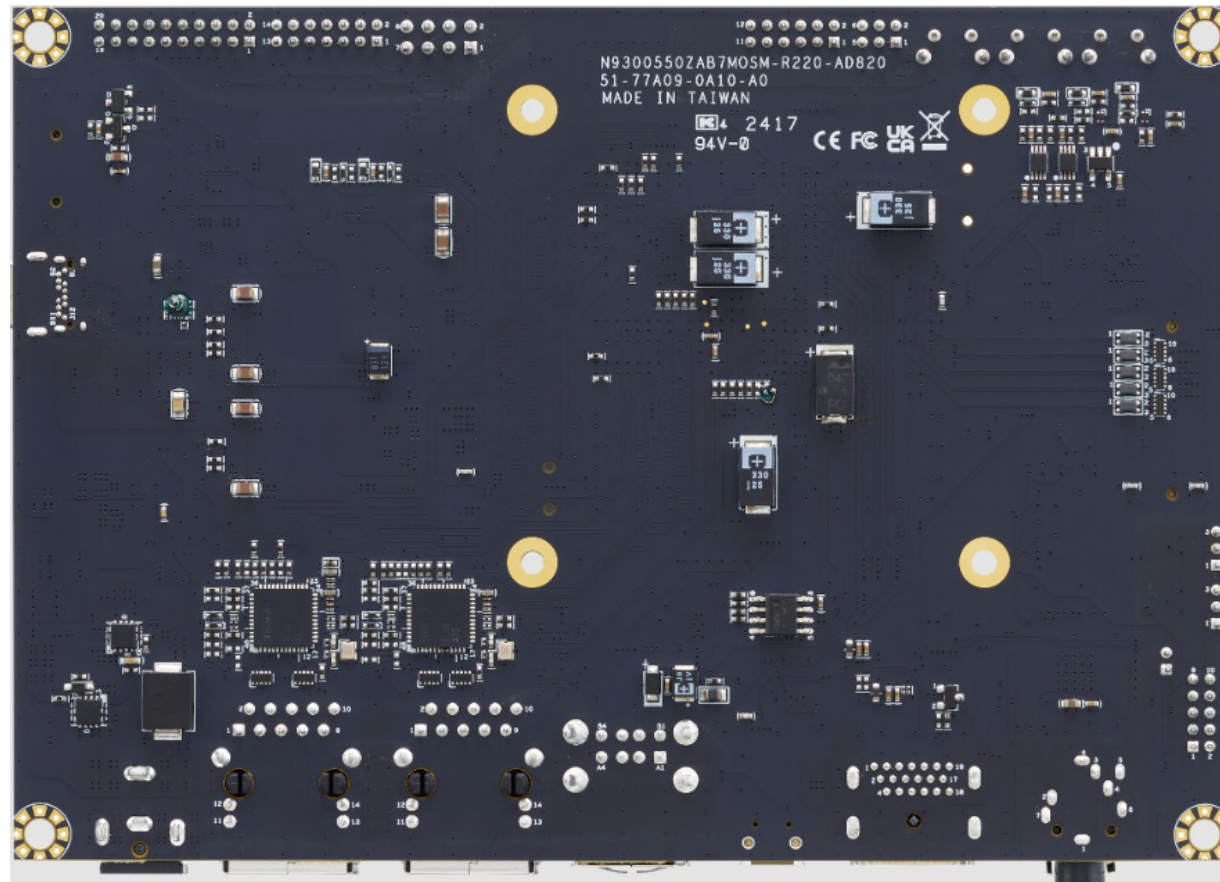


Figure 3– SBC3-IMX93 (Bottom)

4.2. Signal Terminology Descriptions

The following information provides descriptions of the terms used in the signal description table:

Term	Description
I	Input to the module
O	Output from the module
O OD	Open drain output from the module
I OD	Open drain input to the module, with mandatory PU (pull up) on module
OD	Open drain
I/O	Bi-directional Input/Output
PU	PU (pull-up) resistor on module
PD	PD (pull-down) resistor on module
VDD_IN	Main power source from carrier to module
CMOS	Logic input or output
GBE MDI	Differential analog signaling for Gigabit Media Dependent Interface
LVDS DP	Low Voltage Differential Signal for DisplayPort interface
LVDS D-PHY	Low Voltage Differential Signal for MIPI CSI-2 cameras and DSI displays
LVDS M-PHY	Low Voltage Differential Signal for MIPI CSI-3 cameras
LVDS LCD	Low Voltage Differential Signal for LCD displays
LVDS PCIE	Low Voltage Differential Signal for PCIe
LVDS SATA	Low Voltage Differential Signal for SATA
TMD5 HDMI	Transition Minimized Differential Signal for HDMI displays
USB	DC coupled differential signaling for traditional (non-Superspeed) USB signals
USB SS	Differential signal for SuperSpeed USB signals
USB VBUS 5V	5V tolerant input for USB VBUS detection
3.3V	3.3V Power Domain: Active while CARRIER_PWRON is high and CARRIER_SBY# is NOT active (i.e. both signals are high)
1.8V	1.8V Power Domain: Active while CARRIER_PWRON is high and CARRIER_SBY# is NOT active (i.e. both signals are high)
3.3Vsb	3.3V Power Domain: Active while CARRIER_PWRON is high (regardless of CARRIER_SBY#)
1.8Vsb	1.8V Power Domain: Active while CARRIER_PWRON is high (regardless of CARRIER_SBY#)

4.3. Signal Description by Function

4.4. DSI

All DSI signals are sent to a DSI-to-HDMI bridge.



Note: DSI is routed to the ADV7535 and output to the HDMI connector.

4.5. HDMI

The connector is located on the carrier, with a maximum resolution of up to 1080p.



Note: HDMI is derived from DSI signals over the ADV7535/WLCSP-49, with support provided in the Yocto standard.

4.6. LVDS

The connector is placed on the carrier: Hirose DF13E-30DP

J14: Backlight connector

Pin	Description	Pin	Description
1	VDD	2	VDD
3	LVDS_A0_P	4	LVDS_A0_N
5	LVDS_A1_P	6	LVDS_A1_N
7	LVDS_A2_P	8	LVDS_A2_N
9	LVDS_A3_P	10	LVDS_A3_N
11	LVDSA_CLKP	12	LVDSA_CLKN
13	LVDS_CTRL_CLK	14	LVDS_CTRL_DAT

Pin	Description
1	ENABLE
2	GND
3	12V_carrier
4	Backlight Control
5	5V_carrier

15	GND	16	GND
17	N/A	18	N/A
19	N/A	20	N/A
21	N/A	22	N/A
23	N/A	24	N/A
25	N/A	26	N/A
27	GND	28	GND
29	GND	30	GND

4.7. MIPI CSI Camera

22-pin CSI connector (RPI-compatible pinout)

Pin	Description
1	GND
2	CSI_DATA0_N_R
3	CSI_DATA0_P_R
4	GND
5	CSI_DATA1_N_R
6	CSI_DATA1_P_R
7	GND
8	CSI_CLOCK_N_R
9	CSI_CLOCK_P_R
10	GND
11	NI
12	NI
13	GND
14	NI

15	NI
16	GND
17	CAM_ENABLE
18	CAM_PWR_LED
19	GND
20	CSI_I2C_SCL_3V3
21	CSI_I2C_SDA_3V3
22	3V3_carrier

4.8. Audio

Connector located on carrier, standard 3.5 mm audio jack with mic



Note: CTIA pinout order

4.9. LAN Ports

2x RJ45 connectors for wired network interfaces

The network interfaces come from the SoC over 2 TI DP83867IR phy

4.10. SDIO

One MicroSD card-slot is located on the carrier, acting as device storage or boot media.

5. Pin Headers for Slow Speed Signals

5.1. GPIO Header (J6)

Pin	Description	Pin	Description
1	1V8_carrier	2	GND
3	GPIO_A_0	4	GPIO_B_0
5	GPIO_A_1	6	GPIO_B_1
7	GPIO_A_2	8	GPIO_B_2
9	GPIO_A_3	10	GPIO_B_3
11	GPIO_A_4	12	GPIO_B_4
13	GPIO_A_5	14	GPIO_B_5
15	N/A	16	GPIO_B_6
17	N/A	18	GPIO_B_7
19	GND	20	1V8_carrier



Note: GPIO's 4,5,6, and 7 are reserved for board functions.

5.2. I²C

All I2C busses are located on header J44

Pin	Description	Pin	Description
1	3V3_carrier	2	GND
3	I2C_A_SCL_3V3	4	I2C_B_SCL_3V3
5	I2C_A_SDA_3V3	6	I2C_B_SDA_3V3

5.3. SPI

All SPI busses are located on header J45

Pin	Description	Pin	Description
1	SPI_A_SDI_IO0	2	SPI_B_SDI
3	SPI_A_SDO_IO1	4	SPI_B_SDO
5	SPI_A_CS0#	6	SPI_B_CS0#
7	SPI_A_CS1#	8	SPI_B_CS1#
9	SPI_A_SCK	10	SPI_B_SCK
11	VCC_OUT_IO	12	GND



Note: During boot, SPI_A_SCK and SPI_A_CS0# must be kept low.

5.4. CAN bus

CAN buses located on header JP5 & JP6, and the transceiver is already inline
JP5

Pin	Description
1	CAN_A_H_C
2	CAN_A_L_C
3	GND

JP6

Pin	Description
1	CAN_B_H_C
2	CAN_B_L_C
3	GND

5.5. UARTS

All available UARTs are located on header J46

Pin	Description	Pin	Description
1	UART_A_TX	2	UART_A_RX
3	UART_A_RTS#	4	UART_A_CTS#
5	UART_B_TX	6	UART_B_RX
7	UART_B_RTS#	8	UART_B_CTS#
9	UART_C_TX	10	UART_C_RX
11	1V8_carrier	12	GND
13	3V3_carrier	14	5V_carrier



Note: The console is directly available via a Type-C connector located on the board, with no need for adapters.

5.6. PWM and ADC

PWM and ADC share J50 header

Pin	Description	Pin	Description
1	ADC_0	2	GND
3	ADC_1	4	GND
5	PWM_0	6	PWM_1
7	PWM_2	8	PWM_3

5.7. JTAG

JTAG signals are located on header J36 and JP7

Pin	Description	Pin	Description
1	1V8_carrier	2	JTAG_TMS
3	GND	4	JTAG_TCK
5	GND	6	JTAG_TDO
7	JTAG_RTCK	8	JTAG_TDI
9	GND	10	SYS_RST#

JP7 PIN	Description
1	JTAG_nTRST
2	JTAG_DEBUG_EN

6. Onboard Jumpers and Switches

6.1.1 Connector Specifications

List of connectors and counterparts:

- DC Jack: 2.5mm
- LVDS Connector: 15P x 2, P=1.25mm wafer (DF13E-30DP-1.25V(52), Hirose)
- Backlight Connector: 5P, 2mm pitch
- MIPI-CSI: FPC, 22P, 0.5mm pitch (identical to Raspberry Pi)

Header Pinouts:

All headers are 2.0mm pitch, except for the ADC/PWM header, which uses 2.54mm pitch.

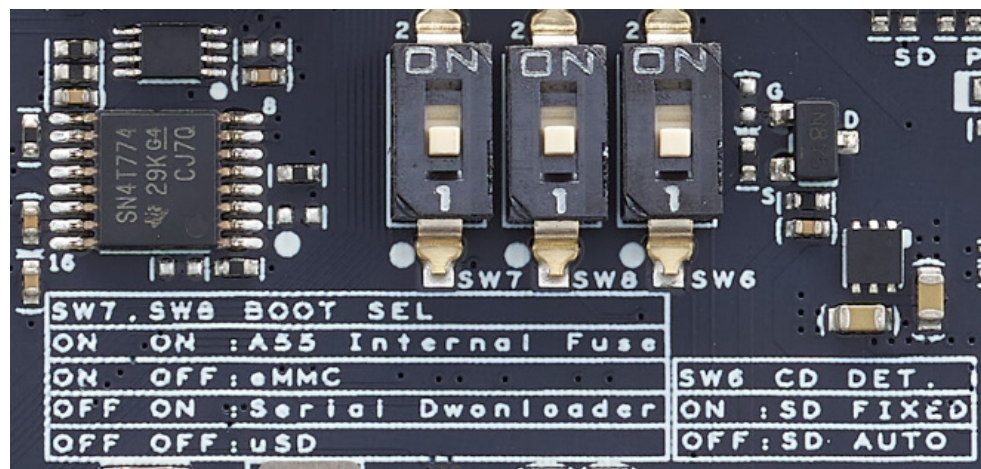
- J6: GPIO Header – 10P x 2, P=2.0mm
- J19: LCD Backlight Voltage Select – 3P x 2, P=2.0mm
- J44: I2C Header – 3P x 2, P=2.0mm
- J45: SPI Header – 6P x 2, P=2.0mm
- J45: UART Header – 7P x 2, P=2.0mm
- JP5/6: CAN Header – 3P x 1, P=2.0mm
- J50: ADC and PWM Header – 4P x 2, P=2.54mm

6.1.2 Boot Select Switches

The i.MX93 can boot from different media; therefore, different boot media can be enabled via switch combinations:

- eMMC on-module storage
- SDIO SD Card located on the carrier
- Serial boot mode, used with Universal Update Utility (UUU) to provision the board

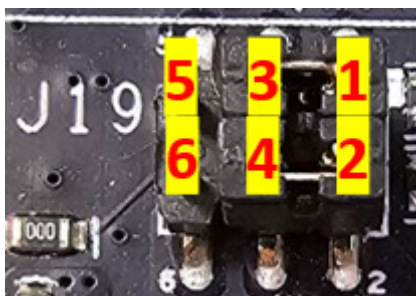
- SW7 and SW8 are used to select the boot media, with SW8 also used for SD card detection.



6.1.3 LCD Panel and Backlight Voltage Settings

The J19/J20 pinouts are labeled as shown below:

The LCD backlight enable signal provides 5V/12V options via J19



The LCD panel power offers a selection of 3/5/12 VDC via J20

