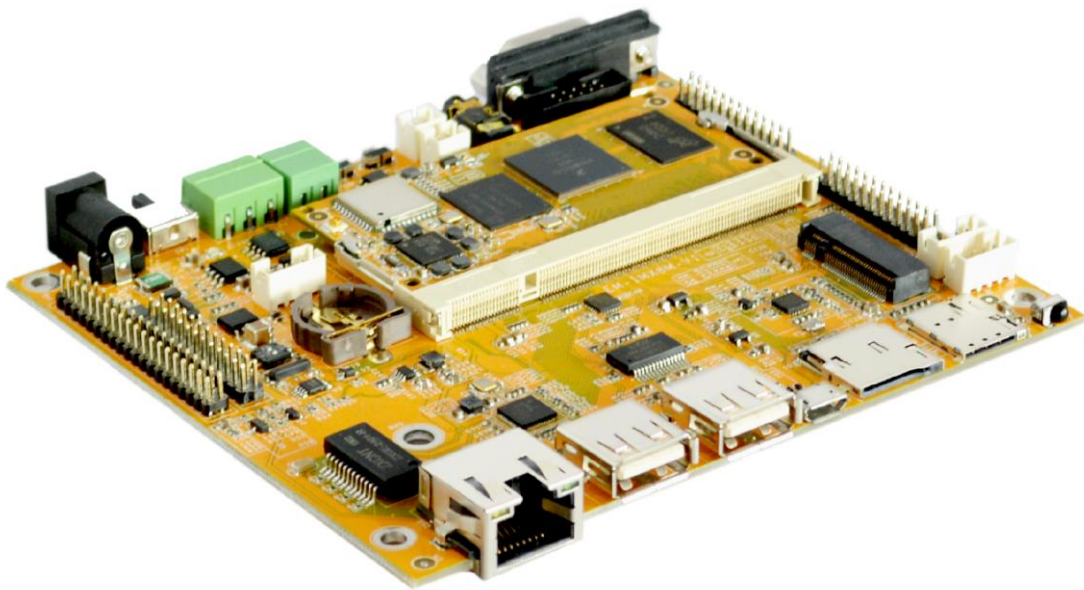


EM-IMX8M-MINI Reference User Manual

V1.0



Boardcon Embedded Design

www.boardcon.com

1. Introduction

1.1. About this Manual

This manual is intended to provide the user with an overview of the board and benefits, complete features specifications, and set up procedures. It contains important safety information as well.

1.2. Feedback and Update to this Manual

To help our customers make the most of our products, we are continually making additional and updated resources available on the Boardcon website (www.boardcon.com , www.armdesigner.com). These include manuals, application notes, programming examples, and updated software and hardware. Check in periodically to see what's new!

When we are prioritizing work on these updated resources, feedback from customers is the number one influence, If you have questions, comments, or concerns about your product or project, please no hesitate to contact us at support@armdesigner.com.

1.3. Limited Warranty

Boardcon warrants this product to be free of defects in material and workmanship for a period of one year from date of buy. During this warranty period Boardcon will repair or replace the defective unit in accordance with the following process:

A copy of the original invoice must be included when returning the defective unit to Boardcon. This limited warranty does not cover damages resulting from lightning or other power surges, misuse, abuse, abnormal conditions of operation, or attempts to alter or modify the function of the product.

This warranty is limited to the repair or replacement of the defective unit. In no event shall Boardcon be liable or responsible for any loss or damages, including but not limited to any lost profits, incidental or consequential damages, loss of business, or anticipatory profits arising from the use or inability to use this product.

Repairs make after the expiration of the warranty period are subject to a repair charge and the cost of return shipping. Please contact Boardcon to arrange for any repair service and to obtain repair charge information.

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1 EM-IMX8M-MINI Introduction

1.1 Summary

The EM-IMX8M-MINI is based around the NXP i.MX8M Mini processor. It is tailor made for a wide range of multimedia applications, featuring 2GB LPDDR4, 8GB eMMC, 2x USB 2.0 Host, powerful network connectivity options including 4G, WiFi & BT. Robust multimedia features including 4K video HEVC/H265/H264/VP9 decode with HDR, 2D/3D graphics acceleration, 16 audio channels (32bits), MIPI-DSI, and 1080p encoder and decoder.

Together with MIPI CSI camera inputs, MIPI DSI display outputs, flexible audio interfaces and comprehensive communication features, EM-IMX8M-MINI is ideal for Advanced graphics, machine vision, and other multimedia applications.

1.2 Processor Features

Multicore Processing

- 4x Cortex-A53 core platforms up to 1.8GHz per core
- 32KB L1-I Cache/ 32 kB L1-D Cache
- 512 kB L2 Cache
- 1x Arm Cortex-M4 core up to 400MHz
- 16 kB L1-I Cache/ 16 kB L2-D Cache

GPU

- 3D GPU (1x shader, OpenGL® ES 2.0)
- 2D GPU

Display Interface

- 1x MIPI DSI (4-lane) with PHY

Video Playback

- 1080p60 VP9 Profile 0, 2 (10-bit) decoder, HEVC/H.265 decoder, AVC/H.264 Baseline, Main, High decoder, VP8 decoder
- 1080p60 AVC/H.264 encoder, VP8 encoder

Audio

- 5x SAI (12Tx + 16Rx external I2S lanes), 8ch PDM input

Camera Interface

- 1x MIPI CSI (4-lane) with PHY

USB

- 2x USB 2.0 OTG controllers with integrated PHY

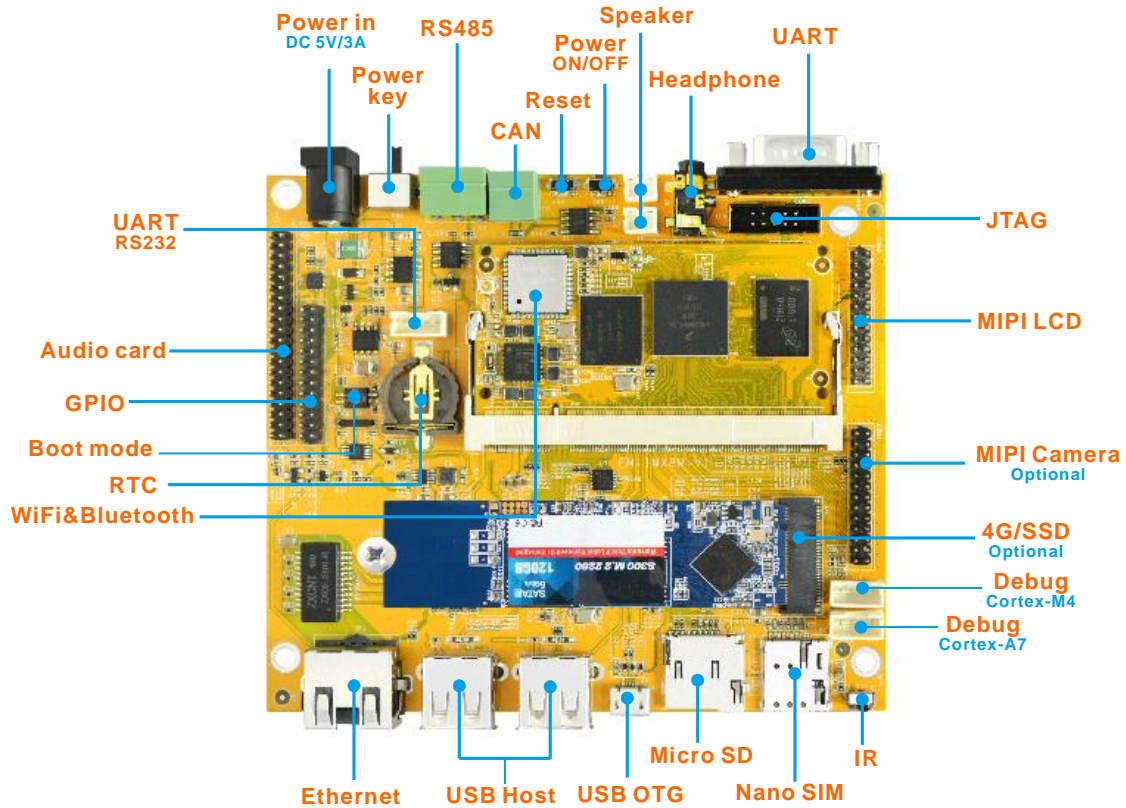
PCIe

- 1x PCIe 2.0 (1-lane) with L1 low power substate

Ethernet

- 1x Gigabit Ethernet (MAC) with AVB and IEEE 1588, Energy Efficient Ethernet (EEE) for low power

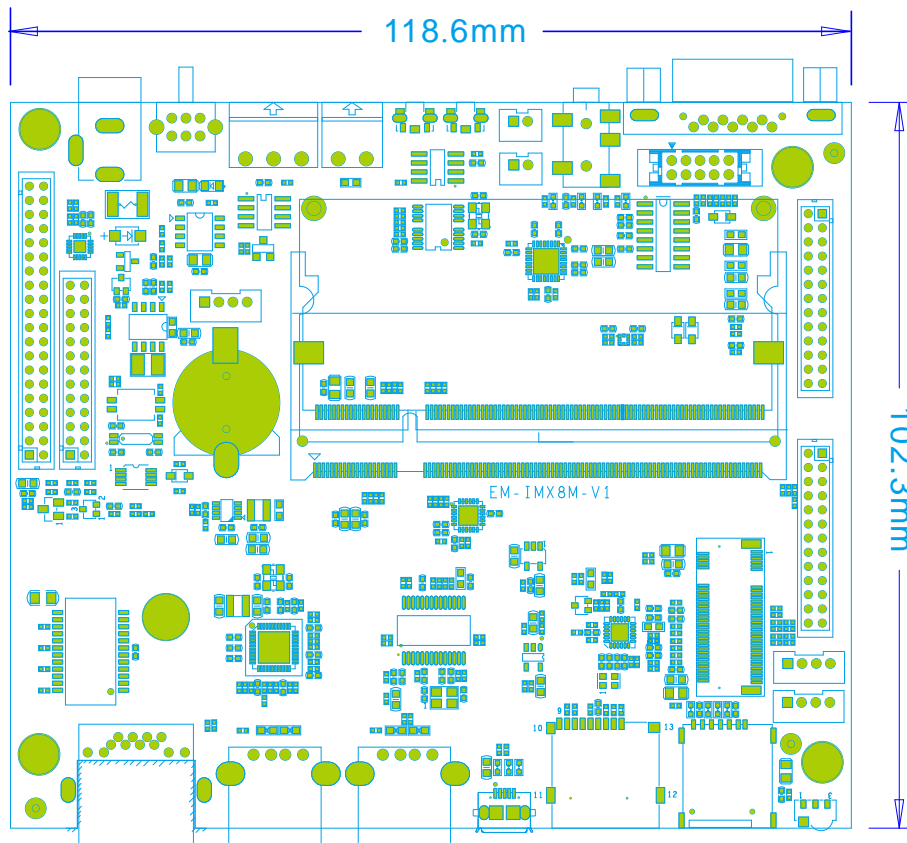
1.3 EM-IMX8M-MINI Specifications



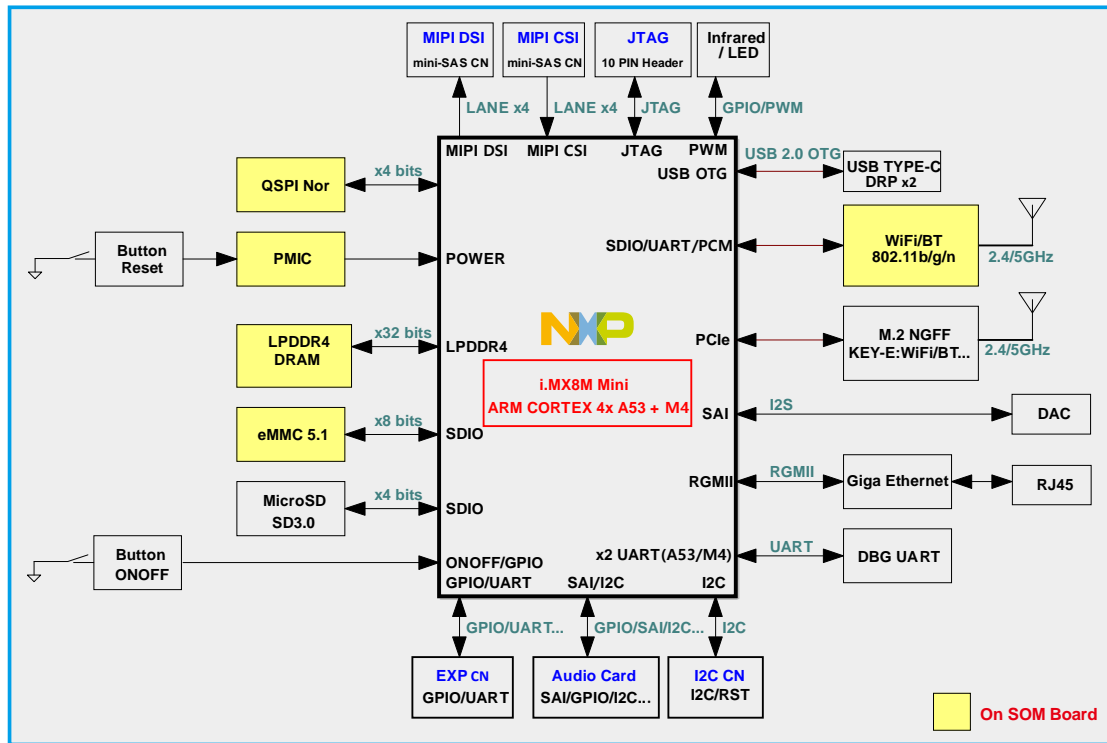
Feature	Specifications
CPU	i.MX 8MQuad, 4x ARM Cortex-A53 @ 1.8 GHz 1 MB L2 cache ARM Cortex-M4 @ 400 MHz
GPU	OpenGL ES1.1,2.0, OpenVG1.1
Memory	2GB LPDDR4
Storage	8GB eMMC flash
Power Management	ROHM BD71847
Power Input	DC 5V/3A
USB	1x USB 2.0 OTG, micro-USB connector 2x USB 2.0 Host, type-A connector
UART	1x RS232(COM1), 3x UARTs (J12, J13, J14)
Ethernet	Gigabit Ethernet port, RJ45 connector. Realtek RTL8211E
Audio	WM8960 audio codec. 3.5mm audio jack, 2x 2pin header for Speaker
Expand Audio	8bit RX and 8bit TX SAI interface, 40-pin header (J5)
SD	Micro SD socket, SD3.01
Display	MIPI-DSI, 4 data lanes, up to 1920 x 1080 @60Hz, 26-pin header (CON2)
RTC	Real time clock, powered by external battery

JTAG	JTAG debug interface, 10-pin header
CAN	2-Pin connector (P4)
RS485	Compatible 9-bit data format, 3-pin connector (P3)
Buttons	Reset (SW2), Power (SW3), Boot Mode (SW4)
Expand interface	2x I2C, 1x SPI, 6x GPIO, 26-pin header (J11)
PCIe	Support USB2.0, PCIE2.1, UIM interface for SSD or 4G module
Camera	MIPI-CSI, 4 data lanes, 26-pin header (CON1)
WiFi&Bluetooth	802.11b/g/n WiFi, Bluetooth 4.0. AP6236 chipset
SIM	Nano SIM
Dimension	Baseboard - 102.3mm x 118.6mm; Core board – 67.6mm x 34.3 mm

1.4 PCB Dimension



1.5 Block Diagram



1.6 Power Meter

Power	OS	Operation Temperature °C	Connected Devices	Electric Current (mA)
5V/3A	Linux4.14.98	28 °C	Power, debug port	375
			Power, debug port, ethernet, 7-inch MIPI LCD, SD card, 2 x U-disk	790
			Power, debug port, ethernet, 7-inch MIPI LCD, SD card, 2 x U-disk, Play audio	825

1.7 CPU Introduction

PICO-IMX8M-MINI specifications

Pin number – 200 pins

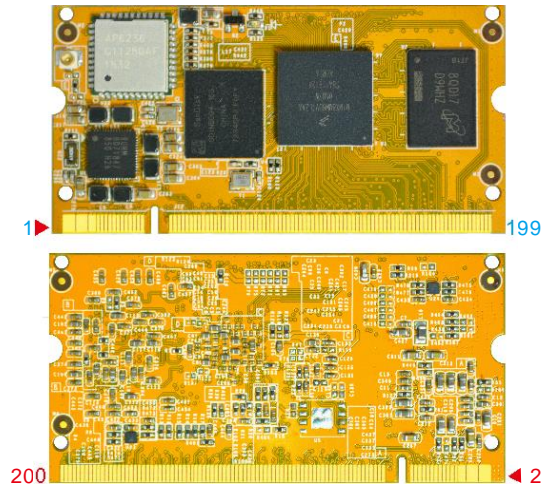
Dimension – 67.6mm x 34.3 mm

Layer – 6 Layers

Power supply – DC 5V

Connector – SO-DIMM200 edge connector

Application – Advanced graphics, machine vision, and other media applications



Pin Definition

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	GND	101	GND	2	GND	102	SD2_DATA1
3	GND	103	PCIE_RXP	4	GND	104	SD2_DATA2
5	GND	105	PCIE_RXN	6	GND	106	SD2_DATA3
7	VSYS_5V	107	GND	8	VSYS_5V	108	SD1_STROBE
9	VSYS_5V	109	CSI_DP3	10	VSYS_5V	110	BOOT_MODE1
11	VSYS_5V	111	CSI_DN3	12	VSYS_5V	112	BOOT_MODE0
13	GND	113	GND	14	GND	114	JTAG_TMS
15	GND	115	CSI_DP2	16	GND	116	JTAG_TDO
17	VDD_1V8	117	CSI_DN2	18	VDD_1V8	118	JTAG_TDI
19	VDD_1V8	119	GND	20	VDD_1V8	120	JTAG_TCK
21	GND	121	CSI_CKP	22	GND	122	JTAG_nTRST
23	VDD_3V3	123	CSI_CKN	24	VDD_3V3	124	CLKOUT1
25	VDD_3V3	125	GND	26	M.2_32K_OUT	126	CLKOUT2
27	SAI1_TXD7	127	CSI_DP1	28	SAI1_TXD6	128	CLKIN1
29	SAI1_TXD5	129	CSI_DN1	30	SAI1_TXD4	130	CLKIN2
31	SAI1_TXD3	131	GND	32	SAI1_TXD2	132	ONOFF
33	SAI1_TXD1	133	CSI_DP0	34	SAI1_TXD0	134	USB2_VBUS
35	GND	135	CSI_DN0	36	SAI1_TXC	136	USB1_VBUS
37	SAI1_RXC	137	GND	38	SAI1_TXFS	138	USB2_ID
39	SAI1_RXFS	139	DSI_DP3	40	GND	140	USB1_ID
41	SAI1_RXD7	141	DSI_DN3	42	SAI1_RXD6	142	UART4_TXD
43	SAI1_RXD5	143	GND	44	SAI1_RXD4	144	UART4_RXD
45	SAI1_RXD3	145	DSI_DP2	46	SAI1_RXD2	146	UART1_RTS
47	SAI1_RXD1	147	DSI_DN2	48	SAI1_RXD0	148	UART1_CTS
49	SAI5_RXFS	149	GND	50	GND	150	UART2_TXD
51	DM_CLK	151	DSI_CKP	52	PDM_DATA2	152	UART2_RXD

53	SAI5_MCLK	153	DSI_CKN	54	PDM_DATA3	154	UART1_TXD
55	PDM_DATA1	155	GND	56	GND	156	UART1_RXD
57	GND	157	DSI_DP1	58	PDM_DATA0	158	I2C4_SCL
59	SYS_nRST	159	DSI_DN1	60	SAI1_MCLK	160	I2C4_SDA
61	GND	161	GND	62	GND	162	I2C3_SCL
63	ENET_TXC	163	DSI_DP0	64	ENET_TX_CTL	164	I2C3_SDA
65	GND	165	DSI_DN0	66	ENET_TD0	166	I2C2_SCL
67	ENET_TD1	167	GND	68	ENET_TD2	168	I2C2_SDA
69	ENET_TD3	169	UART3_RXD	70	ENET_RX_CTL	170	ECSPI2_MOSI
71	ENET_RXC	171	UART3_TXD	72	GND	172	ECSPI2_MISO
73	ENET_RD0	173	UART3_CTS	74	ENET_RD1	174	ECSPI2_SCLK
75	PMIC_ON_REQ	175	UART3_RTS	76	ENET_RD2	176	ECSPI2_SS0
77	GND	177	GND	78	ENET_RD3	178	SAI3_TXD
79	USB2_DP	179	SAI3_TXC	80	ENET_MDC	180	SAI3_TXFS
81	USB2_DN	181	SAI3_RXD	82	ENET_MDIO	182	SAI3_MCLK
83	GND	183	SAI3_RXC	84	GND	184	GPIO1_IO13
85	USB1_DP	185	SAI3_RXFS	86	GND	186	GPIO1_IO10
87	USB1_DN	187	GPIO1_IO15	88	SD2_nCD	188	GPIO1_IO12
89	GND	189	GPIO1_IO14	90	SD2_WP	190	GPIO1_IO08
91	PCIE_CLKP	191	GPIO1_IO05	92	SD2_CMD	192	GPIO1_IO11
93	PCIE_CLKN	193	GPIO1_IO07	94	SD2_CLK	194	GPIO1_IO01
95	GND	195	GPIO1_IO09	96	SD2_nRST	196	SPDIF_EXT_CLK
97	PCIE_TXP	197	GPIO1_IO06	98	GND	198	SPDIF_RX
99	PCIE_TXN	199	GND	100	SD2_DATA0	200	SPDIF_TX

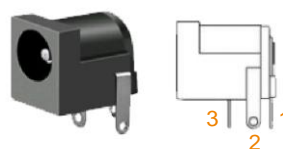
2 Peripherals Introduction

2.1 Power

- **5V Power (P1)**

Universal 5V/3A power supply with 2P2T slide switch.

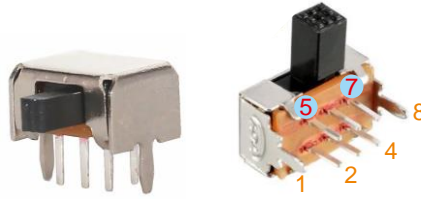
Note: Over-voltage protection is designed to withstand up to +5.5V.



P1					
Pin	Signal	Description	Pin	Signal	Description



1	5VIN	Main power supply. DC 5V power in	2	GND	Ground
3	GND	Ground			



SW1					
Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	NC	Not connect/ Ground
3	GND	Ground	4	DC_SW_CTL	DC 5V control
5	NC	Not connect/ Ground	6	GND	Ground
7	DC_SW_CTL	DC 5V control	8	GND	Ground

• **RTC (BT1)**



The backup battery (3V) is used to ensure the RTC (frequency 32.768KHz) is still able to work after power off. Cell model: CR1220.

Pin	Signal	Description	Pin	Signal	Description
1	VDD_3V3	3V battery	2	GND	Ground

2.2 RS485

SN75176B Differential bus transceiver.

- Bidirectional Transceivers
- ± 200mV Receiver Input Sensitivity
- 50mV Type Receiver Input Hysteresis



P9					
Pin	Signal	Description	Pin	Signal	Description
1	RS485_A	RS-485 Data Line	2	RS485_B	RS-485 Data Line
3	GND	Ground			

2.3 CAN

MCP2551 transceiver.

- Supports 1 Mb/s operation
- Low current standby operation
- High noise immunity due to differential bus implementation



Pin	Signal	Description	Pin	Signal	Description
1	CANL	CAN Low-Level Voltage I/O	2	CANH	CAN High-Level Voltage I/O




2.4 Keys

SW2/SW3 is Tact switch used for Power/Reset.



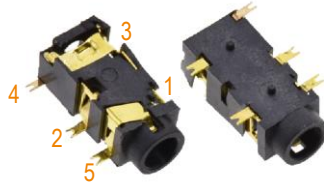
Key	Signal	Description	Key	Signal	Description
SW2	ON/OFF	CPU ON/OFF	SW3	SYS_nRST	Reset

SW4 is a DIP Switch for the selection of BOOT mode.

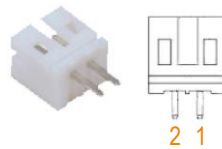
SW4 Boot Mode	SW4		
	1	2	
Download	OFF	OFF	
eMMC Boot	ON	ON	

2.5 Audio

The Audio Codec WM8960 supports stereo audio ADC/DAC. EM-IMX8M-MINI features a SAI (synchronous audio interface) with 8 TX and 8 RX lanes.



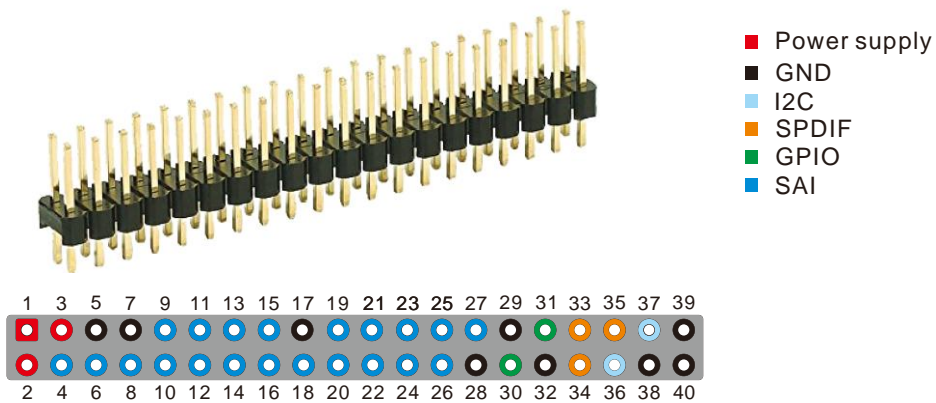
J8 (Headphone)					
Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	HPOUTR	Headphone right channel output
3	HPOUTL	Headphone left channel output	4	HP_DETEC	Headphone detect
5	MIC_RAW	Microphone input			



J6 (Speaker)					
Pin	Signal	Description	Pin	Signal	Description
1	SPK_LN	Speaker left channel -	2	SPK_LP	Speaker left channel +

J7 (Speaker)					
Pin	Signal	Description	Pin	Signal	Description
1	SPK_RN	Speaker right channel -	2	SPK_RP	Speaker right channel +

The Headphone and speaker sync output audio.



Audio card (J5)					
Pin	Signal	Description	Pin	Signal	Description
1	5V_EXT	5V power supply	2	VEXT_3V3	3.3V power supply
3	VEXT_3V3	3.3V power supply	4	SAI1_MCLK	SAT master clock
5	GND	Ground	6	SAI1_TXC	Transmit Bit Clock
7	GND	Ground	8	SAI1_TXFS	Transmit Frame Sync
9	SAI1_TXD0	Transmit Data	10	SAI1_TXD1	Transmit Data
11	SAI1_TXD2	Transmit Data	12	SAI1_TXD3	Transmit Data





13	SAI1_TXD4	Transmit Data	14	SAI1_TXD5	Transmit Data
15	SAI1_TXD6	Transmit Data	16	SAI1_TXD7	Transmit Data
17	GND	Ground	18	SAI1_RXC	Receive Bit Clock.
19	SAI1_RXFS	Receive Frame Sync	20	SAI1_RXD0	Receive Data
21	SAI1_RXD1	Receive Data	22	SAI1_RXD2	Receive Data
23	SAI1_RXD3	Receive Data	24	SAI1_RXD4	Receive Data
25	SAI1_RXD5	Receive Data	26	SAI1_RXD6	Receive Data
27	SAI1_RXD7	Receive Data	28	GND	Ground
29	GND	Ground	30	EXP_IO4	External IO
31	EXP_IO5	External IO	32	GND	Ground
33	SPDIF_EXT_CLK	SPDIF External Clock	34	SPDIF_TX	SPDIF Transmit
35	SPDIF_RX	SPDIF Receive	36	I2C3_SCL	I2C Serial Clock
37	I2C3_SDA	I2C Serial Data	38	GND	Ground
39	GND	Ground	40	GND	Ground

2.6 UART

- Up to 6 UARTS
- 64-Bytes Transmit and receive data FIFOs for all UART
- Compliant with industry-standard 16550 UARTs
- Support Infrared Data Association(IrDA) 1.0 SIRR

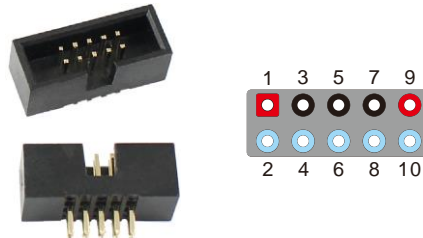
J12/J13/J14/COM1(DB9) are RS232 signal. The signal of J14 is converted by a USB-to-Dual-UART Bridge Controller CP2105.

					
COM1					
Pin	Signal	Description	Pin	Signal	Description
1	NC	Not connect	2	RS232_RX3	Receive Data
3	RS232_TX3	Transmit Data	4	NC	Not connect
5	GND	Ground	6	NC	Not connect
7	RS232_RTS	Request to send	8	RS232_CTS	Clear to send
9	NC	Not connect			
					
J12 (pin header, debug for Cortex-M4)					
Pin	Signal	Description	Pin	Signal	Description

1	VEXT_3V3	3.3V power supply	2	UART2_RXD	Receive Data
3	UART2_TXD	Transmit Data	4	GND	Ground
J13 (pin header, debug for Cortex-A7)					
Pin	Signal	Description	Pin	Signal	Description
1	VEXT_3V3	3.3V power supply	2	UART4_RXD	Receive Data
3	UART4_TXD	Transmit Data	4	GND	Ground
J14 (pin header)					
Pin	Signal	Description	Pin	Signal	Description
1	VEXT_3V3	3.3V power supply	2	U_UART1_RXD	Receive Data
3	U_UART1_TXD	Transmit Data	4	GND	Ground

2.7 JTAG

There is a JTAG (a serial bus protocol usually used for test purposes) on the chip. IMX8M-Mini Supports 2 x 5-pins (JTAG) interface.



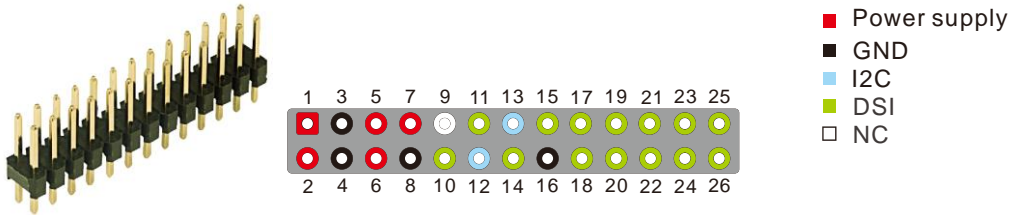
Pin	Signal	Description	Pin	Signal	Description
1	VDD_3V3	3.3V power supply	2	JTAG_TMS	Test Mode Select
3	GND	Ground	4	JTAG_TCK	Test Clock
5	GND	Ground	6	JTAG_TDO	Test Data Out
7	NC	NC	8	JTAG_TDI	Test Data In
9	NC/JTAG_nT RST	NC/Test Reset	10	nRST	Reset

2.8 MIPI DSI

Support up to 1080p@60Hz display through a 4-lane MIPI DSI.

Features

- Compliant to MIPI-DSI standard v1.1
- Support up to 4 data lanes
- Support 80Mbps - 1.5Gbps data rate in high speed operation
- Support 10Mbps data rate in low power operation



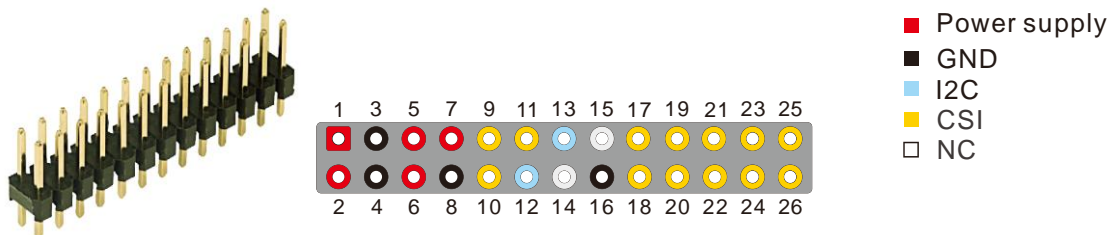
Pin	Signal	Description	Pin	Signal	Description
1	MIPI_5V0	5V power supply	2	MIPI_5V0	5V power supply
3	GND	Ground	4	GND	Ground
5	MIPI_3V3	3.3V power supply	6	MIPI_3V3	3.3V power supply
7	MIPI_1V8	1.8V power supply	8	GND	Ground
9	NC	Not connect	10	DSI_BL_PWM	Backlight
11	DSI_EN	DSI enable	12	I2C3_SCL	I2C serial clock
13	I2C3_SDA	I2c serial date	14	DSI_RST	Touch screen reset
15	DSI_TS_nINT	Touch screen interrupt	16	GND	Ground
17	DSI_DN0	DSI data -	18	DSI_DP0	DSI data +
19	DSI_DN1	DSI data -	20	DSI_DP1	DSI data +
21	DSI_CKN	DSI clock -	22	DSI_CKP	DSI clock +
23	DSI_DN2	DSI data -	24	DSI_DP2	DSI data +
25	DSI_DN3	DSI data -	26	DSI_DP3	DSI data +

2.9 MIPI CSI

The CSI is a simple camera interface. It captures the MIPI CSI input and saves the pixels into memory. The chip supports one 4-lane MIPI CSI2 camera input.

Features

- Configurable interface logic to support most commonly available CMOS sensors
- 8-bit / 16-bit / 24-bit data port for YCbCr, YUV, or RGB data input
- Full control of 8-bit/pixel, 10-bit/pixel or 16-bit / pixel data format to 64-bit receive
- Compliant to MIPI-CSI2 standard
- Support up to 4 data lanes
- Support 80Mbps - 1.5Gbps data rate in high speed operation
- Support 10Mbps data rate in low power operation
- Support 5M pixel at 15 fps, 1080p60, 720p60, VGA at 60 fps

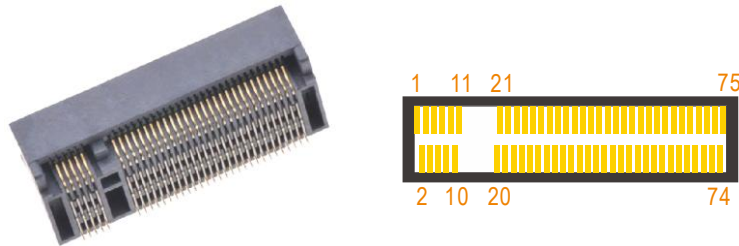


Pin	Signal	Description	Pin	Signal	Description
-----	--------	-------------	-----	--------	-------------

1	MIPI_5V0	5V power supply	2	MIPI_5V0	5V power supply
3	GND	Ground	4	GND	Ground
5	MIPI_3V3	3.3V power supply	6	MIPI_3V3	3.3V power supply
7	MIPI_1V8	1.8V power supply	8	GND	Ground
9	CAMERA_PWDN	Camera Power down	10	CAMERA_RST	Camera Reset
11	CAMERA_CLK	Camera clock	12	I2C2_SCL_1V8	I2C serial clock
13	I2C2_SDA_1V8	I2C serial date	14	NC	Not connect
15	NC	Not connect	16	GND	Ground
17	CSI_CKN	MIPI clock -	18	CSI_CKP	MIPI clock +
19	CSI_DN0	Negative Transmission Data of Pixel0	20	CSI_DP0	Positive Transmission Data of Pixel0
21	CSI_DN1	Negative Transmission Data of Pixel1	22	CSI_DP1	Positive Transmission Data of Pixel1
23	CSI_DN2	Negative Transmission Data of Pixel2	24	CSI_DP2	Positive Transmission Data of Pixel2
25	CSI_DN3	Negative Transmission Data of Pixel3	26	CSI_DP3	Positive Transmission Data of Pixel3

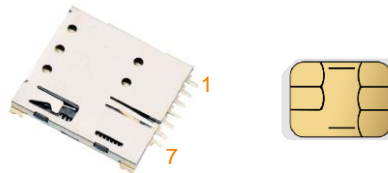
2.10 PCIe M.2

EM-IMX8M-Mini adopts the PCIe M.2 socket (NGFF_M.2 B-KEY_8.5H).



PCIe (for 4G/SSD module)					
Pin	Signal	Description	Pin	Signal	Description
1	CONFIG_3	Module Configuration	2	VPCIe_3V3	3.3V power supply
3	GND	Ground	4	VPCIe_3V3	3.3V power supply
5	GND	Ground	6	Full_CPO	Full card power off
7	M2_USB_DP	USB Data +	8	PCIe_nDIS	PCIe disable
9	M2_USB_DN	USB Data -	10	TP21	Test point
11	GND	Ground	20	TP17	Test point
21	CONFIG_0	Module Configuration	22	TP18	Test point
23	TP23	Test point	24	TP19	Test point

25	TP24	Test point	26	TP22	Test point
27	GND	Ground	28	TP20	Test point
29	NC	Not connect	30	SIM_RST	SIM reset signal
31	NC	Not connect	32	SIM_CLK	SIM clock signal
33	GND	Ground	34	SIM_DATA	SIM data signal.
35	NC	Not connect	36	SIM_VCC	Power for the SIM.
37	NC	Not connect	38	DEVSLP	Device Sleep
39	GND	Ground	40	TP12	Test point
41	PCIE_RXN	PCle RX -	42	TP13	Test point
43	PCIE_RXP	PCle RX +	44	TP14	Test point
45	GND	Ground	46	TP15	Test point
47	PCIE_TXN	PCle TX -	48	TP16	Test point
49	PCIE_TXP	PCle TX +	50	PCle_nRST	PCle reset
51	GND	Ground	52	PCle_nCLKR EQ_DEV	Clock Request
53	REF_CLKN_CN	PCle Reference Clock signals -	54	PCle_nWAKE	PCle PME Wake
55	REF_CLKP_CN	PCle Reference Clock signals +	56	NC	Not connect
57	GND	Ground	58	NC	Not connect
59	NC	Not connect	60	NC	Not connect
61	NC	Not connect	62	NC	Not connect
63	NC	Not connect	64	NC	Not connect
65	NC	Not connect	66	SIM_DET	Detect the SIM insertion/removal
67	M_2_RESET	M.2 module Reset	68	M.2_32K_OUT	Suspend Clock (32KHz)
69	CONFIG_1	Module Configuration	70	VPCle_3V3	3.3V power supply
71	GND	Ground	72	VPCle_3V3	3.3V power supply
73	GND	Ground	74	VPCle_3V3	3.3V power supply
75	CONFIG_2	Module Configuration			

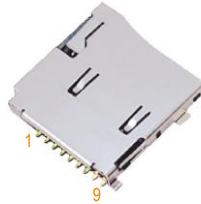

Nano SIM Slot

Pin	Signal	Description	Pin	Signal	Description
1	SIM_CLK	Clock signal	2	SIM_DATA	Send/Receiver data
3	SIM_RST	Reset signal	4	SIM_VCC	Power supply
5	SIM_VCC	Power supply	6	GND	Ground

7	GND	Ground	
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2.11 SD

The Micro SD card is used as an external storage device. The MMC controller interface supports up to 4-bit transfer modes.



Pin	Signal	Description	Pin	Signal	Description
1	SD2_DATA2	SD2 Data Bit	2	SD2_DATA3	SD2 Data Bit
3	SD2_CMD	SD2 Command Signal	4	VSD_3V3	3.3V power supply
5	SD2_CLK	SD2 Clock	6	GND	Ground
7	SD2_DATA0	SD2 Data Bit	8	SD2_DATA1	SD2 Data Bit
9	SD2_DET	SD Detect			

2.12 Infrared Receiver(U3)

IRM-V538T Remote Receiver Sensor, 38.0KHz



Pin	Signal	Description	Pin	Signal	Description
1	IR_CAP	IR in	2	VDD_3V3	3.3V Power supply
3	GND	Ground			

2.13 USB(OTG/HOST)

The USB 2.0 OTG is a Micro USB port, used for download image.



USB OTG					
Pin	Signal	Description	Pin	Signal	Description
1	VBUS1	BUS1 Voltage	2	USB1_DN	OTG data -
3	USB1_DP	OTG data+	4	USB1_ID	OTG ID indicator
5	GND	Ground			

EM-IMX8M-MINI features 2x USB 2.0 Host. It supports high-speed (480Mbps), full-speed (12Mbps) and low-speed (1.5Mbps) mode.



USB HOST (J3)					
Pin	Signal	Description	Pin	Signal	Description
1	VCC_5V	USB Power. DC 5V	2	HUB_USB3_DM	USB data-
3	HUB_USB3_DP	USB Data+	4	GND	Ground
5	GND	Ground	6	GND	Ground
USB HOST (J4)					
Pin	Signal	Description	Pin	Signal	Description
1	VCC_5V	USB Power. DC 5V	2	HUB_USB2_DM	USB data-
3	HUB_USB2_DP	USB Data+	4	GND	Ground
5	GND	Ground	6	GND	Ground

2.14 Ethernet



EM-IMX8M-MINI adopts RTL8211E as the Ethernet chip. RJ45 connector (offset).

Feature

- Implements the full 802.3 specification
- Dynamically configurable to support 10/100/1000-Mbit/s operation
- Supports 10/100 Mbit/s full-duplex and configurable half-duplex operation
- Supports gigabit full-duplex operation

JP2 (RJ45)					
Pin	Signal	Description	Pin	Signal	Description
1	DA+	Bi-directional transmit/receive pair A	2	DA-	Bi-directional transmit/receive pair A
3	DB+	Bi-directional transmit/receive pair B	4	DC+	Bi-directional transmit/receive pair C
5	DC-	Bi-directional transmit/receive pair C	6	DB-	Bi-directional transmit/receive pair B
7	DD+	Bi-directional	8	DD-	Bi-directional

		transmit/receive pair D			transmit/receive pair D
9	GND	Ground	10	GND	Ground
11	SPEED	Network speed	12	GND	Ground
13	VEXT_3V3	DC 3.3V power supply	14	LINK	Link activity

2.15 GPIO

The i.MX8M Mini Dev Board provides access to several peripheral interfaces through the 26-pin expansion header (J11), including GPIO, I2C, UART, and SPI.

Note

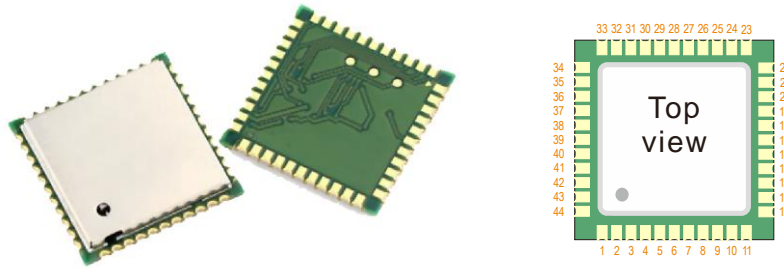
If *UART1_RTS* and *UART1_CTS* used in WiFi module, then can't be used in motherboard.

If WiFi module is used, the *UART1_RXD* and *UART1_TXD* pins only can be used for GPIOs.



Pin	Signal	Description	Pin	Signal	Description
1	VEXT_3V3	3.3V power supply	2	VDD_5V	5V power supply
3	VEXT_3V3	3.3V power supply	4	VDD_5V	5V power supply
5	I2C3_SDA	I2C serial data	6	GND	Ground
7	I2C3_SCL	I2C serial clock	8	GND	Ground
9	GND	Ground	10	ENET_nRST/ GPIO5_IO23/ UART1_TXD	Ethernet reset/ GPIO/UART transmit
11	I2C4_SDA	I2C serial data	12	GPIO5_IO22/ UART1_RXD	GPIO/UART receive
13	I2C4_SCL	I2C serial clock	14	UART1_RTS	Request to send
15	NC/ECSPI2_M OSI	NC/Master output, Slave input	16	UART1_CTS	Clear to send
17	NC/ECSPI2_MI SO	NC/Master input, Slave output	18	SAI5_RXD0	SAI receive
19	NC/ECSPI2_SC LK	NC/SPI Serial clock	20	EXP_IO6	GPIO
21	NC/ECSPI2_SS 0	NC/SPI slave select	22	EXP_IO7	GPIO
23	GND	Ground	24	EXP_IO9	GPIO
25	GND	Ground	26	EXP_IO8	GPIO

2.16 WiFi & Bluetooth



The CPU module SOM-IMX8M-MINI on-board WiFi + Bluetooth4.0 module.

- 802.11b/g/n single-band radio
- Bluetooth V4.0(HS) with integrated Class 1.5 PA and Low Energy (BLE) support
- Concurrent Bluetooth, WLAN operation
- Simultaneous BT/WLAN receive with single antenna
- WLAN host interface options - SDIO v2.0 up to 50 MHz clock rate
- BT host digital interface - UART (up to 4 Mbps)
- IEEE Co-existence technologies are integrated die solution
- ECI — enhanced coexistence support, ability to coordinate BT SCO transmissions around WLAN receives

Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	WIFI_ANT	RF I/O
3	GND	Ground	4	NC	Not connect
5	NC	Not connect	6	BT_WAKE_DEV	HOST wake-up Bluetooth device
7	BT_WAKE_HOST	Bluetooth device to wake-up HOST	8	NC	Not connect
9	VDD_3V3	3.3V power supply	10	XTAL_IN	Crystal input
11	XTAL_OUT	Crystal output	12	WL_REG_ON	Internal regulators power enable/disable
13	WL_WAKE_HOST	WLAN to wake-up HOST	14	SD1_DA2	WiFi data
15	SD1_DA3	WiFi data	16	SD1_CMD_R	WiFi command
17	SD1_CLK_R	WiFi clock	18	SD1_DA0	WiFi data
19	SD1_DA1	WiFi data	20	GND	Ground
21	VIN_LDO_OUT	Internal Buck voltage generation pin	22	VDD_1V8	1.8 V power supply
23	VIN_LDO	Internal Buck voltage generation pin	24	REF_CLK_32K	External Low Power Clock input (32.768KHz)
25	SAI2_RXD	PCM Data output	26	SAI2_TXC	PCM clock



27	SAI2_TXD	PCM data input	28	SAI2_TXFS	PCM sync signal
29	NC	Not connect	30	NC	Not connect
31	GND	Ground	32	NC	Not connect
33	GND	Ground	34	BT_REG_ON	Low asserting reset for Bluetooth core
35	NC	Not connect	36	GND	Ground
37	NC	Not connect	38	NC	Not connect
39	NC	Not connect	40	NC	Not connect
41	BT_UART_RTS	Bluetooth UART interface	42	SAI2_RXC/ UART1_RXD	Bluetooth UART interface
43	SAI2_RXFS/ UART1_TXD	Bluetooth UART interface	44	BT_UART_CTS	Bluetooth UART interface

3 Product Configurations

Standard Contents

NO.	Item	Qty. (PCS)	Description
1	EM-IMX8M-MINI	1	Standard Content (2GB RAM, 8GB eMMC)
2	CD-ROM/ TFcard	1	Linux BSP, Documents, tools, Schematic Drawing, datasheets
3	Ethernet cable	1	
4	Serial Cable	1	CP2102
5	USB Cable	1	Micro USB
6	Power adaptor	1	5V/3A DC