

EMX-IMX7

Reflective electrophoretic display system board

User's Manual

1st Ed – 23 July 2020

Copyright Notice

Copyright © 2020 Avalue Technology Inc., ALL RIGHTS RESERVED.

Part No. E2047IMX700R

FCC Statement



THIS DEVICE COMPLIES WITH PART 15 FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:

- (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE.
- (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.

THIS EQUIPMENT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS "A" DIGITAL DEVICE, PURSUANT TO PART 15 OF THE FCC RULES.

THESE LIMITS ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST HARMFUL INTERFERENCE WHEN THE EQUIPMENT IS OPERATED IN A COMMERCIAL ENVIRONMENT. THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND, IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE HARMFUL INTERFERENCE TO RADIO COMMUNICATIONS.

OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE HARMFUL INTERFERENCE IN WHICH CASE THE USER WILL BE REQUIRED TO CORRECT THE INTERFERENCE AT HIS OWN EXPENSE.

A Message to the Customer

Avalue Customer Services

Each and every Avalue's product is built to the most exacting specifications to ensure reliable performance in the harsh and demanding conditions typical of industrial environments. Whether your new Avalue device is destined for the laboratory or the factory floor, you can be assured that your product will provide the reliability and ease of operation for which the name Avalue has come to be known.

Your satisfaction is our primary concern. Here is a guide to Avalue's customer services. To ensure you get the full benefit of our services, please follow the instructions below carefully.

Technical Support

We want you to get the maximum performance from your products. So if you run into technical difficulties, we are here to help. For the most frequently asked questions, you can easily find answers in your product documentation. These answers are normally a lot more detailed than the ones we can give over the phone. So please consult the user's manual first.

To receive the latest version of the user's manual; please visit our Web site at:

<http://www.avalue.com.tw/>

Content

1. Getting Started	4
1.1 Safety Precautions	4
1.2 Packing List	4
1.3 Document Amendment History	5
1.4 Manual Objectives	6
1.5 System Specifications	7
1.6 Architecture Overview—Block Diagram.....	9
2. Hardware Configuration	10
2.1 Product Overviews	11
2.2 Jumper & Connector list	12
2.3 Setting Jumpers & Connectors	13
2.3.1 EPD Gate power select (J7)	13
2.3.2 Boot Config (J39)	13
2.3.3 Boot Tamper (J40)	14
2.3.4 Battery connector (BT1).....	14
2.3.5 I2C connector 1 (JI2C1).....	15
2.3.6 I2C connector 2 (JI2C2).....	15
2.3.7 I2C connector 3 (JI2C3).....	16
2.3.8 I2C connector 4 (JI2C4).....	16
2.3.9 Speaker L connector (CN1)	17
2.3.10 Speaker R connector (CN2)	17
2.3.11 General purpose I/O connector (CN4).....	18
2.3.12 I2C2 connector (CN5).....	18
2.3.13 EPD connector (CN6).....	19
2.3.14 EPD connector (CN7).....	20
2.3.15 Cortex-A7 Debug connector (JUART1).....	21
2.3.16 Cortex-M4 Debug connector (JUART2)	21
2.3.17 On-board header for USB2.0 (JUSB1).....	22
2.3.18 On-board header for USB2.0 (JUSB2).....	22
3. Mechanical Drawing	23

1. Getting Started

1.1 Safety Precautions

Warning!



Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.

Caution!



Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.

1.2 Packing List

Before you begin installing your single board, please make sure that the following materials have been shipped:

- 1 x EMX-IMX7 Mainboard
- 1 x FPC Cable (ACC-EPD-FPC-01A)



If any of the above items is damaged or missing, contact your retailer.

1.3 Document Amendment History

Revision	Date	By	Comment
1 st	July 2020	Avalue	Initial Release

1.4 Manual Objectives

This manual describes in details Avalue Technology EMX-IMX7 Single Board.

We have tried to include as much information as possible but we have not duplicated information that is provided in the standard IBM Technical References, unless it proved to be necessary to aid in the understanding of this board.

We strongly recommend that you study this manual carefully before attempting to set up EMX-IMX7 or change the standard configurations. Whilst all the necessary information is available in this manual we would recommend that unless you are confident, you contact your supplier for guidance.

Please be aware that it is possible to create configurations within the CMOS RAM that make booting impossible. If this should happen, clear the CMOS settings, (see the description of the Jumper Settings for details).

If you have any suggestions or find any errors regarding this manual and want to inform us of these, please contact our Customer Service department with the relevant details.

1.5 System Specifications

Core Specification	
SoC	NXP i.MX 7 Dual Processor Dual ARM® Cortex®-A7 Cores And Cortex-M4
Memory	1GB DDR3L on-board (Optional 2GB)
Storage	8GB eMMC on-board
EEPROM	NXP PF3000 integrtaed
Display	
Processor	NXP i.MX 7Dual Processor Integrated
Display Interface	Parallel Data, 2 x 50pins Connector(CN6, CN7)
Resolution	E Ink: 42" 2160(H)x2880(V), 31.2": 2560(H)x1440(V)
Audio	
AC97 Codec	CIRRUS WM8960 Stereo codec
Interface	Two 1 x 2-pin wafers for Speaker Left/Right (CN1/CN2)
Ethernet	
LAN Controller	ICPlus IP1001M Gigabit Phy
Interface	One RJ45 port for 10BASE-T, 100BASE-TX, 1000 Base-T
Wireless	
WiFi Module	Optional WiFi module by M.2 socket
Antenna	WiFi module supports 2 antennas with one for WLAN & Bluetooth shared port and one WLAN port
Internal I/O Connectors	
USB	Two 1 x 5-pin wafers for four USB interface (JUSB1/JUSB2)
M.2 Socket	One M.2 E-Key socket
I2C	Four 1 x 5-pin wafers (JI2C1/JI2C2/JI2C3/JI2C4)
GPIO	One 1 x 12-pin wafer for 8 bit GPIO (CN4)
UART 1/2	Two 1 x 4-pin wafer for Cortex-A7&Cortex-M4 debug
Audio	One 2 x 5-pin header for Line-out, Mic-in (JAUDIO)
COMS Battery	One 2-pin wafer for CR2032 battery w/cable (BT1)
Rear I/O Connectors	
USB	1 x Dual stack USB connector for two USB 2.0, 1 x micro USB
LAN	1 x RJ-45 connector for Gigabit Ethernet
Micro SD	1 X Micro SD socket
DC IN	1 X DC IN Jack
Power Requirement	
Power Input	DC-12V/5A
Power Connector	Lockable DC Jack

EMX-IMX7 User's Manual

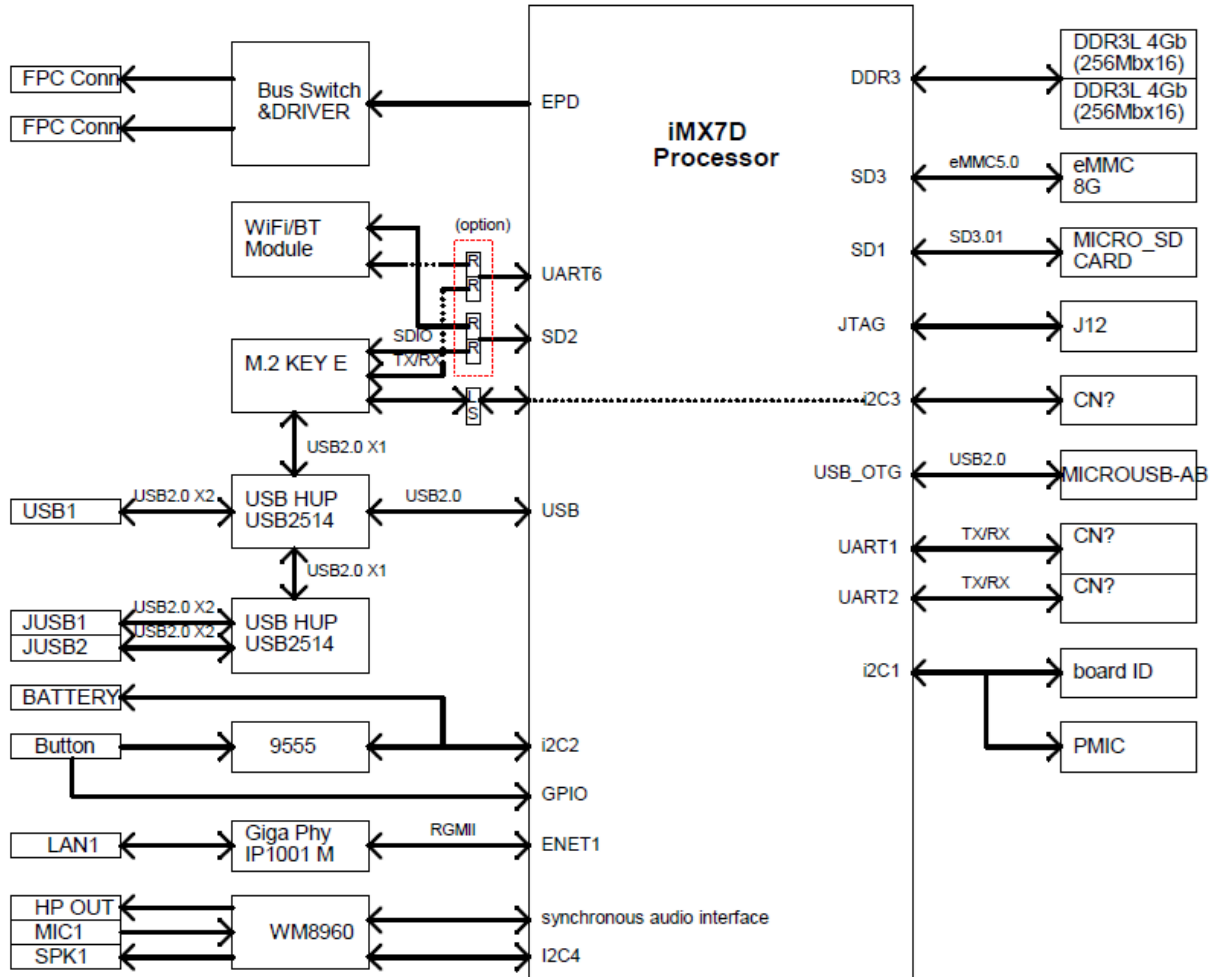
Power Type	AT/ATX (AT is default)
Operational Specification	
Cooling	FAN less design
Operating Temp.	0°C ~ 40°C (32°F ~ 104°F)
Storage Temp.	-20°C ~ 60°C (-4°F ~ 140°F)
Operating Humidity	40°C @ 95% Relative Humidity, Non-condensing
Mechanical & Environmental	
Dimensions	170mm x 170mm
Weight	0.2kg



Note: Specifications are subject to change without notice.

1.6 Architecture Overview—Block Diagram

The following block diagram shows the architecture and main components of EMX-IMX7.



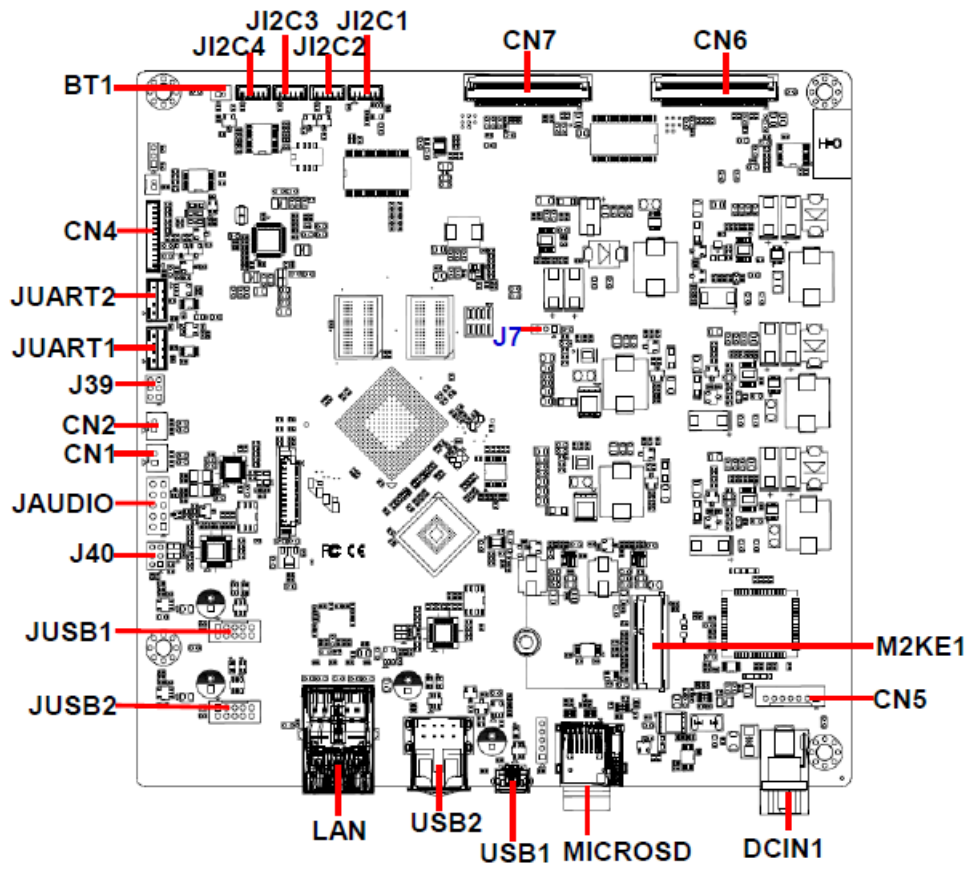
2. Hardware Configuration



Note: If you need more information, please visit our website:

<http://www.avalue.com.tw>

2.1 Product Overviews



2.2 Jumper & Connector list

Jumpers

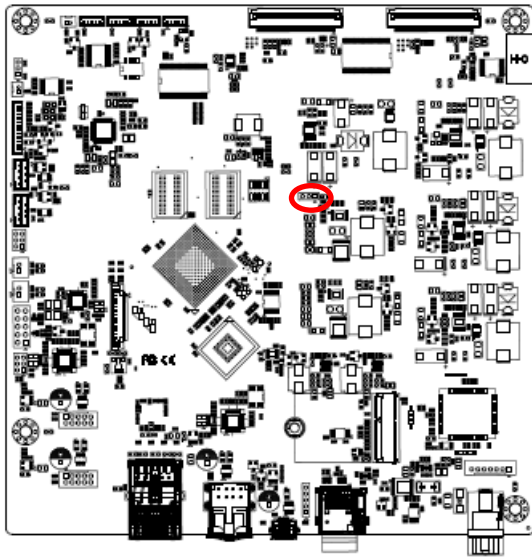
Label	Function	Note
J7	EPD Gate power select	3 x 1 header, pitch 2.00 mm
J39	Boot Config	3 x 2 header, pitch 2.00 mm
J40	Boot Tamper	3 x 2 header, pitch 2.00 mm

Connectors

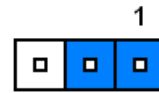
Label	Function	Note
BT1	Battery connector	2 x 1 wafer, pitch 1.25 mm
JAUDIO	Audio connector	6 x 2 header, pitch 2.00 mm
JUART1	Cortex-A7 Debug connector	4 x 1 wafer, pitch 2.00 mm
JUART2	Cortex-M4 Debug connector	4 x 1 wafer, pitch 2.00 mm
CN1	Speaker L connector	2 x 1 wafer, pitch 2.00 mm
CN2	Speaker R connector	2 x 1 wafer, pitch 2.00 mm
CN4	General purpose I/O connector	12 x 1 wafer, pitch 1.25 mm
CN5	I2C2 connector	7 x 1 wafer, pitch 2.00 mm
CN6	EPD connector	50 x 1 wafer, pitch 0.50 mm
CN7	EPD connector	50 x 1 wafer, pitch 0.50 mm
JUSB1/2	2 x On-board header for USB2.0	5 x 2 header, pitch 2.00 mm
USB1	Micro USB connector	
USB2	2 x USB2.0 connector	
LAN	RJ-45 Ethernet	
MICROSD	Micro SD socket	
DCIN1	DC power-in connector	
JI2C1	I2C connector 1	5 x 1 wafer, pitch 1.25 mm
JI2C2	I2C connector 2	5 x 1 wafer, pitch 1.25 mm
JI2C3	I2C connector 3	5 x 1 wafer, pitch 1.25 mm
JI2C4	I2C connector 4	5 x 1 wafer, pitch 1.25 mm
M2KE1	M.2 E-Key socket	

2.3 Setting Jumpers & Connectors

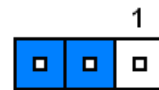
2.3.1 EPD Gate power select (J7)



+22V*



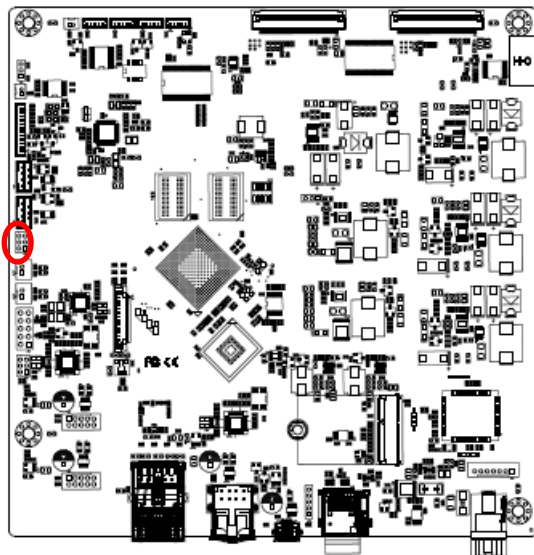
+27V



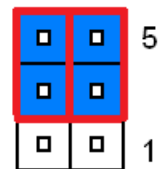
* Default

Signal	Gate Voltage	EPD
1~2 ON	+22V	31.2"
2~3 ON	+27V	42"

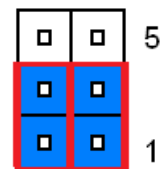
2.3.2 Boot Config (J39)



emmc boot*

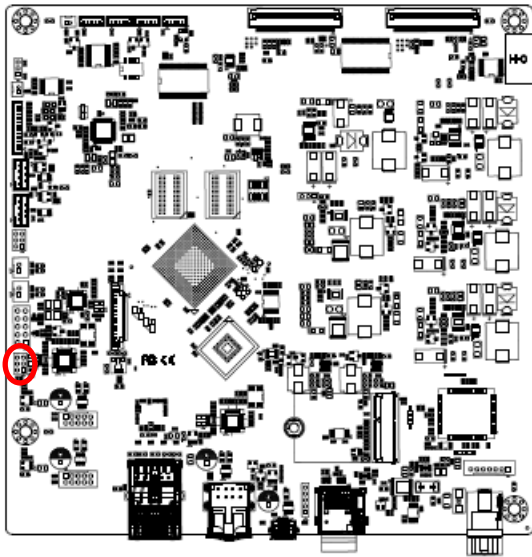


SD boot

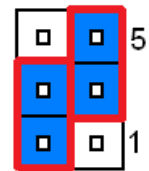


* Default

2.3.3 Boot Tamper (J40)

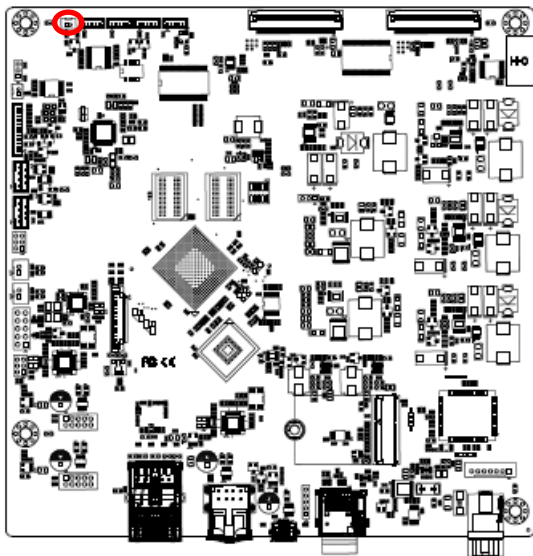


INTERNAL BOOT*



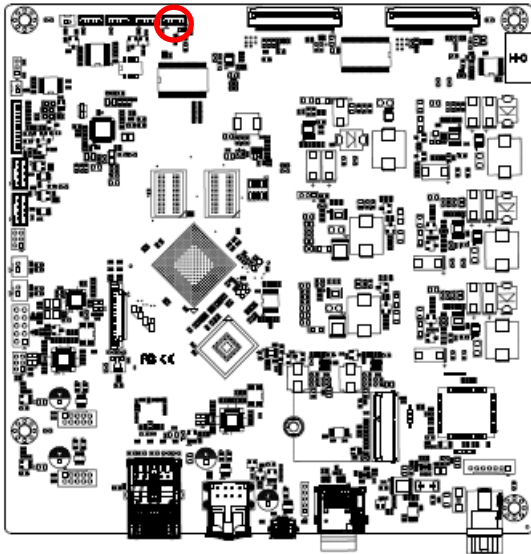
* Default

2.3.4 Battery connector (BT1)



Signal	PIN
+RTC_BAT	1
GND	2

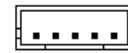
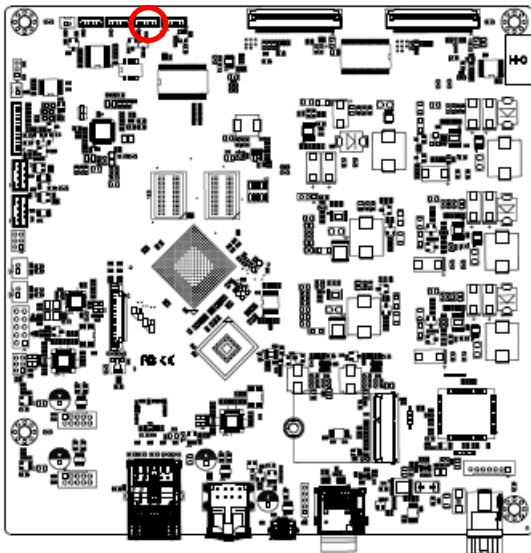
2.3.5 I2C connector 1 (JI2C1)



1

Signal	PIN
+3.3V	1
EXP_I2C_SCL1	2
EXP_I2C_SDA1	3
GND	4
I2C3_INT#	5

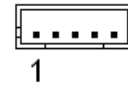
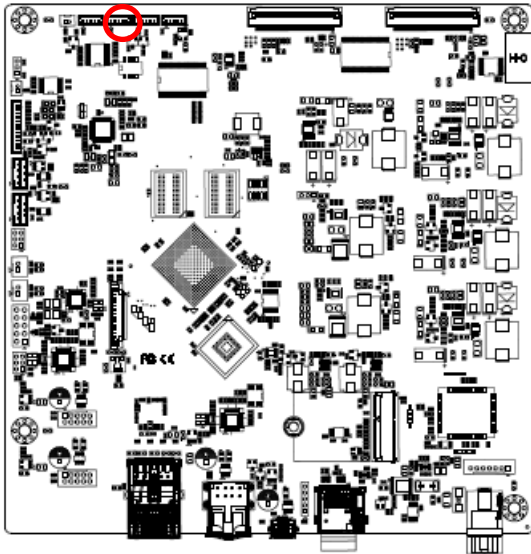
2.3.6 I2C connector 2 (JI2C2)



1

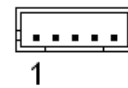
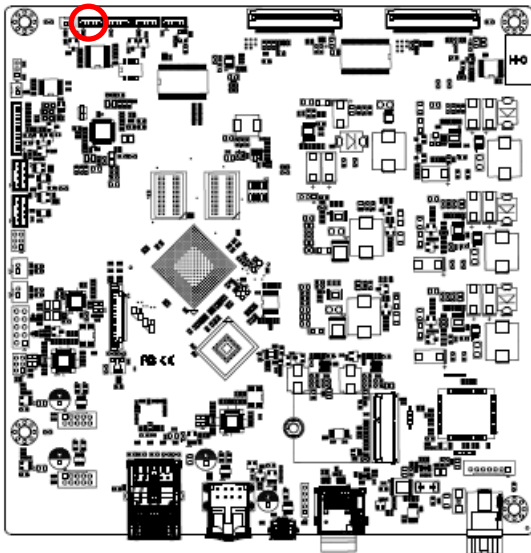
Signal	PIN
+3.3V	1
EXP_I2C_SCL2	2
EXP_I2C_SDA2	3
GND	4
I2C3_INT#	5

2.3.7 I2C connector 3 (JI2C3)



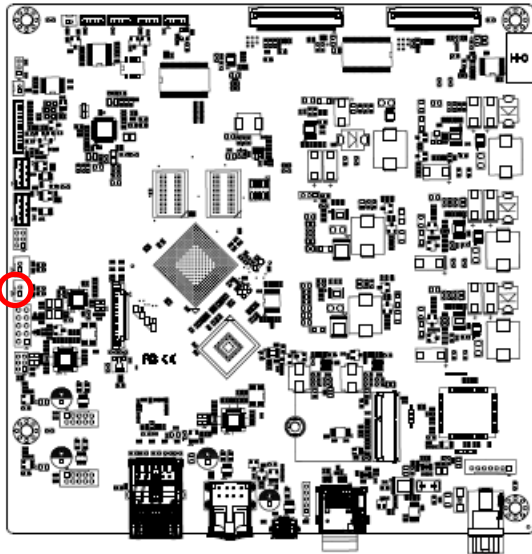
Signal	PIN
+3.3V	1
EXP_I2C_SCL3	2
EXP_I2C_SDA3	3
GND	4
I2C3_INT#	5

2.3.8 I2C connector 4 (JI2C4)



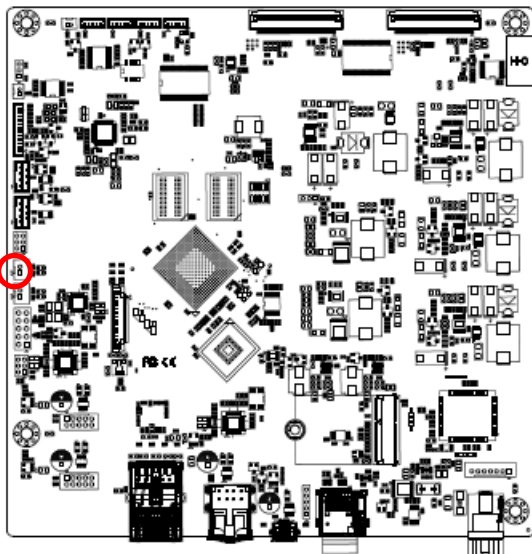
Signal	PIN
+3.3V	1
EXP_I2C_SCL4	2
EXP_I2C_SDA4	3
GND	4
I2C3_INT#	5

2.3.9 Speaker L connector (CN1)



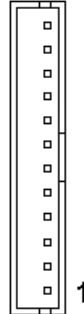
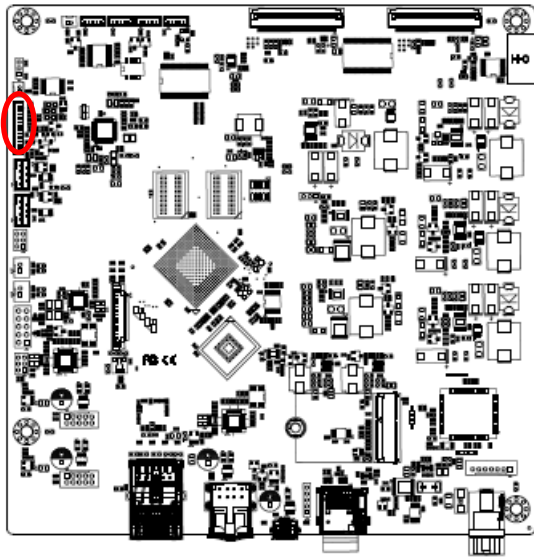
Signal	PIN
SPK_LN	2
SPK_LP	1

2.3.10 Speaker R connector (CN2)



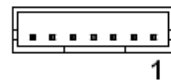
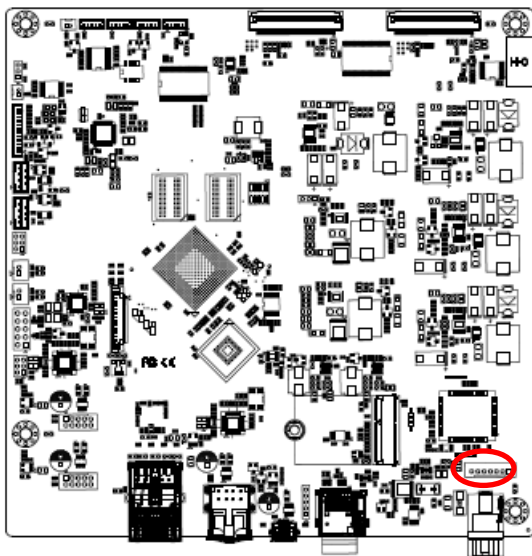
Signal	PIN
SPK_RN	2
SPK_RP	1

2.3.11 General purpose I/O connector (CN4)



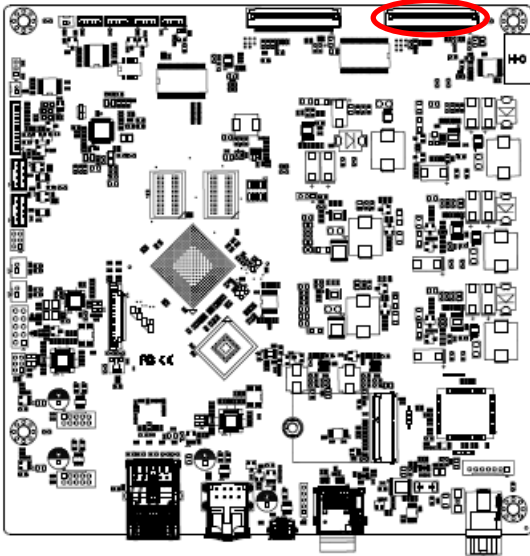
Signal	PIN
9555_GPIO15	12
9555_GPIO14	11
9555_GPIO13	10
9555_GPIO12	9
9555_GPIO11	8
9555_GPIO10	7
MX7_RST_B	6
EXT_BUTTON_IN#	5
GND	4
O_LED	3
G_LED	2
+5V	1

2.3.12 I2C2 connector (CN5)



Signal	PIN
+VIN_12V	1
+VIN_12V	2
I2C2_SCL	3
I2C2_SDA	4
I2C2_INT#	5
GND	6
GND	7

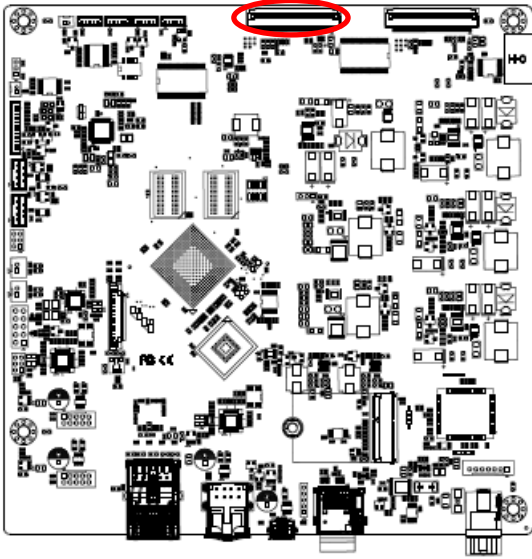
2.3.13 EPD connector (CN6)



Signal	PIN
EPD_VGL-20V	1
TP1	2
EPD_VGH+22V	3
GATE_RL_F11_OUT	4
EINK_VDD	5
GATE_OE_F11_OUT	6
GATE_CLK_F11_OUT	7
GATE_DSP_F11_STV1	8
GND	9
VCOM_TFT	10
EINK_VDD	11
GND	12
SOURCE_CLK_F11_OUT	13
SOURCE_D0	14
SOURCE_D1	15
SOURCE_D2	16
SOURCE_D3	17
SOURCE_D4	18
SOURCE_D5	19
SOURCE_D6	20

Signal	PIN
SOURCE_D7	21
GND	22
SOURCE_D8	23
SOURCE_D9	24
SOURCE_D10	25
SOURCE_D11	26
SOURCE_D12	27
SOURCE_D13	28
SOURCE_D14	29
SOURCE_D15	30
SOURCE_CE_L0_F11_STL1	31
SOURCE_LE_F11_OUT	32
SOURCE_OE_F11_OUT	33
F11_34	34
EPD_RL_J34	35
EPD_VPOS+15V	36
EPD_UD_J34	37
EPD_VENG-15V	38
VCOM_FPL	39
NC	40
GATE_DSP_F11_STV2	41
TP13	42
TP7	43
TP18	44
TP12	45
TP6	46
TP17	47
TP11	48
TP5	49
SOURCE_CE_L0_F11_STL2	50

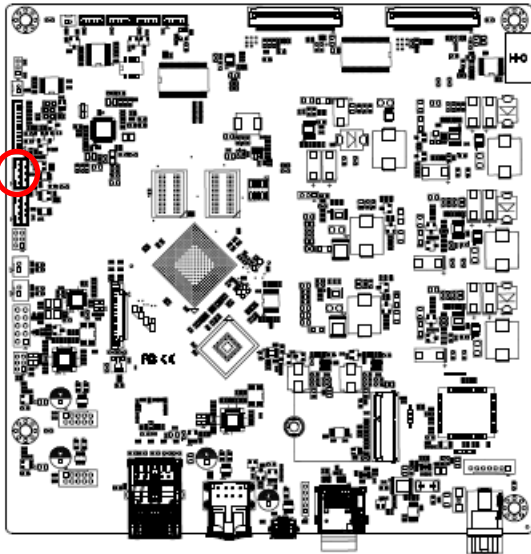
2.3.14 EPD connector (CN7)



Signal	PIN
EPD_VGL-20V	1
TP16	2
EPD_VGH+22V	3
GATE_RL_F12_OUT	4
EINK_VDD	5
GATE_OE_F12_OUT	6
GATE_CLK_F12_OUT	7
GATE_DSP_F12_STV1	8
GND	9
VCOM_TFT	10
EINK_VDD	11
GND	12
SOURCE_CLK_F12_OUT	13
SOURCE_D0	14
SOURCE_D1	15
SOURCE_D2	16
SOURCE_D3	17
SOURCE_D4	18
SOURCE_D5	19
SOURCE_D6	20

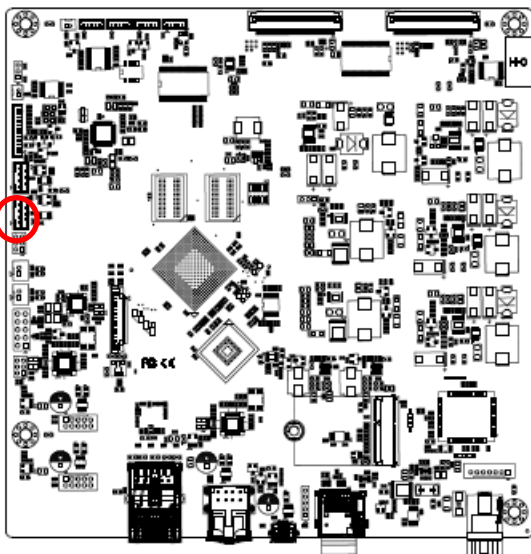
Signal	PIN
SOURCE_D7	21
GND	22
SOURCE_D8	23
SOURCE_D9	24
SOURCE_D10	25
SOURCE_D11	26
SOURCE_D12	27
SOURCE_D13	28
SOURCE_D14	29
SOURCE_D15	30
SOURCE_CE_L0_F12_STL1	31
SOURCE_LE_F12_OUT	32
SOURCE_OE_F12_OUT	33
F11_34	34
EPD_RL_J35	35
EPD_VPOS+15V	36
EPD_UD_J35	37
EPD_VENG-15V	38
VCOM_FPL	39
Border_Power	40
GATE_DSP_F12STV2	41
TP10	42
TP4	43
TP15	44
TP9	45
TP3	46
TP14	47
TP8	48
TP2	49
SOURCE_CE_L0_F12_STL2	50

2.3.15 Cortex-A7 Debug connector (JUART1)



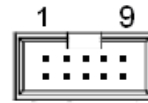
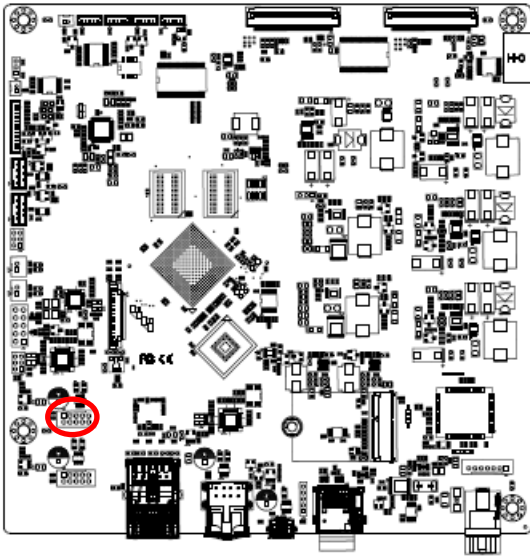
Signal	PIN
GND	4
UART1_RXD_IN	3
UART1_TXD_3.3V_OUT	2
+5V	1

2.3.16 Cortex-M4 Debug connector (JUART2)



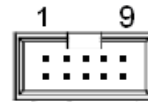
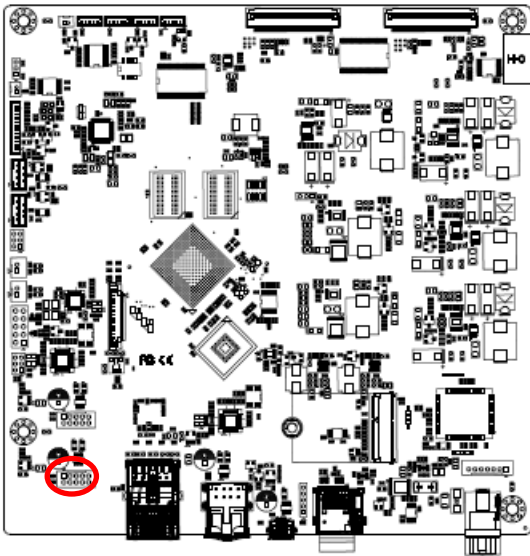
Signal	PIN
GND	4
UART2_RXD_IN	3
UART2_TXD_3.3V_OUT	2
+5V	1

2.3.17 On-board header for USB2.0 (JUSB1)



Signal	PIN	PIN	Signal
+5V	1	2	+5V
USB_NP4	3	4	USB_NP3
USB_PP4	5	6	USB_PP3
GND	7	8	GND
GND	9	10	GND

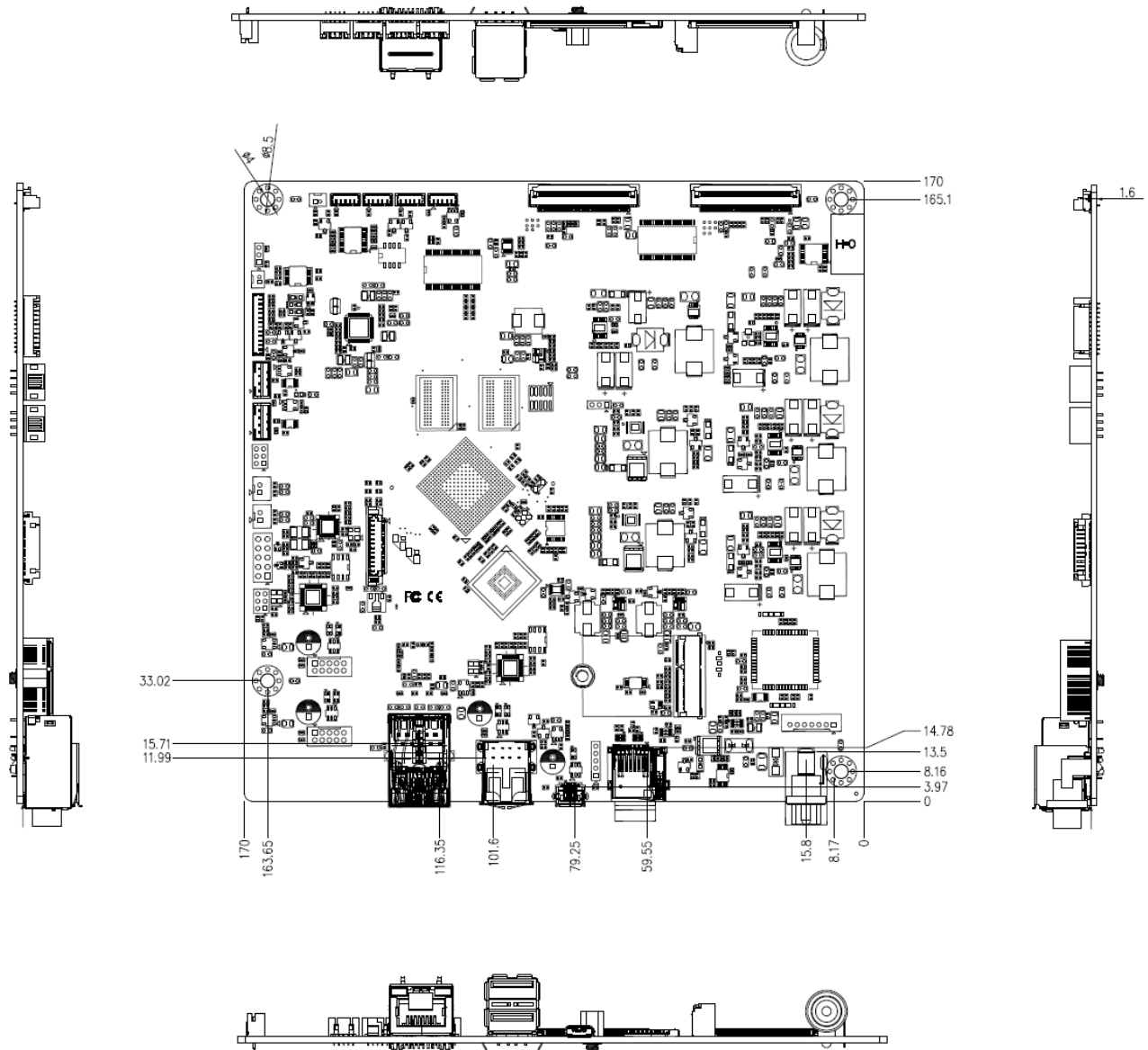
2.3.18 On-board header for USB2.0 (JUSB2)



Signal	PIN	PIN	Signal
+5V	1	2	+5V
USB_NP6	3	4	USB_NP5
USB_PP6	5	6	USB_PP5
GND	7	8	GND
GND	9	10	GND

3. Mechanical Drawing





Unit: mm

