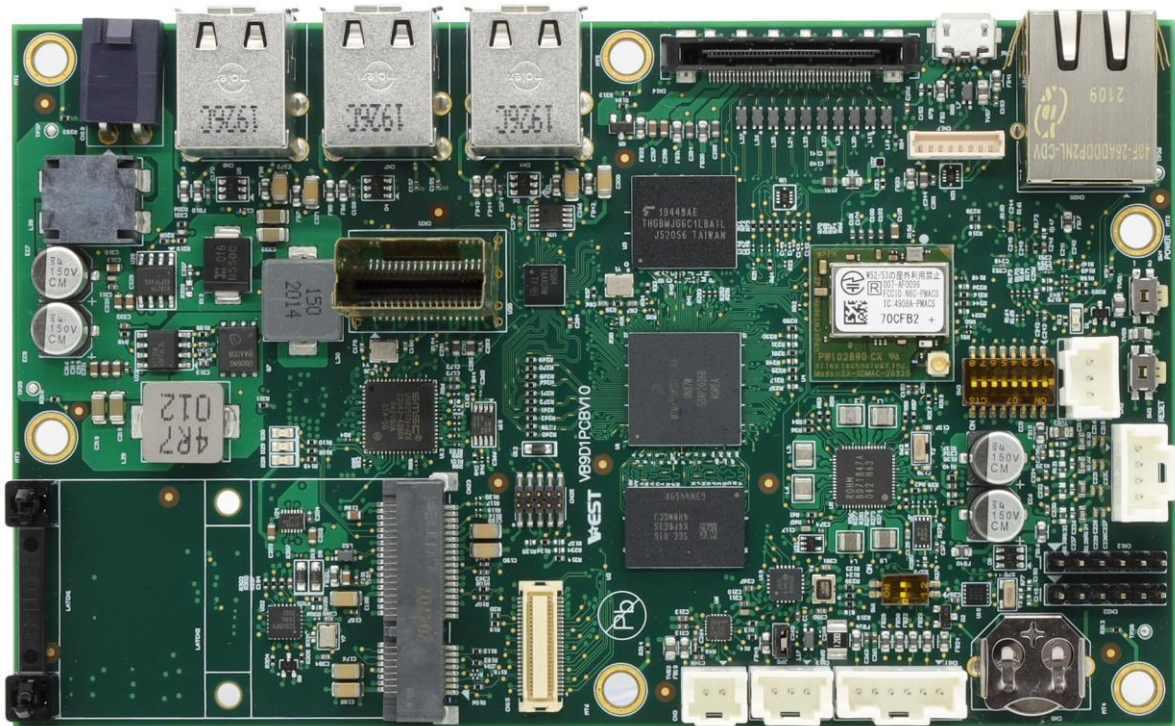


# VEST i.MX 8M Mini Board Hardware Reference Manual

VEST i.MX 8M Mini USG-001, REV A



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# LIST OF ACRONYMS

Acronyms	Abbreviations
VEST	Venture Embedded Solutions Technology
APC	Advanced Products Corporation Private Limited
ISO	International Organization for Standardization
V*EST	Venture Embedded Solutions Technology “The Logo”
eMMC	embedded Multimedia Card (MMC)
ARM	Advanced RISC Machine
CAN	Controller Area Network
SOC	System-on-a-Chip
GPIO	General Purpose Input Output
I2C	Inter-Integrated Circuit
LVDS	Low Voltage Differential Signal
NC	Not Connected
PWM	Pulse Width Modulation
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus
USB OTG	Universal Serial Bus on the Go

Table 1-1: List of Acronyms

# REFERENCE DOCUMENTS

- [i.MX8M Mini Application Processor Datasheet](#)
- [i.MX8M Mini Applications Processor Reference Manual](#)
- [i.MX8M Mini Hardware Developer's Guide](#)

# 1 OVERVIEW

---

## 1.1 GENERAL INFORMATION

The VEST i.MX 8M Mini board is based on the NXP's i.MX 8M Mini applications processor, it can help device manufactures make a smooth transition from conventional Human Machine Interface (HMI) to an advanced interactive user interface that supports multimedia, touch, wireless connectivity and many more features.

The VEST i.MX 8M Mini board runs on the following Operating System:

- Embedded Linux

## 1.2 FEATURE SUMMARY

- NXP i.MX 8M Mini processors (SoloLite/Solo/DualLite/Dual/QuadLite/Quad ARM Cortex – A53, which operates at speeds of up to 1.8GHz, a general-purpose ARM Cortex – M4 400MHz core processor is for low-power processing).
- Up to 4GB of LPDDR4 SDRAM.
- Up to 128GB eMMC for boot/operating system/application/storage.
- High-Security Cryptographic Device IC (ATECC608, protected storage for up to 16 Keys, Certificates or Data).
- On Board 2.4GHz / 5GHz dual band IEEE802.11 a/b/g/n/ac Wave2 WLAN and Bluetooth 4.2 BR/EDR/LE(class 2) Module
- Micro SDHC Socket (CN1)
- USB 2.0 OTG Micro Type B (CN6)
- 3 x Dual Stack USB 2.0 Host Type A (CN4, CN7, CN8)
- Half & Full size Mini PCIe Socket (CN23), with Micro SIM card socket (CN24)
- 3 x LEDs for Mini PCIe Socket (Green D29, Orange D28 and Yellow D30)
- 10/100/1000Mbps Ethernet RJ45 (CN20)
- External RTC with CR1220 Coin Battery Holder (CN5).
- RS232/Half-Duplex RS485 Header (CN11), RS232 & RS485 mode select by dip switch SW1
- CAN V2.0B at 1Mb/s Bus Header (CN13)
- CAN Bus 120  $\Omega$  Terminal Resistor Select Jumper (JP5)
- 10W Stereo Speaker Output Header (CN9)
- MIC Input Header (CN3)
- 2 x UART Debug Pin Header (CN22 for Cortex-A53 Core, CN12 for Cortex-M4 Core)
- 4-Lane MIPI-DSI Connector (CN21), compatible with NXP [MIPI-HDMI adaptor card](#) for HDMI Display.
- Dual Channel LVDS Interface with Backlight (CN16)

- I2C Touch Header (CN17)
- Expansion Header (CN15) for MIPI-CSI 4 lanes, SPDIF, SPI, PWM, UART, I2C and GPIO.
- JTAG Header (CN25)
- GPIO Controlled LED Indicator (D1).
- Reset Button (SW2) and Power Button (SW4).
- 8 bits Boot Mode DIP Switch (SW3) for select boot from eMMC or Micro SD or serial download.
- Watchdog
- 7V – 24VDC Power Input Header (CN18, maximum current 8A)
- 147 mm x 89 mm Form Factor

### 1.3 BLOCK DIAGRAM

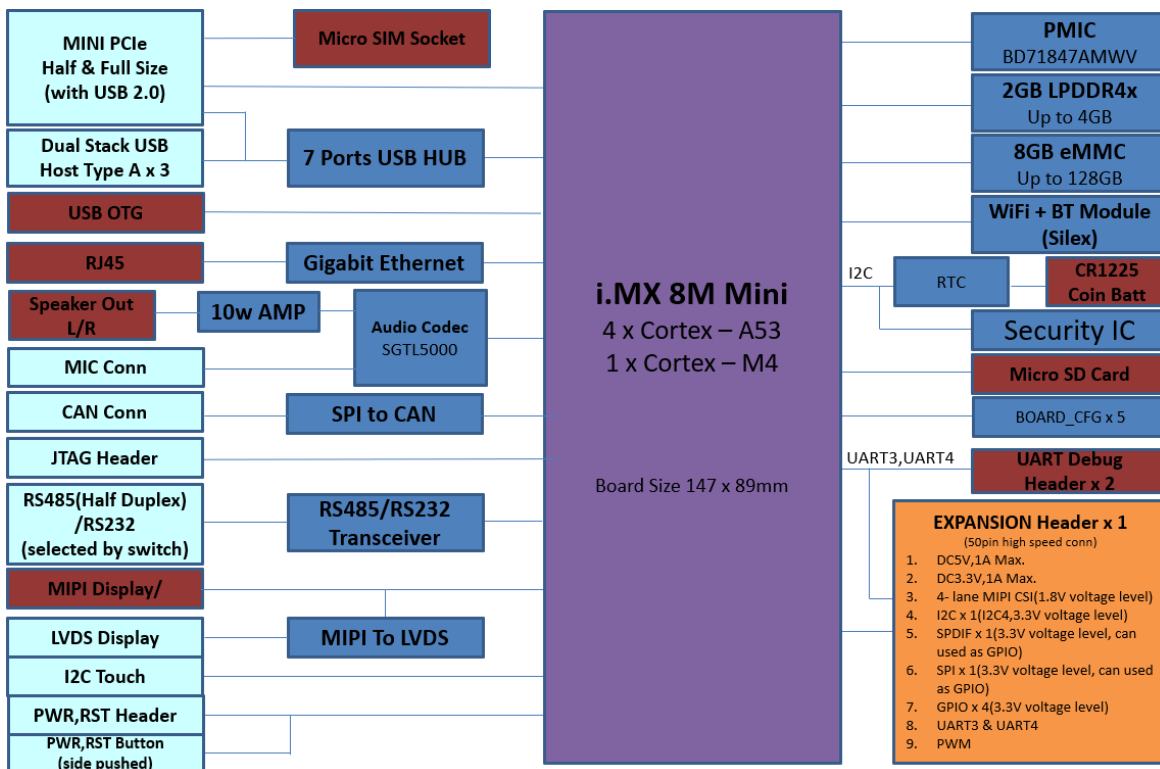


Figure 1-1: VEST i.MX 8M Mini Board Block diagram

### 1.4 VEST i.MX 8M MINI BOARD CONNECTOR AND JUMPER LIST



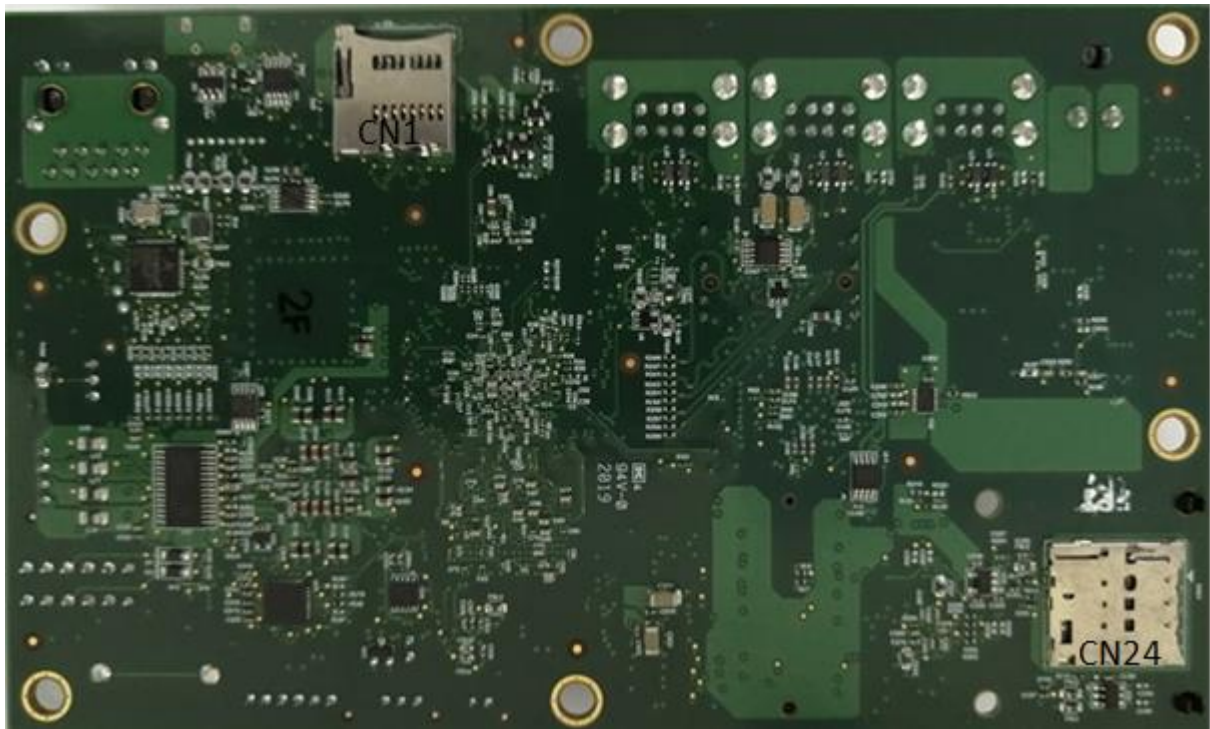
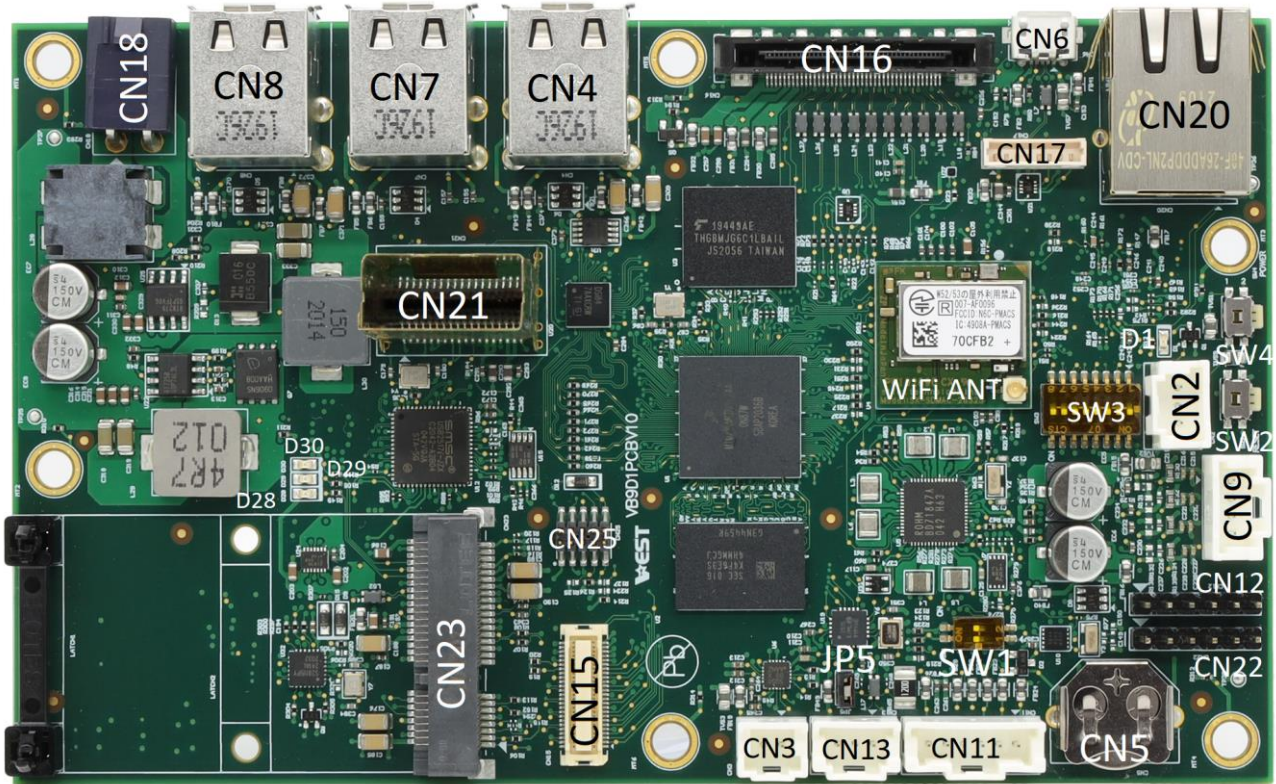



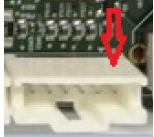



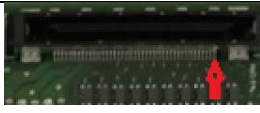



Figure 1-2: VEST i.MX 8M Mini Board User Accessible Connector and Jumper List

The table below lists the user accessible connectors and jumper on the VEST i.MX 8M Mini Board.

Reference	Function	Type	Pin 1 Location
CN1	Micro SDHC Socket	Micro SD	Standard
CN2	Reset & Power Signals Header	Vertical, 3pins, 2mm pitch	
CN3	Mic Input Header	Vertical, 2pins, 2mm pitch	
CN4, CN7, CN8	Dual Stack USB 2.0 Host Type A	USB 2.0 Host Type A	Standard
CN5	CR1220 Coin Battery Holder	CR1220	
CN6	USB 2.0 OTG Micro Type B	USB OTG Micro Type B	Standard
CN9	Stereo Speaker Output Header	Vertical, 4pins, 2mm pitch	
CN11	RS232/RS485 Header	Vertical, 6pins, 2mm pitch	
CN12, CN22	UART Debug Pin Header	Vertical, 6pins, 2.54mm pitch	
CN13	CAN Bus Header	Vertical, 3pins, 2mm pitch	
CN15	Expansion Header	Vertical, 2 x 25pins, 0.5mm pitch	
CN16	Dual Channel LVDS Interface	Vertical, 41pins, 0.5mm pitch	
CN17	I2C Touch Header	Vertical, 8pins, 1.25mm pitch	

Reference	Function	Type	Pin 1 Location
CN18	DC Power Input Header	Right Angle, 2pins, 4.2mm pitch	
CN20	10/100/1000Mbps Ethernet RJ45	10/100/1000Mbps Ethernet RJ45	Standard
CN21	4-Lane MIPI-DSI Connector	Vertical, 2 x 18 pins, 0.8mm pitch	
CN23	Mini PCIe Socket	Mini PCIe Socket	Standard
CN24	Micro SIM Card Socket	Micro SIM	Standard
CN25	JTAG Header	Vertical, 2 x 5 pins, 1.27mm pitch	
D1	GPIO Controlled LED Indicator	Green	
D28	Mini PCIe LED Indicator	Orange	
D29	Mini PCIe LED Indicator	Green	
D30	Mini PCIe LED Indicator	Yellow	
JP5	CAN Bus 120 Ω Terminal Resistor Select Jumper	Vertical, 2pins, 2mm pitch	
SW1	RS232/RS485 Mode Select Dip Switch	Dip Switch, 2 POS, 1.27mm pitch	
SW2	Reset Button	Side Pushed	
SW3	Boot Mode Select Dip Switch	Vertical, 8 POS, 1.27mm pitch	
SW4	Power Button	Side Pushed	

Table 1-2: VEST i.MX 8M Mini Board User Accessible Connector and Jumper List

## 2 VEST i.MX 8M MINI BOARD EXTERNAL CONNECTOR INFORMATION

### 2.1 GENERAL INFORMATION

This chapter describes each of the VEST i.MX 8M Mini Boards external interfaces in detail.

<b>Pin No.:</b>	Pin number on the connector
<b>Signal Name:</b>	Signal name on the connector
<b>Signal Type:</b>	Signal type of this pin I – Input O – Output I/O – Input/ Output
<b>Voltage Level:</b>	Voltage level of this pin
<b>Description:</b>	Short pin functionality description

### 2.2 MICRO SDHC SOCKET (CN1)

The board provides support for micro SD interface; the micro SD interface is driven by SD2 interface.

*Manufacturer: Mole, Manufacturer Part Number: 47352-1001*

The following table describes the pin-out of CN1:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	SD2_DATA2	I/O	3.3V	SD data 2
2	SD2_DATA3	I/O	3.3V	SD data 3
3	SD2_CMD	I/O	3.3V	SD command
4	NVCC_3V3	Power	3.3V	3.3V power
5	SD2_CLK	I/O	3.3V	SD clock
6	GND	Ground	0V	Ground
7	SD2_DATA0	I/O	3.3V	SD data 0
8	SD2_DATA1	I/O	3.3V	SD data 1
9	SD2_nCD	I/O	3.3V	SD card detect
10	GND	Ground	0V	Ground
11	GND	Ground	0V	Ground
12	GND	Ground	0V	Ground
13	GND	Ground	0V	Ground

Table 2-1: Micro SD Card (CN1)

### 2.3 RESET & POWER SIGNALS HEADER (CN2)

The board provides a vertical header for Reset & Power signals.

*Manufacturer: Molex, Manufacturer Part Number: 55932-0310*

The following table describes the pin-out of CN2:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	ONOFF_1V8	I	1.8V	On/Off signal, active low
2	SYS_nRST_1V8	I	1.8V	Reset signal, active low
3	GND	Ground	0V	Ground

Table 2-2: Reset &amp; Power Signals Header (CN2)

### 2.4 MIC INPUT HEADER (CN3)

The board provides a Mic input header.

*Manufacturer: Molex, Manufacturer Part Number: 55932-0210*

The following table describes the pin-out of CN3:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	Mic	I	3.3V	Microphone input
2	GND	Ground	0V	Ground

Table 2-3: Mic Input Header (CN3)

### 2.5 DUAL STACK USB 2.0 HOST TYPE A (CN4, CN7, CN8)

The board provides support for 3 x Dual Stack USB 2.0 host type A connector; the USB host interface is driven by the 7 ports USB Hub.

*Manufacturer: Molex, Manufacturer Part Number: 67298-3090*

The following table describes the pin-out of CN4:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	VBUS_6	Power	5.0V	5V power
2	USB6_HOST_N	Differential	-	USB data negative
3	USB6_HOST_P	Differential	-	USB data positive
4	GND	Ground	0V	Ground

Pin No.	Signal Name	Signal Type	Voltage Level	Description
5	VBUS_5	Power	5.0V	5V power
6	USB5_HOST_N	Differential	-	USB data negative
7	USB5_HOST_P	Differential	-	USB data positive
8	GND	Ground	0V	Ground

Table 2-4: Dual Stack USB 2.0 Host Type A (CN4)

The following table describes the pin-out of CN7:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	VBUS_2	Power	5.0V	5V power
2	USB2_HOST_N	Differential	-	USB data negative
3	USB2_HOST_P	Differential	-	USB data positive
4	GND	Ground	0V	Ground
5	VBUS_1	Power	5.0V	5V power
6	USB1_HOST_N	Differential	-	USB data negative
7	USB1_HOST_P	Differential	-	USB data positive
8	GND	Ground	0V	Ground

Table 2-5: Dual Stack USB 2.0 Host Type A (CN7)

The following table describes the pin-out of CN8:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	VBUS_4	Power	5.0V	5V power
2	USB4_HOST_N	Differential	-	USB data negative
3	USB4_HOST_P	Differential	-	USB data positive
4	GND	Ground	0V	Ground
5	VBUS_3	Power	5.0V	5V power
6	USB3_HOST_N	Differential	-	USB data negative
7	USB3_HOST_P	Differential	-	USB data positive
8	GND	Ground	0V	Ground

Table 2-6: Dual Stack USB 2.0 Host Type A (CN8)

## 2.6 CR1220 COIN BATTERY HOLDER (CN5)

The board provides a CR1220 coin battery holder for external RTC power supply.

Manufacturer: Keystone, Manufacturer Part Number: 3001

The following table describes the pin-out of CN5:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	VDD	Power	3.0V	RTC power
2	VDD	Power	3.0V	RTC power
3	GND	Ground	0V	Ground

Table 2-7: CR1220 Coin Battery Holder (CN5)

## 2.7 USB 2.0 OTG MICRO TYPE B (CN6)

The board provides support for USB OTG interface; the USB OTG interface is driven by the SOC USB OTG1 interface.

*Manufacturer: Hirose, Manufacturer Part Number: ZX62D-B-5PA8(30)*

The following table describes the pin-out of CN6:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	USB1_VBUS	Power	5.0V	5V power
2	USB_1_N	Differential	-	USB OTG data negative
3	USB_2_P	Differential	-	USB OTG data positive
4	USB1_ID	I	3.3V	USB OTG ID signal
5	GND	Ground	0V	Ground

Table 2-8: USB 2.0 OTG Micro Type B (CN6)

## 2.8 STEREO SPEAKER OUTPUT HEADER (CN9)

The board provides a stereo speaker output header; the maximum stereo output power is 10W/Ch into 8  $\Omega$ .

*Manufacturer: Molex, Manufacturer Part Number: 55932-0410*

*Note: to output 10W/Ch power, the DC input should use 12V or higher voltage.*

The following table describes the pin-out of CN9:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	SPKRP	O	DC_IN	Right channel positive differential output
2	SPKRN	O	DC_IN	Right channel negative differential output
3	SPKLN	O	DC_IN	Left channel negative differential output
4	SPKLP	O	DC_IN	Left channel positive differential output

Table 2-9: Stereo Speaker Output Header (CN9)

## 2.9 RS232/HALF-DUPLEX RS485 HEADER (CN11)

The board provides a RS232/half-duplex RS485 interface; the interface is drive by the SOC UART2 through a RS232/RS485 transceiver; The RS232 & RS485 mode is selected by dip switch SW1.

*Manufacturer: Molex, Manufacturer Part Number: 55932-0610*

The following table describes the pin-out of CN11 in RS232 mode:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	GND	Ground	0V	Ground
2	RS232_RXD	I	RS232	RS232 RXD
3	RS232_RTS	I	RS232	RS232 RTS
4	RS232_CTS	O	RS232	RS232 CTS
5	RS232_TXD	O	RS232	RS232 TXD
6	VDD_3V3	Power	3.3V	3.3V Power, 500mA @ max

*Table 2-10: RS232/Half-Duplex 485 Header (CN11, RS232 Mode)*

The following table describes the pin-out of CN11 in RS485 mode:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	GND	Ground	0V	Ground
2	NA	NA	NA	NA
3	NA	NA	NA	NA
4	A/Y Positive	I/O	RS485	A/Y Positive
5	B/Z Negative	I/O	RS485	B/Z Negative
6	VDD_3V3	Power	3.3V	3.3V Power, 500mA @ max

*Table 2-11: RS232/Half-Duplex 485 Header (CN11, RS485 Mode)*

*Note: RS232/RS485 mode and RS485 differential 120  $\Omega$  terminal resistor is selected by dip switch SW1.*

The following table describes the dip switch SW1 setting:

SW1 Mode Setting	Description	SW1 Pin 1-4	SW1 Pin 2-3
RS232 Mode	CN11 is configure to RS232 interface	Don't Care	On
RS485 Mode and 120 $\Omega$ terminal resistor enabled	CN11 is configure to RS485 interface with 120 $\Omega$ terminal resistor.	Off	Off
RS485 Mode and 120 $\Omega$ terminal resistor disabled	CN11 is configure to RS485 interface without 120 $\Omega$ terminal resistor.	On	Off

*Table 2-12: RS232/RS485 Mode Select Dip Switch (SW1)*



## 2.10 UART DEBUG HEADER (CN12, CN22)

The board provides support for 2 x UART debug header; CN22 is for Cortex-A53 core, and CN12 is for Cortex-M4 core debug, the UART debug header is driven by the SOC UART3 & UART4 and it can mate to a TTL-232R-3V3 USB to UART cable for debug.

*Manufacturer: Harwin, Manufacturer Part Number: M20-9990645*

The following table describes the pin-out of CN12:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	GND	Ground	0V	Ground
2	NC	NC	NC	NC
3	NC	NC	NC	NC
4	UART4_RXD	I	3.3V	UART4 RXD <i>Shared with expansion header CN15</i>
5	UART4_TXD	O	3.3V	UART TXD <i>Shared with expansion header CN15</i>
6	NC	NC	NC	NC

*Table 2-13: UART4 Debug Header (CN12)*

The following table describes the pin-out of CN22:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	GND	Ground	0V	Ground
2	NC	NC	NC	NC
3	NC	NC	NC	NC
4	UART3_RXD	I	3.3V	UART3 RXD <i>Shared with expansion header CN15</i>
5	UART3_TXD	O	3.3V	UART3 TXD <i>Shared with expansion header CN15</i>
6	NC	NC	NC	NC

*Table 2-14: UART3 Debug Header (CN22)*

## 2.11 CAN BUS HEADER (CN13)

The board provides a vertical header for CAN bus interface; the CAN is convertor from SOC SPI1.

*Manufacturer: Molex, Manufacturer Part Number: 55932-0310*

The following table describes the pin-out of CN13:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	CANH	Differential	-	CAN bus data signal
2	CANL	Differential	-	CAN bus data signal
3	GND	Ground	0V	Ground

Table 2-15: CAN Bus Header (CN13)

Note: Short JP5 can enable CAN bus on board 120  $\Omega$  terminal resistor.

## 2.12 EXPANSION HEADER (CN15)

The board provides an expansion header for MIPI-CSI, SPDIF, SPI, PWM, UART, I2C and GPIO expansion.

Manufacturer: Molex, Manufacturer Part Number: 52991-0508

The following table describes the pin-out of CN15:

Pin No.	Signal Name	Function	Signal Type	Voltage Level	Description
1	GND		Ground	0V	Ground
2	GND		Ground	0V	Ground
3	SPDIF_TX_PWM3	SPDIF1_OUT PWM3_OUT GPIO5_IO03	O	3.3V	SPDIF Output Line or PWM3 Output
4	CSICK_N	MIPI_CSI_CLK_N	Differential	-	MIPI CSI differential clock negative
5	SPDIF_RX	SPDIF1_IN GPIO5_IO04	I	3.3V	SPDIF Input Line
6	CSICK_P	MIPI_CSI_CLK_P	Differential	-	MIPI CSI differential clock positive
7	SPDIF_EXT_CLK	SPDIF1_EXT_CLK GPIO5_IO05	O	3.3V	SPDIF External Clock
8	GND		Ground	0V	Ground
9	GND		Ground	0V	Ground
10	CSID0_N	MIPI_CSI_D0_N	Differential	-	MIPI CSI differential data 0 negative
11	ECSPI2_SCLK	ECSPI2_SCLK GPIO5_IO10	O	3.3V	SPI SCLK
12	CSID0_P	MIPI_CSI_D0_P	Differential	-	MIPI CSI differential data 0 positive
13	ECSPI2_MOSI	EXSPI2_MOSI GPIO5_IO11	O	3.3V	SPI MOSI
14	GND		Ground	0V	Ground
15	ECSPI2_MISO_UART4_CTS	ECSPI2_MISO UART4_CTS GPIO5_IO12	'O' for ECSPI2_MISO 'I' for UART4_CTS	3.3V	SPI MISO or UART4 CTS
16	CSID1_N	MIPI_CSI_D1_N	Differential	-	MIPI CSI differential data 1 negative

Pin No.	Signal Name	Function	Signal Type	Voltage Level	Description
17	ECSPI2_SSO_UART4_RTS	ECSPI2_SSO UART4_RTS GPIO5_IO13	O	3.3V	SPI SSO or UART4_RTS
18	CSID1_P	MIPI_CSI_D1_P	Differential	-	MIPI CSI differential data 1 positive
19	GND		Ground	0V	Ground
20	GND		Ground	0V	Ground
21	UART4_RXD	UART4_RXD	I	3.3V	UART4 RX
22	CSID2_N	MIPI_CSI_D2_N	Differential	-	MIPI CSI differential data 2 negative
23	UART4_TXD	UART4_TXD	O	3.3V	UART4 TX
24	CSID2_P	MIPI_CSI_D2_P	Differential	-	MIPI CSI differential data 2 positive
25	GND		Ground	0V	Ground
26	GND		Ground	0V	Ground
27	UART3_RXD	UART3_RXD	I	3.3V	UART3 RX
28	CSID3_N	MIPI_CSI_D3_N	Differential	-	MIPI CSI differential data 3 negative
29	UART3_TXD	UART3_TXD	O	3.3V	UART3 TX
30	CSID3_P	MIPI_CSI_D3_P	Differential	-	MIPI CSI differential data 3 positive
31	GND		Ground	0V	Ground
32	GND		Ground	0V	Ground
33	GPIO1_IO08	GPIO1_IO08	I/O	3.3V	GPIO
34	PWM4_OUT	PWM4_OUT GPIO5_IO02			
35	GPIO1_IO07	GPIO1_IO07	I/O	3.3V	GPIO
36	GND		Ground	0V	Ground
37	GPIO1_IO06	GPIO1_IO06	I/O	3.3V	GPIO
38	I2C4_SCL	I2C4_SCL GPIO5_IO20	O	3.3V	I2C4 SCL
39	GPIO1_IO05	GPIO1_IO05 M4_NMI	I/O	3.3V	GPIO
40	I2C4_SDA	I2C4_SDA GPIO5_IO21	I/O	3.3V	I2C4 SDA
41	GND		Ground	0V	Ground
42	GND		Ground	0V	Ground
43	VDD_5V0		Power	5.0V	5.0V Power, total 1A @ max
44	GND		Ground	0V	Ground
45	VDD_5V0		Power	5.0V	5.0V Power, total 1A @ max
46	GND		Ground	0V	Ground
47	VDD_3V3		Power	3.3V	3.3V Power, total 1A @ max
48	GND		Ground	0V	Ground

Pin No.	Signal Name	Function	Signal Type	Voltage Level	Description
49	VDD_3V3		Power	3.3V	3.3V Power, total 1A @ max
50	GND		Ground	0V	Ground

Table 2-16: Expansion Header (CN15)

## 2.13 DUAL CHANNEL LVDS INTERFACE WITH BACKLIGHT HEADER (CN16)

The board provides support for dual channel LVDS and backlight interface.

Manufacturer: Hirose, Manufacturer Part Number: FX15SC-41S-0.5SV

The following table describes the pin-out of CN16:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	A_Y0_R_N	O	-	LVDS0 lane0 negative
2	A_Y0_R_P	O	-	LVDS0 lane0 positive
3	GND	Ground	0V	Ground
4	A_Y1_R_N	O	-	LVDS0 lane1 negative
5	A_Y1_R_P	O	-	LVDS0 lane1 positive
6	GND	Ground	0V	Ground
7	A_Y2_R_N	O	-	LVDS0 lane2 negative
8	A_Y2_R_P	O	-	LVDS0 lane2 positive
9	GND	Ground	0V	Ground
10	A_CLK_R_N	O	-	LVDS0 CLK negative
11	A_CLK_R_P	O	-	LVDS0 CLK positive
12	GND	Ground	0V	Ground
13	A_Y3_R_N	O	-	LVDS0 lane3 negative
14	A_Y3_R_P	O	-	LVDS0 lane3 positive
15	GND	Ground	0V	Ground
16	B_Y0_R_N	O	-	LVDS1 lane0 negative
17	B_Y0_R_P	O	-	LVDS1 lane0 positive
18	GND	Ground	0V	Ground
19	B_Y1_R_N	O	-	LVDS1 lane1 negative
20	B_Y1_R_P	O	-	LVDS1 lane1 positive
21	GND	Ground	0V	Ground
22	B_Y2_R_N	O	-	LVDS1 lane2 negative

Pin No.	Signal Name	Signal Type	Voltage Level	Description
23	B_Y2_R_P	O	-	LVDS1 lane2 positive
24	GND	Ground	0V	Ground
25	B_CLK_R_N	O	-	LVDS1 CLK negative
26	B_CLK_R_P	O	-	LVDS1 CLK positive
27	GND	Ground	0V	Ground
28	B_Y3_R_N	O	-	LVDS1 lane3 negative
29	B_Y3_R_P	O	-	LVDS1 lane3 positive
30	GND	Ground	0V	Ground
31	PWM1_OUT	O, I/O	3.3V	PWM1 output or GPIO
32	DSI_BL_PWM	O, I/O	3.3V	PWM output or GPIO
33	LCD_EN	O	3.3V	LCD enable
34	LCD_3V3	Power	3.3V	3.3V Power, 1A @ max
35				
36	VDD_5V0	Power	5.0V	5.0V Power, 1A @ max
37				
38	VDD_IN	Power	VDD_IN	VDD_IN Power, 2A @ max
39				
40				
41				

Table 2-17: Dual Channel LVDS Interface with Backlight Header (CN16)

## 2.14 I2C TOUCH HEADER (CN17)

The board provides a vertical header for I2C touch; this interface is driven by SOC I2C2 interface.

Manufacturer: Molex, Manufacturer Part Number: 53047-0810

The following table describes the pin-out of CN64:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	VDD_3V3	Power	3.3V	3.3V power, 500mA @ max
2	NC	NC	NC	NC
3	NC	NC	NC	NC
4	GND	Ground	0V	Ground
5	I2C_TOUCH_RST	O	3.3V	External reset from host

Pin No.	Signal Name	Signal Type	Voltage Level	Description
6	I2C_TOUCH_INT	I	3.3V	External interrupt to the host
7	I2C2_SDA	I/O	3.3V	I2C2 SDA
8	I2C2_SCL	O	3.3V	I2C2 SCL

Table 2-18: I2C Touch Header (CN17)

## 2.15 DC POWER INPUT (CN18)

The board provides a 4.2mm pitch 2pins MiniFit header for DC power input.

Manufacturer: Molex, Manufacturer Part Number: 172648-0102

The following table describes the pin-out of CN51:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	GND	Ground	0V	DC power return
2	VDD_IN	Power	7- 24V	DC power input

Table 2-19: DC Power Input Header (CN18)

## 2.16 10/100/1000MBPS ETHERNET (CN20)

The board provides support for 10/100/1000Mbps Ethernet interface.

Manufacturer: Yuan Dean Scientific, Manufacturer Part Number: 48F-26ADDDPXNL-CDV

The following table describes the pin-out of CN20:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	GND	Ground	0V	Ground
2	TXRXP_A	Differential	-	Bi-directional pair A positive
3	TXRXN_A	Differential	-	Bi-directional pair A negative
4	TXRXP_B	Differential	-	Bi-directional pair B positive
5	TXRXN_B	Differential	-	Bi-directional pair B negative
6	TXRXP_C	Differential	-	Bi-directional pair C positive
7	TXRXN_C	Differential	-	Bi-directional pair C negative
8	TXRXP_D	Differential	-	Bi-directional pair D positive
9	TXRXN_D	Differential	-	Bi-directional pair D negative
10	TRDCT1/2/3/4	-	-	Common terminal of channel 1/2/3/4
11	LED_ACT	O	3.3V	LAN Active LED Control
12	GND	Ground	0V	Ground

13	LED_LINK10_100	I/O	3.3V	10/100Mbps LAN Link LED Control
14	LED_LINK1000	I/O	3.3V	1000Mbps LAN Link LED Control

Table 2-20: 10/100/1000Mbps Ethernet (CN20)

## 2.17 MIPI-DSI CONNECTOR (CN21)

The board provides support for MIPI-DSI connector;

It compatible with NXP [MIPI-HDMI adaptor card](#) for HDMI display.



Manufacturer: Molex, Manufacturer Part Number: 75784-0160

The following table describes the pin-out of CN21:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
A1	GND	Ground	0V	Ground
A2	DSICK_N	O	-	MIPI DSI differential clock negative
A3	DSICK_P	O	-	MIPI DSI differential clock positive
A4	GND	Ground	0V	Ground
A5	VDD_1V8	Power	1.8V	1.8V Power
A6	VDD_1V8	Power	1.8V	1.8V Power
A7	GND	Ground	0V	Ground
A8	NC	NC	NC	NC
A9	NC	NC	NC	NC
A10	NC	NC	NC	NC
A11	DSI_EN_1V8	O	1.8V	DSI Enable
A12	GND	Ground	0V	Ground
A13	VDD_3V3	Power	3.3V	3.3V Power
A14	VDD_3V3	Power	3.3V	3.3V Power
A15	GND	Ground	0V	Ground
A16	VDD_5V0	Power	5.0V	5.0V Power
A17	VDD_5V0	Power	5.0V	5.0V Power
A18	GND	Ground	0V	Ground
B1	GND	Ground	0V	Ground
B2	DSIO_N	O	-	MIPI DSI differential data 0 negative

Pin No.	Signal Name	Signal Type	Voltage Level	Description
B3	DSI0_P	O	-	MIPI DSI differential data 0 positive
B4	GND	Ground	0V	Ground
B5	DSI1_N	O	-	MIPI DSI differential data 1 negative
B6	DSI1_P	O	-	MIPI DSI differential data 1 positive
B7	GND	Ground	0V	Ground
B8	DSI_BL_PWM_1V8	I/O	1.8V	PWM or GPIO
B9	DSI_TS_nINT_1V8	I/O	1.8V	GPIO
B10	I2C3_SDA_1V8	I/O	1.8V	I2C3 SDA
B11	I2C3_SCL_1V8	O	1.8V	I2C3 SCL
B12	GND	Ground	0V	Ground
B13	DSI2_N	O	-	MIPI DSI differential data 2 negative
B14	DSI2_P	O	-	MIPI DSI differential data 2 positive
B15	GND	Ground	0V	Ground
B16	DSI3_N	O	-	MIPI DSI differential data 3 negative
B17	DSI3_P	O	-	MIPI DSI differential data 3 positive
B18	GND	Ground	0V	Ground

Table 2-21: MIPI-DSI Connector (CN21)

## 2.18 HALF & FULL SIZE MINI PCIe SOCKET (CN23)

The board provides support for half & full size Mini PCIe socket

*manufacturer: Lotes, Manufacturer Part Number: AAA-PCI-047-K01*

The following table describes the pin-out of CN23:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	PCIE_WAKE_B_CN	I	3.3V	Wake up pin
2	MPCIE_3V3	Power	3.3V	3.3V Power
3	PCIE_GPIO_RESERVED	I/O	3.3V	GPIO, Reserved
4	GND	Ground	0V	Ground
5	NC	NC	NC	NC
6	MPCIE_1V5	Power	1.5V	1.5V Power
7	PCle_nCLKREQ_DEV	I	3.3V	PCle CLK REQ
8	USIM_PWR	O	1.8V	USIM Power
9	GND	Ground	0V	Ground



Pin No.	Signal Name	Signal Type	Voltage Level	Description
10	USIM_DATA	I/O	1.8V	USIM Data
11	PCIE_CLK_N	O	-	PCIE Clock pair negative
12	USIM_CLK	Ground	0V	Ground
13	PCIE_CLK_P	O	-	PCIE Clock pair positive
14	USIM_RST	O	1.8V	USIM Reset
15	GND	Ground	0V	Ground
16	NC	NC	NC	NC
17	NC	NC	NC	NC
18	GND	Ground	0V	Ground
19	NC	NC	NC	NC
20	PCIE_DIS_B	O	3.3V	Disable signal
21	GND	Ground	0V	Ground
22	PCIE_RST_B	O	3.3V	Reset signal
23	PCIE_RX_N	I	-	PCIE Receive pair negative
24	MPCIE_3V3	Power	3.3V	3.3V Power
25	PCIE_RX_P	I	-	PCIE Receive pair positive
26	GND	Ground	0V	Ground
27	GND	Ground	0V	Ground
28	MPCIE_1V5	Power	1.5V	1.5V Power
29	GND	Ground	0V	Ground
30	I2C3_SCL	O	3.3V	I2C3 Clock
31	PCIE_TX_N	O	-	PCIE Transmit pair negative
32	I2C3_SDA	I/O	3.3V	I2C3 Data
33	PCIE_TX_P	O	-	PCIE Transmit pair positive
34	GND	Ground	0V	Ground
35	GND	Ground	0V	Ground
36	USB7_HOST_DN	I/O	-	USB data negative
37	GND	Ground	0V	Ground
38	USB7_HOST_DP	I/O	-	USB data positive
39	MPCIE_3V3	Power	3.3V	3.3V Power
40	GND	Ground	0V	Ground
41	MPCIE_3V3	Power	3.3V	3.3V Power
42	LED_WWAN_B	I	3.3V	Orange LED indicator(D28) control, active low
43	GND	Ground	0V	Ground

Pin No.	Signal Name	Signal Type	Voltage Level	Description
44	LED_WLAN_B	I	3.3V	Green LED indicator(D29) control, active low
45	NC	NC	NC	NC
46	LED_WPAN_B	I	3.3V	Yellow LED indicator(D30) control, active low
47	NC	NC	NC	NC
48	MPCIE_1V5	Power	1.5V	1.5V Power
49	NC	NC	NC	NC
50	GND	Ground	0V	Ground
51	NC	NC	NC	NC
52	MPCIE_3V3	Power	3.3V	3.3V Power

Table 2-22: Half & Full size Mini PCIe Socket (CN23)

## 2.19 MICRO SIM CARD SOCKET (CON24)

The board provides an on-board micro SIM card socket for Mini PCIe.

*manufacturer: JAE, Manufacturer Part Number: SF56K006VBAR2000*

The following table describes the pin-out of CN24:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	USIM_PWR	Power	1.8V	1.8V Power
2	USIM_RST	I	1.8V	USIM Reset
3	USIM_CLK	I	1.8V	USIM CLK
4	NC	NC	NC	NC
5	GND	Ground	0V	Ground
6	NC	NC	NC	NC
7	USIM_DATA	I/O	1.8V	USIM Data
8	NC	NC	NC	NC
9	SIMCARD_DET_1V8	O	1.8V	SIM card detect
10	GND	Ground	0V	Ground

Table 2-23: Micro SIM Card Socket (CN24)

## 2.20 JTAG HEADER (CN25)

The board provides support for JTAG header.

*manufacturer: Samtec, Manufacturer Part Number: FTSH-105-01-L-DV*

The following table describes the pin-out of CN25:

Pin No.	Signal Name	Signal Type	Voltage Level	Description
1	VDD_3V3	Power	3.3V	3.3V Power
2	JTAG_TMS	O	3.3V	JTAG test mode select
3	GND	Ground	0V	Ground
4	JTAG_TCK	O	3.3V	JTAG test clock
5	GND	Ground	0V	Ground
6	JTAG_TDO	O	3.3V	JTAG data out
7	NC	NC	NC	NC
8	JTAG_TDI	I	3.3V	JTAG data in
9	GND	Ground	0V	Ground
10	POR_B_1V8	I	1.8V	System Reset

Table 2-24: JTAG Header (CN25)

## 2.21 GPIO CONTROLLED LED INDICATOR (D1)

The board features a green colour LED indicator to the user.

Manufacturer: LITEON, Manufacturer Part Number: LTST-C190KGKT

The following table describes the function of D1:

Reference	Description
D1	SOC GPIO1_IO00 High -> D1 On SOC GPIO1_IO00 Low -> D1 Off

Table 2-25: GPIO Controlled LED Indicator (D1)

## 2.22 RESET BUTTON (SW2)

The board provides a side push tactile switch for resetting the board.

Manufacturer: E-Switch, Manufacturer Part Number: TL1014BF160QG

The following table describes the function of SW2:

Reference	Description
SW2	Reset button is located at the edge of the PCB to reset the board, active low.

Table 2-26: Reset Button (SW1)

## 2.23 POWER BUTTON (SW4)

The board provides a side push tactile switch for turning the board on/off.

*Manufacturer: E-Switch, Manufacturer Part Number: TL1014BF160QG*

The following table describes the function of SW4:

Reference	Description
SW2	Power button is located at the edge of the PCB to turn on/off the board, active low.

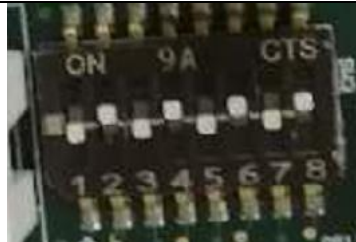
*Table 2-27: Power Button (SW4)*

## 2.24 BOOT MODE SELECTION SWITCH (SW3)

The board provides an 8 bits dip switch for boot mode selection.

*Manufacturer: CTS Electronic Components, Manufacturer Part Number: 218-8LPST*

The following table describes the boot mode setting:

Boot Mode Setting	Description	SW1-8	Picture
Serial Downloader Mode	In this mode, boot device can be programmed through USB OTG interface using MFG Tool	01101010	
Boot from eMMC	In this mode, boot media is eMMC.	10101010	
Boot from Micro SD card	In this mode, boot media is external Micro SD card	10010101	

*Table 2-28: Boot Mode Selection Switch (SW3)*

### 3 ELECTRICAL SPECIFICATION

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VEST i.MX 8M Mini Board was designed to support up to 24VDC power input.

#### 3.1 ABSOLUTE MAXIMUM CHARACTERISTICS

Power Supply Input	Minimum	Maximum
Main Power Supply, DC-IN	-0.3	26V

*Table 3-1: Absolute Maximum Characteristics*

#### 3.2 RECOMMENDED POWER SUPPLY CHARACTERISTICS

Power Supply Input	Minimum	Typical	Maximum	Unit
Voltage of Input Power	7		24	V
Current of Input Power			8	A

*Table 3-2: Recommended Power Supply Characteristics*

## 4 ENVIRONMENTAL SPECIFICATION

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### 4.1 STORAGE TEMPERATURE SPECIFICATION

The VEST i.MX 8M Mini Board can be stored in a temperature ranging from 5°C to 50°C.

### 4.2 OPERATION TEMPERATURE SPECIFICATION

The VEST i.MX 8M Mini Board can operate in a temperature ranging from 5°C to 50°C.

### 4.3 HUMIDITY

- Operating: 10% to 90% (Non-condensing)
- Non-operating: 5% to 95% (Non-condensing)

## 5 MECHANICAL SPECIFICATION

### 5.1 MECHANICAL DIMENSION

- 147 mm x 89 mm

### 5.2 MECHANICAL DRAWING

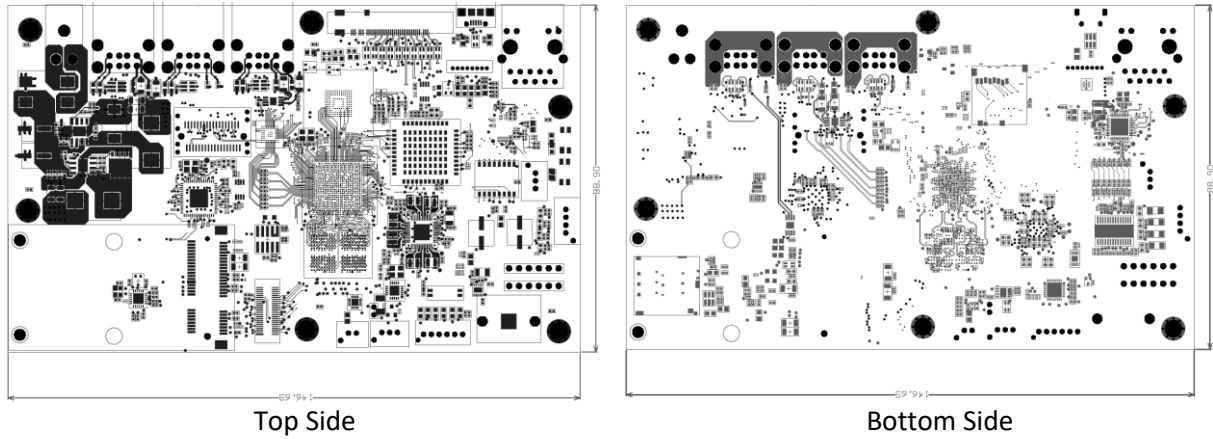


Figure 5-1: Mechanical Drawing

## 6 REVISION HISTORY

Version	Date Released	Changes
0.0.1	06 JUL 2020	Initial Release
A	23 SEP 2021	First Official Release



## 7 LEGAL NOTICES

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Except where required by law, specific testing of all parameters of each Product is not necessarily performed.

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