

# ***R3399X-2C / R3399XH-2C/ R3399XL-2C Series***

## ***User's Manual***

**P/N: G03-R3399-F**

**Revision: 3.0**

**Release date: December 8, 2022**

### **Trademark:**

\* Specifications and Information contained in this documentation are furnished for information use only, and are subject to change at any time without notice, and should not be construed as a commitment by manufacturer.

# Environmental Protection Announcement

Do not dispose this electronic device into the trash while discarding. To minimize pollution and ensure environment protection of mother earth, please recycle.



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## Environmental Safety Instruction

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- Avoid the dusty, humidity and temperature extremes. Do not place the product in any area where it may become wet.
- 0 to 40 centigrade is the suitable temperature. (The temperature comes from the request of the chassis and thermal solution)
- Generally speaking, dramatic changes in temperature may lead to contact malfunction and crackles due to constant thermal expansion and contraction from the welding spots' that connect components and PCB. Computer should go through an adaptive phase before it boots when it is moved from a cold environment to a warmer one to avoid condensation phenomenon. These water drops attached on PCB or the surface of the components can bring about phenomena as minor as computer instability resulted from corrosion and oxidation from components and PCB or as major as short circuit that can burn the components. Suggest starting the computer until the temperature goes up.
- The increasing temperature of the capacitor may decrease the life of computer. Using the close case may decrease the life of other device because the higher temperature in the inner of the case.
- Attention to the heat sink when you over-clocking. The higher temperature may decrease the life of the device and burned the capacitor.

## USER'S NOTICE

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## Manual Revision Information

Reversion	Revision History	Date
3.0	Third Edition	December 8, 2022

## Item Checklist

Motherboard

# Chapter 1

## Introduction of the Motherboard

### 1-1 Feature of Motherboard

- Rockchip® RK3399 6-core: Rockchip® ARM Cortex A72(Dual Core, 1.8Ghz) + Cortex A53(Quad Core, 1.4GHz)
- Onboard 2GB/1333MHz DDR3L DRAM
- Onboard 16GB Flash ROM (Max 64GB)
- Support WIFI and BlueTooth
- 1\*Realtek GbE; 1\*Realtek 10/100Mbps LAN (Optional to **R3399X-2C/ R3399XH-2C**)
- 3\* UART +1\*RS232 +1\*Debug
- 2\* USB 3.0 (1\* OTG Co-lay with USB 3.0); 6\*USB 2.0
- 1\*HDMI 2.0; 1\*eDP; 1\*24-bits dual channel LVDS (Optional to **R3399X-2C/ R3399XH-2C**)
- Support HDMI-in (Optional to **R3399X-2C**)
- Support 4K H.264/H.265 video decoding, up to 60fp 10 bits coding
- Support 1080P H.264 format video encoding
- 1\*Micro SD card slot (Max 256GB)
- Support Android 7.1, Debian9.0

## 1-2 Specification

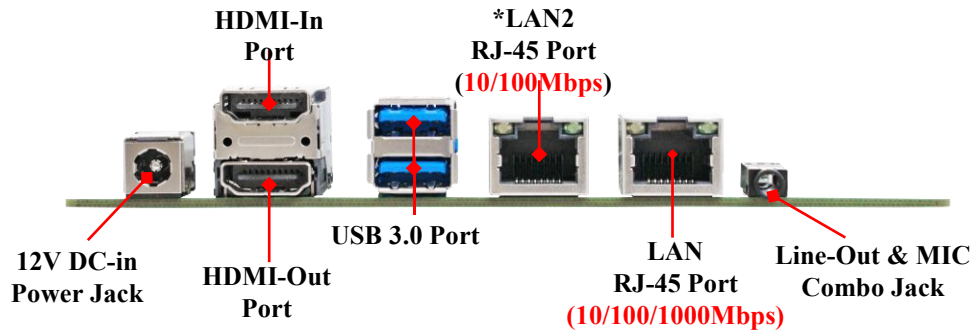
Spec	Description
<b>From Factor</b>	<ul style="list-style-type: none"> <li>● 102 * 146mm</li> </ul>
<b>CPU</b>	<ul style="list-style-type: none"> <li>● Rockchip® RK3399 6-core: Rockchip® ARM Cortex A72(Dual Core 1.8 GHz) +Cortex A53(Quad Core 1.4GHz)</li> </ul>
<b>PMU</b>	<ul style="list-style-type: none"> <li>● Rockchip® <b>RK808-D</b> PMU</li> </ul>
<b>Memory</b>	<ul style="list-style-type: none"> <li>● Onboard 2GB/1333MHz DDR3L DRAM</li> </ul>
<b>Storage</b>	<ul style="list-style-type: none"> <li>● Onboard 16GB EMMC Flash ROM (Max. 64GB)</li> </ul>
<b>Expansion</b>	<ul style="list-style-type: none"> <li>● 1* Micro SD (TF) Card Socket (Max 64GB)</li> <li>● 1* SIM Card Holder</li> <li>● 1* <i>Full-size Mini PCIe slot by USB interface (R3399X-2C/ R3399XH-2C)</i></li> </ul>
<b>Network</b>	<ul style="list-style-type: none"> <li>● 1* Realtek RTL8211E 10/100/1000Mbps LAN</li> <li>● 1* <i>Realtek RTL8152B-VB-CG 10/100Mbps LAN (R3399X-2C /R3399XH-2C)</i></li> <li>● 1* AMPAK AP6398SV 802.11 a/b/g/n/ac 2.4/5G WIFI and BT-V5.0</li> </ul>
<b>Audio</b>	<ul style="list-style-type: none"> <li>● Integrated with Realtek ALC5640 2-CH HD audio chip</li> </ul>
<b>Rear I/O</b>	<ul style="list-style-type: none"> <li>● 1* 12V DC-In Power Jack</li> <li>● 1* HDMI-In Port(<b>R3399XL-2C only</b>)</li> <li>● 1* HDMI-Out Port</li> <li>● 2* USB 3.0 Port (Top one co-lay OTG function)</li> <li>● 2* <i>USB 2.0 Port + 1* RJ-45 Port (R3399XL-2C)</i> or 2* <i>RJ-45 Port (R3399X-2C/R3399XH-2C)</i></li> <li>● 1* Audio Jack (Line-Out &amp; MIC Combo)</li> </ul>
<b>Internal I/O</b>	<ul style="list-style-type: none"> <li>● 1* Power Switch &amp; Recover Button Connector</li> <li>● 1* Reset Button Connector</li> <li>● 1* CPUFAN Connector</li> <li>● 3* UART, 1* RS232, 1* Debug</li> <li>● 2* USB 2.0 Header (<b>R3399XL-2C</b>) or 3 * USB 2.0 header (<b>R3399X-2C/R3399XH-2C</b>)</li> <li>● 1* Speaker Connector (3W Amplifier)</li> <li>● 1* GPIO &amp; I2C Combo Header Block</li> <li>● 1* GPIO_VCC Jumper</li> <li>● 1* MIPI CSI Connector(<b>R3399X-2C/R3399XH-2C</b>)</li> <li>● 1* eDP Header</li> </ul>

- 1\* EDP\_VCC Jumper
- 1\* LVDS Header & 1\* Inverter Connector(*R3399X-2C/R3399XH-2C*)
- 1\* LVDS\_BKLT Jumper(*R3399X-2C/R3399XH-2C*)
- 1\* LVDS\_POWER Jumper(*R3399X-2C/R3399XH-2C*)

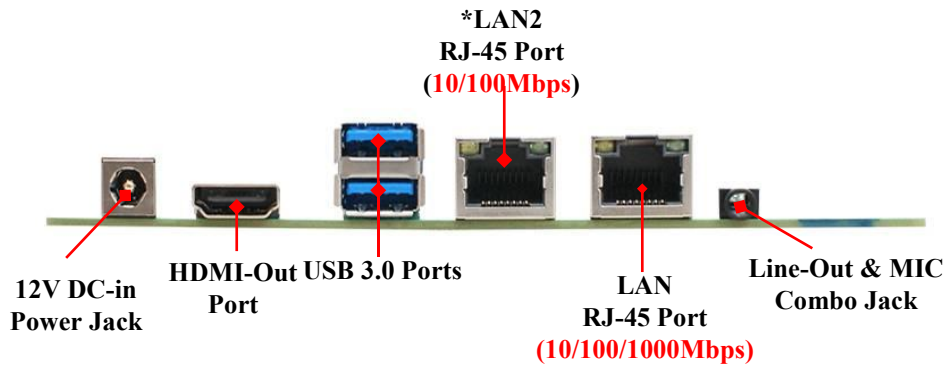
## 1-3 Product Diagram

### Rear IO Panel Diagram

#### *R3399X-2C:*

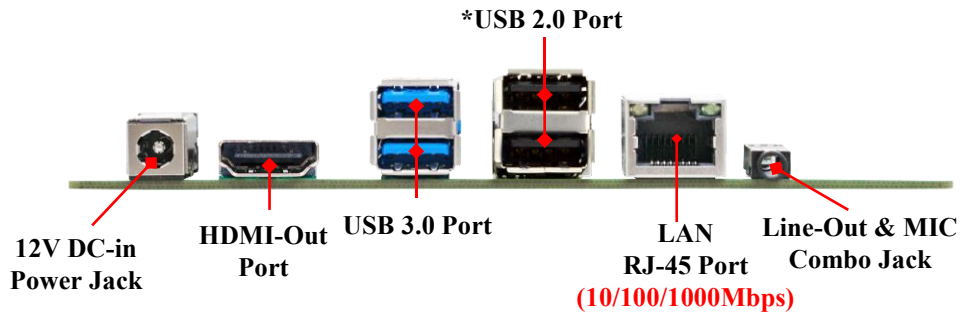


#### *R3399XH-2C:*





## R3399XL-2C:

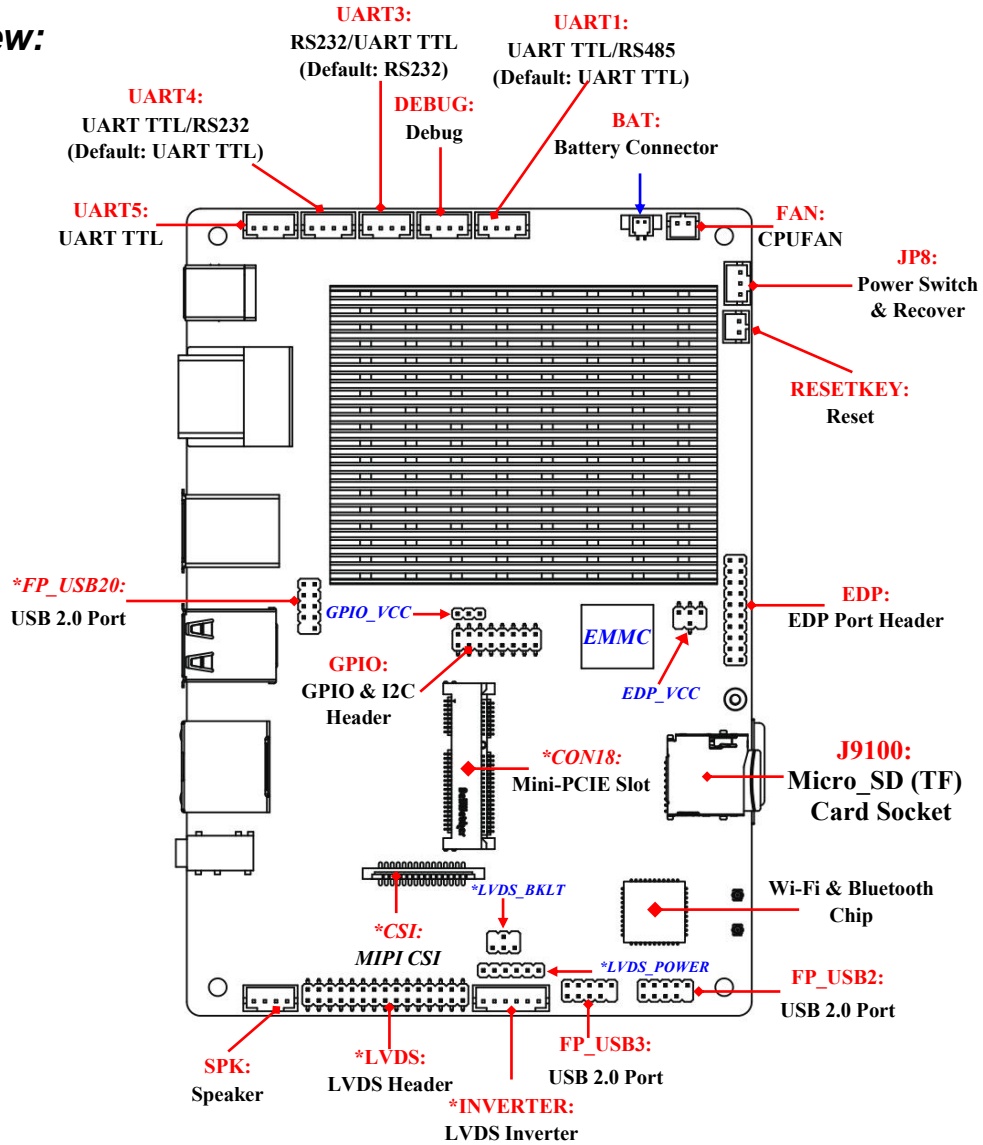


**\*Note:** This manual serves as common manual for R3399X-2C, R3399XH-2C and R3399XL-2C models, which share most of the specifications. Differences of these models are listed as below:

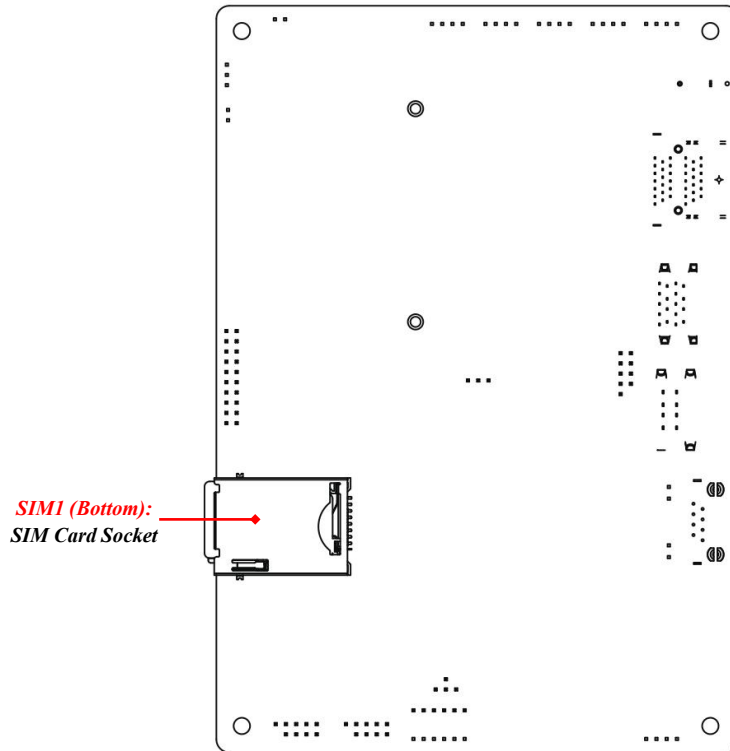
Optional Item	R3399X-2C	R3399XH-2C	R3399XL-2C
HDMI-In	1	N/A	N/A
HDMI-Out (HDMI2.0)	1	1	1
RJ-45	1*Giga +1*Mega	1*Giga +1*Mega	1*Giga
USB 2.0 Ports	6*Internal	6*Internal	2* Rear +4*Internal
Mini-PCIE Slot	1	1	N/A
MiPi CSI	1	1	N/A
LVDS	1	1	N/A
LVDS Inverter	1	1	N/A
LVDS_BKLT	1	1	N/A
LVDS_POWER	1	1	N/A

# Motherboard Internal Diagram

## Top View:



## Bottom View:



## Rear Connectors:

P/N	Name
DCIN	12V DC-In Power Jack
HDMI1 (R3399X-2C)	<b>Top:</b> HDMI-In Port <b>Bottom:</b> HDMI-Out Port
HDMI1 (R3399XH-2C/ R3399XL-2C)	HDMI-Out Port
USB1	<b>Top:</b> USB 3.0/OTG Co-Lay Port <b>Bottom:</b> USB 3.0 Port
USB20_1 (R3399XL-2C)	USB 2.0 Port x2
LAN2 (R3399X-2C/ R3399XH-2C)	10/100 Mbps RJ-45 LAN Port

LAN	10/100/1000 Mbps RJ-45 LAN Port
J19	Audio Line-out & MIC Combo Jack
J9100	Micro-SD (TF) Card Socket
SIM1( <b>Bottom side</b> )	SIM Card Socket

### ***Internal Connector, Headers & Jumpers:***









<b>P/N</b>	<b>Name</b>	<b>Description</b>
JP8	Power Switch/Recovery Connector	3-pin Block
RESETKEY	Reset Connector	2-pin Block
FAN	CPUFAN Connector	2-pin Block
UART1	UART TTL/ RS485 Connector	4-pin Block
DEBUG	Debug Connector	4-pin Block
UART3	RS232/ UART TTL Connector	4-pin Block
UART4	UART TTL/ RS232 Connector	4-pin Block
UART5	UART TTL Connector	4-pin Block
FP_USB2/FP_USB3	USB 2.0 Connector	9-pin Block
*FP_USB20 ( <b>R3399X-2C/ R3399XH-2C</b> )	USB 2.0 Connector	9-pin Block
SPK	3W Speaker Connector	4-pin Block
GPIO	GPIO & I2C Combo Header	16-pin Block
GPIO_VCC	GPIO_VCC Select Jumper	3-pin Block
*CSI ( <b>R3399X-2C/ R3399XH-2C</b> )	MIPI CSI Connector	15-pin Block
EDP	EDP Header	20-pin Block
EDP_VCC	EDP LCD Power VCC Select Jumper	4-pin Block
*LVDS ( <b>R3399X-2C/ R3399XH-2C</b> )	LVDS Header	30-pin Block
*INVERTER ( <b>R3399X-2C/ R3399XH-2C</b> )	LVDS /EDP Inverter	6-pin Block
*LVDS_BKLT ( <b>R3399X-2C/ R3399XH-2C</b> )	LVDS Backlight VCC Select Jumper	4-pin Block
*LVDS_POWER ( <b>R3399X-2C/ R3399XH-2C</b> )	LVDS LCD Power VCC Select Jumper	6-pin Block



# Chapter 2

## Hardware Installation

### 2-1 Rear I/O Connectors

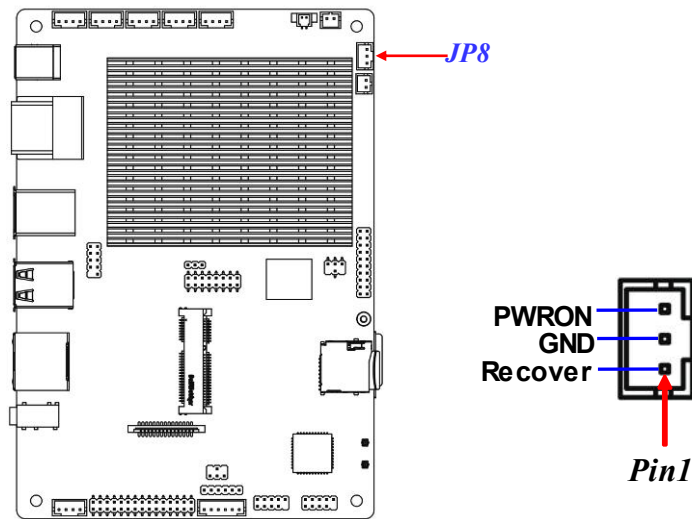
*\*For Rear IO please refer to Page-3/4.*

<i>Icon</i>	<i>P/N</i>	<i>Name</i>	<i>Function</i>
	DCIN	12V DC-in Power Jack	For user to connect compatible power adapter to provide power supply for the system.
	HDMI1 (R3399X-2C)	Top: HDMI-IN Bottom: HDMI-Out	<b>Top:</b> To connect display <b>input</b> device that support HDMI specification. <b>Bottom:</b> To connect display <b>output</b> device that support HDMI 2.0 specification.
	HDMI1 (R3399XH-2C/ R3399XL-2C)	HDMI-Out Port	To connect display <b>output</b> device that support HDMI 2.0 specification.
	USB1	USB 3.0 Port	To connect USB keyboard, mouse or other devices compatible with USB specification. USB 3.0 ports supports up to 5Gbps data transfer rate.
	USB20_1	USB 2.0 Port	To connect USB keyboard, mouse or other devices compatible with USB 2.0 specification.
	LAN2	Megabit RJ-45 LAN Port	This connector is standard RJ-45 LAN jack for Network connection which supports 10/100 Mbps transfer rate.
	LAN	Gigabit RJ-45 LAN Port	This connector is standard RJ-45 LAN jack for Network connection which supports 10/100/1000 Mbps transfer rate.
	J19	Audio Connector	Line-out & MIC audio jack.

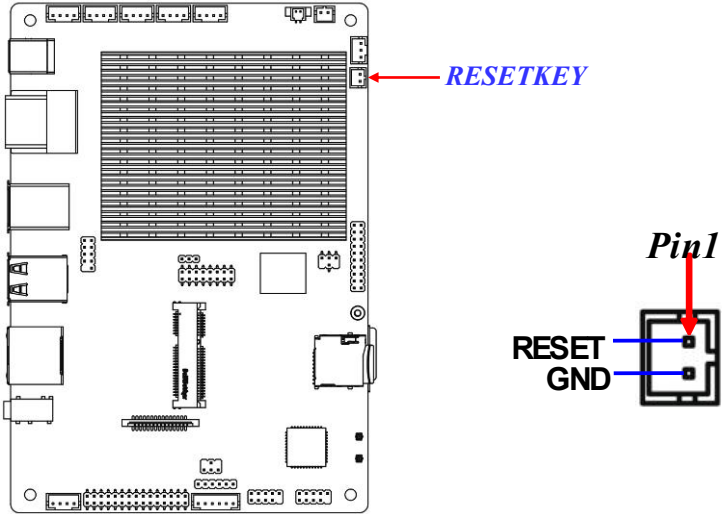
	<b>J9100 (Top)</b>	<b>Macro-SD Card Socket (TF)</b>	For user to insert compatible micro-SD (TF) card into the socket.
	<b>SIM1 (Bottom)</b>	<b>SIM Card Socket</b>	For user to install compatible SIM card.

## 2-2 Internal Connectors, Headers & Jumpers

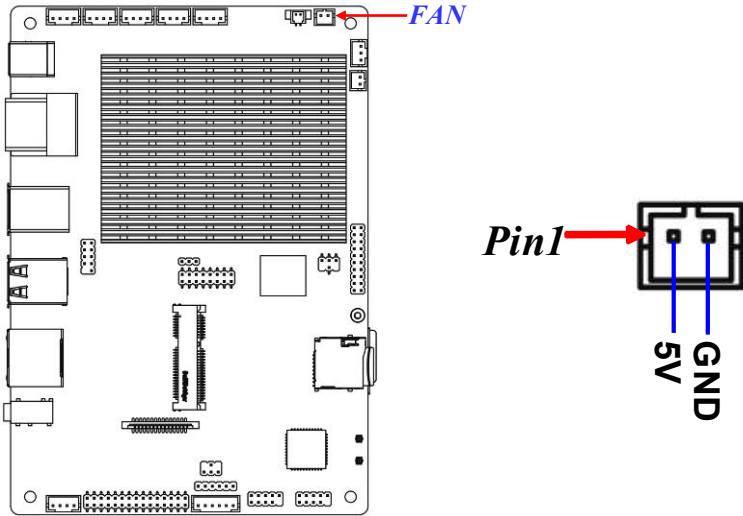
### JP8 (3-pin): Power Switch & Recovery Connector



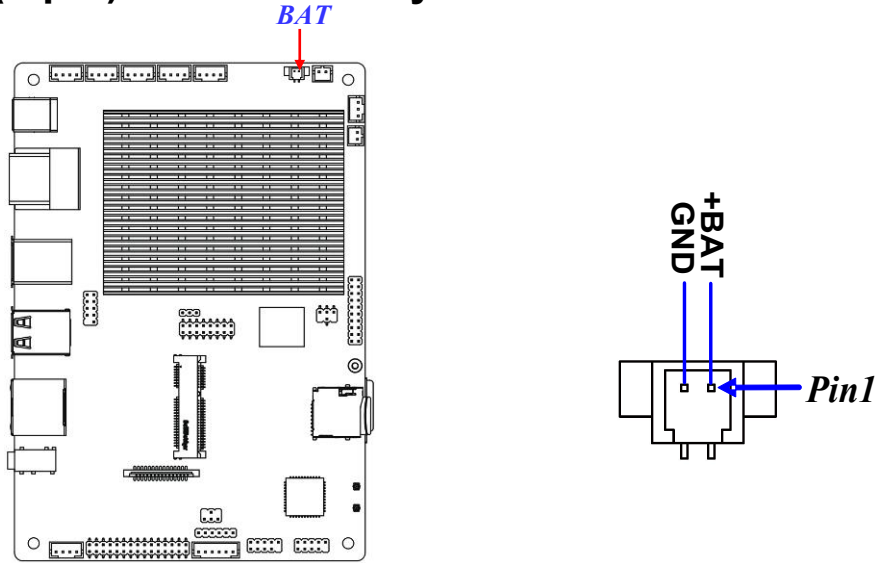
# RESETKEY (2-pin): Reset Connector



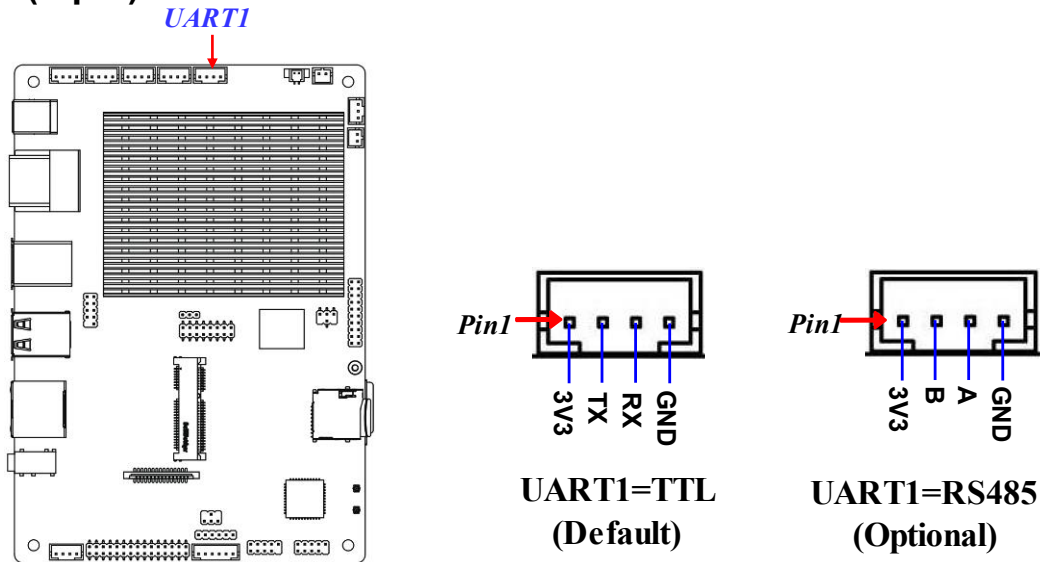
# FAN (2-pin): CPUFAN Connector



## BAT (2-pin): CMOS Battery Connector



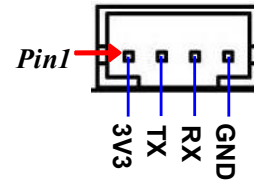
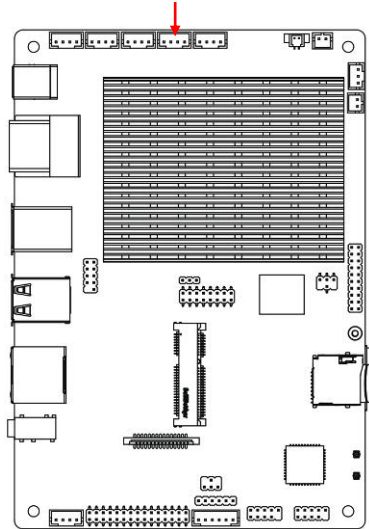
## UART1 (4-pin): UART TTL/ RS485 Connector





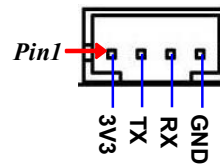
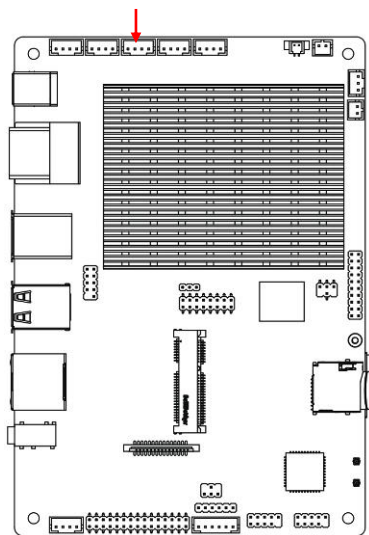
## DEBUG (4-pin): Debug Connector

*DEBUG*



## UART3 (4-pin): RS232/UART TTL Connector

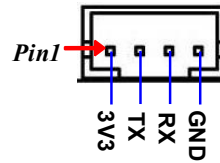
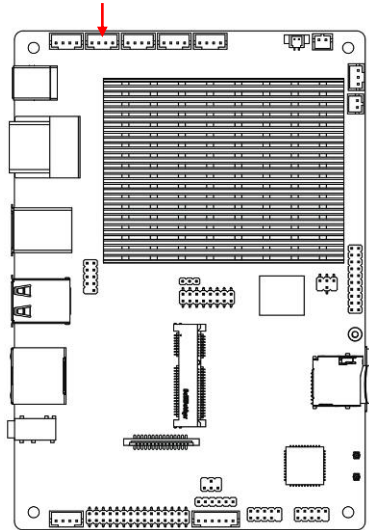
*UART3*



UART3=RS232 (Default);  
UART3=TTL (Optional).

## UART4 (4-pin): UART TTL/RS232 Connector

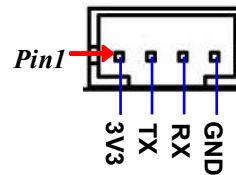
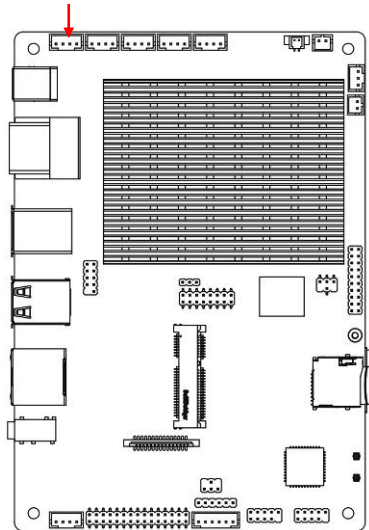
*UART4*



UART4=TTL (Default);  
UART4=RS232 (Optional).

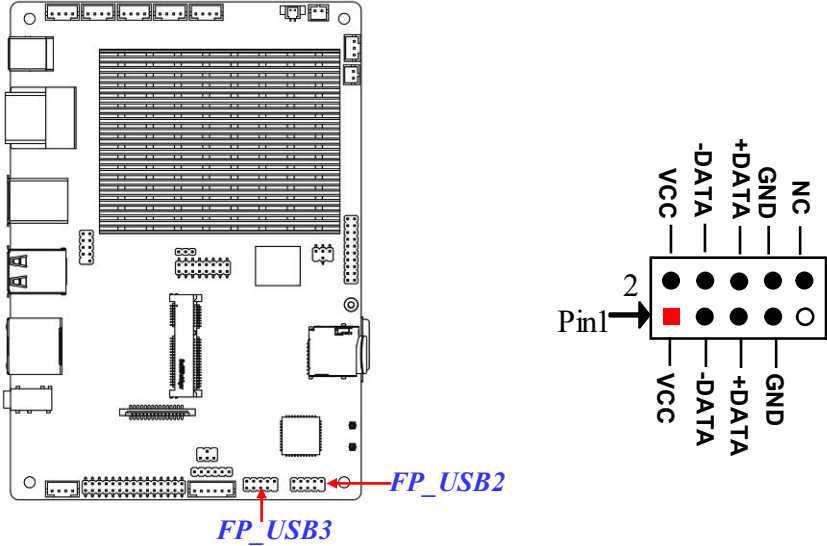
## UART5 (4-pin): UART TTL Connector

*UART5*

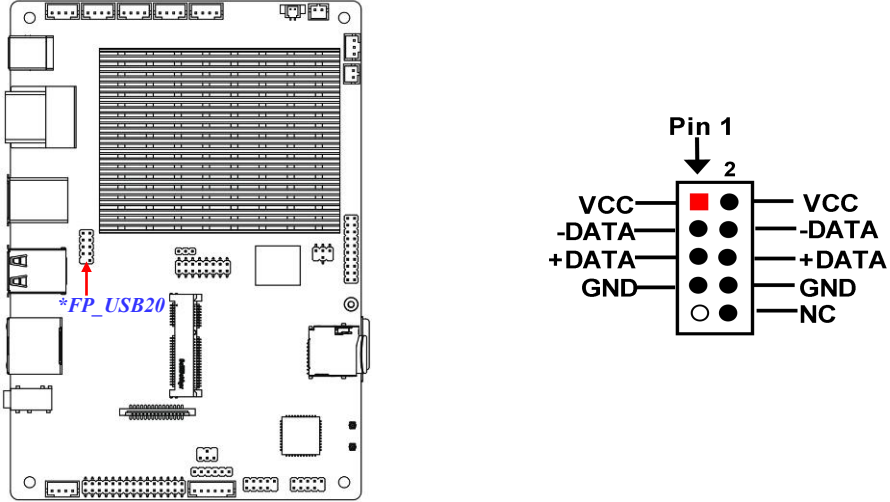


UART5=TTL.

**FP\_USB2/FP\_USB3 (9-pin): USB 2.0 Header**

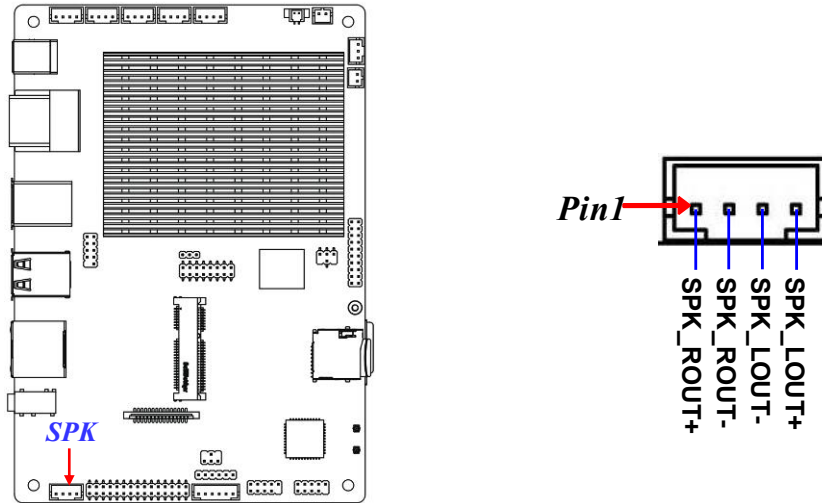


**\*FP\_USB20 (9-pin): USB 2.0 Header**

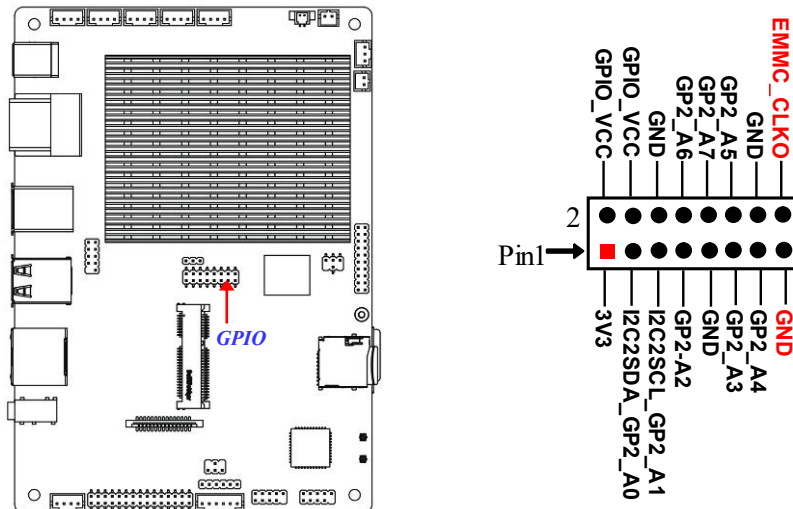


**\*Note:** *FP\_USB20* is optional to *R3399X-2C/ R3399XH-2C* series only.

## SPK (4-pin): 3W Speaker Connector

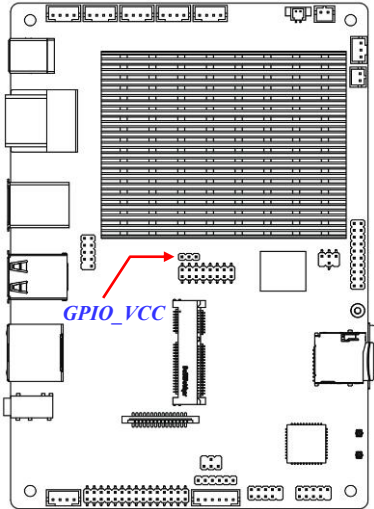


## GPIO (16-pin): 8-bit GPIO & I2C Combo Header Block

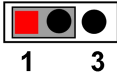


**\*Note:** Pin 15 & 16 short = EMMC\_UPDATE (If EMMC\_CLKO=0V after power-on reset, then system will enter into Maskrom mode).

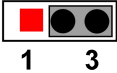
# GPIO\_VCC (3-pin): GPIO\_VCC Select Jumper



*GPIO\_VCC → GPIO VCC Select*

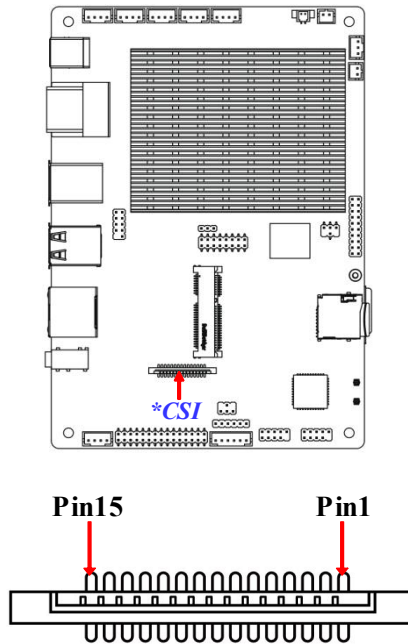


1-2 Closed: VCC=5V;



2-3 Closed: VCC=3V3.

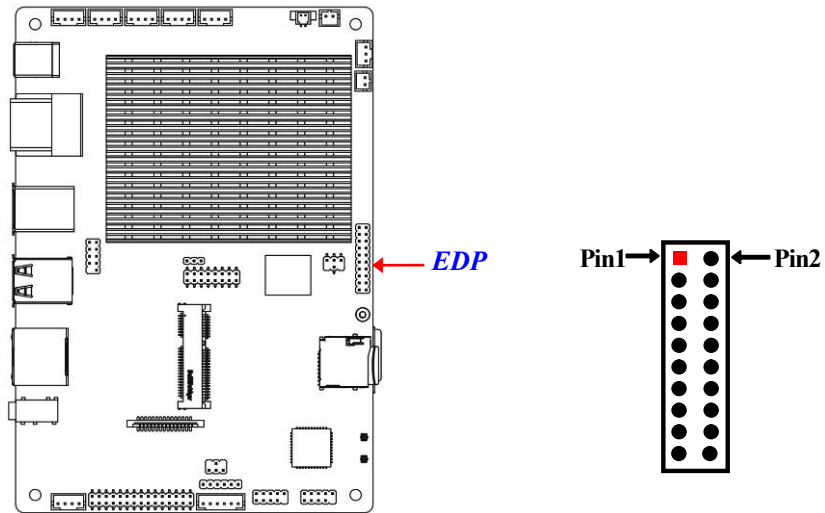
## \*CSI (15-pin): MIPI CSI Connector



No.	Pin Define
1	VCC3V3
2	I2C2_SDA
3	I2C2_SCL
4	MCLK
5	GPIO2_B4
6	GND
7	CLKP
8	CLKN
9	GND
10	D1P
11	D1N
12	GND
13	D0P
14	D0N
15	GND

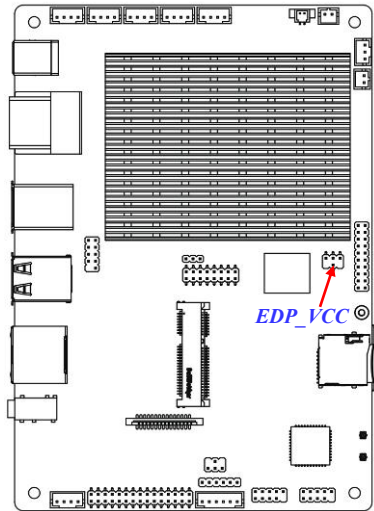
**\*Note:** MIPI CSI is optional to **R3399X-2C/ R3399XH-2C** series only.

## EDP (20-pin): EDP Header

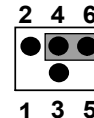
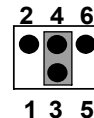
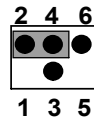


Pin Define	Pin No.	Pin No.	Pin Define
VDD	1	2	VDD
GND	3	4	BKLT_12V
EDP_TX0N	5	6	EDP_TX0P
EDP_TX1N	7	8	EDP_TX1P
EDP_TX2N	9	10	EDP_TX2P
EDP_TX3N	11	12	EDP_TX3P
GND	13	14	GND
EDP_AUXN	15	16	EDP_AUXP
LED_EN	17	18	ADJ
BKLT_3.3	19	20	BKLT_5V

## EDP\_VCC (4-pin): EDP LCD Power VCC Select Jumper

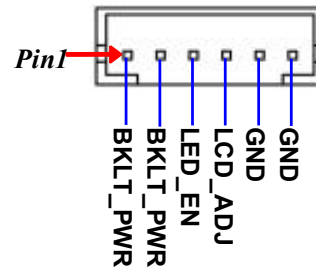
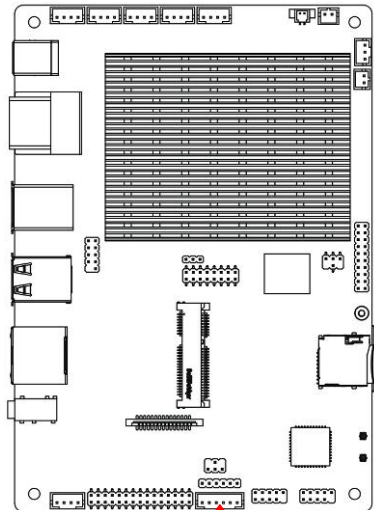


**EDP\_VCC** → EDP LCD Power VCC



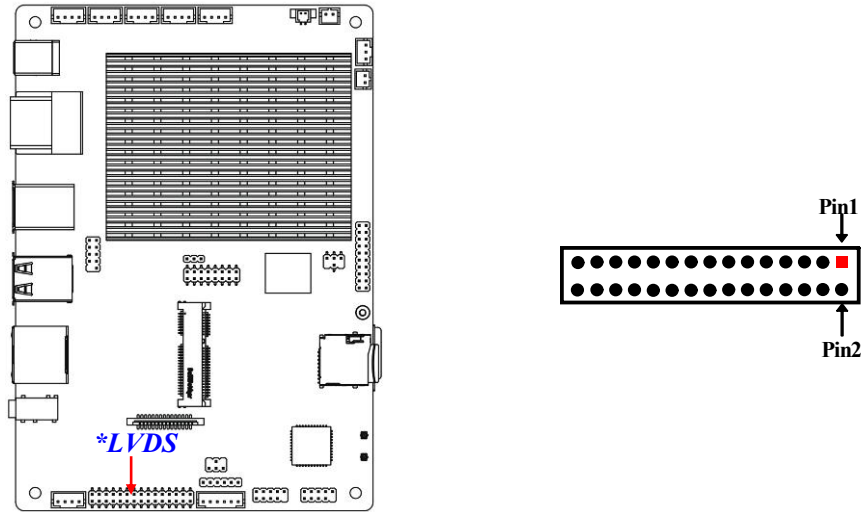
2-4 Closed=3.3V; 3-4 Closed=5V; 4-6 Closed=12V.

## \*INVERTER (6-pin): LVDS Inverter Connector



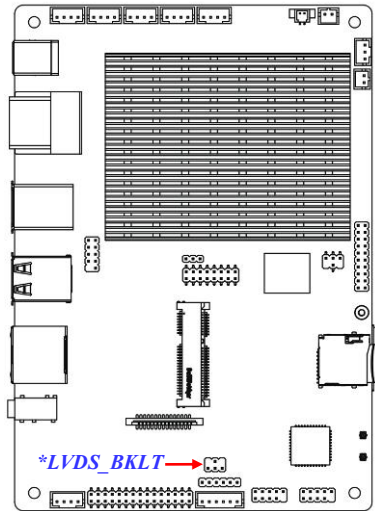


**\*LVDS (30-pin): 24-bit dual channel LVDS Header**

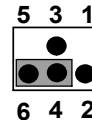
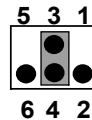
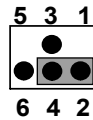


Pin Define	Pin No.	Pin No.	Pin Define
VDD	1	2	VDD
VDD	3	4	GND
GND	5	6	GND
R2AN	7	8	R2AP
R2BN	9	10	R2BP
R2CN	11	12	R2CP
GND	13	14	GND
R2CLKN	15	16	R2CLKP
R2DN	17	18	R2DP
R1AN	19	20	R1AP
R1BN	21	22	R1BP
R1CN	23	24	R1CP
GND	25	26	GND
R1CLKN	27	28	R1CLKP
R1DN	29	30	R1DP

**\*LVDS\_BKLT (4-pin): LVDS Backlight VCC Select Jumper**

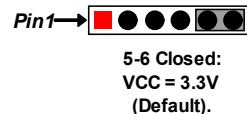
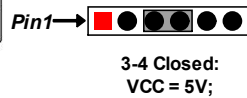
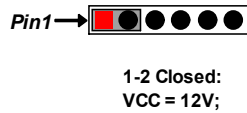
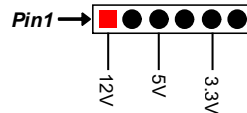
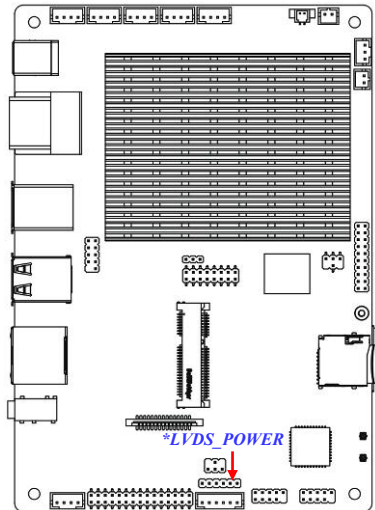


**LVDS\_BKLT → Inverter Backlight VCC**



2-4 Closed=3.3V; 3-4 Closed=5V; 4-6 Closed=12V.

**\*LVDS\_POWER (6-pin): LVDS LCD Power VCC Select Jumper**



1-2 Closed:  
VCC = 12V;

3-4 Closed:  
VCC = 5V;

5-6 Closed:  
VCC = 3.3V  
(Default).

**\*Note:** LVDS, INVERTER, LVDS\_BKLT and LVDS\_POWER are optional to R3399X-2C / R3399XH-2C series only.