

OFR-21WMX

Open Frame Panel PC

User's Manual

2nd Ed – 11 December, 2023

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.

Notice

This guide is designed for experienced users to setup the system within the shortest time. For detailed information, please always refer to the electronic user's manual.

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This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Avalue, or which have been subject to misuse, abuse, accident or improper installation. Avalue assumes no liability under the terms of this warranty as a consequence of such events. Because of Avalue's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If any of Avalue's products is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details. If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU type and speed, Avalue's products model name, hardware & BIOS revision number, other hardware and software used, etc.) Note anything abnormal and list any on-screen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information available.
3. If your product is diagnosed as defective, obtain an RMA (return material authorization) number from your dealer. This allows us to process your good return more quickly.
4. Carefully pack the defective product, a complete Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

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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 OFR-21WMX Panel PC
- 4 x Standoffs F/M M2*3/M2*4mm
- 6 x Extended bracket
- 24 x Screw for Extended (6 bag x4 Screw)
- 1 x Protection film



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

1.3 Document Amendment History

Revision	Date	Comment
1 st	October 2023	Initial Release
2 nd	December 2023	Update AUX-088 Mechanical Drawing

1.4 Manual Objectives

This manual describes in detail the Avalue Technology OFR-21WMX 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 interface with OFR-21WMX series 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.

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

1.5 System Specifications

Specifications	
Mother Board	ACP-I350
CPU	MediaTek MT8365 Edge AI Processor Quad-core ARM 2.0GHz Cortex-A53 MP Core, ARM Mali G52 GPU
CPU Cooler (Type)	TBD
Memory	2GB DDR4 1Gx16 16Gb/3200 Mbps, up to 4GB
Power Supply	12Vdc input
Adapter	60W (Optional)
Microphone	Line-out, Microphone supported
Speaker	5W/8ohm,12v (per channel) audio amplifier for Speaker out TAP3113D2PWP
Wireless LAN	Dual-band (2.4GHz/5GHz) WLAN, 2T2R IEEE 802.11 ac/a/b/g/n WIFI, Bluetooth 5.0 AW-CB451NF M.2 Module
Bluetooth	Bluetooth 5.0
Operating System	Android 10
Expansion Card	1 x M.2 (E Key, 2230, SDIO) Support AZureWave AW-CB451NF (Package: M.2 2230) Daughter board: AUX-088
Storage	
Solid State Drive	32GB eMMC
Panel	
LCD Panel	DV215FHM-NN0- E9689421507R
Touch Screen	21.5" P-cap Touch- E968X000250R (follow OFT-21WR2)
Touch Controller	FW to ACP-I350 USE >> EET I(EXC84H5680STAG)
External I/O	
USB Port	4 USB Interface supported USB2514 USB Hub
Video Port	HDMI 2.0 input supports
Audio Port	Line-out, Microphone supported, 5W/8ohm,12v (per channel) audio amplifier for Speaker out TAP3113D2PWP
LAN Port	10/100 Ethernet supported
Expansion Slots	1 x M.2 (E Key, 2230, SDIO) Support AZureWave AW-CB451NF (Package: M.2 2230)
Mechanical	

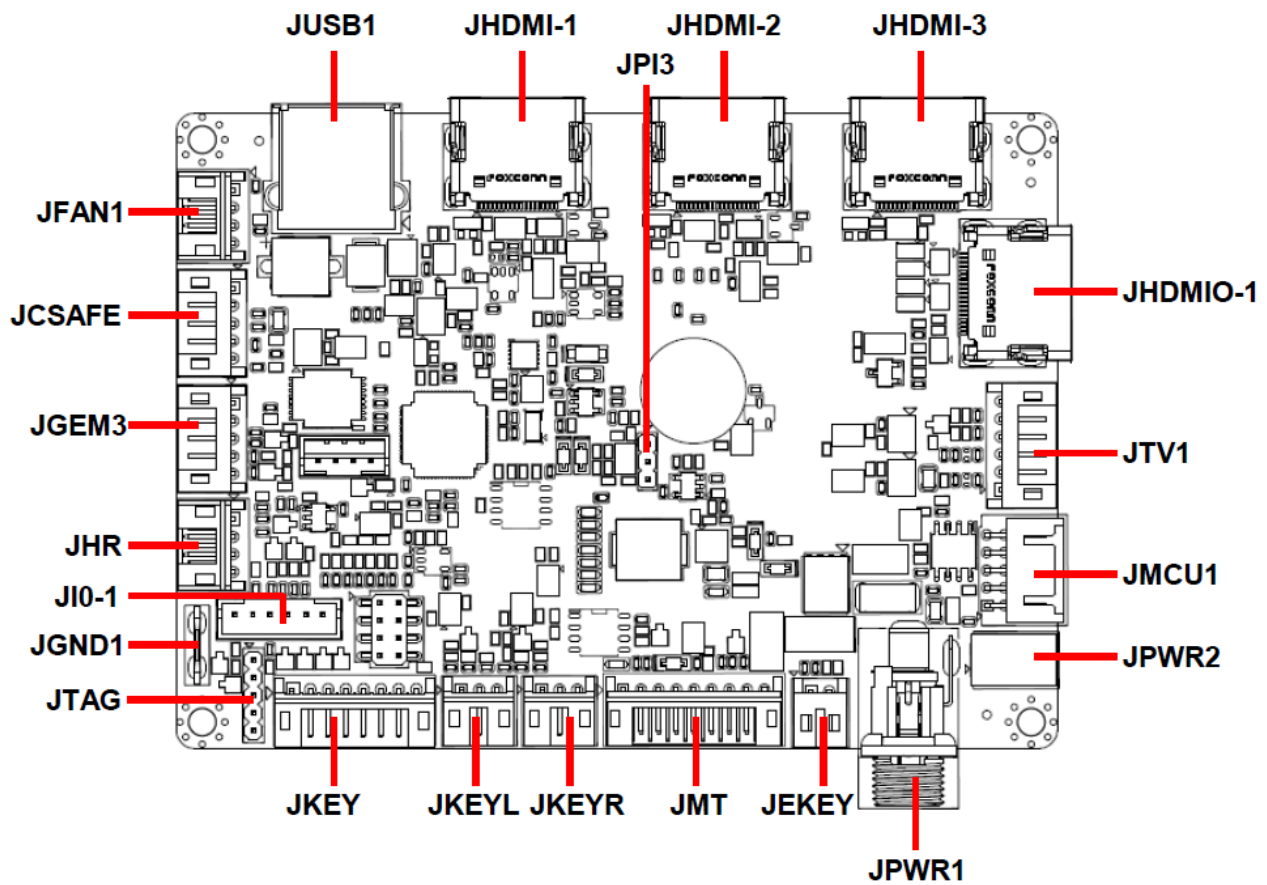
Power Type	AT Power Mode
Power Connector Type	1 x DC-J 3P 90D(M) 2.5mm
Dimension	TBD (Open Frame)
Weight	TBD
Color	TBD
Fanless	Yes
OS Support	Android 10
Reliability	
Dust and Rain Test	TBC
Vibration Test	Random Vibration Operation 1. PSD: 0.00454G²/Hz , 1.5 Grms 2. operation mode 3. Test Frequency : 5-500Hz 4. Test Axis : X,Y and Z axis 5. 30 minutes per each axis 6. IEC 60068-2-64 Test:Fh 7. Storage : CF or SSD Random vibration test (Non-operation) 1. Test Acceleration : 2G 2. Test frequency : 5~500 Hz 3. Sweep : 1 Oct/ per one minute. (logarithmic) 4. Test Axis : X,Y and Z axis 5. Test time :10 min. each axis 6. System condition : Non-Operating mode 7. Reference IEC 60068-2-6 Testing procedures
Mechanical Shock Test	10Grms, IEC 60068-2-27, Half Sine, 11ms
Drop Test	Package drop test 1. One corner , three edges, six faces 2. ISTA 2A, IEC-60068-2-32 Test:Ed
Operating Temperature	0°C ~ 40°C
Operating Humidity	0% ~ 90% relative humidity, non-condensing
Storage Temperature	-20°C ~ 70°C



Note: Specifications are subject to change without notice.

2. Hardware Configuration

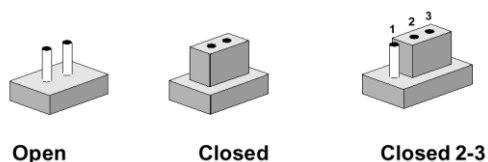
2.1 AUX-088 Product Overview



2.2 AUX-088 Connector List

You can configure your board to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch.

It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To “close” a jumper you connect the pins with the clip. To “open” a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case, you would connect either two pins.



The jumper settings are schematically depicted in this manual as follows:



A pair of needle-nose pliers may be helpful when working with jumpers.

Connectors on the board are linked to external devices such as hard disk drives, a keyboard, or floppy drives. In addition, the board has a number of jumpers that allow you to configure your system to suit your application.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

The following tables list the function of each of the board's jumpers and connectors.

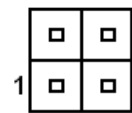
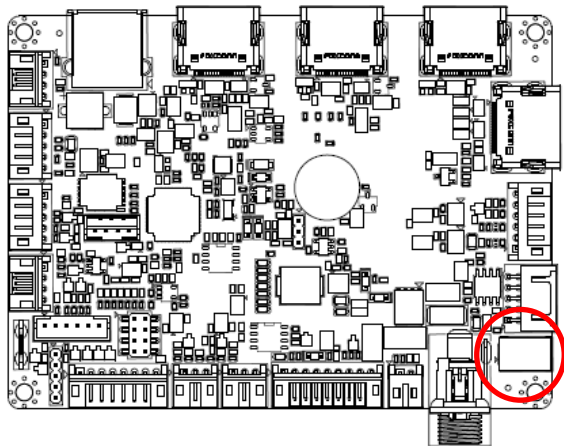
Connectors

Label	Function	
JFAN1	CPU fan connector	4 x 1 wafer, pitch 2.00mm
JCSAFE	JCSAFE connector	5 x 1 wafer, pitch 2.00mm
JGEM3	JGEM connector	5 x 1 wafer, pitch 2.00mm
JHR	JHR connector	4 x 1 wafer, pitch 2.00mm
JIO-1	JIO-1 connector	4 x 2 header, pitch 2.00mm
JI2C	I2C connector	6 x 1 wafer, pitch 2.00mm
JGND1	JGND connector	
JTAG	JTAG connector	5 x 1 header, pitch 2.00mm
JEKEY	JEKEY connector	2 x 1 wafer, pitch 2.00mm
JKEY	JKEY connector	8 x 1 wafer, pitch 2.00mm
JKEYL	JKEYL connector	3 x 1 wafer, pitch 2.00mm
JKEYR	JKEYR connector	3 x 1 wafer, pitch 2.00mm

JMT	JMT connector	9 x 1 wafer, pitch 2.00mm
JPWR1	Power connector	
JPWR2	Power connector	2 x 2 wafer, pitch 2.00mm
JMCU1	JMCU connector	5 x 2 wafer, pitch 2.00mm
JTV1	JTV connector	6 x 1 wafer, pitch 2.00mm
JPI3	JPI connector	3 x 1 header, pitch 2.00mm
JHDMIO-1	HDMI connector	
JHDMI-1~3	HDMI connector	
JUSB1	USB connector	

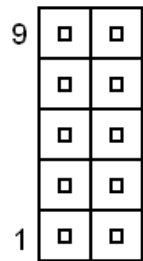
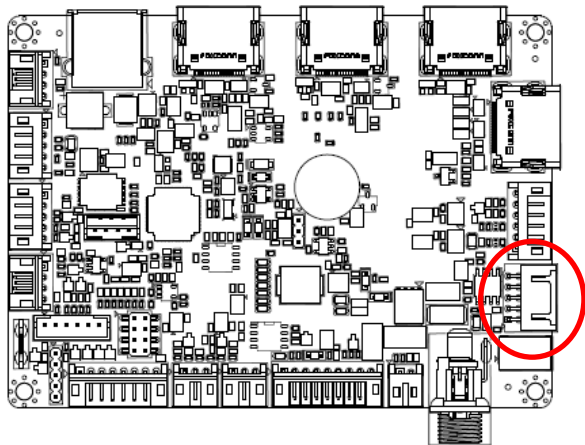
2.1 Setting Connectors

2.1.1 Power connector (JPWR2)



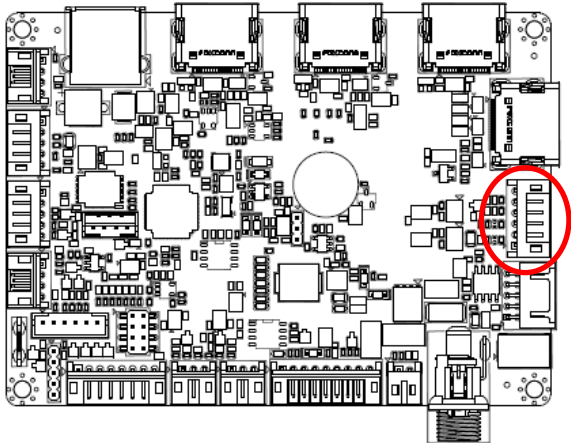
Signal	PIN	PIN	Signal
+V12_OUT	3	4	GND
+V12_OUT	1	2	GND

2.1.2 JMCU connector (JMCU1)



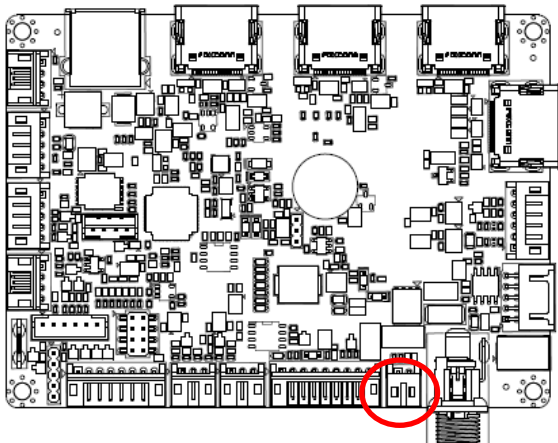
Signal	PIN	PIN	Signal
JMCU1_ERP-EN_12	9	10	GND
JMCU1_RST_SOC_OUT	7	8	JMCU1_RST_MCU_IN
JMCU1_RX	5	6	JMCU1_TX
JMCU1_INT_SOC_OUT	3	4	JMCU1_INT_MCU_IN
JEKEY_SAFETY-KEY_12	1	2	JMCU1_PWR_SOC_12

2.1.3 JTV connector (JTV1)



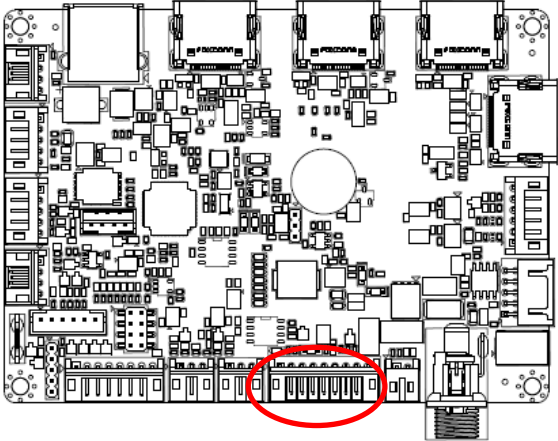
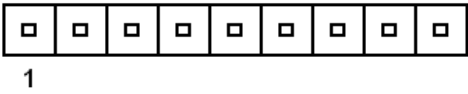
PIN	Signal
6	GND
5	TV_TX
4	TV_RX
3	GND
2	+V5_TV
1	+V12_TV

2.1.4 JEKEY connector (JEKEY)



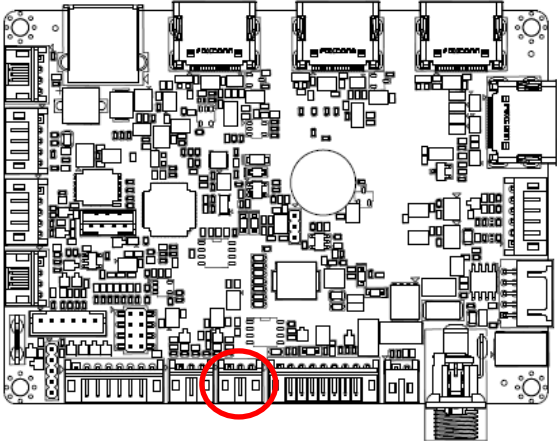
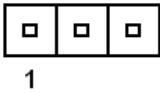
Signal	PIN	PIN	Signal
+12V	1	2	JEKEY_SAFETY-KEY_12

2.1.5 JMT connector (JMT)



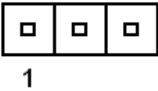
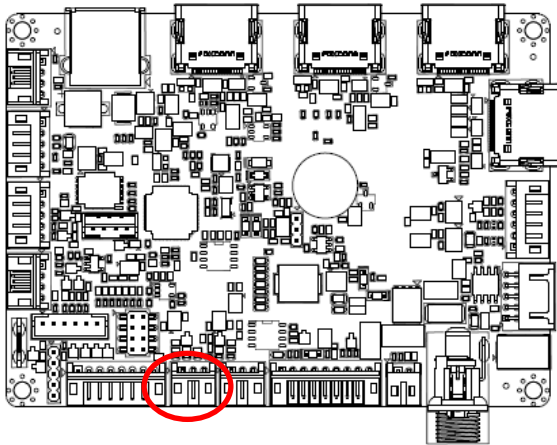
PIN	Signal
1	MT_485+
2	MT_485-
3	MT_ERP-PWR-KEY
4	MT_SAFETY-KEY_12
5	MT_WK_12
6	MT_SHIELD
7	+V12_SB
8	MT_PWM
9	MT_RPM

2.1.6 JKEYR connector (JKEYR)



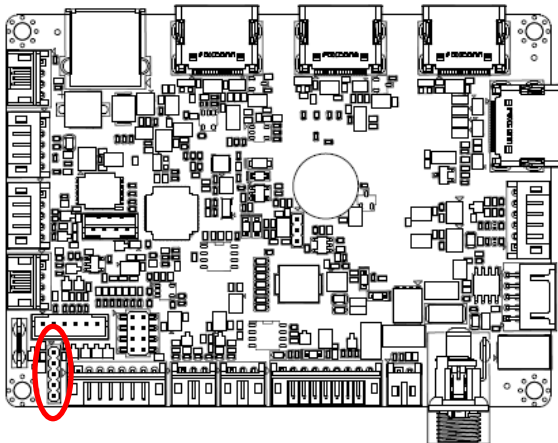
PIN	Signal
1	KEYR_SPD+
2	+V5S_SPD
3	KEYR_SPD-

2.1.7 JKEYL connector (JKEYL)



PIN	Signal
1	KEYL_INC+
2	+V5S_INC
3	KEYL_INC-

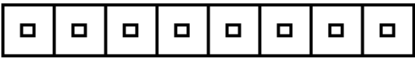
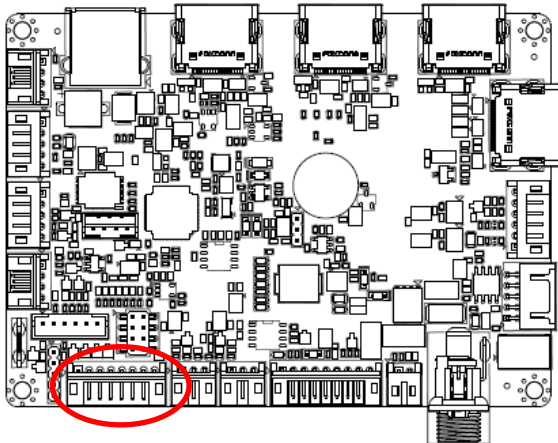
2.1.8 JTAG connector (JTAG)



PIN	Signal
1	+V3.3_MCU
2	M0_ICE_DAT
3	M0_ICE_CLK
4	M0_RESET#
5	GND

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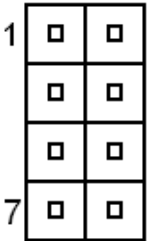
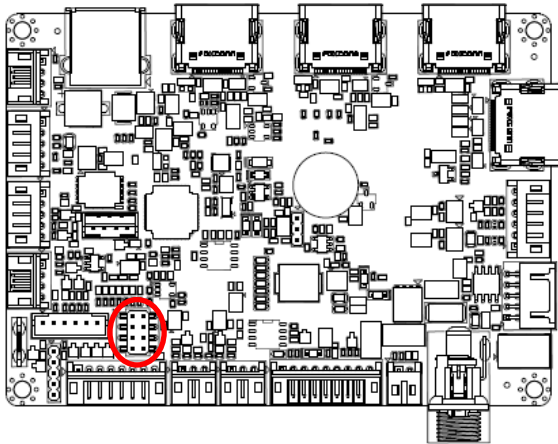
2.1.9 JKEY connector (JKEY)



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PIN	Signal
1	KP_K0
2	KP_K1
3	KP_K2
4	KP_K3
5	KP_S0
6	KP_S1
7	KP_S2
8	KP_SHIELD

2.1.10 JI0-1 connector (JI0-1)

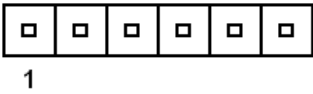
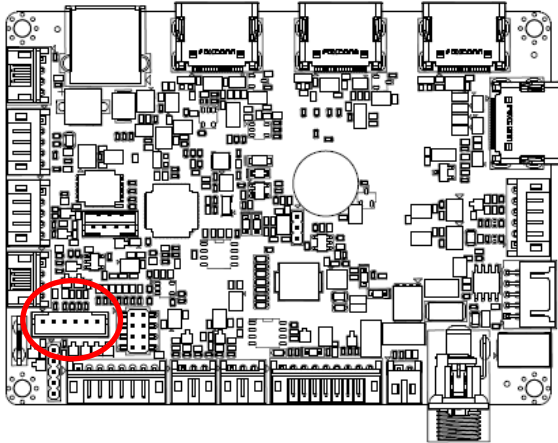


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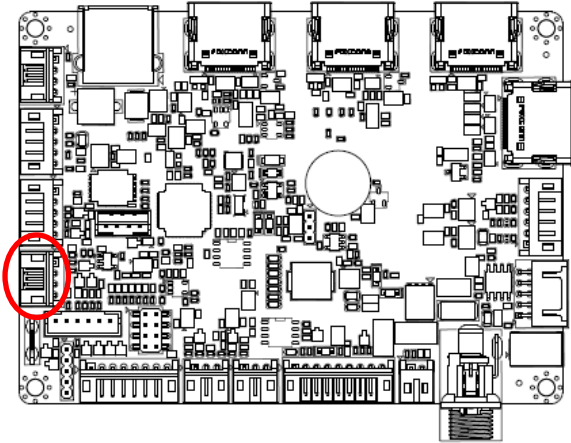
Signal	PIN	PIN	Signal
+V3.3_IO	1	2	GND
M0_EHDA1#	3	4	NCT_P13
M0_EHDA2#	5	6	NCT_P15
M0_EHDA3#	7	8	NCT_P17

2.1.11 JI2C connector (JI2C)



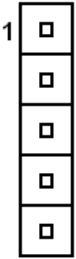
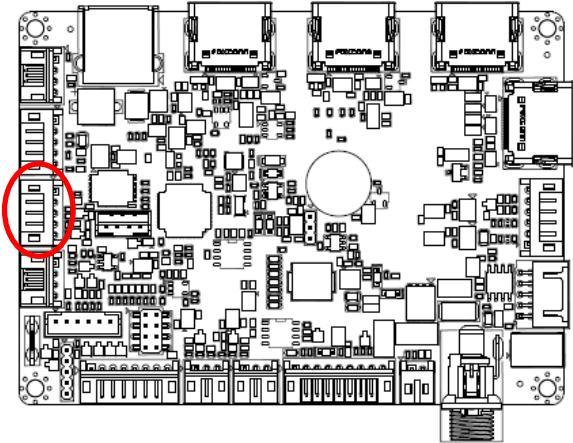
PIN	Signal
1	+V5_I2C
2	+V3.3_I2C
3	I2C_SCL
4	I2C_SDA
5	I2C_INT
6	GND

2.1.12 JHR connector (JHR)



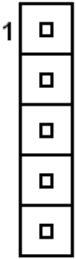
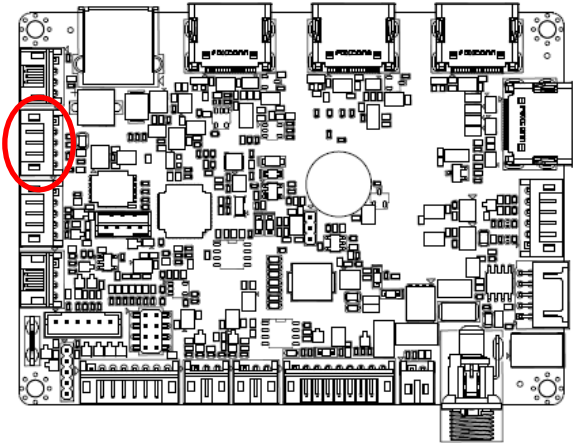
PIN	Signal
1	GND
2	+V5_HR
3	HR_RX
4	HR_TX

2.1.13 JGEM3 connector (JGEM3)



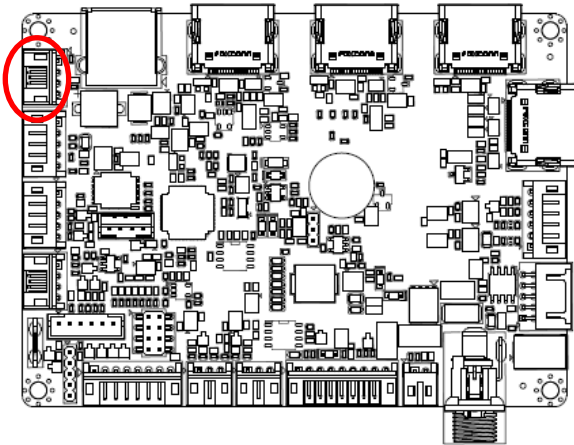
PIN	Signal
1	+V3.3_GEM
2	GEM_RST
3	GEM_TX
4	GEM_RX
5	GND

2.1.14 JCSAFE connector (JCSAFE)



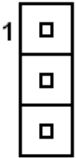
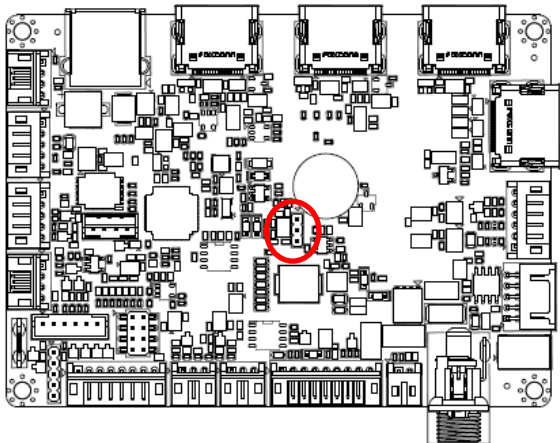
PIN	Signal
1	CS_RX_232
2	CS_TX_232
3	+V12_CS
4	CS_CTS_232
5	GND

2.1.15 JFAN connector (JFAN1)



PIN	Signal
1	+V12_FAN
2	NC
3	NC
4	GND

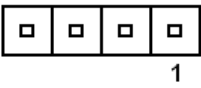
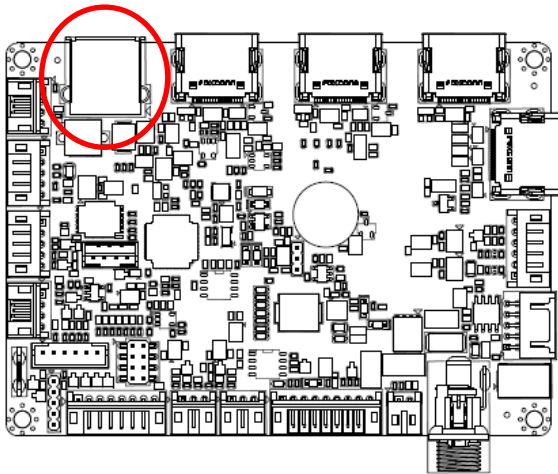
2.1.16 JPI connector (JPI3)



PIN	Signal
1	PI3_SW0_SCL_CTL
2	PI3_SW1_SDA_CTL
3	GND

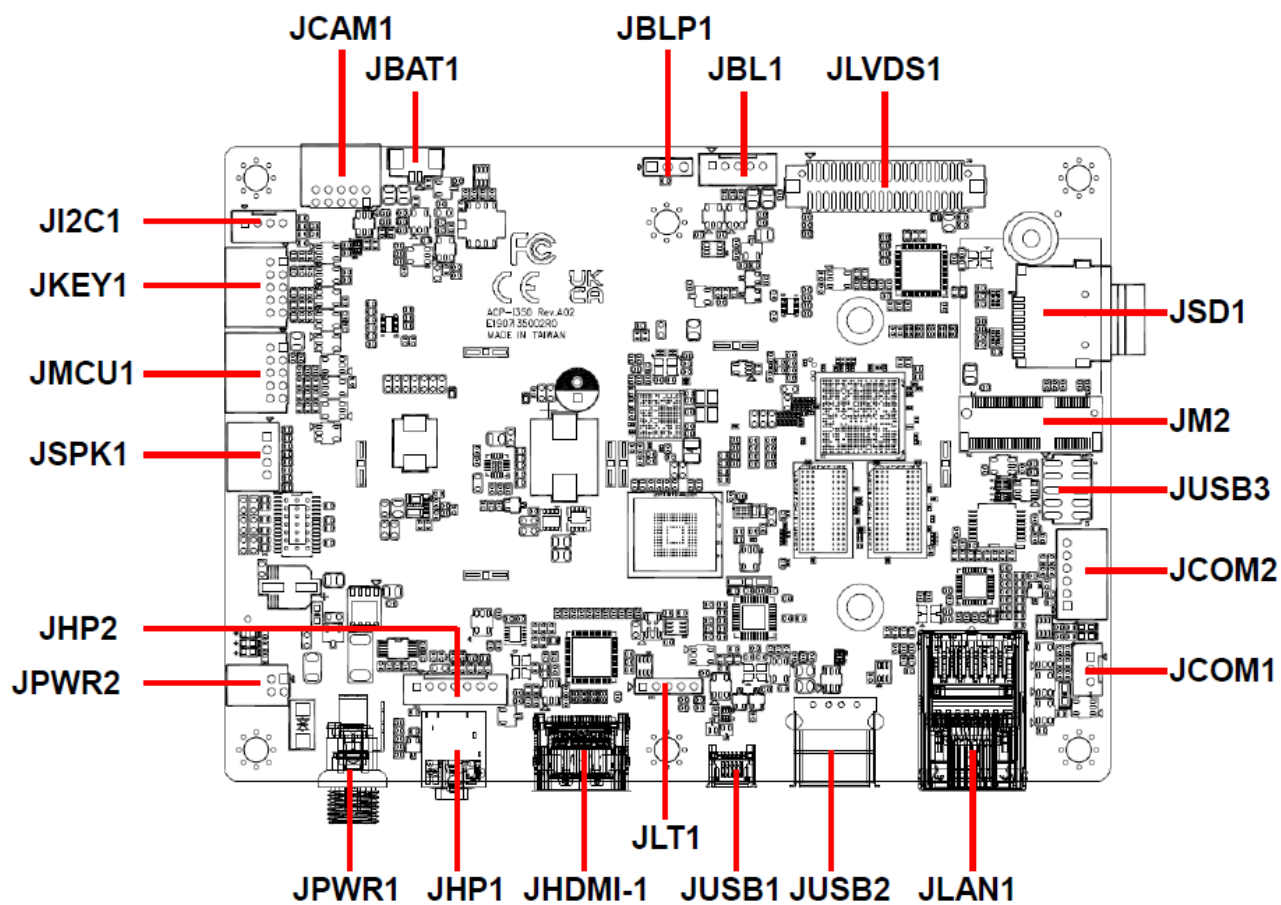
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2.1.17 USB connector (JUSB1)



PIN	Signal
1	+5V_USB
2	NC
3	NC
4	GND

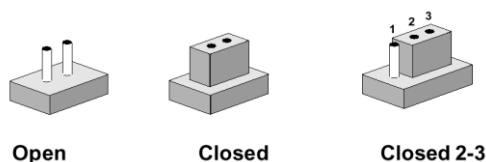
2.2 ACP-I350 Product Overview



2.3 ACP-I350 Jumper and Connector List

You can configure your board to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch.

It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To “close” a jumper you connect the pins with the clip. To “open” a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case, you would connect either two pins.



The jumper settings are schematically depicted in this manual as follows:



A pair of needle-nose pliers may be helpful when working with jumpers.

Connectors on the board are linked to external devices such as hard disk drives, a keyboard, or floppy drives. In addition, the board has a number of jumpers that allow you to configure your system to suit your application.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

The following tables list the function of each of the board’s jumpers and connectors.

Jumpers

Label	Function	Note
JBLP1	JBLP1 connector	3 x 1 header, pitch 2.54mm

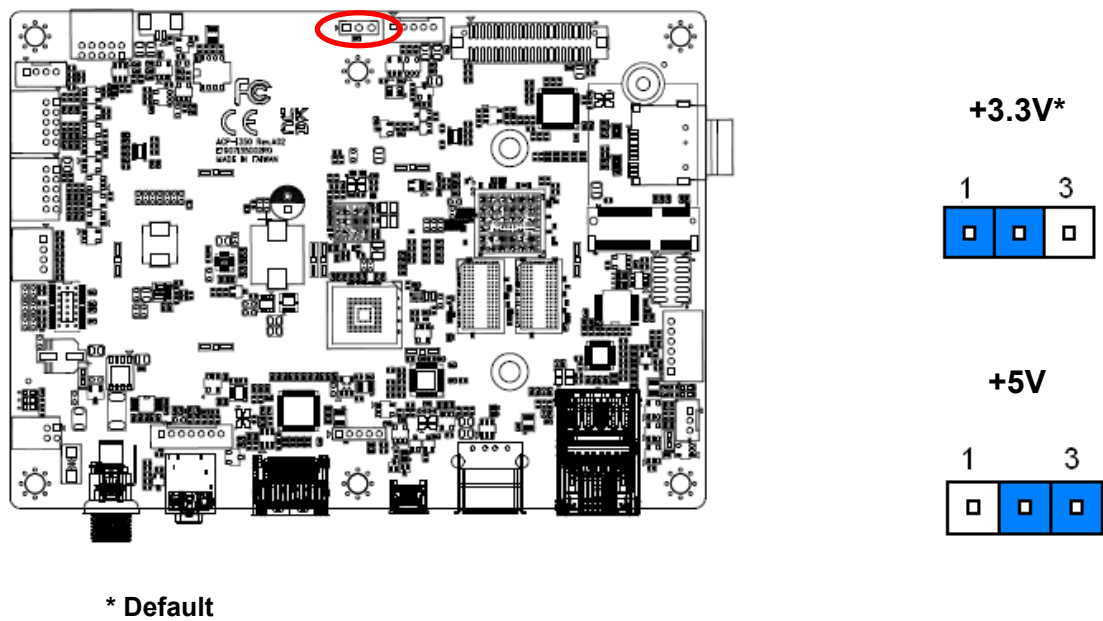
Connectors

Label	Function	Note
JBL1	LCD Inverter connector	5 x 1 wafer, pitch 2.00mm
JLVDS1	LVDS Connector	20 x 2 wafer, pitch 1.25mm
JSD1	JSD Connector	
JM2	JM2 Connector	
JUSB3	USB connector	5 x 2 header, pitch 2.00mm
JCOM2	Serial Port 1/2 connector	6 x 1 wafer, pitch 2.00mm
JCOM1	Serial Port 1/2 connector	3 x 1 wafer, pitch 2.00mm
JPWR2	Power connector	2 x 2 wafer, pitch 2.00mm

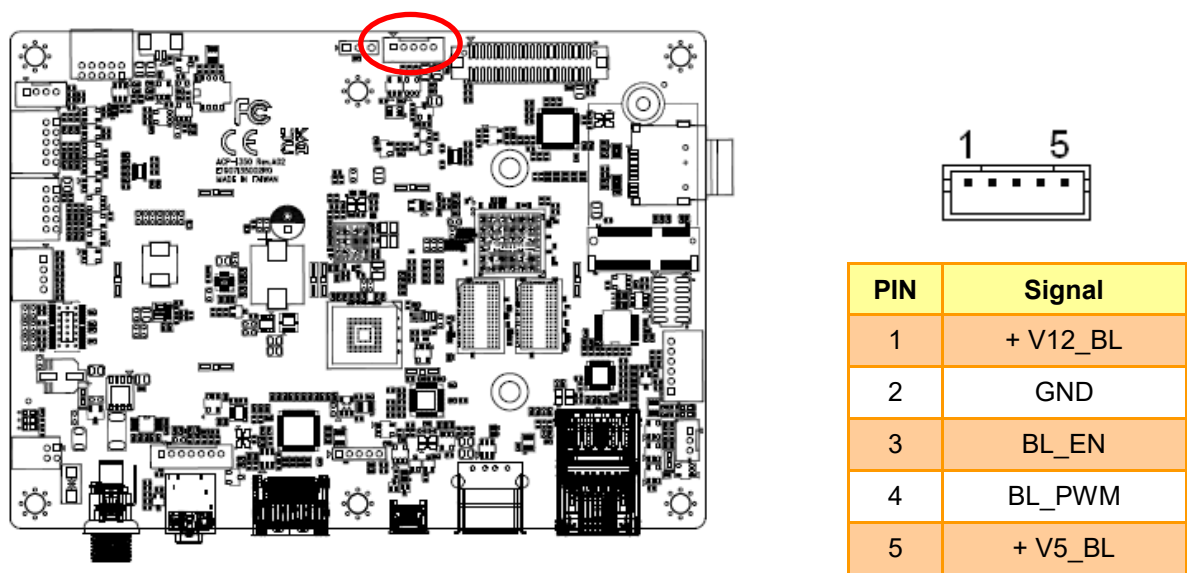
JHP1	JHP connector	
JHP2	JHP connector	7 x 1 wafer, pitch 2.00mm
JLT1	JLT1 connector	5 x 1 header, pitch 2.00mm
JSPK1	Speaker connector	4 x 1 wafer, pitch 2.00mm
JMCU1	JMCU connector	5 x 2 wafer, pitch 2.00mm
JKEY1	JKEY connector	5 x 2 wafer, pitch 2.00mm
JI2C1	JI2C connector	4 x 1 wafer, pitch 2.00mm
JCAM1	JCAM connector	5 x 2 wafer, pitch 2.00mm
JBAT1	Battery connector	2 x 1 wafer, pitch 1.25mm
JPWR1	Power connector	
JHDMI-1	HDMI connector	
JUSB1	USB connector	
JUSB2	USB connector	
JLAN1	RJ-45 Ethernet	

2.4 ACP-I350 Setting Jumpers & Connectors

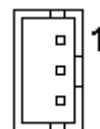
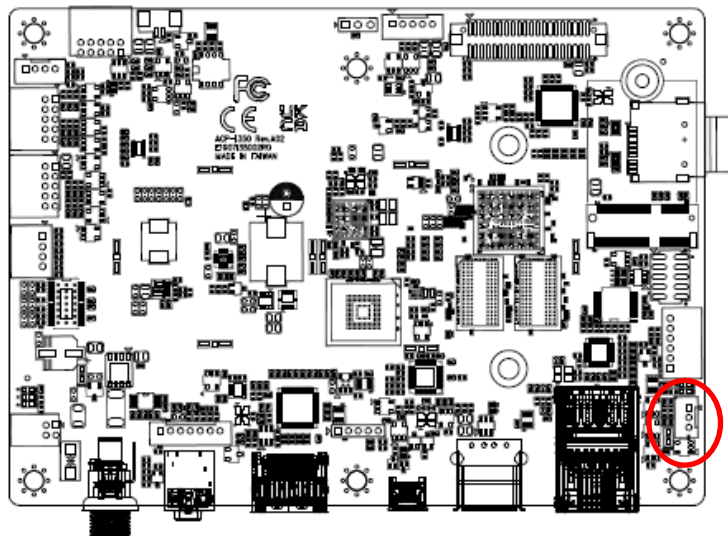
2.4.1 JBLP1 connector (JBLP1)



2.4.2 LCD Inverter connector (JBL1)

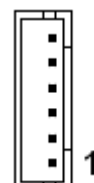
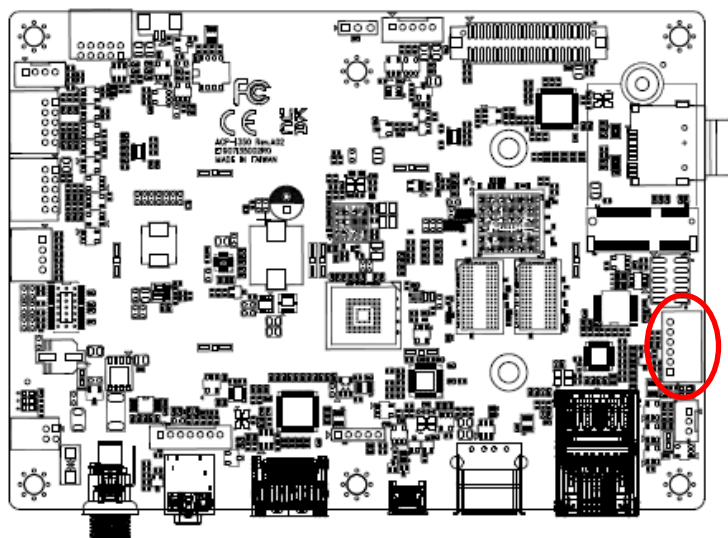


2.4.3 Serial Port 1/2 connector (JCOM1)



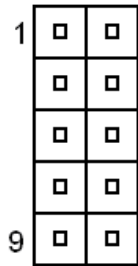
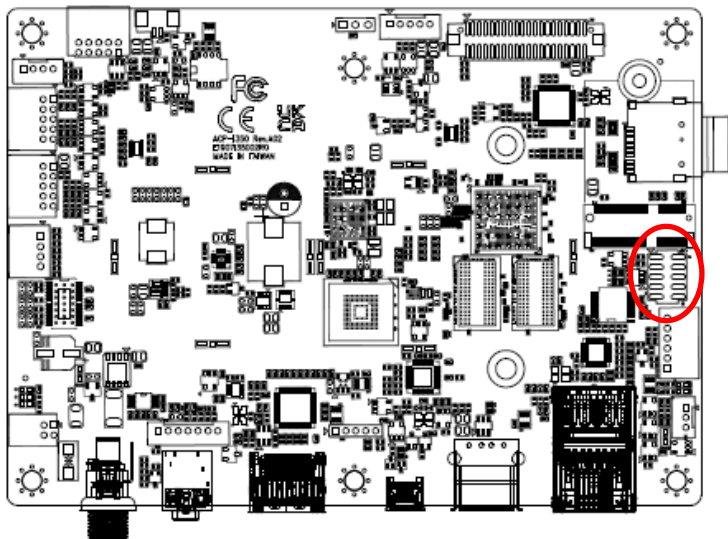
PIN	Signal
1	JCOM1_TX_232
2	JCOM1_RX_232
3	GND

2.4.4 Serial Port 1/2 connector (JCOM2)



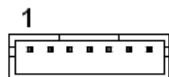
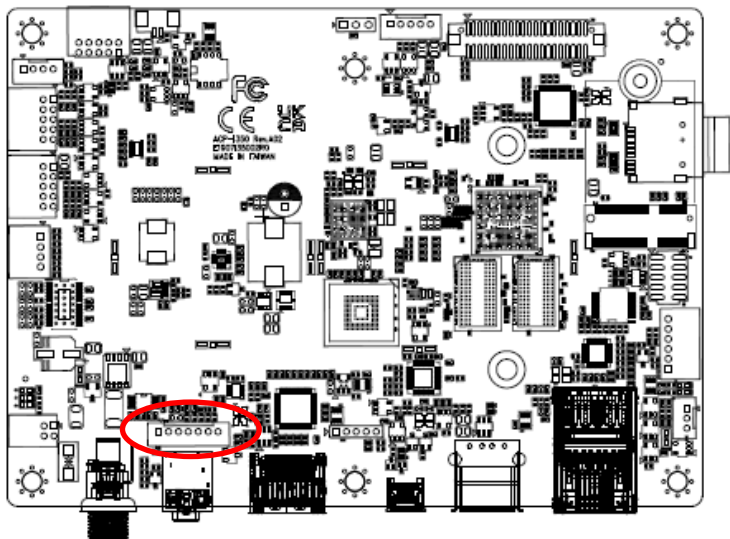
PIN	Signal
6	JCOM2_SAFETY-KET
5	GND
4	JCOM2_485-
3	JCOM2_485+
2	JCOM2_RX_232
1	JCOM2_TX_232

2.4.5 USB connector (JUSB3)



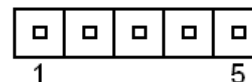
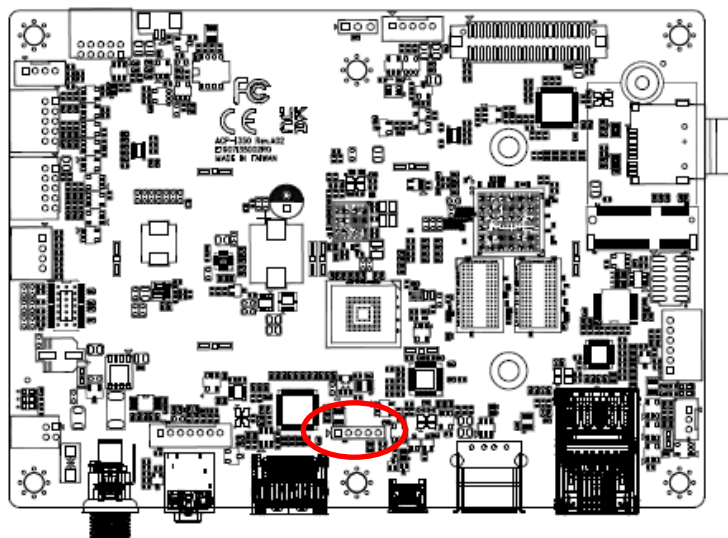
Signal	PIN	PIN	Signal
+5V_JUSB3	1	2	GND
JUSB3_1N	3	4	GND
JUSB3_1P	5	6	JUSB3_2P
GND	7	8	JUSB3_2N
GND	9	10	+5V_JUSB3

2.4.6 JHP2 connector (JHP2)



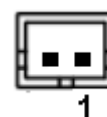
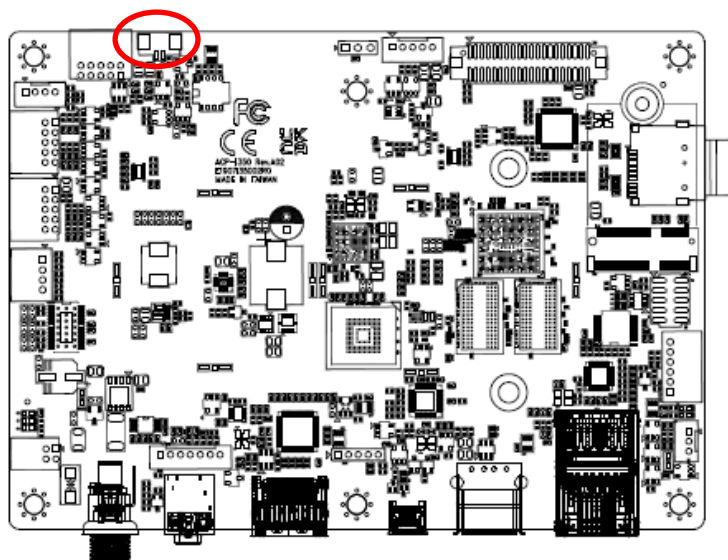
PIN	Signal
1	HP_MIC
2	HP_GND
3	HP_R
4	HP_L
5	HP_DET2
6	HP_DET1
7	HP_L#2

2.4.7 JLT1 connector (JLT1)



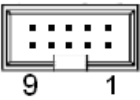
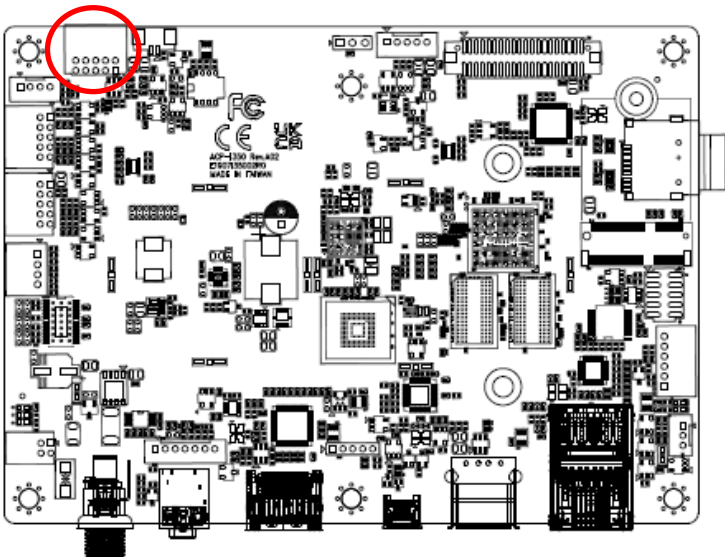
PIN	Signal
1	LT6_RST
2	GND
3	LT6_CSCL
4	LT6_CSDA
5	GND

2.4.8 Battery connector (JBAT1)



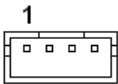
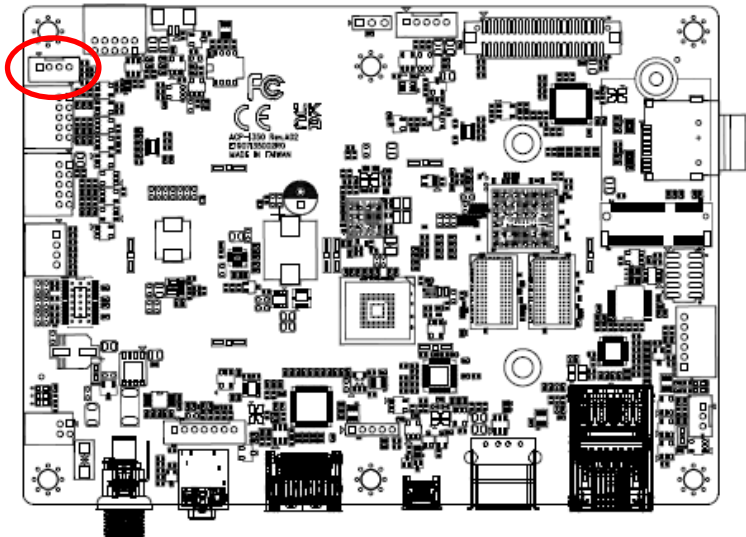
PIN	Signal
1	+VRTCBAT
2	GND

2.4.9 JCAM connector (JCAM1)



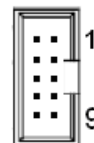
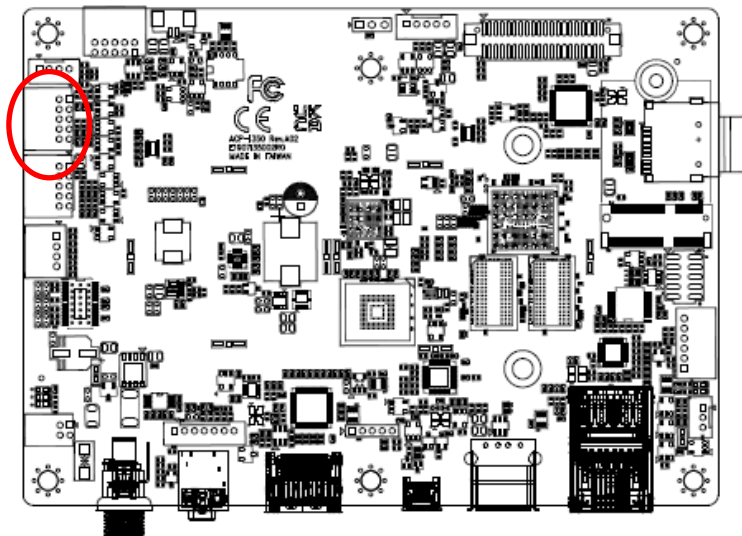
Signal	PIN	PIN	Signal
+V5_JCAM1	2	1	+V2.8_DMIC
USB_JCAM1_N	4	3	DMIC_CLK
USB_JCAM1_P	6	5	DMIC_DAT
GND	8	7	GND
GND	10	9	GND

2.4.10 JI2C connector (JI2C1)



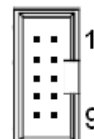
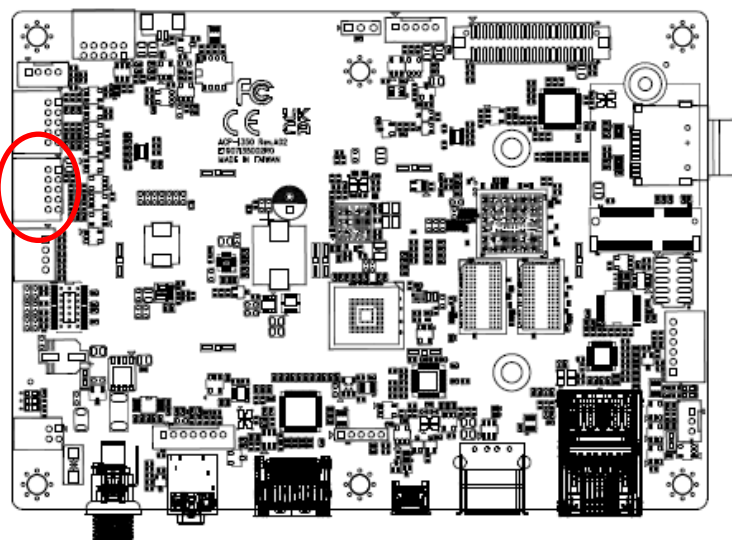
PIN	Signal
1	+V3.3_I2C
2	TP_SCL
3	TP_SDA
4	GND

2.4.11 JKEY connector (JKEY1)



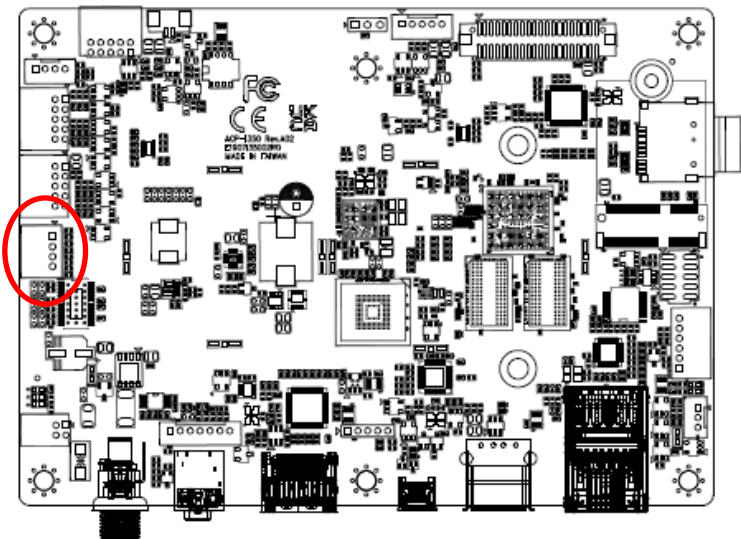
Signal	PIN	PIN	Signal
JKEY1_VOL+	2	1	JKEY1_PWR
JKEY1_VOL-	4	3	JKEY1_RST_SOC
+5V_JKEY1	6	5	+V3.3_JKEY1
JKEY1_I2C_CLK	8	7	GND
JKEY1_I2C_DAT	10	9	JKEY1_INT

2.4.12 JMCU connector (JMCU1)



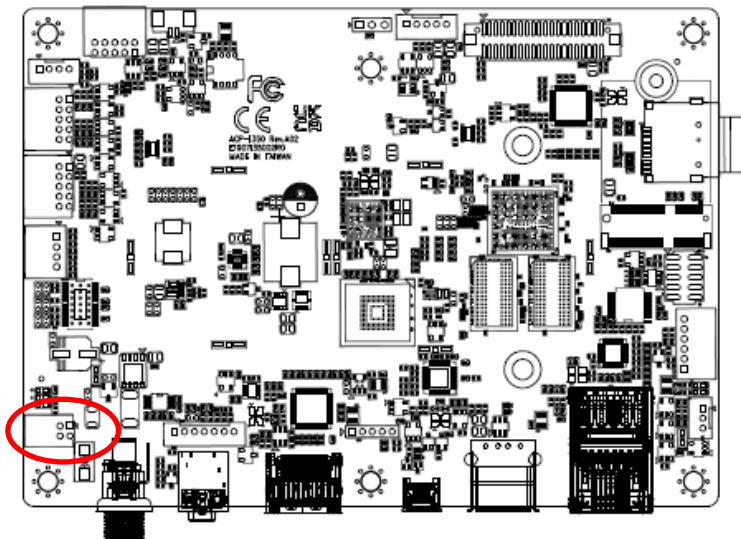
Signal	PIN	PIN	Signal
+12V_JMCU1	2	1	JMCU1_SAFETY-KEY
JMCU1_INT_MCU	4	3	JMCU1_INT_SOC
JMCU1_RX	6	5	JMCU1_TX
JMCU1_RST_MCU	8	7	JMCU1_RST_SOC
GND	10	9	JMCU1_ERP-CTRL

2.4.13 Speaker connector (JSPK1)



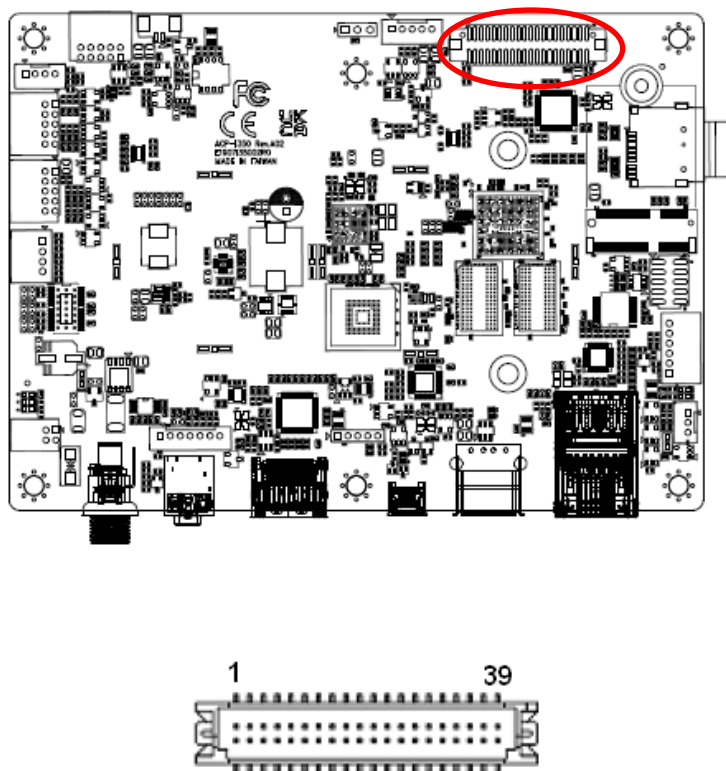
PIN	Signal
1	JSPK_L+
2	JSPK_L-
3	JSPK_R+
4	JSPK_R-

2.4.14 Power connector (JPWR2)



Signal	PIN	PIN	Signal
GND	2	1	+V12_DCIN
GND	4	3	+V12_DCIN

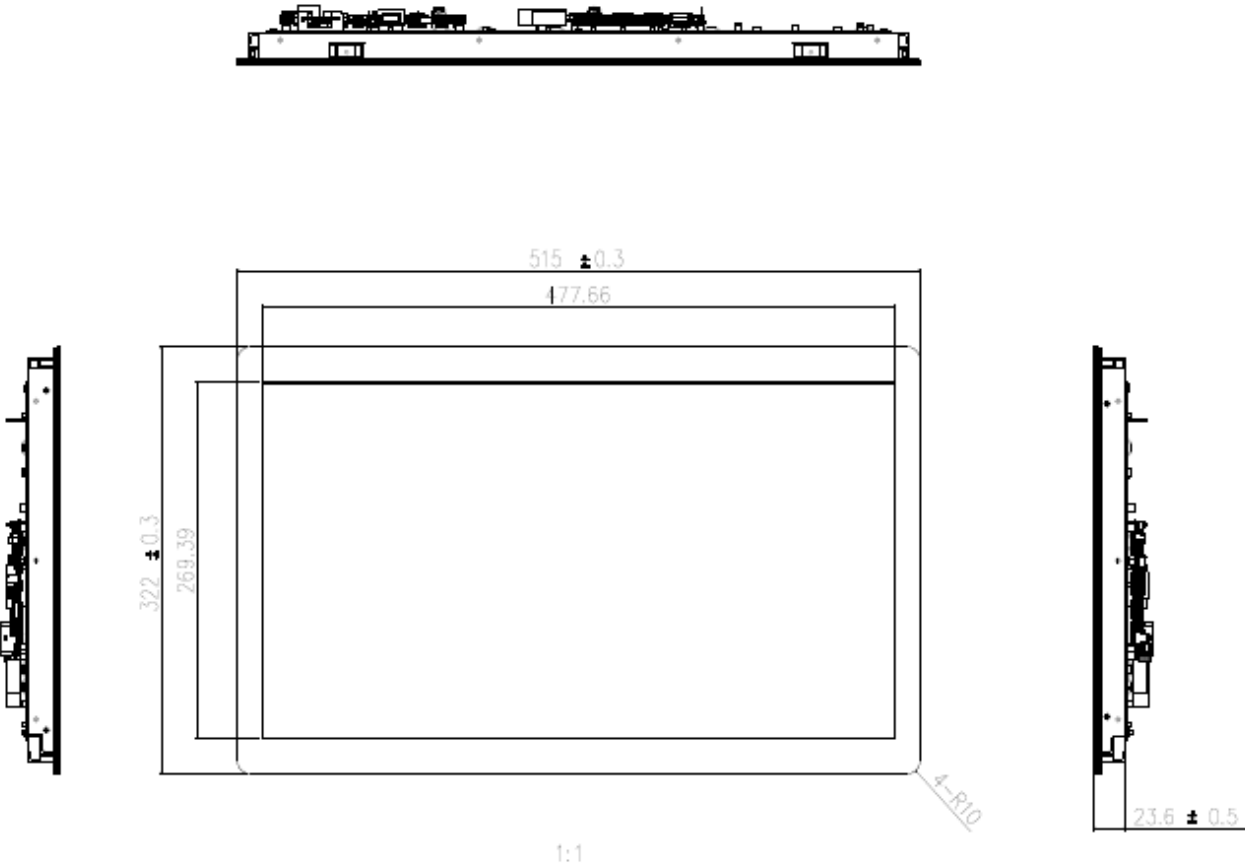
2.4.15 LVDS connector (JLVDS1)



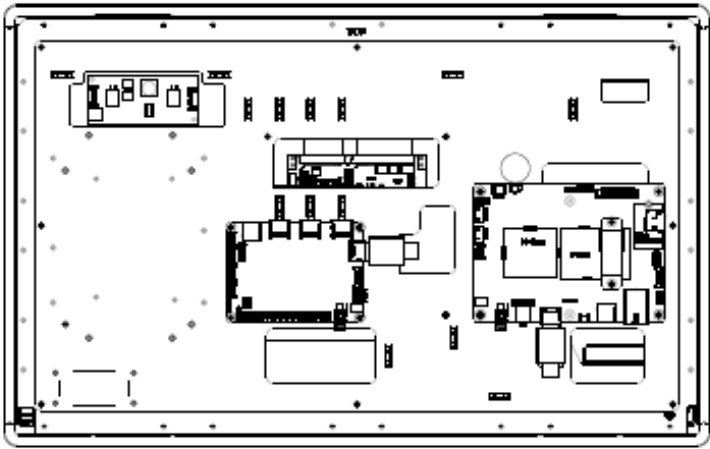
Signal	PIN	PIN	Signal
+V5_LVDS	2	1	+3.3V_LVDS
+V5_LVDS	4	3	+3.3V_LVDS
+V5_LVDS	6	5	+3.3V_LVDS
GND	8	7	GND
LT9_LA0P	10	9	LT9_LA1P
LT9_LA0N	12	11	LT9_LA1N
GND	14	13	GND
LT9_LA2P	16	15	LT9_LA3P
LT9_LA2N	18	17	LT9_LA3N
GND	20	19	GND
LT9_LB0P	22	21	LT9_LB1P
LT9_LB0N	24	23	LT9_LB1N
GND	26	25	GND
LT9_LB2P	28	27	LT9_LB3P
LT9_LB2N	30	29	LT9_LB3N
GND	32	31	GND
LT9_LACP	34	33	LT9_LBCP
LT9_LACN	36	35	LT9_LBCN
GND	38	37	GND
+V12_LVDS	40	39	+V12_LVDS

3. Mechanical Drawing





Unit: mm



Unit: mm

