IoT-40A V1.2 Full Function Digital Signage Specifications

The History of Modification

Version	Description	Date
V1.0	Creation	2018-11-27
V1.4	Modification description	2023-03-23

Contents

Chapter 1 Overview

1.1 Scope of Application

IoT-40A (full function) belongs to Android smart motherboard, which is generally applicable to smart display terminal products, video terminal products, industrial automation terminal products, such as: advertising machines, digital signage, smart self-service terminals, smart retail terminals, O2O smart devices, industrial control hosts, robots equipment, etc.

1.2 Product Description

IoT-40A (full function) uses the Allwinner A40i Cortex-A7 quad-core CPU, equipped with Android 7.1 system, the maximum frequency is up to 1.2GHz, the performance is 1.5 times higher than the A20, and the cost performance is high. The GPU adopts Mali400 MP2, which supports most of the current popular video and image format decoding, and is the best choice for your advertising machine and smart terminal.

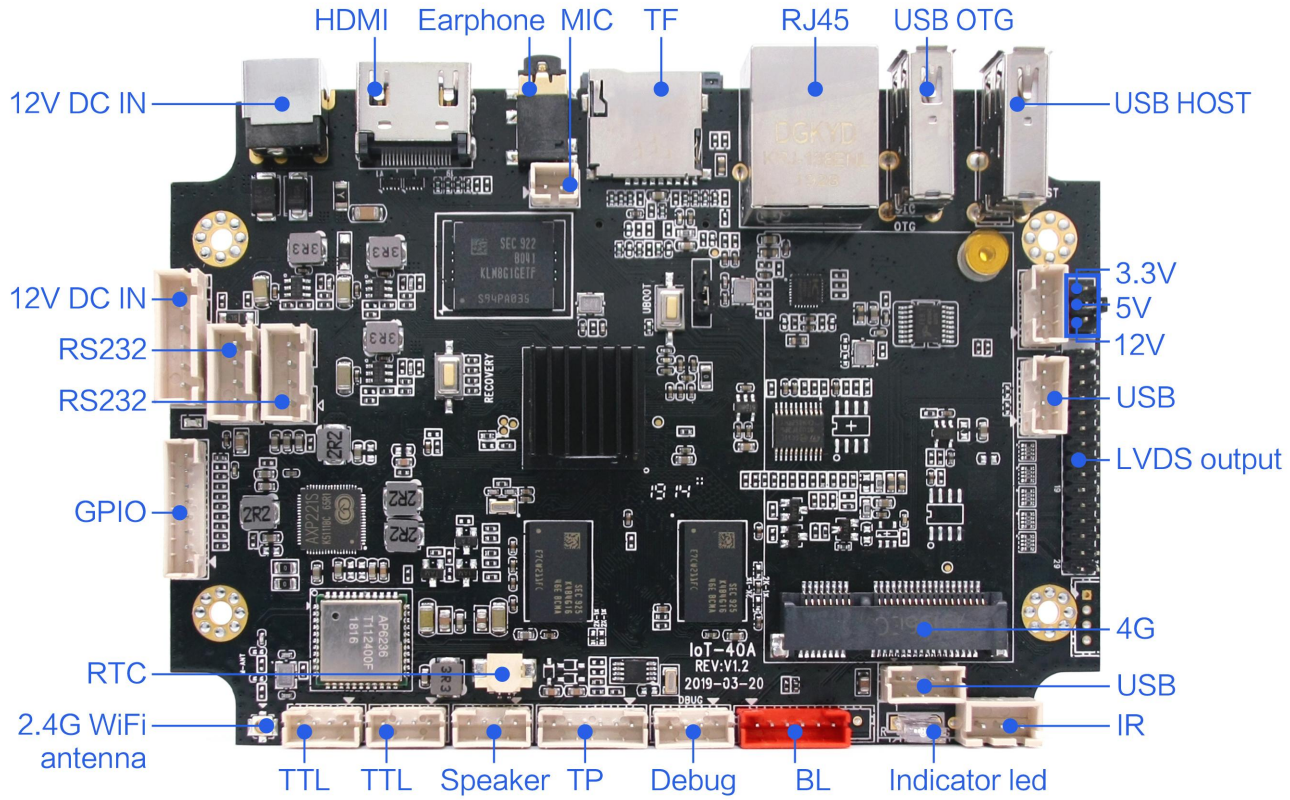
1.3 Features

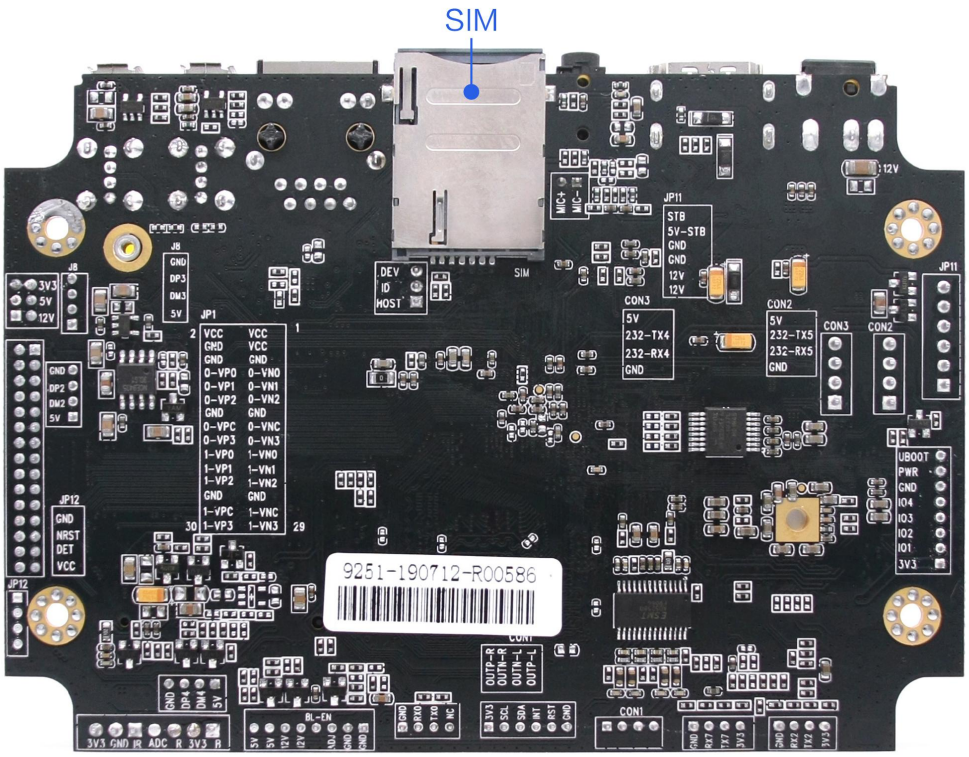
- It has a classical template and is compatible with the structured design of ShiMeTa IoT-20A and DS831.

- Complete functions, support audio and video output, network links, content storage, interface extension and other functions in one.
- Rich interface, five USB ports (three pin, two standard USB ports), four expandable serial ports, GPIO/ADC interface, can meet the requirements of various peripherals on the market.
- HD output, maximum support for HDMI and LVDS 1080P dot screen and decoding.
- Support mobile communication, support Huawei, Longshang, Quecte and other PCI-E 4G/3G modules, support network links and calls.
- System customization, can customize the system function, and provide system call interface API reference code, which perfectly supports the client upper application APP development.
- Seamless connection，support MIPS release software and other mainstream information release software, convenient management.

1.4 Appearance and Interface Diagram

Front / Back：


HDMI
Earphone
MIC
TF
RJ45
USB OTG
12V DC IN
USB HOST
12V DC IN
3.3V
5V
12V
RS232
RS232
USB
LVDS output
GPIO
4G
RTC
USB
2.4G WiFi antenna
IR
TTL
TTL
Speaker
TP
Debug
BL
Indicator led


SIM

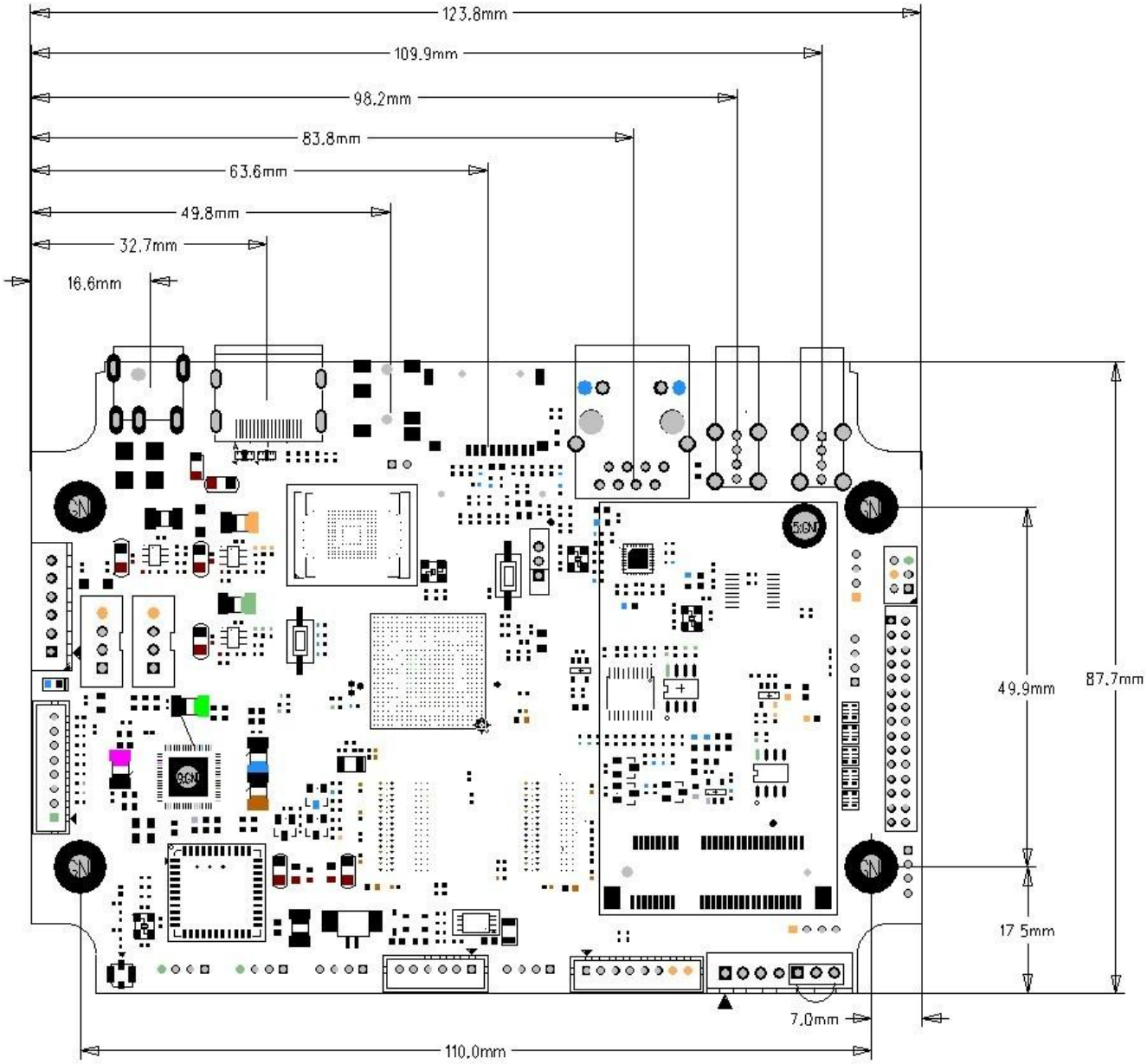
Chapter 2 Basic Function List

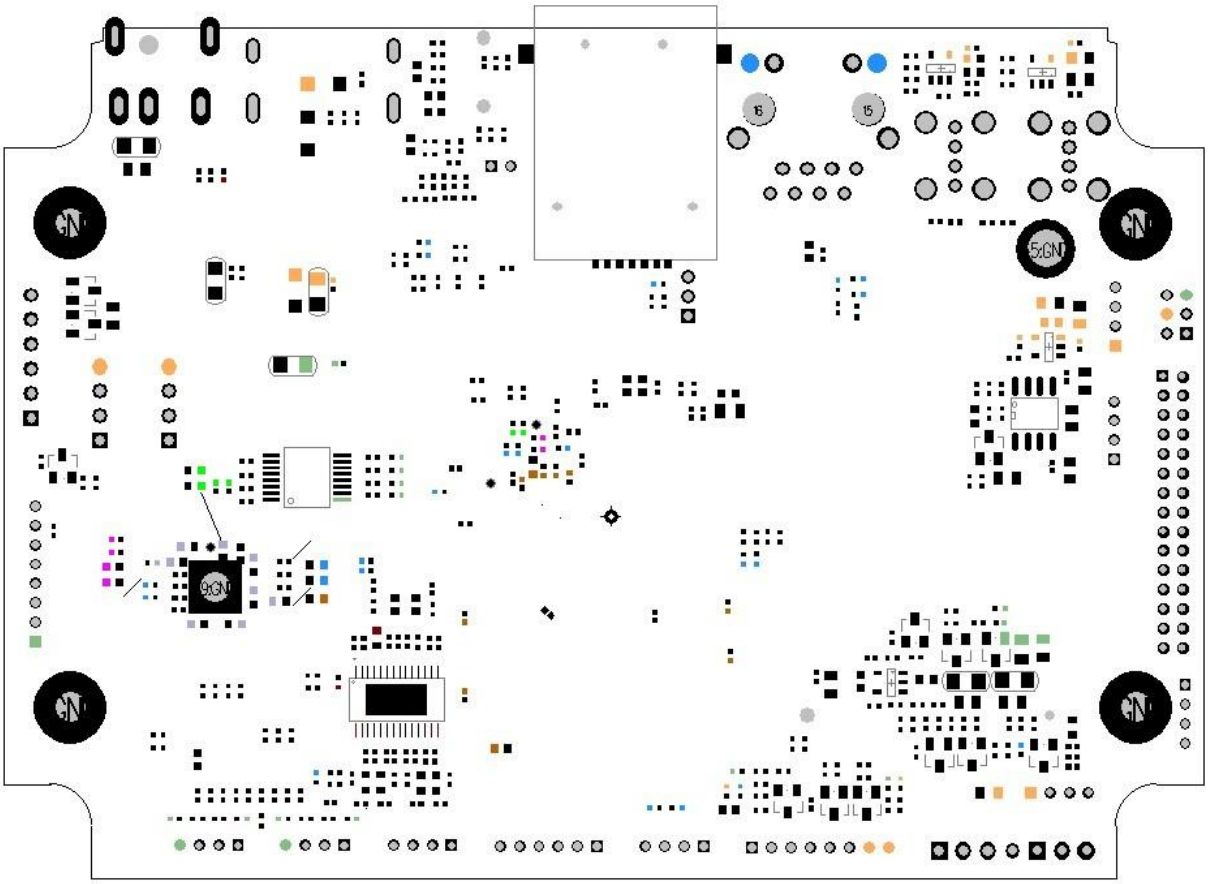
Main Product Hardware Index	
Size	123.8*87.7*mm
CPU	A40i , Quad-core，Main frequency up to 1.2GHz
RAM	Standard 1G， (2G optional)
Built-in memory	EMMC standard 8G，(16/32G optional)
Built-in ROM	2KB EEPROM
Decoding resolution	Up to 1080P
Operating system	Android 7.1
Play Mode	Support loop, timing, interlude and other playback modes
Network Support	4G, Ethernet, support WiFi/ Bluetooth 4.0, wireless peripheral extension
Video display	Support wmv、avi、flv、rm、rmvb、mpeg 、ts、mp4, etc.
Picture format	Support BMP、JPEG、PNG、GIF
USB2.0 interface	2 USB HOST、3 USB socket
Serial Port	2 serial TTL sockets，2 serial RS232 sockets
GPS	External GPS（optional）
WIFI、BT	Built-in WIFI，BT4.0（optional）

4G	Built-in WCDMA,EVDO,4G full netcom, support voice calls
Ethernet	1，10M/100M Adaptive Ethernet
SD Card	Support TF Card
LVDS output	1 single / dual channel, can directly drive 50/60Hz LCD screen
HDMI output	1，Support 1080P output
AV output	Support left and right channel output, built-in dual 4R/20W, 8R/10W power amplifier
RTC real-time clock	Support
Timing switcher	Support
System Update	Support local SD,USB upgrade

Chapter 3 PCB Dimensions and Interface Layout

3.1 PCB size chart





PCB: 6-layer board

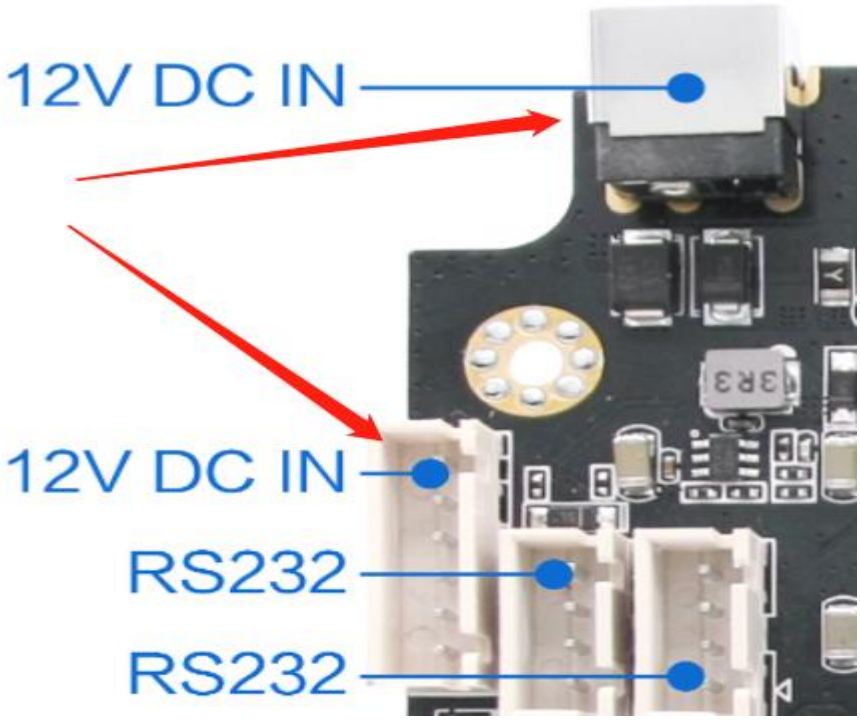
Dimensions: 123.8mm*87.4mm, 1.6mm board thickness

Screw hole size: ϕ3.2mm x 4

3.2 Interface Parameter Description

◆Power input interface

Powered by a 12V DC power supply, the board subsystem can only be powered from the DC base and power outlet. The DC IN specification of the power adapter plug is D6.0, d2.0. The 12V DC power supply needs to support a minimum of 600mA when no external peripheral load is connected.



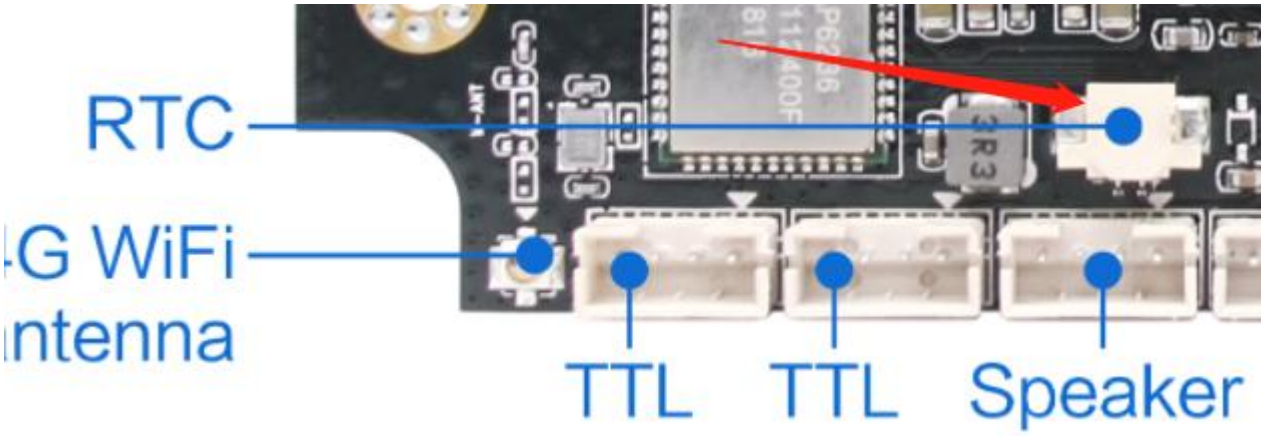
The interface of the power socket is defined as follows. It can be powered by the power board. The size of the socket is 6PIN 2.54mm spacing.

Number	Definition	Attributes	Description
1	VCC	input	12V input
2	VCC	input	12V input
3	GND	ground wire	ground wire
4	GND	ground wire	ground wire
5	VCC-5V	input	Standby 5V input
6	STB	output	Standby signal output

Standby 5V input and standby signal output are used for standby power board. For low-power standby, connect the standby 5V input and standby signal output signals to the 5V STB and PS_ON of the power board respectively（The description of these two signals may be different in different power boards, please refer to the actual one）. If you do not need to do low-power standby, these two feet can be not connected.

◆ BAT1 RTC Battery interface

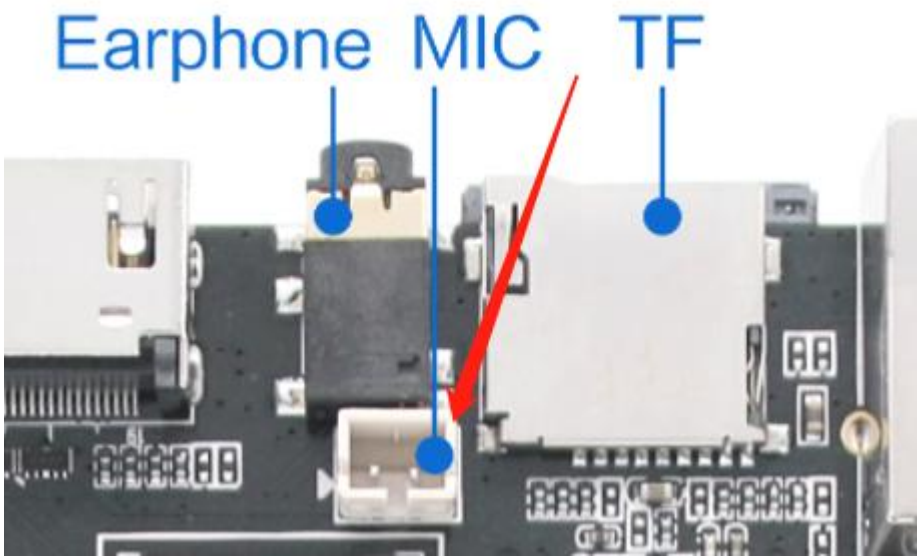
The standard 2032 interface is used to power the system clock when power is off.



Number	Definition	Attributes	Description
1	RTC	input	3Vinput
2	GND	ground wire	ground wire

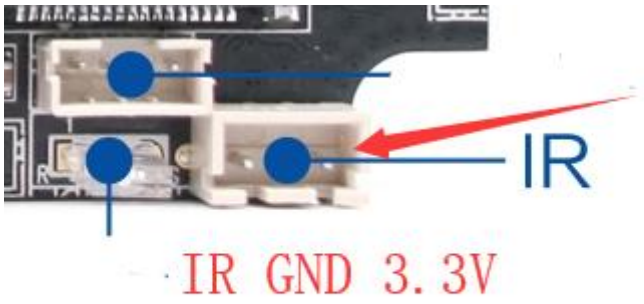
◆ MIC interface

Please pay attention to MIC positive and negative connection, do not reverse connection.



Number	Definition	Attributes	Description
1	MIC-	input	MIC-
2	MIC+	input	MIC+

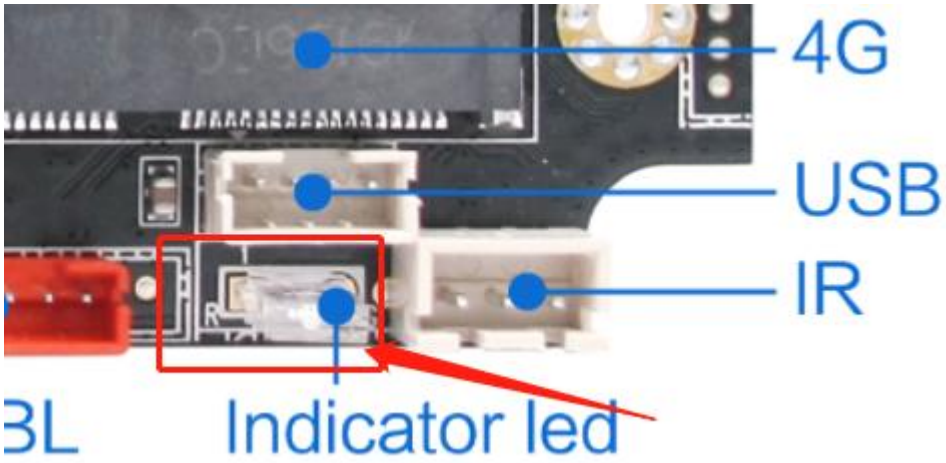
◆ Remote receiving interface



Number	Definition	Attributes	Description
1	IR	input	remote signal input
2	GND	ground wire	ground wire
3	3V3	power supply	3.3Voutput

◆ Work indicator led

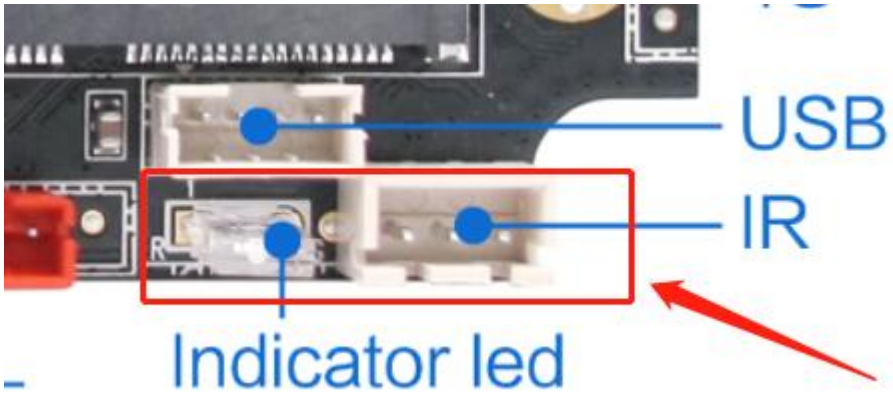
Common anode red and blue LED lights are supported by default.



Number	Definition	Attributes	Description
1	LED_B	blue light	work indicator
2	VCC	power supply	3.3V output
3	LED_R	red light	standby indicator

◆ LED/IR interface

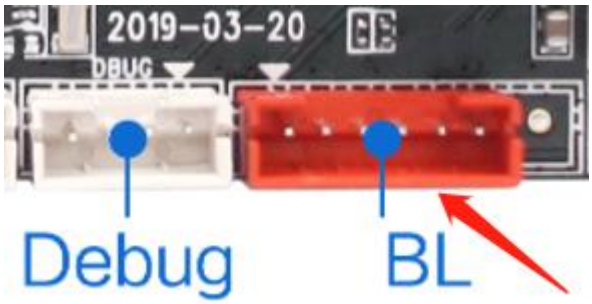
The position is next to the remote control receiver and indicator light（Welding 7pin socket with 2.54mm spacing is optional）.



Number	Definition	Attributes	Description
1	LED_B	output	Work indicator
2	VCC	power supply	3.3V output
3	LED_R	output	standby indicator
4	ADC	ADC input	ADC button input
5	IR	input	remote signal input
6	GND	ground wire	ground wire
7	3.3V	power supply	3.3V output

◆ Backlight control interface

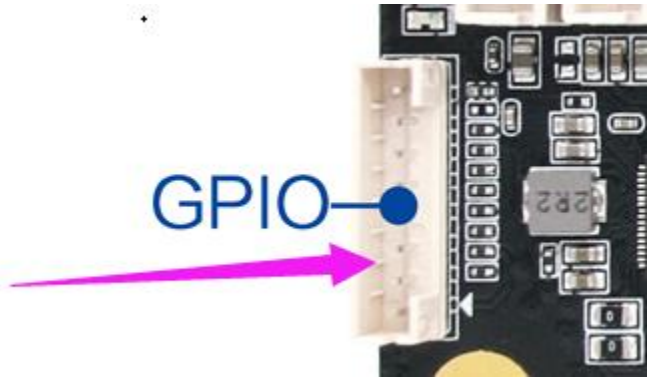
For backlight control of LVDS screen, the 12V power supply current is no more than 1.5A. When using a large screen of 19 inches or more or the power of the screen backlight is above 20W, please supply power from other power supply boards to avoid system instability. The backlight enable voltage is 5V. For other voltages, please add IO level conversion circuit. **This 12V power supply can only be used as a backlight power supply, and it must not be used as a power input system.**



Number	Definition	Attributes	Description
6	VCC	power supply	12V output
5	VCC	power supply	12V output
4	BL-EN	output	Backlight enable control
3	BL-ADJ	output	Backlight brightness control
2	GND	ground wire	ground wire
1	GND	ground wire	ground wire

◆ I/O control interface

Input/output for providing control signals to peripherals at a level of 3.3V. The ADC signal can be used for button control.



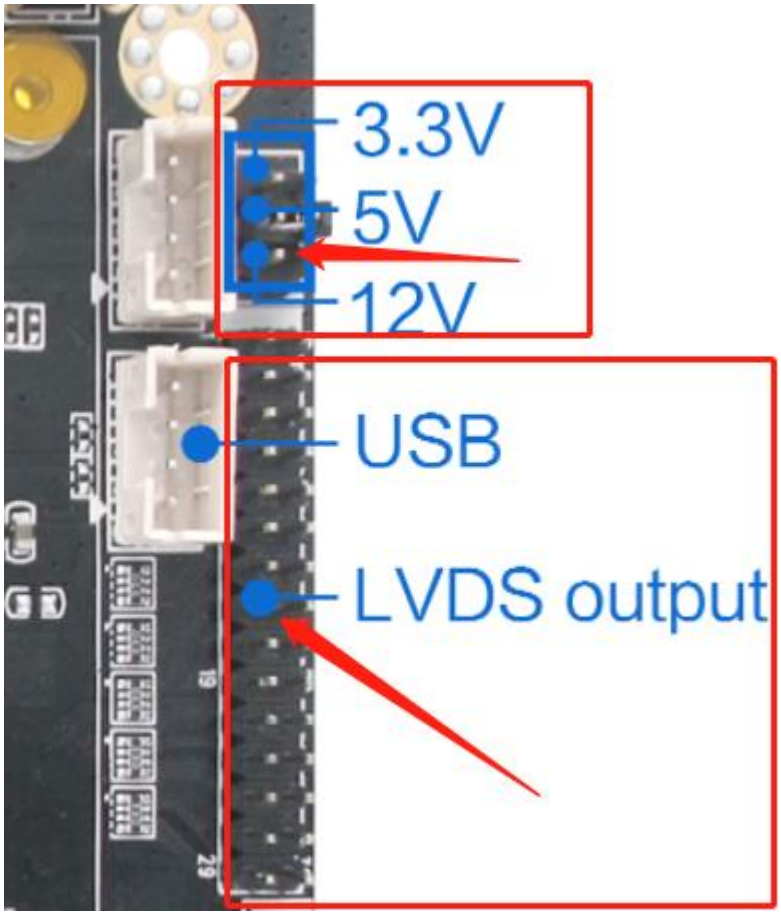
Number	Definition	Attributes	Description
1	VCC	power supply	3.3V output
2	I/O	input	IO1
3	I/O	input	IO2
4	I/O	output	IO3
5	IO/ADC	input/output	IO4(ADC optional)
6	GND	ground wire	ground wire
7	PWRON	power supply	power button
8	UBOOT	debug port	upgrade debug port

◆ LVDS interface

Universal LVDS interface definition, support single / dual, 6 / 8bit 1080P LVDS screen. The screen voltage can be selected through the jumper cap, and can be selected to support 3.3V/5V/12V screen power supply.

In order to avoid burning the board and the screen, please note the following：

1. Please confirm whether the power supply voltage of the screen specification screen is correct, and whether the corresponding power supply of the board can meet the maximum current of the screen operation.
2. Use a multimeter to confirm that the power cord selected by the jumper cap is correct.



In the above figure, the jumper cap is used to select the screen power supply. From top to bottom, the order is: 3.3V/5V/12V.

Number	Definition	Attributes	Description
1	PVCC	power output	LCD power output, +3.3v/+5V/ +12V optional
2			
3			
4	GND	ground wire	Ground wire
5			
6			
7	0-VN0	output	Pixel0 Negative Data (Odd)
8	0-VP0	output	Pixel0 Positive Data (Odd)
9	0-VN1	output	Pixel1 Negative Data (Odd)
10	0-VP1	output	Pixel1 Positive Data (Odd)
11	0-VN2	output	Pixel2 Negative Data (Odd)
12	0-VP2	output	Pixel2 Positive Data (Odd)
13	GND	ground wire	ground wire
14	GND	ground wire	ground wire
15	0-VNC	output	Negative Sampling Clock (Odd)
16	0-VPC	output	Positive Sampling Clock (Odd)
17	0-VN3	output	Pixel3 Negative Data (Odd)

18	0-VP3	output	Pixel3 Positive Data (Odd)
19	1-VN0	output	Pixel0 Negative Data (Even)
20	1-VP0	output	Pixel0 Positive Data (Even)
21	1-VN1	output	Pixel1 Negative Data (Even)
22	1-VP1	output	Pixel1 Positive Data (Even)
23	1-VN2	output	Pixel2 Negative Data (Even)
24	1-VP2	output	Pixel2 Positive Data (Even)
25	GND	ground wire	ground wire
26	GND	ground wire	ground wire
27	1-VNC	output	Negative Sampling Clock (Even)
28	1-VPC	output	Positive Sampling Clock (Even)
29	1-VN3	output	Pixel3 Negative Data (Even)
30	1-VP3	output	Pixel3 Positive Data (Even)

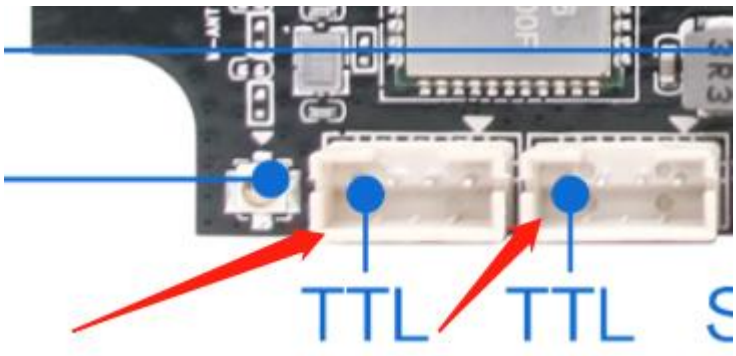
◆ TTL two-line serial port socket interface*2

The board leads to two sets of common two-wire serial ports, which can support the common serial devices on the market. The serial port level is 0V to 3.3V. If the level of the docked serial port is higher than 3.3V, there must be an isolation circuit or a level shifting circuit, otherwise the master and device will be burned out.

Precautions：

1.Whether the voltage of TTL serial port matches. Cannot directly access RS232, 485 devices.

2.Whether TX and Rx are connected correctly.



Number	Definition	Attributes	Description
1	GND	ground wire	ground wire
2	UART- RX	input	RX
3	UART- TX	output	TX
4	VCC	power supply	3.3V output

◆ RS232 two-wire serial port socket interface*2

The board also introduces two sets of RS232 serial ports, which can support RS232 serial devices that are

common in the market.

Precautions：

1.Whether the voltage of TTL serial port matches. Can not directly access TTL, 485 devices.

2.Whether TX and Rx are connected correctly.

Number	Definition	Attributes	Description
1	GND	ground wire	ground wire
2	232-RX	input	232-RX
3	232-TX	output	232-TX
4	VCC	power supply	5V output

Serial number	Serial port number	Corresponding nodes	Whether the serial port is extensible
1	Port 2	TTYS2	Not
2	Port 7	TTYS7	Not
3	Port 4	TTYS4	Not
3	Port 5	TTYS5	Not

◆ USB

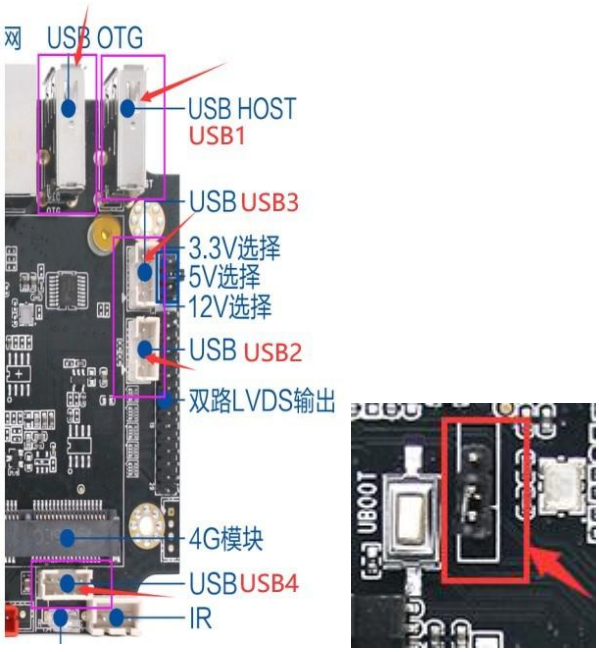
The board has 2 USB standard interfaces and 3 built-in USB sockets for peripheral expansion. The default is HOST. The supply current is no more than 1A. The USB OTG holder can can select Host/Device through the jumper position shown in the figure below.

2 standard USB sockets supply maximum current 1A, controllable.

USB2 is the main control chip output, the maximum power supply current 1A, controllable.

USB3 and USB4 are the HUB chip output, together with the maximum power supply current 1A, controllable.

The maximum total USB current shall not exceed 2.5A.



Number	Definition	Attributes	Description
1	VCC	power supply	5V output
2	DM	input/output	DM
3	DP	input/output	DP
4	GND	ground wire	ground wire

◆ Touch screen interface

Number	Definition	Attributes	Description
1	VCC	power supply	3.3V output
2	SCK	input/output	I2C clock

3	SDA	input/output	I2C data
4	INT	input/output	Interrupt
5	RST	input/output	Reset
6	GND	Ground wire	Ground wire

- **Audio interface 1(external amplifier required)**

- **Audio interface 2(can directly drive the speaker)**

Number	Definition	Attributes	Description
1	OUTP-R	output	Audio output right +
2	OUTN-R	output	Audio output right -
3	OUTN-L	output	Audio output left -
4	OUTP-L	output	Audio output left +

◆ Some other standard interfaces and functions:

Storage interface	SD/TF card	Data storage, up to 32G
	USB	HOST interface, support data storage, data import, USB mouse and keyboard, camera, touch screen, etc.
Ethernet interface	RJ45 interface	Support 100M wired network
HDMI interface	Standard interface	Support HDMI data output, support up to 1080P
Headphone jack	Standard interface	3.5mm standard interface
4G interface	PCI-E standard interface	Support a variety of Mini PCI-E 4G modules such as Quecte and Longshang, power supply 3.3V
SIM card interface	Standard interface	Support various standards (depending on 4G module)

Chapter 4 Electrical Performance

Items		Min	Typical	Max
power voltage	voltage	10.2V	12V	13.8V
	ripple	--	--	50mV
power voltage	current	3A		
Power supply current (HDMI output, not connected to other peripherals)	Working current	--	300mA	500mA
	stand-by current	--	17mA	20mA
	USB supply current	-`-	--	500mA
Supply current (LVDS)	3.3V operating current		400 mA	500 mA
	5V working current		550 mA	1A
	12V working current		580 mA	1A

	USB supply current	--	--	500mA
total output	current	3.3V		800mA
environment	relative humidity	20%	--	80%
	operating temperature	0℃	--	60℃
	storage temperature	-20℃	--	70℃

Note 1： When connecting the LVDS screen, you need to pay attention to choose the correct backlight working voltage 3.3V or 5V or 12V, please do not apply it to the peripherals beyond the corresponding maximum current.

Note 2: When the LVDS screen is connected, the overall working current and standby current of the board depend on the screen to be connected. The above table is not listed one by one.

Chapter 5 Precautions for Assembly and Use

Please pay attention to the following (and not limited to) problem points during assembly and use.

1.The bare board and peripherals are short-circuited.

2.During the installation and fixing process, the deformation of the bare board due to the fixing is avoided.

3.When installing the LVDS screen, pay attention to the screen voltage and current compliance. Pay attention to the problem of the 1st foot of the screen.

4. When installing the LVDS screen, pay attention to the screen backlight voltage and current compliance. If the power of the screen backlight is 20W or more, whether it is powered by another power board.

5. When installing peripherals (USB, IO.etc), pay attention to peripheral IO level and current output issues.

6. When installing the serial port, pay attention to whether the 232, 485 device is directly connected. Whether the connection of X and RX is correct.

7. Whether the input power supply is connected to the power input interface, and whether the input power supply voltage and current meet the requirements according to the evaluation of the total peripheral equipment. It is forbidden to

access the power supply input power from the backlight socket for convenient operation.