
Product Specification

Item No.: BTP-PCM-A-020E

Product Name: All-in-one Rockchip RK3568 Solution Android Development

Motherboard

Version : V6.0

Version History

Version	Description	Date
V3.0	Established	2023/03/22

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Part 1

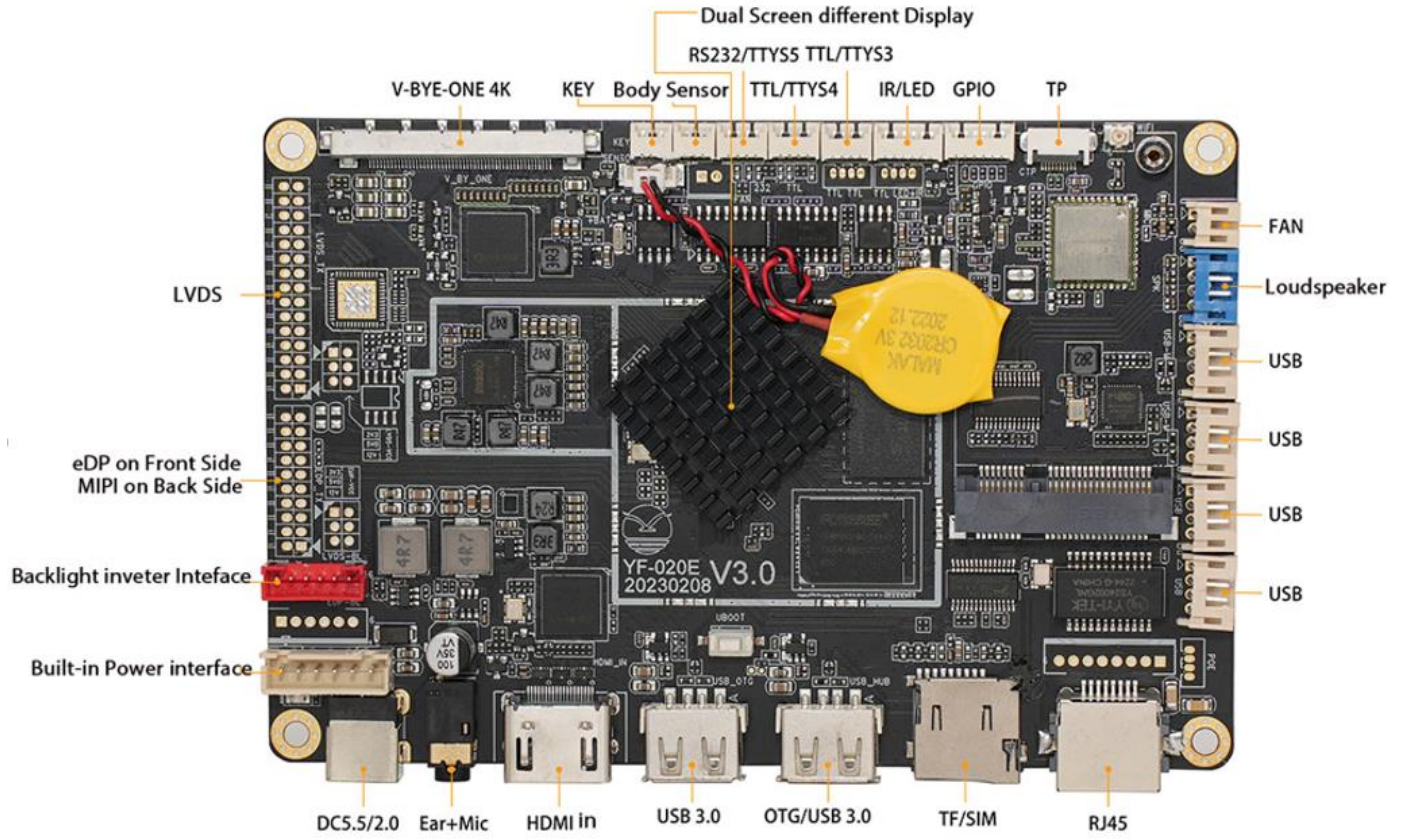
1.1: General Product Description

The 020E board uses Rockchip RK3568 high-performance, low-power quad-core application processor, equipped with Android11.0 system, with a main frequency of up to 2.0GHz. The embedded 3D GPU makes RK3568 fully compatible with OpenGL ES 1.1/2.0/3.2, OpenCL 2.0 and Vulkan 1.1. The special 2D hardware engine will maximize display performance and provide very smooth operation. The built-in NPU supports 1.0T and INT8/INT16 mixed operations, supports almost all formats of H.264 decoder 4K@60fps, H.265 decoder 4K@60fps, and also supports H.264/H.265 encoder 1080p@60fps, high quality JPEG encoder/decoder. . Integrated multi-channel LCD driver, Ethernet, WIFI5, BT power amplifier into one, supports most of the current popular video and picture format decoding, dual 6/8-bit LVDS, eDP, V-by-one supports 2K/4K level output compatibility Drive various TFT LCD displays to simplify the overall system design.

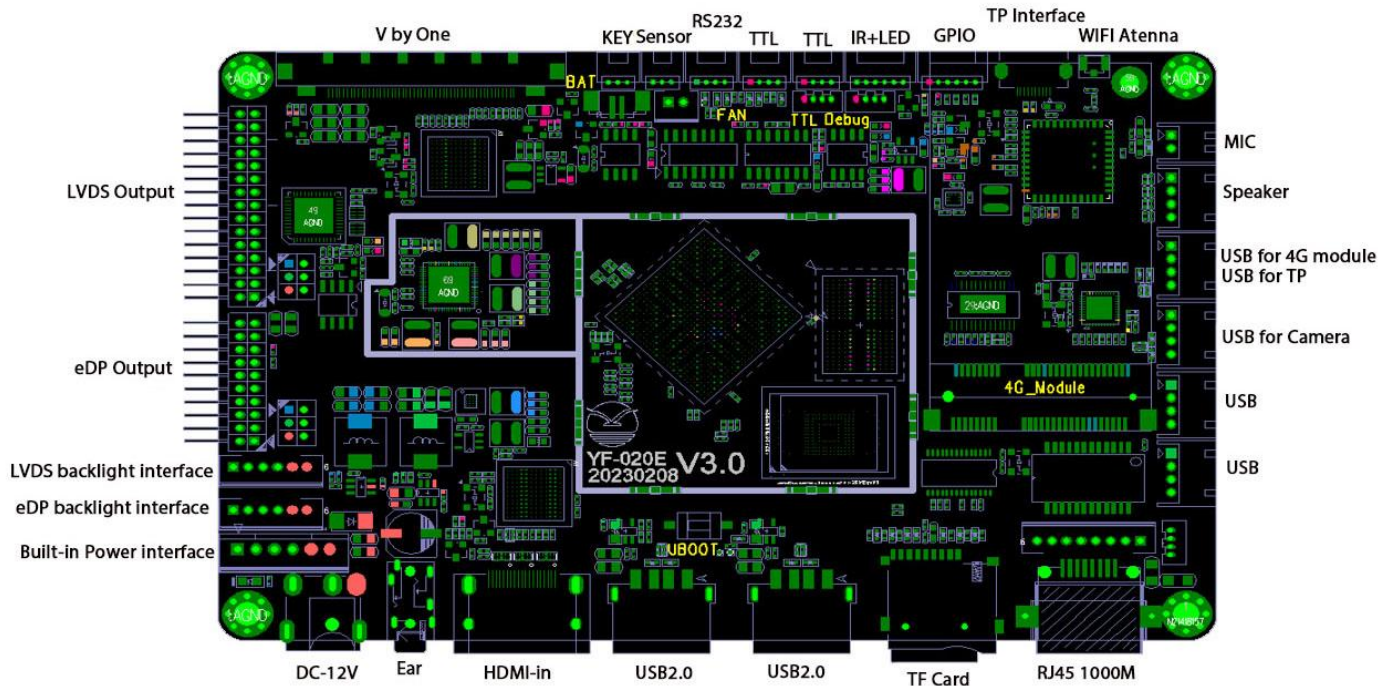
1.2: Key Features

- ◆ High integration level. Integrated USB/LVDS/Gigabit Ethernet/WIFI5/BT/eDP/TF card expansion/HDMI-IN/Ve-By-One/microphone and other functions simplify the overall machine design and make the overall machine design more beautiful.
- ◆ High definition. Supports 1080P/H.265 (4K2K) video decoding and various Ve-By-One/LVDS/eDP signal LCD displays.
- ◆ Comes with built-in power amplifier. Supports dual-channel 8R/5W power amplifier.
- ◆ Rich interfaces. Supports USB/serial/GPIO/ADC interface expansion and can meet mainstream peripherals on the market.
- ◆ Full-featured. Supports horizontal and vertical screen playback, video split screen, rolling subtitles, timer switch, USB data import and other functions.
- ◆ Convenient management: Humanized playlist creation software facilitates advertising playback management and control. Playback log makes it easy to understand the playback status.

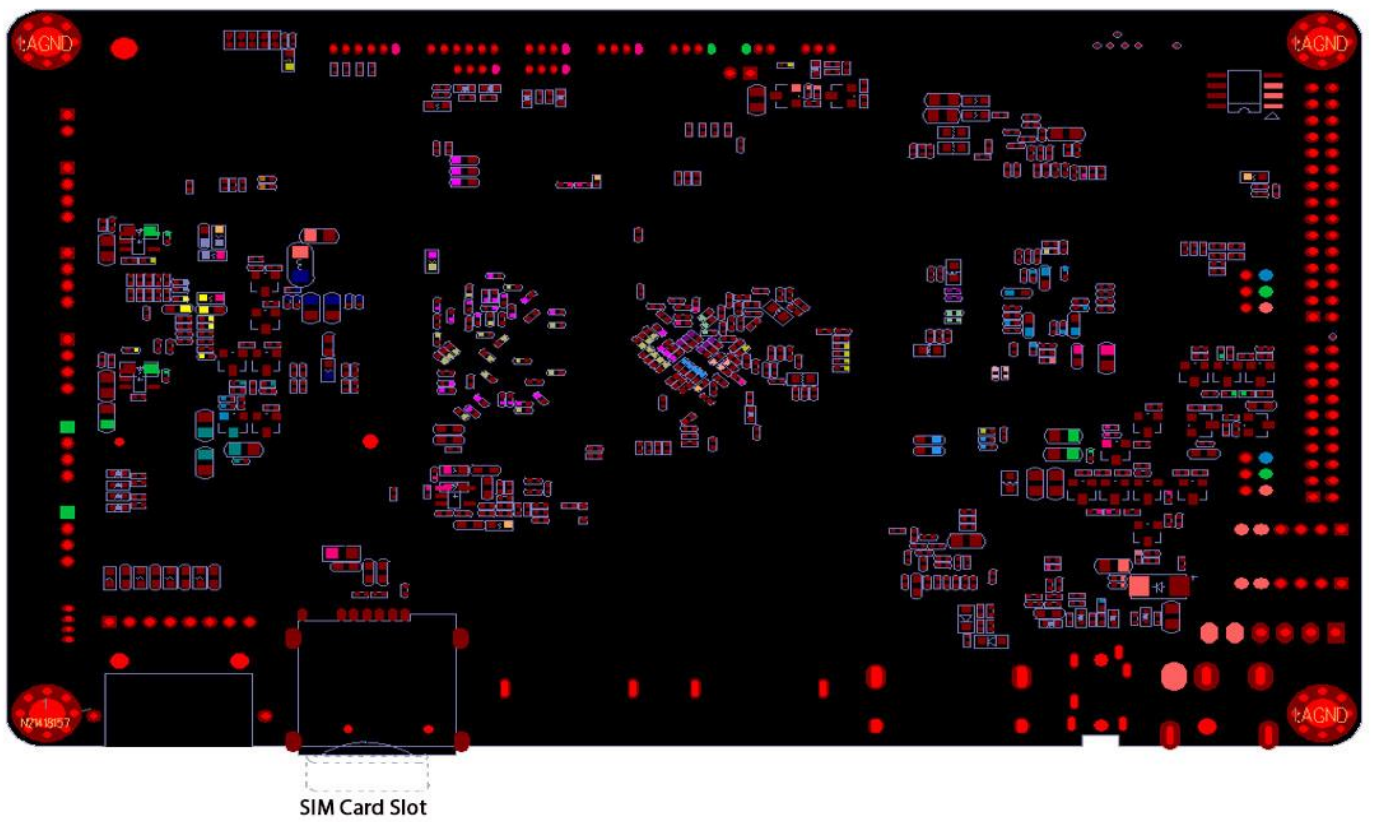
1.3: Layout and interface Diagram



Front Side



Back Side



Part 2

2.1: Hardware Specification

CPU	Rockchip RK3568 UP to 2.0Hz
GPU	Mali-G52-2EE High performance GPU
NPU	NPU support up to 1.0T
RAM	LPDDR4X/LPDDR4 2GB standard, optional 4GB, 8GB,16GB
ROM	EMMC 16G standard, optional 32GB 64GB, up to 128GB
Decoding Resolution	Support 1080P/H.265(4K2K)
O.S.	Android11.0
Play Mode	Supports multiple playback modes such as loop, timing, and insert playback
Network	Gigabit Ethernet, supporting WiFi/BT, wireless peripheral expansion
USB2.0 interface	6way USB HOST
Serial Ports	TTL x 3way, Debug x 1way, RS232 x 1way
Ethernet	RJ45 x 1way, 10M/1000M, Adaptive Ethernet
HDMI Input	UP to 1920*1080/720P/1080P
EDP Output	EDP x 1way (up to 2560*1440)
LVDS Output	LVDS x1way (up to 1920*1080)
Audio Output	Left and right channel Output 8R/2W speakers
RTC	Support RTC (Real Time Clock)
Hardware-Watch-dog	Support
Timing-on/off	Support
O.S Updating	Updating through TF card or Computer
Special Function	Updating Resolution firmware through USB

3.2: Interface Pin Map Specification

1 BAT1 RTC Battery interface (J3)

Pin No.	Definition	Property	Description
1	RTC	Input	3.3VInput
2	GND	Ground	Ground

2 FAN 2P-2.0(CON7)

Pin No.	Definition	Property	Description
1	VCC	Output	12V Output
2	GND	Ground	Ground

3 LED+IR Remote control of work indicator light 6P-1.25(CON4)

Pin No.	Definition	Property	Description
1	LED-R	Red Light	Non-working indicator
2	GND	Ground	Ground
3	LED-G	Green Light	Working indicator
4	IR-VCC	IR-VCC	IR-VCC Power
5	GND	Ground	Ground
6	IR	IR Signal	IR Signal

4 Touch-control Panel interface(JP1-10P/0.5Interval)

Pin No.	Definition	Property	Description
1	GND	Ground	Ground
2	GND	Ground	Ground
3	RST	Input/ Output	Reset
4	INT	Input/ Output	Pause
5	GND	Ground	Ground
6	SCL	Clock	Clock
7	SDA	Data	Data
8	VCC	Power	V3.3 Power
9	GND	Ground	Ground
10	GND	Ground	Ground

5 Serial-Port interface 1.25-4pin (CON2/CON3/CON6)TTL

Pin No.	Definition	Property	Description
1	VCC-3.3V	Output	3.3V Output
2	UART-TX	Input/ Output	data input / Output
3	UART-RX	Input/ Output	data input / Output
4	GND	Ground	Ground

6 Serial-Port interface (CON1)RS232

Pin No.	Definition	Property	Description
1	VCC-5V	Output	5V Output
2	UART-TX	Input/ Output	data input / Output
3	UART-RX	Input/ Output	data input / Output
4	GND	Ground	Ground

7 Loudspeaker interface (CON8)

Pin No.	Definition	Property	Description
1	OUTL+	Output	Audio Output Left+
2	OUTL-	Output	Audio Output Left-
3	OUTR-	Output	Audio Output Right-
4	OUTR+	Output	Audio Output Right+

8 MIC interface(MIC1)

Pin No.	Definition	Property	Description
1	MIC IN	Input	MIC Negative
2	MIC IP	Input	MIC Positive

9 backlight control interface (CON7)

Pin No.	Definition	Property	Description
1	VCC	Power	12V Output
2	VCC	Power	12V Output
3	BL-EN	Output	backlight enable control
4	BL-ADJ	Output	Backlight Brightness Control
5	GND	Ground	Ground
6	GND	Ground	Ground

10 I/O Control interface 6P-1.25(CON5)

Pin No.	Definition	Property	Description
1	VCC	Power	3.3V Output
2	I/O	Input/ Output	GPIO-1
3	I/O	Input/ Output	GPIO-2
4	I/O	Input/ Output	GPIO-3
5	I/O	Input/ Output	GPIO-4
6	GND	Ground	Ground

11 I/O Control interface 3P-1.25 (CN1)

Pin No.	Definition	Property	Description
1	I/O	Input/ Output	Sensor
2	GND	Ground	Ground
3	VCC	Power	+5V Output

12 Key interface 3P-1.25 (J1)

Pin No.	Definition	Property	Description
1	PWR	On/Off key	On/Off key
2	ADKey	ADKey	ADKey
3	GND	Ground	Ground

13 USB Built-in interface(CON16 for TP &4G module,CON24 for camera)

Pin No.	Definition	Property	Description
1	USB-5V	Output	5V Output
2	DM	Input/ Output	data input / Output
3	DP	Input/ Output	data input / Output
4	GND	Ground	Ground

14 LVDS/VE-BY-ONE Backlight inverter interface 6P-2.0 (CON18)

Pin No.	Definition	Property	Description
1	GND	Ground	Ground
2	GND	Ground	Ground
3	BL-ADJ	Output	Backlight brightness Control
4	BL-EN	Output	Backlight Enable Control
5	VCC	Power	12V Output
6	VCC	Power	12V Output

15 EDP Backlight inverter interface 6P-2.0 (CON10)

Pin No.	Definition	Property	Description
1	GND	Ground	Ground
2	GND	Ground	Ground
3	BL-ADJ	Output	Backlight brightness Control
4	BL-EN	Output	Backlight Enable Control
5	VCC	Power	12V Output
6	VCC	Power	12V Output

16 Built-in Power Interface 6P-2.54 (CON17)

Pin No.	Definition	Property	Description
1	STB	Output	Switch Signal
2	ST-5V	input	5Vinput
3	GND	Ground	Ground
4	GND	Ground	Ground
5	VCC	Power	12Vinput
6	VCC	Power	12Vinput

LVDS interface (CON15)

Pin No.	Definition	Property	Description
1	PVCC	Power Output	LCDPower Output, +3.3V/+5V/ +12V Optional, By setting Jumper on CN1
2			
3			
4	GND	Ground	Ground
5			
6			
7	RXO0-	Output	Pixel0 Negative Data (Odd)
8	RXO0+	Output	Pixel0 Positive Data (Odd)
9	RXO1-	Output	Pixel1 Negative Data (Odd)
10	RXO1+	Output	Pixel1 Positive Data (Odd)
11	RXO2-	Output	Pixel2 Negative Data (Odd)
12	RXO2+	Output	Pixel2 Positive Data (Odd)
13	GND	Ground	Ground
14	GND	Ground	Ground
15	RXOC-	Output	Negative Sampling Clock (Odd)
16	RXOC+	Output	Positive Sampling Clock (Odd)
17	RXO3-	Output	Pixel3 Negative Data (Odd)
18	RXO3+	Output	Pixel3 Positive Data (Odd)
19	RXE0-	Output	Pixel0 Negative Data (Even)
20	RXE0+	Output	Pixel0 Positive Data (Even)
21	RXE1-	Output	Pixel1 Negative Data (Even)
22	RXE1+	Output	Pixel1 Positive Data (Even)
23	RXE2-	Output	Pixel2 Negative Data (Even)
24	RXE2+	Output	Pixel2 Positive Data (Even)
25	GND	Ground	Ground
26	GND	Ground	Ground
27	RXEC-	Output	Negative Sampling Clock (Even)
28	RXEC+	Output	Positive Sampling Clock (Even)
29	RXE3-	Output	Pixel3 Negative Data (Even)
30	RXE3+	Output	Pixel3 Positive Data (Even)

MIPI LCD Panel Signal (CN2)

Pin	Symbol	Function
1	NC	No connection
2	VDD	Power supply VDDIN=3.3V
3	VDD	Power supply VDDIN=3.3V
4	GND	Ground
5	RESET	Global reset Signal(3.3)
6	NC	No connection
7	GND	Ground
8	D0N	0- MIPI Differential data
9	D0P	0+MIPI Differential data
10	GND	Ground
11	D1N	1- MIPI Differential data
12	D1P	1+MIPI Differential data
13	GND	Ground
14	CLKN	-MIPI Differential clock data
15	CLKP	+MIPI Differential clock data
16	GND	Ground
17	D2N	2- MIPI Differential data
18	D2P	2+MIPI Differential data
19	GND	Ground
20	D3N	3- MIPI Differential data
21	D3P	3+MIPI Differential data
22	GND	Ground
23	NC	No connection
24	NC	No connection
25	GND	Ground
26	NC	No connection
27	NC	No connection
28	NC	No connection
29	NC	No connection
30	GND	Ground
31	LED-	LED Cathode
32	LED-	LED Cathode
33	NC	No connection
34	NC	No connection
35	NC	No connection
36	NC	No connection
37	NC	No connection
38	NC	No connection

39	LED+	LED Anode
40	LED+	LED Anode

◆ **EDP Interface 2*10P-2.0(CON25)**

Pin No.	Definition	Property	Description
1	PVCC	Power	LCD Power Output, +3.3V/+5V/ +12V Optional , by Setting CN5
2		Output	
3	GND	Ground	Ground
4			
5	D0N	Output	Negative Data
6	D0P	Output	Positive Data
7	D1N	Output	Negative Data
8	D1P	Output	Positive Data
9	D2N	Output	Negative Data
10	D2P	Output	Positive Data
11	D3N	Output	Negative Data
12	D3P	Output	Positive Data
13	GND	Ground	Ground
14	GND	Ground	Ground
15	AUXN	Output	Negative Data
16	AUXP	Output	Positive Data
17	GND	Ground	Ground
18	GND	Ground	Ground
19	GND	Ground	Ground
20	HPD	Output	Hot plug detect output, Open drain.

◆ **V-BY-ONE 51P-0.5 interface (J11)**

Pin	Symbol	Function
1	GND	Ground
2	M2-D3P	8th Pixel Positive V by One differential data input Lan 7.
3	M2-D3N	8th Pixel Negative V by One differential data input Lan 7.
4	GND	Ground
5	M2-D2P	7th Pixel Positive V by One differential data input Lan 6.
6	M2-D2N	7th Pixel Negative V by One differential data input Lan 6.
7	GND	Ground
8	M2-D1P	6th Pixel Positive V by One differential data input Lan 5.

9	M2-D1N	6th Pixel Negative V by One differential data input Lan 5.
10	GND	Ground
11	M2-D0P	5th Pixel Positive V by One differential data input Lan 4.
12	M2-D0N	5th Pixel Negative V by One differential data input Lan 4.
13	GND	Ground
14	M1-D3P	4th Pixel Positive V by One differential data input Lan 3.
15	M1-D3N	4th Pixel Negative V by One differential data input Lan 3.
16	GND	Ground
17	M1-D2P	Third Pixel Positive V by One differential data input Lan 2.
18	M1-D2N	Third Pixel Negative V by One differential data input Lan 2.
19	GND	Ground
20	M1-D1P	Second Pixel Positive V by One differential data input Lan 1.
21	M1-D1N	Second Pixel Negative V by One differential data input Lan 1.
22	GND	Ground
23	M1-D0P	First Pixel Positive V by One differential data input Lan 0.
24	M1-D0N	First Pixel Negative V by One differential data input Lan 0.
25	GND	Ground
26	LOCK	Lock detect output, Open drain.
27	HPD	Hot plug detect output, Open drain.
28	NC	No connection
29	NC	No connection
30	NC	No connection
31	NC	No connection
32	NC	No connection
33	NC	No connection
34	NC	No connection
35	NC	No connection
36	NC	No connection
37	NC	No connection
38	NC	No connection
39	GND	Ground
40	GND	Ground
41	GND	Ground
42	GND	Ground
43	NC	No connection
44	NC	No connection
45	VCC	Power supply VCC= +12V
46	VCC	Power supply VCC= +12V
47	VCC	Power supply VCC= +12V
48	VCC	Power supply VCC= +12V

49	VCC	Power supply VCC= +12V
50	VCC	Power supply VCC= +12V
51	VCC	Power supply VCC= +12V

eDP interface (CN3)

Pin	Symbol	Function
1	APS_EN	APS on/off or No connection (optional)
2	H_GND	High Speed Ground
3	Lane1_N	Complement Signal Link Lane 1
4	Lane1_P	True Signal Link Lane 1
5	H_GND	High Speed Ground
6	Lane0_N	Complement Signal Link Lane 0
7	Lane0_P	True Signal Link Lane 0
8	H_GND	High Speed Ground
9	AUX_CH_P	True Signal Auxiliary Channel
10	AUX_CH_N	Complement Signal Auxiliary Channel
11	H_GND	High Speed Ground
12	LCD_VCC	LCD logic and driver power
13	LCD_VCC	LCD logic and driver power
14	LCD_Self_Test	LCD Panel Self-Test Enable
15	LCD_GND	LCD logic and driver ground
16	LCD_GND	LCD logic and driver ground
17	HPD	Hot Plug Detect
18	BL_GND	Backlight Ground
19	BL_GND	Backlight Ground
20	BL_GND	Backlight Ground
21	BL_GND	Backlight Ground
22	BL_ENABLE	Backlight on/off
23	BL_PWM_DIM	System PWM Signal input for dimming
24	NC (WPN)	Reserved for the use by LCD manufacturer (WPN)
25	NC	No connection
26	BL_PWR	Backlight power
27	BL_PWR	Backlight power
28	BL_PWR	Backlight power
29	BL_PWR	Backlight power
30	NC	CLR_EN on/off or No connection (optional)

Other Standard Interface and their Functions

storage interface	TF Card Slot	Data storage, support up to 128G
	USB	HOST interface, support Data storage, Data import, USB Mouse, USB Keyboard, Camera, Touch-control Panel, Etc.

Ethernet interface	RJ45 interface	Support Wire Network
HDMI interface	standard interface	Support HDMI Data Output, support up to 4K
TF	standard interface	TF 128G

4.1: Electricity Property

Item		Min.	Typical	Max
PowerVoltage	Voltage	--	12	--
	Wave	--	--	50mV
Current output (HDMI Output,without other device connected)	Work Current	--	250mA	300mA
	Stand-by Current	--	10uA	5mA
	USB Current Output	--	--	500mA
	LCD Panel Current Output	--	--	1A
Work Enviroment	Relative Humidity	--	--	80%
	Work Temperature	-20°C	--	70°C

Caution 1: When connecting to the LVDS LCD Panel, it is necessary to pay attention to selecting the correct backlight working Voltage 3.3V, 5V, 12V. Users should not apply it to peripherals that exceed the corresponding Max current

Part 5

5.1: Cautions for Assembling

- During assembly and use, please pay attention to the following (and not limited to) problems.
- Short circuit problem between bare board and peripherals.
- during the installation and fixation process, avoid deformation problems of the bare board due to fixation.
- To install the LVDS LCD Panel, pay attention to whether the LCD Panel Voltage and current are correct. Pay attention to the direction of pin 1 of the LCD Panel Interface.
- To Install the LVDS LCD Panel, pay attention to whether the LCD Panel backlight Voltage and current are correct. When LCD Panel backlight power is above 20W, please use external Power boards for power supply.
- To Install peripherals (USB, IO), pay attention to the peripheral IO level and current Output issues.
- To Install Device to the serial port, pay attention to whether the RS232, 485 device is directly connected, and whether the TX and RX connected correctly.
- Check whether Input Power is connected to the Power Input interface. check whether Power Voltage and current meet the requirements, according to the total peripheral evaluation
- It is forbidden to connect the power supply to the backlight socket for the convenience of operation.