Datasheet of Development Board

Model: DP02

Document changes history

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Chapter	1 Overview	3
1.1	Product scope	3
1.2	Product overview	3
1.3	Product Features	3
1.4	Interface Diagram	4
Chapter	2 Basic parameters	5
Chapter	3 Dimension & layout of PCB	6
3.1	Dimension of PCB	6
3.2	Interface parameter	6
3.2.1	USB2.0 holder (4pin/2.0mm)	6
3.2.2	BAT2 RTC interface (2pin/2.0mm)	6
3.2.3	Speaker interface (2pin/2.0mm*2)	7
3.2.4	IR_IN (3pin/2.0mm)	7
3.2.5	Backlight Control Interface (6pin/2.0mm)	8
3.2.6	Interface of LVDS screen (15*2pin/2.0mm)	8
3.2.7	USB3.0 Interface (30pin/2.0mm_15*2)	9
3.2.8	Serial Port Socket Interface of Debug (4pin/1.25mm)	
3.2.9	LAN/Power/IO Extension/USB_OTG (30pin/2*15/2.0mm)	
3.2.10	Phone receiver (RJ11)	
3.2.12	L On-board Boost Interface(6pin/0.5mm)	
3.2.12	2 KEY/MIC/Earphone(30P/2*15/2.0MM)	
3.2.13	POE Module	
3.2.14	Other Standards and Features	
Chapter	4 Electrical Performance	15
Chapter	5 Precautions of use	16

Catalogue

Chapter 1 Overview

1.1 Product scope

DP02 1.0 is a motherboard designed for self-service terminals used in commercial displays. It's powered by an advanced RK3399 chip that utilizes a 48nm process to deliver high performance while consuming less power. This chip is versatile and can be used in a wide range of intelligent display, video, industrial automation, and computing terminals, such as digital signage, advertising machines, smart retail terminals, and industrial control hosts, to name a few. It's a powerful and flexible solution that can be used in a variety of applications.

1.2 Product overview

DP02 1.0 is equipped with a powerful six-core processor, the Rockchip RK3399, which comprises two Cortex-A72 cores and four Cortex-A53 cores. It runs on the Android 12.0 operating system, with a clock speed of up to 2.0 GHz, and boasts a rich set of interfaces. The Mali-G610 MP4 GPU and support for hardware decoding of H.264/H.265/VP9 up to 4Kx2K@60fps make it a top performer, ideal for applications involving human-machine interaction and industrial control.

1.3 Product Features

- High integration, combining HDMI/HDMI IN/LVDS/eDP/WIFI/BT interfaces in a sleek, minimalist design.
- A wide range of expansion interfaces, including five USB ports (two pin header USB 2.0, one standard USB OTG-A port, and two USB 3.0), and one serial port, making it compatible with a variety of peripherals in the market.
- Support for triple display, with a maximum resolution of 1920x1200 for LVDS screens and 4K@60 Hz for HDMI screens, with a maximum resolution of 3840x2160.
- Support for customizing the Android system, with system call interface API reference code provided to fully support customer upper-layer APP development. Perfect support for a variety of mainstream touch screens, including infrared, optical, capacitive, resistive, and touch films. HID configuration for driver-free touch screens is supported without the need for debugging.

1.4 Interface Diagram



Photo Disclaimer

The above photos were taken of a batch of our company's products. As the product is continuously maintained, the actual shipped motherboard may not be exactly the same as the one shown in the photos.

Chapter 2 Basic parameters

Main parameters				
PCBA size	168mm * 85mm			
CPU	Rockchip RK3399: Dual-core Cortex-A72, Quad-core Cortex-A53			
Operating system	Android 12.0			
Dram/Storage	4G / 64G			
HDMI output	x1: Standard Type-A female socket, supports up to 4K@60Hz resolution			
LVDS output	x1: Support single/dual 8bit, it directly drives 50/60Hz LCD screen			
Video format support	mp4、 mkv、 wmv、 mov、 flv etc.			
Image format support	BMP、JPEG、 PNG、 GIF			
Audio input/output	Speaker output (support left and right channel output, maximum support dual 20W / 4R, 10W / 8R)			
USB interface	USB OTG(Type-C) *1, USB HOST *2, USB3.0 *2			
Serial port	x1			
network support	WIFI 2.4G/5G/BT (Need to specify)			
RTC real time clock	Support			
System Upgrade	Local USB OTA			

Chapter 3 Dimension & layout of board

3.1 Dimension of PCB



PCB: Six layers, thickness: 1.6mm PCBA: L * W=168mm*85mm Screw holes size: ∮3.2mm x 4

3.2 Interface parameter

3.2.1 USB2.0 holder (4pin/2.0mm)

The electrical definition is as follows

No.	Definition	Property		Remarks
1	5V	5VPower	5VInput	First pin
2	DM	Data-	Data-	SB2.0
3	DP	Data+	Data+	
4	GND	Ground	Ground	

3.2.2 BAT2 RTC interface (2pin/2.0mm)

It adopts a Wafer socket interface with a 2-pin 1.25mm pitch, which is used to provide power to the system clock when the power is cut off.

No.	Definition	Property	1	Remarks
1	GND	GND	GND	First pin
2	VCC_BAT	Power	Power	RT ST

3.2.3 Speaker interface (2pin/2.0mm*2)

The	electrical	definition	is	as follows
11IC	ciccuicai	actinition	15	45 10110115

No.	Definition	Property		Remarks
1	L+/L-	Power	5VOutput	
2	R+/R-	Input/Output	DM	First pin S0 ∀0 XXdS TXdS

3.2.4 IR_IN (3pin/2.0mm)

No.	Definition	Property		Remarks
1	IR_IN	Infrared signal in	3.3V	
2	GND	LED output control	LED_R	
3	3.3 VCC	LED output control	LED_G	First pin

3.2.5 Backlight Control Interface (6pin/2.0mm)

This is used for controlling the backlight of LVDS and eDP/V-by-one screens. The 12V power supply current should not exceed 1.5A. When using screens larger than 19 inches or with backlight power above 20W, it is recommended to take the backlight power from another power board to avoid system instability. The 12V power in this socket can only be used as a backlight power output and cannot be used as a power input for the system.

No.	Definition	Property		Remarks
1	VCC	Power	12V output	
2	VCC	Power	12V	. MAR
3	BL-EN	Output	backlight on/off control	First pin
4	BL-ADJ	Output	Backlight Brightness Control	
5	GND	Ground	Ground	
6	GND	Ground	Ground	

3.2.6 Interface of LVDS screen (15*2pin/2.0mm)

This is the definition of the general LVDS interface, which supports single/dual, 6/8-bit, 1080P LVDS screens. The screen voltage can be selected through a jumper cap and supports 3.3V/5V/12V screen power supply.

To avoid damaging the board and the screen, please pay attention to the following points:

1. Confirm that the screen power supply voltage specified in the screen datasheet is correct and that the board's corresponding power can meet the maximum current required by the screen.

2. Use a multimeter to confirm that the selected power via the jumper cap is correct.

3. When connecting the screen wires of the 6/8-bit LVDS screen, install the connector close to the pin1 end.

No.	Definition	Property	Remarks	
1				
2	PVCC	Power Output	LCD Power Output, +5V/ +12V optional	505 mm 1205
3				
4				<u> </u>
5	GND	Ground	Ground	e e
6				
7	0-VN0	Output	Pixel0 Negative Data (Odd)	
8	0-VP0	Output	Pixel0 Positive Data (Odd)	First pin
9	0-VN1	Output	Pixel1 Negative Data (Odd)	Σ
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	Ground
14	GND	Ground	Ground
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	Ground
26	GND	Ground	Ground
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)

3.2.7 USB3.0 Interface (30pin/2.0mm_15*2)

This interface is a common eDP screen interface, in the form of a 35-pin FPC connector, and supports 12V screen power supply.

To avoid damaging the board and the screen, please pay attention to the following points:

1. Confirm that the screen power supply voltage specified in the screen datasheet is correct and that the board's corresponding power can meet the maximum current required by the screen.

No.	Definition	Property	Remarks	
1	1.8V	1.8VPower	1.8VPower	C
2	PWR-KEY	Button Input	Button Input	
3	GND	Ground	Ground	с <u>-</u> ,
4	GND	Ground	Ground	
5	USBHP3+_E	DP+	USBData+	
6	USBHP3E	DP-	USBData-	6
7	GND	Ground	Ground	
8	GND	Ground	Ground	
9	SSRX3+_E	Input	USB3.0InputData+	nd pin irst pir
10	SSRX3E	Input	USB3.0InputData-	E Seco

2. The electrical definition of the screen interface is as follows:

11	GND	Ground	Ground	
12	GND	Ground	Ground	
13	SSTX3+_E	Output	USB3.0OutputData+	
14	SSTX3E	Output	USB3.0OutputData-	
15	GND	Ground	Ground	
16	GND	Ground	Ground	
17	USBHP4+_E	DP+	USB Data+	
18	USBHP4E	DP-	USB Data-	
19	GND	Ground	Ground	
20	GND	Ground	Ground	
21	SSTX4+_E	Output	USB3.0OutputData+	
22	SSTX4+_E	Output	USB3.0OutputData-	
23	GND	Ground	Ground	
24	GND	Ground	Ground	
25	SSRX4+_E	Input	USB3.0InputData+	
26	SSRX4E	Input	USB3.0InputData-	
27	GND	Ground	Ground	
28	GND	Ground	Ground	
29	VCC5V	5V	5VPower	
30	VCC5V	5V	5VPower	

3.2.8 Serial Port Socket Interface of Debug (4pin/1.25mm)

The board defaults to two sets of standard RS232 serial ports, which can support commonly used RS232 serial devices on the market. Please note the following:

1. Make sure that the serial port voltage matches the device, and do not connect TTL or RS485 serial devices directly.

2. Check if the TX and RX connections are correct.

No.	Definition	Property		Remarks
1	GND	Ground	Ground	
2	PC232-TX	Output	232-TX	
3	PC232-RX	Input	232-RX	First pin
4	VCC3.3	Power	Power	

3. The serial port node information is ttys6 and ttys7.

3.2.9 LAN/Power/IO Extension/USB_OTG (30pin/2*15/2.0mm)

Definition

No.	Definition	Property	Remarks	
1	12V	12VInput	12VInput	
2	12V	12VInput	12VInput	-
3	12V	12VInput	12VInput	
4	12V	12VInput	12VInput	
5	IO_IN	IO port	IO port	
6	IO_IN	IO port	IO port	
7	5V_VCC	5VOutput	5VOutput	
8	3.3V_VCC	3.3VOutput	3.3VOutput	
9	Ethernet light	Ethernet light Output	Ethernet light Output	
10	Ethernet light	Ethernet light Output	Ethernet light Output	
11	GND	Ground	Ground	SB2.
12	GND	Ground	Ground	
13	DD+	Network signal 4+	Network signal 4+	ET/F
14	DD-	Network signal 4-	Network signal 4-	WO
15	GND	Ground	Ground	Я. San Handa Ha На на
16	GND	Ground	Ground	
17	DC+	Network signal 3+	Network signal3+	ond pin Tirst pin
18	DC-	Network signal3-	Network signal3+	Secc
19	GND	Ground	Ground	_
20	GND	Ground	Ground	
21	DB+	Network signal2+	Network signal2+	-
22	DB-	Network signal2-	Network signal2-	
23	GND	Ground	Ground	
24	GND	Ground	Ground	_
25	DA+	Network signal1+	Network signal1+	_
26	DA-	Network signal1-	Network signal1-	
27	GND	Ground	Ground	
28	GND	Ground	Ground	

29	USB_OTG_D M	USB_OTG_DM	USB upgrade DM signal
30	USB_OTG_D P	USB_OTG_DP	USB upgrade DM signal

3.2.10 Phone receiver (RJ11)

The electrical definition of the RJ11 I2C interface on the board is as follows:

No.	Definition	Property	Remarks	
1	MIC_IN	Microphone Input	3.3VOutput	第一脚
2	GND	Ground	Ground	
3	SPK_OUT_R	Speaker	Vol+	MIC/SDK
4	SPK_OUT_L	Speaker	Vol-	MIC/SPK
5	IO_IN	IO interface Input	IO interface Input	
6	GND	Ground	Ground	

3.2.11 On-board Boost Interface (6pin/0.5mm)

The on-board boost interface has a 12V input and can output 30V-60V, with a current range of 220-600mA, adjustable according to the electrical parameters of the connected screen. The electrical definition of the interface is as follows:

No.	Definition	Property	Remarks	
1	GND	Ground	Ground	
2	GND	Ground	Ground	Eirst pin
3	VC+	Backlight power +	Backlight power +	
4	VC+	Backlight power +	Backlight power +	
5	VC-	Backlight power -	Backlight power -	
6	VC-	Backlight power -	Backlight power -	

3.2.12 KEY/MIC/Earphone (30P/2*15/2.0MM)

No.	Definition	Property	F	Remarks
1	GND	Ground	Ground	
2	GND	Ground	Ground	
3	HPOUT1L	LeftChannel1Outpu	LeftChannel1Output	
		t of earphone	of earphone	
4	HPOUT1R	RightChannel1Out	RightChannel1Output	
	CND	Cround	of earphone	
5	GND	Ground	Ground	
6	GND	Ground	Ground	
7	HPOUT2L	Left Channel 2 Output of	Left Channel 2 Output of	
		earphone	carphone	
8	HPOUT2R	Right Channel2	Right Channel 2 Output of	
		Output of	earphone	
0	CND	earphone	Ground	
9	GND	Ground	Ground	
10	GND	Ground	Ground	
11	MIC_IN	MIC_Input	MIC_Input	
12	GND	Ground	Ground	
13	GND	Ground	Ground	
14	GND	Ground	Ground	
15	Earphone	Earphone detection	Earphone detection	
	detection Input	Input	Input	and pin
16	GND	Ground	Ground	Sec
17	Upgrade Key	Upgrade key	Upgrade key	
18	GND	Ground	Ground	
19	LED1_Output	LED1_Output	LED1_Output	
20	LED2_Output	LED2_Output	LED2_Output	
21	GND	Ground	Ground	
22	GND	Ground	Ground	
23	3.3V	3.3VOutput	3.3VOutput	
24	KEY1	Input1	Key Input1	
25	GND	Ground	Ground	
26	KEY2	Key Input2	Key Input2	
27	GND	Ground	Ground	

28	GND	Ground	Ground
29	GND	Ground	Ground
30	Earphone detection	Earphone detection	Earphone detection Input
	Input	Input	

3.2.13 POE Module

Interfaces definition as follows:

No.	Definition	Property	Remarks	
1	VCC1+	POE+PowerInput	POE+PowerInput	
2	VCC1-	POE-PowerInput	POE-PowerInput	First nin
3	VCC2+	POE+PowerInput	POE+PowerInput	
4	VCC2-	POE-PowerInput	POE-PowerInput	POE
5	GND	Ground	Ground	
6	GND	Ground	Ground	
7	POE12V_OUT	POE12VOutput	POE12VOutput	
8	POE12V_OUT	POE12VOutput	POE12VOutput	

3.2.14 Other Standards and Features

USB interface	USB	HOST interface, data storage, data import, USB mouse and keyboard, camera, touch screen, etc.
Ethernet interface	RJ45 interface	No
HDMI interface	Standard interface	Support HDMI Data Output,maximum support 4Kx2K

Chapter 4 Electrical Performance

Item		Min.	Standard	Max.
	Voltage		12V	
Power parameter	Ripple			50mV
	Current		ЗА	
Power current	Working current		250mA	380mA
(HDMI Output, No peripheral device)	Standby current		22mA	30mA
Power current(LVDS)	5V working current		550mA	2A
	12V working current		580mA	2A
Power current (V-by-one)	-			
Total output	Current			ЗА
	Relative humidity			80%
Environment	Working temp.	- 10C		60°C
	Storage temp.	- 40 C		80°C

Note 1: When connecting an LVDS screen, be sure to select the correct screen operating voltage of 3.3V, 5V, or 12V to avoid damaging the screen.

Note 2: The overall operating current and standby current of the board when connecting an LVDS screen depend on the specific screen used and are not listed in the above table.

Chapter 5 Precautions of use



01

Please ensure that the board is not charged when installing or assembling peripheral devices. When installing, be sure to wear anti-static tools such as static bracelets to prevent electrostatic discharge.



02

When connecting peripheral devices using wires, please make sure that the pin definitions of each device match the corresponding sockets on the motherboard to avoid short circuits caused by incorrect wire connections.



When fixing the motherboard with screws, please ensure that the board is evenly stressed to avoid PCB open circuit caused by board deformation.



04 When ins

When installing interfaces that allow for voltage selection, such as LVDS or eDP, please ensure that the selected voltage is consistent with the specifications of the screen.



05

When installing peripherals (USB, UART, IO, etc.), please pay attention to the IO level and current output capability of the peripherals.



06

When installing serial ports, please pay special attention to the matching of the IO level and the corresponding connections of TX, RX, 485-A, and 485-B.



07 The selection of the input power supply should be evaluated based on the total

should be evaluated based on the total peripheral devices to determine whether the input voltage and total current can meet the requirements.



08

When designing the entire product, it is necessary to consider the height limitation and heat dissipation of the motherboard.