



LKD3399 开发板 产品手册 V1.0

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1 产品概述

1.1 产品描述

LKD3399 基于瑞芯微 RK3399 芯片平台精心设计的一款全功能开发板，由核心模块与底板组成。核心模块与底板的连接采用标准的 MXM3.0 卡边缘连接器，并通过 4 颗 M3 的螺丝固定，稳定可靠、易于安装和维护。

LKD3399 具有功能齐全、接口丰富、可扩展性强的特点，可以配合我司开发的各类型扩展配件使用，实现多种不同功能组合及扩展。该产品可供学习开发、功能评估、产品验证和批量生产。

LKD3399 支持 Android 和 Linux 系统，为用户开放系统源码。用户可基于此款产品二次开发和定制。我司为开发者和企业用户提供全方位的技术支持，使其高效的完成研究开发工作。

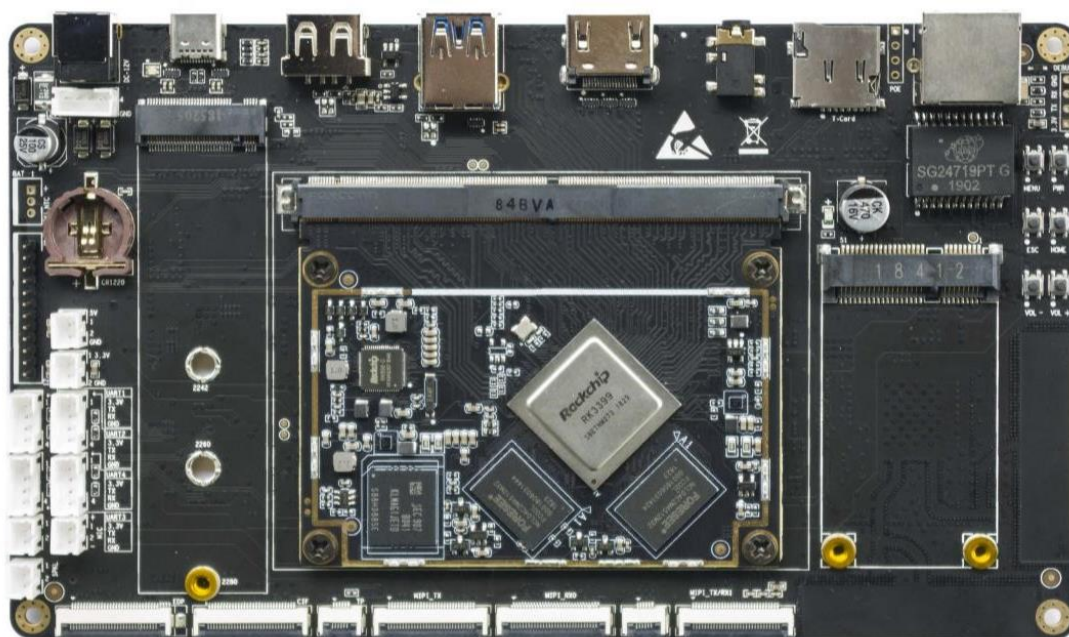


图 1-1

1.2 功能概要

- 多种供电方式：DC 9-18V ， 双锂电池串联，type-C，POE 802.3at；
- 多种接口显示屏输出：HDMI，DP，eDP，MIPI，可支持多屏异显；
- 双摄像头输入，最大 13M；

- 板载双频 WIFI，支持 802.11 a/b/g/n/ac 协议，板载双路 wifi 天线，也可跳接外置天线；
- 板载千兆以太网，可支持 802.3at 协议 POE 供电；
- 板载 mipi PCIE 接口，可外接 LTE 模块；
- 板载 M2 接口，可外接 NVMe 协议 SSD；
- 支持 4 路 UART 接口；
- 可扩展支持 6 MIC 阵列实现远场语音识别；
- 可扩展支持 HDMI 输入，多路 USB 摄像头输入，多路远距离 AHD 摄像头输入；
- 可扩展支持双路 LVDS 输出，RGB 输出，VGA 输出；
- 可扩展支持 RS232，RS485 接口；
- 支持 Android，Linux，Ubuntu 多种 OS；

1.3 产品框图

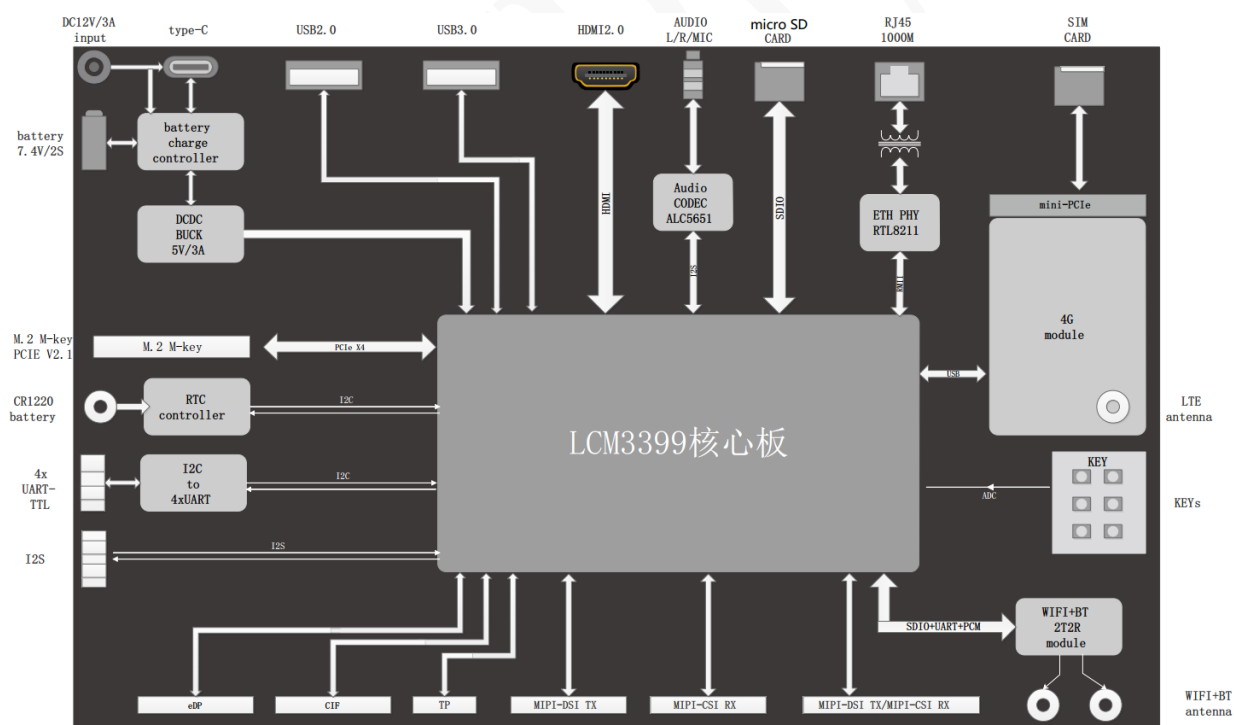


图 1-2

2 外观和尺寸

2.1 产品外观

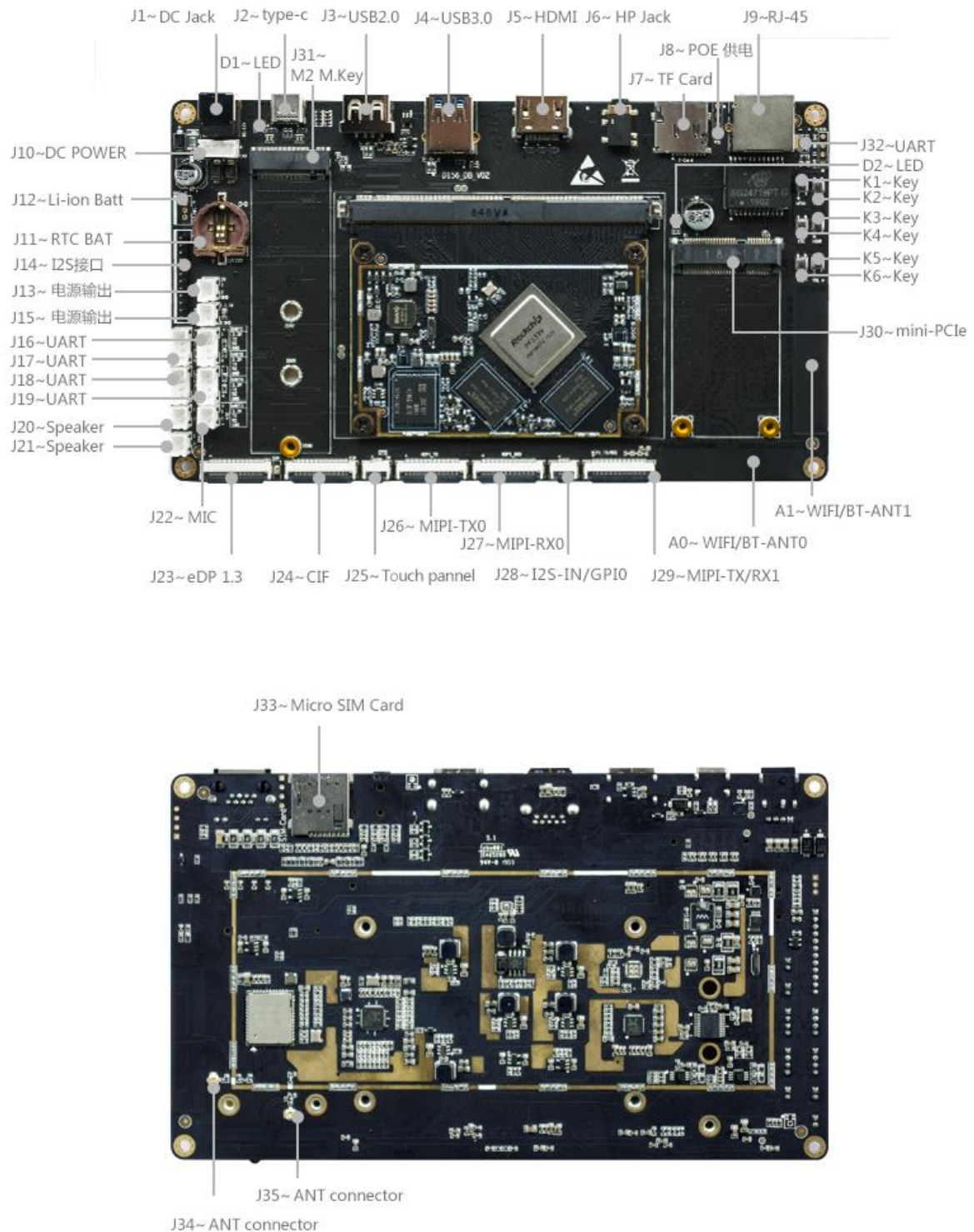


图 2-1

2.2 产品尺寸

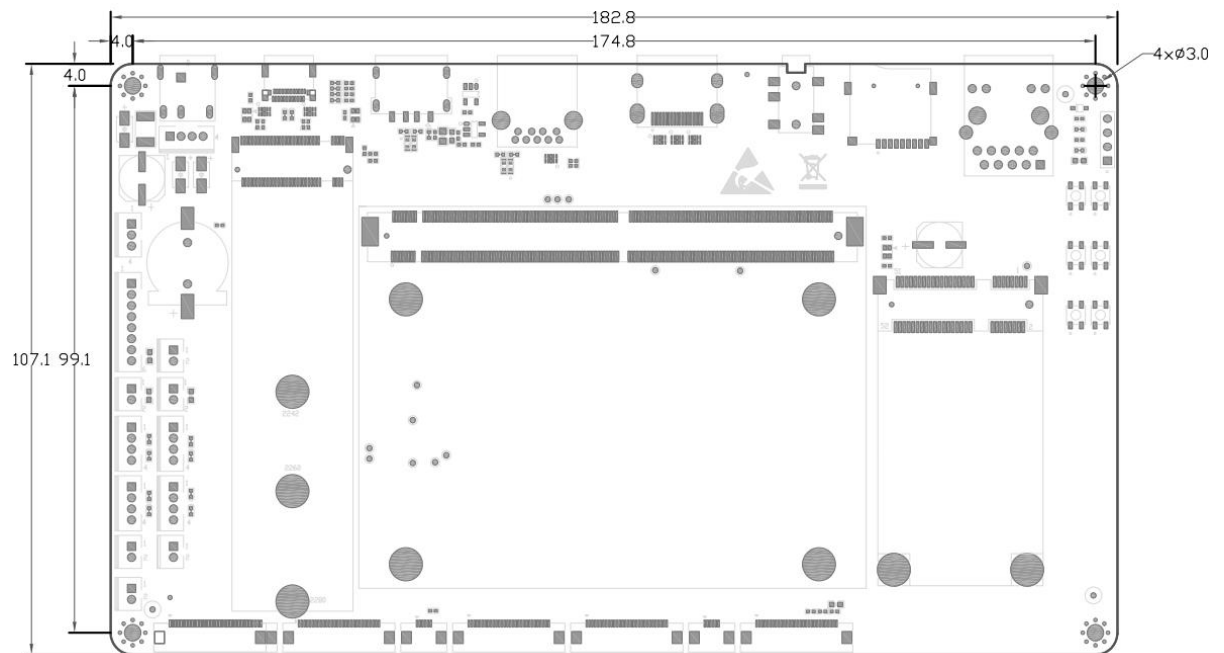


图 2-2

3 产品参数

表 3-1

Function	Description
CPU	RK3399, 28 nm HKMG, Big cluster with dual-coreCortex-A72 + little cluster with quad-core Cortex-A53
GPU	Mali- T860 MP4, OpenGL ES1.1/2.0/3.0/3.1/3.2, OpenCL1.2, DirectX11.1
VPU	4K VP9 and 4K H265 up to 60fps video decoding 1080P@60fps multi-format video decoding (MVC, mpeg-1/2/4, VC-1) 1080P video encoding, with h.264, MVC and VP8 format supported Video anti-cross, de-noising, edge/detail/color optimization supported
DDR	LPDDR4, 2GB/4GB(Optional)
eMMC	eMMC 5.1, 8GB/16GB/32GB/64GB/128GB(Optional)
PMU	RK808, Support a variety of power supply
Net work	10/100/1000Mbps Ethernet (Realtek RTL8211E) Wi-Fi 2.4GHz/5GHz,802.11a/b/g/n/ac, 2x2 MIMO, up to 867 Mbps (AP6356S) BT V4.1 with BLE supported 2G/3G/4G LTE module supported (optional)
Storage	MicroSD (TF) Card Compatible with SDIO3.0 PCIE V2.1 M.2 NGFF (M-KEY) with NVMe SSD optional
OS	Android / Ubuntu / Buildroot
PCB size	L* W (mm): 182.8 * 107.1 (PCB 1.6mm)
Screw size	φ3mm
Hardware Interface	
Power	DC12V - 2A (DC Jack 5.5*2.1mm / PH2.0 wafer connector) POE+ 802.3at standard (optional) Type-C USB (optional) 2S Li-ion battery (optional)
Type-C	USB3.0 OTG +USB2.0 HOST DisplayPort 1.2 up to 4K@60fps Power Delivery 2.0+ (optional)
USB	Type-A USB2.0 HOST + type-A USB3.0 HOST
Display	Type-A HDMI 2.0 up to 4K@60HZ Duel channel MIPI-DSI up to 2560*1600@60HZ eDP1.3 30pin 0.5mm pitch up to 1920*1080@60HZ DisplayPort 1.2 up to 4K@60fps

Audio	φ3.5mm earphone Jack with L/R audio out and Mic in 1x analog microphone or 2x digital microphone 1x HDMI audio out 2x 3W/4Ω speaker out with L/R channel 2x I2S, 8 channels RX for Mic array and 2 channels RX for HDMI in
Camera	2x MIPI-CSI interface with Dual-ISP built-in, and 2x 13Mpixel camera work the same time supported
PCIe	1x mini PCIe for 2G/3G/4G LTE module 1x M.2 M-key PCIE V2.1 for NVMe SSD
SD card	Compatible with SDIO 3.0 protocol, system boot up supported
SIM card	Micro sim slot for Mini-PCIe 4G LTE module
RJ-45	10/100/1000-Mbps data transfer rates
RTC	CR1220 battery socket, RTC power on and off supported
UART	4x UARTs and 1 Serial Console for debugging
Keys	6x keys (power, menu, esc, home, volume+/update, volume-)
Led	2x led, 1 RGB led and 1 white led
Power output	1x 5V-1A and 1x 3.3V-1A
Others	GPIO, I2C, SPI

4 接口定义

4.1 接口编号

表 4-1

Part reference	Part Name	Part Specifications	Part Description
J1	DC Jack	DC 5.5*2.1mm	Main power supply, DC12V – 2A
J2	Type-C USB	Type-C USB3.0 otg	USB3.0 otg, USB2.0 Host, DP1.2, PD2.0
J3	Type-A USB	Type-A USB2.0 host	USB2.0 host
J4	Type-A USB	Type-A USB3.0 host	USB3.0 host
J5	Type-A HDMI	Type-A HDMI2.0	HDMI 2.0 up to 4K@60HZ
J6	HP Jack	φ3.5mm 4-L Jack	L/R audio out and Mic in
J7	TF-card	MicroSD (TF) Card Slot	SDIO 3.0 protocol, system boot up supported
J8	POE	2.54mm pitch 4pin header	POE+ 802.3at standard
J9	RJ-45	Gigabit Ethernet	10/100/1000-Mbps data transfer rates
J10	DC-power	PH2.0mm pitch 4pin	DC12V-2A power in or out
J11	RTC-BAT	CR1220 socket	CR1220 battery used
J12	Li-ion BAT	PH2.0mm pitch 3pin wafer	2 serial Li-ion battery with NTC detect
J13	Power output	PH2.0mm pitch 2pin wafer	DC5V-1A output for external devices
J14	I2S interface	2.0mm pitch 12pin header	I2S with 8 channels RX for Mic array
J15	Power output	PH2.0mm pitch 2pin wafer	DC3.3V-1A output for external devices
J16	UART2	PH2.0mm pitch 4pin wafer	3.3V TTL serial port
J17	UART1	PH2.0mm pitch 4pin wafer	3.3V TTL serial port
J18	UART3	PH2.0mm pitch 4pin wafer	3.3V TTL serial port
J19	UART4	PH2.0mm pitch 4pin wafer	3.3V TTL serial port
J20	Speaker-R	PH2.0mm pitch 2pin wafer	3W/4Ω or 1.5W/8Ω speaker for right channel
J21	Speaker-L	PH2.0mm pitch 2pin wafer	3W/4Ω or 1.5W/8Ω speaker for left channel
J22	Mic	PH2.0mm pitch 2pin wafer	analog microphone input
J23	eDP	30pin 0.5mm pitch FPC connector	eDP1.3 up to 1920*1080@60HZ
J24	Cif	30pin 0.5mm pitch FPC connector	DVP, GPIO, I2C, SPI, 1.8V, 2.8V, 3.3V
J25	TP	6pin 0.5mm pitch FPC connector	I2C,RST,INT,3.3V for touch panel
J26	Mipi-TX0	30pin 0.5mm pitch FPC connector	MIPI-DSI 4lane, I2C, power, GPIO, for external displays
J27	Mipi-RX0	30pin 0.5mm pitch FPC connector	MIPI-CSI 4lane, I2C, power, GPIO, for external cameras or HDMI-IN
J28	I2S-IN	6pin 0.5mm pitch FPC connector	I2S-IN, GPIO,, for HDMI-IN used
J29	Mipi-TX/RX1	30pin 0.5mm pitch FPC connector	MIPI-DSI 4lane, I2C, power, GPIO, for external displays; MIPI-CSI 4lane, I2C, power, GPIO, for external cameras or HDMI-IN;

J30	Mini-PCIe	Mini-PCIe 52pin socket	For 2G/3G/4G LTE module used
J31	M.2 M-key	M.2 M-key 67pin socket	PCIE V2.1 for NVMe SSD
J32	SYS debug	2.54mm pitch header	UART for system debug
J33	Sim card	Micro Sim card slot	Micro push-to-push sim card
J34	Ant connector 0	I-PEX connector	For external 2.4GHZ/5GHZ WIFI/BT antenna
J35	Ant connector 0	I-PEX connector	For external 2.4GHZ/5GHZ WIFI/BT antenna
A0	Antenna 0	PCB board antenna	Internal 2.4GHZ/5GHZ WIFI/BT antenna
A1	Antenna 1	PCB board antenna	Internal 2.4GHZ/5GHZ WIFI/BT antenna
K1	key 1	push-button	Menu button
K2	key 2	push-button	power button
K3	key 3	push-button	home button
K4	key 4	push-button	esc button
K5	key 5	push-button	Volume + button
K6	key 6	push-button	Volume - button

4.2 pin 脚定义

4.2.1 DC-power (J10)

表 4-2-1

Pin number	Pin name	Voltage	GPIO name
1	Power in	12V	-
2	Power in	12V	-
3	GND	GND	-
4	GND	GND	-

4.2.2 Li-ion battery (J12)

表 4-2-2

Pin number	Pin name	Voltage	GPIO name
1	VBat+	7V-8.4V	-
2	NTC	-	-
3	VBat-	GND	-

4.2.3 5V Power output (J13)

表 4-2-3

Pin number	Pin name	Voltage	GPIO name
1	Power output	5V	-
2	GND	GND	-

4.2.4 I2S interface (J14)

表 4-2-4

Pin number	Pin name	Voltage	GPIO name
1	DC_3V output	3.0V	-
2	VCCA_1V8 output	1.8V	-
3	I2C1_SDA	1.8V	GPIO4_A1
4	I2C1_SCL	1.8V	GPIO4_A2
5	I2S0_SCLK	1.8V	GPIO3_D0
6	I2S0_WS	1.8V	GPIO3_D2
7	I2S0_SDI0	1.8V	GPIO3_D3
8	I2S0_SDI1	1.8V	GPIO3_D4
9	I2S0_SDI2	1.8V	GPIO3_D5
10	I2S0_SDI3	1.8V	GPIO3_6
11	I2S_MCLK	1.8V	GPIO4_A0
12	GND	GND	-

4.2.5 3.3V Power output (J15)

表 4-2-5

Pin number	Pin name	Voltage	GPIO name
1	Power output	3.3V	-
2	GND	GND	-

4.2.6 UART1 (J17)

表 4-2-6

Pin number	Pin name	Voltage	GPIO name
1	UART_3V3 output	3.3V	-
2	UART_TX	3.3V	-
3	UART_RX	3.3V	-
4	GND	GND	-

4.2.7 UART2 (J16)

表 4-2-7

Pin number	Pin name	Voltage	GPIO name
1	UART_3V3 output	3.3V	-
2	UART_TX	3.3V	-
3	UART_RX	3.3V	-
4	GND	GND	-

4.2.8 UART3 (J18)

表 4-2-8

Pin number	Pin name	Voltage	GPIO name
1	UART_3V3 output	3.3V	-
2	UART_TX	3.3V	-
3	UART_RX	3.3V	-
4	GND	GND	-

4.2.9 UART4 (J19)

表 4-2-9

Pin number	Pin name	Voltage	GPIO name
1	UART_3V3 output	3.3V	-
2	UART_TX	3.3V	-
3	UART_RX	3.3V	-
4	GND	GND	-

4.2.10 Speaker-R (J20)

表 4-2-10

Pin number	Pin name	Power	GPIO name
1	Speaker-R-P	3W-4Ω/1.5W-8Ω	-
2	Speaker-R-N	3W-4Ω/1.5W-8Ω	-

4.2.11 Speaker-L (J21)

表 4-2-11

Pin number	Pin name	Power	GPIO name
1	Speaker-L-P	3W-4Ω/1.5W-8Ω	-
2	Speaker-L-N	3W-4Ω/1.5W-8Ω	-

4.2.12 Mic (J22)

表 4-2-12

Pin number	Pin name	Power	GPIO name
1	Mic-P	2.8V	-
2	Mic-N	2.8V	-

4.2.13 eDP (J23)

表 4-2-13

Pin number	Pin name	Voltage	GPIO name
1	NC	-	-
2	GND	GND	-
3	EDP_TX1N	-	-
4	EDP_TX1P	-	-
5	GND	GND	-
6	EDP_TX0N	-	-
7	EDP_TX0P	-	-
8	GND	GND	-
9	EDP_AUXP	-	-
10	EDP_AUXN	-	-
11	GND	GND	-
12	LCD_VCC	3.3V	-
13	LCD_VCC	3.3C	-
14	NC	-	-
15	GND	GND	-
16	GND	GND	-
17	EDP_HPD	3.0V	GPIO4_C7
18	BL_GND	GND	-
19	BL_GND	GND	-
20	BL_GND	GND	-
21	BL_GND	GND	-
22	EDP_BL_EN	3.0V	GPIO4_D5
23	EDP_BL_PWM	3.0V	GPIO4_C6
24	NC	-	-
25	NC	-	-
26	BL_PWR	12V	-
27	BL_PWR	12V	-
28	BL_PWR	12V	-
29	BL_PWR	12V	-
30	NC	12V	-

4.2.14 Cif (J24)

表 4-2-14

Pin number	Pin name	Voltage	GPIO name
1	GND	GND	-
2	CIF_D0	1.8V	GPIO2_A0
3	CIF_D1	1.8V	GPIO2_A1

4	CIF_D2	1.8V	GPIO2_A2
5	CIF_D3	1.8V	GPIO2_A3
6	CIF_D4	1.8V	GPIO2_A4
7	CIF_D5	1.8V	GPIO2_A5
8	CIF_D6	1.8V	GPIO2_A6
9	CIF_D7	1.8V	GPIO2_A7
10	NC	-	-
11	NC	-	-
12	CIF_HREF	1.8V	GPIO2_B1
13	CIF_VSYNC	1.8V	GPIO2_B0
14	GND	GND	-
15	CIF_MCLK	1.8V	GPIO2_B3
16	GND	GND	-
17	CIF_PCLK	1.8V	GPIO2_B2
18	GND	GND	-
19	CIF_RST	1.8V	GPIO0_B5
20	CIF_PDN	1.8V	GPIO2_B4
21	I2C1_SDA	1.8V	GPIO4_A1
22	I2C1_SCL	1.8V	GPIO4_A2
23	VCC1V8_DVP	1.8V	-
24	I2C4_SCL	3.0V	GPIO1_B4
25	I2C4_SDA	3.0V	GPIO1_B3
26	VCC1V8_S3	1.8V	-
27	VCC1V8_S3	1.8V	-
28	VCC2V8_DVP	2.8V	-
29	VCC3V3_SYS	3.3V	-
30	VCC3V3_SYS	3.3V	-

4.2.15 TP (J25)

表 4-2-15

Pin number	Pin name	Voltage	GPIO name
1	VCC3V0_TOUCH	3.0V	-
2	I2C4_SCL	3.0V	GPIO1_B4
3	I2C4_SDA	3.0V	GPIO1_B3
4	TP_RST	3.0V	GPIO1_D0
5	TP_INT	3.0V	GPIO1_C4
6	GND	GND	-

4.2.16 Mipi-TX0 (J26)

表 4-2-16

Pin number	Pin name	Voltage	GPIO name
1	GND	GND	-
2	MIPI_TX0_D0P	-	-
3	MIPI_TX0_D0N	-	-
4	GND	GND	-
5	MIPI_TX0_D1P	-	-
6	MIPI_TX0_D1N	-	-
7	GND	GND	-
8	MIPI_TX0_CLKP	-	-
9	MIPI_TX0_CLKN	-	-
10	GND	GND	-
11	MIPI_TX0_D2P	-	-
12	MIPI_TX0_D2N	-	-
13	GND	GND	-
14	MIPI_TX0_D3P	-	-
15	MIPI_TX0_D3N	-	-
16	GND	GND	-
17	LCD_RST	1.8V	GPIO0_A2
18	LCD_PWR_EN	1.8V	GPIO1_A4
19	LCD_BL_EN	3.0V	GPIO4_D4
20	LCD_BL_PWM	3.0V	GPIO4_C2
21	I2C1_SDA	1.8V	GPIO4_A1
22	I2C1_SCL	1.8V	GPIO4_A2
23	VCC_1V8	1.8V	-
24	VCC3V3_SYS	3.3V	-
25	VCC3V3_SYS	3.3V	-
26	VCC_SYS	5V	-
27	VCC_SYS	5V	-
28	LCD_PWR	12V	-
29	LCD_PWR	12V	-
30	LCD_PWR	12V	-

4.2.17 Mipi-RX0 (J27)

表 4-2-17

Pin number	Pin name	Voltage	GPIO name
1	GND	GND	-
2	MIPI_RX0_D0P	-	-
3	MIPI_RX0_D0N	-	-
4	GND	GND	-
5	MIPI_RX0_D1P	-	-
6	MIPI_RX0_D1N	-	-
7	GND	GND	-

8	MIPI_RX0_CLKP	-	-
9	MIPI_RX0_CLKN	-	-
10	GND	GND	-
11	MIPI_RX0_D2P	-	-
12	MIPI_RX0_D2N	-	-
13	GND	GND	-
14	MIPI_RX0_D3P	-	-
15	MIPI_RX0_D3N	-	-
16	GND	GND	-
17	MIPI_MCLK0	24MHZ output	GPIO2_B3
18	GND	GND	-
19	MIPI_RST0	1.8V	GPIO0_A6
20	MIPI_PDN0	1.8V	GPIO4_A5
21	I2C1_SDA	1.8V	GPIO4_A1
22	I2C1_SCL	1.8V	GPIO4_A2
23	VCC1V8_DVP	1.8V	-
24	I2C4_SCL	3.0V	GPIO1_B4
25	I2C4_SDA	3.0V	GPIO1_B3
26	VCC1V8_S3	1.8V	-
27	VCC1V8_S3	1.8V	-
28	VCC2V8_DVP	2.8V	-
29	VCC3V3_SYS	3.3V	-
30	VCC3V3_SYS	3.3V	-

4.2.18 I2S-IN (J28)

表 4-2-18

Pin number	Pin name	Voltage	GPIO name
1	HDMIIN_STBY	3.0V	GPIO4_C5
2	HDMIIN_INT	1.8V	GPIO0_A1
3	I2S0_SCLK_HDMIIN	1.8V	-
4	I2S0_LRCK_RX_HDMIIN	1.8V	-
5	I2S0_SDIO_HDMIIN	1.8V	-
6	GND	GND	-

4.2.19 Mipi-TX/RX1 (J29)

表 4-2-19

Pin number	Pin name	Voltage	GPIO name
1	GND	GND	-
2	MIPI_TX1/RX1_D0P	-	-
3	MIPI_TX1/RX1_D0N	-	-

4	GND	GND	-
5	MIPI_TX1/RX1_D1P	-	-
6	MIPI_TX1/RX1_D1N	-	-
7	GND	GND	-
8	MIPI_TX1/RX1_CLKP	-	-
9	MIPI_TX1/RX1_CLKN	-	-
10	GND	GND	-
11	MIPI_TX1/RX1_D2P	-	-
12	MIPI_TX1/RX1_D2N	-	-
13	GND	GND	-
14	MIPI_TX1/RX1_D3P	-	-
15	MIPI_TX1/RX1_D3N	-	-
16	GND	GND	-
17	MIPI_MCLK1	24MHZ output	GPIO2_B3
18	GND	GND	-
19	MIPI_RST1	1.8V	GPIO0_B0
20	MIPI_PDN1	1.8V	GPIO2_D3
21	I2C1_SDA	1.8V	GPIO4_A1
22	I2C1_SCL	1.8V	GPIO4_A2
23	VCC1V8_DVP	1.8V	-
24	I2C4_SCL	3.0V	GPIO1_B4
25	I2C4_SDA	3.0V	GPIO1_B3
26	VCC1V8_S3	1.8V	-
27	VCC1V8_S3	1.8V	-
28	VCC2V8_DVP	2.8V	-
29	VCC3V3_SYS	3.3V	-
30	VCC3V3_SYS	3.3V	-

4.2.20 Mini-PCIE (J30)

表 4-2-20

Pin number	Pin name	Voltage	GPIO name
1	NC	-	-
2	VBAT_4G	3.3V	-
3	NC	-	-
4	GND	GND	-
5	NC	-	-
6	NC	-	-
7	NC	-	-
8	SIM_VDD	1.8V/3.0V	-
9	GND	GND	-
10	SIM_DATA	1.8V/3.0V	-
11	VDD_EXT	1.8V	-

12	SIM_CLK	1.8V/3.0V	-
13	NC	-	-
14	SIM_RST	1.8V/3.0V	-
15	GND	GND	-
16	NC	-	-
17	NC	-	-
18	GND	GND	-
19	NC	-	-
20	NC	-	-
21	GND	GND	-
22	4G_RESET_N	1.8V	-
23	NC	-	-
24	VBAT_4G	3.3V	-
25	NC	-	-
26	GND	GND	-
27	GND	GND	-
28	NC	-	-
29	GND	GND	-
30	NC	-	-
31	NC	-	-
32	NC	-	-
33	NC	-	-
34	GND	GND	-
35	GND	GND	-
36	4G-USB-DM	USB data -	-
37	GND	GND	-
38	4G-USB-DP	USB data +	-
39	VCC_4G	3.3V	-
40	GND	GND	-
41	VCC_4G	3.3V	-
42	LED_STATE	Network LED status	-
43	GND	GND	-
44	NC	-	-
45	NC	-	-
46	NC	-	-
47	NC	-	-
48	NC	-	-
49	NC	-	-
50	GND	GND	-
51	NC	-	-
52	VCC_4G	3.3V	-

4.2.21 SYS debug (J32)

表 4-2-21

Pin number	Pin name	Voltage	GPIO name
1	3V3 output	3.3V	-
2	UART2DBG_TX	3.0V	-
3	UART2DBG_RX	3.0V	-
4	GND	GND	-

5 扩展配件

基于 LKD3399 开发板，配合我司开发的扩展模块，可以扩展更多的功能。配件列表如下：

表 5-1

Module number	Module name	Module description	LBD3399 接口
LA-MID7	7 寸 mipi 屏	Mipi 接口，1024*600	J25(TP), J26(MIPI-TX0)
LA-MID8	8 寸 mipi 屏	Mipi 接口，800*1280	J25(TP), J26(MIPI-TX0)
LA-LV17	17.3 寸 lvds 屏	双 8 位 LVDS 接口，1920*1080	J26(MIPI-TX0)
LA-ED17	17.3 寸 eDP 屏	30 线 edp 接口，1920*1080	J23(eDP)
LA-MI2C	双摄像头转接板	双路 mipi 接口； 可选配我司 2M，5M，8M，13M 摄像头并同时接其中任意两颗。	J27 (MIPI-RX0) J29 (MIPI-TX/RX1)
LA-MIAH	AHD 摄像头转接板	2M 高清 AHD 摄像头，远距离传输	J27 (MIPI-RX0) J29 (MIPI-TX/RX1)
LA-USCV	CVBS 摄像头转接板	接模拟摄像头，远距离传输	USB 接口
LA-MIHD	HDMI 输入转接板	HDMI 输入	J27 (MIPI-RX0) J28 (I2S-IN)
LA-IOEX	GPIO 扩展板	GPIO/SPI/I2C 功能扩展	J24 (CIF)
LA-UDBG	UART 扩展板	系统调试，TTL 与 RS232 互转	J32 (SYS DEBUG)
LA-AMIC	MIC 阵列板	6 阵列 MIC 远场语音识别	J14 (I2S-interface)



图 5-1

6 应用场景

6.1 产品示例



智能零售



研发评估



功能验证



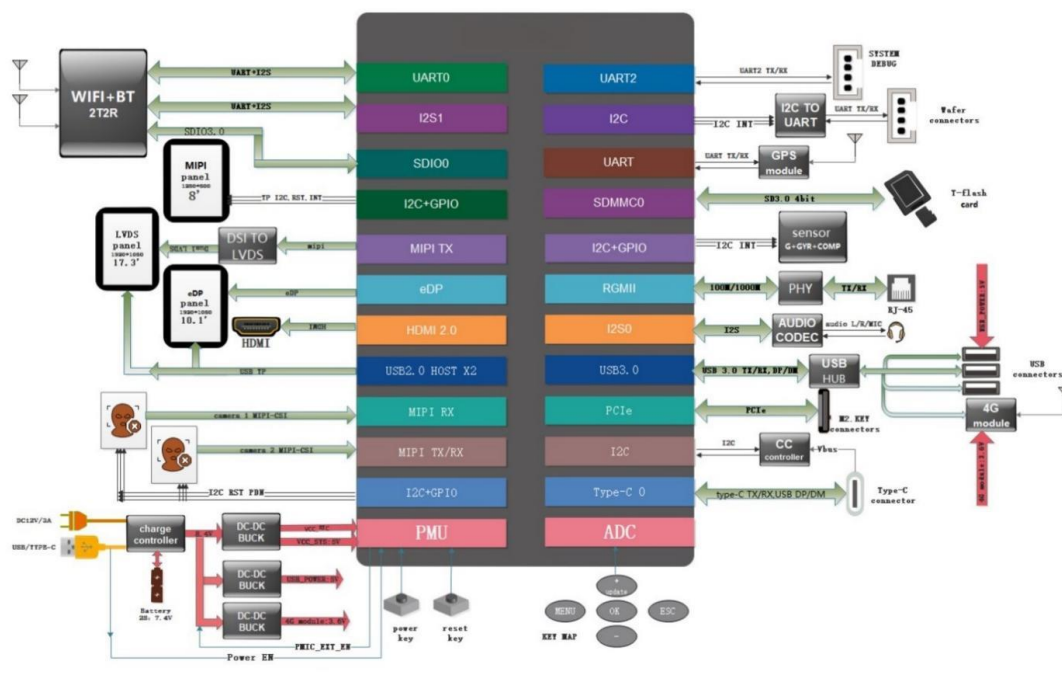
计算机视觉



商显设备

图 6-1

6.2 应用设计框图



7 支持与服务

7.1 技术支持

- 为客户提供开发相关的技术咨询；
- 为签约客户提供相关设计资料的检查工作；

7.2 售后服务

- 按照国家规定提供产品售后服务；
- 为客户提供个性化定制服务，如有任何需求，请联系我司；