

RDK Ultra Module Product Brief

v1.0

RDK Ultra Module，是一款面向生态开发者的高性能边缘计算平台。硬件接口兼容 Jetson Orin 系列开发板，方便用户快速集成和产品化落地。

概述



RDK Ultra Module 主要特性包括八核 Cortex® A55 处理器、96Tops 算力、最高 8GB 内存、支持 4K@60 帧视频编解；主要接口包括 HDMI、千兆以太网、USB 3.0、MIPI CSI、PCIe3.0 等。

RDK Ultra Module 板载 eMMC 容量包括 64GB。

规格

尺寸: 69.6 mm x 45 mm

CPU: 八核 Arm® Cortex® A55 64-bit @ 1.2GHz

BPU: 等效 96Tops

内存: 8GB LPDDR4@3200MT/s

存储: 64GB eMMC

外围接口:

- 1 x Gigabit Ethernet port
- 4 x USB 3.0 接口
- 15 x GPIOs
- 4 x UART/2 x SPI/2 x I2S/4 x I2C/2 x PWM/2 x LPWM /1 x CAN
- 3 x 1 (Gen3)PCIe

图像:

- 2 x 4-lane MIPI CSI 接口
- 2 x 2-lane MIPI CSI 接口

显示:

- 1 x HDMI 接口, 最大支持 1080p60

多媒体:

- 支持 H.265 编解码, 最大 4K@60 帧
- 支持 MJPEG 编解码

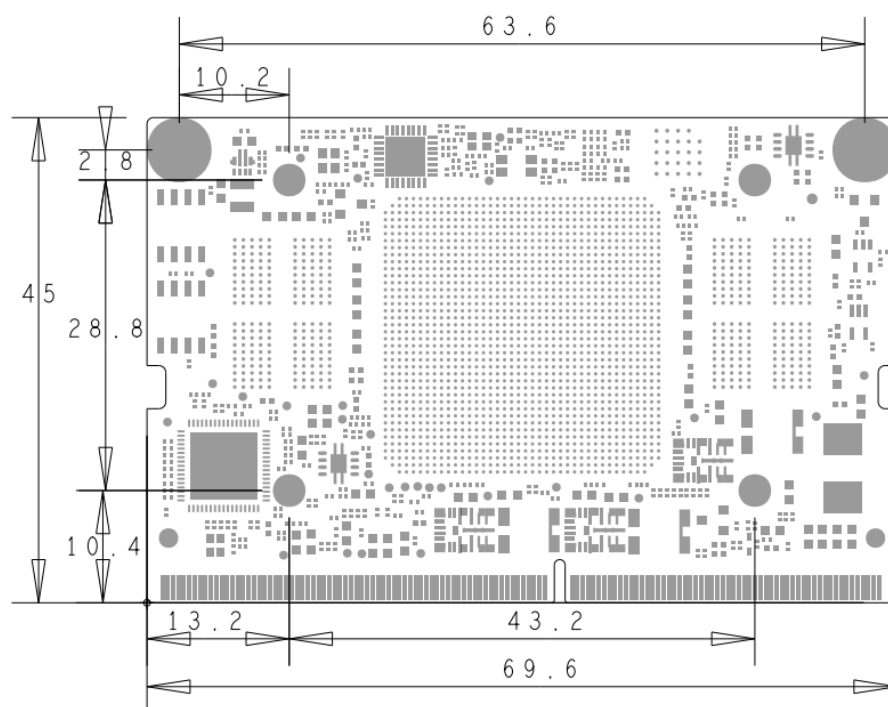
电源输入: 12V/5A DC

工作温度: -25 到 85°C

生命周期: 维持量产状态至少到 2028 年

详细规格说明, 请访问地平线开发者社区 <https://developer.horizon.cc/>

尺寸



Pinout 定义

Pin # Top Odd	Sign	Description
1	GND	Ground (0V)
3	CSI0_D2N	Input MIPI_CSI0 D2 negative
5	CSI0_D2P	Input MIPI_CSI0 D2 positive
7	GND	Ground (0V)
9	CSI1_CLKN	Input MIPI_CSI1 clock negative
11	CSI1_CLKP	Input MIPI_CSI1 clock positive
13	GND	Ground (0V)
15	CSI0_D3N	Input MIPI_CSI0 D3 negative
17	CSI0_D3P	Input MIPI_CSI0 D3 positive
19	GND	Ground (0V)
21	CSI2_D2N	Input MIPI_CSI2 D2 negative
23	CSI2_D2P	Input MIPI_CSI2 D2 positive
25	GND	Ground (0V)
27	CSI3_CLKN	Input MIPI_CSI3 clock negative
29	CSI3_CLKP	Input MIPI_CSI3 clock positive
31	GND	Ground (0V)
33	CSI2_D3N	Input MIPI_CSI2 D3 negative
35	CSI2_D3P	Input MIPI_CSI2 D3 positive
37	GND	Ground (0V)
39	USB1_RXN	USB3.0 Port1 RX negative
41	USB1_RXP	USB3.0 Port1 RX positive
43	GND	Ground (0V)
45	USB1_TXN	USB3.0 Port1 TX negative
47	USB1_TXP	USB3.0 Port1 TX positive
49	GND	Ground (0V)
51	USB2_RXN	USB3.0 Port2 RX negative
53	USB2_RXP	USB3.0 Port2 RX positive
55	GND	Ground (0V)
57	USB2_TXN	USB3.0 Port2 TX negative
59	USB2_TXP	USB3.0 Port2 TX positive
61	GND	Ground (0V)
63	HDMI_D2N	Output HDMI TX2 negative
65	HDMI_D2P	Output HDMI TX2 positive
67	GND	Ground (0V)
69	HDMI_D1N	Output HDMI TX1 negative
71	HDMI_D1P	Output HDMI TX1 positive
73	GND	Ground (0V)
75	HDMI_D0N	Output HDMI TX0 negative
77	HDMI_D0P	Output HDMI TX0 positive
79	GND	Ground (0V)
81	HDMI_CLKN	Output HDMI clock negative
83	HDMI_CLKP	Output HDMI clock positive

85	GND	Ground (0V)
87	GPIO0	typically a 1V8 signal, GPIO #0
89	SPI0_MOSI	typically a 1V8 signal, SPI 0 Master Out / Slave In
91	SPI0_SCLK	typically a 1V8 signal, SPI 0 Clock
93	SPI0_MISO	typically a 1V8 signal, SPI 0 Master In / Slave Out
95	SPI0_CS0	typically a 1V8 signal, SPI 0 Chip Select 0
97	SPI0_CS1	typically a 1V8 signal, SPI 0 Chip Select 1
99	UART0_TXD	typically a 1V8 signal, UART #0 Transmit
101	UART0_RXD	typically a 1V8 signal, UART #0 Receive
103	UART0_RTSN	typically a 1V8 signal, UART #0 Request to Send
105	UART0_CTSN	typically a 1V8 signal, UART #0 Clear to Send
107	GND	Ground (0V)
109	USB0_DN	USB2.0 Port0 negative
111	USB0_DP	USB2.0 Port0 positive
113	GND	Ground (0V)
115	USB1_DN	USB2.0 Port1 negative
117	USB1_DP	USB2.0 Port1 positive
119	GND	Ground (0V)
121	USB2_DN	USB2.0 Port2 negative
123	USB2_DP	USB2.0 Port2 positive
125	GND	Ground (0V)
127	GPIO4	typically a 1V8 signal, GPIO #4
129	GND	Ground (0V)
131	PCIE0_RXN	PCIe 0 Receive negative
133	PCIE0_RXP	PCIe 0 Receive positive
135	GND	Ground (0V)
137	NC	NORMAL CLOSE
139	NC	NORMAL CLOSE
141	GND	Ground (0V)
143	CAN_RX	typically a 3V3 signal, CAN Receive
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145	CAN_TX	typically a 3V3 signal, CAN Transmit
147	GND	Ground (0V)
149	NC	NORMAL CLOSE
151	NC	NORMAL CLOSE
153	GND	Ground (0V)
155	NC	NORMAL CLOSE
157	NC	NORMAL CLOSE
159	GND	Ground (0V)
161	USB0_RXN	USB3.0 Port0 RX negative
163	USB0_RXP	USB3.0 Port0 RX positive
165	GND	Ground (0V)
167	PCIE1_RXN	PCIe 1 Receive negative
169	PCIE1_RXP	PCIe 1 Receive positive
171	GND	Ground (0V)
173	PCIE1_CLKN	PCIe 1 Reference Clock negative

175	PCIE1_CLKP	PCIe 1 Reference Clock positive
177	GND	Ground (0V)
179	PCIE_WAKE	PCIe Wake. 51k Ω pull-up to 3V3 on the module
181	PCIE0_RST	PCIe 0/1/2 Reset. 4.7k Ω pull-up to 3V3 on the module.
183	PCIE1_RST	PCIe 0/1/2 Reset. 4.7k Ω pull-up to 3V3 on the module.
185	I2C0_SCL	General I2C 0 Clock. 2.2k Ω pull-up to 3V3 on the module.
187	I2C0_SDA	General I2C 0 Data. 2.2k Ω pull-up to 3V3 on the module.
189	I2C1_SCL	General I2C 1 Clock. 2.2k Ω pull-up to 3V3 on the module.
191	I2C1_SDA	General I2C 1 Data. 2.2k Ω pull-up to 3V3 on the module.
193	I2S0_DOUT	I2S Audio Port 0 Data Out
195	I2S0_DIN	I2S Audio Port 0 Data In
197	I2S0_FS	I2S Audio Port 0 Left/Right Clock
199	I2S0_SCLK	I2S Audio Port 0 Clock
201	GND	Ground (0V)
203	UART1_TXD	typically a 1V8 signal, UART #1 Transmit
205	UART1_RXD	typically a 1V8 signal, UART #1 Receive
207	UART3_TXD	typically a 1V8 signal, UART #3 Transmit
209	UART3_RXD	typically a 1V8 signal, UART #3 Receive
211	GPI09	typically a 1V8 signal, GPIO #9 or Audio Codec Master Clock
213	CAM_I2C_SDA	Camera I2C Clock. 2.2k Ω pull-up to 3V3 on the module.
215	CAM_I2C_SCL	Camera I2C Data. 2.2k Ω pull-up to 3V3 on the module.
217	MODULE_ID	10k Ω pull-up to VDD_IN on the module.
219	PCIE2_RST	PCIe 0/1/2 Reset. 4.7k Ω pull-up to 3V3 on the module.
221	PCIE2_CLKREQ	PCIe 2 Clock Request. 51k Ω pull-up to 3V3 on the module
223	NC	NORMAL CLOSE
225	NC	NORMAL CLOSE
227	USB3_DN	USB2.0 Port3 negative
229	USB3_DP	USB2.0 Port3 positive
231	GND	Ground (0V)
233	ShutDown_RQ	When driven/pulled low by the module, requests the carrier board to shut down. 4.7k Ω pull-up to VDD_IN on the module.
235	NC	NORMAL CLOSE
237	POWER_EN	Signal for module on/off: high level on, low level off. Connects to module Power Sequencer/PMIC EN0 through converter logic. POWER_EN is routed to a Schmitt trigger buffer on the module. A 100k Ω pulldown is also on the module.

239	SYS_RESET	Module Reset. Reset to the module when driven low by the carrier board. Used as carrier board supply enable when driven high by the module when module power sequence is complete. Used to ensure proper power on/off sequencing between module and carrier board supplies. 10k Ω pull-up to VDD_1V8 on the module.
241	GND	Ground (0V)
243	GND	Ground (0V)
245	GND	Ground (0V)
247	GND	Ground (0V)
249	GND	Ground (0V)
251	VDD_IN	Main power-12V $\pm$ 10%
253	VDD_IN	Main power-12V $\pm$ 10%
255	VDD_IN	Main power-12V $\pm$ 10%
257	VDD_IN	Main power-12V $\pm$ 10%
259	VDD_IN	Main power-12V $\pm$ 10%

Pin # Bottom Even	信号名	Description
2	GND	Ground (0V)
4	CSI0_D0N	Input MIPI_CSI0 D0 negative
6	CSI0_D0P	Input MIPI_CSI0 D0 positive
8	GND	Ground (0V)
10	CSI0_CLKN	Input MIPI_CSI0 clock negative
12	CSI0_CLKP	Input MIPI_CSI0 clock positive
14	GND	Ground (0V)
16	CSI0_D1N	Input MIPI_CSI0 D1 negative
18	CSI0_D1P	Input MIPI_CSI0 D1 positive
20	GND	Ground (0V)
22	CSI2_D0N	Input MIPI_CSI2 D0 negative
24	CSI2_D0P	Input MIPI_CSI2 D0 positive
26	GND	Ground (0V)
28	CSI2_CLKN	Input MIPI_CSI2 clock negative
30	CSI2_CLKP	Input MIPI_CSI2 clock positive
32	GND	Ground (0V)
34	CSI2_D1N	Input MIPI_CSI2 D1 negative
36	CSI2_D1P	Input MIPI_CSI2 D1 positive
38	GND	Ground (0V)
40	PCIE2_RXN	PCIe 2 Receive negative
42	PCIE2_RXP	PCIe 2 Receive positive
44	GND	Ground (0V)
46	PCIE2_TXN	PCIe 2 Transmit negative
48	PCIE2_TXP	PCIe 2 Transmit positive
50	GND	Ground (0V)
52	PCIE2_CLKN	PCIe 2 Reference Clock negative
54	PCIE2_CLKP	PCIe 2 Reference Clock positive

56	GND	Ground (0V)
58	USB3_RXN	USB3.0 Port3 RX negative
60	USB3_RXP	USB3.0 Port3 RX positive
62	GND	Ground (0V)
64	USB3_TXN	USB3.0 Port3 TX negative
66	USB3_TXP	USB3.0 Port3 TX positive
68	GND	Ground (0V)
70	CSI1_D0N	Input MIPI_CSI1 D0 negative
72	CSI1_D0P	Input MIPI_CSI1 D0 positive
74	GND	Ground (0V)
76	CSI1_D1N	Input MIPI_CSI1 D1 negative
78	CSI1_D1P	Input MIPI_CSI1 D1 positive
80	GND	Ground (0V)
82	CSI3_D0N	Input MIPI_CSI3 D0 negative
84	CSI3_D0P	Input MIPI_CSI3 D0 positive
86	GND	Ground (0V)
88	NC	NORMAL CLOSE
90	CSI3_D1N	Input MIPI_CSI3 D1 negative
92	CSI3_D1P	Input MIPI_CSI3 D1 positive
94	HDMI_CEC	Input HDMI0 CEC. 3V3 tolerant.
96	HDMI_HPD	Input HDMI hotplug. 3V3 tolerant.0: plug in
98	HDMI_SDA	Bidirectional HDMI SDA. 3V3 tolerant.
100	HDMI_SCL	Bidirectional HDMI SCL. 3V3 tolerant.
102	GND	Ground (0V)
104	SPI1_MOSI	typically a 1V8 signal, SPI 1 Master Out / Slave In
106	SPI1_SCLK	typically a 1V8 signal, SPI 1 Clock
108	SPI1_MISO	typically a 1V8 signal, SPI 1 Master In / Slave Out
110	SPI1_CS0	typically a 1V8 signal, SPI 1 Chip Select 0
112	SPI1_CS1	typically a 1V8 signal, SPI 1 Chip Select 1
114	CAM0_PWDN	typically a 1V8 signal, Camera 0 Powerdown or GPIO
116	CAM0_MCLK	typically a 1V8 signal, Camera 0 Reference Clock
118	GPIO1	typically a 1V8 signal, GPIO #1
120	CAM1_PWDN	typically a 1V8 signal, Camera 1 Powerdown or GPIO
122	CAM1_MCLK	typically a 1V8 signal, Camera 1 Reference Clock
124	GPIO2	typically a 1V8 signal, GPIO #2
126	GPIO3	typically a 1V8 signal, GPIO #3
128	GPIO5	typically a 1V8 signal, GPIO #5
130	GPIO6	typically a 1V8 signal, GPIO #6
132	GND	Ground (0V)
134	PCIE0_TXN	PCIe 0 Transmit negative
136	PCIE0_TXP	PCIe 0 Transmit positive
138	GND	Ground (0V)
140	NC	NORMAL CLOSE
142	NC	NORMAL CLOSE
144	GND	Ground (0V)
KEY		

146	GND	Ground (0V)
148	NC	NORMAL CLOSE
150	NC	NORMAL CLOSE
152	GND	Ground (0V)
154	NC	NORMAL CLOSE
156	NC	NORMAL CLOSE
158	GND	Ground (0V)
160	PCIE0_CLKN	PCIe 0 Reference Clock negative
162	PCIE0_CLKP	PCIe 0 Reference Clock positive
164	GND	Ground (0V)
166	USB0_TXN	USB3.0 Port0 TX negative
168	USB0_TXP	USB3.0 Port0 TX positive
170	GND	Ground (0V)
172	PCIE1_TXN	PCIe 1 Transmit negative
174	PCIE1_TXP	PCIe 1 Transmit positive
176	GND	Ground (0V)
178	MOD_SLEEP	typically a 1V8 signal, Module Sleep. When active (low), indicates module has gone to Sleep mode.
180	PCIE0_CLKREQ	PCIe 0 Clock Request. 51k Ω pull-up to 3V3 on the module
182	PCIE1_CLKREQ	PCIe 1 Clock Request. 51k Ω pull-up to 3V3 on the module
184	MDIO_N	GbE Transformer Data 0 negative
186	MDIO_P	GbE Transformer Data 0 positive
188	GBE_LED_LINK	Ethernet Link LED (Green)
190	MDI1_N	GbE Transformer Data 1 negative
192	MDI1_P	GbE Transformer Data 1 positive
194	GBE_LED_ACT	Ethernet Activity LED (Yellow)
196	MDI2_N	GbE Transformer Data 2 negative
198	MDI2_P	GbE Transformer Data 2 positive
200	GND	Ground (0V)
202	MDI3_N	GbE Transformer Data 3 negative
204	MDI3_P	GbE Transformer Data 3 positive
206	GPIO7	typically a 1V8 signal, GPIO #7 or PWM
208	GPIO8	typically a 1V8 signal, GPIO #8
210	NC	NORMAL CLOSE
212	GPIO10	typically a 1V8 signal, GPIO #10
214	FORCE_REC	Force Recovery strap pin. Held low when SYS_RESET* goes high (i.e., during power-on) places system in USB recovery mode. 10k Ω pull-up to 1.8V on the module.
216	GPIO11	typically a 1V8 signal, GPIO #11
218	GPIO12	typically a 1V8 signal, GPIO #12 or LPWM
220	I2S1_DOUT	typically a 1V8 signal, I2S Audio Port 1 Data Out
222	I2S1_DIN	typically a 1V8 signal, I2S Audio Port 1 Data In
224	I2S1_FS	typically a 1V8 signal, I2S Audio Port 1 Left/Right Clock

226	I2S1_SCLK	typically a 1V8 signal, I2S Audio Port 1 Clock
228	GPIO13	typically a 1V8 signal, GPIO #13 or PWM
230	GPIO14	typically a 1V8 signal, GPIO #14 or LPWM
232	I2C2_SCL	General I2C 2 Clock. 2.2k Ω pull-up to 1V8 on the module.
234	I2C2_SDA	General I2C 2 Data. 2.2k Ω pull-up to 1V8 on the module.
236	UART2_TXD	typically a 1V8 signal, UART #2 Transmit
238	UART2_RXD	typically a 1V8 signal, UART #2 Receive
240	SLEEP/WAKE	Configured as GPIO for optional use to indicate the system should enter or exit sleep mode. 5V tolerant.
242	GND	Ground (0V)
244	GND	Ground (0V)
246	GND	Ground (0V)
248	GND	Ground (0V)
250	GND	Ground (0V)
252	VDD_IN	Main power-12V $\pm$ 10%
254	VDD_IN	Main power-12V $\pm$ 10%
256	VDD_IN	Main power-12V $\pm$ 10%
258	VDD_IN	Main power-12V $\pm$ 10%
260	VDD_IN	Main power-12V $\pm$ 10%

警告

- RDK Ultra Module 使用外接电源需满足相关地区的法规标准。
- 本产品应在通风良好的环境中使用，在密闭空间使用时，需要做好散热措施。
- 使用时，本产品应放置在稳固、平坦、不导电的表面上。
- 将不兼容的设备与 RDK Ultra Module 连接时，导致设备损坏，将不支持维修。
- 所有与本产品配套使用的外围设备均应符合使用国家的相关标准，并标明相应地确保满足安全和性能要求。外围设备包括但不限于与 RDK Ultra Module 结合使用时的键盘、显示器和鼠标。
- 与本产品一起使用的所有外围设备的电缆和连接器必须有足够的绝缘，以便相关的满足安全要求。

安全守则

为避免本产品发生故障或损坏，请遵守以下事项：

- 运行时请勿接触水或湿气，或放置在导电物体表面上。
- 不要接触任何热源； RDK Ultra Module 在正常环境温度下可靠运行。
- 装配时，避免对印刷电路板和连接器造成机械或电气损坏。
- 当设备通电时，避免手触摸印刷电路板及设备边缘，减少静电放电损坏的风险。

修订记录

Version	Date	Description
v1.0	2023.08.29	初版