CM5 Product Brief

ARM Cortex®-A76 Core-board (RK3588)

Reversion 1.2
2022-11-09

Catalogue

Model CM5

Rockchip ARM RK3588 Core Board

Features

- RK3588 ARM Quad Cortex-A76 and Quad Cortex-A55 2.4 GHz
- Onboard 8GB/16GB LPDDR4 memory and 64/128GB eMMC
- ARM Mali G610 MP4
- 6T NPU support
- DP & HDMI upto 8K@60fps
- USB3.0, USB2.0 ,2 x GbE, PCIE x 4
- WIFI/BT support
- RTC support
- Debian11 support
- Android12 support
- Ubuntu22 support
- Yocto support

1、Overview

CM5 is adopted the new generation flagship of Rockchip RK3588 with octa-core 64-bit processor, integrated ARM Mali-G610 MP4 quad-core GPU, and with built-in AI accelerator NPU, which can provide 6Tops computing power, support mainstream deep learning framework, and meet the computing power requirements of most artificial intelligence models. Besides,RK3588 also introduces a new generation of hardware based maximum 48 million pixel ISP (image signal processor), and implements many algorithm accelerators, such as HDR, 3A, LSC, 3DNR, 2DNR, sharpening, dehaze, fisheye correction, gamma correction, etc., which has a wide range of applications in graph post-processing.

The SOM of RK3588 (CM5) takes the form of core board and bottom board. The core board is connected to the bottom board through the standard interface of SODIMM 314P MXM3.0, which can form a complete industrial motherboard. With abundant expansion interfaces, it supports the expansion of multiple types of peripheral devices, greatly showing the high performance advantages of RK3588-ultra-low power consumption and super performance. It can be directly used in a variety of intelligent product development, accelerating the product landing.

CM5 can be customized with the bottom board, which has some rich interfaces, supporting multiple hard disk, gigabit network, WiFi6, 5G/4G expansion and a variety of video input and output; Meanwhile, it can provide many power supply modes and support for multiple operating systems; It can be applied to MINI PC, ARM PC, edge computing, cloud server, intelligent NVR and other fields as well.

2、Features

2.1 High-performance octa-core processor

RK3588 is integrated with quad-core Cortex-A76 and quad-core Cortex-A55 CPU with G610 MP4 Graphics processor,and the separate NEON co-processor, and the main frequency is up to 2.4GHz, which delivers superior general-purpose computing performance. Integrated octa-core high-performance CPU, with more bandwidth compression technology.There is strong overall extreme performance on RK3588.

2.2 With strong AI computing performance, Built-in neural network processor NPU

Support 6.0 Tops computing power and INT4, INT8, INT16, and FP16 operations. AI development tools are provided: support for fast model transformation, development board side to side transformation API, and support for TensorFlow/TFLite/Caffe/ONNX/Darknet and other models. Provide AI application development interface: support Android NN API, RKNN cross-platform API, Linux support TensorFlow development.

2.3 Excellent hard decoding capability

Support 8K VP9 and 4K 10bits H265/H264 video decoding, up to 60fps ,and support 1080P multi-format video decoding (VC-1, MPEG-1/2/4, VP8); Support 1080P video encoding, with H.264, VP8 format; Support 8K 60Hz display and HDCP 1.4/2.2.

2.4 Powerful display interface performance

Support double LVDS, EDP, HDMI multiple display output interfaces,and support same DualView or different DualView.

2.5 Various Network Connection Modes

Support Gigabit Ethernet (RJ45), and onboard WIFI/BT module, dual-band WIFI2.4GHz/5GHz, and 802.11b/g/n protocol; Onboard MINI PCIE(4G/5G) interface seat and SIM seat, which can expand 4G/5G mobile communication function; Support WCDMA,EVDO,4G/5G full netcom.

2.6 Convenient industrial equipment communication connection

Support RS232(with hardware flow control) and RS485 interface simultaneously, and it can be convenient to connect various industrial equipment

2.7 Rich extension interface

Support USB2.0/USB3.0、Gigabit Ethernet 、RS485、RS232、ADC、HDMI、WIFI、Ethernet and power interface

2.8 Operating System Support

Debian11、Ubuntu22.04、Ubuntu20.04 、Android12

3、RK3588 Block Diagram

4、 Physical pictures

82mm

60mm

eMMC:64GB/128GB可选

LPDDR4:8GB/16GB可选
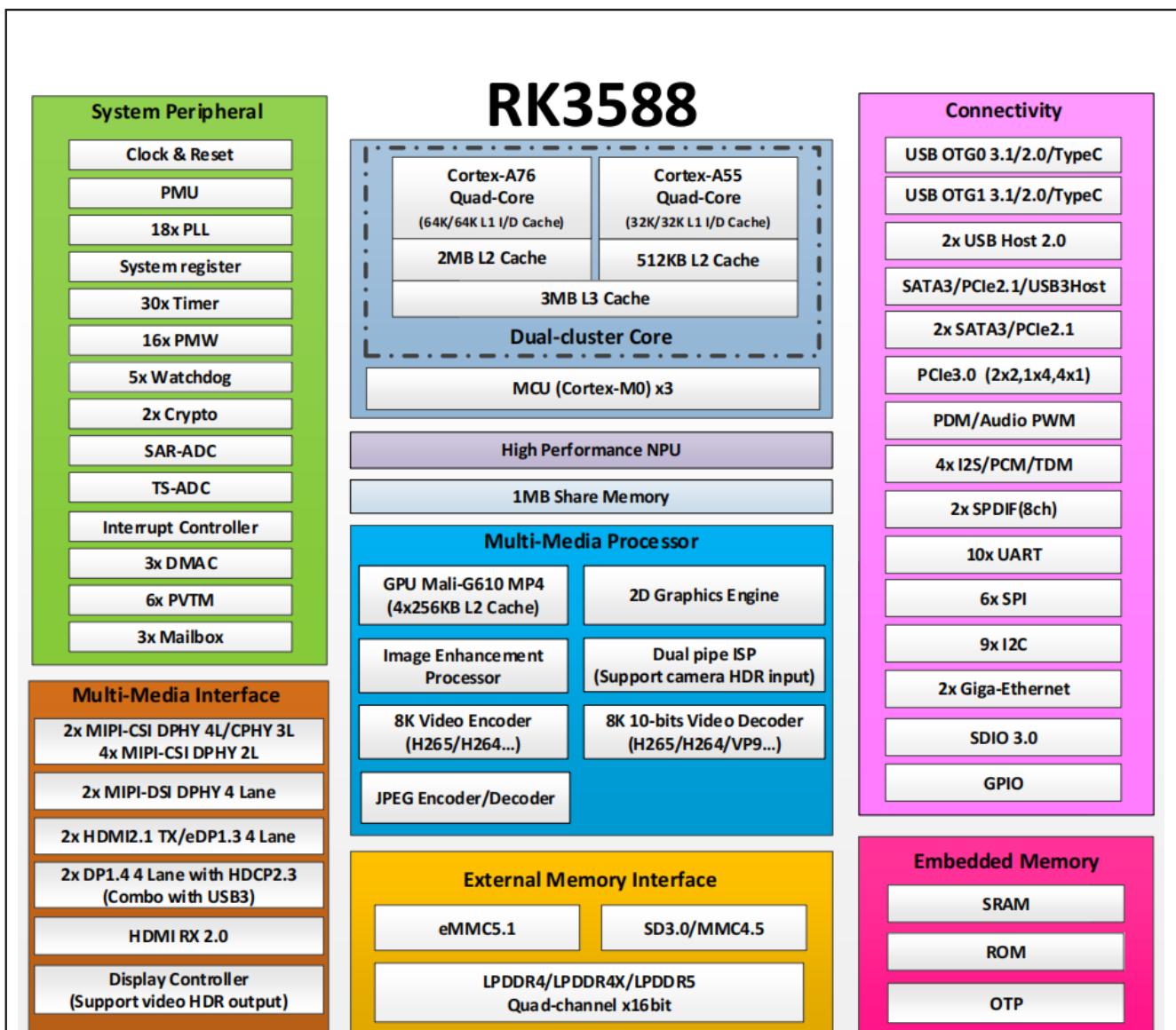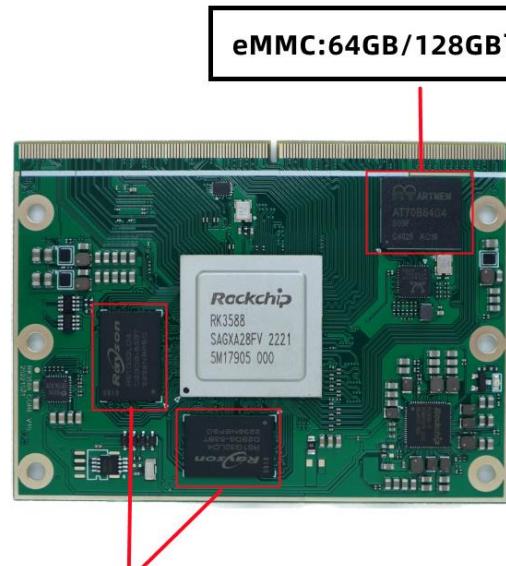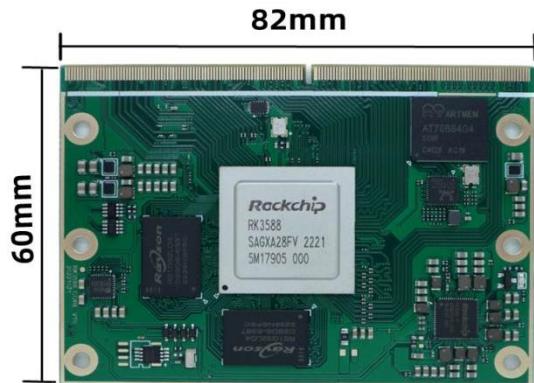
The storage of
eMMC&LPDDR4 are optional

5、Applications

Smart Cockpit

Edge Computing

智能座舱

AR/VR

边缘计算

高端IPC

高端平板

ARM PC
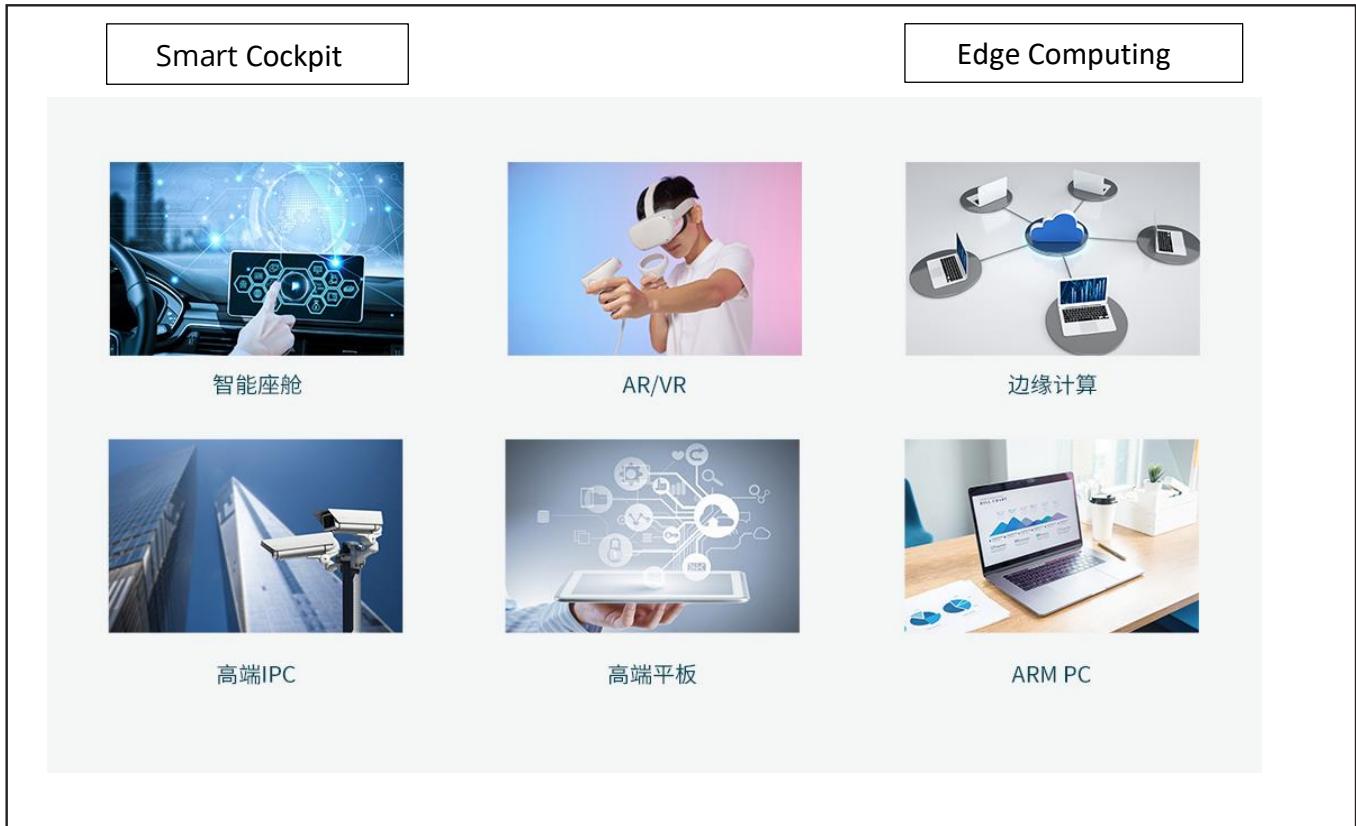
High-end IPC

High-end Tablet

6、The Descriptions of PIN

A1 --> A2 --> A3 ············>>>············ A154 --> A155 --> A156

B1--> B2 --> B3 ············>>>············ B156 -->B157 --> B158
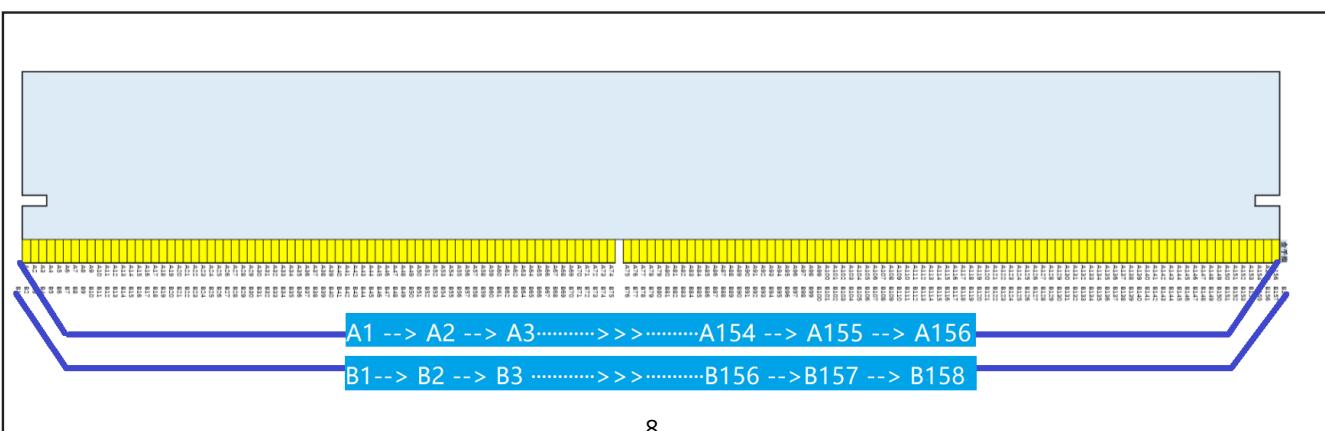
7、The Definitions of PIN

Functional domain	PIN	Definitions
usb3.0	B16	TYPEC1_SSRX1P
	B17	TYPEC1_SSRX1N
	B18	TYPEC1_SSTX1P
	B19	TYPEC1_SSTX1N
	B20	TYPEC1_SSRX2P
	B21	TYPEC1_SSRX2N
	B22	TYPEC1_SSTX2P
	B23	TYPEC1_SSTX2N
	B24	TYPEC1_OTG-DP
	B25	TYPEC1_OTG-DM
	B26	TYPEC1_SBU1
	B27	TYPEC1_SBU2
	B28	GND
	B29	TYPEC0_OTG-DP
	B30	TYPEC0_OTG-DM
	B31	TYPEC0_SSTX1P

	B32	TYPEC0_SSTX1N
	B33	TYPEC0_SSRX1P
	B34	TYPEC0_SSRX1N
	B35	TYPEC0_SSRX2P
	B36	TYPEC0_SSRX2N
	B37	TYPEC0_SSTX2P
	B38	TYPEC0_SSTX2N
	B39	TYPEC0_SBU1
	B40	TYPEC0_SBU2
	B41	GND
	B58	TYPEC0OTG-ID
	B59	TYPEC0-USB2.0-VBUSDET
	B74	USB-HOST-PWREN-H
	B75	TYPEC0-SBU1-DC
	B76	TYPEC0-SBU2-DC
PMIC	B7	RESET-L
	B8	PMIC-EXT-EN-OUT
	B9	PMIC-VDC
	B10	GND
SARADC	B42	BOOT -CONFIG
	B43	SARADC -VIN1 -KEY/RECOVERY
	B44	SARADC -VIN3 -HP-HOOK
	B45	SARADC -VIN2 -LCD-ID1
	B46	GND
USB2.0+HUB	B11	HOST0_DP
	B12	HOST0_DM
	B13	HOST1_DP
	B14	HOST1_DM
	B15	GND
MIPI	B47	MIPI-DPHY1-RX-D0P
	B48	MIPI-DPHY1-RX-D0N
	B49	MIPI-DPHY1-RX-D1P
	B50	MIPI-DPHY1-RX-D1P

B51	MIPI-DPHY1-RX-CLKP
B52	MIPI-DPHY1-RX-CLKN
B53	MIPI-DPHY1-RX-D2P
B54	MIPI-DPHY1-RX-D2N
B55	MIPI-DPHY1-RX-D3P
B56	MIPI-DPHY1-RX-D3N
B57	GND
B106	MIPI-DCPHY0 -PWREN0-H
B112	MIPI-TE0/PWM14-M0 -1V8
B127	LED1/GPO
B128	LED2/LED1
B129	GPIO1-D7
B130	LCD-PWREN-H
A44	MIPI-DPHY1-TX-D0N
A45	MIPI-DPHY1-TX-D0P
A46	MIPI-DPHY1-TX-D1N
A47	MIPI-DPHY1-TX-D1P
A48	MIPI-DPHY1-TX-CLKN
A49	MIPI-DPHY1-TX-CLKP
A50	MIPI-DPHY1-TX-D2N
A51	MIPI-DPHY1-TX-D2P
A52	MIPI-DPHY1-TX-D3N
A53	MIPI-DPHY1-TX-D3P
A54	GND
A55	MIPI-DPHY0-TX-D0N
A56	MIPI-DPHY0-TX-D0P
A57	MIPI-DPHY0-TX-D1N
A58	MIPI-DPHY0-TX-D1P
A59	MIPI-DPHY0-TX-CLKN
A60	MIPI-DPHY0-TX-CLKP
A61	MIPI-DPHY0-TX-D2N
A62	MIPI-DPHY0-TX-D2P
A63	MIPI-DPHY0-TX-D3N

	A64	MIPI-DPHY0-TX-D3P
	A65	GND
	A66	MIPI-DPHY0-RX-D0N
	A67	MIPI-DPHY0-RX-D0P
	A68	MIPI-DPHY0-RX-D1N
	A69	MIPI-DPHY0-RX-D1P
	A70	MIPI-DPHY0-RX-CLKN
	A71	MIPI-DPHY0-RX-CLKP
	A72	MIPI-DPHY0-RX-D2N
	A73	MIPI-DPHY0-RX-D2P
	A74	GND
	A75	MIPI-DPHY0-RX-D3N
	A76	MIPI-DPHY0-RX-D3P
	A77	GND
	A91	MIPI-DCPHY0 -PWREN1-H
	A142	I2C4-SCL-M3-MIPI
	A143	I2C4-SDA-M3-MIPI
	A145	MIPI-DCPHY1 -RX-PDN-H
	A146	MIPI-DCPHY0 -RX-PDN-H
	A147	GND
CAMERA	B89	MIPI-CSI1-RX-CLK1P
	B90	MIPI-CSI1-RX-CLK1N
	B91	MIPI-CSI1-RX-D3P
	B92	MIPI-CSI1-RX-D3N
	B93	MIPI-CSI1-RX-D2P
	B94	MIPI-CSI1-RX-D2N
	B95	MIPI-CSI1-RX-CLK0P
	B96	MIPI-CSI1-RX-CLK0N
	B97	MIPI-CSI1-RX-D1P
	B98	MIPI-CSI1-RX-D1N
	B99	MIPI-CSI1-RX-D0P
	B100	MIPI-CSI1-RX-D0N
	B101	GND

	B131	I2C3-SDA-M0
	B132	I2C3-SDL-M0
	B134	I2S0-LRCK-RX/PWM15-M2
	B135	MIPI-CSI0-PDN0 -H
	B136	MIPI-CSI1-PDN1 -H
	B137	MIPI-CAM1 -CLKOUT
	B138	MIPICSI1-PWREN-H
	B139	MIPICSI0-PWREN-H
	B140	MIPI-CSI0-PPDN1-H
	B141	MIPI-CSI1-PPDN0-H
	B143	MIPI-CAM3 -CLKOUT
	B144	GND
	A78	MIPI-CSI0-RX-CLK1P
	A79	MIPI-CSI0-RX-CLK1N
	A80	MIPI-CSI0-RX-D3P
	A81	MIPI-CSI0-RX-D3N
	A82	MIPI-CSI0-RX-D2P
	A83	MIPI-CSI0-RX-D2N
	A84	MIPI-CSI0-RX-CLK0P
	A85	MIPI-CSI0-RX-CLK0N
	A86	MIPI-CSI0-RX-D1P
	A87	MIPI-CSI0-RX-D1N
	A88	MIPI-CSI0-RX-D0P
	A89	MIPI-CSI0-RX-D0N
	A90	GND
GPIO	B82	GPIO1-B5
	B113	GPIO3-C0
	B114	GPIO3-C1
	B129	GPIO1-D7
	A144	GPIO1-B7
	A107	ADC_IN2
	A121	GPIO1_D0_1V8
	B63	GND

	B64	HDMI_RX-SCL-M1
	B65	HDMI_RX-SDA-M1
	B66	HDMI0_TX-ON-H
	B67	HDMI_TX0 -CEC-M0
	B68	HDMI_TX0 -SDA-M0
	B69	HDMI_TX0 -SCL-M0
	B70	HDMI1_TX-ON-H
	B71	HDMITX1-CEC-M2
	B72	HDMITX1-SDA-M1
	B73	HDMITX1-SCL-M1
	B109	HDMIIRX-DET-L
	A1	GND
	A2	HDMI0 -TX3N-PORT
	A3	HDMI0 -TX3P -PORT
	A4	HDMI0 -TX0N-PORT
	A5	HDMI0 -TX0P -PORT
	A6	HDMI0 -TX1N-PORT
	A7	HDMI0 -TX1P -PORT
	A8	HDMI0 -TX2N-PORT
	A9	HDMI0 -TX2P -PORT
	A10	HDMI0 -TX-SBDP
	A11	HDMI0 -TX-SBDN
	A12	GND
	A13	HDMI1 -TX-SBDN
	A14	HDMI1 -TX-SBDP
	A15	HDMI1 -TX3N-PORT
	A16	HDMI1 -TX3P -PORT
	A17	HDMI1 -TX0N-PORT
	A18	HDMI1 -TX0P -PORT
	A19	HDMI1 -TX1N-PORT
	A20	HDMI1 -TX1P -PORT
	A21	HDMI1 -TX2N-PORT
	A22	HDMI1 -TX2P -PORT

	A23	GND
	A24	HDMI-RX-CLKN-PONT
	A25	HDMI-RX-CLKP-PONT
	A26	HDMI-RX-D0N-PONT
	A27	HDMI-RX-D0P-PONT
	A28	HDMI-RX-D1N-PONT
	A29	HDMI-RX-D1P-PONT
	A30	HDMI-RX-D2N-PONT
	A31	HDMI-RX-D2P-PONT
	A32	GND
	A92	HDMIIRX-HPDOUT-H
PHY	B118	PHY1 -MDI3 -
	B119	PHY1 -MDI3+
	B120	PHY1 -MDI2 -
	B121	PHY1 -MDI2+
	B122	PHY1 -MDI1 -
	B123	PHY1 -MDI1+
	B124	PHY1 -MDI0 -
	B125	PHY1 -MDI0+
	B126	GND
	A33	PHY0 -LED1/CFG-LDO0
	A34	PHY0 -LED2/CFG-LDO1
	A35	PHY0 -MDI0+
	A36	PHY0 -MDI0 -
	A37	PHY0 -MDI1+
	A38	PHY0 -MDI1 -
	A39	PHY0 -MDI2+
	A40	PHY0 -MDI2 -
	A41	PHY0 -MDI3+
	A42	PHY0 -MDI3 -
	A43	GND
WIFI+BT	B87	32KOUT-WIFI
	B102	I2S2-SDI-M1-BT

	B103	I2S2-LRCK-TX-M1 -BT
	B104	I2S2-SCCK-TX-M1-BT
	B105	I2S2-SD0-MI-BT
	B107	CC-INT -L
	B110	HOST-WAKE-BT-H
	B113	GPIO3-C0
	B114	GPIO3-C1
	B116	REFCLKO-25M
	B117	GND
	A93	BT -REG-ON-H
	A95	BT -WAKE-HOST-H
	A96	UART8 -TX-M1-BT
	A97	UART8 -RX-M1-BT
	A98	UART8 -CTSN-M1-BT
	A99	UART8 -RTSN-M1-BT
	A115	WIFY-REG-ON-H
	A116	WIFY-WAKE -HOST-H
DEBUG	B80	UART -RX-M0
	B81	UART -TX-M0
MIC/SPK	B145	HP -FE-L
	B146	PHONE -CTL
	B147	SPK-CTL-H
	B148	MIC1P
	B149	MIC1N
	B150	MIC2P
	B151	MIC2N
	B152	VCC-MICBIAS
	B153	LOUT1
	B154	ROUT1
	B155	HPGND
	B156	GND
TP	B115	TP_INT -L
	B116	REFCLKO-25M

	A117	TP-RST-L
	A148	PWRON-L
	A149	SDMMC_DET
	A150	SDMMC_CMD
	A151	SDMMC_D3
SDMMC	A152	SDMMC_D2
	A153	SDMMC_D1
	A154	SDMMC_D0
	A155	SDMMC -CLK
	A156	GND
	A100	PCIE20 -CLK-PWREN
	A101	GND
	A102	PCIE20 -0-RXP/SATA30 -0-RXP
	A103	PCIE20 -0-RXN/SATA30 -0-RXN
	A104	PCIE20 -0-TXN/SATA30 -0-TXN
	A105	PCIE20 -0-TXP/SATA30 -0-TXP
	A106	PCIE20 -0-REFCLKP
	A107	PCIE20 -0-REFCLKN
	A108	GND
	A109	PCIE20 -1-TXP/SATA30 -0-TXP
	A110	PCIE20 -1-TXN/SATA30 -0-TXN
	A111	PCIE20 -1-RXP/SATA30 -0-RXP
PCIE	A112	PCIE20 -1-RXN/SATA30 -0-RXN
	A113	PCIE20 -1-REFCLKP
	A114	PCIE20 -1-REFCLKN
	A119	GND
	A120	PCIE30 -PORT0 -RX0P
	A121	PCIE30 -PORT0 -RX0N
	A122	PCIE30 -PORT0 -RX1P
	A123	PCIE30 -PORT0 -RX1N
	A124	PCIE30 -PORT0 -REFCLKP
	A125	PCIE30 -PORT0 -REFCLKN
	A126	PCIE30 -PORT0 -TXOP

	A127	PCIE30 -PORT0 -TX0N
	A128	PCIE30 -PORT0 -TX1P
	A129	PCIE30 -PORT0 -TX1N
	A130	GND
	A131	PCIE30 -PORT1 -RX2P
	A132	PCIE30 -PORT1 -RX2N
	A133	PCIE30 -PORT1 -RX3P
	A134	PCIE30 -PORT1 -RX3N
	A135	PCIE30 -PORT1 -TX2P
	A136	PCIE30 -PORT1 -TX2N
	A137	PCIE30 -PORT1 -TX3P
	A138	PCIE30 -PORT1 -TX3N
	A139	PCIE30 -PORT1 -REFCLKN
	A140	PCIE30 -PORT1 -REFCLKP
	A141	GND
	B60	PCIEX1_1_WAKEN_M1_L
	B61	PCIEX1_1_CLKREQN_M1_L
	B62	PCIEX1_1_PERSTN_M1_L
POWER	B3	VCC5V0_SYS (5V Input)
	B4	VCC5V0_SYS (5V Input)
	B5	VCC5V0_SYS (5V Input)
	B6	VCC5V0_SYS (5V Input)
	B157	32KOUT-RTC
	B158	VCC_BATTERY (RTC External power input 4.2V)
	B1	GND
	B2	GND