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VisionSOM-V2L Datasheet and Pinout

Rev. 20240104091452

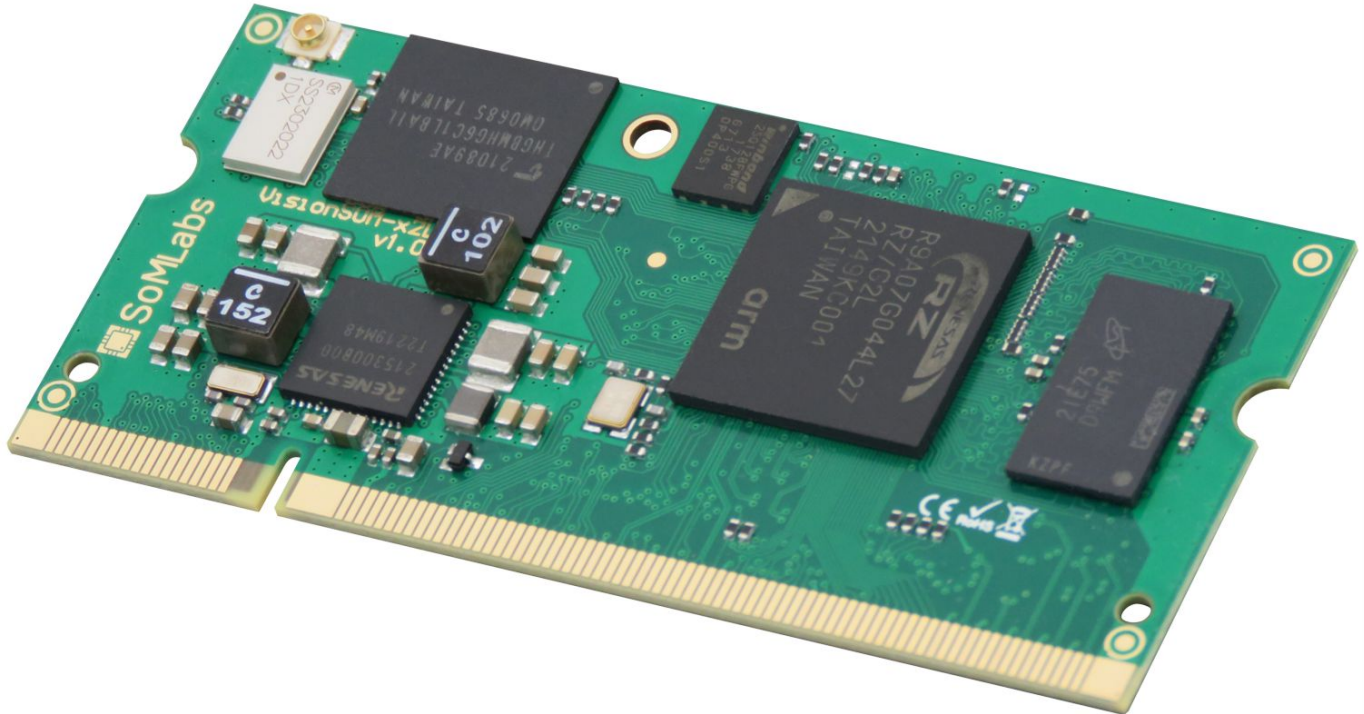
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VisionSOM-V2L Datasheet and Pinout

General description



The VisionSOM-V2L family is a SODIMM-sized SoM based on the Renesas dual core RZ/V2L application processor which features an advanced implementation of DRP-AI (ML+AI) coprocessor. The VisionSOM-V2L family offers energy efficient dual ARM Cortex-A55 cores (at speed up to 1.2GHz) and ARM Cortex-M33 core (at speed up to 200MHz) as well as a 3D Graphics Processing Unit (ARM Mali-G31 GPU @500MHz, 1920x1080 @60fps) with Open GL 3.2ES/OpenCL 2.0 (Full Profile) capabilities and Video Codec Processor (VCP) with 1920x1080 @30fps.

The VisionSOM-V2L is a multimedia and video oriented, highly integrated SoM (System on Module) featuring high computation power, optionally integrated 2.4GHz Wi-Fi and Bluetooth v5.1 connectivity. The option of integrated, fully certified Wi-Fi and Bluetooth module simplifies the carrier board design and is ideally suited for wireless application. The VisionSOM-V2L provides a variety memory configuration, including 1GB of fast and efficient DDR4 and eMMC Flash that meets our customers requirements.

The SoM supports connections to a variety of interfaces: two high-speed USB 2.0 with integrated PHY, dual Ethernet 1Gbit, audio, MIPI-DSI display output with optional touch panel, MIPI-CSI camera input with scaling processor, serial communication interfaces including 2xCAN. In addition, the system supports industrial grade embedded applications.

SoMLabs also provides a complete hardware and software development board for the SoM in the form of a carrier board and optional TFT display and touch panel.

Applications

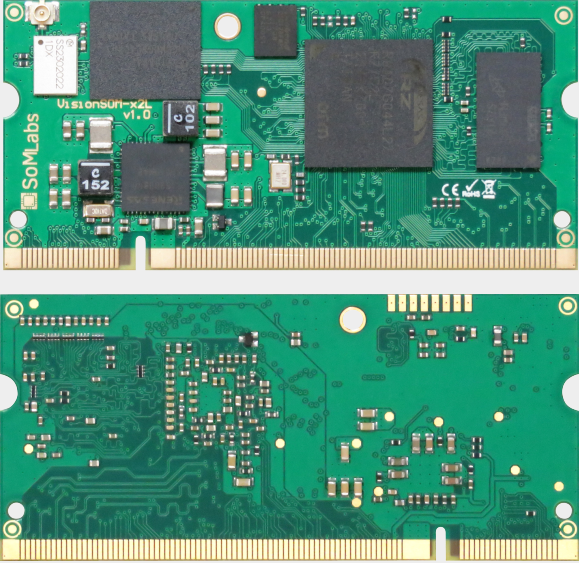
- IoT Edge Devices
- IoT gateways
- Machine vision equipment

- AI+ML Decision/Recognition Systems
- Robotics
- Human-machine Interfaces (HMI)
- IP Cameras
- Home Appliances
- Home Automation - Smart Home
- Residential gateways
- Industrial embedded Linux computer
- Fitness/outdoor equipment

Features

- Powered by dual core Renesas RZ/V2L application processor (R9A07G054L27GBG)
- Dual ARM Cortex-A55 core at speed up to 1.2GHz
- ARM Cortex-M33 core at speed up to 200MHz
- Integrated Machine-Learning (ML) and Artificial Intelligence (AI) AI Accelerator (DRP-AI)
- Integrated 3D GPU (ARM Mali-G31 @500MHz)
- 1GB RAM (DDR4)
- Up to 32GB eMMC memory
- Optional Murata radio module 2.4GHz Wi-Fi and Bluetooth v5.1
- Built-in dual USB 2.0 interface
- Built-in 2xCAN-FD interfaces
- Built-in MIPI-DSI display interface
- Built-in MIPI-CSI camera interface
- Power-efficient and cost-optimized solution
- Ideal for industrial IoT and embedded applications
- Integrated security features

Pictures of SOM versions

Version	Photo
eMMC	

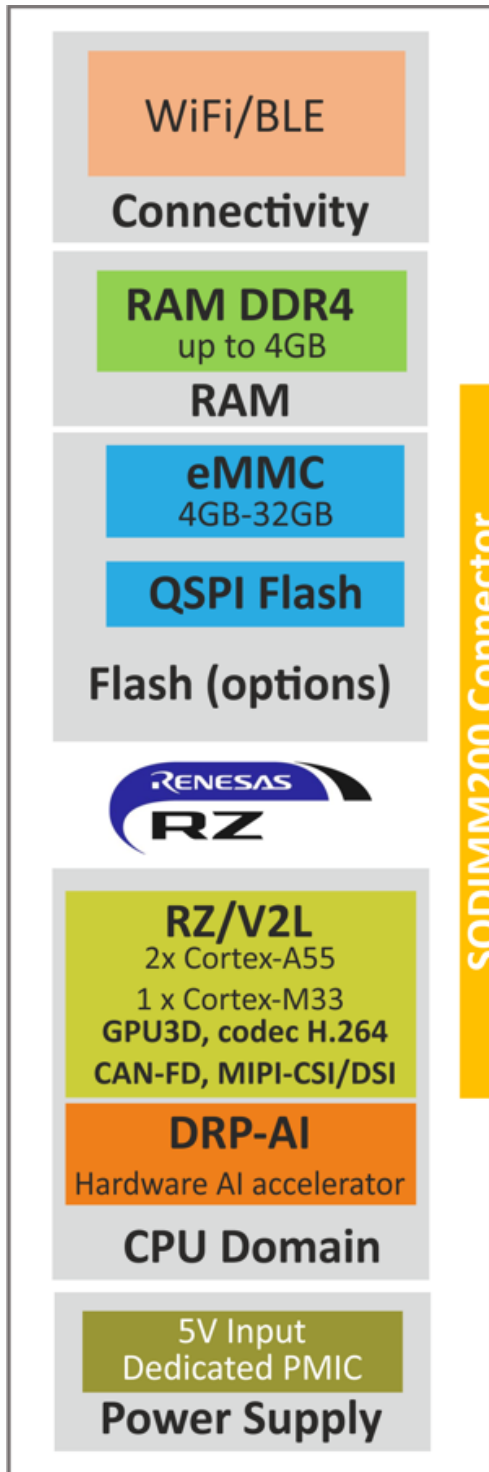
WiFi/BT module is available for all memory configurations.

Ordering info

SLS22CpuType_Clock_RamSize_FlashSize_SF_TEMP

SLS	Product type SLS - System on Module
2	SOM Name 2 - High Performance VisionSOM SODIM200 module
2	CPU Family 2 - Renesas RZ/V2L family
CpuType	CPU Type RV2LDC - RZ/V2L dual Cortex-A55 + Cortex-M33 + DRP-AI
Clock	CPU Clock Speed 1200C - 1.2GHz
RamSize	DDR4 RAM Size 01GR - 1GB (1024MB)
FlashSize	eMMC Memory Size 04GE - 4GB eMMC 08GE - 8GB eMMC 16GE - 16GB eMMC 32GE - 32GB eMMC
SF	Special Features 0SF - No Special Features 1WB - Built-in 2.4GHz Wi-Fi and Bluetooth v5.1
TEMP	Operating Temperature E - Extended: -25 to +70 C I - Industrial: -40 to +85 C

Block Diagram



Operating ranges

Parameter	Value	Unit	Comment
Power Supply	5.0	V	Connected to VDD-5V0 SODIM200 pins
Max. input GPIO voltage	3.3	V	In 3.3V power domain
Max. input GPIO voltage	1.8	V	In 1.8V power domain
Environment temperature	-40...+85	°C	Industrial range w/o WiFi module
	-25...+70		Industrial range with WiFi module
	0...+70		Consumer range

Electrical parameters

SOM signal name	Parameter	Value			Unit
		Min.	Typ.	Max.	
VDD-5V	Supply Voltage (Input)	4.0	5.0	5.5	V
VDD-1V8	Output power supply for external 1.8V accesories	-	-	0.3 ¹	A
VDD-3V3	Output power supply for external 3.3V accesories	-	-	0.3 ²	A
VGPI0 @1V8	GPIO Input Voltage	0	-	2.05	V
VGPI0 @3V3	GPIO Input Voltage	0	-	3.6 ²	V
V _{USB0-VBUS}	USB VBUS Input Voltage	0	-	5.25 ³	V
V _{ETH0}	I/O voltage for Ethernet 0	0	-	1.8	V
V _{ETH1}	I/O voltage for Ethernet 1	0	-	1.8 or 3.3 ⁴	V
V _{JTAG}	I/O voltage for Ethernet 1	0	-	1.8 ⁵	V
V _{ADC-IN}	Input voltage for ADC-CHx ⁶	0	-	1.8	V

Notes:

1. Total current on both VDD-1V8 outputs.
1. Total current on both VDD-3V3 outputs.
3. Input current is limited by 1+1,8kOhm resistors (voltage divider) connected in series.
4. Depends on logic state on ET1-VDD-SEL (ET1-VDD-SEL='0' -> V=1.8V, ET1-VDD-SEL='1' or left open -> V=3.3V, internally pull-up'ed.).
5. JTAG/SWD interface lines are 1.8V compatible.
6. "x" means 0...7.

SoM pinout

Important notes:

1. Detail pin configurations description you can find, edit and arrange in dedicated SCFG file (with free "Smart Configurator" tool).
2. On-board eMMC memory is connected to SDIO0 interface.
3. Optional on-board QSPI Flash memory is connected to QSPI0 interface.
4. SDIO1 interface is used to communication with Murata 1DX radio module.
5. UART2 is used to communication with BT-BLE interatted with Murata 1DX radio module.
6. I2C3 is used to communication with on-board PMIC.

SOM pin number	Default function	GPIO	BGA456 ball	Notes
1	GND	Power	-	
2	GND	Power	-	
3	ET0-PHY-RST	P47-1	A20	1.8V Power Domain GPIO mode not allowed
4	PWR-GOOD	Output		PMIC power-good signalling for external devices
5	ET0-INT	P47-0	B20	3.3V Power Domain
6	PWR-ON	Input		PMIC PWRON input (on-off function) Internal pull-down Connect to GND if not used Connect to VDD-3V3 with external pull-up resistor (4.7kOhm) and pushbutton to GND if used
7	ET0-MDIO	I/O	U1	1.8V Power Domain GPIO mode not allowed
8	PWR-FAIL	Input		PMIC enable-input: PWR-FAIL='0' -> SOM power supply is off PWR-FAIL='1' or left open -> SOM power supply is on Can be used as cold-reset input (active low)
9	ET0-MDC	I/O	U2	1.8V Power Domain GPIO mode not allowed
10	RESET-OUT	Output		RESET output for external peripherals
11	GND	Power	-	
12	RESET-IN	Input		MPU reset input, active low
13	ET0-RXC	I/O	P2	1.8V Power Domain GPIO mode not allowed
14	GND	Power	-	
15	ET0-RX-CTL	I/O	P1	1.8V Power Domain GPIO mode not allowed
16	UART0-RXD	P38-1	B15	3.3V Power Domain
17	ET0-RXD0	I/O	R2	1.8V Power Domain GPIO mode not allowed
18	UART0-TXD	P38-0	A15	3.3V Power Domain
19	ET0-RXD1	I/O	R1	1.8V Power Domain GPIO mode not allowed
20	UART1-CTS	P41-0	E17	3.3V Power Domain
21	ET0-RXD2	I/O	T2	1.8V Power Domain GPIO mode not allowed
22	UART1-RTS	P41-1	A18	3.3V Power Domain

23	ET0-RXD3	I/O	T1	1.8V Power Domain GPIO mode not allowed
24	UART1-RXD	P40-0	C17	3.3V Power Domain
25	GND	Power	-	
26	UART1-TXD	P40-1	B17	3.3V Power Domain
27	ET0-TX-CTL	I/O	N2	1.8V Power Domain GPIO mode not allowed
28	UART4-RXD	P2-1	A13	3.3V Power Domain
29	ET0-TXC	I/O	N1	1.8V Power Domain GPIO mode not allowed
30	UART4-TXD	P2-0	B13	3.3V Power Domain
31	ET0-TXD3	I/O	N1	1.8V Power Domain GPIO mode not allowed
32	UART3-RXD	P0-1	B12	3.3V Power Domain
33	ET0-TXD2	I/O	L2	1.8V Power Domain GPIO mode not allowed
34	UART3-TXD	P0-0	A11	3.3V Power Domain
35	ET0-TXD1	I/O	M2	1.8V Power Domain GPIO mode not allowed
36	VBAT-RTC	Power	-	RTC 3V battery
37	ET0-TXD0	I/O	M1	1.8V Power Domain GPIO mode not allowed
38	GND	Power	-	
39	VDD-1V8	Power		1.8V output for external devices, max. 300 mA
40	VDD-1V8	Power		1.8V output for external devices, max. 300 mA
41	VDD-5V0	Power		External power supply
42	VDD-5V0	Power		External power supply
43	VDD-5V0	Power		External power supply
44	VDD-5V0	Power		External power supply
45	VDD-5V0	Power		External power supply
46	VDD-5V0	Power		External power supply
47	VDD-5V0	Power		External power supply
48	VDD-5V0	Power		External power supply
49	VDD-5V0	Power		External power supply
50	VDD-5V0	Power		External power supply
51	NC	Not Connected	-	
52	NC	Not Connected	-	
53	VDD-3V3	Power		3.3V output for external devices, max. 300mA
54	VDD-3V3	Power	-	3.3V output for external devices, max. 300mA
55	GND	Power	-	
56	SYSLED	P42-0	AG4	3.3V Power Domain
57	VPROG	NC	-	For SoMLabs purposes only, leave unconnected
58	GND	Power	-	
59	BOOT-RECOVERY	Input	BOOT input, active low during reset	
60	SSI-MCLK	AUDIO_CLK1	E12	-
61	GND	Power	-	
62	SSI0-RXD	P7-1	AH28	3.3V Power Domain

63	ET1-VDD-SEL	Input		Ethernet 1 (ET1) interface voltage selection: ET1-VDD-SEL='0' -> V=1.8V ET1-VDD-SEL='1' or left open -> V=3.3V The line has internal pull-up.
64	SSIO-TXD	P7-0	AJ28	3.3V Power Domain
65	ET1-PHY-RST	P47-3	B21	3.3V Power Domain
66	SSIO-RCK	P6-1	AH27	3.3V Power Domain
67	ET1-INT	P47-2	A21	3.3V Power Domain
68	SSIO-BCK	P6-0	AJ27	3.3V Power Domain
69	ET1-MDIO	P37-1	W1	1.8V or 3.3V Power Domain selected by ET1-VDD-SEL GPIO allowed only for 3.3V.
70	GND	Power	-	
71	ET1-MDC	P37-0	W2	1.8V or 3.3V Power Domain selected by ET1-VDD-SEL GPIO allowed only for 3.3V.
72	CAN1-RX	P13-0	AF23	3.3V Power Domain
73	GND	Power	-	
74	CAN1-TX	P12-1	AE23	3.3V Power Domain
75	ET1-RXC	P33-1	AC1	1.8V or 3.3V Power Domain selected by ET1-VDD-SEL GPIO allowed only for 3.3V.
76	CAN0-RX	P42-2	AJ3	3.3V Power Domain
77	ET1-RX-CTL	P34-0	AC2	1.8V or 3.3V Power Domain selected by ET1-VDD-SEL GPIO allowed only for 3.3V.
78	CAN0-TX	P42-1	AE7	3.3V Power Domain
79	ET1-RXD0	P34-1	AC3	1.8V or 3.3V Power Domain selected by ET1-VDD-SEL GPIO allowed only for 3.3V.
80	GND	Power	-	
81	ET1-RXD1	P35-0	AC4	1.8V or 3.3V Power Domain selected by ET1-VDD-SEL GPIO allowed only for 3.3V.
82	I2C3-SCL-EXT	P46-3	D13	I2C interface used for on-board PMIC configuration Built-in pull-up resistor 2.2kOhm connected to 3.3V 3.3V Power Domain
83	ET1-RXD2	P35-1	AB4	1.8V or 3.3V Power Domain selected by ET1-VDD-SEL GPIO allowed only for 3.3V.
84	I2C3-SDA-EXT	P46-2	C12	I2C interface used for on-board PMIC configuration Built-in pull-up resistor 2.2kOhm connected to 3.3V 3.3V Power Domain
85	ET1-RXD3	P36-0	AB3	1.8V or 3.3V Power Domain selected by ET1-VDD-SEL GPIO allowed only for 3.3V.
86	I2C2-SCL	P42-4	AC5	Built-in pull-up resistor 2.2kOhm connected to 3.3V
87	GND	Power	-	
88	I2C2-SDA	P42-3	AH3	Built-in pull-up resistor 2.2kOhm connected to 3.3V
89	ET1-TX-CTL	P29-1	Y1	1.8V or 3.3V Power Domain selected by ET1-VDD-SEL GPIO allowed only for 3.3V.
90	P19-0	P19-0	B1	3.3V Power Domain
91	ET1-TXC	P29-0	AB2	1.8V or 3.3V Power Domain selected by ET1-VDD-SEL GPIO allowed only for 3.3V.
92	P18-0	P18-0	C2	3.3V Power Domain
93	ET1-TXD3	P31-1	Y2	1.8V or 3.3V Power Domain selected by ET1-VDD-SEL GPIO allowed only for 3.3V.
94	GND	Power	-	

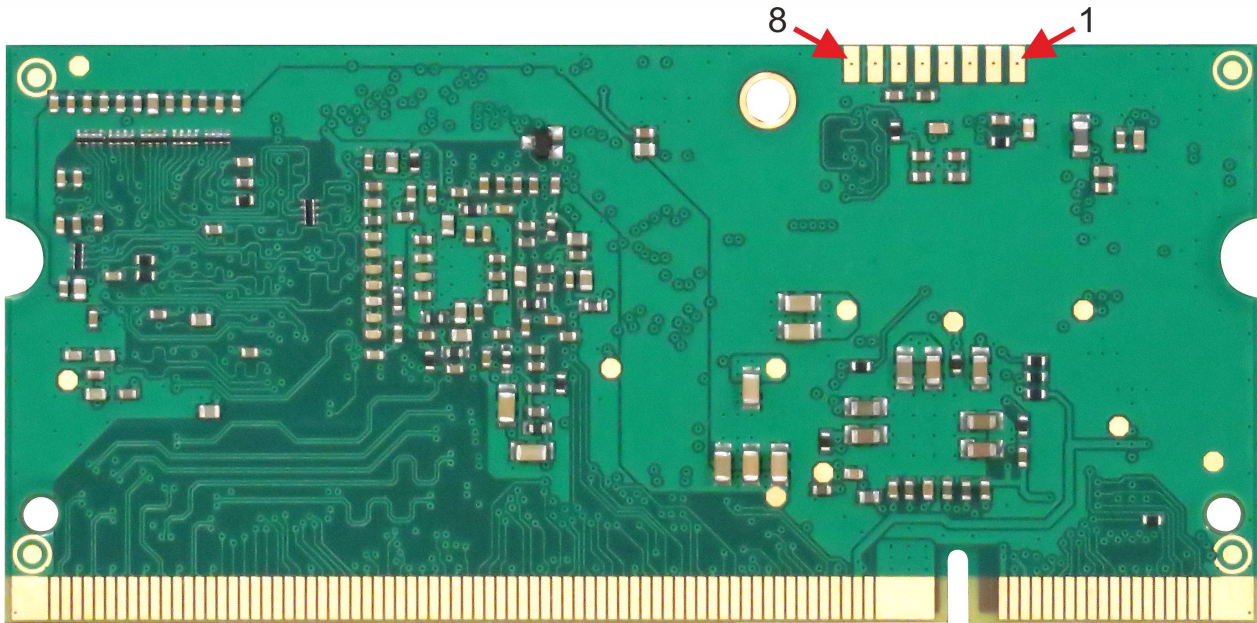
95	ET1-TXD2	P31-0	AA1	1.8V or 3.3V Power Domain selected by ET1-VDD-SEL GPIO allowed only for 3.3V.
96	P18-1	P18-1	D3	3.3V Power Domain
97	ET1-TXD1	P30-1	AA2	1.8V or 3.3V Power Domain selected by ET1-VDD-SEL GPIO allowed only for 3.3V.
98	P45-0	P45-0	A8	3.3V Power Domain
99	ET1-TXD0	P30-0	AB1	1.8V or 3.3V Power Domain selected by ET1-VDD-SEL GPIO allowed only for 3.3V.
100	P45-2	P45-2	A9	3.3V Power Domain
101	GND	Power	-	
102	P45-3	P45-3	B9	3.3V Power Domain
103	USB1-D_N	Analog I/O	-	
104	P46-0	P46-0	B10	3.3V Power Domain
105	USB1-D_P	Analog I/O	-	
106	P46-1	P46-1	A10	3.3V Power Domain
107	USB1-OC	P8-1	AJ20	3.3V Power Domain
108	P45-1	P45-1	D12	3.3V Power Domain
109	USB1-EN	P8-0	AH19	3.3V Power Domain
110	P1-1	P1-1	A12	3.3V Power Domain
111	GND	Power	-	
112	P3-1	P3-1	B14	3.3V Power Domain
113	USB0-OC	P5-0	AJ4	3.3V Power Domain
114	P1-0	P1-0	C13	3.3V Power Domain
115	USB0-EN	P4-0	AJ5	3.3V Power Domain
116	GND	Power	-	
117	USB0-ID	P5-1	AH4	3.3V Power Domain
118	P3-0	P3-0	A14	3.3V Power Domain
119	USB0-D_N	Analog I/O	-	
120	P48-2	P48-2	A22	3.3V Power Domain
121	USB0-D_P	Analog I/O	-	
122	P4-1	P4-1	AH6	3.3V Power Domain
123	USB0-VBUS	Dedicated input	AH10	3.3V Power Domain
124	P7-2	P7-2	AJ19	3.3V Power Domain
125	GND	Power	-	
126	GND	Power	-	
127	P11-1	P11-1	AF22	3.3V Power Domain
128	P11-0	P11-0	AG22	3.3V Power Domain
129	P8-2	P8-2	AH20	3.3V Power Domain
130	P12-0	P12-0	AE22	3.3V Power Domain
131	P9-1	P9-1	AH21	3.3V Power Domain
132	P13-1	P13-1	AG23	3.3V Power Domain
133	P9-0	P9-0	AJ21	3.3V Power Domain
134	SPI1-SSL	P44-3	B19	3.3V Power Domain
135	SPI0-SSL	P43-3	B19	3.3V Power Domain
136	SPI1-MISO	P44-2	D18	3.3V Power Domain
137	SPI0-MISO	P43-2	E18	3.3V Power Domain
138	SPI1-MOSI	P44-1	F17	3.3V Power Domain

139	SPI0-MOSI	P43-1	D17	3.3V Power Domain
140	SPI1-CLK	P44-0	A19	3.3V Power Domain
141	SPI0-CLK	P43-0	B18	3.3V Power Domain
142	GND	Power	-	
143	GND	Power	-	
144	I2C1-SCL	Dedicated I2C line	C23	RIIC1_SCL Built-in pull-up resistor 2.2kOhm connected to 3.3V
145	P14-0	P14-0	AF27	3.3V Power Domain
146	I2C1-SDA	Dedicated I2C line	A24	RIIC1_SDA Built-in pull-up resistor 2.2kOhm connected to 3.3V
147	P10-1	P10-1	AH22	3.3V Power Domain
148	I2C0-SCL	Dedicated I2C line	B24	RIIC0_SCL Built-in pull-up resistor 2.2kOhm connected to 3.3V
149	P10-0	P10-0	AJ22	3.3V Power Domain
150	I2C0-SDA	Dedicated I2C line	A25	RIIC0_SDA Built-in pull-up resistor 2.2kOhm connected to 3.3V
151	P15-0	P15-0	AH23	3.3V Power Domain
152	GND	Power	-	
153	P14-1	P14-1	AJ23	3.3V Power Domain
154	ADC-CH7	Dedicated analog input		12-bit ADC, max. 1.8V on input
155	P16-0	P16-0	AH24	3.3V Power Domain
156	ADC-CH6	Dedicated analog input		12-bit ADC, max. 1.8V on input
157	P15-1	P15-1	AJ24	3.3V Power Domain
158	ADC-CH5	Dedicated analog input		12-bit ADC, max. 1.8V on input
159	P17-0	P17-0	AH25	3.3V Power Domain
160	ADC-CH4	Dedicated analog input		12-bit ADC, max. 1.8V on input
160	SSI-MCLK	AUDIO-CLK	E12	Reference clock output (for audio codec)
161	P16-1	P16-1	AJ25	3.3V Power Domain
162	ADC-CH3	Dedicated analog input		12-bit ADC, max. 1.8V on input
163	P17-2	P17-2	AH26	3.3V Power Domain
164	ADC-CH2	Dedicated analog input		12-bit ADC, max. 1.8V on input
165	P17-1	P17-1	AJ26	3.3V Power Domain
166	ADC-CH1	Dedicated analog input		12-bit ADC, max. 1.8V on input
167	P13-2	P13-2	AG26	3.3V Power Domain
168	ADC-CH0	Dedicated analog input		12-bit ADC, max. 1.8V on input
169	GND	Power	-	
170	GND	Power	-	
171	DSI-DATA3_P	Analog I/O	AH18	MIPI-DSI line
172	CSI-DATA3_N	Analog I/O	AH11	MIPI-CSI line
173	DSI-DATA3_N	Analog I/O	AJ18	MIPI-DSI line
174	CSI-DATA3_P	Analog I/O	AJ11	MIPI-CSI line
175	GND	Power	-	
176	GND	Power	-	
177	DSI-DATA2_P	Analog I/O	AH15	MIPI-DSI line
178	CSI-DATA2_N	Analog I/O	AH14	MIPI-CSI line
179	DSI-DATA2_N	Analog I/O	AJ15	MIPI-DSI line
180	CSI-DATA2_P	Analog I/O	AJ14	MIPI-CSI line

181	GND	Power	-	
182	GND	Power	-	
183	DSI-CLK_P	Analog I/O	AG17	MIPI-DSI line
184	CSI-CLK_N	Analog I/O	AG12	MIPI-CSI line
185	DSI-CLK_N	Analog I/O	AG18	MIPI-DSI line
186	CSI-CLK_P	Analog I/O	AG13	MIPI-CSI line
187	GND	Power	-	
188	GND	Power	-	
189	DSI-DATA1_P	Analog I/O	AH17	MIPI-DSI line
190	CSI-DATA1_N	Analog I/O	AH12	MIPI-CSI line
191	DSI-DATA1_N	Analog I/O	AJ17	MIPI-DSI line
192	CSI-DATA1_P	Analog I/O	AJ12	MIPI-CSI line
193	GND	Power	-	
194	GND	Power	-	
195	DSI-DATA0_P	Analog I/O	AH16	MIPI-DSI line
196	CSI-DATA0_N	Analog I/O	AH13	MIPI-CSI line
197	DSI-DATA0_N	Analog I/O	AJ16	MIPI-DSI line
198	CSI-DATA0_P	Analog I/O	AJ13	MIPI-CSI line
199	GND	Power	-	
200	GND	Power	-	
-	WLAN-ENABLE	P40-2	A17	1DX radio module line (WiFi) Not available externally
-	WLAN-H-WAKE	P19-1	B2	1DX radio module line (WiFi) Not available externally
-	SD1-CLK	-	H3	1DX radio module line (WiFi) Not available externally
-	SD1-CMD	-	J2	1DX radio module line (WiFi) Not available externally
-	SD1-DATA0	-	H1	1DX radio module line (WiFi) Not available externally
-	SD1-DATA1	-	H2	1DX radio module line (WiFi) Not available externally
-	SD1-DATA2	-	K2	1DX radio module line (WiFi) Not available externally
-	SD1-DATA3	-	J1	1DX radio module line (WiFi) Not available externally
-	UART2-RXD	P48-1	B23	1DX radio module line (BLE) Not available externally
-	UART2-TXD	P48-0	B22	1DX radio module line (BLE) Not available externally
-	UART2-RTS	P48-4	B23	1DX radio module line (BLE) Not available externally
-	UART2-CTS	P48-3	C22	1DX radio module line (BLE) Not available externally
-	BT-DEV-WAKE	P39-0	A16	1DX radio module line (BLE) Not available externally
-	BT-HOST-WAKE	P39-1	C15	1DX radio module line (BLE) Not available externally
-	BT-REG-ON	P39-3	B16	1DX radio module line (BLE) Not available externally

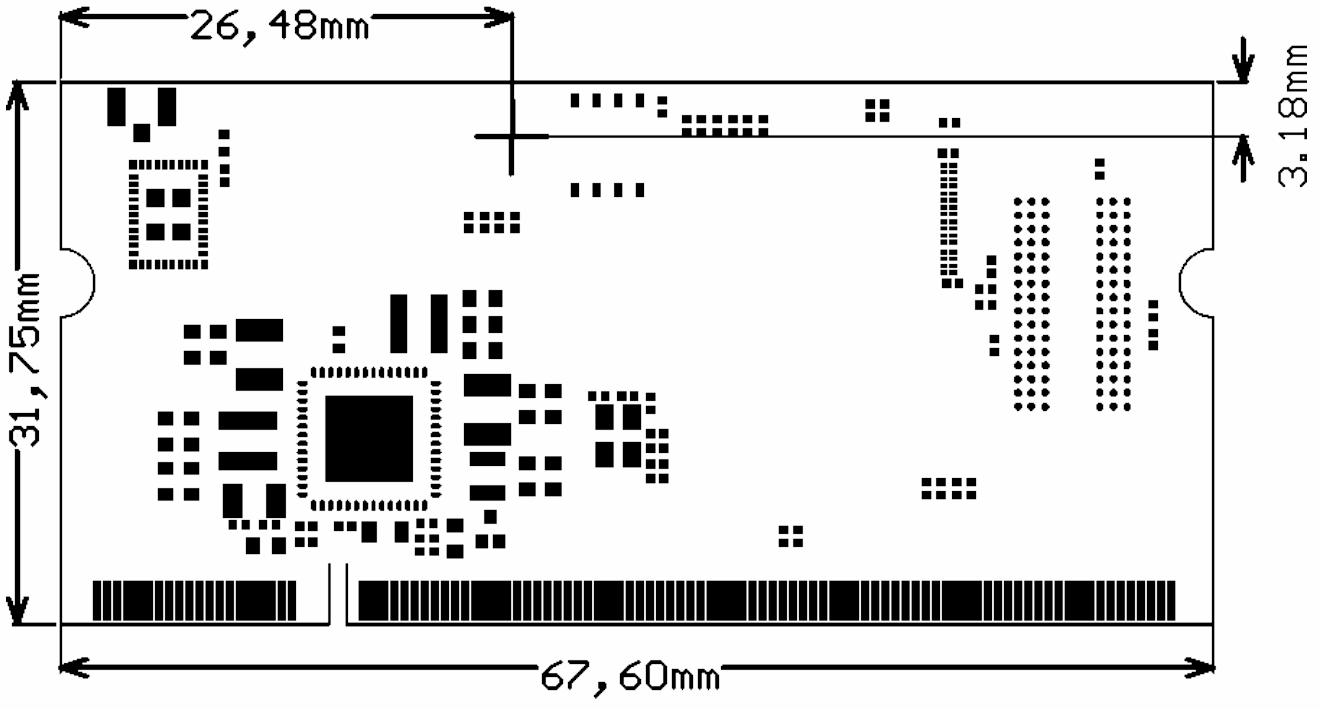
-	JTAG-TMS		AD2	JTAG interface 1.8V Power Domain
-	JTAG-TCK		AE1	JTAG interface 1.8V Power Domain
-	JTAG-TDO		AE2	JTAG interface 1.8V Power Domain
-	JTAG-TDI		AF1	JTAG interface 1.8V Power Domain
-	JTAG-TRST		AF2	JTAG interface 1.8V Power Domain
-	QSPI-CLK		C4	Optional on-board QSPI Flash (W25Q128FWPIG)
-	QSPI-IO0		A3	Optional on-board QSPI Flash (W25Q128FWPIG)
-	QSPI-IO1		B3	Optional on-board QSPI Flash (W25Q128FWPIG)
-	QSPI-IO2		A4	Optional on-board QSPI Flash (W25Q128FWPIG)
-	QSPI-IO3		B4	Optional on-board QSPI Flash (W25Q128FWPIG)
-	QSPI-SS		A2	Optional on-board QSPI Flash (W25Q128FWPIG)

JTAG Connector



Connector pin number	Default function	GPIO	BGA456 ball	Notes
JTAG-CONN-1	VDD-1V8	-	-	
JTAG-CONN-2	TMS (SWDIO)	-	AD2	10kOhm pull-up
JTAG-CONN-3	TCK (SWDCLK)	-	AE1	10kOhm pull-up
JTAG-CONN-4	TDO	-	AE2	10kOhm pull-up
JTAG-CONN-5	TDI	-	AF1	10kOhm pull-up
JTAG-CONN-6	TRST	-	AF2	10kOhm pull-up
JTAG-CONN-7	DEBUG EN	-	AE18	10kOhm pull-down
JTAG-CONN-8	GND	-	-	-

Dimensions





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