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VisionSOM-RT117x Datasheet and Pinout

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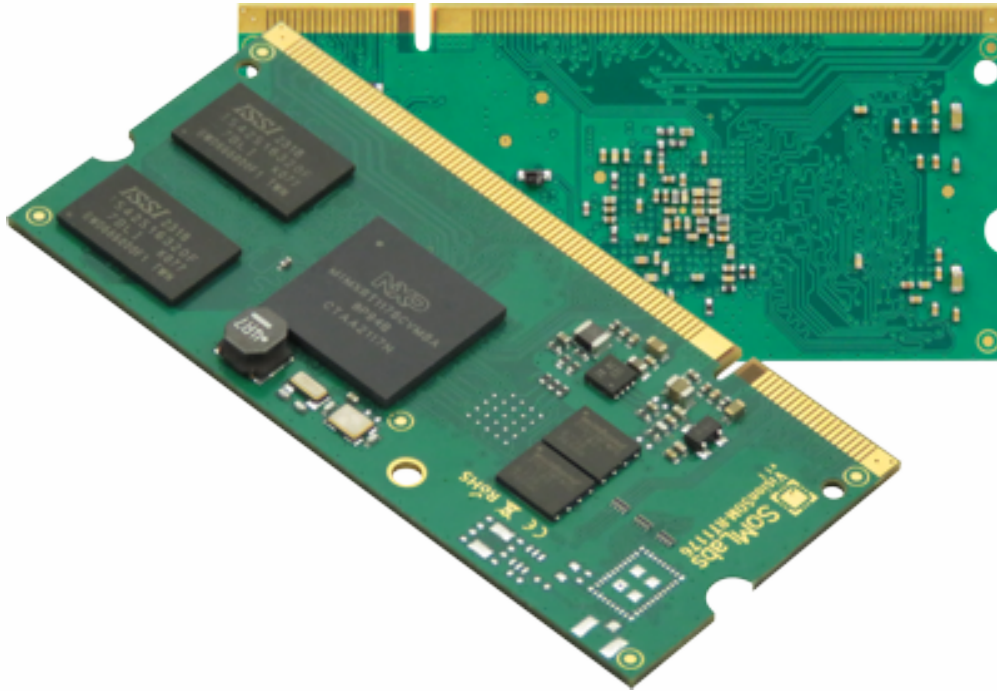
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VisionSOM-RT117x Datasheet and Pinout

General description



The VisionSOM-RT117x family is a SODIMM-sized SoM based on the NXP i.MX RT1170 family real-time microcontroller which features an advanced implementation of a dual ARM Cortex-M7 and Cortex-M4 cores. The Cortex-M7 operates at up to 1 GHz and the Cortex-M4 up to 400 MHz with 2 MB on-chip RAM. The real-time microcontroller (MCU) family offers various memory interfaces and a wide range of connectivity interfaces including 3x Ethernet up to Gbps with TSN/AVB, UART, SPI, I2C, USB and 3x CAN-FD. The i.MX RT1170 provides advanced embedded security including secure boot and crypto engines.

The VisionSOM-RT117x is a low power highly integrated SoM (System-on-Module) featuring high computation performance, real-time functionality and MCU usability. High security enabled by AES-128/256 and RSA4096, HAB and On-the-fly QSPI Flash Decryption together with 2D graphical acceleration make an ideally suited solution for home and industrial control systems, wireless application, communication solutions and real-time systems.

The system supports industrial grade targeting embedded application.

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

Applications

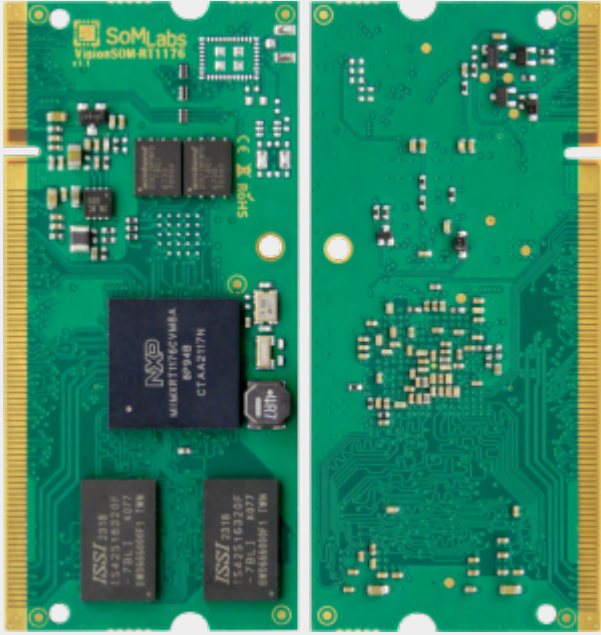
- Industrial embedded RTOS computer
- Home Appliances
- Air Conditioning
- Building Security
- Fleet Management
- Heat Metering
- Home Automation - Smart Home
- Human-machine Interfaces (HMI)
- Motor Drives

- Cash Register
- Intermediate Flight Controller
- Smart grid Infrastructure
- IoT gateways
- Residential getaways
- Smart Lock
- Robotics
- Toys and Board Games

Features

- Powered by NXP i.MX RT117x application processor
- Single (Cortex-M7) or dual (Cortex-M7 + Cortex-M4) core solution
- Core clock up to 1GHz (single core, commercial grade MCU)
- 2MB on-chip RAM memory
- up to 128MB SDRAM memory
- up to 32MB QuadSPI Flash memory
- Power-efficient and cost-optimized solution
- Ideal for industrial IoT and embedded applications
- FreeRTOS support

Pictures of SOM versions

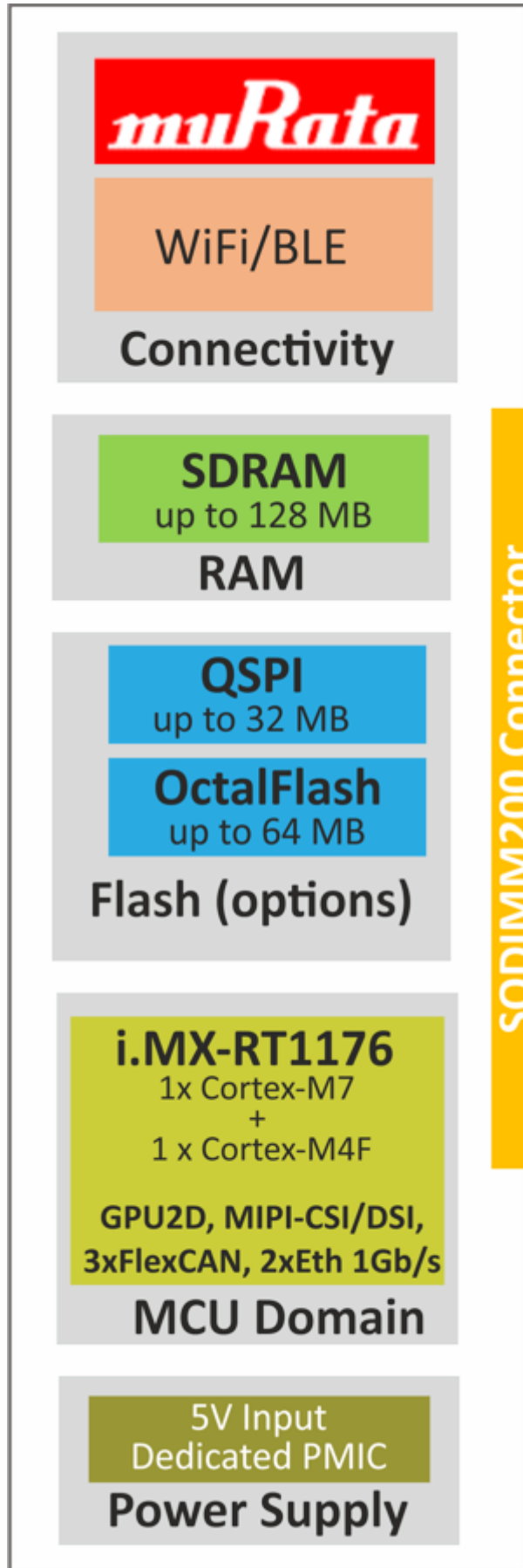
Version	Photo
SDRAM & dual QSPI	

Ordering info

SLS14CpuType_Clock_RamSize_FlashSize_SF_TEMP

SLS	Product type SLS - System on Module
1	SOM Name 1 - VisionSOM SODIMM200
4	CPU Family 4 - i.MX RT117x
CpuType	CPU Type RT1176 - i.MX RT 1176
Clock	CPU Clock Speed 800C - 800MHz
RamSize	RAM Size 0R - No RAM 32R - 32MB 64R - 64MB 128R - 128MB
FlashSize	Flash Size Type and Density 4QSPI - 4MB QSPI Flash 16QSPI - 16MB QSPI Flash 32QSPI - 32MB QSPI Flash 64OF - 64MB Octal Flash
SF	Special Features 0SF - No Special Features
TEMP	Operating Temperature C - Consumer: 0 to +70 C I - Industrial: -40 to +85 C

Block Diagram



Operating ranges

Parameter	Value	Unit	Comment
External Power Supply	5.0	V	Connected to VDD-5V0 SODIMM pins
Internal DC-DC converter output voltage	3.3	V	Connected to VDD-3V3 SODIMM pins
Internal DC-DC converter output current	200	mA	Maximum value for external loads
Input GPIO_DISP_B1 domain voltage	1.98	V	-
Input NVCC_SNVS domain voltage	1.85	V	NVCC_SNVS is internally powered from VDD_SNVS_ANA = 1.75V ¹
Input IO domains voltage	3.96	V	Maximum value Regarding domains: - NVCC_SD1 - NVCC_LPSR - NVCC_DISP2 - NVCC_GPIO - NVCC_SD1
Input VBUS (USB1 and USB2) voltage	5.6	V	-
Environment temperature ²	-40...+85	°C	Industrial range
	0...+70		Consumer range

Note:

1. All system control lines (i.a. ONOFF, POR_B, PMIC_STBY_REQ, PMIC_ON_REQ) are powered from NVCC_SNVS domain, connected to VDD_SNVS_ANA=1.75V.
2. Maximum MPU junction temperature is +105°C (industrial version) or +95°C (consumer version).

Electrical parameters

SOM signal name	Parameter	Value			Units
		Min.	Typ.	Max.	
VDD-5V	Supply Voltage	4.5	5.0	5.5	V
-	Total Supply Current ¹	-	TBD	TBD	mA
GPIOs in GPIO_DISP_B1 domain	Input Voltage	0	1.8	1.98 ²	V
GPIOs in NVCC_SNVS domain	Input Voltage	0	1.75	1.85 ²	V
GPIOs in NVCC_SD1, NVCC_LPSR, NVCC_DISP2, NVCC_GPIO, NVCC_SD1 domains	Input Voltage	0	3.3	3.96 ²	V
USB Vbus	USB Supply	0	5	5.6 ²	V
System Control Lines	-	0	1.75	1.85 ^{2, 3}	V
VDD-3V3	Internal DC/DC converter Output Voltage	3.15	3.3	3.35	V
-	Internal DC/DC converter Output Current	-	-	0.2	A
VDD-COIN-3V	SNVS Backup Battery Supply	2.82	-	3.6	V

Notes:

1. Excluding external load connected to VDD-3V3 lines.
2. Applying the maximum voltage higher than recommended results in shorten lifetime.
3. All system control lines (i.a. ONOFF, POR_B, PMIC_STBY_REQ, PMIC_ON_REQ) are powered from NVCC_SNVS domain, supplied from internal MCU LDO output (VDD_SNVS_ANA=1.75V).

Pinout

Important notes:

1. Detail pin configurations description you can find, edit and arrange in dedicated MEX files (with free "i.MX Pin Tool" configurational tool): [VisionSOM-RT117x with QSPI Flash and SDRAM memory on board](#)

SOM pin number	Default function	GPIO	Ball number	Notes
1	GND	-	-	-
2	GND	-	-	-
3	JTAG.TMS	GPIO_LPSR_15	U7	3.3V power domain
4	WAKEUP		T8	1.75V VDD_SNVS_ANA power domain A GPIO powered by SNVS domain power supply which can be configured as wakeup source in SNVS mode
5	JTAG.TCK	GPIO_LPSR_14	T6	3.3V power domain
6	ON-OFF	-	U10	1.75V VDD_SNVS_ANA power domain A brief connection to GND in the OFF mode causes the internal power management state machine to change the state to ON. In the ON mode, a brief connection to GND generates an interrupt (intended to be a software-controllable power-down). Approximately five seconds (or more) to GND causes a forced OFF. Both boot mode inputs can be disconnected.
7	JTAG.TDO	GPIO_LPSR_11	T5	3.3V power domain
8	PMIC-STBY-REQ	-	T9	1.75V VDD_SNVS_ANA power domain Internally used
9	JTAG.TDI	GPIO_LPSR_12	U5	3.3V power domain
10	RESET	-	T10	POR-B of MCU line (resets all of the chip except the Secure Non-Volatile Storage (SNVS) block), active low 1.75V VDD_SNVS_ANA power domain
11	JTAG.TRST	GPIO_LPSR_10	R5	3.3V power domain
12	RESET-IN	-	-	Active low global reset line (hard reset by turning off the power)
13	JTAG.MOD	GPIO_LPSR_13	U6	3.3V power domain Line with internal pull-down by 10 kOhm resistor
14	GND	-	-	-
15	SD1.DATA1	GPIO_SD_B1_03	B17	WIFI data line or GPIO Available to the user as GPIO only in modules without 1DX radio modules 3.3V power domain
16	UART2.RXD	GPIO_DISP_B2_11	A6	3.3V power domain
17	SD1.DATA0	GPIO_SD_B1_02	C15	WIFI data line or GPIO Available to the user as GPIO only in modules without 1DX radio modules 3.3V power domain
18	UART2.TXD	GPIO_DISP_B2_10	D9	3.3V power domain
19	GND	-	-	-
20	UART10.CTS	GPIO_AD_34	J16	3.3V power domain
21	SD1.CLK	GPIO_SD_B1_01	D15	WIFI data line or GPIO Available to the user as GPIO only in modules without 1DX radio modules 3.3V power domain

22	UART10.RTS	GPIO_AD_35	G17	3.3V power domain
23	SD1.CMD	GPIO_SD_B1_00	B16	WIFI data line or GPIO Available to the user as GPIO only in modules without 1DX radio modules 3.3V power domain
24	UART10.RXD	GPIO_AD_16	N17	3.3V power domain
25	SD1.DATA3	GPIO_SD_B1_05	A16	WIFI data line or GPIO Available to the user as GPIO only in modules without 1DX radio modules 3.3V power domain
26	UART10.TXD	GPIO_AD_15	M14	3.3V power domain
27	SD1.DATA2	GPIO_SD_B1_04	B15	WIFI data line or GPIO Available to the user as GPIO only in modules without 1DX radio modules 3.3V power domain
28	UART3.RXD	GPIO_AD_31	J17	3.3V power domain
29	UART1-EXT.CTS	GPIO_AD_26	L14	BT serial interface line or GPIO Available to the user as GPIO only in modules without 1DX radio modules 3.3V power domain
30	UART3.TXD	GPIO_AD_30	K17	3.3V power domain
31	UART1-EXT.RTS	GPIO_AD_27	N16	BT serial interface line or GPIO Available to the user as GPIO only in modules without 1DX radio modules 3.3V power domain
32	UART5.RXD	GPIO_AD_29	M17	3.3V power domain
33	UART1-EXT.RXD	GPIO_AD_25	M15	BT serial interface line or GPIO Available to the user as GPIO only in modules without 1DX radio modules 3.3V power domain
34	UART5.TXD	GPIO_AD_28	L17	3.3V power domain
35	UART1-EXT.TXD	GPIO_AD_24	L13	BT serial interface line or GPIO Available to the user as GPIO only in modules without 1DX radio modules 3.3V power domain
36	VDD-COIN-3V	-	-	The backup power supply for VDD-SNVS-3V3 domain
37	GND	-	-	-
38	GND	-	-	-
39	VOUT-1V8			Internally generated by MPU 1.8V for internal peripherals (maximum external load is very limited, details in Electrical Characteristics section of "i.MX RT1170 Crossover Processors Data Sheet for Industrial Products" by NXP)
40	VOUT-1V8			Internally generated by MPU 1.8V for internal peripherals (maximum external load is very limited, details in Electrical Characteristics section of "i.MX RT1170 Crossover Processors Data Sheet for Industrial Products" by NXP)
41	VDD-5V			Power supply input
42	VDD-5V			Power supply input
43	VDD-5V			Power supply input
44	VDD-5V			Power supply input
45	VDD-5V			Power supply input
46	VDD-5V			Power supply input

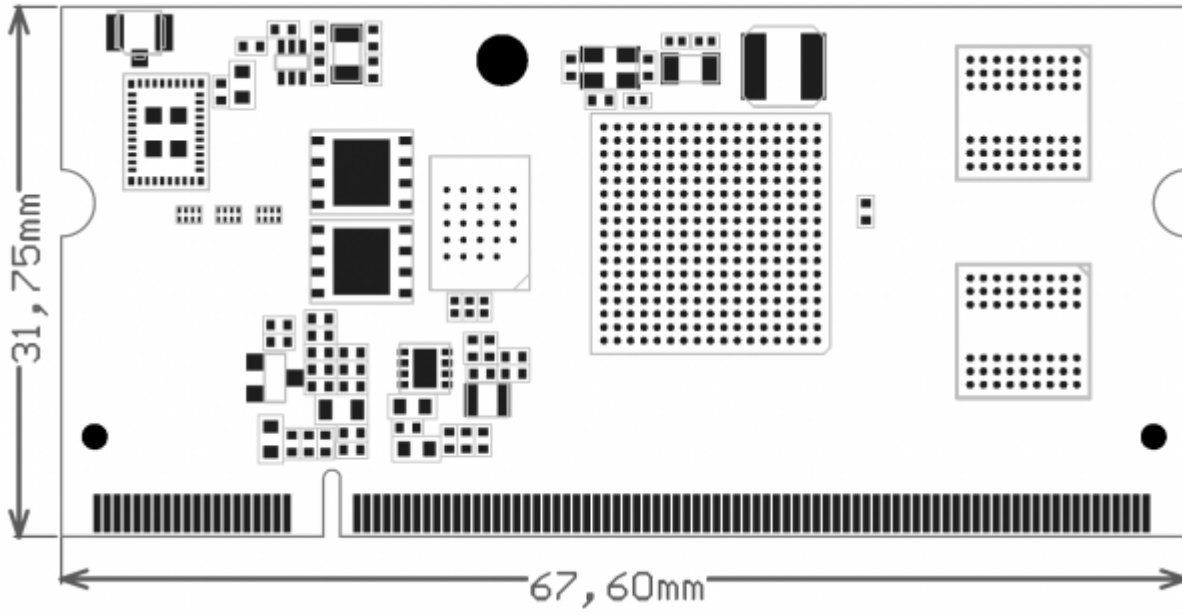
47	VDD-5V			Power supply input
48	VDD-5V			Power supply input
49	VDD-5V			Power supply input
50	VDD-5V			Power supply input
51	NC	-	-	-
52	NC	-	-	-
53	VOOUT-3V3			Internally generated by PMIC 3.3V for external devices
54	VOOUT-3V3			Internally generated by PMIC 3.3V for external devices
55	GND	-	-	-
56	DAC-OUT	DAC-OUT	H16	12-bit DAC voltage output (range 0-1.8V)
57	RECOVERY	BOOT-MODE0	P6	Boot mode selector, if: RECOVERY = 0 then BOOT-MODE0 = 1, as a result serial loader starts RECOVERY = 1 or open then BOOT-MODE0 = 0, as a result MCU boots from fuses
58	GND	-	-	-
59	GND	-	-	-
60	SAI1.MCLK	GPIO_DISP_B2_03	D7	3.3V power domain
61	NC	-	-	-
62	SAI1.RX	GPIO_DISP_B2_06	C6	3.3V power domain
63	USB1.D_N			USB1 interface analog I/O
64	SAI1.TX	GPIO_DISP_B2_07	D6	3.3V power domain
65	USB1.D_P			USB1 interface analog I/O
66	SAI1.FSYNC	GPIO_DISP_B2_04	C7	3.3V power domain
67	USB1.VBUS	-	D17	USB1 analog domain, input voltage 2.4-5.5V
68	SAI1.BCLK	GPIO_DISP_B2_05	C9	3.3V power domain
69	USB1.OC	GPIO_AD_11	P16	3.3V power domain
70	GND	-	-	-
71	USB1.EN	GPIO_AD_10	R17	3.3V power domain
72	CAN2.RX	GPIO_AD_01	R14	3.3V power domain
73	USB1.ID	GPIO_AD_09	R16	3.3V power domain
74	CAN2.TX	GPIO_AD_00	N12	3.3V power domain
75	GND	-	-	-
76	CAN1.RX	GPIO_AD_07	T17	3.3V power domain
77	USB2.ID	GPIO_AD_08	R15	3.3V power domain
78	CAN1.TX	GPIO_AD_06	N13	3.3V power domain
79	USB2.EN	GPIO_AD_12	P17	3.3V power domain
80	GND	-	-	-
81	USB2.OC	GPIO_AD_13	L12	3.3V power domain
82	I2C2.SCL	GPIO_AD_18	M16	3.3V power domain
83	USB2.VBUS	-	D16	USB2 analog domain, input voltage 2.4-5.5V
84	I2C2.SDA	GPIO_AD_19	L16	3.3V power domain
85	USB2.D_N			USB2 interface analog I/O
86	I2C1.SCL	GPIO_AD_32	K16	3.3V power domain
87	USB2.D_P			USB2 interface analog I/O
88	I2C1.SDA	GPIO_AD_33	H17	3.3V power domain
89	GND	-	-	-

90	GND	-	-	-
91	NC	-	-	-
92	UART8.RTS	GPIO_AD_05	P13	3.3V power domain
93	NC	-	-	-
94	UART8.CTS	GPIO_AD_04	M13	3.3V power domain
95	ENET-QOS.RESET	GPIO_EMC_B1_41	L1	3.3V power domain
96	UART8.RXD	GPIO_AD_03	P15	3.3V power domain
97	ENET-QOS.INT	GPIO_EMC_B1_40	K1	3.3V power domain
98	UART8.TXD	GPIO_AD_02	R13	3.3V power domain
99	ENET-QOS.MDIO	GPIO_EMC_B2_20	R3	3.3V power domain
100	GPIO3-13	GPIO_AD_14	N14	3.3V power domain
101	ENET-QOS.MDC	GPIO_EMC_B2_19	U2	3.3V power domain
102	GPIO3-21	GPIO_AD_22	K12	3.3V power domain
103	GND	-	-	-
104	GPIO3-22	GPIO_AD_23	J12	3.3V power domain
105	ENET-QOS.RXC	GPIO_DISP_B1_01	D13	1.8V power domain
106	GPIO5-03	GPIO_DISP_B2_02	E9	3.3V power domain
107	ENET-QOS.RX-CTL	GPIO_DISP_B1_00	E13	1.8V power domain
108	GPIO5-10	GPIO_DISP_B2_09	D8	3.3V power domain
109	ENET-QOS.RXD0	GPIO_DISP_B1_02	D11	1.8V power domain
110	GPIO5-01	GPIO_DISP_B2_00	E8	3.3V power domain
111	ENET-QOS.RXD1	GPIO_DISP_B1_03	E11	1.8V power domain
112	GPIO5-02	GPIO_DISP_B2_01	F8	3.3V power domain
113	ENET-QOS.RXD2	GPIO_DISP_B1_04	E10	1.8V power domain
114	GPIO5-09	GPIO_DISP_B2_08	B5	3.3V power domain
115	ENET-QOS.RXD3	GPIO_DISP_B1_05	C11	1.8V power domain
116	GND	-	-	-
117	GND	-	-	-
118	SPI4.CS0	GPIO_DISP_B2_15	A4	3.3V power domain
119	ENET-QOS.TX-CTL	GPIO_DISP_B1_10	B14	1.8V power domain
120	SPI4.IN	GPIO_DISP_B2_13	A5	3.3V power domain
121	ENET-QOS.TXC	GPIO_DISP_B1_11	A14	1.8V power domain
122	SPI4.OUT	GPIO_DISP_B2_14	A7	3.3V power domain
123	ENET-QOS.TXD3	GPIO_DISP_B1_06	D10	1.8V power domain
124	SPI4.SCK	GPIO_DISP_B2_12	B6	3.3V power domain
125	ENET-QOS.TXD2	GPIO_DISP_B1_07	E12	1.8V power domain
126	GND	-	-	-
127	ENET-QOS.TXD1	GPIO_DISP_B1_08	A15	1.8V power domain
128	GPIO-SVNS.0	GPIO_SNVS_00	R10	1.75V VDD_SNVS_ANA power domain
129	ENET-QOS.TXD0	GPIO_DISP_B1_09	C13	1.8V power domain
130	GPIO-SVNS.1	GPIO_SNVS_01	P10	1.75V VDD_SNVS_ANA power domain
131	GND	-	-	-
132	GPIO-SVNS.2	GPIO_SNVS_02	L9	1.75V VDD_SNVS_ANA power domain
133	NC	-	-	-
134	GPIO-SVNS.3	GPIO_SNVS_03	M10	1.75V VDD_SNVS_ANA power domain
135	NC	-	-	-

136	GPIO-SVNS.4	GPIO_SNVS_04	N10	1.75V VDD_SNVS_ANA power domain
137	NC	-	-	-
138	GPIO-SVNS.5	GPIO_SNVS_05	P9	1.75V VDD_SNVS_ANA power domain
139	UART12.CTS	GPIO_LPSR_05	N8	3.3V power domain
140	GPIO-SVNS.6	GPIO_SNVS_06	M9	1.75V VDD_SNVS_ANA power domain
141	UART12.RTS	GPIO_LPSR_04	N7	3.3V power domain
142	GPIO-SVNS.7	GPIO_SNVS_07	R9	1.75V VDD_SNVS_ANA power domain
143	UART12.RXD	GPIO_LPSR_01	R6	3.3V power domain
144	GPIO-SVNS.8	GPIO_SNVS_08	N9	1.75V VDD_SNVS_ANA power domain
145	UART12.TXD	GPIO_LPSR_00	N6	3.3V power domain
146	GPIO-SVNS.9	GPIO_SNVS_09	R11	1.75V VDD_SNVS_ANA power domain
147	NC	-	-	-
148	GND	-	-	-
149	I2C5.SCL	GPIO_LPSR_09	P5	3.3V power domain
150	I2C6.SCL	GPIO_LPSR_07	R8	3.3V power domain
151	I2C5.SDA	GPIO_LPSR_08	U8	3.3V power domain
152	I2C6.SDA	GPIO_LPSR_06	P8	3.3V power domain
153	GND	-	-	-
154	NC	-	-	-
155	NC	-	-	-
156	NC	-	-	-
157	NC	-	-	-
158	NC	-	-	-
159	NC	-	-	-
160	NC	-	-	-
161	NC	-	-	-
162	NC	-	-	-
163	NC	-	-	-
164	NC	-	-	-
165	NC	-	-	-
166	NC	-	-	-
167	NC	-	-	-
168	NC	-	-	-
169	GND	-	-	-
170	GND	-	-	-
171	NC	-	-	-
172	NC	-	-	-
173	NC	-	-	-
174	NC	-	-	-
175	GND	-	-	-
176	GND	-	-	-
177	NC	-	-	-
178	NC	-	-	-
179	NC	-	-	-
180	NC	-	-	-
181	GND	-	-	-

182	GND	-	-	-
183	DSI.CLK_P			DSI video output channel analog line
184	CSI.CLK_N			CSI video input channel analog line
185	DSI.CLK_N			DSI video output channel analog line
186	CSI.CLK_P			CSI video input channel analog line
187	GND	-	-	-
188	GND	-	-	-
189	DSI.DATA1_P			DSI video output channel analog line
190	CSI.DATA1_N			CSI video input channel analog line
191	DSI.DATA1_N			DSI video output channel analog line
192	CSI.DATA1_P			CSI video input channel analog line
193	GND	-	-	-
194	GND	-	-	-
195	DSI.DATA0_P			DSI video output channel analog line
196	CSI.DATA0_N			CSI video input channel analog line
197	DSI.DATA0_N			DSI video output channel analog line
198	CSI.DATA0_P			CSI video input channel analog line
199	GND	-	-	-
200	GND	-	-	-
	BOOT0	GPIO_LPSR_02	P6	3.3V power domain Recovery function Connected with BT-EN (BT_REG_ON) line of 1DX radio module
	BOOT1	GPIO_LPSR_03	T7	3.3V power domain Connected with WLAN-EN (WL_REG_ON) line of 1DX radio module
	BT-HWAKE	GPIO_AD_20	K13	3.3V power domain By default configured as GPIO3-19 connected to BT_HOST_WAKE of 1DX radio module
	BT-DWAKE	GPIO_AD_21	K14	3.3V power domain By default configured as GPIO3-20 connected to BT_DEV_WAKE of 1 DX radio module
	WDOG-B	GPIO_EMC_B2_18	N3	Internal hardware watchdog line (not available to the user)
	WLAN-WAKE	GPIO_AD_17	N15	3.3V power domain By default configured as GPIO3-16 connected to WL_HOST_WAKE pin of 1DX radio module

Dimensions



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