

Nitrogen8M_Mini SOM

User Manual

REVISION HISTORY

Date	Revision	Description
4/8/2019	0.1	First Draft
5/17/2019	0.2	Updated Power Consumptions
6/11/2019	0.3	Updated Connector Voltage Details
7/29/2019	0.4	Updated SODIMM Connector Pin out (PIN#22,101,223)

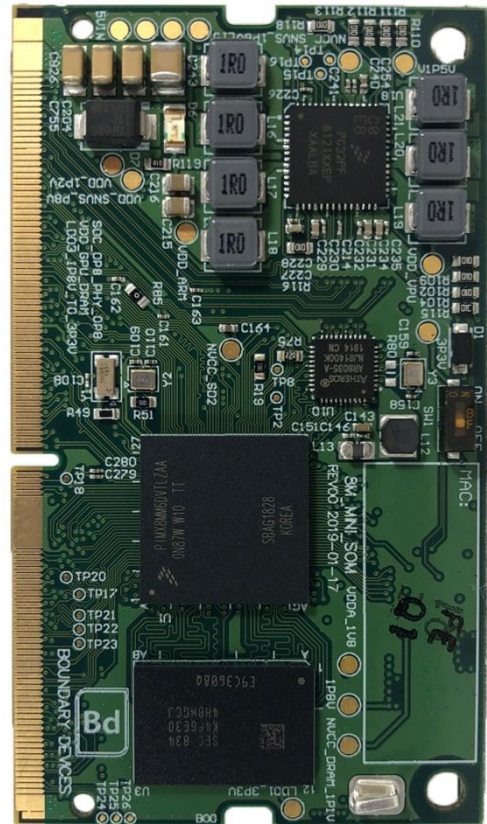




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1. NITROGEN8M_MINI SOM OVERVIEW

1.1 NITROGEN PLATFORM

The first Nitrogen platform was launched in 2014 after the worldwide success of Boundary Devices' i.MX 6 SABRE Lite Reference Design (now BD-SL-i.MX6). The Nitrogen platforms consist of Single Board Computers (SBC) and System on Modules (SOM) using BD's proprietary board layout design and featuring NXP's i.MX 6, i.MX 7, and i.MX 8 applications processors.

The Nitrogen platforms come fully supported by Boundary Devices' engineering team, and includes a full Board Support Package. Nitrogen platforms are designed to serve as a development platform as well as a production-ready solution. All Nitrogen boards can be de-populated or fully customized to meet specific project and budget requirement. Contact a Boundary Devices representative at info@boundarydevices.com to learn more.

1.2 NITROGEN8 FAMILY

The Nitrogen8 family of SBCs and SOMs are the latest in Boundary Devices' i.MX based embedded computing solutions. The Nitrogen8 family includes the Nitrogen8M, Nitrogen8X and Nitrogen8 MAX featuring NXP's i.MX 8 family of processors that were released in 2018.

The different Nitrogen8 series of SBCs and SOMs include offerings designed to best leverage the advantages of the i.MX 8, i.MX 8X, and i.MX 8M applications processors to fit a variety of embedded and IoT applications including: industrial automation, aviation & aerospace, HMI, industrial control, robotics, building control, digital displays, infotainment, telematics, and more.

1.3 SOFTWARE SUPPORT

Boundary Devices provides a full Board Support Package (BSP) for all Nitrogen boards.

The BSP includes bootloader, kernel and user-space components optimized for each platform.

Industry leading OS-Level support can be found on the Boundary Devices website via the Blog (<https://boundarydevices.com/blog>) and Wiki (<https://boundarydevices.com/wiki>). You can also find images for the latest versions of popular OS supported by the Nitrogen platforms including: Yocto, Buildroot, Ubuntu, Debian, Android, QNX, and FreeRTOS. Visit <https://boundarydevices.com/wiki/operating-systems/>

Boundary Devices does not provide application development or support, but does have large list of software partners who can. You can browse our partners at <https://boundarydevices.com/support>

1.4 MAIN SPECIFICATIONS

Introducing the Nitrogen8M_Mini SOM, featuring NXP's new i.MX 8M Mini applications processor. The RAM (2-4GB), and eMMC (8-128) can be modified to fit your requirements. The Nitrogen8M_Mini SOM is designed for mass production use with a guaranteed 10 year life span, FCC Pre-scan results, and a stable supply chain. Industrial temperature and conformal coating options are available. No cost carrier board review is available with volume purchase. Contact us for more information.

1.4.1 CPU

CPU Name	NXP i.MX 8M Mini Quad
CPU Type	x4 Cortex-A53 x1 Cortex-M4F
CPU Cores	4
CPU Clock (Max)	2GHz

1.4.2 MEMORY & STORAGE

MEMORY & STORAGE	
RAM	2GB LPDDR4 (up to 4 GB)
eMMC	8GB eMMC (upto 128 GB)

1.4.3 MULTIMEDIA

MULTIMEDIA	
2D/3D Graphics Acceleration	GCNanoUltra for 3D, GC320 for 2D
Video Encode / Decode	1080p60 H.264, VP8/1080p60 H.265, H.264, VP8, VP9
Camera Interfaces	x1 4-Lane MIPI CSI

1.4.4 DISPLAY & AUDIO CONNECTIONS

DISPLAY CONNECTIONS	
MIPI DSI	x1 4-lane (up to 1080p60)
AUDIO INTERFACES	
Headphone	Via Carrier



1.4.5 NETWORKING CONNECTIONS

NETWORKING CONNECTIONS	
Ethernet	10/100/1GB (PHY ONLY)
WiFi	802.11ac (BD-SMAC / QCA9377)(via Carrier)
Bluetooth	BT4.1 (BD-SMAC / QCA9377)(via Carrier)

1.4.6 CONNECTIVITY PORTS

CONNECTIVITY PORTS	
I2C	x3 (via Carrier)
SPI	x2(via Carrier)
UART	Up to x4 RS-232(via Carrier)
SD / MMC	x2(via Carrier)
USB	X1 USB 2.0 Host + x1 USB 2.0 OTG (via Carrier)
RTC	x1 + battery (via Carrier)
PCIe	x1(via Carrier)

1.4.7 MISCELLANEOUS SPECIFICATIONS

PCB SPECIFICATIONS	
Dimensions (L x W)	69.60 mm x 40mm
MISCELLANEOUS SPECIFICATIONS	
Temperature Rating	0°- +70°C (-40°- +85°C optional)
Power Supply	5V

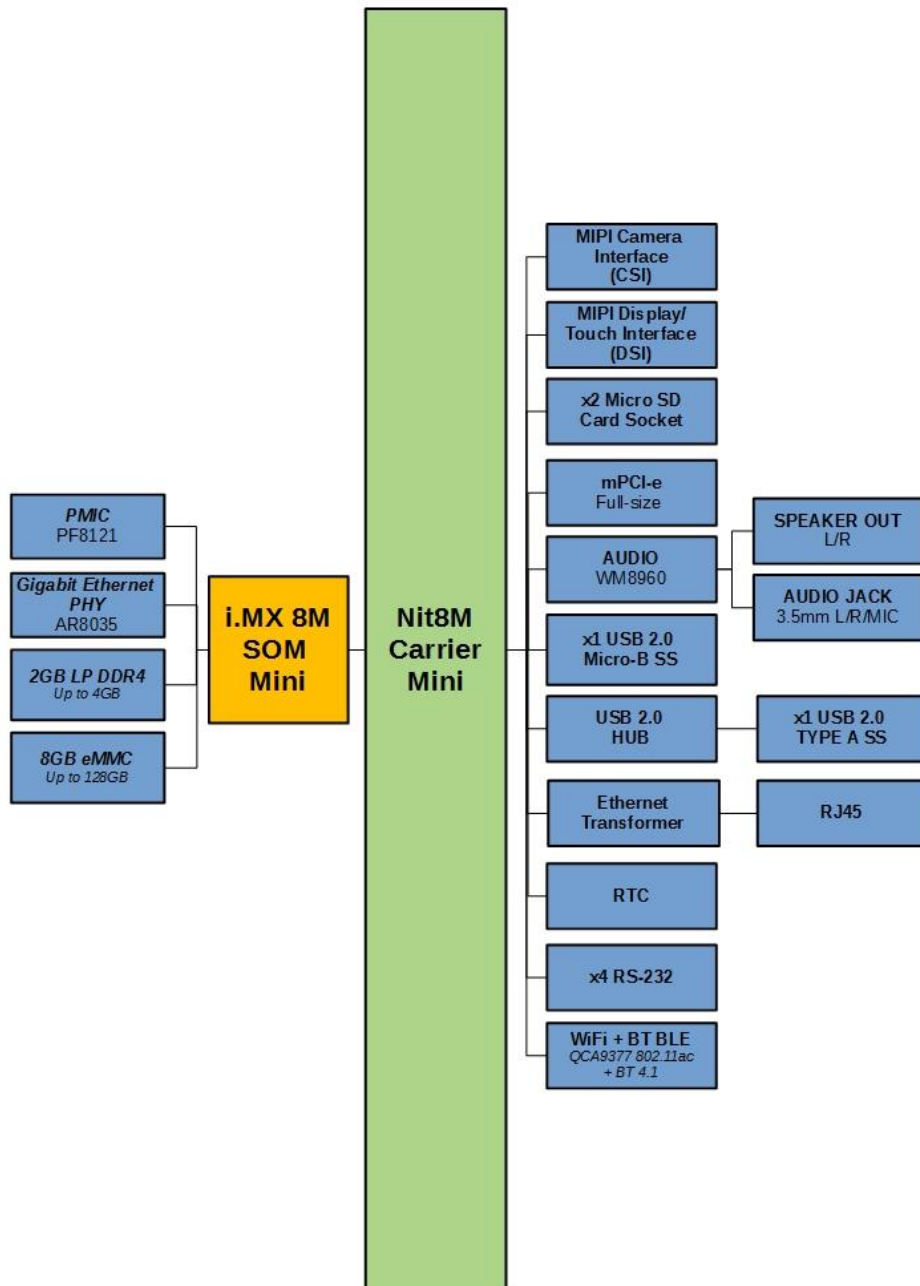


1.5 SUPPORTED OPERATING SYSTEMS

OS SUPPORTED	
Yocto	Yes
Debian	Yes
Ubuntu	Yes
Android	Yes

2.ARCHITECTURE OVERVIEW

2.1 BLOCK DIAGRAM





3.ELECTRICAL CHARACTERISTICS

3.1 ELECTRICAL CHARACTERISTICS OF NITROGEN8M_MINI SOM

PARAMETER	MIN	TYP	MAX	UNIT
Main Input Voltage	X	5	5	V
Power Consumption*	X	1300	2700	mW
CPU Clock	X	1.6	2	GHz

*The Power Consumption refers to a single board with no other peripherals plugged in

4.CONNECTOR DETAILS

4.1 CONNECTOR LAYOUT

260 Pin SODIMM Edge Connector to Carrier Board Interface (TE 2309407-1)				
PIN#	SOM Signal	SOM Voltage Domain	Voltage Level	Comments
1	+5V	-	5V Power	
2	+5V	-	5V Power	
3	+5V	-	5V Power	
4	+5V	-	5V Power	
5	+5V	-	5V Power	
6	+5V	-	5V Power	
7	+5V	-	5V Power	
8	+5V	-	5V Power	
9	GND	-	Ground	
10	GND	-	Ground	
11	GND	-	Ground	
12	GND	-	Ground	
13	GND	-	Ground	
14	GND	-	Ground	
15	GND	-	Ground	
16	GND	-	Ground	
17	GND	-	Ground	
18	GND	-	Ground	
19	LDO3_1P8V_TO_3P3V		Power Output	DEFAULT 1.8V FOR CUSTOMER USE 350 MA MAX
20	GND	-	Ground	
21	LDO3_1P8V_TO_3P3V		Power Output	DEFAULT 1.8V FOR CUSTOMER USE 350 MA MAX
22	VDD_LICELL		3V Battery	
23	RGMII_ACT		Ethernet	
24	SAI1_RXFS	NVCC_SAI1	3.3V	
25	RGMII_LINK		Ethernet	
26	SAI1_RXC	NVCC_SAI1	3.3V	
27	GND	-	Ground	
28	SAI1_RXD0	NVCC_SAI1	3.3V	
29	TRX3_N		Ethernet	
30	SAI1_RXD1	NVCC_SAI1	3.3V	
31	TRX3_P		Ethernet	



32	SAI1_RXD2	NVCC_SAI1	3.3V	
33	GND	-	Ground	
34	SAI1_RXD3	NVCC_SAI1	3.3V	
35	TRX2_N		Ethernet	
36	SAI1_RXD4	NVCC_SAI1	3.3V	
37	TRX2_P		Ethernet	
38	SAI1_RXD5	NVCC_SAI1	3.3V	
39	GND	-	Ground	
40	SAI1_RXD6	NVCC_SAI1	3.3V	
41	TRX1_N		Ethernet	
42	SAI1_RXD7	NVCC_SAI1	3.3V	
43	TRX1_P		Ethernet	
44	GND	-	Ground	
45	GND	-	Ground	
46	SAI1_MCLK	NVCC_SAI1	3.3V	
47	TRX0_N		Ethernet	
48	GND	-	Ground	
49	TRX0_P		Ethernet	
50	SAI1_TXFS	NVCC_SAI1	3.3V	
51	GND	-	Ground	
52	SAI1_TXC	NVCC_SAI1	3.3V	
53	CLKOUT2	NVCC_CLK	1.8V	
54	SAI1_TXD0	NVCC_SAI1	3.3V	
55	CLKIN2	NVCC_CLK	1.8V	
56	SAI1_TXD1	NVCC_SAI1	3.3V	
57	GND	-	Ground	
58	SAI1_TXD2	NVCC_SAI1	3.3V	
59	CLKOUT1	NVCC_CLK	1.8V	
60	SAI1_TXD3	NVCC_SAI1	3.3V	
61	CLKIN1	NVCC_CLK	1.8V	
62	SAI1_TXD4	NVCC_SAI1	3.3V	
63	GND	-	Ground	
64	SAI1_TXD5	NVCC_SAI1	3.3V	
65	JTAG_TMS	NVCC_JTAG	3.3V	
66	SAI1_TXD6	NVCC_SAI1	3.3V	
67	JTAG_TCK	NVCC_JTAG	3.3V	
68	SAI1_TXD7	NVCC_SAI1	3.3V	
69	JTAG_TDI	NVCC_JTAG	3.3V	
70	GND	-	Ground	
71	JTAG_TDO	NVCC_JTAG	3.3V	



72	WIFI_RESET	NVCC_SD1	1.8V	
73	JTAG_MOD	NVCC_JTAG	3.3V	
74	WL_WAKE_HOST	NVCC_SAI2	3.3V	
75	JTAG_NTRST	NVCC_JTAG	3.3V	
76	SAI5_RXC	NVCC_SAI5	3.3V	
77	GND	-	Ground	
78	SD3_DATA3	NVCC_NAND	3.3V	
79	SD2_RESET_B	NVCC_SD2	1.8V/3.3V	CUSTOMER DRIVEN 1.8V OR 3.3V
80	SD3_DATA2	NVCC_NAND	3.3V	
81	SD2_CD	NVCC_SD2	1.8V/3.3V	CUSTOMER DRIVEN 1.8V OR 3.3V
82	SD3_DATA1	NVCC_NAND	3.3V	
83	SD2_DATA0	NVCC_SD2	1.8V/3.3V	CUSTOMER DRIVEN 1.8V OR 3.3V
84	SD3_DATA0	NVCC_NAND	3.3V	
85	SD2_DATA1	NVCC_SD2	1.8V/3.3V	CUSTOMER DRIVEN 1.8V OR 3.3V
86	SD3_CMD	NVCC_NAND	3.3V	
87	SD2_DATA2	NVCC_SD2	1.8V/3.3V	CUSTOMER DRIVEN 1.8V OR 3.3V
88	GND	-	Ground	
89	SD2_DATA3	NVCC_SD2	1.8V/3.3V	CUSTOMER DRIVEN 1.8V OR 3.3V
90	SD3_CLK	NVCC_NAND	3.3V	
91	SD2_CMD	NVCC_SD2	1.8V/3.3V	CUSTOMER DRIVEN 1.8V OR 3.3V
92	GND	-	Ground	
93	GND	-	Ground	
94	SAI2_TXFS	NVCC_SAI2	3.3V	
95	SD2_CLK	NVCC_SD2	1.8V/3.3V	CUSTOMER DRIVEN 1.8V OR 3.3V
96	UART1_TXD	NVCC_UART	3.3V	
97	GND	-	Ground	
98	UART1_RTS	NVCC_UART	3.3V	
99	USB_OTG2_PWR	NVCC_GPIO1	3.3V	
100	UART1_RXD	NVCC_UART	3.3V	
101	CAMERA_CLK	NVCC_GPIO1	3.3V	
102	SAI2_TXC	NVCC_SAI2	3.3V	
103	USB_OTG2_VBUS	USB POWER	5V	
104	SAI2_RXD0	NVCC_SAI2	3.3V	
105	GND	-	Ground	

106	UART1_CTS	NVCC_UART	3.3V	
107	USB_OTG2_D_P	USB_OTG2	3.3V	
108	SAI2_TXD	NVCC_SAI2	3.3V	
109	USB_OTG2_D_N	USB_OTG2	3.3V	
110	CLK_REQ_O	NVCC_SAI3	3.3V	
111	GND	-	Ground	
112	BT_WAKE_DEV	NVCC_SAI2	3.3V	
113	USB_OTG1_PWR	NVCC_GPIO1	3.3V	
114	SLOW_CLK	NVCC_GPIO1	3.3V	
115	USB_OTG1_OC	NVCC_GPIO1	3.3V	
116	BT_REG_ON	NVCC_NAND	3.3V	
117	USB_OTG1_ID	USB_OTG1	3.3V	
118	SAI2_RXC	NVCC_SAI2	3.3V	
119	GND	-	Ground	
120	GND	-	Ground	
121	USB_OTG1_D_P	USB_OTG1	3.3V	
122	PCIE_RST_B	NVCC_SAI3	3.3V	
123	USB_OTG1_D_N	USB_OTG1	3.3V	
124	PCIE_DIS_B	NVCC_GPIO1	3.3V	
125	GND	-	Ground	
126	GND	-	Ground	
127	USB_OTG1_VBUS	USB_OTG1	5V	
128	PCIE_TX_P	VDD_PCI_1P8	PCIE	
129	QSPIA_NSS0	NVCC_NAND	3.3V	
130	PCIE_TX_N	VDD_PCI_1P8	PCIE	
131	QSPIA_DATA0	NVCC_NAND	3.3V	
132	GND	-	Ground	
133	QSPIA_DATA1	NVCC_NAND	3.3V	
134	PCIE_RX_P	VDD_PCI_1P8	PCIE	
135	QSPIA_DATA2	NVCC_NAND	3.3V	
136	PCIE_RX_N	VDD_PCI_1P8	PCIE	
137	QSPIA_DATA3	NVCC_NAND	3.3V	
138	GND	-	Ground	
139	GND	-	Ground	
140	PCIE_REFCLK_P	VDD_PCI_1P8	PCIE	
141	QSPIA_SCLK	NVCC_NAND	3.3V	
142	PCIE_REFCLK_N	VDD_PCI_1P8	PCIE	
143	GND	-	Ground	
144	GND	-	Ground	
145	GND	-	Ground	

146	GND	-	Ground	
147	TP18	-	-	
148	CSI_D0_N	VDD_MIPI_1P8	MIPI 1.8V	
149	UART4_RXD	NVCC_UART	3.3V	
150	CSI_D0_P	VDD_MIPI_1P8	MIPI 1.8V	
151	UART4_TXD	NVCC_UART	3.3V	
152	GND	-	Ground	
153	GND	-	Ground	
154	CSI_D1_N	VDD_MIPI_1P8	MIPI 1.8V	
155	GND	-	Ground	
156	CSI_D1_P	VDD_MIPI_1P8	MIPI 1.8V	
157	GND	-	Ground	
158	GND	-	Ground	
159	GND	-	Ground	
160	CSI_D2_N	VDD_MIPI_1P8	MIPI 1.8V	
161	GND	-	Ground	
162	CSI_D2_P	VDD_MIPI_1P8	MIPI 1.8V	
163	GND	-	Ground	
164	GND	-	Ground	
165	GND	-	Ground	
166	CSI_D3_N	VDD_MIPI_1P8	MIPI 1.8V	
167	GND	-	Ground	
168	CSI_D3_P	VDD_MIPI_1P8	MIPI 1.8V	
169	GND	-	Ground	
170	GND	-	Ground	
171	UART2_RXD	NVCC_UART	3.3V	
172	CSI_CK_N	VDD_MIPI_1P8	MIPI 1.8V	
173	UART2_TXD	NVCC_UART	3.3V	
174	CSI_CK_P	VDD_MIPI_1P8	MIPI 1.8V	
175	GND	-	Ground	
176	GND	-	Ground	
177	GND	-	Ground	
178	I2C3_SCL	NVCC_I2C	3.3V	
179	TP20	-	-	
180	I2C3_SDA	NVCC_I2C	3.3V	
181	GND	-	Ground	
182	GND	-	Ground	
183	GND	-	Ground	
184	NAND_CLE	NVCC_NAND	3.3V	
185	I2C4_SDA	NVCC_I2C	3.3V	

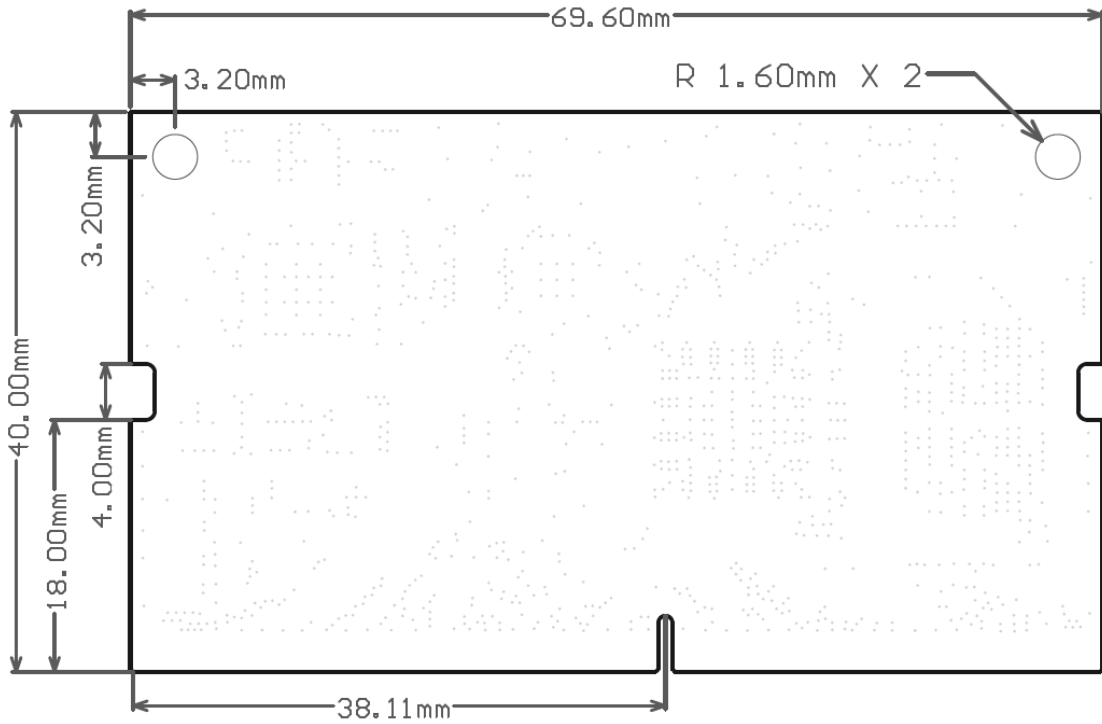
186	SPDIF_EXT_CLK/PWM1	NVCC_SAI3	3.3V	
187	I2C4_SCL	NVCC_I2C	3.3V	
188	GND	-	Ground	
189	GND	-	Ground	
190	I2C2_SDA	NVCC_I2C	3.3V	
191	TP17	-	-	
192	I2C2_SCL	NVCC_I2C	3.3V	
193	GND	-	Ground	
194	GND	-	Ground	
195	TP21	-	-	
196	DSI_D0_P	VDD_MIPI_1P8	MIPI 1.8V	
197	TP22	-	-	
198	DSI_D0_N	VDD_MIPI_1P8	MIPI 1.8V	
199	TP23	-	-	
200	GND	-	Ground	
201	GND	-	Ground	
202	DSI_D1_P	VDD_MIPI_1P8	MIPI 1.8V	
203	ECSPI2_SCLK	NVCC_ECSPi	3.3V	
204	DSI_D1_N	VDD_MIPI_1P8	MIPI 1.8V	
205	GND	-	Ground	
206	GND	-	Ground	
207	ECSPI2_MOSI	NVCC_ECSPi	3.3V	
208	DSI_CLK_P	VDD_MIPI_1P8	MIPI 1.8V	
209	ECSPI2_MISO	NVCC_ECSPi	3.3V	
210	DSI_CLK_N	VDD_MIPI_1P8	MIPI 1.8V	
211	ECSPI2_SS0	NVCC_ECSPi	3.3V	
212	GND	-	Ground	
213	UART3_TXD	NVCC_UART	3.3V	
214	DSI_D2_P	VDD_MIPI_1P8	MIPI 1.8V	
215	UART3_RXD	NVCC_UART	3.3V	
216	DSI_D2_N	VDD_MIPI_1P8	MIPI 1.8V	
217	UART3_CTS	NVCC_ECSPi	3.3V	
218	GND	-	Ground	
219	UART3_RTS	NVCC_ECSPi	3.3V	
220	DSI_D3_P	VDD_MIPI_1P8	MIPI 1.8V	
221	GPIO1_IO5/M4NMI	NVCC_GPIO1	3.3V	
222	DSI_D3_N	VDD_MIPI_1P8	MIPI 1.8V	
223	USB_OTG2_OC	NVCC_GPIO1	3.3V	
224	GND	-	Ground	
225	GPIO1_IO11	NVCC_GPIO1	3.3V	



226	GPIO1_IO09	NVCC_GPIO1	3.3V	
227	ON_OFF	NVCC_SNV5_1P8	1.8V	
228	TOUCH_RESET	NVCC_GPIO1	3.3V	
229	RTC_IRQ	NVCC_GPIO1	3.3V	
230	TOUCH_INT	NVCC_GPIO1	3.3V	
231	EXT_RESET_N	NVCC_SNV5_1P8	1.8V	
232	GPIO1_IO01	NVCC_GPIO1	3.3V	
233	HP_DET	NVCC_SAI3	3.3V	
234	SPDIF_TX/PWM3	NVCC_SAI3	3.3V	
235	MIC_DET	NVCC_GPIO1	3.3V	
236	GND	-	Ground	
237	GND	-	Ground	
238	SPDIF_RX/PWM2	NVCC_SAI3	3.3V	
239	SAI3_MCLK/PWM4	NVCC_SAI3	3.3V	
240	GND	-	Ground	
241	GND	-	Ground	
242	SAI5_MCLK	NVCC_SAI5	3.3V	
243	SAI3_TXC	NVCC_SAI3	3.3V	
244	GND	-	Ground	
245	SAI3_RXD	NVCC_SAI3	3.3V	
246	SAI5_RXFS	NVCC_SAI5	3.3V	
247	SAI3_TXD	NVCC_SAI3	3.3V	
248	SAI5_RXD0	NVCC_SAI5	3.3V	
249	TP26	-	-	
250	SAI5_RXD1	NVCC_SAI5	3.3V	
251	TP25	-	-	
252	SAI5_RXD2	NVCC_SAI5	3.3V	
253	TP24	-	-	
254	SAI5_RXD3	NVCC_SAI5	3.3V	
255	GND	-	Ground	
256	GND	-	Ground	
257	GND	-	Ground	
258	GND	-	Ground	
259	GND	-	Ground	
260	GND	-	Ground	

5.MOUNTING INFORMATION

5.1 NITROGEN8M_MINI SOM MOUNTING SPECIFICATIONS



COMPANY	BOUNDARY DEVICES		
ASSY #	ASM_NIT8M_MINI_SOM	REV	REV00
DATE	2019-01-15		