

Nitrogen8M SOM

User Manual

REVISION HISTORY

Date	Revision	Description
8/20/2018	0.1	First Draft
1/10/2019	0.2	Added images/Drawings
2/28/2019	0.3	Added J4 CSI Connector Details
11/1/2019	0.4	Added SODIMM Voltage Rail Table
12/4/2019	0.5	Updated Power Consumption Specifications. Updated Mechanical Drawing

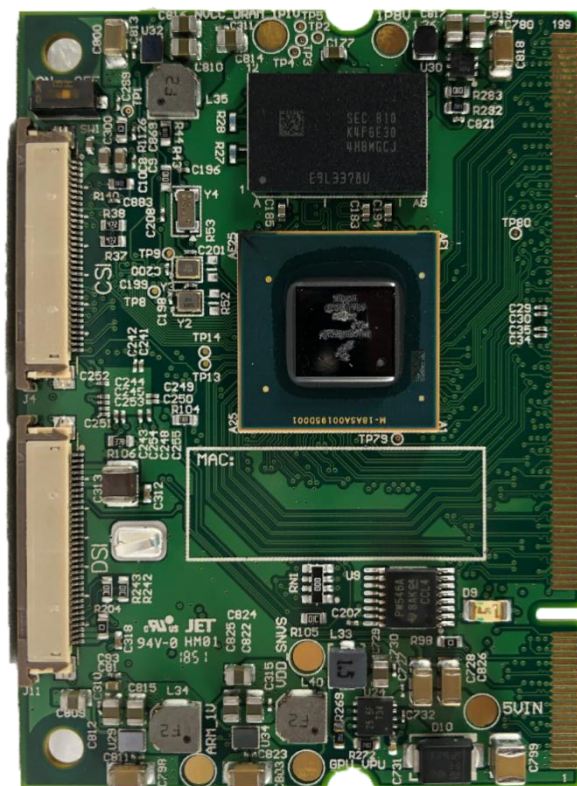




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1. NITROGEN8M SOM OVERVIEW

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 Nitrogen8MAX 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.

The boards ship with U-Boot, Linux Kernel as well as a Yocto-based Qt operating system ([Boot2Qt](#)).

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

The Nitrogen8M series of system on modules (SOM) is the latest in our line of i.MX based Nitrogen platform. The Nitrogen8M SOM series will leverage the i.MX 8M family of applications processors from NXP. Built with industry-leading audio, voice and video processing, the i.MX 8M applications processor family is ideal for applications scaling from consumer home audio to industrial building automation and mobile computers. The Nitrogen8M platform will include a robust set of populated attributes, allowing them to be embedded in a variety of applications.

Key Features of the Nitrogen8M Series:

- Cortex-A53 (64-bit) + Cortex-M4F
- 2-4GB of LPDDR4 RAM
- 8-128GB of eMMC
- 4K + HDR Video Capabilities
- 4-Lane MIPI-DSI Display (up to 1080p)
- Dual Camera Inputs (4-Lane MIPI-CSI)
- High Performance GPU3D (GC7000)

1.4.1 CPU

CPU		
CPU Name	NXP i.MX 8M Dual	NXP i.MX 8M Quad
CPU Type	2x Cortex-A53 1x Cortex-M4F	4x Cortex-A53 1x Cortex-M4F
CPU Cores	2	4
CPU Clock (Max)	1.5GHz	2GHz

1.4.2 MEMORY & STORAGE

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

1.4.3 MULTIMEDIA

MULTIMEDIA	
2D/3D Graphics Acceleration	VivanteGC7000Lite
Video Encode / Decode	4Kp60, h.265 and VP9
Camera Interfaces	2x MIPI CSI

1.4.4 DISPLAY & AUDIO CONNECTIONS

DISPLAY CONNECTIONS	
HDMI	1x (w/CEC, up to 4K)
MIPI DSI	1x 4-lane (up to 1080p)
AUDIO INTERFACES	
Headphone	1x (WM8960) via Carrier
Microphone	1x via Carrier
Amplifier	1W (per channel) 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	3x
SPI	1x
UART	2x RS-232
SD / MMC	1x (optional)
USB	3x USB 3.0 Host + 1x USB 3.0 OTG
RTC	1x + battery
PCIe	2x (1 mPCIe + 1 expansion connector)
JTAG	1x
I2C	3x
SPI	1x

1.4.7 MISCELLANEOUS SPECIFICATIONS

PCB SPECIFICATIONS	
Dimensions (L x W)	67.6mm x 48.39mm
MISCELLANEOUS SPECIFICATIONS	
Temperature Rating	0° - +70°C (-40° - +85°C optional)
Power Supply	5V

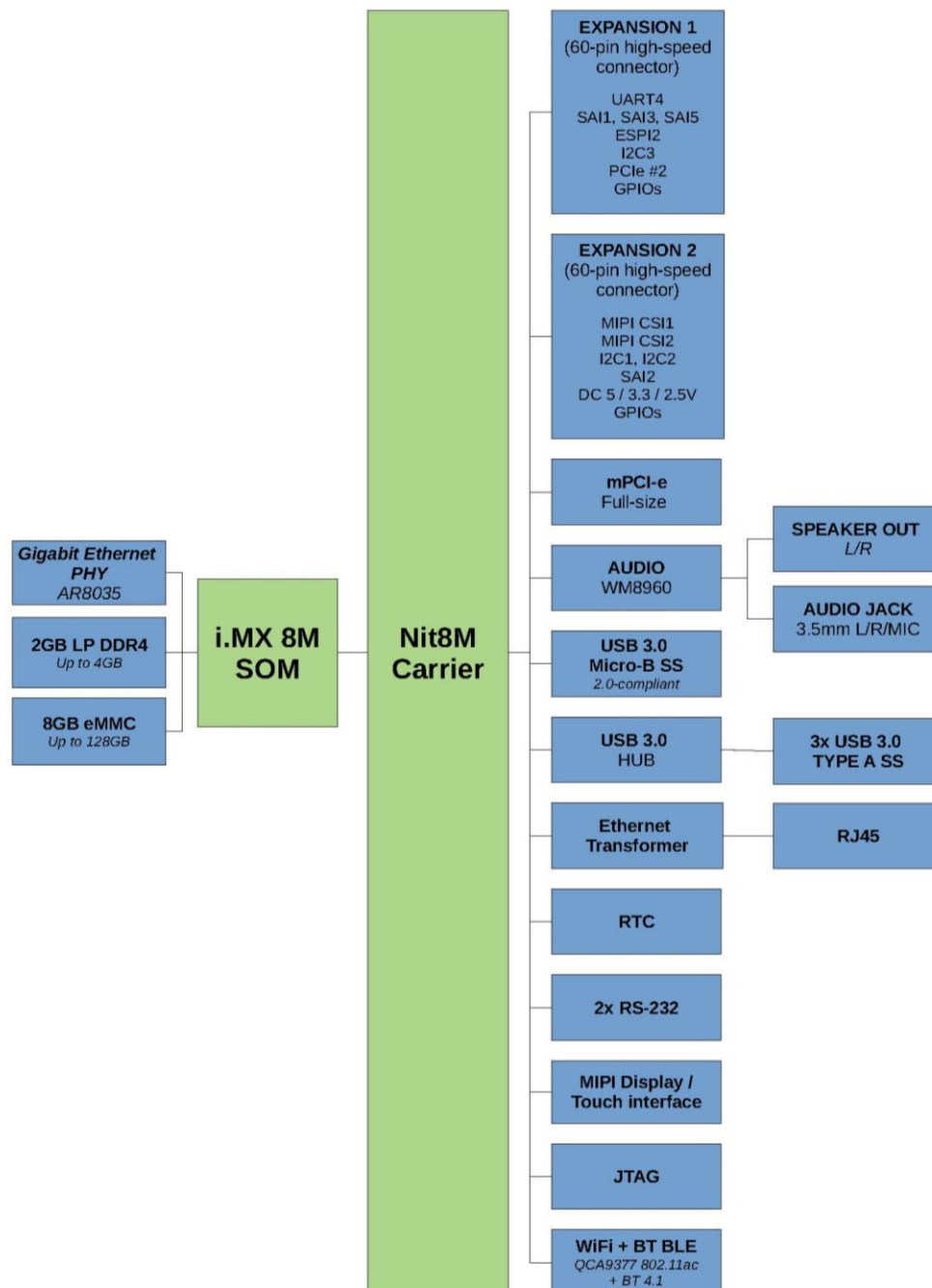


1.5 SUPPORTED OPERATING SYSTEMS

OS SUPPORTED	
Yocto	Yes
Buildroot	Yes
Debian	Yes
Ubuntu	Yes
Android	Yes
QNX	No
FreeRTOS	Yes (M4 core)
Windows Embedded Compact (WEC)	No

2.Architecture Overview

2.1 BLOCK DIAGRAM





3.ELECTRICAL CHARACTERISTICS

3.1 ELECTRICAL CHARACTERISTICS OF NITROGEN8M SOM

PARAMETER	MIN	TYPE	MAX	UNIT
Main Input Voltage	x	5	x	V
Power Consumption*	x	2.4	3.8	W
CPU Clock	x	x	1.5	GHz

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

4.CONNECTOR DETAILS

4.1 CONNECTOR LAYOUT

200 Pin SODIMM Edge Connector to Carrier Board Interface				
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	GND	-	Ground	
8	PMIC_ON_REQ	NVCC_SNV5	3.3V	
9	TRX3_N		Ethernet	
10	SLOW_CLK	NVCC_GPIO1	3.3V	
11	TRX3_P		Ethernet	
12	SD2_DATA0	NVCC_SD2	1.8V	
13	GND	-	Ground	
14	SD2_DATA1	NVCC_SD2	1.8V	
15	TRX2_N		Ethernet	
16	SD2_DATA2	NVCC_SD2	1.8V	
17	TRX2_P		Ethernet	
18	SD2_DATA3	NVCC_SD2	1.8V	
19	GND	-	Ground	
20	SD2_CMD	NVCC_SD2	1.8V	
21	TRX1_N		Ethernet	
22	SD2_CLK	NVCC_SD2	1.8V	
23	TRX1_P		Ethernet	
24	WIFI_RESET	NVCC_SAI5	1.8V	
25	GND	-	Ground	
26	SD2_CD	NVCC_SD2	1.8V	
27	TRX0_N		Ethernet	
28	BT_HOST_WAKE	NVCC_SAI5	1.8V	
29	TRX0_P		Ethernet	
30	UART3_TXD	NVCC_UART	3.3V	
31	GND	-	Ground	
32	UART3_RXD	NVCC_UART	3.3V	

33	SPDIF_EXT_CLK	NVCC_SAI3	3.3V	
34	UART3_RTS	NVCC_ECSPi	3.3V	
35	USB1_OTG_ID	USB_P0_VDD33	3.3V	
36	UART3_CTS	NVCC_ECSPi	3.3V	
37	PCIE_RST_B	NVCC_ECSPi	3.3V	
38	WL_EN	NVCC_SAI5	1.8V	
39	PCIE_DIS_B	NVCC_ECSPi	3.3V	
40	WL_IRQ	NVCC_SAI5	1.8V	
41	GND	-	Ground	
42	BT_EN	NVCC_SAI5	1.8V	
43	CSI_P2_D0_N	CSI_P2_VDDHA	CSI	
44	GND	-	Ground	
45	CSI_P2_D0_P	CSI_P2_VDDHA	CSI	
46	PCIE1_TX_P	PCIE0_VPH	PCIE	
47	GND	-	Ground	
48	PCIE1_TX_N	PCIE0_VPH	PCIE	
49	CSI_P2_D1_N		CSI	
50	GND	-	Ground	
51	CSI_P2_D1_P	CSI_P2_VDDHA	CSI	
52	PCIE1_RX_P	PCIE0_VPH	PCIE	
53	GND	-	Ground	
54	PCIE1_RX_N	PCIE0_VPH	PCIE	
55	CSI_P2_D2_N	CSI_P2_VDDHA	CSI	
56	GND	-	Ground	
57	CSI_P2_D2_P	CSI_P2_VDDHA	CSI	
58	PCIE1_REFCLK_P	PCIE0_VPH	PCIE	
59	GND	-	Ground	
60	PCIE1_REFCLK_N	PCIE0_VPH	PCIE	
61	CSI_P2_D3_N	CSI_P2_VDDHA	CSI	
62	GND	-	Ground	
63	CSI_P2_D3_P	CSI_P2_VDDHA	CSI	
64	PCIE2_REFCLK_P	PCIE1_VPH	PCIE	
65	GND	-	Ground	
66	PCIE2_REFCLK_N	PCIE1_VPH	PCIE	
67	CSI_P2_CK_N	CSI_P2_VDDHA	CSI	
68	GND	-	Ground	
69	CSI_P2_CK_P	CSI_P2_VDDHA	CSI	
70	PCIE2_TX_P	PCIE1_VPH	PCIE	
71	GND	-	Ground	
72	PCIE2_TX_N	PCIE1_VPH	PCIE	

73	JTAG_TCK	NVCC_JTAG	3.3V	
74	GND	-	Ground	
75	JTAG_TDI	NVCC_JTAG	3.3V	
76	PCIE2_RX_P	PCIE1_VPH	PCIE	
77	JTAG_TMS	NVCC_JTAG	3.3V	
78	PCIE2_RX_N	PCIE1_VPH	PCIE	
79	JTAG_MOD	NVCC_JTAG	3.3V	
80	GND	-	Ground	
81	JTAG_NTRST	NVCC_JTAG	3.3V	
82	QSPIA_DATA4	NVCC_NAND	3.3V	
83	JTAG_TDO	NVCC_JTAG	3.3V	
84	QSPIA_DATA3	NVCC_NAND	3.3V	
85	CAMERA_CLK	NVCC_GPIO1	3.3V	
86	QSPIA_DATA2	NVCC_NAND	3.3V	
87	EXT_RESET_N	-	3.3V	
88	QSPIA_DATA1	NVCC_NAND	3.3V	
89	ECSPi2_SS0	NVCC_ECSPi	3.3V	
90	QSPIA_DATA0	NVCC_NAND	3.3V	
91	ECSPi2_MOSI	NVCC_ECSPi	3.3V	
92	QSPIA_NSS0	NVCC_NAND	3.3V	
93	ECSPi2_MISO	NVCC_ECSPi	3.3V	
94	GND	-	Ground	
95	GND	-	Ground	
96	QSPIA_SCLK	NVCC_NAND	3.3V	
97	ECSPi2_SCLK	NVCC_ECSPi	3.3V	
98	GND	-	Ground	
99	GND	-	Ground	
100	USB1_D_N	USB_P0_VDD33	3.3V	
101	I2C3_SCL	NVCC_I2C	3.3V	
102	USB1_D_P	USB_P0_VDD33	3.3V	
103	I2C3_SDA	NVCC_I2C	3.3V	
104	GND	-	Ground	
105	GPIO1_IO10	NVCC_GPIO1	3.3V	
106	USB1_TX_N	USB_P0_VDD33	3.3V	
107	I2C4_SCL	NVCC_I2C	3.3V	
108	USB1_TX_P	USB_P0_VDD33	3.3V	
109	I2C4_SDA	NVCC_I2C	3.3V	
110	GND	-	Ground	
111	GND	-	Ground	
112	USB1_RX_N	USB_P0_VPH	USB	

113	USB2_TX_P	USB_P1_VPH	USB	
114	USB1_RX_P	USB_P0_VPH	USB	
115	USB2_TX_N	USB_P1_VPH	USB	
116	GND	-	Ground	
117	GND	-	Ground	
118	USB1_VBUS	USB_P0_VDD33	5V Power	
119	USB2_RX_P	USB_P1_VPH	USB	
120	USB1_OC	NVCC_GPIO1	3.3V	
121	USB2_RX_N	USB_P1_VPH	USB	
122	UART2_RXD	NVCC_UART	3.3V	
123	GND	-	Ground	
124	UART2_TXD	NVCC_GPIO1	3.3V	
125	USB2_D_N	USB_P1_VDD33	USB	
126	UART1_RXD	NVCC_UART	3.3V	
127	USB2_D_P	USB_P1_VDD33	USB	
128	UART1_TXD	NVCC_UART	3.3V	
129	GND	-	Ground	
130	SAI1_MCLK	NVCC_SAI1	3.3V	
131	USB_HUB_RESET	NVCC_GPIO1	3.3V	
132	SAI1_TXD1	NVCC_SAI1	3.3V	
133	USB1_OTG_PWR_EN	NVCC_GPIO1	3.3V	
134	SAI1_TXD2	NVCC_SAI1	3.3V	
135	UART4_TXD	NVCC_UART	3.3V	
136	SAI1_TXD3	NVCC_SAI1	3.3V	
137	UART4_RXD	NVCC_UART	3.3V	
138	SAI1_TXD4	NVCC_SAI1	3.3V	
139	FAST_BOOT	NVCC_GPIO1	3.3V	
140	SAI1_TXD5	NVCC_SAI1	3.3V	
141	RTC_IRQ	NVCC_GPIO1	3.3V	
142	SAI1_TXD6	NVCC_SAI1	3.3V	
143	GP_M4_NMI	NVCC_GPIO1	3.3V	
144	SAI1_TXD7	NVCC_SAI1	3.3V	
145	GPIO1_IO3	NVCC_GPIO1	3.3V	
146	SAI1_RXD1	NVCC_SAI1	3.3V	
147	NAND_NCE1	NVCC_NAND	3.3V	
148	SAI1_RXD2	NVCC_SAI1	3.3V	
149	NAND_NCE3	NVCC_NAND	3.3V	
150	SAI1_RXD3	NVCC_SAI1	3.3V	
151	NAND_CLE	NVCC_NAND	3.3V	
152	SAI1_RXD4	NVCC_SAI1	3.3V	

153	NAND_NREADY	NVCC_NAND	3.3V	
154	SAI1_RXD5	NVCC_SAI1	3.3V	
155	NAND_DATA05	NVCC_NAND	3.3V	
156	SAI1_RXD6	NVCC_SAI1	3.3V	
157	NAND_NWP	NVCC_NAND	3.3V	
158	SAI1_RXD7	NVCC_SAI1	3.3V	
159	NAND_DQS	NVCC_NAND	3.3V	
160	SAI1_RXC	NVCC_SAI1	3.3V	
161	GND	-	Ground	
162	SAI1_RXFS	NVCC_SAI1	3.3V	
163	HDMI_CLK_N	HDMI_AVDDIO	HDMI	
164	SPDIF_RX/PWM2	NVCC_SAI3	3.3V	
165	HDMI_CLK_P	HDMI_AVDDIO	HDMI	
166	SAI2_RXD	NVCC_SAI2	3.3V	
167	GND	-	Ground	
168	SAI2_RXFS	NVCC_SAI2	3.3V	
169	HDMI_TX0_N	HDMI_AVDDIO	HDMI	
170	SAI2_TXC	NVCC_SAI2	3.3V	
171	HDMI_TX0_P	HDMI_AVDDIO	HDMI	
172	SAI2_TXFS	NVCC_SAI2	3.3V	
173	GND	-	Ground	
174	SAI2_RXC	NVCC_SAI2	3.3V	
175	HDMI_TX1_N	HDMI_AVDDIO	HDMI	
176	SAI2_MCLK	NVCC_SAI2	3.3V	
177	HDMI_TX1_P	HDMI_AVDDIO	HDMI	
178	SAI2_TXD	NVCC_SAI2	3.3V	
179	GND	-	Ground	
180	SAI3_MCLK/PWM4	NVCC_SAI3	3.3V	
181	HDMI_TX2_N	HDMI_AVDDIO	HDMI	
182	SAI1_TXFS	NVCC_SAI1	3.3V	
183	HDMI_TX2_P	HDMI_AVDDIO	HDMI	
184	SAI1_TXC	NVCC_SAI1	3.3V	
185	GND	-	Ground	
186	SAI1_RXD0	NVCC_SAI1	3.3V	
187	HDMI_AUX_P	HDMI_AVDDIO	HDMI	
188	SAI1_TXD0	NVCC_SAI1	3.3V	
189	HDMI_AUX_N	HDMI_AVDDIO	HDMI	
190	SAI3_TXFS	NVCC_SAI3	3.3V	
191	GND	-	Ground	
192	SAI3_TXC	NVCC_SAI3	3.3V	

193	HDMI_DDC_SDA	HDMI_AVDDIO	5V	
194	SAI3_RXD	NVCC_SAI3	3.3V	
195	HDMI_DDC_SCL	HDMI_AVDDIO	5V	
196	SAI3_TXD	NVCC_SAI3	3.3V	
197	HDMI_CEC	HDMI_AVDDIO	3.3V	
198	SAI3_RXFS	NVCC_SAI3	3.3V	
199	HDMI_HPD	HDMI_AVDDIO	3.3V	
200	SAI3_RXC	NVCC_SAI3	3.3V	

J4: CSI Connector (AVX 086210033340800)	
PIN#	Function
1	+5V
2	+5V
3	+5V
4	+5V
5	GND
6	CAMERA_CLK
7	NAND_NCE2
8	NAND_NWE
9	I2C2_SDA
10	I2C2_SCL
11	GND
12	N/A
13	N/A
14	N/A
15	N/A
16	N/A
17	N/A
18	GND
19	CSI_P1_CK_P
20	CSI_P1_CK_N
21	GND
22	CSI_P1_D3_P

23	CSI_P1_D3_N
24	GND
25	CSI_P1_D2_P
26	CSI_P1_D2_N
27	GND
28	CSI_P1_D1_P
29	CSI_P1_D1_N
30	GND
31	CSI_P1_D0_P
32	CSI_P1_D0_N
33	GND

J11: MIPI-DSI + Touch connector (AVX 086210033340800)	
PIN#	Function
1	GND
2	GND
3	+5V
4	+5V
5	+5V
6	+5V
7	SPDIF_TX/PWM3
8	GPIO1_IO01
9	TOUCH_INT
10	TOUCH_RESET
11	NAND_RE_B
12	GND
13	DSI_D3_N
14	DSI_D3_P

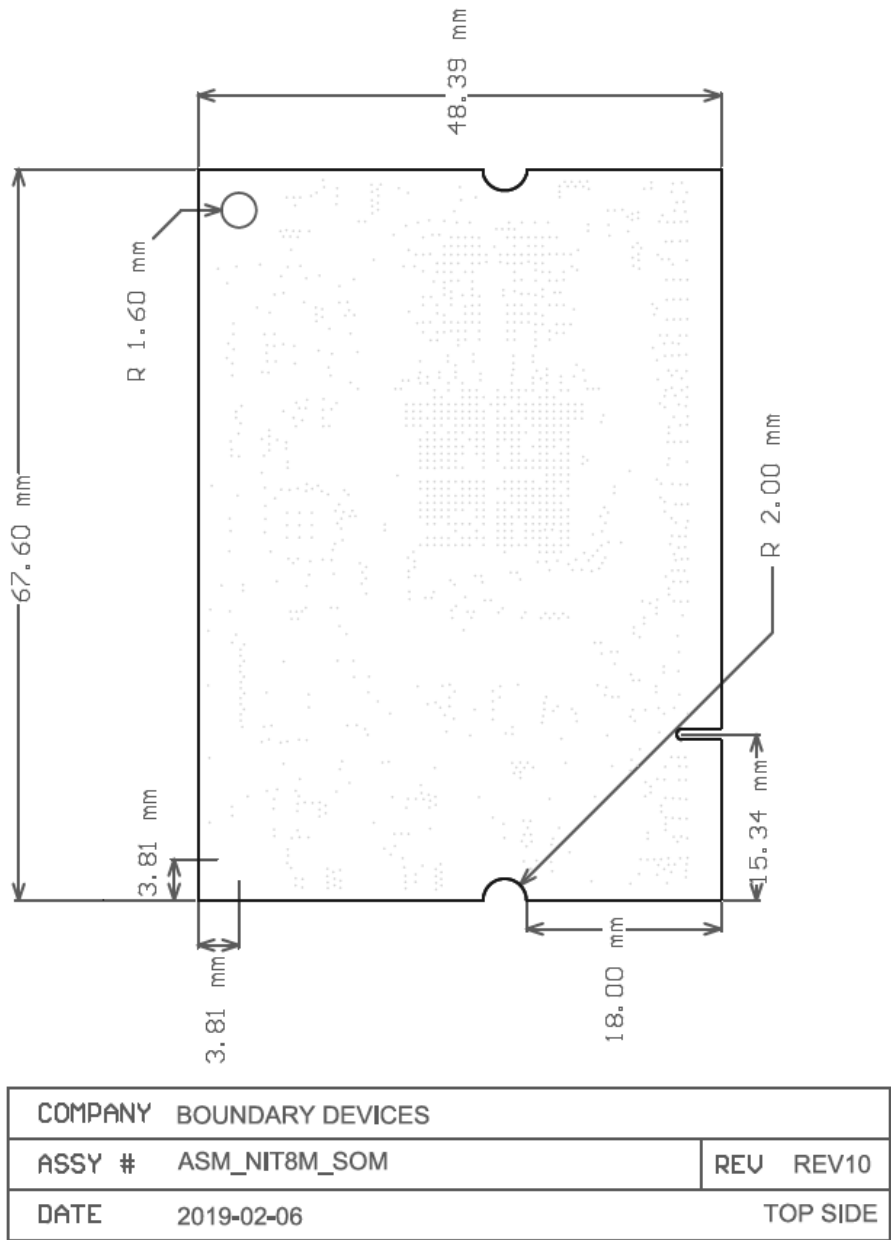


15	GND
16	DSI_D2_N
17	DSI_D2_P
18	GND
19	DSI_CLK_N
20	DSI_CLK_P
21	GND
22	DSI_D1_N
23	DSI_D1_P
24	GND
25	DSI_D0_N
26	DSI_D0_P
27	GND
28	I2C1D_SCL
29	I2C1D_SDA
30	GND
31	VDD_SNVS
32	VDD_SNVS
33	VDD_SNVS



5.MOUNTING INFORMATION

5.1 NITROGEN8M SOM MOUNTING SPECIFICATIONS



Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Boundary Devices:

[Nit8MQ_Mini_SOM_2r8e](#) [Nit8MQ_Mini_SOM_4r8e](#) [Nit8MQ_Mini_SOM_1r8e](#) [Nit8MQ_Mini_SOM_2r8e_i](#)
[Nit8MQ_SOM_2r16e](#) [Nit8MQ_SOM_2r8e](#) [Nit8MQ_SOM_4r8e](#) [Nit8MQ_Mini_SOM_1r16e](#) [Nit8MQ_Mini_SOM_2r16e](#)
[Nit8MQ_Mini_SOM_2r16e_i](#) [Nit8MQ_Mini_SOM_4r16e](#) [Nit8MQ_SOM_2r16e_i](#) [Nit8MQ_SOM_4r16e](#)