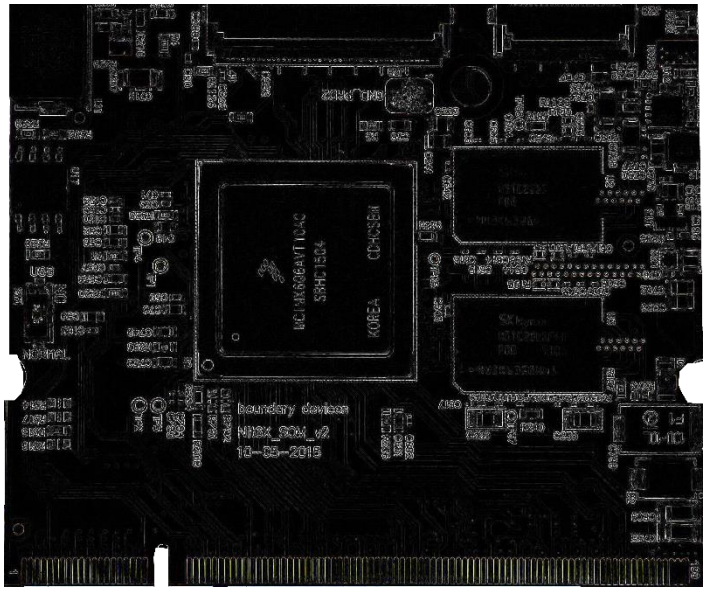
Boundary Devices

Nitrogen8M SOM

User Manual

REVISION HISTORY		
Date	**Revision**	**Description**
8/20/2018	0.1	First Draft



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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	1.5GHz

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	Vivante GC7000Lite
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	
JTAG	1x

1.4.7 MISCELLANEOUS SPECIFICATIONS

PCB SPECIFICATIONS	
Dimensions (L x W)	TBD
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

TBD

3. ELECTRICAL CHARACTERISTICS

3.1 ELECTRICAL CHARACTERISTICS OF NITROGEN8M

PARAMETER	MIN	TYPE	MAX	UNIT
Main Input Voltage		5		V
Power Consumption*		X		mW
CPU Clock			1.5	GHz

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

4. CONNECTOR DETAILS

4.1 CONNECTOR LAYOUT

Standard Connector Pin Out Table			
PIN#	**Function**	**PIN#**	**Function**
1	GND	2	HDMI_HPD
3	TRX0_P	4	USB_HUB_RESET
5	TRX0_N	6	SAI1_TXFS
7	GND	8	SAI1_TXC
9	TRX1_P	10	SAI1_RXD0
11	TRX1_N	12	SAI1_TXD0
13	GND	14	SAI1_MCLK
15	TRX2_P	16	PCIE_RST_B
17	TRX2_N	18	PCIE_DIS_B
19	GND	20	I2C4_SCL
21	TRX3_P	22	I2C4_SDA
23	TRX3_N	24	GND
25	GND	26	USB1_D_N
27	ECSPI2_MOSI	28	USB1_D_P
29	ECSPI2_MISO	30	GND
31	GND	32	USB1_RX_N
33	ECSPI2_SCLK	34	USB1_RX_P
35	GND	36	GND
37	ECSPI2_SS0	38	USB1_TX_N
39	UART4_TXD	40	USB1_TX_P
41	UART4_RXD	42	GND
43	GND	44	USB2_D_P
45	PCIE1_TX_P	46	USB2_D_N
47	PCIE1_TX_N	48	GND
49	GND	50	USB2_TX_N
51	PCIE1_RX_P	52	USB2_TX_P
53	PCIE1_RX_N	54	GND
55	GND	56	USB2_RX_N
57	PCIE1_REFCLK_P	58	USB2_RX_P
59	PCIE1_REFCLK_N	60	GND
61	GND	62	SLOW_CLK
63	JTAG_TCK	64	SD2_DATA0
65	JTAG_TDI	66	SD2_DATA1
67	JTAG_TDO	68	SD2_DATA2
69	JTAG_TMS or LED_10_100	70	SD2_DATA3
71	JTAG_MOD or LED_1000	72	SD2_CMD
73	JTAG_nTRST or LED_ACT	74	SD2_CLK
75	SPDIF_EXT_CLK/PWM1	76	UART2_RXD
77	GND	78	FAST_BOOT
79	HDMI_TX0_P	80	WIFI_RESET
81	HDMI_TX0_N	82	UART2_TXD
83	GND	84	SD2_CD

85	HDMI_TX1_P	86	BT_HOST_WAKE
87	HDMI_TX1_N	88	UART3_TXD
89	GND	90	UART3_RXD
91	HDMI_TX2_P	92	UART3_RTS
93	HDMI_TX2_N	94	UART3_CTS
95	GND	96	WL_EN
97	HDMI_CLK_P	98	WL_IRQ
99	HDMI_CLK_N	100	BT_EN
101	GND	102	USB1_VBUS
103	HDMI_DDC_SDA	104	SAI3_TXFS
105	HDMI_DDC_SCL	106	SAI3_TXC
107	HDMI_CEC	108	SAI3_RXD
109	GND	110	SAI3_TXD
111	RTC_IRQ	112	GND
113	UART1_RXD	114	CSI_P1_D0_N
115	UART1_TXD	116	CSI_P1_D0_P
117	SAI3_RXFS	118	GND
119	SAI3_RXC	120	CSI_P1_D1_N
121	GND	122	CSI_P1_D1_P
123	SAI1_TXD1	124	GND
125	SAI1_TXD2	126	CSI_P1_D2_N
127	SAI1_TXD3	128	CSI_P1_D2_P
129	SAI1_TXD4	130	GND
131	SAI1_TXD5	132	CSI_P1_D3_N
133	SAI1_TXD6	134	CSI_P1_D3_P
135	SAI1_TXD7	136	GND
137	SAI1_RXD1	138	CSI_P1_CK_N
139	SAI1_RXD2	140	CSI_P1_CK_P
141	SAI1_RXD3	142	GND
143	SAI1_RXD4	144	HDMI_AUX_P
145	SAI1_RXD5	146	HDMI_AUX_N
147	SAI1_RXD6	148	GND
149	SAI1_RXD7	150	NAND_nCE1
151	SAI1_RXC	152	USB1_OTG_ID
153	SAI1_RXFS	154	NAND_NCE3
155	SPDIF_RX/PWM2	156	NAND_CLE
157	GND	158	NAND_NREADY
159	PCIE2_REFCLK_P	160	NAND_DATA05
161	PCIE2_REFCLK_N	162	NAND_NWP
163	GND	164	USB1_OTG_PWR_EN
165	PCIE2_TX_P	166	NAND_DQS
167	PCIE2_TX_N	168	SD2_RESET_B
169	GND	170	I2C3_SDA
171	PCIE2_RX_P	172	I2C3_SCL
173	PCIE2_RX_N	174	QSPIA_DATA4
175	GND	176	QSPIA_DATA3
177	SAI2_RXD	178	QSPIA_DATA2
179	SAI2_RXFS	180	QSPIA_DATA1
181	SAI2_TXC	182	QSPIA_DATA0
183	SAI2_TXFS	184	QSPIA_NSS0
185	SAI2_RXC	186	QSPIA_SCLK

187	SAI2_MCLK	188	GP_M4_NMI
189	SAI2_TXD	190	GPIO1_IO3
191	SAI23_MCLK/PWM4	192	PMIC_ON_REQ
193	USB1_OC	194	GPIO1_IO10
195	+5V	196	+5V
197	+5V	198	+5V
199	+5V	200	+5V

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	I2C4_SCL
29	I2C4_SDA
30	GND
31	VDD_SNVS
32	VDD_SNVS
33	VDD_SNVS

5. MOUNTING INFORMATION

5.1 NITROGEN8M SOM MOUNTING SPECIFICATIONS

The overall dimensions of the Nitrogen8M_SOM board is TBD