



Bravo Canyon Technical Product Specification

Model #
NUC13BRFA4
NUC13BRFA2
NUC13BRKP2

Version 1.0
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Preface

The purpose of this document is to provide technical references for customers and developers for the Simply NUC “Bravo Canyon” NUC 13 / Ruggedized products. Bravo Canyon SKUs include NUC13BRFA4, NUC13BRFA2 and NUC13BRKP2.

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1. Description

The Bravo Canyon is a small form factor PC, offered in three variants powered by a series of Intel processors ranging from N50 (6w), Atom x7211E (6w), and Atom x7425E (12W). With the perfect combination of performance, connectivity, and reliability in a fanless, dust-resistant ruggedized chassis. This is great for everyday use, lite CAD development and video editing, and built to survive environments most PCs can't. Bravo Canyon can withstand 0° to 50°C external ambient operating temperatures on select kits.

1.1. Overview

Moonstone has the following features

- Intel N50 or, Intel Atom x7211E or, Intel Atom x7425E
- Windows 11 /, Ubuntu support
- Intel® UHD Graphics Technology
- DDR5 4800 MT/s memory 8GB~16GB optional “in-band” ECC support (select models only)
- 1x M.2 2280 Key M Slot for SSD PCIe x2 NVMe
- 1x M.2 2242 Key B Slot for SATA
- Intel Dual Band WiFi-6E AX210,/,Bluetooth 5.3
- 2x USB 2.0 Type-A
- 2x USB 3.2 Gen 2 Type-A
- 10/100/1000/2500 Mbps, Dual 2.5G Ethernet
- 2x HDMI 2.1 ports (4k @60Hz)
- 1x MIPI CSI header (Camera Serial Interface)
- 2x USB 2.0 Headers
- 20v/3.25a vDC Power Input
- Kensington Lock

1.2. Processors

Bravo Canyon has the following features

Table 1: CPU Features

Bravo Canyon	Intel® Processor N50 (Alder Lake-N)	Intel® x7211E (Alder Lake-N)	Intel® x7425E (Alder Lake-N)
Architecture	N-Series	Atom®	Atom®
TDP/ Watts	6 Watts	6 Watts	12 Watts
Max Turbo Frequency	3.40 GHz	3.2GHz	3.40 GHz
Cores	2	2	4
Threads	2	2	4
L1 Cache	96KB (Per Core)	96KB (Per Core)	96 KB (per core)

Bravo Canyon	Intel® Processor N50 (Alder Lake-N)	Intel® x7211E (Alder Lake-N)	Intel® x7425E (Alder Lake-N)
Architecture	N-Series	Atom®	Atom®
L2 Cache	2MB (Shared)	2MB (Shared)	2 MB (shared)
L3 Cache	6MB (Shared)	6MB (Shared)	6 MB (shared)
Integrated Graphics	Intel® UHD Graphics Technology	Intel® UHD Graphics Technology	Intel® UHD Graphics Technology

1.3. Integrated Graphics Processing Unit

Bravo Canyon CPU has an Intel integrated graphics processing unit with the following features;

Table 2: Graphics Features

Processor / Features	N50	x7211E	x7425E
Integrated Graphics	Intel® UHD-16EU Graphics (Generation: 12.2)	Intel® UHD-16EU Graphics (Generation: 12.2)	Intel® UHD-24EU Graphics (Generation: 12.2)
Base Frequency Max Turbo Frequency	600 MHz/750 Mhz	600 MHz/1000 Mhz	800 Mhz/1000 Mhz
Execution Units	16	16	24
Graphics Output	eDP 1.4b, DP 1.4, HDMI 2.1, MIPI-DSI 1.3		
Max Resolution (HDMI)	4096 x 2160@60Hz / Version: 2.1		
Max Resolution (DP)	4096 x 2160@60Hz		
DirectX Support	Version: 12.1		
eDisplayPort / DisplayPort	Version: 1.4b / 1.4		
HDCP Version Support	-		
Maximum Number of Displays	2		

1.4. Memory

Bravo Canyon Supports one memory type, LPDDR5 / 262-Pin 1.1VS SDRAM SO-DIMM

- LP-DDR5 4800 MT/s
- Memory Bus: Single Channel
- Support for maximum of 16 GB

Note: ECC memory is not supported...

1.5. Storage

- One M.2 PCIe Gen 3 / 4 connector supporting the 22x80 configuration ("M" key) for NVMe Only.
- One M.2 PCIe Gen 3 / 4 connector supporting the 22x43 configuration ("B" key) for NVMe Only.

1.5.1. PCIe Interface

The Bravo Canyon supports two M.2 Slots. The PCIe based M.2 slots are in the Key-"M" for a 22mm x 80mm and for a 22mm x 42mm in Key "B".

The PCIe 4.0 / x4 interface on the port has a theoretical maximum transfer rate of 8GBps.

1.6. Networking

Bravo Canyon utilizes the Intel i226-v controller and supports 2 / 2.5 Gb interfaces by way of onboard RJ-45 connectors. The i226-v controller features are as follows:

- Integrated MAC + BASE-T PHY.
- MDI (Copper) standard IEEE 802.3 Ethernet interface for 2500BASE-T, 1000BASE-T, 100BASE-TX, and 10BASE-TE applications (802.3, 802.3u, 802.3bz, and 802.3ab).
- MDI lane swap.
- IEEE 802.3 auto-negotiator.
- IEEE 802.3x and IEEE 802.3z compliant flow control support with software-controllable Rx thresholds and Tx pause frames.
- Automatic crossover detection function (MDI/ MDI-X).
- IEEE 1588 protocol and 802.1AS implementation.
- Supporting Time Sensitive Networking (TSN) Capabilities (IEEE 802.1Qbu, 802.3br, 802.1Qbv, 802.1AS-REV, 802.1p, Q, and 802.1Qav).
- Supports IEEE 802.3az – Energy Efficient Ethernet (EEE).
- Smart Power Down (SPD) at S0 no link/Sx no link.
- Full wake up support (APM and ACPI).
- MAC Power Management controls.
- Power Management Protocol Offload (Proxying).
- Latency Tolerance Reporting (LTR.)
- TCP/UDP, Ipv4 checksum offloads (Rx/ Tx).
- Transmit Segmentation Offloading (TSO) (Ipv4, Ipv6).
- Legacy, Message Signal Interrupt (MSI) and Message Signal Interrupt Extension (MSI-X).
- Support for packets up to 9.5 KB (Jumbo Frames).
- Descriptor ring management hardware for Transmit and Receive.

1.6.1. Wireless Networking Interface

Bravo Canyon utilizes an Intel AX210 Wi-Fi card that supports:

- 2.4Ghz, 5Ghz, and 6.0E channels.
- Maximum bandwidth of 2.4Gbps
- 2x2 transmit/receive streams.
- Supports IEEE WLAN standards IEEE 802.11a/b/d/e/g/h/i/k/n/r/u/v/w/ac/ax
- Supports authentications WPA and WPA2, 802.1X EAP-TLS, EAP-TTLS/MSCHAPv2, PEAPv0-MSCHAPv2 (EAP-SIM, EAP-AKA, EAP-AKA')
- 64-bit and 128-bit WEP, TKIP, 128-bit AES-CCMP, 256-bit AES-GCMP encryption supported
- Bluetooth® 5.2, BLE.

2. Technical Reference

2.1.1. Headers –

Figure 1: Header Locations

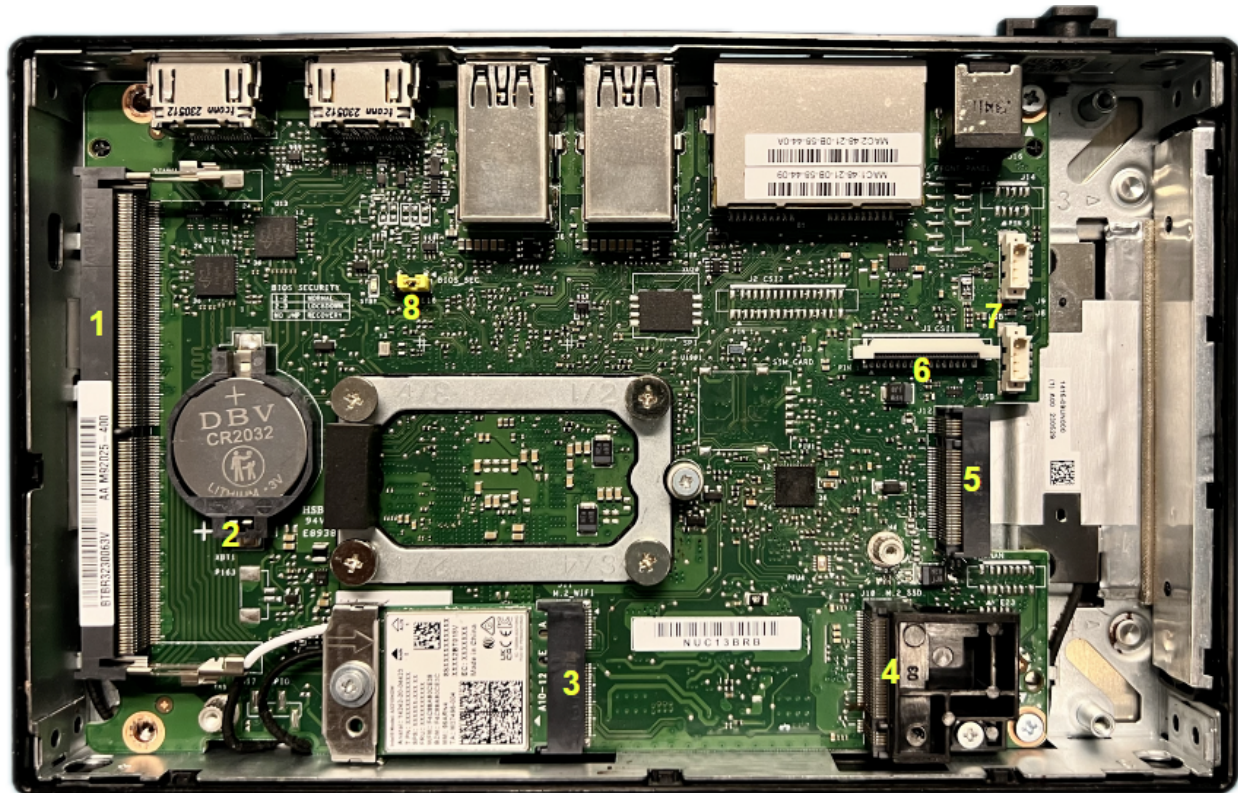


Table 3: Top Side Header Definitions

Identifier	Header
1	SO DIMM Socket
2	Battery Holder
3	M.2 Key E (Wi-Fi)
4	M.2 Key M 2242 (SSD)
5	M.2 Key M 2280 (SSD)
6	MIPI CSI-1 Connector
7	USB 2.0
8	Bios Security

2.2. Battery Holder

Figure 2: Battery Holder

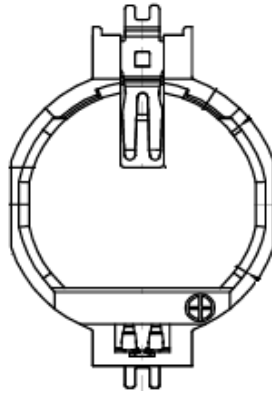


Table 4: Battery Holder Definitions

Pin	Signal
1	3V Positive Note plus (+) symbol on battery holder
2	Ground

2.3. CSI Connector

Figure 3: CSI Connector

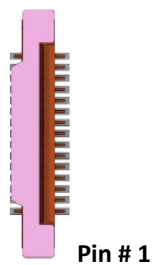


Table 5: CSI Connector Pinout

Pin	Signal
1	Ground
2	CAM1_DN0

Pin	Signal
3	CAM1_DP0
4	Ground
5	CAM1_DN1
6	CAM1_DP1
7	Ground
8	CAM1_CN
9	CAM1_CP
10	Ground
11	CAM_GPIO0
12	CAM_GPIO1
13	SCL0
14	SDA0
15	+3.3 V

2.4. M.2 For Storage

Table 8: M.2 2280 / Key-M SSD Pinout

Pin	Signal	Signal	Pin
74	3.3V	GND	75
72	3.3V	GND	73
70	3.3V	GND	71
68	N/A	PEDET	69
66	CONNECTOR KEY	N/A	67
64	CONNECTOR KEY	CONNECTOR KEY	65
62	CONNECTOR KEY	CONNECTOR KEY	63
60	CONNECTOR KEY	CONNECTOR KEY	61
58	N/A	CONNECTOR KEY	59
56	N/A	GND	57
54	WAKE#	PEFCLKp	55
52	CLKREQ#	PEFCLKn	53
50	PERST#	GND	51
48	N/A	PETp0	49
46	N/A	PETn0	47
44	N/A	GND	45
42	SMB_DATA	PERp0	43
40	SMB_CLK	PERn0	41
38	N/A	GND	39
36	N/A	PETp1	37
34	N/A	PETn1	35
32	N/A	GND	33

30	N/A	PERp1	31
28	N/A	PERn1	29
26	N/A	GND	27
24	N/A	PETp2	25
22	N/A	PETn2	23
20	N/A	GND	21
18	3.3V	PERp2	19
16	3.3V	PERn2	17
14	3.3V	GND	15
12	3.3V	PETp3	13
10		PETn3	11
8	N/A	GND	9
6	N/A	PERp3	7
4	3.3V	PERn3	5
2	3.3V	GND	3
		GND	1

2.5. M.2 For Radio

Table 10: M.2 Key-E Pinout

Pin	Signal	Signal	Pin
74	3.3V	GND	75
72	3.3V	GND	73
70	3.3V	GND	71

Pin	Signal	Signal	Pin
68	N/A	PEDET	69
66	CONNECTOR KEY	N/A	67
64	CONNECTOR KEY	CONNECTOR KEY	65
62	CONNECTOR KEY	CONNECTOR KEY	63
60	CONNECTOR KEY	CONNECTOR KEY	61
58	N/A	CONNECTOR KEY	59
56	N/A	GND	57
54	WAKE#	PEFCLKp	55
52	CLKREQ#	PEFCLKn	53
50	PERST#	GND	51
48	N/A	PETp0	49
46	N/A	PETn0	47
44	N/A	GND	45
42	SMB_DATA	PERp0	43
40	SMB_CLK	PERn0	41
38	N/A	GND	39
36	N/A	PETp1	37
34	N/A	PETn1	35
32	N/A	GND	33
30	N/A	PERp1	31
28	N/A	PERn1	29
26	N/A	GND	27
24	N/A	PETp2	25
22	N/A	PETn2	23

Pin	Signal	Signal	Pin
20	N/A	GND	21
18	3.3V	PERp2	19
16	3.3V	PERn2	17
14	3.3V	GND	15
12	3.3V	PETp3	13
10		PETn3	11
8	N/A	GND	9
6	N/A	PERp3	7
4	3.3V	PERn3	5
2	3.3V	GND	3
		GND	1

2.6. USB 2.0 Header

Figure 8: USB2.0 Header

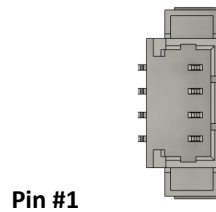


Table 12: USB 3.0 Pinout

Pin	Signal
1	5V
2	D -
3	D +
4	GND

2.7. Chassis Rear I/O Connectors

Figure 8: Rear I/O Connections



Table 14: Rear I/O Connections Defined

Identifier	Connector
1	Power Button
2	Status LEDs
3	USB 3.2 Type A
4	Status LEDs
5	DC-Input
6	HDMI 2.1
7	USB 2.0 Type A
8	Dual 2.5 GbE LAN

3. Chassis Expandability Options



4. Mechanical Dimensions (Chassis & Variants)

174 x 108 x 25.9H mm [H: +3.4mm rubber feet]

Figure 11: Length / Width / Height Dimensions



5. System Power Supply

Power Supply

- 20VDC / 3.25 A / 65w
- 3 Prong Power Supply

6. Environmental(Operational Temperature Range)

- Can withstand 0° to 50°C external ambient operating temperatures on select kits.

7. Version History

Version	Date	Comments
1.0	03/14/2024	Initial release

