OPS Technical Product Specification

OPS1SN

Version 1.1, 09/08/2021

Preface

The purpose of this document is to provide a technical reference for customers and developers of the Simply NUC OPS1SN family of products.

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1   Description

1.1   Overview

Simply NUC OPS1SN Module is a disruptive modular approach for the OPS industry. Intel NUC Compute Element options along with Simply NUC's standard OPS chassis provide scalability and upgradability while leveraging existing "OPS ready" large-format display technologies to do more with your budget. Start with a Simply NUC OPS1SN Module and select an Intel NUC Compute Element with the exact processor performance you need. The Simply NUC OPS1SN module is designed to fit into a standard OPS slot on the back of your displays and interactive whiteboards. The module with compute element is designed to meet the standard Open Pluggable Specifications, simplifying installation, usage, maintenance, and future upgrades to your technology.

The perfect slot PC to bring your interactive 4K imagery to life in both classrooms and businesses alike, the Simply NUC OPS1SN Module brings an immersive experience to your whiteboard enabled lesson, large-format display meetings and digital signage applications. A total of six USB ports will power all the mice, keyboards, cameras and other peripherals on which your collaboration space depends. With upgradable Intel NUC Compute Elements, Simply NUC OPS1SN systems are scalable from Celeron all the way up to Core i7 with vPro, while also providing future upgrade paths to future generations of Intel® processor technology.

Intel® NUC Elements enable you to design systems for video collaboration, classroom learning, digital signage and other A/V based OPS deployments. Housed in a quiet actively cooled chassis that will fit into standard OPS enabled displays, the Simply NUC OPS1SN Module can be easily integrated into a broad range of digital solutions. The modular chassis options provide flexibility in usage, are qualified for 24/7 operation, and provide value now and for future generations to come.

OPS1SN has the following features:

- Intel NUC Compute Element U-Series (Required)
- Actively-Cooled chassis
- M.2 slot for NVMe or SATA SSD
- HDMI 1.4b with Built-In CEC
- Intel® 10/100/1000 Mbps RJ45 Ethernet
- Support for Wireless and Bluetooth Technologies
- Four USB 3.0 Gen 1 Type A Ports
- Two USB 2.0 Type A Ports
- One RS-232 Serial Port
- Digital Audio 7.1 Surround Sound
- Qualified for 24x7 operation
- Designed to Open Pluggable Specification
- External dipole antennas
- Internal Wi-Fi and Bluetooth antennas

1.2   Compute Element

The OPS1SN module utilizes the Intel NUC U-Series Compute Element. The Compute Element module options along with a series of Intel-designed components, deliver the flexibility of modular computing to allow the creation of the exact system needed. The Compute Element module options provide scalability in performance incorporating

- Celeron to Core i7 with vPro processors with integrated GPU,
- 4GB to 16GB of DRAM, and
- Wireless-AC + Bluetooth or WiFi-6 + Bluetooth

From generation to generation, Intel is committed to preserve the form factor and pin-out of the Compute Element module for upgradability.

1.3   Integrated Graphics Processing Unit

The iGPU is part of the Compute Element module. Depending on the Compute Element chosen, the Intel integrated GPU would be

- UHD Graphics 610,
- UHD Graphics 620,
- UHD Graphics Xe, or
- Iris XE Graphics

1.4   Memory

The DRAM is part of the Compute Element module and is fixed and non-configurable. Depending on the Compute Element chosen, the on-module memory would be

- 4GB LPDDR3-2133,
- 8GB LPDDR3-2133,
- 4GB LPDDR4-3733,
- 8GB LPDDR4-4266, or
- 16 GB LPDDR4-4266

1.5   Storage

OPS1SN has one M.2 key-M slot for a 2280 storage module supporting either a SATA or PCIe SSD.

1.5.1 SATA Interface

The M.2 slot is a key-M slot for a SATA 2280 M.2 module, up to 2TB in density. The SATA III port has a theoretical maximum transfer rate of 6Gbps.

1.5.2 PCIe Interface

The M.2 slot is a key-M slot for an PCIe 2280 M.2 module, up to 8TB in density. The PCIe 3.0 x4 interface on the port has a theoretical maximum transfer rate of 4GBps.

1.6 Networking

1.6.1 RJ-45 Connector for Networking Interface

OPS1SN has an Intel I225LM gigabit controller to provide the 1GbE interface to the on-board RJ-45 Ethernet connector. The I225LM controller features

- Integrated MAC + BASE-T PHY
- MDI standard IEEE 802.3 Ethernet interface for 2500BASE-T, 1000BASE-T, 100BASE-TX, and 10BASE-TE
- 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 cross-over 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 an 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

1.6.2 Wireless Networking Interface

The wireless radio support is part of the Compute Element module and is fixed. Depending on the Compute Element chosen, the on-module wireless support will come in the form of

- Wireless-AC 9560 with Bluetooth 5.0, or
- WiFi-6 AX201 with Bluetooth 5.1

2   Technical Reference

2.1   Motherboard Headers

2.1.1.1   M.2 for Storage

The M.2 storage socket supports both SATA III and PCI Express (PCIe) drives in a 2280 key-M module. SATA drives support a theoretical maximum transfer rate of 6Gbps, and PCIe drives utilizing PCIe Gen 3 can deliver up to 4GBps bandwidth.

Table 1: M.2 Key-M SSD Pinout

Pin	Signal	Signal	Pin
74	3.3V	GND	75
72	3.3V	GND	73
70	3.3V	GND	71
68	SUSCLK(32kHz) (O)(0/3.3V)	PEDET (NC-PCIe/GND-SATA)	69
66	CONNECTOR KEY	N/C	67
64	CONNECTOR KEY	CONNECTOR KEY	65
62	CONNECTOR KEY	CONNECTOR KEY	63
60	CONNECTOR KEY	CONNECTOR KEY	61
58	N/C	CONNECTOR KEY	59
56	N/C	GND	57
54	PEWAKE# (I/O)(0/3.3V) or N/C	REFCLKp	55
52	CLKREQ# (I/O)(0/3.3V) or N/C	REFCLKn	53
50	PERST# (O)(0/3.3V) or N/C	GND	51
48	N/C	PETp0/SATA-A+	49
46	N/C	PETn0/SATA-A-	47
44	N/C	GND	45
42	SMB_DATA	PERp0/SATA-B-	43
40	SMB_CLK	PERn0/SATA-B+	41

Pin	Signal	Signal	Pin
38	DEVSLP (O)	GND	39
36	N/C	PETp1	37
34	N/C	PETn1	35
32	N/C	GND	33
30	N/C	PERp1	31
28	N/C	PERn1	29
26	N/C	GND	27
24	N/C	PETp2	25
22	N/C	PETn2	23
20	N/C	GND	21
18	3.3V	PERp2	19
16	3.3V	PERn2	17
14	3.3V	GND	15
12	3.3V	PETp3	13
10	DAS/DSS# (I/O)/LED1# (I)(0/3.3V)	PETn3	11
8	USB_D-	GND	9
6	USB_D+	PERp3	7
4	3.3V	PERn3	5
2	3.3V	GND	3
		GND	1

2.2 Chassis I/O Connectors

2.2.1 Connectors – Front Panel

Front-panel connector locations are shown below.
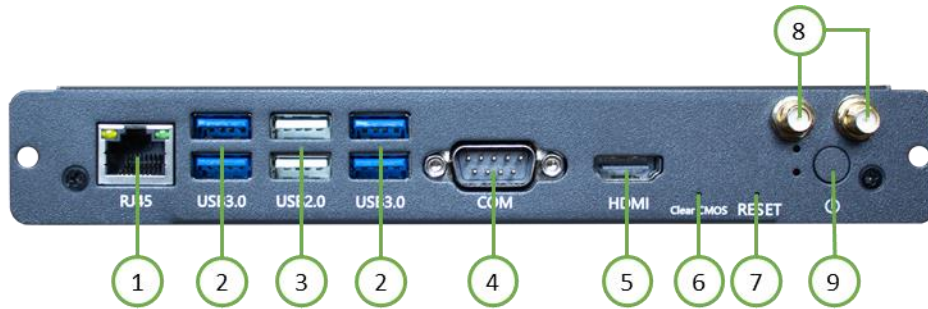
Figure 1: Front Side Panel Connectors

Table 2: Front Side Connections Defined

Identifier	Connector
1	RJ-45 for Gigabit Ethernet
2	Four USB 3.0 Gen1 Type-A
3	Dual USB 2 Type-A
4	Serial Port DE-9
5	HDMI Port
6	Clear CMOS
7	Reset
8	Antenna Connector RP-SMA
9	Power Button

The on-board RJ-45 gigabit Ethernet port is controlled by an Intel I219LM gigabit controller. For more information on the controller refer RJ-45 Connector for Networking Interface.

The four USB 3.0 Gen1 Type-A ports on the front of the module support transfer speeds up to 5Gbps.

The two USB 2 Type-A ports on the front of the module support transfer speeds up to 480Mbps.

The serial communications port is a male DE-9 connector intended to connect to a serial RS-232 interface.

The HDMI 1.4b port can support a maximum output resolution 4096 x 2160, 30Hz.

A through-hole is provided to a Clear CMOS button to reset the device to its default settings.

A through-hole is provided to a Reset button to reset the device.

The two RP-SMA connectors are used to amplify both the Wi-Fi and Bluetooth signals when appropriate antennas are attached.

The power button is used to turn the OPS module on and off.

2.2.2 Connectors – Rear Panel

Connectors on the back side of the module are as follows.

Figure 2: Back Panel Connectors

Table 3: Back Panel Connectors Defined

Identifier	Connector
10	DC Power Input
11	Board-to-Board Connector

The system has a 12-19VDC input with 10% tolerance.

The board-to-board connector is an 80-pin JAE TX25 connector which can plug into an OPS module receiver via its 80-pin JAE TX24 connector.

2.3 Mechanical Dimensions

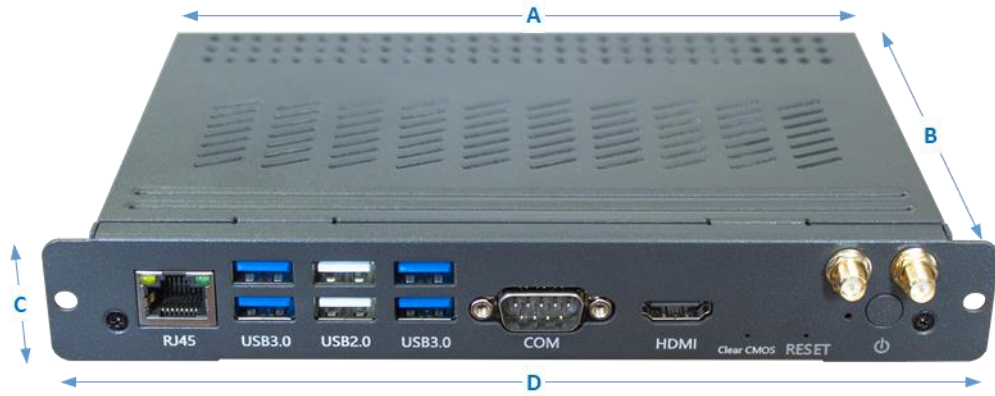The dimensions for the OPS1SN OPS module are given below.

Figure 3: OPS1SN Dimensions

Table 4: Dimension Values

Specification	Value
A (OPS1SN Width)	180mm
B (OPS1SN Depth)	118mm
C (OPS1SN Height)	30mm
D (OPS1SN Front Panel Width)	200mm
Weight	820g

3   Environmental Specifications

Table 5: Environmental Specifications

Condition	Specification
Input Voltage	12V – 19V ±10%
Input Voltage Connector	5.5 x 2.5mm Barrel Plug
Recommended PSU Wattage	90W
Operating Temperature	0°C– 40°C
Operating Humidity	5% – 90% Non-Condensing
Storage Temperature	-20°C – 70°C

Condition	Specification
Storage Humidity	5% – 90% Non-Condensing

4   Version History

Version	Date	Comments
1.0	08/29/21	Initial release.
1.1	09/08/2021	Removed all references to line-in and line-out jacks