

# EdgeCard Server™ User Manual



Green Edge Computing Corp.



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## Revision History

Date	Revision Description	Revision
2024/09/16	Initial Release	A
2024/11/20	Changed maximum power consumption to 65W in specification section.	A.2
2025/01/22	Update Approved Accessory List in appendix 6. Added errata section 2.4.6.	A.3

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## 1 Related documents

- EdgeCard Datasheet
- TN001 (EdgeCard Removal and Installation)
- UM002 (EdgePod User Manual)
- QF001 (GECCO Warranty)

## 2 Product summary and key features

**Description:** Ultra compact, rugged, fan-less, pluggable server, with range of processor and memory options, OpenVPX/VITA65 aligned rear interface, Ethernet, USB, and DisplayPort front interfaces. Compatible with the GECCO EdgePod to allow operation of an EdgeCard without cables and fans due to the presence of a VPX backplane and advanced conduction cooling. For benchtop evaluation and standalone application of the EdgeCard Server, the product can be ordered with a standalone cooling option to prevent overheating when operated outside of an EdgePod.

**Applications:** Zero-touch computing for edge deployments, remote management, virtual machines, containers, Windows/Linux, multiaccess edge computing, IoT/AI/ML applications. Suitable for defence, aerospace, telecom, retail, infrastructure, mining, refining, process industries, smart agriculture, smart city, manufacturing, maritime, and more!

**Benefits:** Easy to deploy because of small size, low weight, pluggable design eliminates wiring problems. Easy to maintain and swap out for upgrades and repairs. Convenient front ports for commissioning prior to deployment and troubleshooting when installed.

### 2.1 What you will find in the box

- EdgeCard Server
- User Manual

When ordered with the “Accessory Kit”:<sup>1</sup>

- 1x 100W AC to DC USB-C Universal Power Adapter
- 1x Mini-DP to DisplayPort Cable
- 1x ix Industrial Ethernet Cable
- 1x Cat 6 RJ45 coupler
- 1x USB-hub
- 1x Power/Reset pin-tool

### 2.2 Mounting instructions

**EdgePod installation:** Insert the EdgeCard into an empty slot in any GECCO EdgePod. The card slot has two guide rails that provide support and heat transfer for the EdgeCard. The rear VPX connector provides connectivity for power, networking and I/O. Refer to TN001 (EdgeCard Removal and Installation) for detailed installation instructions.

**Standalone deployment:** For standalone deployments the Standalone Cooling option needs to be specified at the time of ordering. This factory installed option is required for adequate cooling. The EdgeCard can be placed on any flat surface, with the top side free of obstruction to ensure air flow over the EdgeCard. Since the EdgeCard is designed to transfer its generated heat through the metal case, the outside of the EdgeCard gets hot during operation. This is normal.

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<sup>1</sup> To fully benefit from the accessory kit, customer need to provide their own DisplayPort monitor, USB keyboard and mouse.

## 2.3 Requirements for power, network, and cooling

**Power:** The rear VPX connector provides power through the backplane of the GECCO EdgePod. Refer to section 2.4.5 for power characteristics.

When using the EdgeCard Server in standalone applications, a 100W USB-C PD adaptor can be plugged in the front USB-C port. The adaptor works with any conventional single-phase 110-220 Vac outlet.

**Network:** The rear VPX connector provides a 10GbE interface to the EdgeCard through the backplane of the GECCO EdgePod. In addition, there is a dedicated 1GbE interface for management access (BMC).

When using the EdgeCard Server in standalone applications, an Ethernet cable with **ix Industrial connector** can be plugged into the front panel Ethernet port. This cable is provided with the Accessory Kit option. This port also provides access to the management interface (BMC).

**Cooling:** When the EdgeCard Server is installed in a GECCO EdgePod, the EdgePod provides the mechanism for drawing heat from the EdgeCard and disperses it from the outer shell of the EdgePod. The operating temperature range depends on the selected EdgePod and cooling system installed.

When using the EdgeCard Server in standalone applications, always use the optional Standalone Cooling option and ensure that the ambient air temperature stays in the range of -20C to +30C. The Standalone Cooling option is only to be used when the EdgeCard is not deployed in a GECCO EdgePod, which may include bench testing and proof of concept trials, and for very compact applications where space is severely restricted, and a single CPU is adequate.

## 2.4 Specifications

### 2.4.1 Processor

Processor option need to be selected at the time of ordering. Please refer to the EdgeCard datasheet for all processor options.

### 2.4.2 Processor Memory

Processor memory is DDR4. Up to 64GB is supported and needs to be specified at the time of ordering. Please refer to the EdgeCard datasheet for ordering options. It is not possible to change or upgrade processor memory in the field.

### 2.4.3 M.2 Expansion Slots

The EdgeCard has expansion support for two onboard M-keyed M.2 modules. Module type 2280 is recommended. Contact GECCO for supporting the shorter 2260, 2242 and 2230 module types. At least one SSD module shall be present to support installing and running an Operating System.

Each slot provides support for SATA Gen 3 (up to 6Gb/s) as well as 4-lane PCIe Gen 3. When a SATA drive is installed in M.2 slot #0, the SATA interface to VPX is automatically disabled. Therefore, if a SATA connection on VPX is required, M.2 slot #0 cannot host a M.2 SATA module, however, the slot may still be used to host a PCIe/NVMe type module. Such limitation does not exist when using M.2 PCIe modules, such as M.2 PCIe NVMe SSD.

Access to the M.2 slots is through a hatch on the bottom side. To open the hatch, flip the EdgeCard Server and remove the two Phillips screws to lift the hatch up.



Figure 1. Access to M.2 Expansion Slots

For applications with that require an AI processor, GECCO recommends the use of the Hailo-8 M.2 Module. When specified at the time of ordering, the EdgeCard is preloaded with M.2 SSD drives and/or Hailo-8 M.2 modules.



**Warning:** M.2 modules and exposed contacts and circuitry of the EdgeCard are susceptible to electrostatic discharge. Handling in an ESD safe environment is recommended.

#### 2.4.4 RTC Battery

An RTC battery feature is included to keep the Real-Time-Clock running when no power is provided to the EdgeCard. A CR1225 coin battery is installed by default. For replacement, the battery holder is accessible through the top hatch. To open the hatch, remove the two Phillips screws to lift the hatch up.



Figure 2. Access to RTC battery on the EdgeCard Server.

To replace the battery, push the metal tab on the battery holder in the direction of the arrow (see Figure 3), then lift the battery from the battery holder. When inserting the new battery, make sure the + side (flat side) is on the side of the metal tab.



Figure 3. EdgeCard RTC battery replacement

### 2.4.5 Technical Specifications

Size	171mm x 100mm x 26mm (6.7in x 3.9in x 1.0in)
Weight	0.63 kg (1.38 lbs)
Power	45W Idle 50W Nominal 65W Max 3W (running on Vaux)
Cooling	Passive (no internal fan) With standalone cooling option: Active (heatsink+fan)
Operating Temperature	0 to 55 °C (32 to 131°F)
Connectivity – front	USB-C (USB 3.1   100W PD (sink)   DP Alt mode) USB Type A (USB 3.1) Mini-DisplayPort (DisplayPort 1.1) ix Industrial Ethernet (1000BASE-T)
Connectivity – rear	VPX VITA 65.0 Single Board Computer I/O intensive profile (SLT3-PAY-1F1F2U1TU1T1U1T-14.2.16): 2 x 10Gb Ethernet (10GBASE-KR) 1 x 1Gb BMC Ethernet (1000BASE-T) 4 x PCIe Gen3 (x1, x2, x4 bifurcation, NVMe) 8 x PCIe Gen3 (x4, x8 bifurcation, NVMe) 1 x DisplayPort 1.1 1 x USB 3.1 1 x USB 2.0



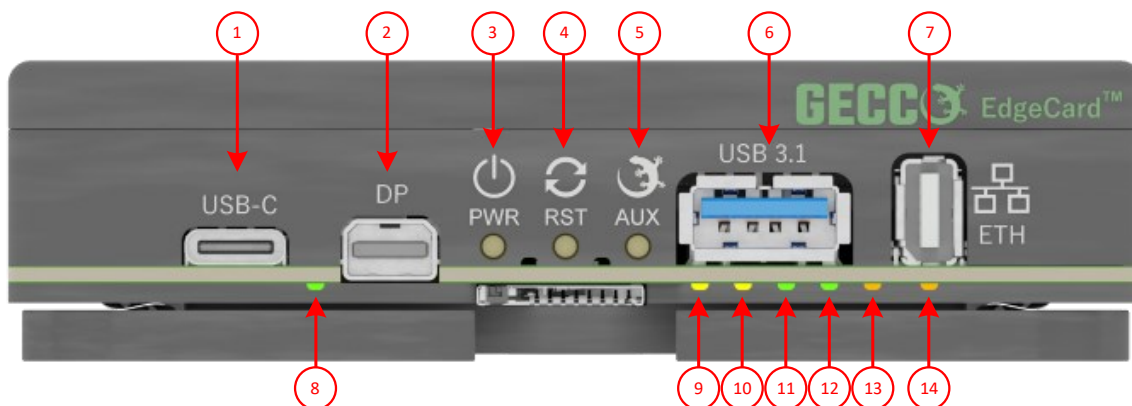
	<p>1 x SATA Gen3                  2 x RS232 Serial Port (or 1x RS422/RS485)                  20 x GPIO (3.3V I/O)</p> <p><b>Note:</b> not all I/O is exposed when installed in an EdgePod. Refer to the EdgePod documentation and contact GECCO if additional I/O is required.</p>
Power supply	12VDC via backplane, or 75-100W through USB-C Power Delivery (PD)
Predicted operating life	10 years
HCI compatibility	Visit <a href="http://www.g3cco.com">http://www.g3cco.com</a> or contact your GECCO sales representative for a list of validated HCI/software partners.
Server Management	Baseboard Management Controller for remote monitoring and management: remote power and reset control, remote KVM, serial over LAN, Virtual Media, Web-based User interface and IPMI.
Compliance	Designed to meet: UL/CSA/NOM-019 safety standards FCC/ISED radiation standards

**2.4.6 Errata**

The following table shows known issues with the EdgeCard Server:

<b>Issue #1</b>	<b>DP Alt mode on front panel USB-C connector is not stable and may not work with certain docking stations.</b>
	Use of video over the USB-C connector is not recommended for continuous operational use. An alternative for video/display is Virtual KVM in BMC. If a physical monitor is required, use a mini-DP to DisplayPort cable to connect a DisplayPort monitor directly to the mini-DP connector on the EdgeCard.
<b>Issue #2</b>	<b>BMC features may not work as expected.</b>
	<p>The OpenBMC implementation on the EdgeCard Server is work in progress. The following features are known to be working. Other features are provided on an experimental basis.</p> <ul style="list-style-type: none"> <li>- Web User Interface (WebUI).</li> <li>- Virtual KVM</li> <li>- Sensor data, except certain warning and error thresholds.</li> <li>- Server power operations (virtual power/reset button)</li> </ul>

### 3 Front Panel Description



- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>1 USB 3.1 Type C connector with support for 100W Power Delivery and DisplayPort Alt mode.</li> <li>2 Mini-DisplayPort connector.</li> <li>3 Power Button.</li> <li>4 Reset Button.</li> <li>5 Auxiliary Button (reserved for future use).</li> <li>6 USB 3.1 Type A connector.</li> <li>7 ix 1Gb Ethernet connector.</li> </ul> | <ul style="list-style-type: none"> <li>8 Main Power LED (green).</li> <li>9 Activity LED (yellow) for rear VPX 10Gb Ethernet port 0.</li> <li>10 Activity LED (yellow) for rear VPX 10Gb Ethernet port 1.</li> <li>11 Activity LED (green) for M.2 slot 0.</li> <li>12 Activity LED (green) for M.2 slot 1.</li> <li>13 Activity LED (orange) for front ix 1Gb Ethernet.</li> <li>14 Activity LED (orange) for rear VPX 1Gb Ethernet.</li> </ul> |
|--|--|

#### 3.1 Front Panel Power and Reset Buttons

In the event the operating system commands cannot be used for power down or reset, the power and reset buttons on the front panel may be used. The EdgeCard Server has miniaturized buttons that avoid accidental operation for maximum uptime of the server. Only a quick press is required, which means the button can be released immediately after activation. A small click will be noticeable when a button is activated.

One quick press of the power button will signal the operating system to gracefully power down. In power down state, the power consumption is reduced to less than 4 Watts. The main power LED will turn off. The time between pressing the power button, and going into power down state, depends on the operating system and may vary from a couple of seconds to a couple of minutes. In the event an EdgeCard Server does not reach power down state a long press on the power button may be required to force shutdown. To force shutdown, keep the power button pressed for approximately two seconds. In power down state, it is safe to unplug the USB-C power supply from the EdgeCard Server.

When the EdgeCard Server is in power down state (ie. it is plugged in, but the main power LED is not lit), one quick press on the power button will power it back up.

The reset button can be used to force a reset. One quick press will reset the EdgeCard Server. This will reboot the EdgeCard without powering down.

### 3.2 USB-C Connector

The USB-C connector on the EdgeCard can be used in several ways. Refer to Appendix: Approved Accessory List for examples of cables and adapters that may be used in the following use cases:

1. As a power supply port, using a 100W USB-C PD power adapter.
2. As a display port, using a USB-C DP Alt Mode to DP Monitor Cable.
3. As a regular USB-C port for USB 2 and USB 3.1 compatible peripherals.
4. A combination of the above, with a combo adapter or docking station.

As a power source for external peripherals, the current is limited to 900mA (5V). The power is shared with USB01 on VPX, therefore peripherals connected to both USB-C and USB01 on VPX shall not exceed the current limit. Note that this is a standard limit for USB 3.1 and sufficient for peripherals like keyboard, mouse, thumb drives, etc.

### 3.3 DisplayPort

The EdgeCard Server has three ports for outputting a DisplayPort 1.1 signal:

1. Mini-DisplayPort connector on the front, or
2. USB-C connector on the front (using “Alt-Mode”), or
3. VPX connector over the backplane.

The presence of a monitor is automatically detected. Only one display port can be active and the priority is as listed above. The EdgeCard automatically switches to the port with the highest priority when a monitor is detected. For example, if a monitor is plugged into the Mini-DisplayPort connector, the other ports are disabled. To enable DisplayPort over the backplane, no monitors shall be plugged into the front.

DisplayPort is enabled by the BMC (AST2600) and may require manual driver installation depending on the chosen Operating System, see Appendix: DisplayPort Support for more information.

The “Accessory Kit” includes a Mini-DisplayPort to DisplayPort cable which requires a native DisplayPort monitor. It is possible to use a VGA or HDMI monitor instead with the use of an active adapter. See Appendix: Approved Accessory List for details.

### 3.4 USB 3.1 Connector

A regular USB port for external peripherals. Current to external peripherals is limited to 900mA (5V). The power is shared with USB02 on VPX, therefore peripherals connected to both USB 3.1 and USB02 on VPX shall not exceed the current limit. Note that this is a standard limit for USB 3.1 and sufficient for peripherals like keyboard, mouse, thumb drives, etc.

### 3.5 ix Industrial Ethernet Connector

The ix Industrial connector is an IEC Standard Compliant Next-Generation Industrial Transmission Connector used for 1000BASE-T Ethernet. The connector has mechanical advantages over a traditional RJ45 connector and it electrically compatible. When a connection to another device, such as an Ethernet switch, requires an RJ45 connection, the use of an ix-to-RJ45 cable is recommended. These cables are commercially available off-the-shelf in various lengths. If the accessory kit is ordered, a 1 meter cable is included. This Ethernet port may be used to access the CPU and the BMC.

## 4 BMC

The EdgeCard Server provides a Board Management Controller (BMC) which is accessible through the 1000BASE-T port on the rear VPX interface and the ix Industrial Ethernet connector on the front panel.

### 4.1 Feature List <sup>2</sup>

- Secure login-based portal access
- Host management: Power, Reset, LEDs, Events, Watchdog
- IPMI 2.0
- Update Support for BMC firmware
- Web-based user interface
- SSH based Serial-Over-LAN (SOL)
- Remote KVM
- User management
- Virtual media

### 4.2 Web-based User Interface (WebUI)

The WebUI is an intuitive method for remote access. By default, the BMC is configured to dynamically receive an IP address from the network. Generally, a DHCP server on the network can show a list of devices on the network and their IP addresses. If this is unavailable, an application such as [Advanced IP Scanner](#) could be used to scan the network. Install and run this application on a separate computer attached to the same network as the EdgeCard. Once the IP address of the BMC is known, use an internet browser to connect to the BMC.

Upon entering the IP address of the BMC into a browser there might be a warning that the connection is not private. Advance to continue to the BMC login screen.

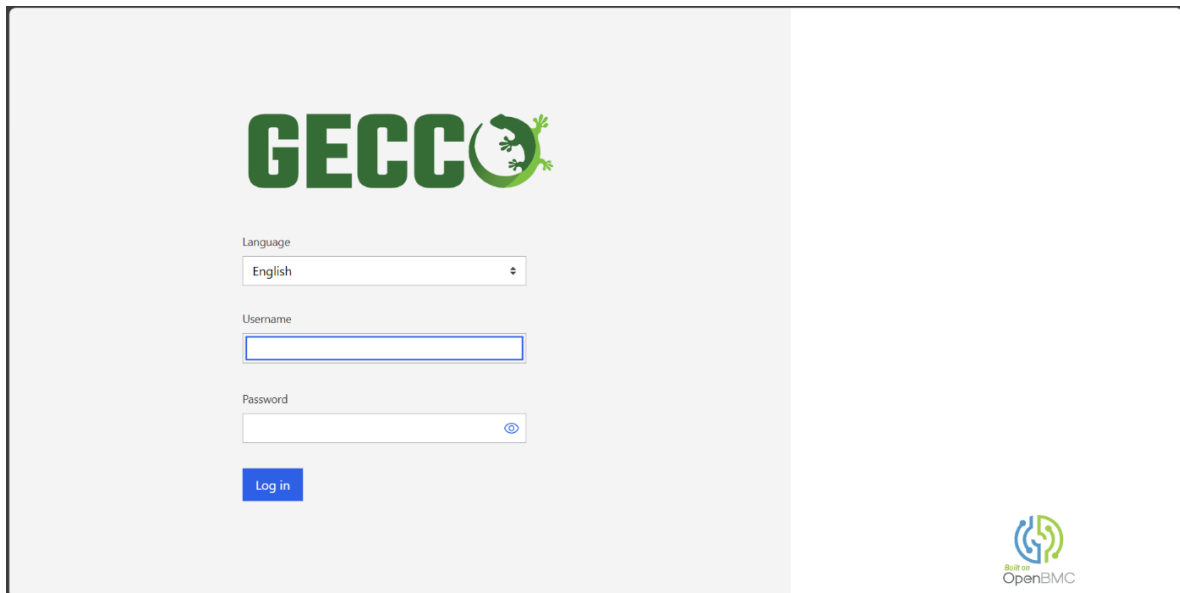


Figure 4. EdgeCard OpenBMC Login Screen

<sup>2</sup> Some features of the BMC are still in development, please contact GECCO for details.

The default credentials of the BMC are:

- Username: root
- Password: OpenBmc (the first character is a zero)

After logging in, the Overview screen will be present for the user.

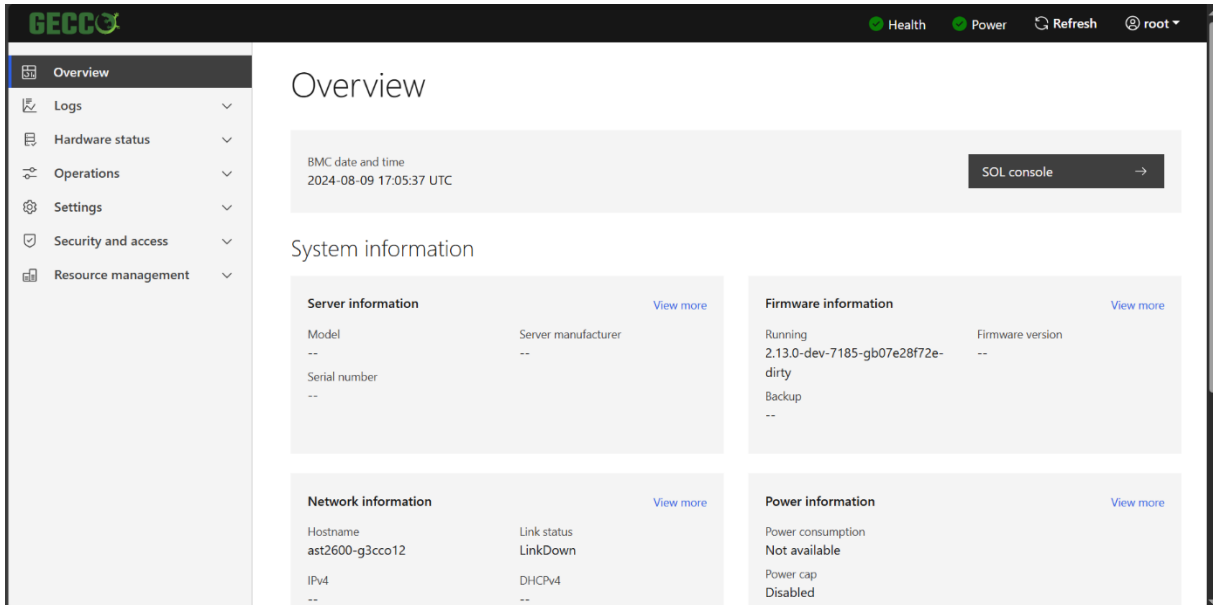


Figure 5. EdgeCard OpenBMC Overview Screen

### 4.3 Accessing Sensor Information

From the Overview screen select the dropdown Hardware status and select Sensors.

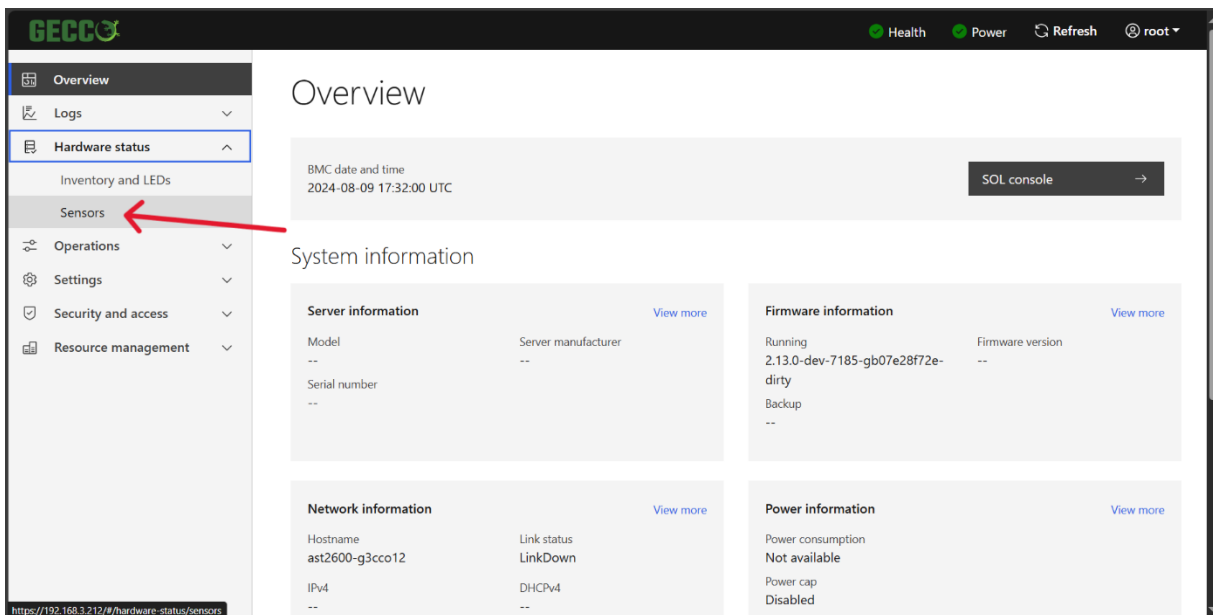


Figure 6. EdgeCard OpenBMC Hardware Status Menu

From the Sensors screen there is information on the vitals of the hardware. This is where to check the current status and the warning and critical threshold values.

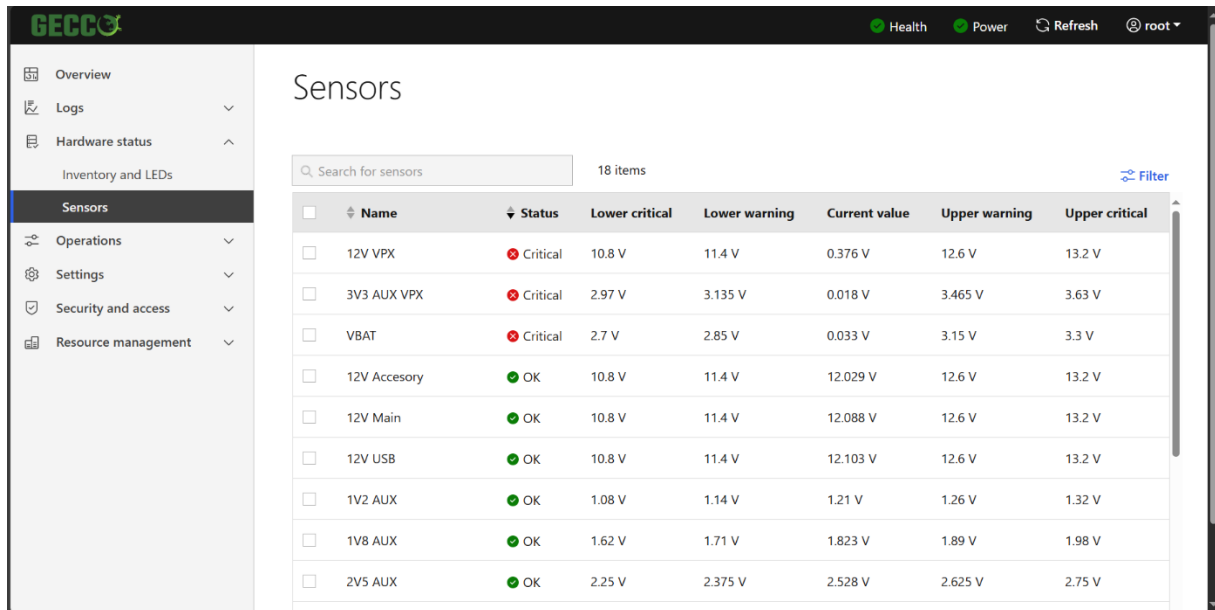


Figure 7. EdgeCard OpenBMC Sensors Screen

#### 4.4 Accessing and using the KVM

The Keyboard Video and Mouse (KVM) screen is to monitor and control the server. To access the KVM select the Operations dropdown menu and select KVM.

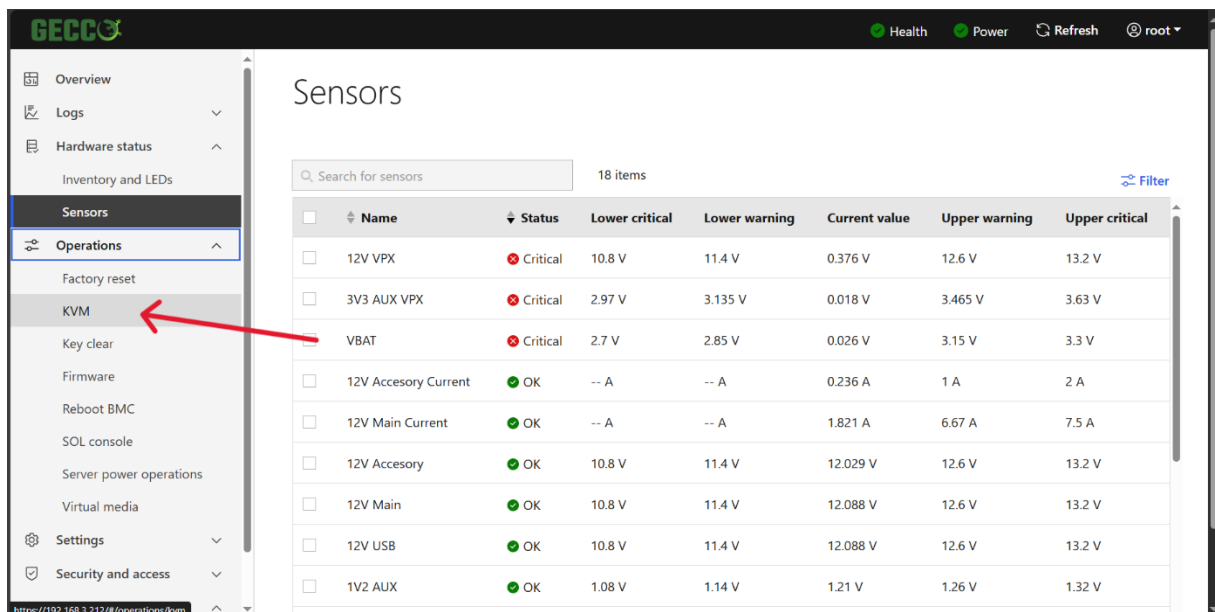


Figure 8. EdgeCard OpenBMC Operations Menu

Once on the KVM screen, it will show the server display output. You can use your mouse and keyboard to control the server.

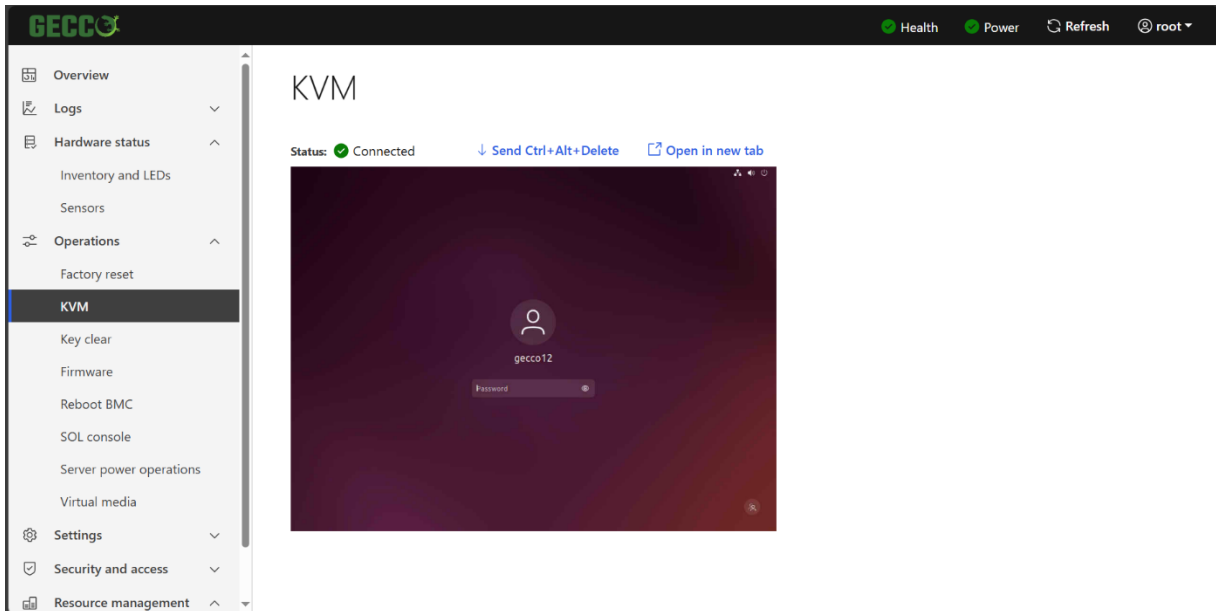


Figure 9. EdgeCard OpenBMC KVM Screen

#### 4.5 Using Remote Reset, Shutdown and Power Up.

The BMC allows to remotely reset, shutdown, and power up the EdgeCard server. To do these actions navigate to the Server power operation option in the Operations dropdown.

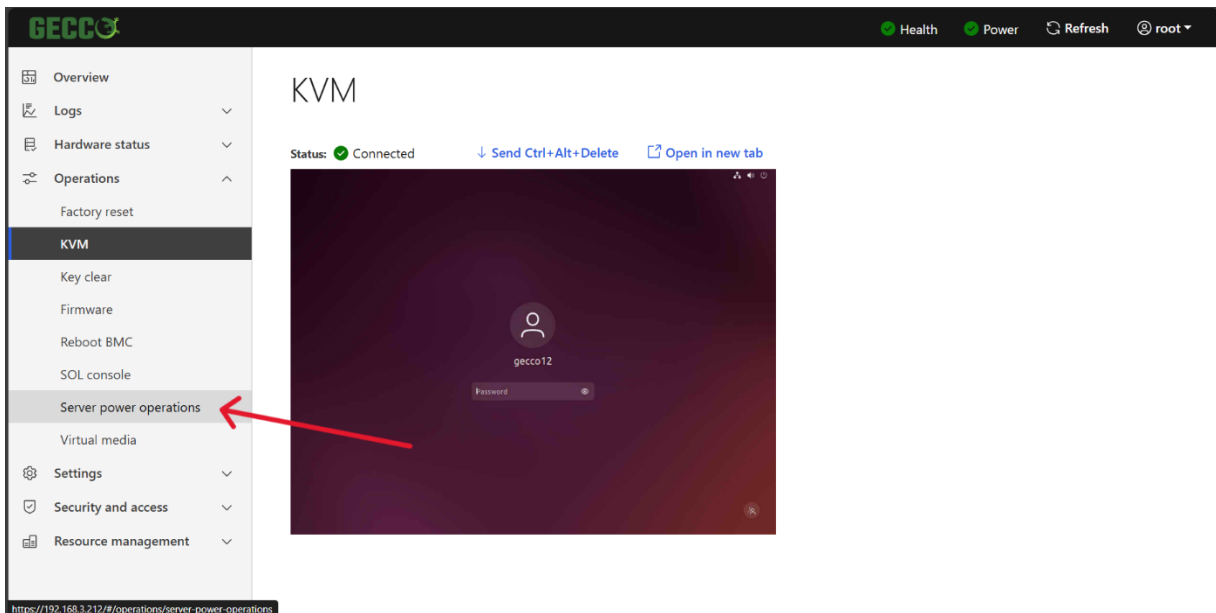


Figure 10. EdgeCard OpenBMC Operations Menu

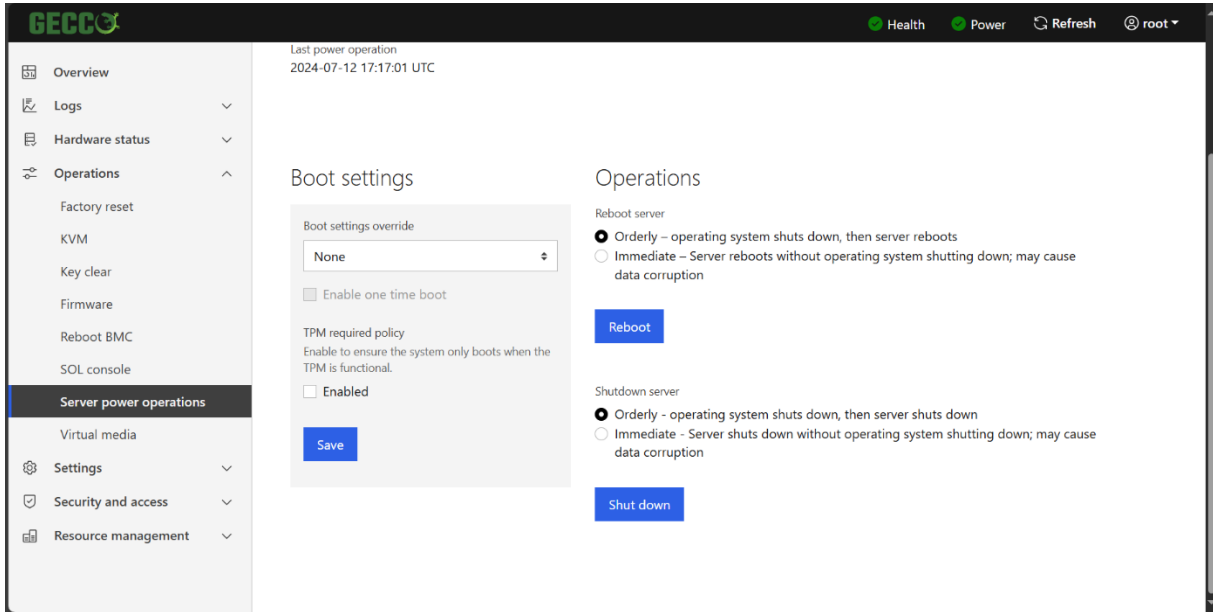


Figure 11. EdgeCard OpenBMC Server Power Operations Screen

In this screen it is possible to Reboot with the reboot selection and to Shutdown using the shutdown selection. If the server is powered off there is the option to power on, as shown in Figure 12.

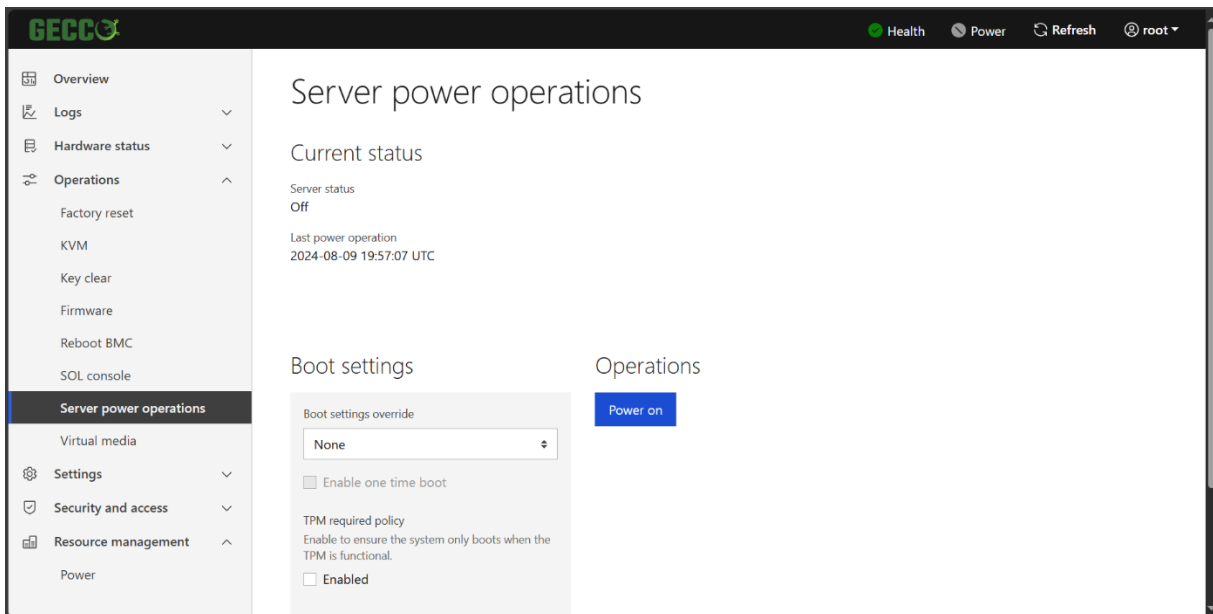


Figure 12 EdgeCard OpenBMC in Server Power Off state

## 5 Warranty

GECCO products carry a limited warranty. Please refer to the GECCO Warranty Policy [QF001] and your contracted terms and conditions of sale.



## 6 Appendix: Approved Accessory List

The list in this appendix is not a complete list, but rather a list of cables, adapters, and solid-state drives (SSD) that have been proven to work in combination with the EdgeCard. The interfaces on the EdgeCard are standard and therefore other similar cables and adapters are likely to work. **Passive display conversion adapters are not supported. For the conversion from Mini-DisplayPort to VGA or HDMI the use of an active adapter is required.**

Category	Brand	Model #	Description	
Power Supplies for Standalone Operation	Wavlink	WL-P1101	112W Universal Charger Portable USB C Laptop Adapter	
	Anker	A2672	100W USB C Power Adapter	
Display cables and adapters	StarTech	CDP2DPMM6B	USB-C to DisplayPort Cable	
	StarTech	MDP2VGA2	Mini-DisplayPort to VGA Active Adapter	
	StarTech	MDP2HD4K60S	Mini-DisplayPort to HDMI Active Adapter	
	IVANKY	VBL08-US	Mini-DisplayPort to HDMI Active Adapter	
	IVANKY	DD06-US	Mini-DisplayPort to DisplayPort Cable	
SSD	Exascend	PE4 Series	Commercial temperature grade, 0°C to 70°C	
		EXPE4M960GB		960GB M.2 2280 (1TB)
		EXPE4M1920GB		1920GB M.2 2280 (2TB)
		EXPE4M3840GB		3840GB M.2 2280 (4TB)
	Exascend	PI4 Series	Industrial temperature grade, -40°C to 85°C	
		EXPI4M960GB		960GB M.2 2280 (1TB)
		EXPI4M1920GB		1920GB M.2 2280 (2TB)
		EXPI4M3840GB		3840GB M.2 2280 (4TB)

**Table 1. Approved Accessory List**

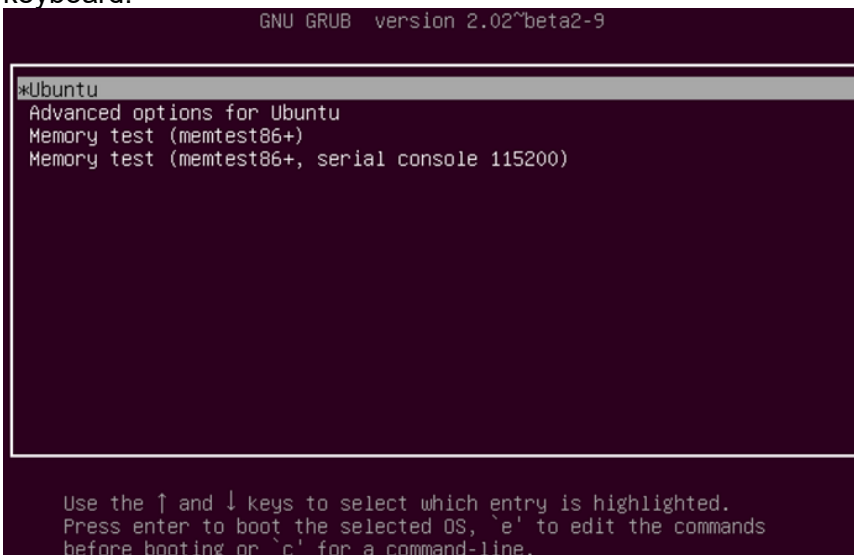
## 7 Appendix: DisplayPort Support

The EdgeCard Server has a Mini-DisplayPort connector and supports DP Alt mode over the USB-C connector for DisplayPort 1.1 video output. DisplayPort is enabled by the BMC on the EdgeCard Server and requires the appropriate driver in the installer or live operating system. By default, EdgeCard Servers are shipped with the proper configuration to enable video output. Only in the event the operating system is re-installed, or a different operating system is installed, the instructions in this document may be necessary to enable video output on the EdgeCard.

Linux kernels 5.19 and above have default support built in. Older kernels may require that the “nomodeset” boot option is set to ensure video output on the DisplayPort or USB-C connector. This boot option can be set for one time booting or permanently. This document uses Ubuntu as an example, but the concept works similar on other Linux distributions.

### 7.1 Manually set “nomodeset” option for one time boot

1. Power on the system.
2. Watch for the "GNU GRUB" bootloader screen. It may be required to keep the “SHIFT” key pressed during boot to show this bootloader screen.
3. When you see the option for "Ubuntu" as shown below, press the "E" key on your keyboard.



```

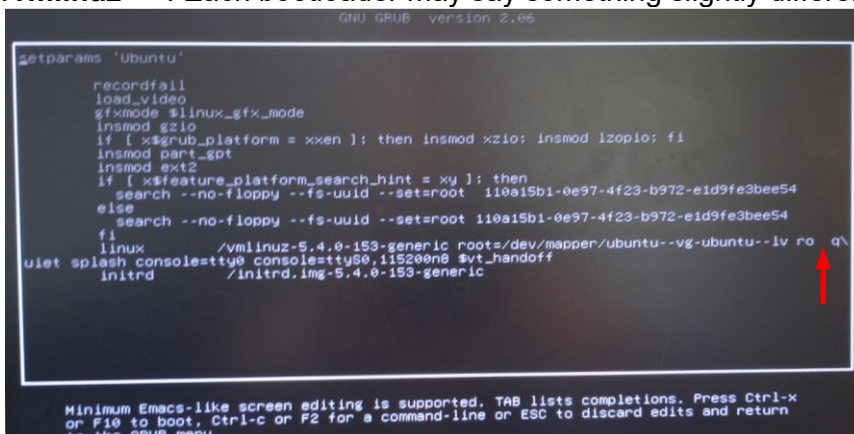
GNU GRUB  version 2.02~beta2-9

*Ubuntu
Advanced options for Ubuntu
Memory test (memtest86+)
Memory test (memtest86+, serial console 115200)

Use the ↑ and ↓ keys to select which entry is highlighted.
Press enter to boot the selected OS, 'e' to edit the commands
before booting or 'c' for a command-line.

```

4. In the editor, use the arrow keys to locate the line that starts with "**linux** /vmlinuz\*\*\*". Each bootloader may say something slightly different.



```

GNU GRUB  version 2.06

setparams "Ubuntu"
recordfail
load_video
gfxmode $linux_gfx_mode
insmod gzio
if [ x$grub_platform = xxen ]; then insmod xzio; insmod lzopio; fi
insmod part_gpt
insmod ext2
if [ x$feature_platform_search_hint = xy ]; then
  search --no-floppy --fs-uuid --set=root 110a15b1-0e97-4f23-b972-e1d9fe3bee54
else
  search --no-floppy --fs-uuid --set=root 110a15b1-0e97-4f23-b972-e1d9fe3bee54
fi
linux /vmlinuz-5.4.0-153-generic root=/dev/mapper/ubuntu--vg-ubuntu--lv ro q
quiet splash console=tty0 console=ttyS0,115200n8 $vt_handoff
initrd /initrd.img-5.4.0-153-generic

Minimum Emacs-like screen editing is supported. TAB lists completions. Press Ctrl-x
or F10 to boot, Ctrl-c or F2 for a command-line or ESC to discard edits and return
to the GRUB menu.

```

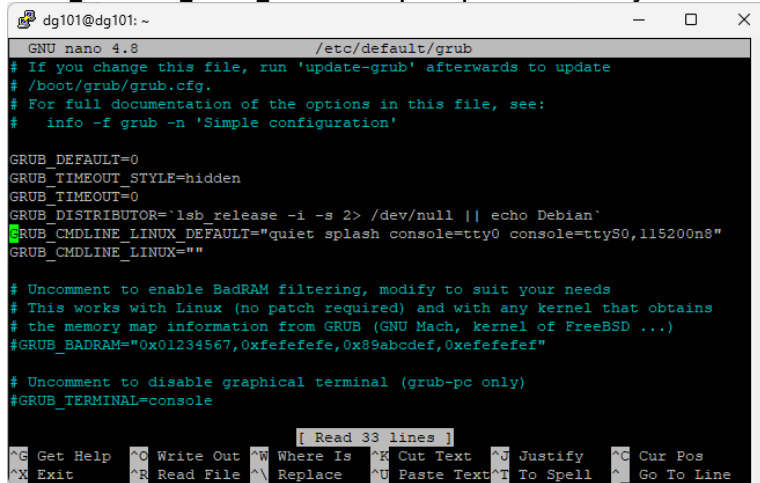
5. Add the "**nomodeset**" option into the line at the location indicated by the red arrow. Again, each bootloader may say something slightly different but adding "**nomodeset**" before other options like “quiet” or “splash” is good.

6. Now press "**CTRL+X**" or **F10** and your system should boot to the installer or live operating system with normal video output.
7. After boot into the live operating system, you can permanently set this option (see section 7.2) or install the appropriate drivers (see section 7.3).

## 7.2 Permanently set "nomodeset" option

1. Start the live operating system. Following the instructions in section 7.1 may be required for this.
2. Start a terminal or an SSH session and after login, type "**sudo nano /etc/default/grub**".
3. Enter password if prompted.
4. Move the cursor to the line that looks like the following:

**GRUB\_CMDLINE\_LINUX\_DEFAULT="quiet splash console=tty0 console=ttyS0,115200n8"**



```

dg101@dg101: ~
GNU nano 4.8 /etc/default/grub
# If you change this file, run 'update-grub' afterwards to update
# /boot/grub/grub.cfg.
# For full documentation of the options in this file, see:
# info -f grub -n 'Simple configuration'

GRUB_DEFAULT=0
GRUB_TIMEOUT_STYLE=hidden
GRUB_TIMEOUT=0
GRUB_DISTRIBUTOR=`lsb_release -i -s 2> /dev/null || echo Debian`
GRUB_CMDLINE_LINUX_DEFAULT="quiet splash console=tty0 console=ttyS0,115200n8"
GRUB_CMDLINE_LINUX=""

# Uncomment to enable BadRAM filtering, modify to suit your needs
# This works with Linux (no patch required) and with any kernel that obtains
# the memory map information from GRUB (GNU Mach, kernel of FreeBSD ...)
#GRUB_BADRAM="0x01234567,0xfefefefefefefefefefef,0x89abcdef,0xefefefefef"

# Uncomment to disable graphical terminal (grub-pc only)
#GRUB_TERMINAL=console

[ Read 33 lines ]
^G Get Help  ^O Write Out  ^W Where Is  ^K Cut Text  ^J Justify    ^C Cur Pos
^X Exit      ^R Read File  ^N Replace   ^U Paste Text ^I To Spell  ^_ Go To Line

```

5. Change that line to match the following (adding "nomodeset"):
 

**GRUB\_CMDLINE\_LINUX\_DEFAULT="quiet splash **nomodeset** console=tty0 console=ttyS0,115200n8"**
6. Press CTRL+O to save, followed by enter.
7. Press CTRL-X to exit.
8. Now type "**sudo update-grub2**" to apply the change.
9. Once complete, reboot the server.

## 7.3 Installing the DisplayPort driver

Drivers and instructions for installing the drivers can be found on [https://www.aspeedtech.com/support\\_driver/](https://www.aspeedtech.com/support_driver/)