



**Connect Tech Inc.**  
Embedded Computing Experts

# USERS GUIDE



## Sentry-X2 Mini (ESG650)

CTIM-00166 Revision 0.00 2026-04-16



**CONNECT TECH**  
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## PREFACE

### Disclaimer

The information contained within this user's guide, including but not limited to any product specification, is subject to change without notice.

Connect Tech assumes no liability for any damages incurred directly or indirectly from any technical or typographical errors or omissions contained herein or for discrepancies between the product and the user's guide.

### Customer Support Overview

If you experience difficulties after reading the manual and/or using the product, contact the Connect Tech reseller from which you purchased the product. In most cases the reseller can help you with product installation and difficulties.

In the event that the reseller is unable to resolve your problem, our highly qualified support staff can assist you. Support resources are available 24 hours a day, 7 days a week on our website at: <https://connecttech.com/support/resource-center/>. See the contact information section below for more information on how to contact us directly. Our technical support is always free.

### Contact Information

Contact Information	
<b>Mail/Courier</b>	Connect Tech Inc. Technical Support 489 Clair Rd. W. Guelph, Ontario Canada N1L 0H7
<b>Contact Information</b>	<a href="mailto:sales@connecttech.com">sales@connecttech.com</a> <a href="http://connecttech.com">connecttech.com</a>  Toll Free: 800-426-8979 (North America only) Telephone: +1-519-836-1291 Facsimile: 519-836-4878 (on-line 24 hours)
<b>Support</b>	Please go to the <a href="#">Connect Tech Resource Center</a> for product manuals, installation guides, device drivers, BSPs and technical tips.  Submit your <a href="#">technical support questions</a> to our support engineers. Technical Support representatives are available Monday through Friday, from 8:30 a.m. to 5:00 p.m. Eastern Standard Time.

## Limited Product Warranty

Connect Tech Inc. provides a 1 year Warranty for this product. Should this product, in Connect Tech Inc.'s opinion, fail to be in good working order during the warranty period, Connect Tech Inc. will, at its option, repair or replace this product at no charge, provided that the product has not been subjected to abuse, misuse, accident, disaster or non-Connect Tech Inc. authorized modification or repair.

You may obtain warranty service by delivering this product to an authorized Connect Tech Inc. business partner or to Connect Tech Inc. along with proof of purchase. Product returned to Connect Tech Inc. must be pre-authorized by Connect Tech Inc. with an RMA (Return Material Authorization) number marked on the outside of the package and sent prepaid, insured and packaged for safe shipment. Connect Tech Inc. will return this product by prepaid ground shipment service.

The Connect Tech Inc. Limited Warranty is only valid over the serviceable life of the product. This is defined as the period during which all components are available. Should the product prove to be irreparable, Connect Tech Inc. reserves the right to substitute an equivalent product if available or to retract the Warranty if no replacement is available.

The above warranty is the only warranty authorized by Connect Tech Inc. Under no circumstances will Connect Tech Inc. be liable in any way for any damages, including any lost profits, lost savings or other incidental or consequential damages arising out of the use of, or inability to use, such product.

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## ESD Warning



Electronic components and circuits are sensitive to ElectroStatic Discharge (ESD). When handling any circuit board assemblies including Connect Tech carrier assemblies, it is recommended that ESD safety precautions be observed. ESD safe best practices include, but are not limited to:

- Leaving circuit boards in their antistatic packaging until they are ready to be installed.
- Using a grounded wrist strap when handling circuit boards, at a minimum you should touch a grounded metal object to dissipate any static charge that may be present on you.
- Only handling circuit boards in ESD safe areas, which may include ESD floor and table mats, wrist strap stations and ESD safe lab coats.
- Avoiding handling circuit boards in carpeted areas.
- Try to handle the board by the edges, avoiding contact with components.

## REVISION HISTORY

Revision	Date	Changes
0.00	2026-04-16	Preliminary Release

## INTRODUCTION

Sentry-X2 Mini(ESG650) is a MIL-Rugged system, powered by the NVIDIA® Jetson NX Orin™ 16GB module.

Designed for mission critical applications in harsh environments, the Sentry-X2 Mini is a MIL-SPEC certified AI system for computing at the tactical edge. The NVIDIA® Jetson NX Orin™ 16GB is a 1024-core GPU capable of 157 TOPS, ideal for advanced AI and machine learning applications. The Sentry-X2 Mini (ESG650) includes, 1Gb, 2.5Gb, dual USB 3.2 ports, and a wide array of I/O options.

Tested to MIL-STD specifications for shock and vibration and utilizing IP67 rated D38999 connectors for data integrity, Sentry-X2 Mini (ESG650) is designed to meet the strict requirements of military, aerospace, and heavy industrial applications.

Preliminary

## Product Features and Specifications

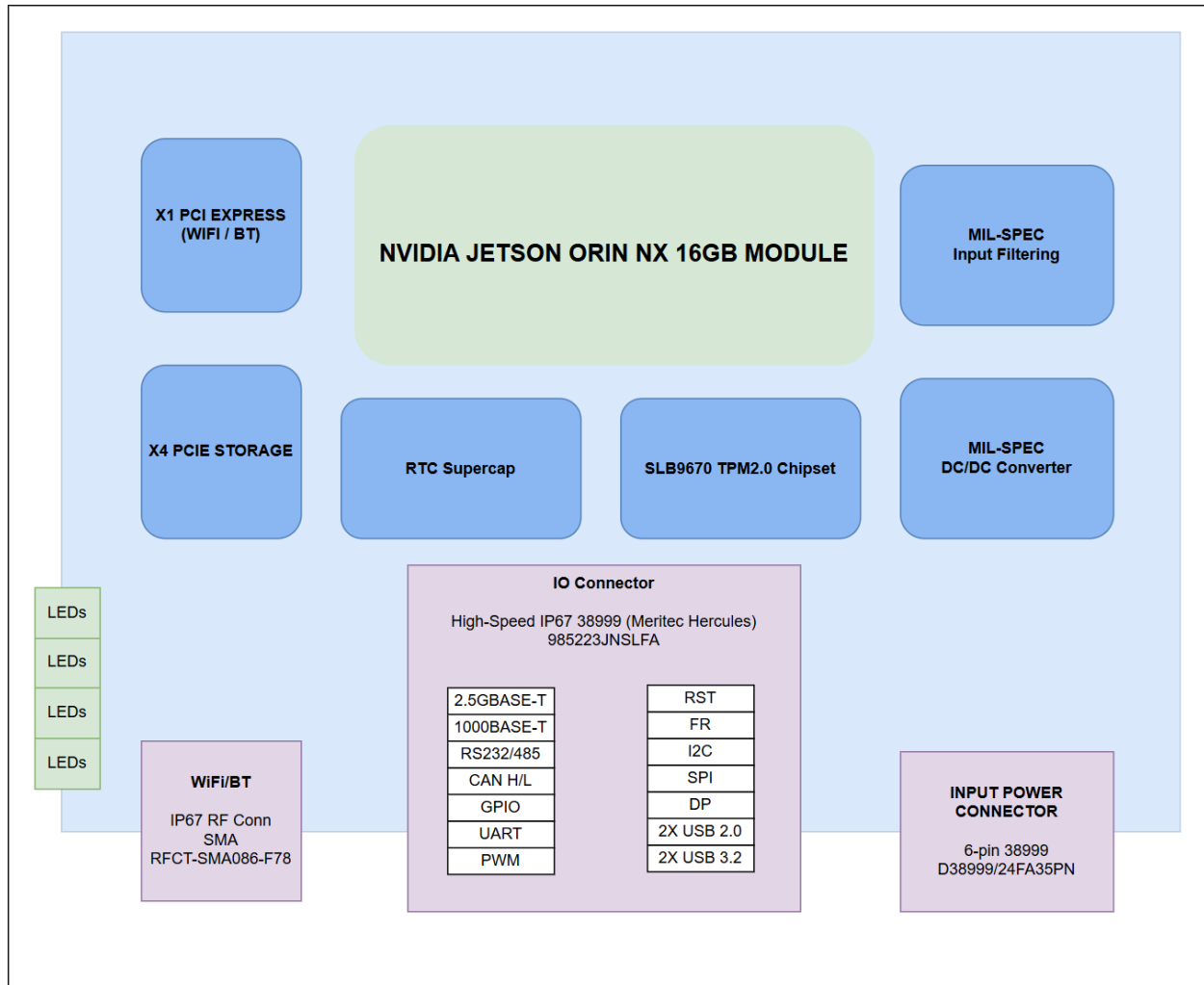
Specifications											
<b>Product Name</b>	Sentry-X2 Mini (ESG650) Embedded System										
<b>Module Compatibility</b>	NVIDIA® Jetson NX Orin™ 16GB <table border="1" data-bbox="618 436 1421 562"> <thead> <tr> <th colspan="2">Specifications</th> </tr> </thead> <tbody> <tr> <td><b>CPU</b></td> <td>8-core Arm® Cortex®-A78AE v8.2 64-bit CPU 2MB L2 + 4MB L3</td> </tr> <tr> <td><b>GPU</b></td> <td>1024-core NVIDIA® Ampere architecture GPU with 32 Tensor Cores</td> </tr> <tr> <td><b>Memory</b></td> <td>16GB 128-bit LPDDR5 102.4GB/s</td> </tr> <tr> <td><b>AI Performance</b></td> <td>157 TOPS</td> </tr> </tbody> </table>	Specifications		<b>CPU</b>	8-core Arm® Cortex®-A78AE v8.2 64-bit CPU 2MB L2 + 4MB L3	<b>GPU</b>	1024-core NVIDIA® Ampere architecture GPU with 32 Tensor Cores	<b>Memory</b>	16GB 128-bit LPDDR5 102.4GB/s	<b>AI Performance</b>	157 TOPS
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<b>Memory</b>	16GB 128-bit LPDDR5 102.4GB/s										
<b>AI Performance</b>	157 TOPS										
<b>Mechanical Dimensions</b>	See Mechanical Drawing Appendix										
<b>USB</b>	2x USB 3.2 Ports (10Gbps Capable)										
<b>Networking</b>	1x 1000BASE-T Ethernet (1GbE) 1x 2.5GBASE-T Ethernet (2.5GbE)										
<b>Storage</b>	1x M.2 M Key (Up to 4TB NVMe)										
<b>Wireless Expansion</b>	1x M.2 E Key Wi-Fi/BT (optional)										
<b>Video Output</b>	1x DisplayPort 1.4 Output 4K @ 60HZ										
<b>Misc I/O</b>	5x 3v3 GPIO (1x PWM capable) 1x 3.3V, 1A Source pin 1x UART (RS232/422/485 configurable) 1x 3.3V I2C 1x 3.3V SPI 2x 3.3V UART										
<b>CAN</b>	1x Non-Isolated CAN 2.0b										
<b>RTC Battery</b>	SuperCap (No Battery Installed)										
<b>Security Processor</b>	TPM 2.0										
<b>Input Power/Misc Power Details</b>	MIL-STD-704F Input Power +28V Nominal Operating Voltage (+16V to +50V Range as specified by MIL-STD-704F) Designed to EMI/EMC as per MIL-STD-461F/G										
<b>Operating Temperature</b>	-20°C to +70°C (-4°F to +158°F)										
<b>Weight</b>	1.5KG										
<b>Designed to MIL Specifications</b>	Environmental: MIL-STD-810H, DO-160H EMC/EMI: MIL-STD-461G, MIL-STD-704F										
<b>Warranty and Support</b>	1 Year Warranty and Free Support										

## Part Numbers / Ordering Information

Part Number	
<b>ESG650-001</b>	Sentry-X2 Mini Embedded System integrated with NVIDIA® Jetson NX Orin™ 16GB Module with Passive Cooling, WIFI 6E, 2 TB NVMe
<b>ESG650-002</b>	Sentry-X2 Mini Embedded System integrated with NVIDIA® Jetson NX Orin™ 16GB Module with Passive Cooling, 2 TB NVMe
Optional Accessories	
<b>ADG121</b>	Meritec 38999 Development Breakout PCB (ESG633/ESG650)
<b>CBG741</b>	Power Cable Flying Lead
<b>CBG745</b>	1 Meter 38999 Meritec Cable
<b>CKG074</b>	Kit Includes: <ul style="list-style-type: none"> <li>- 1x CBG741 (Power Cable Flying Lead)</li> <li>- 1x CBG745 (1 Meter 38999 Meritec Cable)</li> <li>- 1x ADG121 (Meritec 38999 Development Breakout PCB (ESG633/ESG650))</li> </ul>
<b>MSG093</b>	Wi-Fi/BT Development Antenna
<b>MSG127</b>	Development AC/DC Power Supply with MIL-38999 Adapter Cable (ESG650)

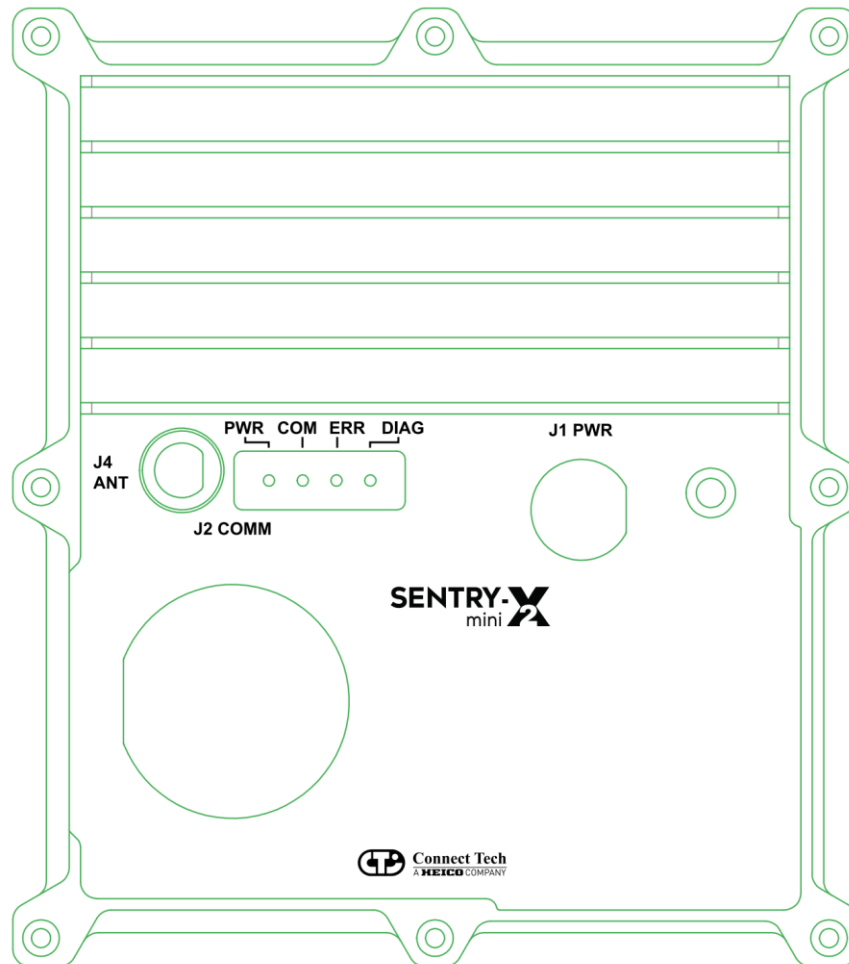
# PRODUCT OVERVIEW

## Block Diagram



## Connector Summary & Locations

### Sentry-X2 Mini (ESG650) IO



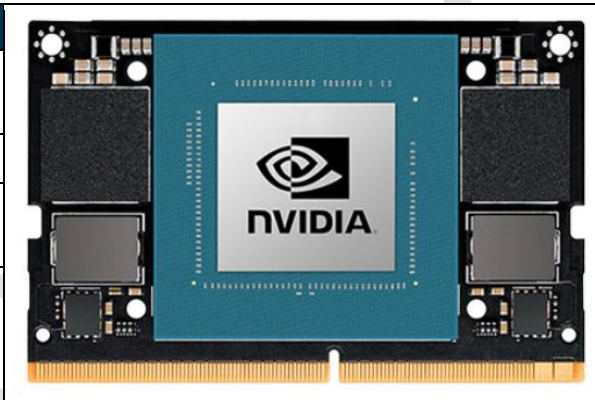
External Connector	Description
J1 - PWR	Input Power +28V Nominal Operating Voltage (+16V to +50V Range as specified by MIL-STD-704F)
J2 - COMM	Multi IO Connector with 1Gb, 2.5Gb, dual USB 3.2 ports, and a wide array of I/O options
J4 - ANT	Antenna (WiFi and Bluetooth)

## DETAILED FEATURE DESCRIPTION

### Sentry-X2 Mini (ESG650) Embedded System NVIDIA® Jetson NX Orin™

The NVIDIA® Jetson AGX Orin™ processor and chipset are implemented as the main processor for this system. 3 options are available 8GB NX ORIN and 16GB ORIN, 16GB ORIN US, all options offer the same -25C to +80C Module temperature range.

Function	Description
<b>Location</b>	Within The Sentry-X2 Mini (ESG633) Embedded System
<b>Type</b>	Module
<b>Pinout</b>	Refer to NVIDIA® Jetson NX Orin™ Datasheet.
<b>Features</b>	Refer to NVIDIA® Jetson NX Orin™ Datasheet.



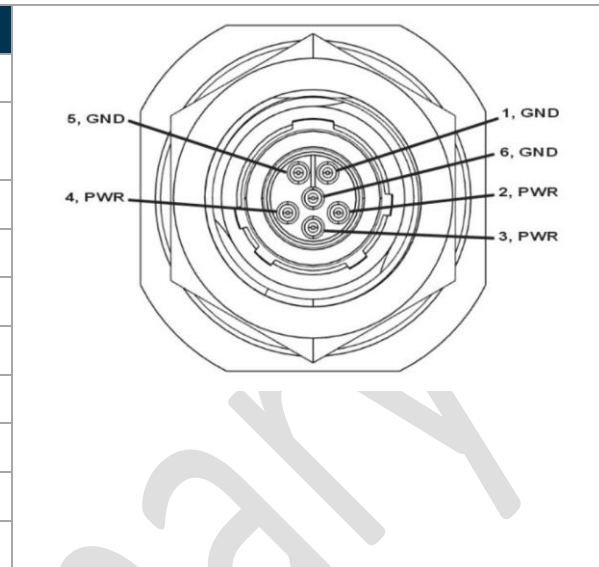
**Note:** A Thermal Transfer Plate is incorporated on the NVIDIA® Jetson NX Orin™ module that dissipates heat through the top of the Sentry-X2 Mini (ESG650) Embedded System Chassis.

### Internal Storage Options

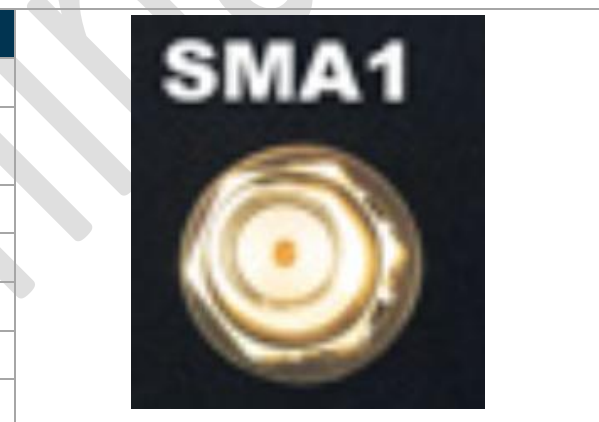
The Sentry-X2 Mini (ESG650) comes with a baseline of a single PCIe Gen 4, x4 lane 2TB NVMe, with an option for a single 4TB.

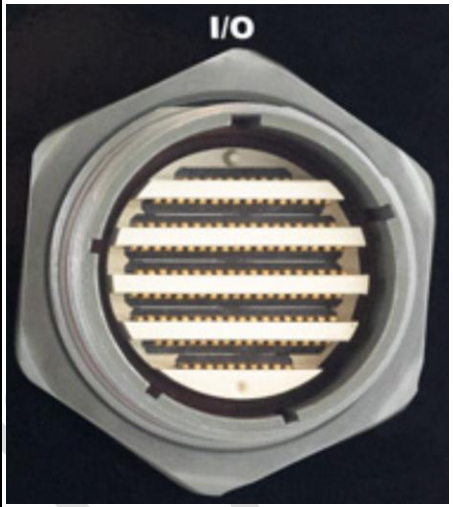
## Connectors & Jumpers

Function		
Location	Front Panel	
Type	Power Connector, 38999 Shell 9 N Key D38999/24FA35PN	
Cable	CBG741 – Power Cable Flying Lead	
Pinout	Pin	Description
	1	GND
	2	PWR
	3	PWR
	4	PWR
	5	GND
	6	GND



Function		
Location	Front Panel	
Type	WiFi/BT RF Connector RFCT-SMA086-F78	
Accessory	MSG093 - Wi-Fi/BT Development Antenna	
Jumper settings	Position	Description
	1	Signal
	Shell	FGND



Function	IO																				
Location	Rear I/O Panel																				
Type	Meritec 38999 Receptacle SHELL 23, N-Key P/N 985223JNSLFA																				
Cable	CBG745 – Meritec 38999 Cable																				
																					
Pinout	PIN/ ROW	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
	A						NC	NC	NC	NC	NC	NC	NC	NC	NC	NC					
	B			GND	CAN1_N	CAN1_P	GND	NC	NC	GND	DP_AU_X_P	DP_AU_X_N	GND	DP_LAN_E3_P	DP_LAN_E3_N	GND	DP_LAN_E2_P	DP_LAN_E2_N	GND		
	C		GND	NC	NC	GND	PWM1	NC	GND	RS422_TX1_P	RS422_TX1_N	GND	DP_LAN_E0_N	DP_LAN_E0_P	GND	DP_LAN_E1_N	DP_LAN_E1_P	GND	GPIO4	GPIO3	
	D	GND	USB1_D_P	USB1_D_N	GND	*RS422_TX2_N	*RS422_TX2_P	GND	*RS422_RX2_N	*RS422_RX2_P	GND	RS422_RX1_N	RS422_RX1_P	GND	USB1_S_SRX_N	USB1_S_SRX_P	GND	USB1_S_STX_N	USB1_S_STX_P	GND	
	E	GND	USB2_D_N	USB2_D_P	GND	UART2_RX	UART2_TX	GND	NC	NC	GND	*UART1_RX	*UART1_TX	GND	USB2_S_STX_P	USB2_S_STX_N	GND	USB2_S_SRX_P	USB2_S_SRX_N	GND	
	F	GND	USB1_V_BUS	USB1_V_BUS	GND	I2C1_SDA	I2C1_SCL	GND	SPI_MOSI	SPI_MISO	GND	SPI_CS#	SPI_CLK	GND	GPIO2	GPIO1	GND	3V3	3V3	GND	
	G		GND	USB2_V_BUS_OTG	USB2_V_BUS_OTG	GND	DP_HP_D	USB_ID	GND	PWR_BTN#	GND	GND	GND	GND	GND	GND	GND	GND	GND	RST#	FR#
	H			ETH_GND	ETH1_MX2_N	ETH1_MX2_P	ETH_GND	ETH1_MX3_P	ETH1_MX3_N	ETH_GND	ETH1_MX0_P	ETH1_MX0_N	ETH_GND	ETH1_MX1_P	ETH1_MX1_N	ETH_GND	ETH2_MX0_N	ETH2_MX0_P	ETH_GND		
	I					ETH_GND	ETH2_MX3_N	ETH2_MX3_P	ETH_GND	ETH2_MX2_N	ETH2_MX2_P	ETH_GND	ETH2_MX1_N	ETH2_MX1_P	ETH_GND						

Note 1: UART1/RS422\_2 can function as TTL OR RS422, this interface cannot operate as both TTL and RS422 at the same time

Note 2: Digital Ground and Ground References are isolated to each row.

## POWER CONSUMPTION & THERMALS

The system is capable of the following Orin NX NVP Models under certain temperature conditions. Operation outside the recommended criteria is not recommended.

NVP Model	Temperature
15W - Mode	-20C to +70C
25W - Mode	-20C to +60C
40W - Mode	-20C to +50C

The maximum power draw of the system is 150W, under high thermal stress the system may experience thermal shutdown above 125W draw.

## WI-FI ACCESS INSTRUCTIONS

Select, pre-configured units can be accessed via Wi-Fi and SSH without the need for a 38999 cable, providing a convenient temporary alternative connection method. Note that an antenna and power cable are still required. The following credentials and commands are needed to establish this connection. Should Wi-Fi be disabled for any reason, this method may become inaccessible and the 38999 cable will be necessary.

Step 1 - Connect to Wi-Fi

Network Name (SSID): **ESG650\_SN<Unit Serial Number>** Password: **connecttech**

An example SSID for ESG650 Serial Number 1001 would be: **ESG650\_SN1001**.

Step 2 - SSH Credentials

Username: **nvidia** User Password: **nvidia**

Step 3 - SSH Command

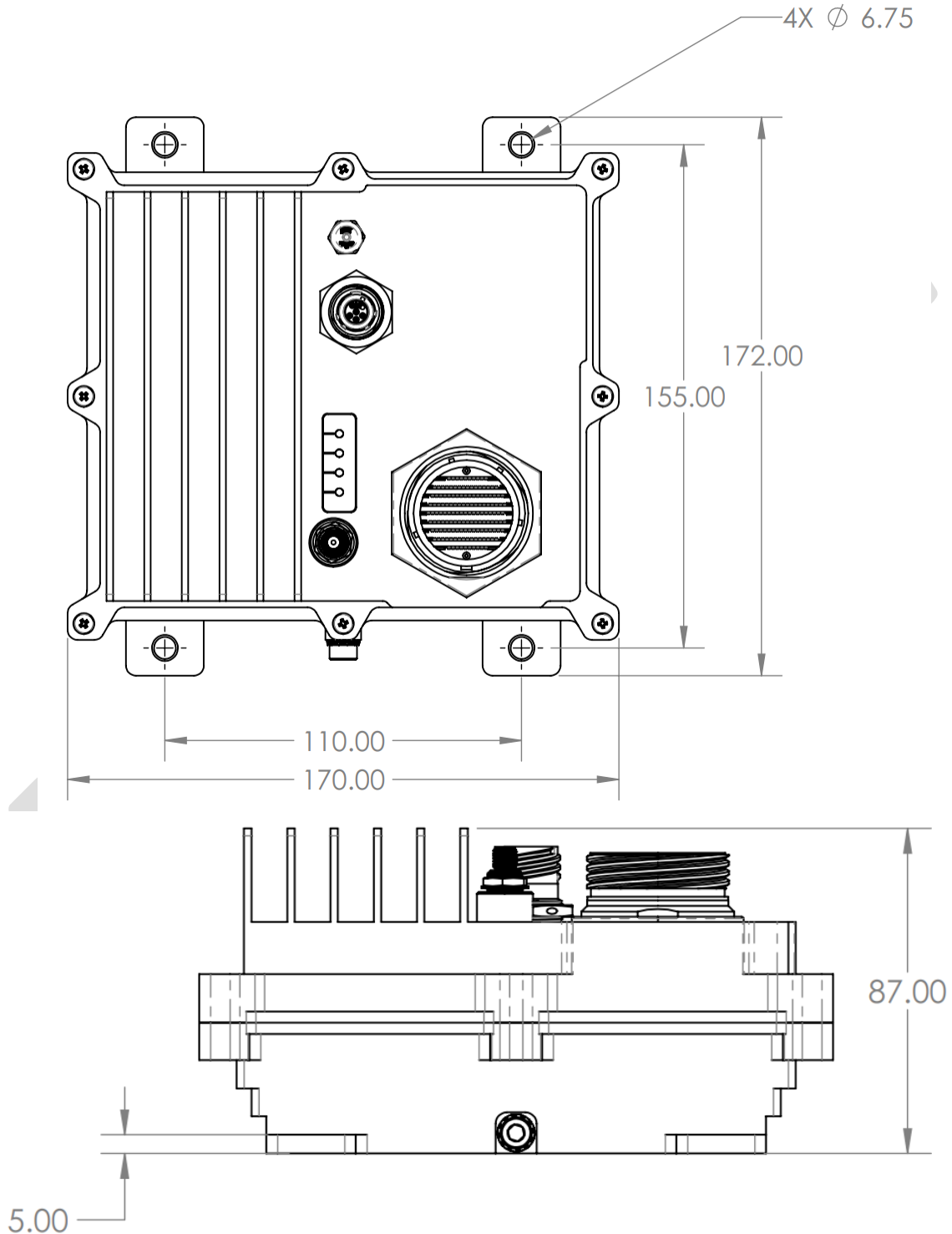
Once the host computer is connected to the ESG650 Wi-Fi network, open a terminal and run the following command:

```
ssh -x nvidia@10.42.0.1
```

When prompted, enter the user password listed above.

## MECHANICAL DRAWINGS & MODELS

Dimensional Drawings does not include all IO Configurations. If product SKU includes alternate connector layout, please contact Technical Support for Drawings and 3D Models.



## CABLES

Cables	
CBG741	Power Cable Flying Lead
CBG745	1 Meter 38999 Meritec Cable
CKG074	Kit Includes: <ul style="list-style-type: none"> <li>- 1x CBG741 (Power Cable Flying Lead)</li> <li>- 1x CBG745 (1 Meter 38999 Meritec Cable)</li> <li>- 1x ADG121 (Meritec 38999 Development Breakout PCB (ESG633/ESG650))</li> </ul>

## ACCESSORIES

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