



**Connect Tech Inc.**  
Embedded Computing Experts

# USERS GUIDE



## Rudi-NX FPD-Link III

CTIM-00105(0.01) 2024-04-29



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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. Our support section is available 24 hours a day, 7 days a week on our website at: <http://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.<br>Technical Support<br>489 Clair Rd. W.<br>Guelph, Ontario<br>Canada N1L 0H7   |
| <b>Contact Information</b> | <a href="mailto:sales@connecttech.com">sales@connecttech.com</a><br><a href="mailto:support@connecttech.com">support@connecttech.com</a><br><a href="http://www.connecttech.com">www.connecttech.com</a><br><br>Toll Free: 800-426-8979 (North America only)<br>Telephone: +1-519-836-1291<br>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.<br><br>Submit your <a href="#">technical support</a> questions 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 one-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.

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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 COM Express 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     | 2024-02-27 | Preliminary Release  |
| 0.01     | 2024-04-29 | Added display specification and Force Recovery Mode instructions |

## INTRODUCTION

Connect Tech’s Rudi-NX brings a deployable NVIDIA® Jetson Orin™ NX to the market. The Rudi-NX’s design includes a Locking Power Input (+9 to +36V), Dual Gigabit Ethernet, HDMI video, 4 x USB 3.0 Type A, 4 x FPD-Link III Cameras, USB Type-C (w/ OTG functionality), M.2 (B-Key 3042, M-Key 2280, and E-Key 2230 functionality; bottom access panel), 40 Pin Locking GPIO connector, 6-Pin Locking Isolated Full-Duplex CAN, RTC battery, 2FF (mini) SIM card slot, and a dual purpose Reset/Force Recovery pushbutton with Power LED.

Rudi-NX is compatible with NVIDIA® Jetson Orin™ NX and Orin™ Nano modules. Some I/O performance will change across modules.

### Product Feature and Specifications

| Feature                      | Rudi-NX FPD-Link III  |
|------------------------------|---|
| <b>Module Compatibility</b>  | NVIDIA® Jetson Orin™ NX<br>NVIDIA® Jetson Orin™ Nano  |
| <b>Mechanical Dimensions</b> | 109mm x 135mm x 50mm  |
| <b>USB</b>                   | 4x USB 3.0 (Connector: USB Type-A)<br>1x USB 3.1 OTG (Type-C)<br><br>1x USB 3.0 + 2.0 Port to M.2 B-Key<br>1x USB 2.0 to M.2 E-Key  |
| <b>GMSL Cameras</b>          | 4x FPD-Link III Camera Inputs (Connector: Quad Micro COAX)<br>Deserializers Embedded On Carrier Board   |
| <b>Display</b>               | 1x HDMI 2.0 Type-A  |
| <b>Networking</b>            | 2x 10/100/1000BASE-T Uplink (1 Port From PCIe PHY Controller)   |
| <b>Storage</b>               | 1x NVMe (M.2 2280 M-KEY)  |
| <b>Wireless Expansion</b>    | 1x WiFi Module (M.2 2230 E-KEY)<br>1x LTE Module (M.2 3042 B-KEY) w/ 2FF SIM Card Connector   |
| <b>Misc. I/O</b>             | 1x SPI<br>2x Isolated Camera Trigger Input<br>2x UART (1x Console, 1x 3.3V)<br>1x RS-485<br>2x I2C<br>2x PWM OUT<br>4x GPIO (2x IN, 2x OUT)<br>2x 5V<br>2x 3.3V<br>9x GND |
| <b>CAN</b>                   | 1x Isolated CAN FD (1Mbps max)  |

|                              |   |
|------------------------------|---|
| <b>RTC Battery</b>           | CR2032 Battery Holder                                   |
| <b>Pushbutton</b>            | Dual Purpose Reset/Force Recovery Functionality         |
| <b>Status LED</b>            | Power Good LED  |
| <b>Power Input</b>           | +9V to +36V DC Power Input (Mini-Fit Jr. 4-Pin Locking) |
| <b>Operating Temperature</b> | -20 C to +60 C<br>with minimum airflow of 70 CFM        |
| <b>Weight</b>                | 679g (ESG606-32)  |
| <b>Warranty and Support</b>  | 1 Year Warranty and Free Support                        |

## Part Numbers / Ordering Information

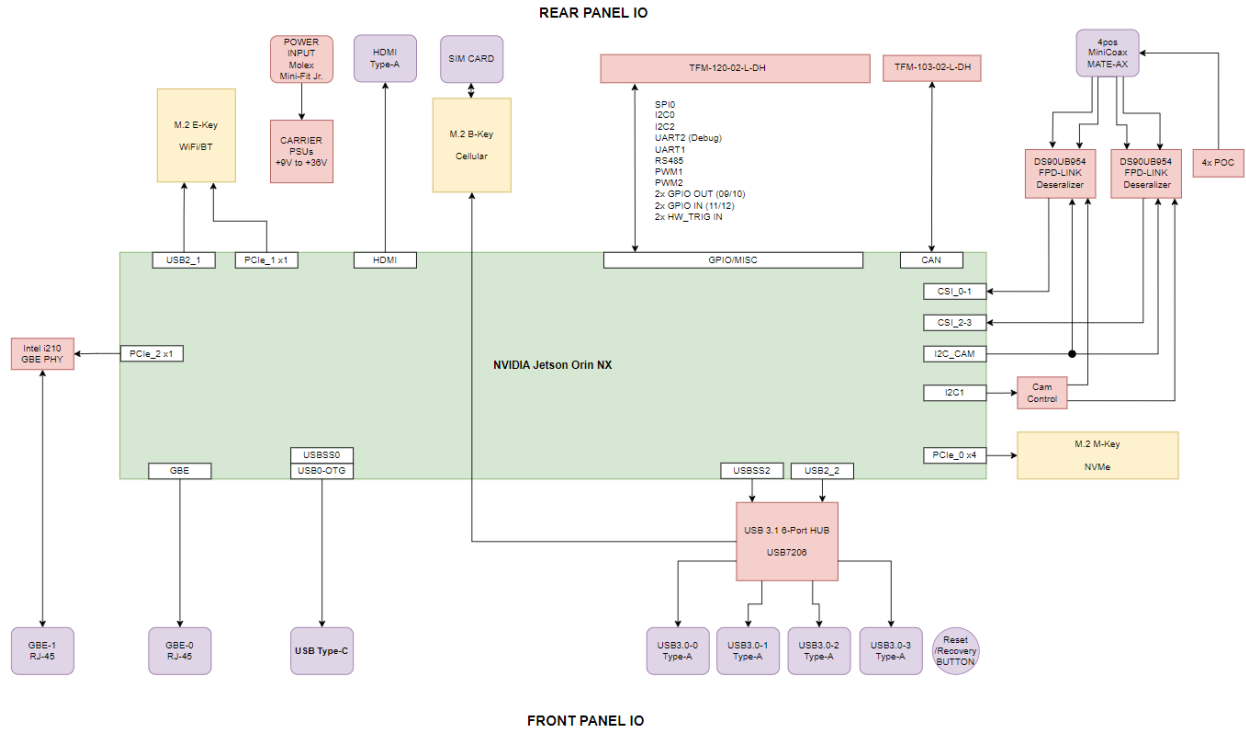
| Part Number | Description          | Jetson Module                 |
|-------------|----------------------|-------------------------------|
| ESG606-xx   | Rudi-NX FPD-Link III | Jetson Orin™ NX or Orin™ Nano |

Please refer to the Rudi-NX webpage or contact [sales@connecttech.com](mailto:sales@connecttech.com) for the most up to date ordering information.



# PRODUCT OVERVIEW

## Block Diagram



## Connector Locations

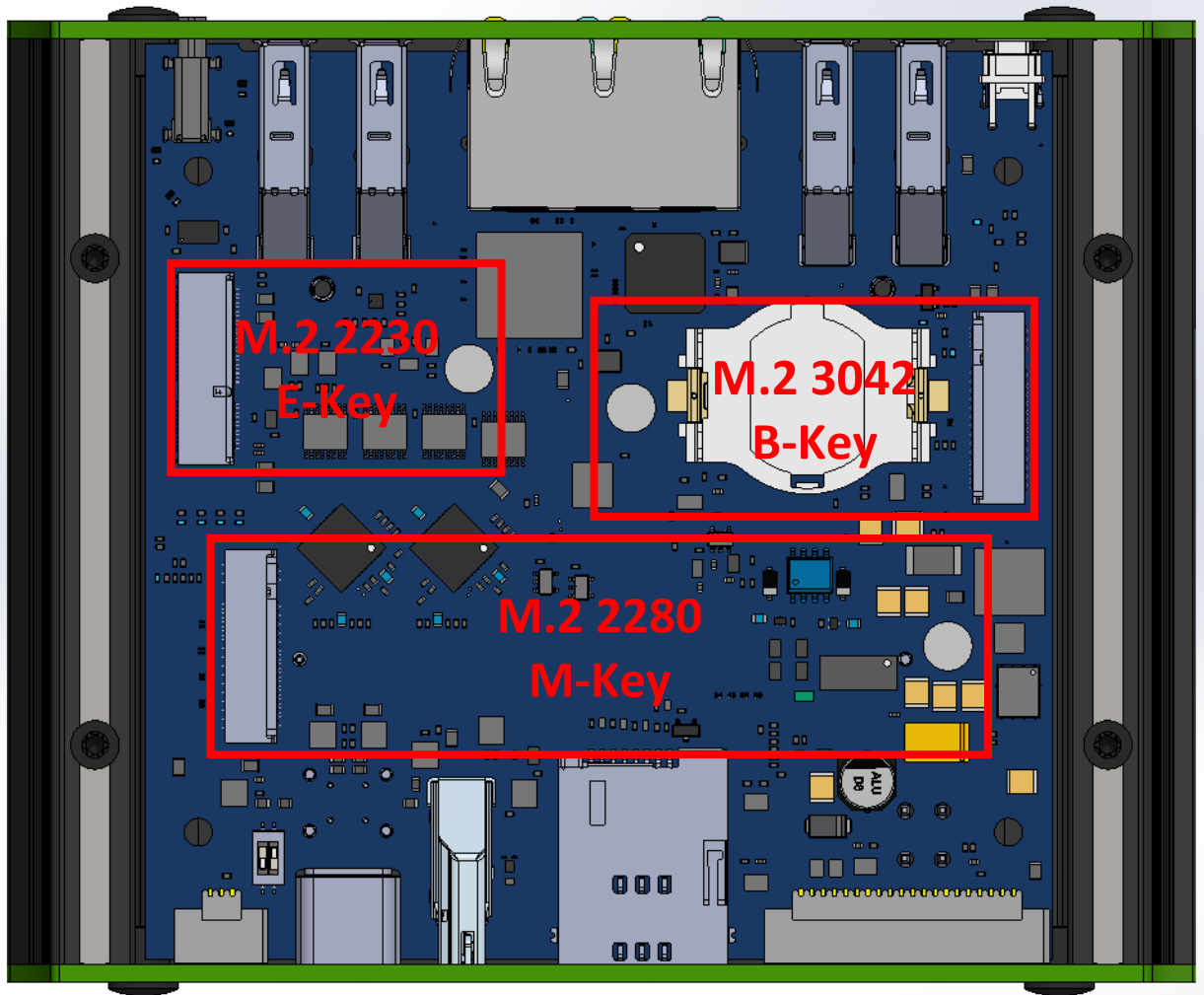
FRONT VIEW



REAR VIEW



**BOTTOM VIEW (COVER REMOVED)**



## Internal Connector Summary

| Designator | Connector           | Description   |
|------------|---------------------|---|
| P1         | 0353180420          | +9V to +36V Mini-Fit Jr. 4-Pin DC Power Input Connector                                 |
| P2         | 10128796-001RLF     | M.2 3042 B-Key 2G/3G/LTE Cellular Module Connector                                      |
| P3         | SM3ZS067U410AER1000 | M.2 2230 E-Key WiFi/Bluetooth Module Connector  |
| P4         | 10131758-001RLF     | M.2 2280 M-Key NVMe SSD Connector   |
| P5         | 2007435-3           | HDMI Video Connector  |
| P6         | USB4200-03-A        | USB3.1 OTG Type-C Connector   |
| P7         | JXD1-2015NL         | Dual RJ-45 Gigabit Ethernet Connector   |
| P8         | 2309413-1           | NVIDIA® Jetson Orin™ NX<br>NVIDIA® Jetson Orin™ Nano<br>Module Board-To-Board Connector |
| P10        | 0475530001          | SIM Card Connector  |
| P11A, B    | 48404-0003          | USB3.0 Type-A Connector   |
| P12A, B    | 48404-0003          | USB3.0 Type-A Connector   |
| P13        | TFM-120-02-L-DH-TR  | 40 Pin GPIO Connector   |
| P14        | 2304168-9           | FPD-Link III Quad Camera Connector  |
| P15        | TFM-103-02-L-DH-TR  | 6 Pin Isolated CAN Connector  |
| BAT1       | BHSD-2032-SM        | CR2032 RTC Battery Connector  |

## External Connector Summary

| Location | Connector      | Mating Part or Connector                                |
|----------|----------------|---|
| Front    | OTG            | USB3.1 OTG Type-C Connector                             |
| Front    | GbE1, GbE2     | Dual RJ-45 Gigabit Ethernet Connector                   |
| Front    | USB 1, 2, 3, 4 | USB3.0 Type-A Connector                                 |
| Front    | ANT 1, 2       | Antenna RP-SMA Female                                   |
| Front    | SYS            | Reset / Force Recovery Pushbutton                       |
| Rear     | PWR IN         | +9V to +36V Mini-Fit Jr. 4-Pin DC Power Input Connector |
| Rear     | HDMI           | HDMI Video Connector                                    |
| Rear     | SIM CARD       | SIM Card Connector                                      |
| Rear     | EXPANSION I/O  | 40 Pin GPIO Connector                                   |
| Rear     | FPD Link III   | FPD-Link III Quad Camera Connector                      |
| Rear     | CAN            | 6 Pin Isolated CAN Connector                            |
| Rear     | ANT 3, 4       | Antenna RP-SMA Female                                   |

## Switch Summary

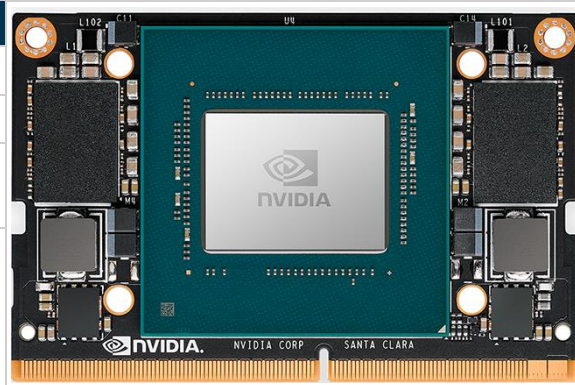
| Designator     | Connector    | Description   |
|----------------|--------------|---|
| SW1-1<br>SW1-2 | 1571983-1    | <b>Manufacturing Test Only</b> (Internal)<br>CAN Termination Enable/Disable |
| SW2            | TL1260BQRBLK | Dual Function Reset/Recovery Pushbutton (External)                          |

## DETAILED FEATURE DESCRIPTION

### Rudi-NX FPD-Link III NVIDIA® Jetson Orin™ NX/Nano Module Connector

The NVIDIA® Jetson Orin™ NX/Nano processor and chipset are implemented on the Jetson Orin™ NX/Nano Module. This connects to the NVIDIA® Jetson Orin™ NX/Nano to the Rudi-NX via a TE Connectivity DDR4 SODIMM 260 Pin connector.


| Function        | Description                                      |
|-----------------|--|
| <b>Location</b> | Internal to Rudi-NX                              |
| <b>Type</b>     | Module   |
| <b>Pinout</b>   | Refer to NVIDIA® Jetson Orin™ NX/Nano Datasheet. |
| <b>Features</b> | Refer to NVIDIA® Jetson Orin™ NX/Nano Datasheet. |



**Note:** A Thermal Transfer Plate is mounted to the NVIDIA® Jetson Orin™ NX/Nano module internally to the Rudi-NX. Heat will dissipate through to the top of the Rudi-NX chassis.


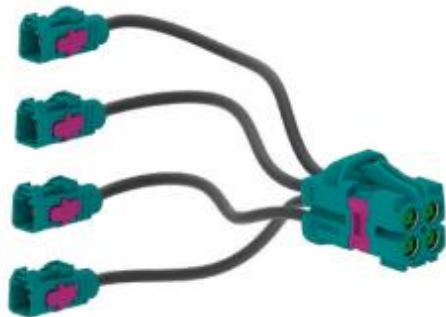
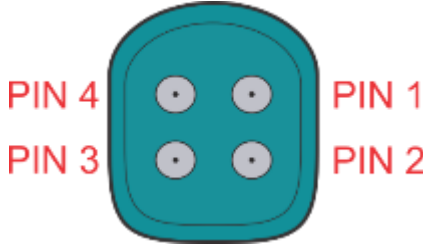
## Rudi-NX FPD-Link III HDMI Connector

The NVIDIA® Jetson Orin™ NX/Nano module will output video via the Rudi-NX vertical HDMI connector that is HDMI 2.0 capable.

| Function                | Description             |  |
|-------------------------|-------------------------|--|
| <b>Location</b>         | Rear                    |  |
| <b>Type</b>             | HDMI Vertical Connector |  |
| <b>Mating Connector</b> | HDMI Type-A Cable       |  |
| <b>Pinout</b>           | Refer to HDMI Standard  |  |

## Rudi-NX FPD-Link III Camera Connector

The Rudi-NX allows FPD-Link III through the Quad MATE-AX connector. The FPD-Link III to MIPI Deserializers are embedded on the carrier board which use 4-Lane MIPI video per 2 cameras. Additionally, the Rudi-NX outputs +12V Power Over COAX (POC) with a 2A current capability (500mA per camera).

| Function            |            | Description  |  |
|---------------------|------------|--|--|
| <b>Location</b>     |            | Rear   |    |
| <b>Type</b>         |            | Camera Coax Connector  |  |
| <b>Mating Cable</b> |            | Quad Fakra Cable<br>4 Position MATE-AX to 4 x<br>FAKRA Z-code 50Ω RG174 Cable<br>CTI P/N: CBG341 (1 meter) |   |
| Pin                 | MIPI-Lanes | Description  |  |
| 1                   | CSI 2/3    | Camera Connector   |  |
| 2                   | CSI 2/3    | Camera Connector   |  |
| 3                   | CSI 0/1    | Camera Connector   |  |
| 4                   | CSI 0/1    | Camera Connector   |  |

## Rudi-NX FPD-Link III USB 3.0 Type-A Connector

The Rudi-NX incorporates 4 vertical USB 3.0 Type-A connectors with a 2A current limit per connector. All USB 3.0 Type-A ports are 5Gbps capable.


| Function                | Description           |
|-------------------------|-----------------------|
| <b>Location</b>         | Front                 |
| <b>Type</b>             | USB Type-A Connector  |
| <b>Mating Connector</b> | USB Type-A Cable      |
| <b>Pinout</b>           | Refer to USB Standard |




## Rudi-NX FPD-Link III 10/100/1000 Dual Ethernet Connector

The Rudi-NX implements 2 x RJ-45 ethernet connectors for internet communication. Connector GbE1 is connected directly to the NVIDIA® Jetson Orin™ NX/Nano module. Connector GbE2 is connected through a PCIe Gigabit Ethernet PHY.


| Function                | Description                |
|-------------------------|----------------------------|
| <b>Location</b>         | Front                      |
| <b>Type</b>             | RJ-45 Connector            |
| <b>Mating Connector</b> | RJ-45 Ethernet Cable       |
| <b>Pinout</b>           | Refer to Ethernet Standard |





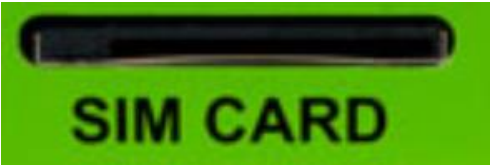
## Rudi-NX FPD-Link III USB3.1 OTG Connector

The Rudi-NX implements a USB3.1 Type-C connector to allow host mode access to the module or OTG flashing of the module. This connector can also be used a regular USB port with 10Gbps link speed. Max current is 2A.

| Function                | Description           |   |
|-------------------------|-----------------------|---|
| <b>Location</b>         | Front                 |  |
| <b>Type</b>             | USB Type-C Connector  |   |
| <b>Mating Connector</b> | USB Type-C Plug       |   |
| <b>Pinout</b>           | Refer to USB Standard |   |

## Rudi-NX FPD-Link III SIM Card Connector

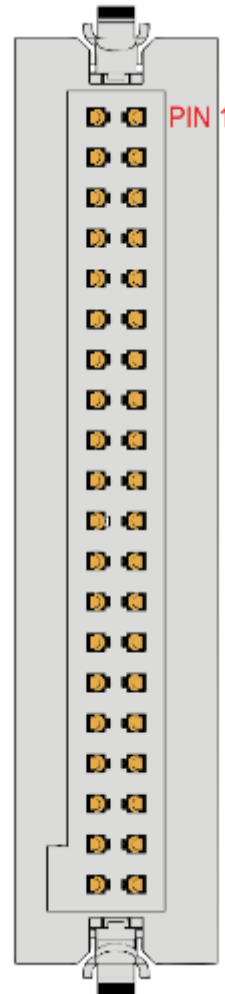
The Rudi-NX implements a mini (2FF) SIM Card connector.

| Function        | Description                   |   |
|-----------------|-------------------------------|---|
| <b>Location</b> | Rear                          |  |
| <b>Type</b>     | 2FF (mini) SIM Card Connector |   |
| <b>Pinout</b>   | Refer to SIM Card Standard    |   |

## Rudi-NX FPD-Link III GPIO Connector

The Rudi-NX implements a Samtec TFM-120-02-L-DH-TR Connector to allow for additional user control.

| Function                 |        | Description                 |          |
|--------------------------|--------|-----------------------------|----------|
| <b>Location</b>          |        | Rear                        |          |
| <b>Type</b>              |        | GPIO Expansion Connector    |          |
| <b>Carrier Connector</b> |        | TFM-120-02-L-DH-TR          |          |
| <b>Mating Cable</b>      |        | SFSD-20-28C-G-12.00-SR      |          |
| Pinout                   | Colour | Description                 | I/O Type |
| 1                        | Brown  | +5V <sup>1</sup>            | Power    |
| 2                        | Red    | SPIO_MOSI <sup>2</sup>      | O        |
| 3                        | Orange | SPIO_MISO <sup>2</sup>      | I        |
| 4                        | Yellow | SPIO_SCK <sup>2</sup>       | O        |
| 5                        | Green  | SPIO_CS0# <sup>2</sup>      | O        |
| 6                        | Violet | +3.3V <sup>1</sup>          | Power    |
| 7                        | Gray   | GND                         | Power    |
| 8                        | White  | HW_TRIG_0_P <sup>4</sup>    | I        |
| 9                        | Black  | HW_TRIG_0_N <sup>4</sup>    | I        |
| 10                       | Blue   | HW_TRIG_1_P <sup>4</sup>    | I        |
| 11                       | Brown  | HW_TRIG_1_N <sup>4</sup>    | I        |
| 12                       | Red    | GND                         | Power    |
| 13                       | Orange | UART2_TX_DEBUG <sup>2</sup> | O        |
| 14                       | Yellow | UART2_RX_DEBUG <sup>2</sup> | I        |
| 15                       | Green  | GND                         | Power    |
| 16                       | Violet | I2C0_SCL                    | I/O      |
| 17                       | Gray   | I2C0_SDA                    | I/O      |
| 18                       | White  | GND                         | Power    |
| 19                       | Black  | I2C2_SCL                    | I/O      |
| 20                       | Blue   | I2C2_SDA                    | I/O      |
| 21                       | Brown  | GND                         | Power    |
| 22                       | Red    | GPIO09 <sup>2</sup>         | O        |
| 23                       | Orange | GPIO10 <sup>2</sup>         | O        |
| 24                       | Yellow | GPIO11 <sup>2</sup>         | I        |
| 25                       | Green  | GPIO12 <sup>2</sup>         | I        |



|    |        |                               |       |
|----|--------|-------------------------------|-------|
| 26 | Violet | GND                           | Power |
| 27 | Gray   | GPIO13 <sup>2</sup><br>(PWM1) | O     |
| 28 | White  | GPIO14 <sup>2</sup><br>(PWM2) | O     |
| 29 | Black  | GND                           | Power |
| 30 | Blue   | RXD+ (RS485)                  | I     |
| 31 | Brown  | RXD- (RS485)                  | I     |
| 32 | Red    | TXD+ (RS485)                  | O     |
| 33 | Orange | TXD- (RS485)                  | O     |
| 34 | Yellow | RTS (RS485)                   | O     |
| 35 | Green  | +5V <sup>1</sup>              | Power |
| 36 | Violet | UART1_TX <sup>2</sup>         | O     |
| 37 | Gray   | UART1_RX <sup>2</sup>         | I     |
| 38 | White  | +3.3V <sup>1</sup>            | Power |
| 39 | Black  | GND                           | Power |
| 40 | Blue   | GND                           | Power |

|   |   |                  |                      |
|---|---|------------------|----------------------|
| Notes   | Jetson Orin™ NX SW Interface Cross Reference <sup>3</sup> |                  |                      |
|   | <b>Signal Name</b>  | <b>Module ID</b> | <b>Controller ID</b> |
|   | GPIO09  | GPIO09           | PAC.06               |
|   | GPIO10  | GPIO10           | PEE.02               |
|   | GPIO11  | GPIO11           | PQ.06                |
|   | GPIO12  | GPIO12           | PN.01                |
|   | GPIO13<br>(PWM)   | pwmchip1         | 32c0000.pwm          |
|   | GPIO14<br>(PWM)   | pwmchip0         | 32a0000.pwm          |
|   | <b>Signal Name</b>  | <b>SW/Dev ID</b> | <b>DTB ID</b>        |
|   | SPI0  | spidev0.0        | spi@3210000          |
|   | I2C0  | i2c-1            | I2c@c240000          |
|   | I2C2  | i2c-0            | I2c@3160000          |
|   | RS485   | ttyTHS1          | serial@3110000       |
|   | UART1   | ttyTHS0          | serial@3100000       |
| <ol style="list-style-type: none"> <li>+3.3V and +5V power pins are outputs only, <b>DO NOT</b> feed power to these pins.</li> <li>GPIO/UART/SPI/I2C are +3.3V.</li> <li>Software information refers to JetPack 5 and may change if using a different JetPack version.</li> </ol> |   |                  |                      |

**Note 4:**

| Signal Name | I2C Device Pin# | I2C Mux Signal Name |
|-------------|-----------------|---------------------|
| HW_TRIG_0   | 6               | S5                  |
| HW_TRIG_1   | 7               | S6                  |

| I2C Device Address | Connected to DS90UB954 |
|--------------------|------------------------|
| 0x48               | CHA GPIO0              |
| 0x49               | CHA GPIO1              |
| 0x4A               | CHB GPIO0              |
| 0x4B               | CHB GPIO1              |


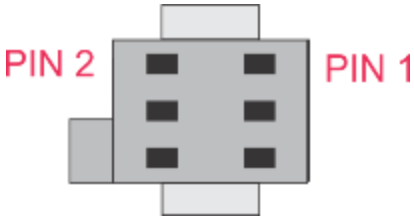
**I2C device bus information:**

| I2C Device | SW/Dev ID | DTB ID      |
|------------|-----------|-------------|
| I2C1       | i2c-7     | i2c@c250000 |

## Rudi-NX FPD-Link III Isolated CAN Connector

The Rudi-NX implements a Samtec TFM-103-02-L-DH-TR Connector to allow for Isolated CAN with built-in 120Ω termination. 1 x Isolated Power (+5V), 1 x Isolated CANH, 1 x Isolated CANL, 3 x Isolated Ground.


| Function                 |        | Description            |
|--------------------------|--------|------------------------|
| <b>Location</b>          |        | Rear                   |
| <b>Type</b>              |        | Isolated CAN Connector |
| <b>Carrier Connector</b> |        | TFM-103-02-L-DH-TR     |
| <b>Mating Cable</b>      |        | SFSD-03-28C-G-12.00-SR |
| Pinout                   | Colour | Description            |
| 1                        | Brown  | GND                    |
| 2                        | Red    | +5V Isolated           |
| 3                        | Orange | GND                    |
| 4                        | Yellow | CANH                   |
| 5                        | Green  | GND                    |
| 6                        | Violet | CANL                   |

**Note:** Built-in 120Ω termination can be removed with customer request. Please contact Connect Tech Inc. for further details.

## Rudi-NX FPD-Link III Reset & Force Recovery Pushbutton


The Rudi-NX implements a dual functionality pushbutton for both Reset and Recovery of the platform. To Reset the module, simply press and hold the pushbutton for a minimum of 250 milliseconds. To put the Jetson Orin™ NX/Nano module into Force Recovery mode, press and hold the pushbutton for a minimum of 10 seconds.

| Function                     | Description          |  |
|------------------------------|----------------------|--|
| <b>Location</b>              | Front                |  |
| <b>Type</b>                  | Pushbutton           |  |
| <b>Reset Button Press</b>    | Minimum 250ms (typ.) |  |
| <b>Recovery Button Press</b> | Minimum 10s (typ.)   |  |

**Note:** A full power cycle of the Rudi-NX Platform must be performed after module flashing.

## Rudi-NX FPD-Link III Power Connector

The Rudi-NX implements a Mini-Fit Jr. 4-Pin Power Connector that accepts +9V to +36V DC power.

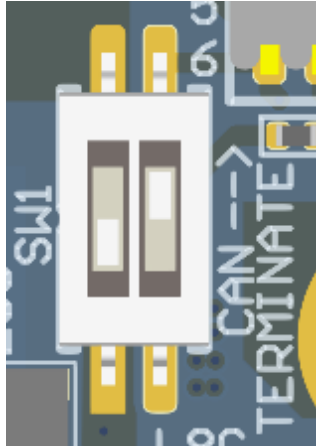
| Function                     | Description                  |  |
|------------------------------|------------------------------|--|
| <b>Location</b>              | Rear                         |  |
| <b>Type</b>                  | Mini-Fit Jr. 4-Pin Connector |  |
| <b>Minimum Input Voltage</b> | +9V DC                       |  |
| <b>Maximum Input Voltage</b> | +36V DC                      |  |
| <b>CTI Mating Cable</b>      | CTI PN: CBG408               |  |

**Note:** A Power Supply capable of 100W or more is required to operate the Rudi-NX with all peripherals running at their respective maximum rating.

## Rudi-NX FPD-Link III CAN Termination Enable/Disable DIP Switch Selection

The Rudi-NX internally implements 2 position DIP Switch for Enabling or Disabling the CAN Termination Resistor of 120Ω.

| Function                                 | Description   |  |
|--|---|--|
| <b>Location</b>                          | Internal to Rudi-NX                                       |  |
| <b>Type</b>                              | DIP Switch  |  |
| <b>SW1-1 – OFF</b><br><b>SW1-2 – OFF</b> | <b>Manufacturing Test Only</b><br>CAN Termination Disable |  |


|  |  |  |
|--|--|--|
| <p><b>SW1-1 – ON</b><br/><b>SW1-2 – ON</b></p> | <p><b>Manufacturing Test Only</b><br/>CAN Termination Enable</p> |  |
|--|--|--|

**Note:** CAN Termination Disabled by default upon shipment to customer.  
Please contact Connect Tech Inc. if you would like to set the Termination to be Enabled before shipment.

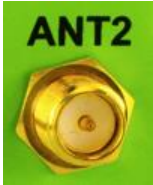
### Rudi-NX FPD-Link III Antenna Connectors

The Rudi-NX chassis implements 4x SMA Antenna Connectors (Optional) for the internal M.2 2230 E-Key (WiFi/Bluetooth) and M.2 3042 B-Key (Cellular).


| Function                |        | Description                   |
|-------------------------|--------|-------------------------------|
| <b>Location</b>         |        | Front and Rear                |
| <b>Type</b>             |        | RP-SMA Female Connector       |
| <b>Mating Connector</b> |        | RP-SMA Male Antenna Connector |
| ANT#                    | Module | Description                   |
| 1                       | WiFi   | AUX                           |
| 2                       | WiFi   | MAIN                          |
| 3                       | LTE    | MAIN                          |
| 4                       | LTE    | Diversity                     |




**ANT1**



**ANT2**



**ANT3**



**ANT4**

## TYPICAL INSTALLATION

1. Ensure all external system power supplies are off and disconnected.
2. Install the necessary cables for your application:
  - a) Ethernet cable.
  - b) HDMI video display cable.
  - c) Keyboard, Mouse, etc. via USB.
  - d) SIM Card. **Not hot-plug capable.**
  - e) FPD-Link III Camera(s). **Not hot-plug capable.**
  - f) GPIO 40-Pin Connector. **Not hot-plug capable.**
  - g) CAN 6-Pin Connector. **Not hot-plug capable.**
  - h) Antennas for WiFi/Bluetooth (if applicable).
  - i) Antennas for LTE (if applicable).
- 3) Connect the Power Cable of the +9V to +36V Power Supply into the Mini-Fit Jr. 4-Pin power connector.
- 4) Plug the AC cable into the Power Supply and into the wall socket.

## FORCE RECOVERY MODE

The USB Type-C port of the Rudi-NX can be used to reprogram the Jetson Orin™ NX/Nano from another host platform running NVIDIA® Jetpack™.

1. Power down the system completely. The system power MUST be OFF, nor in suspend or sleep mode.
2. Connect the OTG USB port to another host device that will be supplying the new system file.
3. Hold down the main Push Button for approximately 10 seconds.
4. The Jetson Orin™ NX/Nano will show up on the host system USB list as a new NVIDIA® target device.
5. After successfully updating the system software, power off the system. A clean power up will revert the OTG port back into host mode.



## THERMAL DETAILS

The Rudi-NX has an Operating Temperature Range of -20°C to +60°C.

However, it is important to note that the NVIDIA® Jetson Orin™ NX/Nano Modules have their own properties separate to that of the Rudi-NX.

Customer responsibility requires proper implementation of a thermal solution that maintains the Rudi-NX temperatures below the specified temperatures (shown in the tables below) under the maximum thermal load and system conditions for their use case.

### NVIDIA® Jetson Orin™ NX/Nano

| Parameter                                      | Value | Units |
|--|-------|-------|
| Maximum Jetson Orin™ SoC Operating Temperature | 99    | °C    |
| Jetson Orin™ SoC Shutdown Temperature          | 105   | °C    |

### Rudi-NX

| Parameter  | Value        | Units |
|--|--------------|-------|
| Maximum Operating Temperature @70CFM<br>970 Evo Plus 1TB, LTE, and WiFi modules were installed | T.cpu = TBD  | °C    |
|  | T.gpu = TBD  | °C    |
|  | T.nvme = TBD | °C    |
|  | T.amb = 60.0 | °C    |

## CURRENT CONSUMPTION DETAILS

### NVIDIA® Jetson Orin™ NX/Nano

| Parameter   | NX / Nano Value | Units | Temperature |
|---|-----------------|-------|-------------|
| NVIDIA® Jetson Orin™ NX/Nano Module, Passive Cooling, MAXN mode, Idle, HDMI, Ethernet, Mouse, and Keyboard plugged in   | 14 / TBD        | W     | 25°C (typ.) |
| NVIDIA® Jetson Orin™ NX/Nano Module, Passive Cooling, MAXN mode, CPU stressed, GPU stressed, HDMI, Ethernet, all 5 USB ports loaded at 1.5A each, 2 cameras streaming | 79 / TBD        | W     | 25°C (typ.) |

## SOFTWARE / BSP DETAILS

All Connect Tech NVIDIA® Jetson based products are built upon a modified Linux for Tegra (L4T) Device Tree that is specific to each CTI product.

**WARNING:** The hardware configurations of CTI's products differ from that of the NVIDIA® supplied evaluation kit. Please review the product documentation and install **ONLY** the appropriate CTI L4T BSPs. Failure to follow this process could result in non-functional hardware.

## CABLES INCLUDED

| Description       | Part Number            | Qty |
|-------------------|------------------------|-----|
| Power Input Cable | CBG408                 | 1   |
| GPIO Cable        | SFSD-20-28C-G-12.00-SR | 1   |
| CAN Cable         | SFSD-03-28C-G-12.00-SR | 1   |

## ACCESSORIES

| Description                   | Part Number |
|-------------------------------|-------------|
| AC/DC Power Supply            | MSG085      |
| Quad FAKRA FPD-Link III Cable | CBG341      |
| Mounting Brackets             | MSG067      |

## APPROVED VENDORS CAMERAS

| Manufacturer  | Description  | Part Number | Image Sensor |
|---------------|--------------|-------------|--------------|
| e-con Systems | FPD-Link III | NeduCAM25   | AR0234       |

Please visit our Supported Cameras [chart](#) for additional cameras (if applicable).

## MECHANICAL DETAILS

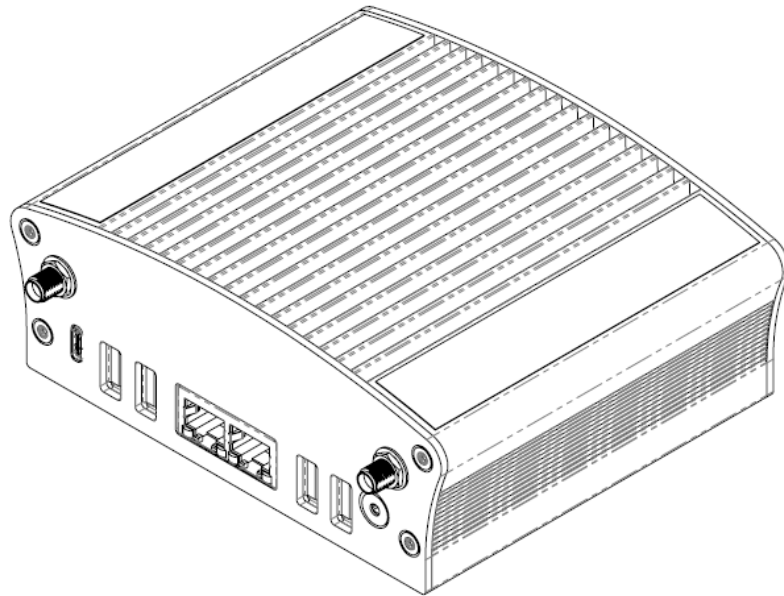
### Rudi-NX FPD-Link III Disassembly Procedure

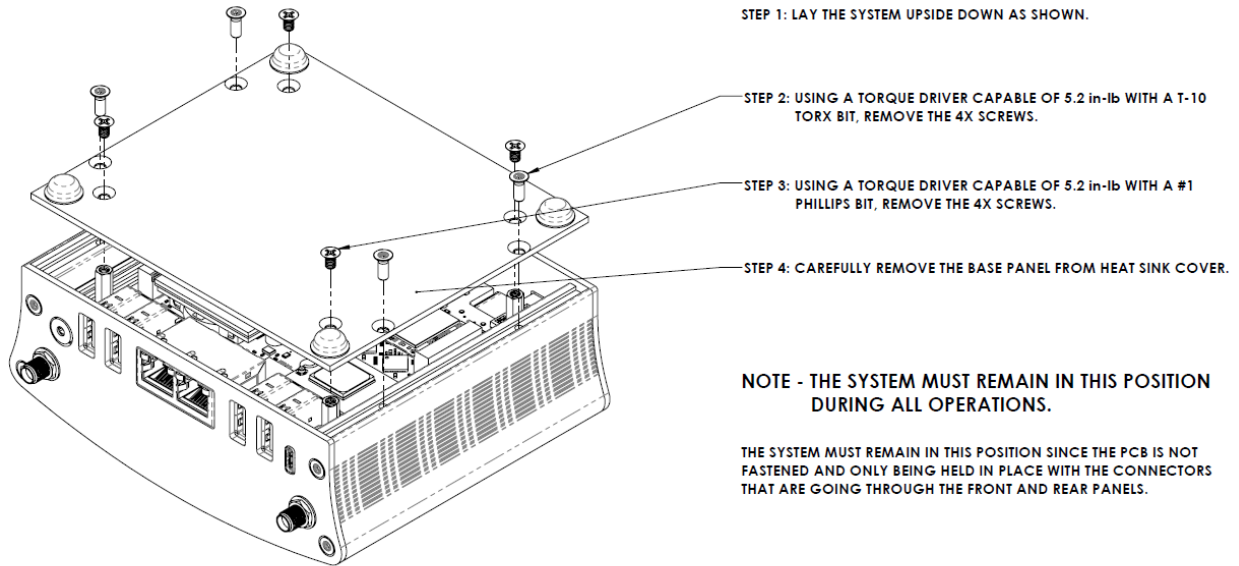
#### INSTRUCTIONS FOR DISASSEMBLY

THE FOLLOWING PAGES SHOW THE DISASSEMBLY OF THE BASE PANEL TO GAIN ACCESS INTO THE SYSTEM TO ALLOW FOR PLUG-INS INTO M.2 SLOTS.

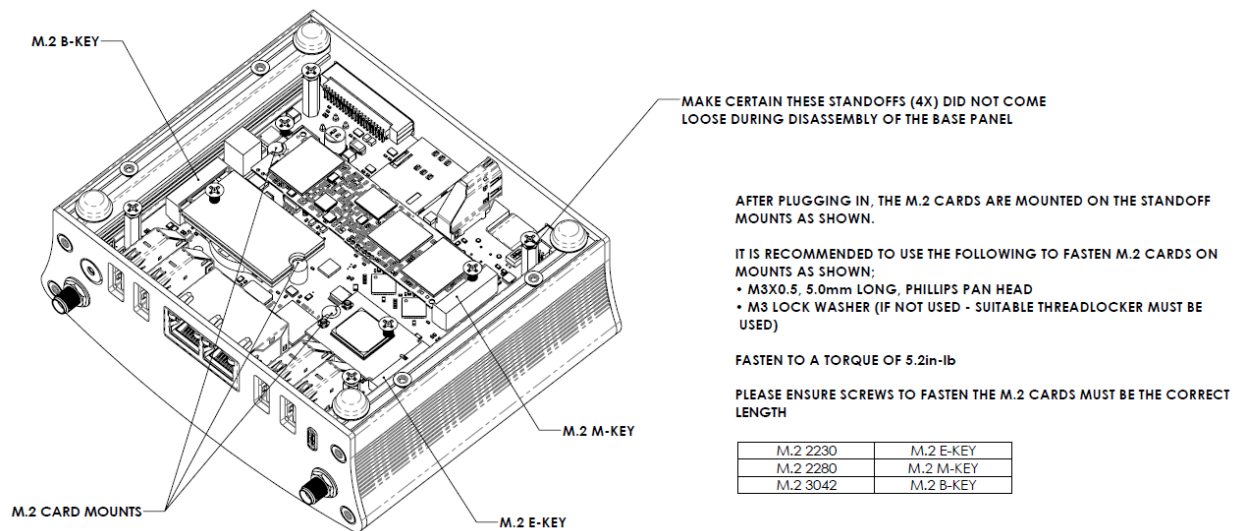
ALL OPERATIONS MUST BE COMPLETED IN A ESD CONTROLLED ENVIRONMENT. WRIST OR HEEL ESD STRAPS MUST BE WORN DURING ANY OPERATION OUTLINED.

ALL FASTENERS TO BE REMOVED AND RE-ASSEMBLED USING PROPER TORQUE DRIVERS

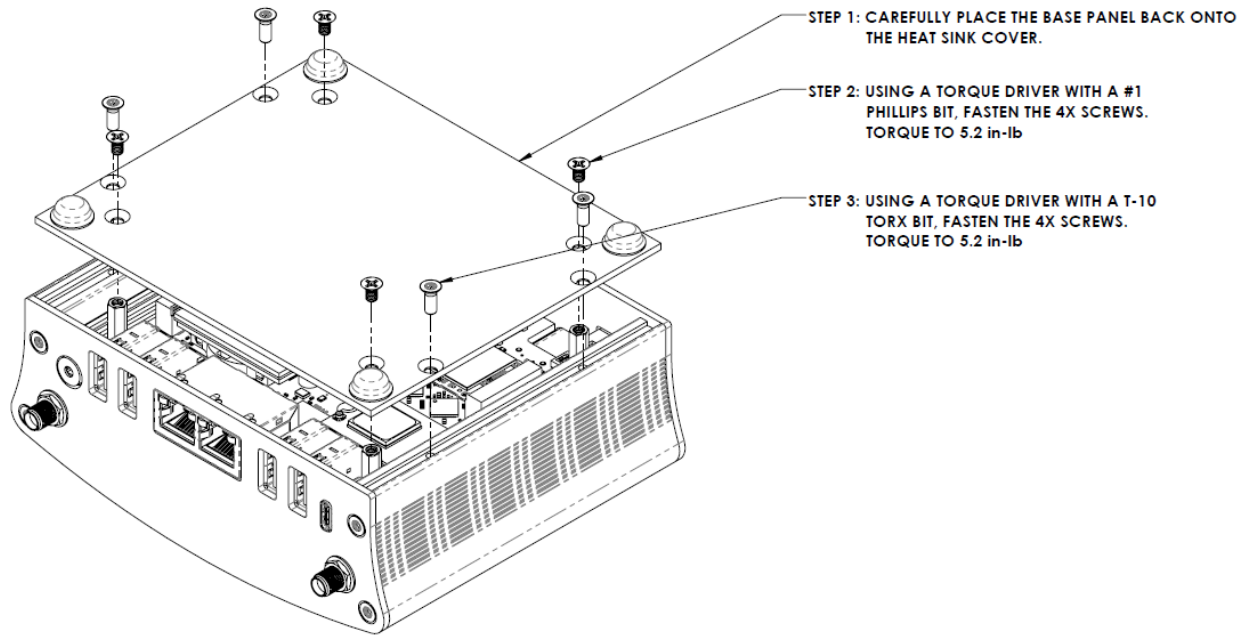




### DISASSEMBLY PROCEDURE

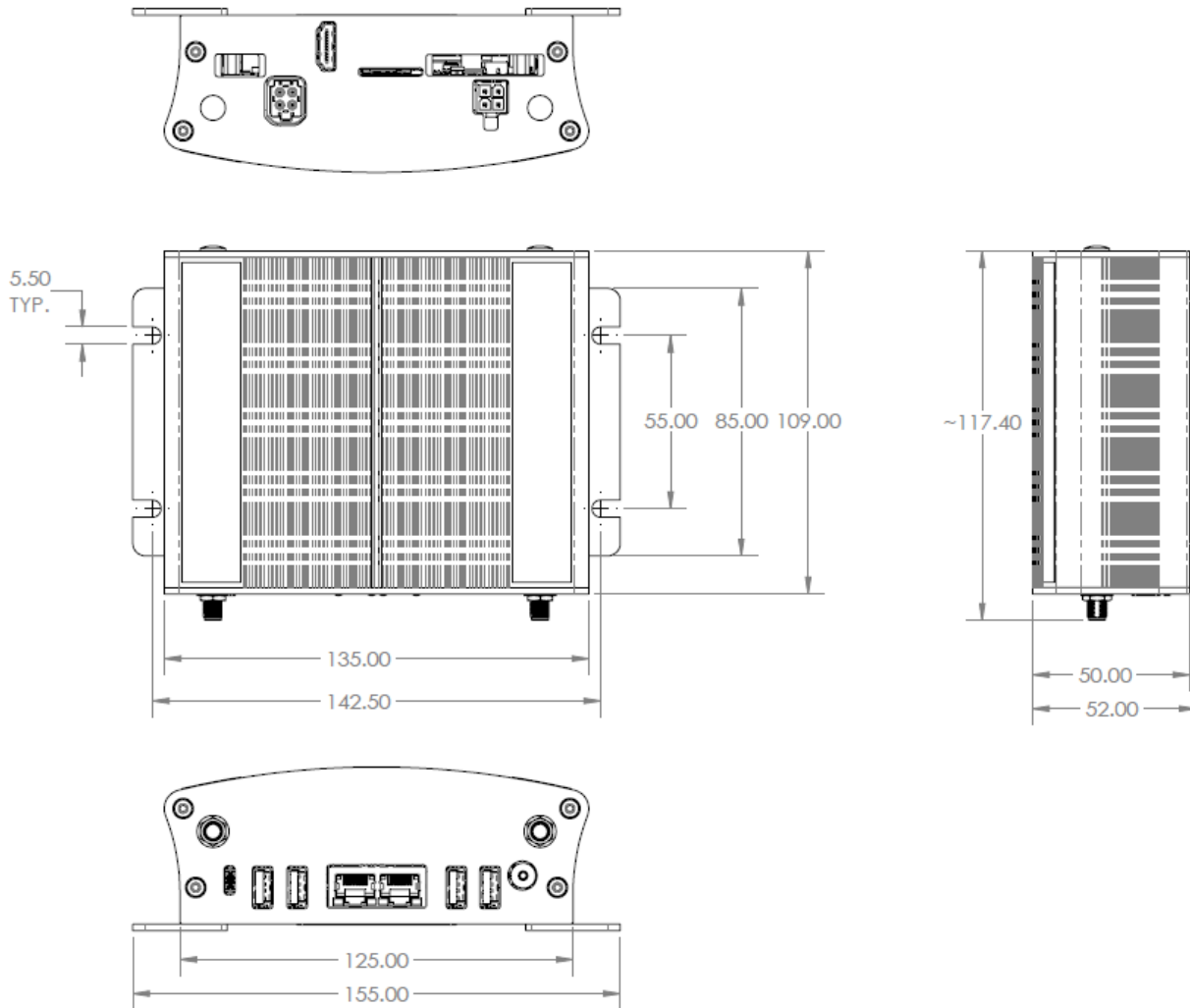


## Rudi-NX FPD-Link III Re-Assembly Procedure

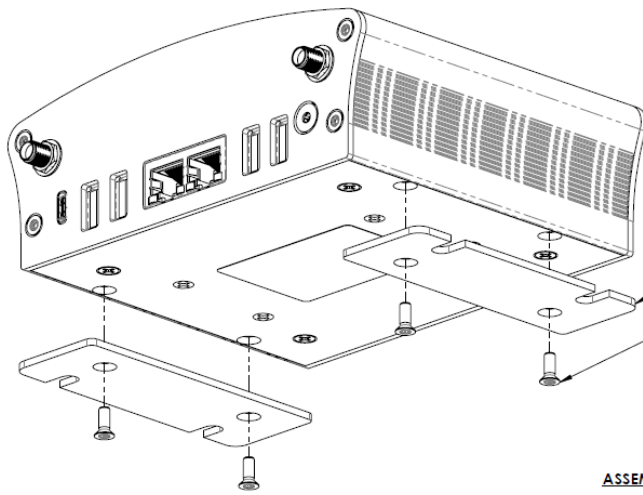


### ASSEMBLY PROCEDURE

### Rudi-NX FPD-Link III Optional Mounting Brackets Plan View



## Rudi-NX FPD-Link III Optional Mounting Brackets Assembly Procedure

**NOTE:**

OPTIONAL BOTTOM PLATE ASSEMBLY SHOWN IN STEP 4 IS NOT SHOWN HERE

MOUNTING BRACKETS  
2 PLACES

1011755\_00\_DIN 965 - M3 x 8 - 4.8 - TX8  
SCREW, ENCLOSURE ASSEMBLY  
4 PLACES  
TORQUE 5.2 in-lb  
NOTE: REMOVE SCREWS FROM EXISTING  
ASSEMBLY TO USE TO SECURE  
MOUNTING BRACKET

**ASSEMBLY INSTRUCTIONS:**

1. REMOVE THE RUBBER FEET FROM THE BOTTOM OF ASSEMBLY.
2. SECURE THE MOUNTING BRACKET ONE SIDE AT A TIME USING EXISTING SCREWS.
3. TORQUE THE FASTENERS TO 5.2 in-lb.