



Server Module 3.0

Reference Guide



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Table1 - Document Revision Notes

Date	Description
December 2025	· First release

1 INTRODUCTION

1.1 About This Document

This document is part of a set of documents providing information necessary to operate and program the iNav4U Server Module 3.0

1.2 Related Documents

For additional information not covered in this manual, please refer to the documents listed in Table 2.

2.0 OVERVIEW

2.1 Highlights

iNav4U-Server is an industrial IoT Gateway Computer with an integrated DIN rail latch mechanism and modular I/O Expansion modules.

- CPU: NXP i.MX8M Plus, quad-core Cortex-A53, 1.8GHz
- DRAM: 8GB RAM; Storage: 64 GB eMMC
- Built-in interfaces: 2x LAN, USB3.0, TPM2.0, RS485, RS232, CAN bus, 2x DI + 2x DO
- Stackable I/O Expansion modules:
 - Serial – up to 12x RS485 | RS232
 - Digital I/O – up to 32x DO + 32x DI
 - ADC – up to 8 channels
 - Wireless: 802.11ax WiFi and Bluetooth 5.3 BLE
- Several temperature rating options:
 - Commercial: 0°C to 50°C
 - Industrial: -30°C to 70°C
- Operating systems: iNav4U OS - Linux

2.2 Specifications

The "Option" column specifies the iNav4U-Server configuration option required to have the feature.

Table 3 Features and Configuration options

Feature	Description
CPU Core and Graphics	
CPU	NXP i.MX8M Plus QuadLite, quad-core ARM Cortex-A53, 1.8GHz
	NXP i.MX8M Plus Quad, quad-core ARM Cortex-A53, 1.8GHz
NPU	AI/ML Neural Processing Unit, up to 2.3 TOPS
Real-Time Co-processor	ARM Cortex-M7, 800Mhz
Memory and Storage	
RAM	1GB – 8GB, LPDDR4
Storage	eMMC flash, soldered on board 16GB - 64GB
Network	
LAN	2x GBit Ethernet, RJ45 connectors
Cellular	4G/LTE CAT4 cellular module, Quectel EG25G Worldwide LTE, UMTS/HSPA+ and GSM/GPRS/EDGE coverage
	4G/LTE CAT4 cellular module, Quectel EG25G Worldwide LTE, UMTS/HSPA+ and GSM/GPRS/EDGE coverage
I/O	
USB	1x USB3.0 port, type-A connector
Serial	1x RS485, two-wire port Isolated, terminal-block connector
	1x RS232, Rx/Tx Isolated, terminal-block connector
CAN bus	1x CAN bus port Isolated, terminal-block connector
	2x digital outputs + 2x digital inputs Isolated, 24V compliant with EN 61131-2, terminal-block connector
Digital I/O	Serial console via UART-to-USB bridge, micro-USB connector
Debug	NXP SDP programming port, micro-USB connector

I/O Expansion modules	
Wireless	802.11ax WiFi and Bluetooth 5.3 BLE Implemented with Intel WiFi 6E AX210 module 2x RP-SMA connectors Stacking restrictions: one wireless module
RS485	4x RS485, two-wire Isolated, terminal-block connector Stacking restrictions: up-to 3 RS485/RS232 modules
RS232	4x RS232, Rx/Tx Isolated, terminal-block connector Stacking restrictions: up-to 3 RS485/RS232 modules
Digital I/O	8x digital outputs + 8x digital inputs Isolated, 24V compliant with EN 61131-2, terminal-block connector Stacking restrictions: up-to 4 digital I/O modules
ADC	8x analog inputs, 0...10V / 4...20mA Isolated, terminal block connector Stacking restrictions: one ADC module

System	
RTC	Real time clock operated from on-board coin-cell battery
Watchdog	Hardware Watchdog
Security	Secure boot, implemented with i.MX8M Plus HAB module
	TPM 2.0, Infineon SLB9673
Indicators	2x programmable dual-color LEDs

Table 4 Electrical, Mechanical and Environmental

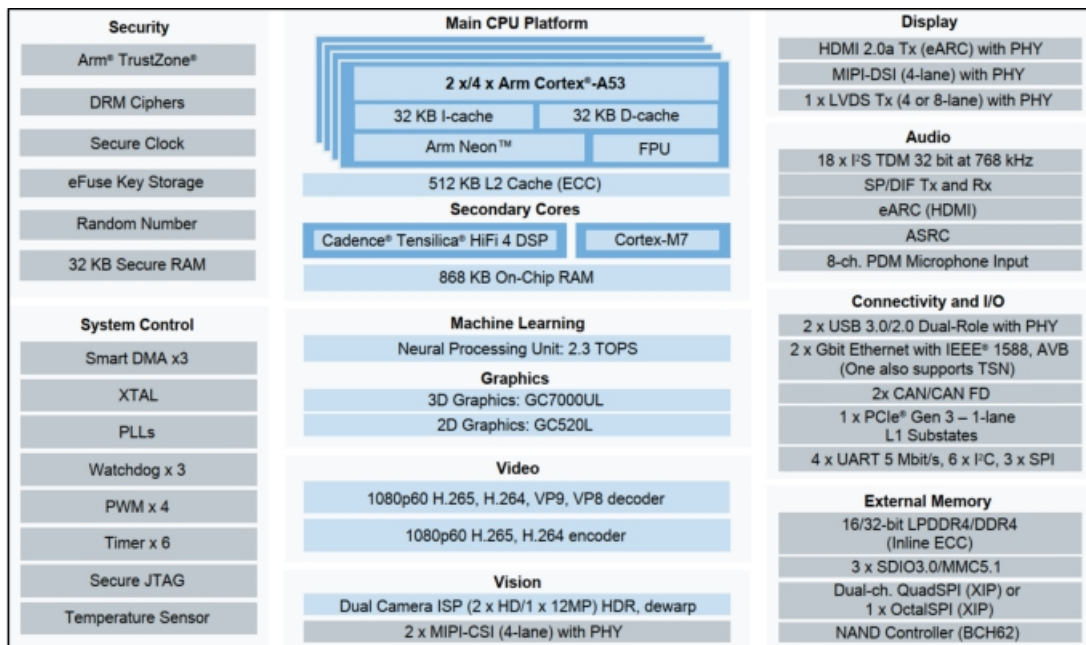
Electrical Specifications	
Power Supply	12V-24V DC (-20%/+20%) Reverse voltage protection
Power consumption	2.5 - 8 W, depending on system load and device configuration
Mechanical Specifications	
Housing type	DIN rail housing (for DIN rail version EN 50022)
Housing material	ABS/PC high endurance
Dimensions	Server module – 110 x 30 x 95 mm I/O Expansion module – 110 x 20 x 95 mm
Cooling	Passive cooling, fanless design
Weight	Server – 0.22 kg I/O Expansion module – 0.11 kg
Terminal blocks connectors	0.2-1.5mm ² ; 16-26 AWG;
Environmental and Reliability	
MTTF	> 200,000 hours
Operation temperature	Commercial: 0° to 50° C
	Industrial: -40° to 70° C
Storage temperature	-40° to 85° C
Relative humidity	10% to 90% (operation)
	05% to 95% (storage)
Compliance	
Regulatory	FCC, CE, UKCA
EMC	EN 55032/5, EN 61000-6-2, EN 61000-6-3
Safety	EN/UL/IEC 62368-1

3 CORE SYSTEM COMPONENT

3.1 NXP i.MX8M Plus SoC

The i.MX8M Plus processors feature an advanced implementation of a quad ARM® Cortex®-A53 core that operates at up to 1.8 GHz. A general-purpose Cortex®-M7 core processor enables low-power processing.

Figure 1 i.MX8M Plus Block Diagram



3.2 System Memory

3.2.1 DRAM

iNav4U-Server comes with 8GB of on-board LPDDR4 memory.

3.2.2 Primary Storage

iNav4U-Server features up to 128GB of soldered-onboard eMMC memory for storing the bootloader and the operating system (Kernel and root filesystem). The remaining eMMC space is used to store general-purpose (user) data.

3.3 Cellular and GPS (only on request)

iNav4U-Server with a cellular interface is implemented with a mini-PCIe cellular modem module and a nano-SIM socket. To enable cellular functionality, install an active SIM card in the nano-SIM socket. The cellular module should be installed in the mini-PCIe socket.

The cellular modem module also supports GNSS/GPS.

A secure lock panel protects the SIM card from external unauthorized tampering or extraction.

Modem antenna connections are available via SMA connectors on the iNav4U-Server front panel. iNav4U supplies iNav4U-Server with the Quectel EC25-G 4G/LTE CAT4 global cellular module.

Note: Cellular modem is present only in servers ordered with the “Cellular” configuration

3.4 Ethernet

iNav4U-Server incorporates two independent Ethernet ports implemented with i.MX8M Plus internal MACs and two Realtek RTL8211 PHYs.

3.5 Serial Debug Console

iNav4U-Server features a serial debug console via a UART-to-USB bridge over a micro USB connector. CP2104 UART-to-USB bridge is interfaced with i.MX8M Plus UART port. CP2104 USB signals are routed to the micro USB connector on the front panel, labelled DBG.

3.6 USB Programming Port

iNav4U-Server features a USB SDP programming interface that can be used for device recovery using the NXP UUU utility.

USB programming interface is routed to the micro USB port located on the bottom of the device. The connector can be optionally protected from unauthorized access with a secure screw panel.

When a host PC is connected to the USB programming connector via a USB cable, iNav4U Server disables normal eMMC boot and enters Serial Downloader boot mode.

3.7 Industrial I/O Terminal Block

iNav4U-Server features a 16-pin terminal block containing several I/O interfaces. Each interface is galvanically isolated from the iNav4U-Server, and from each other.

For the connector pin-out, please refer to section 6.4.

3.7.1 CAN Bus / NMEA2000

iNav4U-Server features a CAN 2.0B port implemented with i.MX8M Plus CAN controller.

Key characteristics:

- Galvanic isolation from the central unit

Note: iNav4U-Server does NOT provide built-in termination on the CAN bus port.

An external termination should be added based on the bus topology.

Note: iNav4U-Server does NOT provide built-in termination on the CAN bus port.

External termination should be added depending on the bus topology.

3.7.2 RS485

RS485 functionality is implemented using the MAX13488 transceiver interfaced with i.MX8M Plus UART port.

Key characteristics:

- 2-wire, half-duplex
- Galvanic isolation from the main unit
- Programmable baud rate of up to 3Mbps
- Optional 120Ω termination resistor

The integrated 120Ω termination resistor can be enabled by shorting between RS485_TRM (pin 9) to RS485_COM (pin 10).

3.7.3 RS232

RS232 function is implemented with MAX3221 (or compatible) transceiver interfaced with i.MX8M Plus UART port. Key characteristics:

- RX/TX only
- Galvanic isolation from the central unit
- Programmable baud rate up to 250kbps

3.7.4 Digital inputs (x2) and outputs (x2)

Two self-powered digital inputs are implemented with the CLT03 digital termination in accordance with EN 61131-2. The inputs are self-powered, meaning that an external power supply is not required for operation. Two digital outputs are implemented with the TPS272C dual-channel high-side switch in accordance with EN 61131-2. Key characteristics:

- Designed for 24V PLC applications
- Galvanic isolation from the central unit and other I/O modules
- Digital outputs: maximal output current – 1A per channel
- Digital inputs are self-powered with a current limit

Table 5 Digital I/O Characteristics

Parameter	Description	Min	Typ.	Max.	Unit
VDC	External Power Supply Voltage	6	24	30	V
VIn TLH	Low to High input Voltage		9.4	11	V
VIn THL	High to Low input Voltage	5	7.5		V

VIn Hist	Input trigger Hystereses	1.2		2.6	V
IOut	Maximum output per channel			1	A

Figure 2 Digital output – typical wiring example

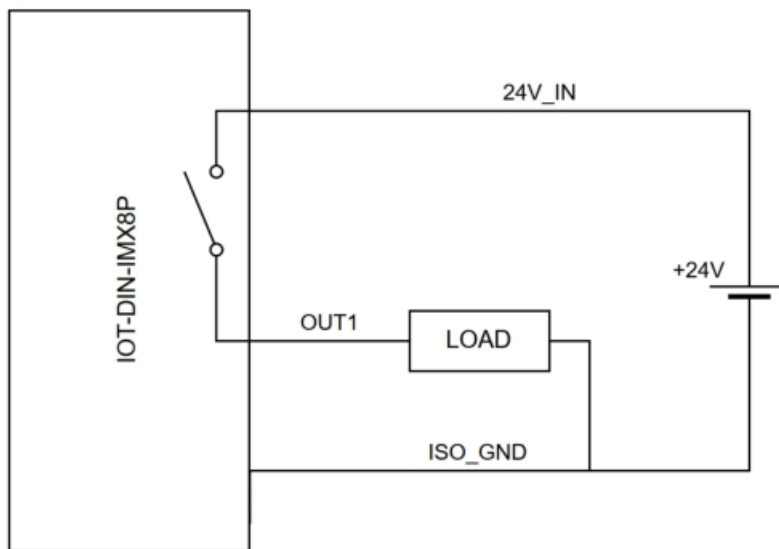
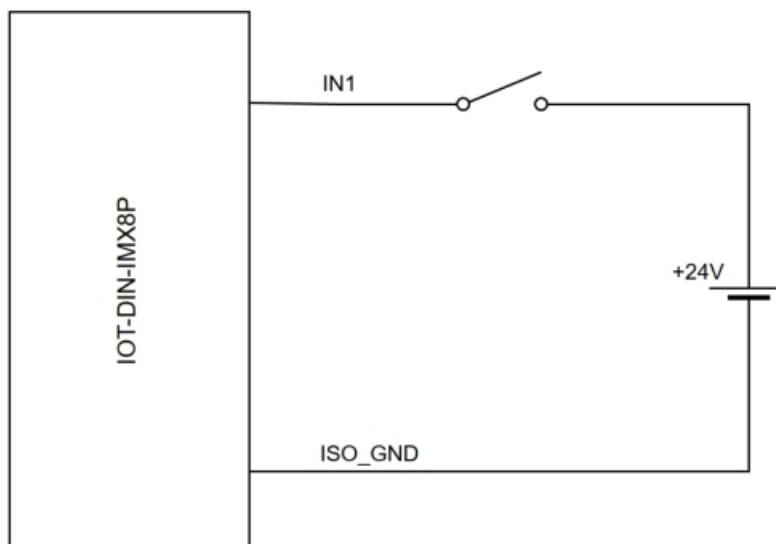


Figure 3 Digital input – typical wiring example



4. EXPANSION MODULES

4.1 I/O Expansion Modules Interconnection

The iNav4U-Server main module supports up to eight I/O expansion modules, which can be stacked with the main modules to extend the system's feature set.

A server assembly includes one main module (the left-most unit), an SSD hard disk module and multiple I/O Expansion modules. Module stacking is done from left to right. Up to 8 I/O Expansion Modules (including the SSD hard disk module) can be supported in one server assembly.

The modules are interconnected using iNav4U's proprietary StackLink expansion connector, which extends a series of iNav4U modules into a chain of peripherals.

Different I/O Expansion Modules utilize different I/O resources present in the StackLink interface. The following table outlines the resource requirements for each module type and the stacking restrictions.

Table 6 StackLink Interface Matrix

Module	Interface		
	USB	I2CA	I2CB
IFM-DI808		x	
IFM-RS232	x		
IFM-RS485	x		
IFM-ADC8			x
Max. Modules:	3	4	1

4.2 Support I/O Expansion Modules

iNav4U supplied the following I/O Expansion Modules:

- IFM-RS485: 4x ports RS485 module
- IFM-RS232: 4x ports RS232 module
- IFM-DI808: 8x inputs + 8x outputs digital I/O module
- IFM-ADC8: 8x analog inputs module

For detailed specification of I/O Expansion Modules, please refer to the I/O Expansion Modules reference guide.

5 SYSTEM LOGIC

5.1 Power Subsystem

5.1.1 Power Rails

IOT-DIN-IMX8PLUS is powered from a single power rail through the DC power connector.

5.1.2 Power Modes

IOT-DIN-IMX8PLUS supports three hardware power modes.

Table 7 Power modes

Power Mode	Description
ON	All internal power rails are enabled. Mode entered automatically when the main power supply is connected.
OFF	CPU core power rails are off. All peripheral power rails are off.
Sleep	DRAM is maintained in self-refresh. Most CPU core power rails are off. Most of the peripheral power rails are off.

5.1.3 RTC Back-Up Battery

IOT-DIN-IMX8PLUS features a 120mAh coin cell lithium battery, which maintains the on-board RTC Whenever the main power supply is not present.

5.2 Real-Time Clock

IOT-DIN-IMX8PLUS RTC is implemented with the AM1805 real-time clock (RTC) chip. The RTC is connected to the i.MX8M Plus SoC using I2C interface at address 0xD2/D3. IOT-DIN-IMX8PLUS The backup battery keeps the RTC running to maintain clock and time information whenever the main power supply is not present.

5.3 Hardware Watchdog

IOT-DIN-IMX8PLUS watchdog function is implemented with the i.MX8M Plus watchdog.

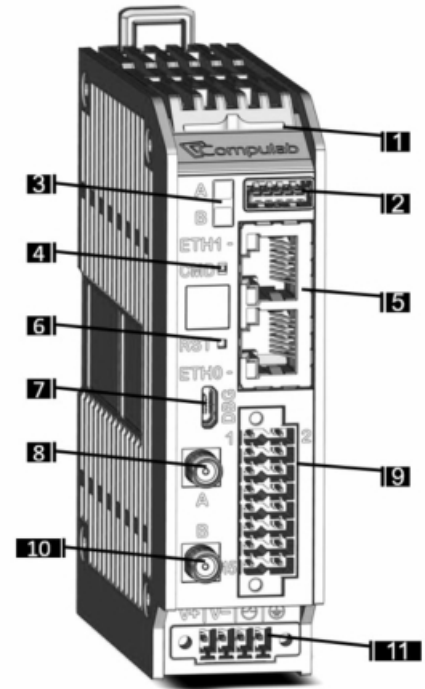
5.4 Trusted Platform Module

IOT-DIN-IMX8PLUS is assembled with an Infineon SLB 9673 TPM2.0 compatible device.

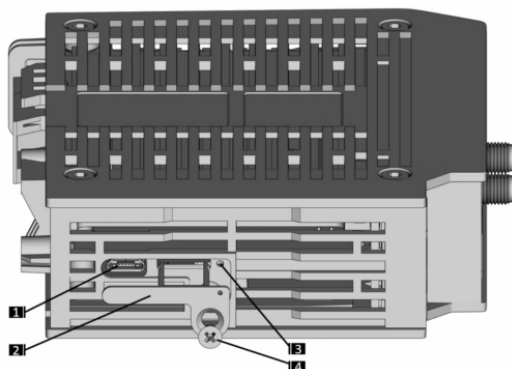
6 INTERFACES AND CONNECTORS

6.1 Connector Locations

6.1.1 Front Panel



6.1.2 Bottom Panel



Item	Description
1	SDP programming port, micro-USB type
2	SIM card tray
3	Tray retraction lever
4	Locking screw (Philips head)

6.2 DC Power Connector

DC power input connector.

Table 8 Power connector pin-out

Pin	Signal Name	Description
1	+V	V+ DC pin (for wire 16-20 AWG)
2	V-	V0 DC pin (for wire 16-20 AWG)
3	CNTL	Programmable power control
4	P.E.	Protective Earth connection

Table 9 Power connector data

Signal Name	Description
4-pin dual-row plug with screw terminal connections Locking: screw flange Pitch: 3.5 mm Wire cross-section: AWG 16 – AWG 26 Connector P/N: JL15EDGVM-35004G0[1 2] Mating connector P/N: JiNL JL15EDGKM-35004G01 NOTE: iNav4U supplies the mating connector with the Server module	

6.2.1 Remote Power CNTL Input

A remote power button can be connected to the device's DC input terminal block. Pressing the button changes the system's power state. Connect the button between the CNTL pin on the power input terminal block and the system 0V (V-).

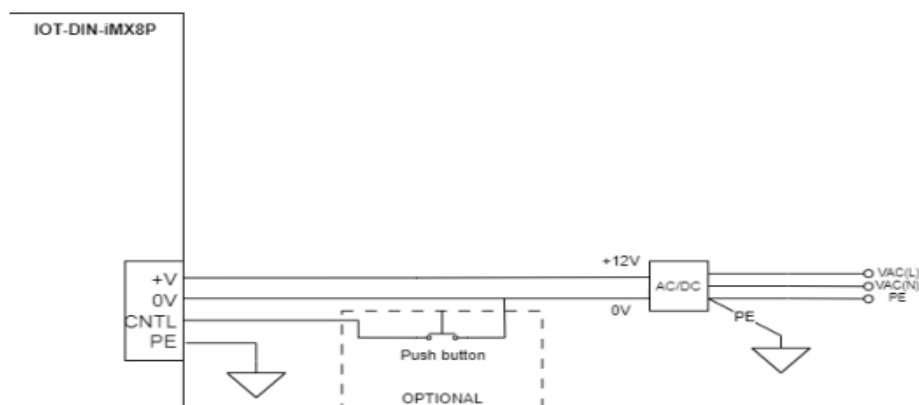
Table 10 Power Button Control

Current State	Press	Resulting State
ON	Short	OFF (O/S controlled shutdown)
ON	Long	OFF (forced hardware shutdown)
OFF	Short	ON

Warning: Connecting the Remote Power Button input to DC voltage may damage the device.

*** Only connect the input pin to GND via the contact switch ***

6.2.2 Typical Connection Schematic



6.3 USB Host Connector

The iNav4U-Server Module USB 3.0 host port is available via a standard Type-A USB 3.0 connector. The USB 3.0 port is implemented directly on the native MX8M Plus port.

6.4 Industrial I/O Connector

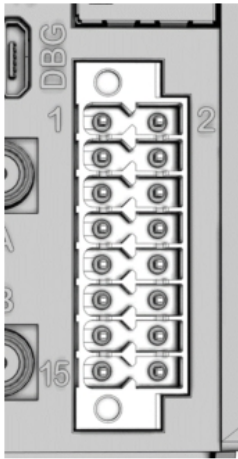
iNav4U-Server industrial I/O signals are routed to the terminal block. Connector pin-out is shown below. For additional details, please refer to section 3.7.

Table 11 Industrial I/O add-on connector pin-out

Pin	Signal Name	Description	Isolation Power Domain
1	DIO_VIN	Digital I/O external DC power input	DIO
2	DIO_IN0	Digital input 0	DIO
3	DIO_OUT0	Digital output 0	DIO
4	DIO_IN1	Digital input 1	DIO
5	DIO_OUT1	Digital output 1	DIO
6	DIO_COM	Digital I/O isolated ground	DIO
7	RS485_D-	RS485 negative	RS485
8	RS485_D+	RS485 positive	RS485
9	RS485_TRM	RS485 termination control	RS485
10	RS485_COM	RS485 isolated ground	RS485
11	RS232_RxD	RS232 receive	RS232
12	RS232_TxD	RS232 transmit	RS232
13	CAN_COM	CAN isolated ground	CAN
14	RS232_COM	RS232 isolated ground	RS232
15	CAN_L	CAN bus low	CAN
16	CAN_H	CAN bus high	CAN

Table 12 Industrial I/O add-on connector data

Table 12 Industrial I/O add-on connector data

Connector type	Pin numbering
16-pin dual-row plug with push-in spring connections Locking: screw flange Pitch: 3.5 mm Wire cross-section: AWG 16 – AWG 26 Connector P/N: JiLN JL15EDGRHCM-35005B01 Mating connector P/N: JiLN JL15EDGKNHM-35016B01 NOTE: iNav4U supplies the mating connector with the Server unit	

6.5 Serial Debug Console

The iNav4U-Server serial debug console interface is routed to the micro USB connector. For additional Information, please refer to section 3.6 of this document.

6.6 RJ45 Ethernet Connectors

IOT-DIN-IMX8PLUS features two Ethernet ports, ETH0 and ETH1, routed to two RJ45 connectors. For more info, refer to section 3.4.

6.7 SIM card socket

The iNav4U-Server nano-SIM card socket is located on the bottom panel. For SIM card installation instructions, please refer to the iNav4U-Server User's Manual.

6.8 Indicator LED's

The tables below describe the iNav4U-Server indicator LEDs

Table 13 SystemStatus LED

LED State	Server Status
OFF	System is in OFF or deep-
Solid BLUE	System is running U-boot
Solid PURPLE	U-boot bootloader is not
Blinking BLUE	System is running Linux
Blinking AMBER	Invalid combination of I/O

Table 14 System Status LED

GPIO	LED
GPIO5_2	Green
GPIO5_4	Red

General-purpose LEDs are active high and controlled by SoC GPIOs.

Table 15 User LED B

GPIO	LED
GPIO5_1	Green
GPIO5_3	Red

6.9 Antenna Connectors

iNav4U-Server features two SMA connectors for external antennas.

Table 16 Default antenna connector assignment

Connector Name	Function	Connector Type
A	GPS antenna	SMA
B	LTE main antenna	SMA

NOTE: SMA connectors are present only in server configurations with a cellular modem

7 MECHANICAL DRAWINGS

iNav4U-Server 3D model is available for download at:
Coming soon

8 OPERATIONAL CHARACTERISTIC

8.1 Absolute Maximum Rating

Table 17 Absolute Maximum Ratings

Parameter	Min	Max	Unit
Main power supply	-0.3	32	V

NOTE: Stress beyond Absolute Maximum Ratings may cause permanent damage to the device

8.2 Recommended Operating Conditions

Table 18 Recommended Operating Conditions

Parameter	Min	Typ.	Max	Unit
Main power supply	9.6	12-24	28.8	V

8.3 Typical Power Consumption

*** To be included in future revisions of this document