

Neosys Technology Inc.

IGT-30 Series Industrial Gateway

User Manual

Revision 1.0

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Legal Information

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Neosys Technology Inc. may modify, update or upgrade the software, firmware or any accompanying user documentation without any prior notice. Neosys Technology Inc. will provide access to these new software, firmware or documentation releases from download sections of our website or through our service partners.

Before installing any software, applications or components provided by a third party, customer should ensure that they are compatible and interoperable with Neosys Technology Inc. product by checking in advance with Neosys Technology Inc.. Customer is solely responsible for ensuring the compatibility and interoperability of the third party's products. Customer is further solely responsible for ensuring its systems, software, and data are adequately backed up as a precaution against possible failures, alternation, or loss.

For questions in regards to hardware/ software compatibility, customers should contact Neosys Technology Inc. sales representative or technical support.

To the extent permitted by applicable laws, Neosys Technology Inc. shall NOT be responsible for any interoperability or compatibility issues that may arise when (1) products, software, or options not certified and supported; (2) configurations not certified and supported are used; (3) parts intended for one system is installed in another system of different make or model.

Contact Information

Headquarters
(Taipei, Taiwan)

Neosys Technology Inc.
15F, No.868-3, Zhongzheng Rd., Zhonghe Dist., New Taipei City, 23586, Taiwan
Tel: +886-2-2223-6182 Fax: +886-2-2223-6183 [Email](#), [Website](#)

Americas
(Illinois, USA)

Neosys Technology America Inc.
3384 Commercial Avenue, Northbrook, IL 60062, USA
Tel: +1-847-656-3298 [Email](#), [Website](#)

China

Neosys Technology (China) Ltd.
Room 612, Building 32, Guiping Road 680, Shanghai
Tel: +86-2161155366 [Email](#), [Website](#)

Declaration of Conformity

FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

CE

The product(s) described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

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All other names, brands, products or services are trademarks or registered trademarks of their respective owners.

Safety Precautions

Read these instructions carefully before you install, operate, or transport the system.

- Install the system or DIN rail associated with, at a sturdy location
- Install the power socket outlet near the system where it is easily accessible
- Secure each system module(s) using its retaining screws
- Place power cords and other connection cables away from foot traffic. Do not place items over power cords and make sure they do not rest against data cables
- Shutdown, disconnect all cables from the system and ground yourself before touching internal modules
- Ensure that the correct power range is being used before powering the device
- Should a module fail, arrange for a replacement as soon as possible to minimize down-time
- If the system is not going to be used for a long time, disconnect it from mains (power socket) to avoid transient over-voltage

Service and Maintenance

- ONLY qualified personnel should service the system
- Shutdown the system, disconnect the power cord and all other connections before servicing the system
- When replacing/ installing additional components (expansion card, memory module, etc.), insert them as gently as possible while assuring proper connector engagement

ESD Precautions

- Handle add-on module, motherboard by their retention screws or the module's frame/ heat sink. Avoid touching the PCB circuit board or add-on module connector pins
- Use a grounded wrist strap and an anti-static work pad to discharge static electricity when installing or maintaining the system
- Avoid dust, debris, carpets, plastic, vinyl and styrofoam in your work area.
- Do not remove any module or component from its anti-static bag before installation

About This Manual

This manual introduces Neosys IGT-30 series, an industrial grade gateway that can be deployed in a complex communication network. The manual covers IGT-30 series connections, LED indicators, initial setup and installation of the system.

Revision History

Version	Date	Description
1.0	Sep. 2019	Initial release

1. Introduction

Neosys IGT-30D/ IGT-31D are rugged industrial grade ARM-based gateway. Based on Texas Instruments' Sitara AM335x family and coupled with Debian operating system, IGT-30D/ IGT-31D are in compliance with CE/FCC, shock, vibration, etc. certifications.

1.1 IGT-30 Series Overview

Neosys IGT-30 series, equipped with AM3352 from Texas Instrument's Sitara AM335x family, is an ARM-based Box PC aimed at Industrial Internet of Things (IIoT) Gateway and Industry 4.0 applications. As required by any industrial applications, IGT-30 series is shipped as a ready system preinstalled with Debian and in compliance with common industrial certifications such as CE/FCC, shock and vibration. It has a power input range of 12 to 25 VDC and a wide operating temperature from -25°C to 70°C to ensure IGT-30 continues to function under harsh industrial conditions.



IGT-30 series supports PoE Powered Device (PD) mode meaning it can be powered by a LAN cable from a PoE Power Sourcing Equipment (PSE), and at the same time transfer data via this cable as well. IGT-30 series has I/Os that are applicable to a range of industrial grade sensors. It features one USB2.0 port, two 10/100M LAN ports, one configurable COM port (RS-232/422/485) and a CAN bus port (IGT-31D only). In addition to the ports mentioned, there are 8 built-in isolated digital input channels that accept discrete signals from various sensors or buttons/ switches. There are also 2 built-in isolated digital output channels to control actuators and indicators.

Communication wise, IGT-30 series has a mini PCIe slot and a USIM holder allowing it to transmit acquired data and system status via 3G, 4G or WiFi (mini PCIe WiFi module). There are two openings on top of IGT-30 series for users to mount the SMA connector of the wireless module. In terms of storage, IGT-30 series has dual microSDHC slots, one internal and one external. This design allows users to

separate system/ user data and can also expedite in OS deployment for mass production. Inherited from its predecessor, IGT-30 series features six LED indicators and two function buttons that can be programmed by users. The function buttons can act as controls for IGT-30 series and exclude the need for external input devices, such as keyboard/ mouse.

1.2 IGT-30D/ IGT-31D Hardware Specifications

System Specification

	IGT-30D	IGT-31D
Processor	Texas Instrument Sitara AM3352 1GHz Processor	
Memory module	1GB DDR3L SDRAM	

Input/ Output Interface

Ethernet:	1x 10/ 100Mbit LAN 1x 10/ 100Mbit LAN with PoE (PD)	
USB port	1x USB2.0	
Storage expansion	2x microSDHC (internal x1, external x1)	
Serial port	1x software configurable RS-232/ 422/ 485 port	
Console port	1x 3-wired RS-232 port	
User LED	6x user programmable LED	
Function button	2x user programmable function buttons	
Power button	1x power button	
Reset button	1x reset button	
CAN bus	NA	Isolated CAN bus port, 2.0 A/ B
Wireless expansion	mini PCIe (USB signal only) + internal SIM slot x1	

Digital Input

Digital input	8x digital input channels
Input signal type	Dry contact/ sinking/ sourcing
Isolation voltage	3750Vms
Logic "0" voltage	11~24V
Logic "1" voltage	0~1.5V

Digital Output

Digital output	2x output channels
Output signal type	Sinking/ sourcing
Isolation voltage	1500Vms
Rated driving current	500mA
Rated driving voltage	24 VDC/ VAC

2. System Overview

Upon receiving and unpacking your IGT-30/ IGT-30D system, please check immediately if the package contains all the items listed in the following table. If any item(s) are missing or damaged, please contact your local dealer or Neosys Technology.

2.1 IGT-30/ IGT-30D Packing List

System Item	IGT-30/ IGT-30D	Qty
1	IGT-30 or IGT-30D	1
2	3-pole terminal block	1
3	10-pole terminal block	3
4	Cover plate	1
5	M3 flat screw	1
6	DIN-rail clip set	1

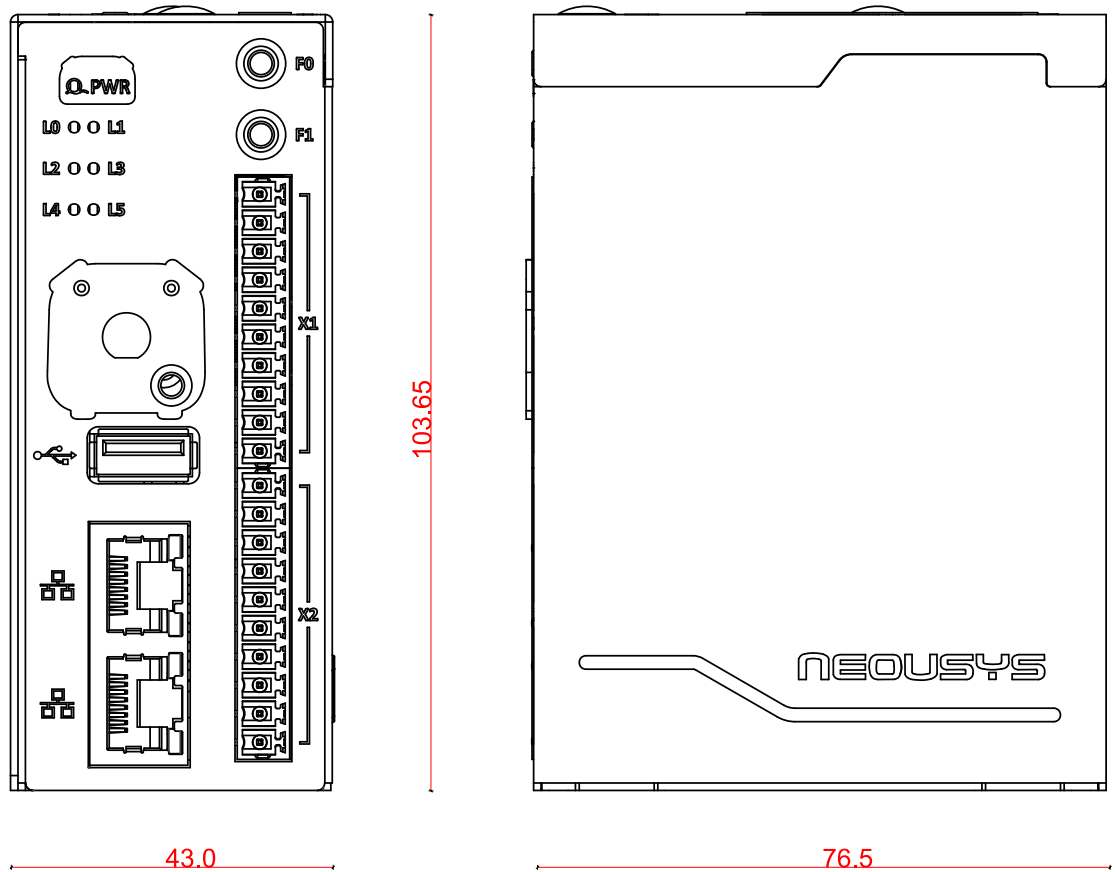


NOTE

The BR2032 battery is not included with the purchase of the system. The battery is user provided and is responsible for the system's real-time clock.

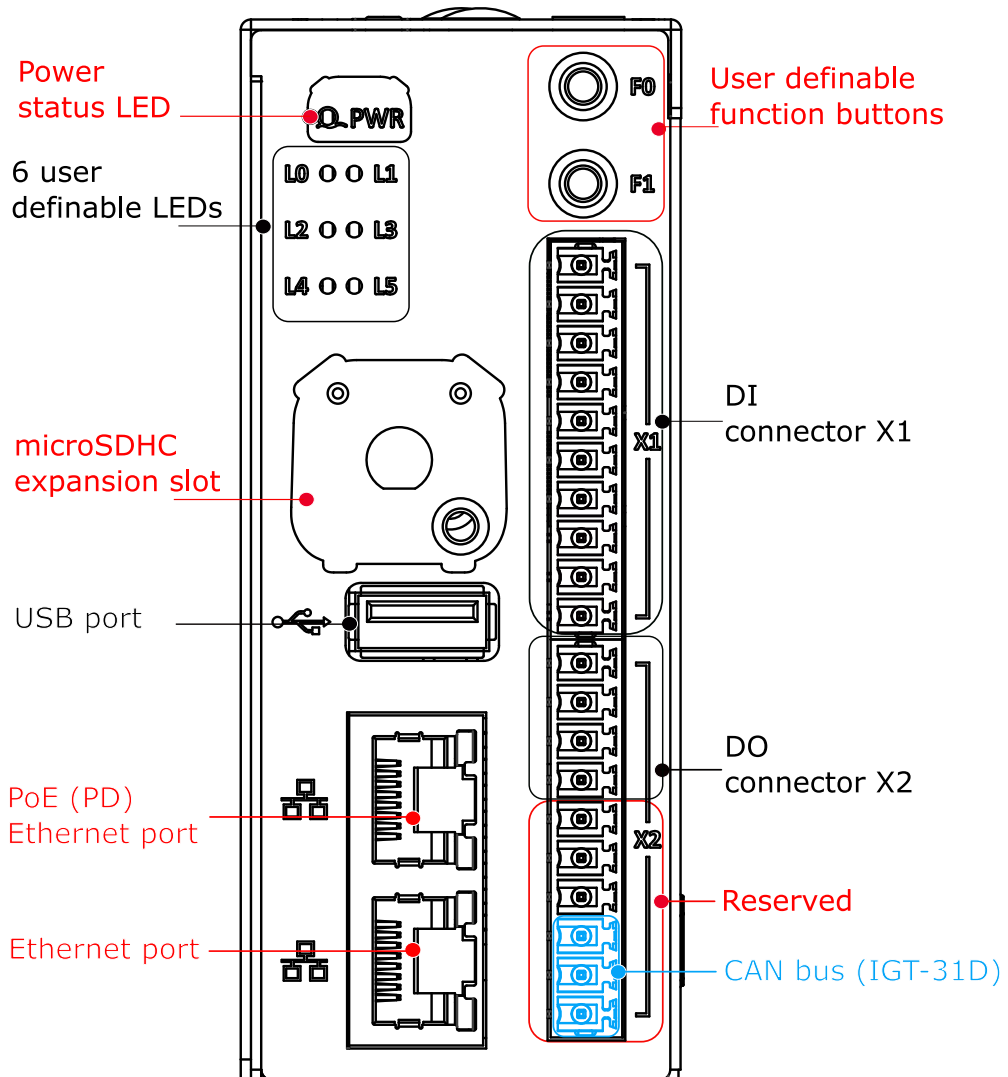
2.2 Enclosure Dimensions

Neosys IGT-30 enclosure dimensions come in a footprint measuring just 103.65 (H) x 43.0 (W) x 76.5 (D) mm. The compact dimensions make it easy to setup and deploy in areas where space is limited. It also comes with a DIN clip for DIN-rail mounting purposes.



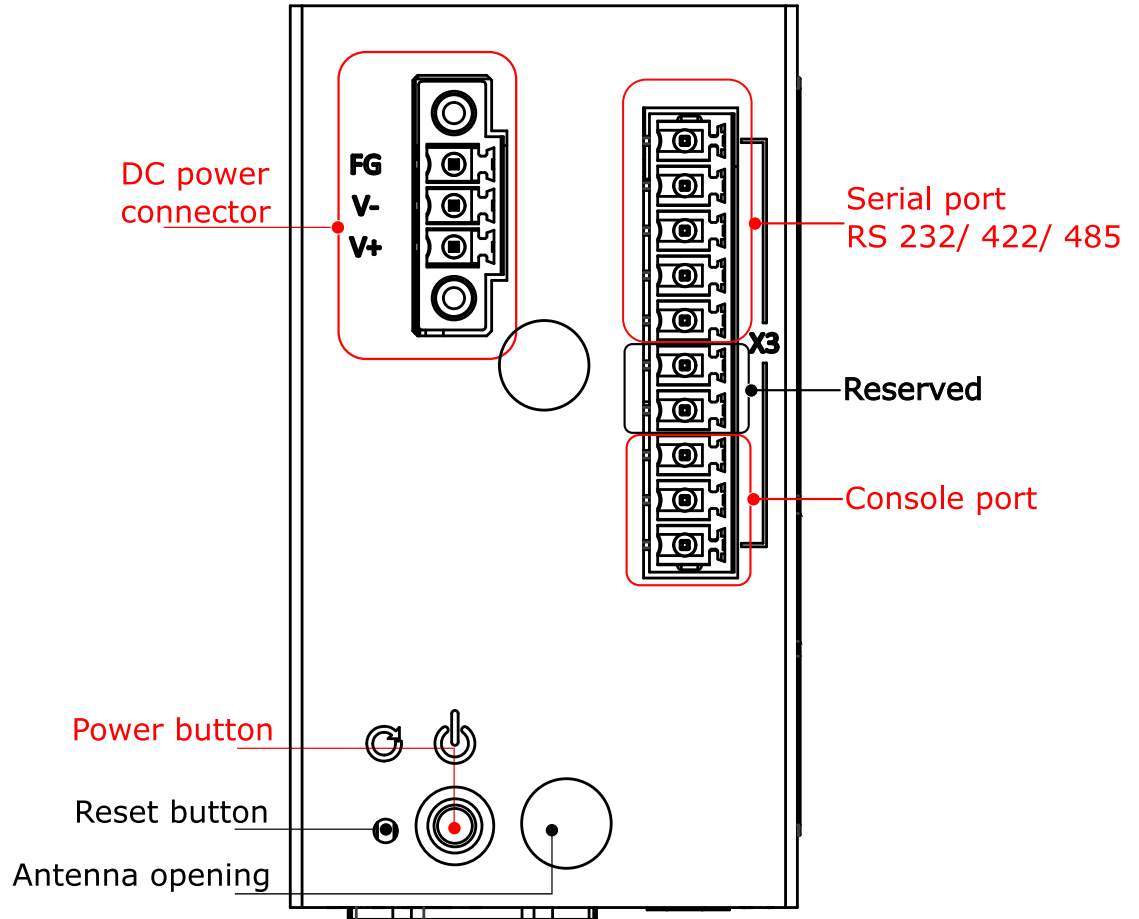
2.3 Enclosure Front View

There is a power status indicator LED, six user-definable LEDs, microSDHC expansion slot (under cover plate), SIM card slot, USB port, Ethernet port, two user-definable function buttons, two DI/ DO connectors, console port, CAN bus (IGT-31D only) and reserved ports.



2.4 Enclosure Top View

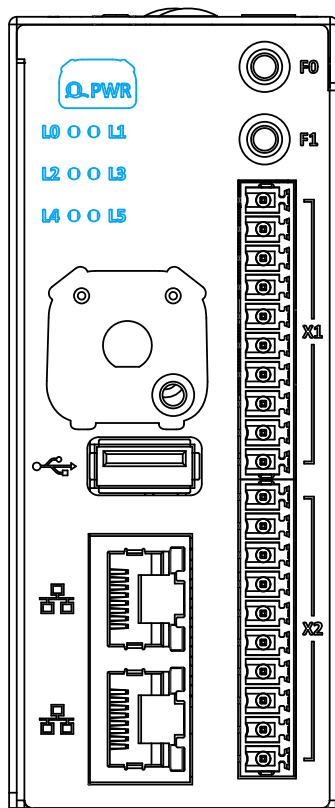
Top of the enclosure features a 3-pin DC power connector, serial port (RS-232/ 422/ 485), console port, power button, reset button and an antenna opening.



3. System LED

The system has 6 user definable LED indicators for users to program accordingly to their needs. However, there are some LEDs that come with preset default statuses that will be mentioned in this chapter. Other LEDs you will find on the system include the Ethernet port and the power status LED.

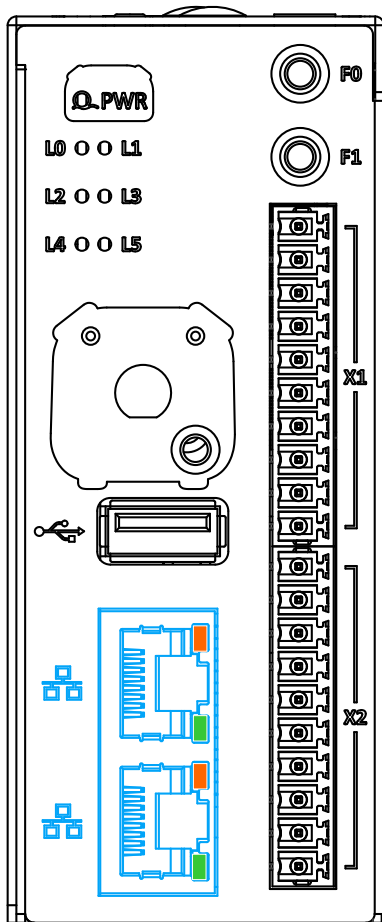
3.1 Power & System Status LED



There are seven (7) system status LEDs that include a power status LED and six (6) user programmable LEDs where some may have predefined settings.

Label	Name	Status description	Preset status
PWR	Power	Green: System on Off: System off	Power status indicator with green color. On if power on, and off if power off
L0	LED 0	Amber, User definable	Amber LED. User-defined behavior. Configured by default as system heart-beat
L1	LED 1	Amber, User definable	Amber LED. User-defined behavior. No default function.
L2	LED 2	Amber, User definable	Amber LED. User-defined behavior. Configured by default as External SD activity.
L3	LED 3	Amber, User definable	Amber LED. User-defined behavior. Configured by default as Internal SD activity.
L4	LED 4	Amber, User definable	Amber LED. User-defined behavior. No default function.
L5	LED 5	Amber, User definable	Amber LED. User-defined behavior. No default function.

3.2 Ethernet Port & LED



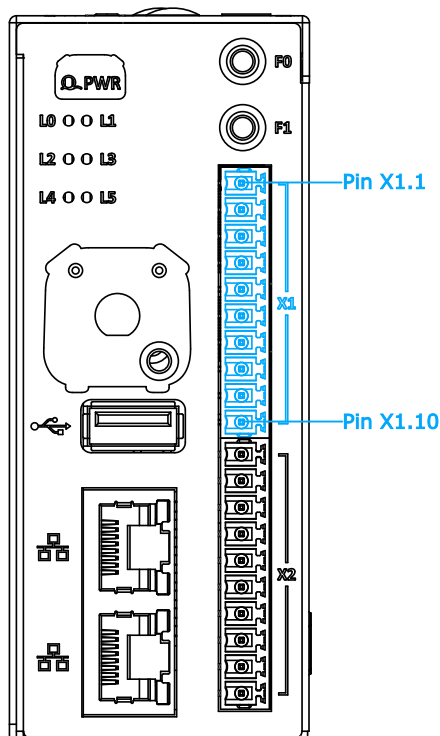
The Ethernet port provides network connectivity. In addition to the console port, it is one of the two ports that may be used for system's initialization. The LED status indicator light functions are described as below.

LED indicator	Color	Status description
Connection status	Amber	Steady on: Connection established Blinking: Data activity
Connection Speed	Green	Steady on: 100Mbps connection established Off: 10Mbps connection established

4. Digital I/O and DC Connector

There are three I/O connectors on IGT-30D/ IGT-31D, each serving a different purpose and function from one another. They consist of digital input/ output, console and serial port. There is also a DC connector at the top of the system.

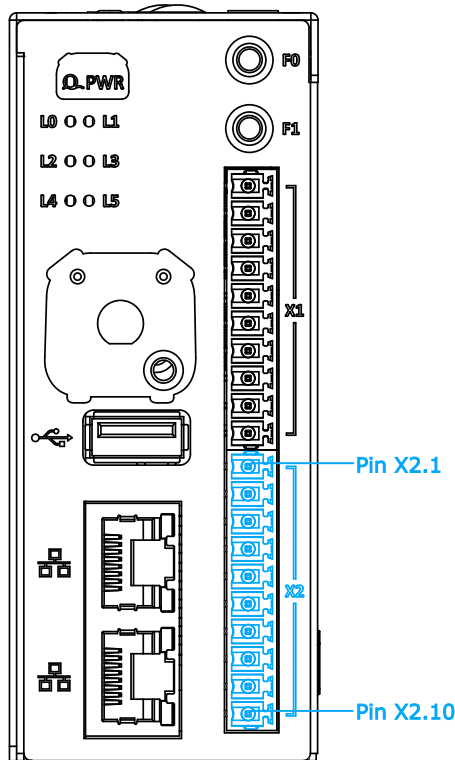
4.1 Digital Input Connector (X1) & Pin Definition



X1 connector on the front panel comprises of ten pins starting with Pin X1.1 from the top in numeric order downwards to X1.10. It is dedicated for digital input functions.

Pin	Channel	Description	Pin	Channel	Description
X1.1	DI_COM	Common point of digital inputs	X1.6	DI_3	Digital input 3
X1.2	DRY_COM	Common point of dry contact inputs. Modify corresponding DIP switches to enable dry contact input.	X1.7	DI_4	Digital input 4
X1.3	DI_0	Digital input 0	X1.8	DI_5	Digital input 5
X1.4	DI_1	Digital input 1	X1.9	DI_6	Digital input 6
X1.5	DI_2	Digital input 2	X1.10	DI_7	Digital input 7

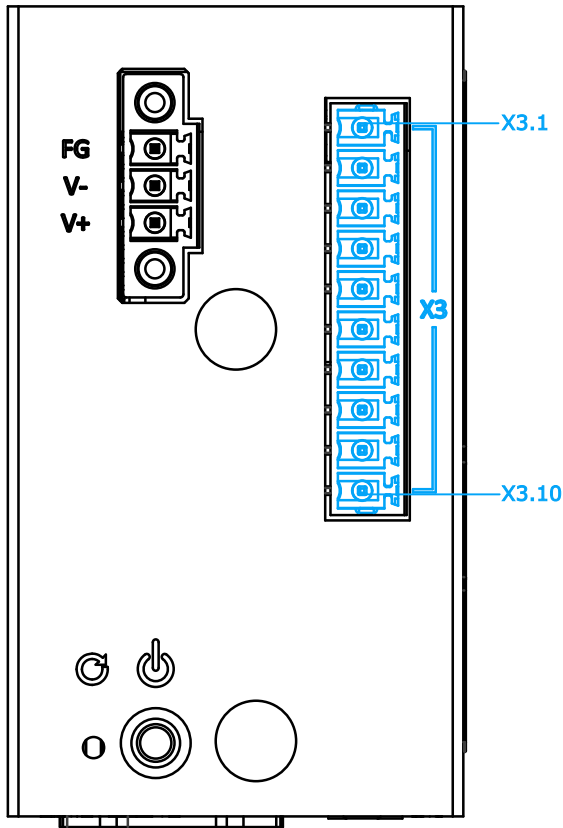
4.2 Digital Output Connector (X2) & Pin Definition



X2 connector on the front panel comprises of ten pins starting with Pin X2.1 from the top in numeric order downwards to X2.10. It is dedicated for digital output functions.

Pin	Channel	Description	Pin	Channel	Description
X2.1	DO_0_A	Digital output	X2.6	Reserved	Reserved pin.
X2.2	DO_0_B	0.	X2.7		Please keep it unconnected
X2.3	DO_1_A	Digital output	X2.8	CAN+	CAN High signal (IGT-31D only)
X2.4	DO_1_B	1.	X2.9	CAN-	CAN Low signal (IGT-31D only)
X2.5	Reserved	Reserved pin. Please keep it unconnected.	X2.10	CAN_GND	CAN ground (IGT-31D only)

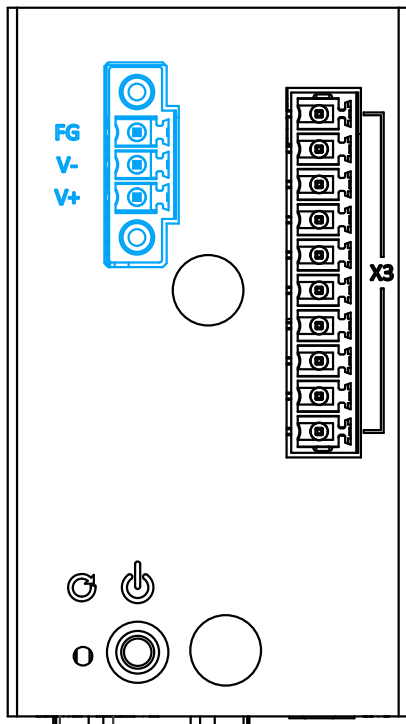
4.3 Serial Port (X3) & Console Port Pin Definition



X3 connector on the top panel comprises of ten pins starting with Pin X3.1 to X3.10. It features signals for a serial port and a console port. The serial port, in the preinstalled Debian operating system, is mapped to ttyS1, and is software configurable among RS-232, RS-422 and RS-485. The following table shows the definition of the ten pins.

Pin	Channel	RS-422	RS-485	RS-232
X3.1	TX+	TX+ of ttyS1	Data+ of ttyS1	Rx of ttyS1
X3.2	TX-	TX- of ttyS1	Data- of ttyS1	-
X3.3	RX+	RX+ of ttyS1	-	Tx of ttyS1
X3.4	RX-	RX- of ttyS1	-	-
X3.5	GND	Ground of serial port. This pin connects to system digital ground.		
X3.6	Reserved	Reserved pin. Please keep it unconnected.		
X3.7	Reserved			
X3.8	CTX	Tx of Console Port (RS-232 signal)		
X3.9	CRX	Rx of Console Port (RS-232 signal)		
X3.10	GND	Ground of serial port. This pin connects to system digital ground.		

4.4 DC Connector Definition



The DC connector also locates at the top of the system. Please take care of the polarity while wiring to DC input.

DC Connector Pin

Pin	Description
V+	Positive polarity of DC input
V-	Negative polarity of DC input
FG	Frame Ground

5. System Setup

The system setup involves hardware and DIN rail installation. Before you start, please make sure you have done the following:

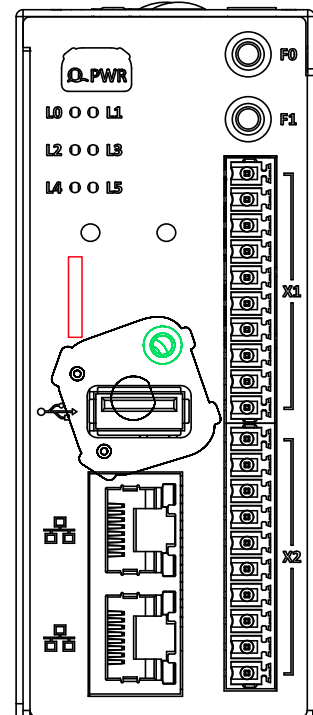
- It is recommended that only qualified service personnel should install and service this product to avoid injury.
- During the process, please observe all ESD procedures to avoid damaging the equipment.
- For internal, external microSDHC installation or replacement, make sure the system has powered off.
- Before disassembling your system, please make sure the system has powered off with all cables (power, video, data, etc.) and antennae disconnected.
- Place the system on a flat and sturdy surface (remove from mounts or out of server cabinets) before proceeding with the installation/ replacement procedure.

5.1 External microSDHC Installation/ Replacement

The external microSDHC slot can be located behind the cover-plate (dotted line) on the front panel. To replace or insert cards, you must loosen the screw securing the cover-plate to access the slot. The microSD card provides additional expansion storage to the system.

Please ensure the system has powered off.

1. Loosen the screw (green) on the front panel just enough to move the cover-plate (dotted line) to expose the microSDHC (red) slot.
2. If you already have a card installed and wanting to replace it use your fingernail to push-in the card and the card will spring out just enough for you to retract them out of the slot.
3. The card insertion is directional. So gently insert the card, if you feel like the card is stuck, try turning the card around and try inserting it again. When properly inserted, you should hear a “click” sound.



WARNING

Prior to inserting the microSDHC card, please remember to power off the system as it is not hot-pluggable. Failure to do so may damage the SIM card, system or result in data loss on the microSDHC card!



NOTE

The internal and external microSDHC cards are interchangeable. Either one can serve as expansion storage or system OS card. However during boot up, the system will detect the external slot for bootable OS before detecting the internal slot.

5.2 Internal microSDHC Card & Battery Installation



NOTE

The BR2032 battery is not included with the purchase of the system. The battery is user provided and is responsible for the system's real-time clock.

To access the internal and microSDHC and battery slot, you must remove the panel and cover. To do so, please perform the following procedure:

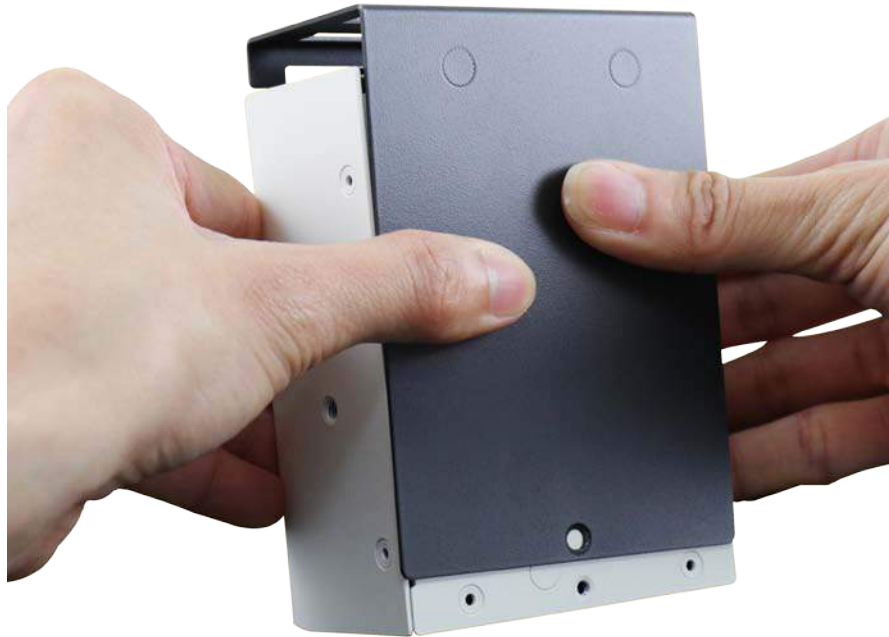
1. Unfasten the screw on the side panel.



2. Unfasten the screw holding the cover plate.



3. Place your thumbs firmly on the side of the panel, gently push upwards to disengage and remove it.



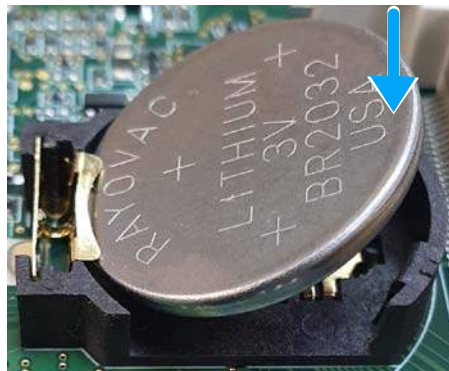
4. Once you have removed the cover, unfasten two screws that secure the PCBA in the enclosure.



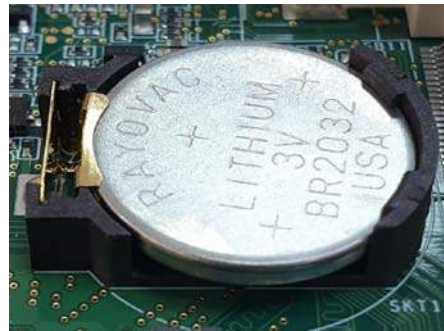
5. Gently pull the PCBA out of the enclosure to access the battery and microSDHC slot.



6. To install the battery, insert the battery on a 45° angle as shown below and press down (indicated by the arrow) on the other end to clip the battery in place.



Insert battery at 45° angle



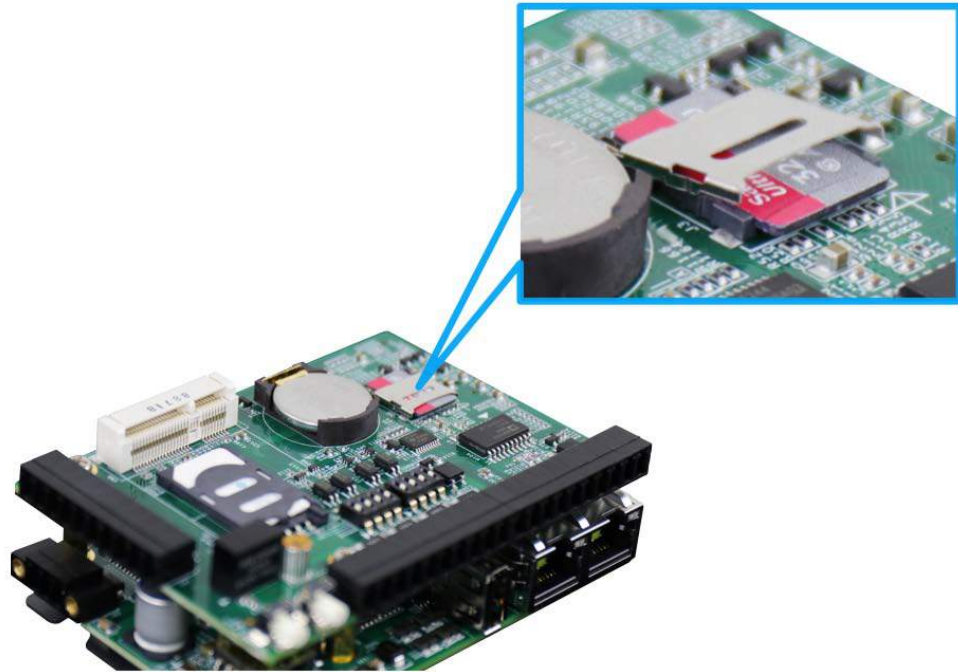
Battery clipped into place



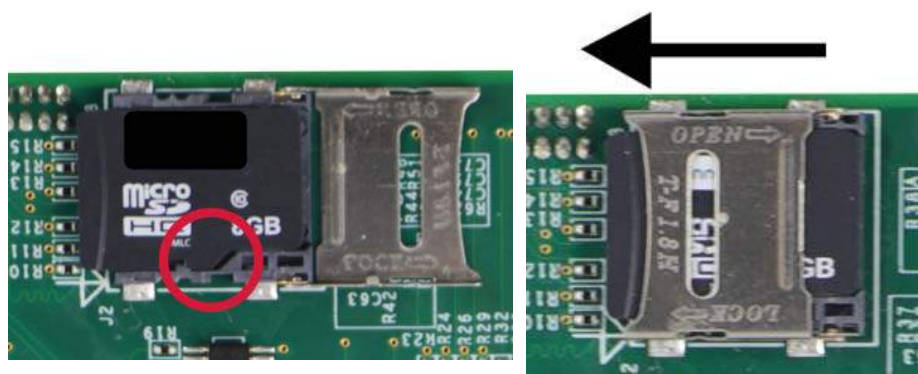
NOTE

The BR2032 battery is not included with the purchase of the system. The battery is user provided and is responsible for the system's real-time clock.

7. To install the internal microSDHC card, with the orientation shown below, gently press down and slide the holder in the direction shown to unclip the microSDHC card. Flip open the holder to install/ replace the microSDHC card.



8. Place the replacement microSDHC card in the slot, make sure the notch matches (indicated by the red circle), flip the holder over to sit on top of the microSDHC card and slot, push in the direction shown to secure microSDHC card.



Make sure the notch meets

To secure the microSDHC card



NOTE

When in doubt which direction to lock and unlock the microSDHC card holder, please refer to the markings (OPEN/ LOCK) on the holder.

9. Gently slide the PCBA back into the enclosure, making sure the connectors\ buttons meet the enclosure openings.



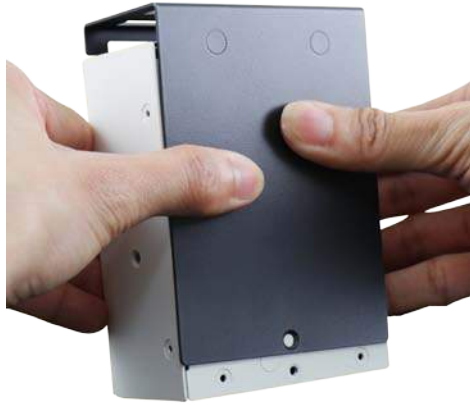
Slide back into enclosure

Make sure connectors meet

10. Secure the two screws holding the PCBA to the enclosure.



11. Install the panel, fasten the screws to secure the enclosure panel and cover plate.



Install the cover



Secure enclosure cover



Secure cover plate

5.3 PCIe Mini Installation

To access the PCIe Mini card, you must disassemble the enclosure and cover.

To do so, please perform the following procedure:

1. Unfasten the screw on the panel.



2. Unfasten the screw holding the cover-plate.



3. Place your thumbs firmly on the side of the panel, gently push upwards to disengage and remove it.



4. Once you have removed the panel, unfasten two screws that secure the PCBA in the enclosure.



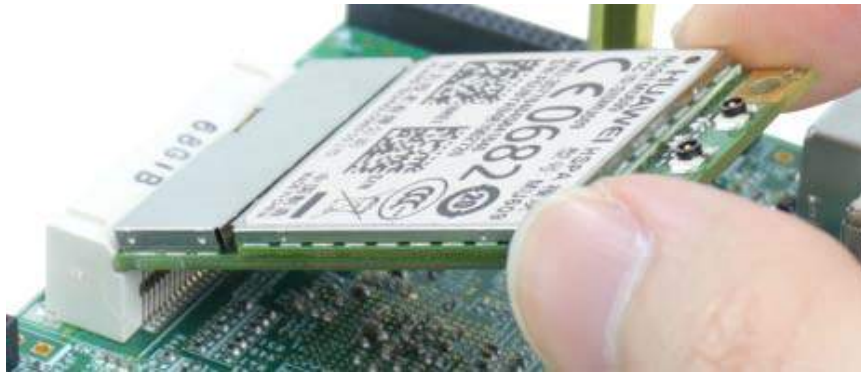
5. Gently pull the PCBA out of the enclosure.



6. Insert the SIM card as shown below.



7. Locate the PCIe Mini slot and inset the module on a 45 degree angle.



8. Gently press the module down and secure the module with the dedicated screw.



9. Clip-on PCIe Mini module's antennae (please refer to the module's user manual on antennae cable connection).



NOTE

Please note how the antennae cable is routed. This is the recommended routing path to accommodate SMA-female connector installation.

10. Insert the PCBA back into the enclosure, making sure the connectors\ buttons meet the enclosure openings and the SMA female connector is accessible.



Make sure connectors meet



Make sure SMA female connector is accessible

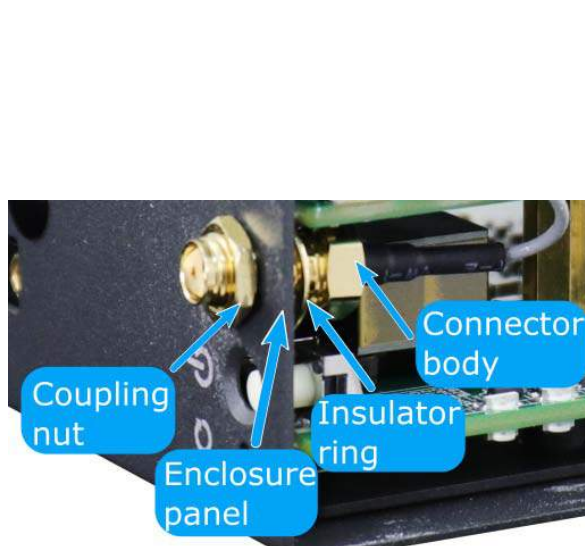
11. Secure the PCBA onto the enclosure by fastening the two screws.



- Remove the antennae cover from the panel.



- To install the SMA female connector, make sure the coupling nut sits outside the enclosure panel, insulator ring sits inside the enclosure panel with the connector body. Fasten the SMA female connector by turning the coupling nut and the connector body in opposite directions. Reinstall the cover plate and panel.



SMA female connector installation



Reinstall cover and enclosure



NOTE

Please fasten the SMA female connector before installing the cover and enclosure!

- Secure the panel and cover plate by fastening respective screws.



Fastening the cover plate screw



Fastening the cover screw

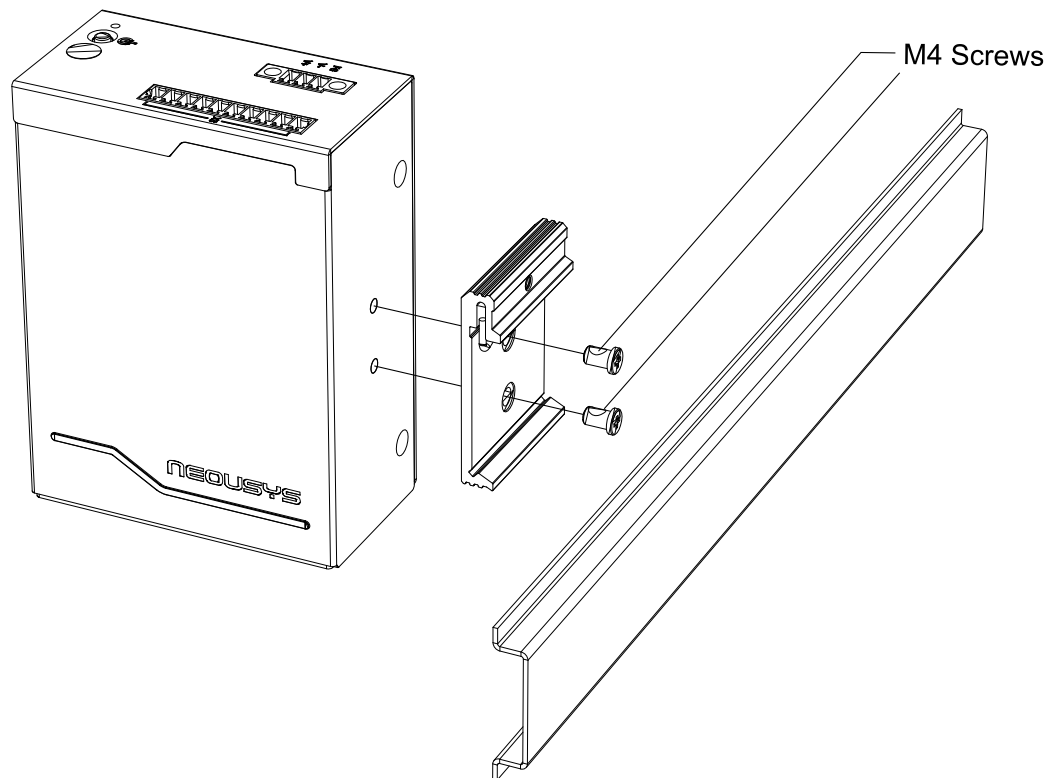
- Install the antennae to complete the installation.



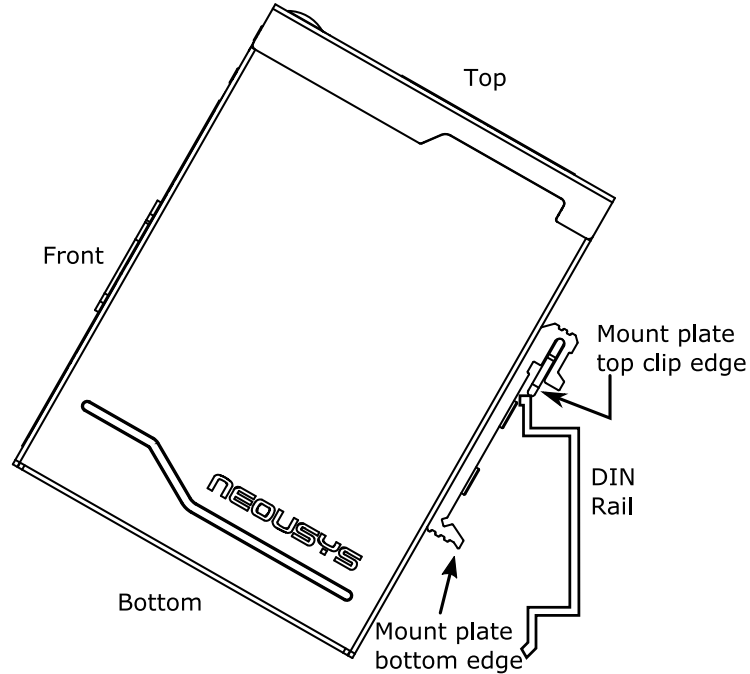
5.4 DIN Rail Installation

The DIN rail is easy to install and it is a convenient way to position the system once it has been initialized. The Din rail has been proven to be most beneficial in the industrial environment where space is limited. The mount plate comes with two M4 screws. Please refer to the illustration below to install the DIN clip/ rail.

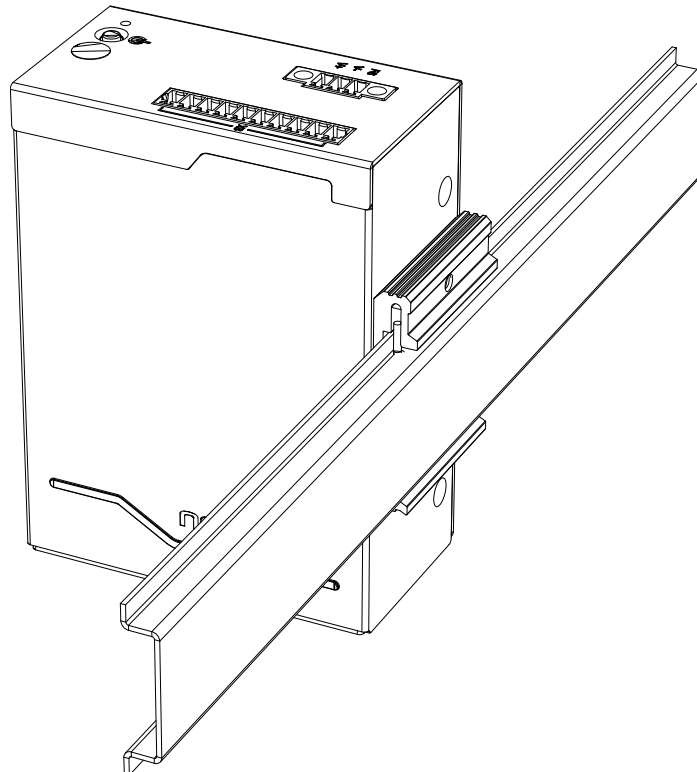
1. To install, secure the mount plate onto the rear of the system enclosure using the M4 screws provided.



2. To install the mount plate onto the DIN rail, you must come over the top of the DIN rail, tilting downwards, overlap the top clip edge of the mount plate onto the DIN rail first, then firmly press the bottom-front of the enclosure to clip the bottom edge of the mount plate.



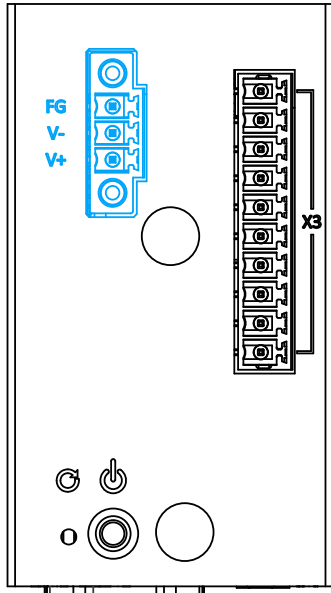
3. Confirm the mount plate has indeed clipped onto the DIN rail for proper fit to complete the installation.



5.5 Power-on the System

To power the system, please make sure you have done the following:

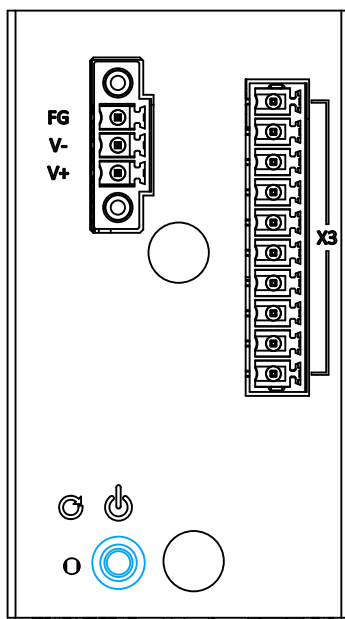
1. Connect and plug in the 3-pole terminal block.



 **WARNING**

Please make sure the voltage of DC power is correct before you connect it to the system. Supplying a voltage over 24V will damage the system.

2. Press the power button to turn on the system.




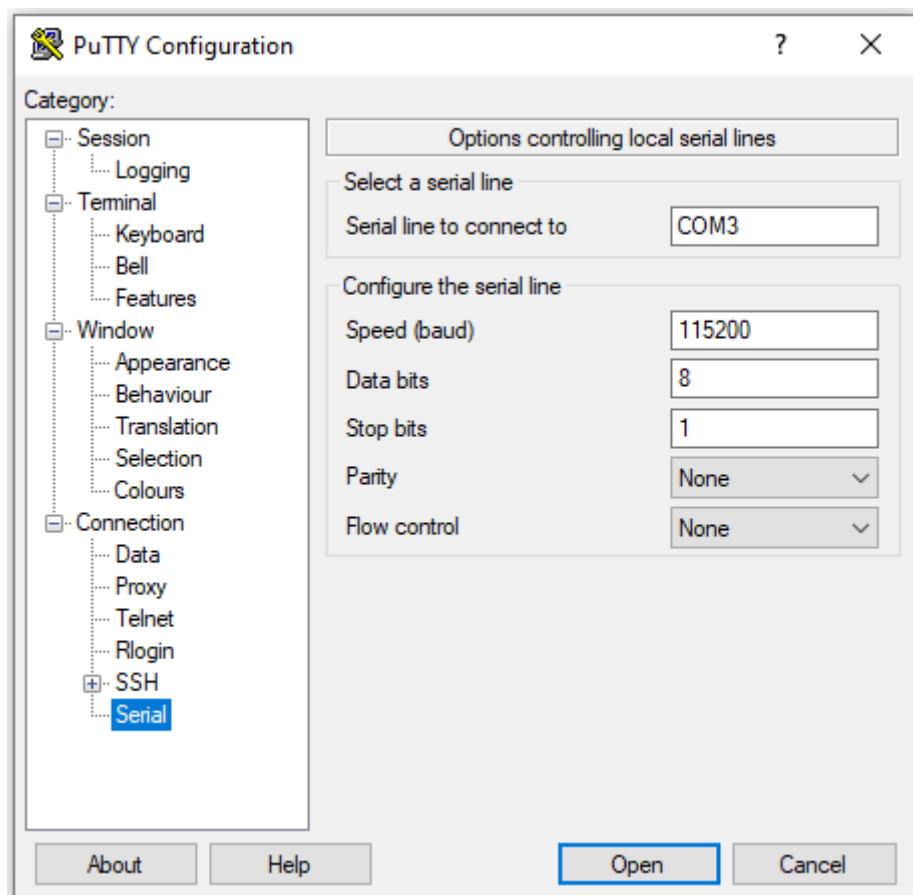
6. Initial Login

There are two ways to log into the system and setup your IGT-30. Method one is to login by connecting to the console port of IGT-30 and the host computer, and method two is to connect a host computer to the Ethernet port of IGT-30 and access via a SSH-supported terminal application such as PuTTY.

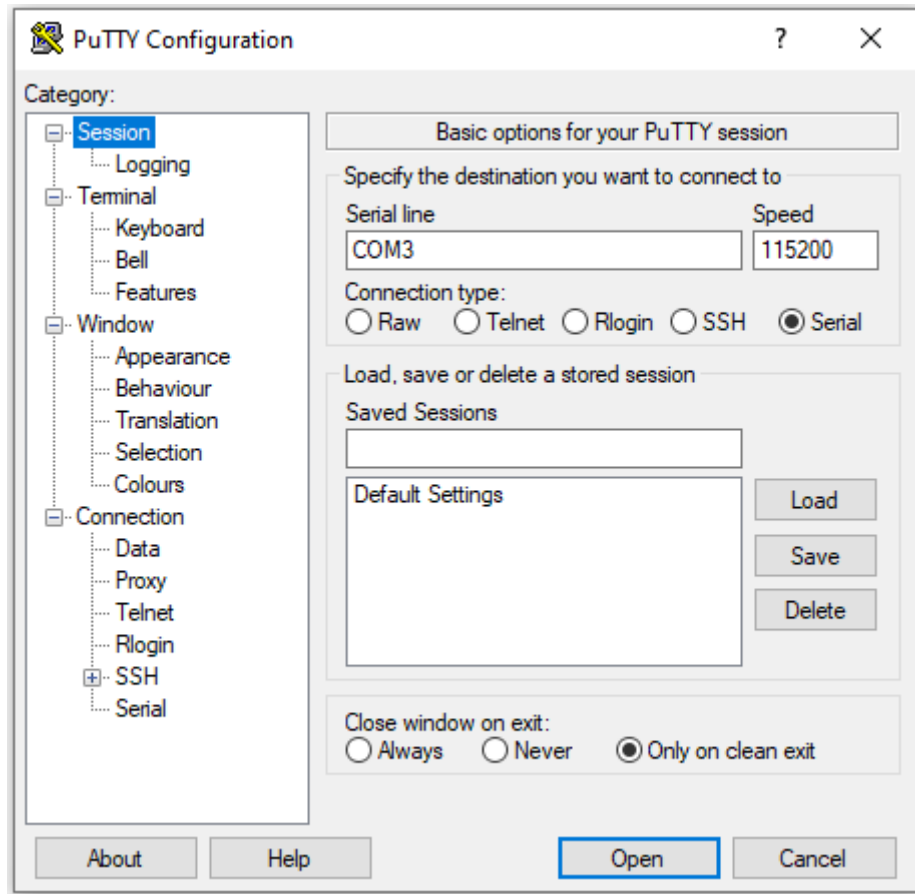
6.1 Login via Console Port

Establish a connection between your host computer and IGT-30's console port (connector 1, pins CTX, CRX and GND). Please note that a cross-over cable is required (CTX to Rx and CRx to Tx) and you must connect to [IGT-30's console port](#).

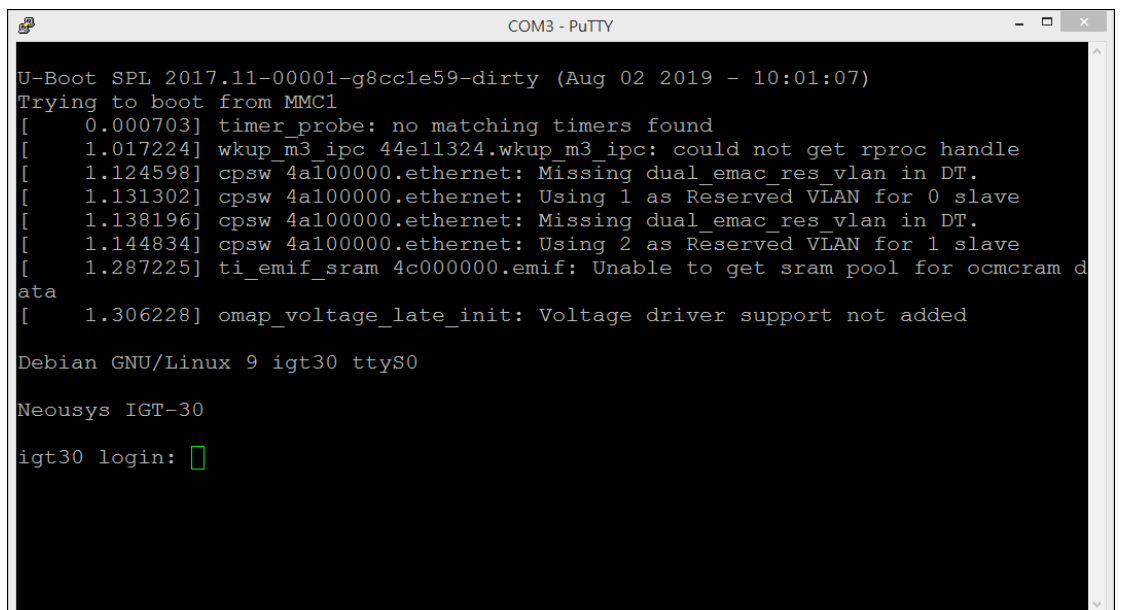
1. Right click on  `putty.exe`, click on "Run as administrator" to bring up the PuTTY Configuration window.
2. Go to Category > Serial, enter the COM port you connected your host computer to IGT-30 and enter the following parameters:



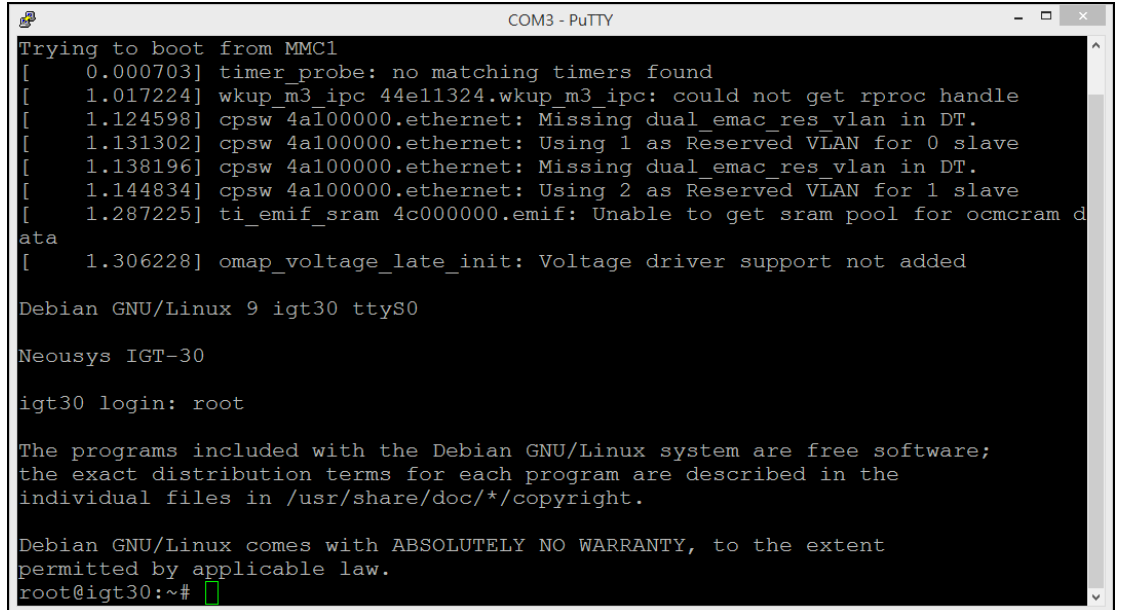
- Go back to Category > Session, select Serial and it should bring up the parameters set in the previous step. Click on Open when ready.



- A series of messages may appear, wait for "igt30 login:" prompt.



5. Enter "root" to login, password is not required and the Linux CLI prompt "root@igt30:~#" will appear. From here you may begin configuring your IGT-30.



```
COM3 - PuTTY
Trying to boot from MMC1
[ 0.000703] timer_probe: no matching timers found
[ 1.017224] wkup_m3_ipc 44e11324.wkup_m3_ipc: could not get rproc handle
[ 1.124598] cpsw 4a100000.ethernet: Missing dual_emac_res_vlan in DT.
[ 1.131302] cpsw 4a100000.ethernet: Using 1 as Reserved VLAN for 0 slave
[ 1.138196] cpsw 4a100000.ethernet: Missing dual_emac_res_vlan in DT.
[ 1.144834] cpsw 4a100000.ethernet: Using 2 as Reserved VLAN for 1 slave
[ 1.287225] ti_emif_sram 4c000000.emif: Unable to get sram pool for ocmcram d
ata
[ 1.306228] omap_voltage_late_init: Voltage driver support not added

Debian GNU/Linux 9 igt30 ttyS0

Neosys IGT-30

igt30 login: root

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
root@igt30:~#
```

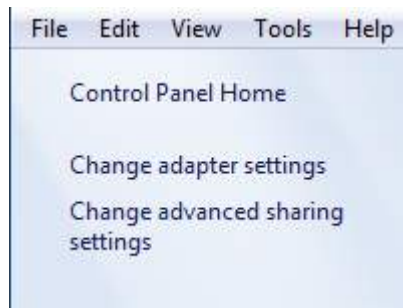
**NOTE**


Please remember to change the default password "root" to avoid unauthorized access.

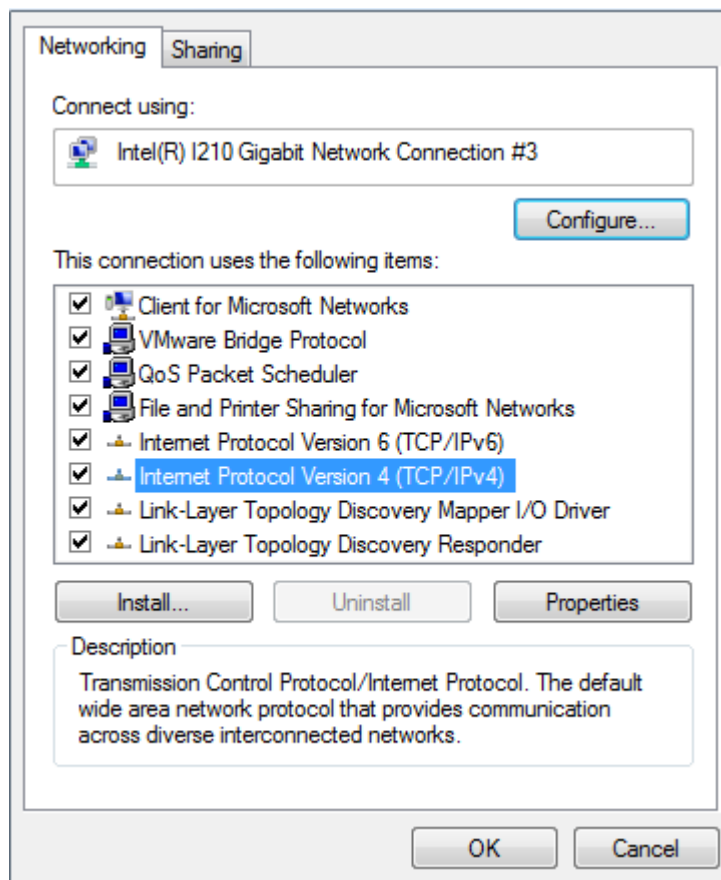
6.2 Login via Ethernet

Establish an Ethernet connection between your host computer and IGT-30, power on both systems. Please note that the Ethernet port on IGT-30 supports AUTO-MDIX meaning either a straight-through or cross-over cable can be used.

1. On your host computer, please go to “Start > Control Panel > View network status and tasks > Change adapter settings”.



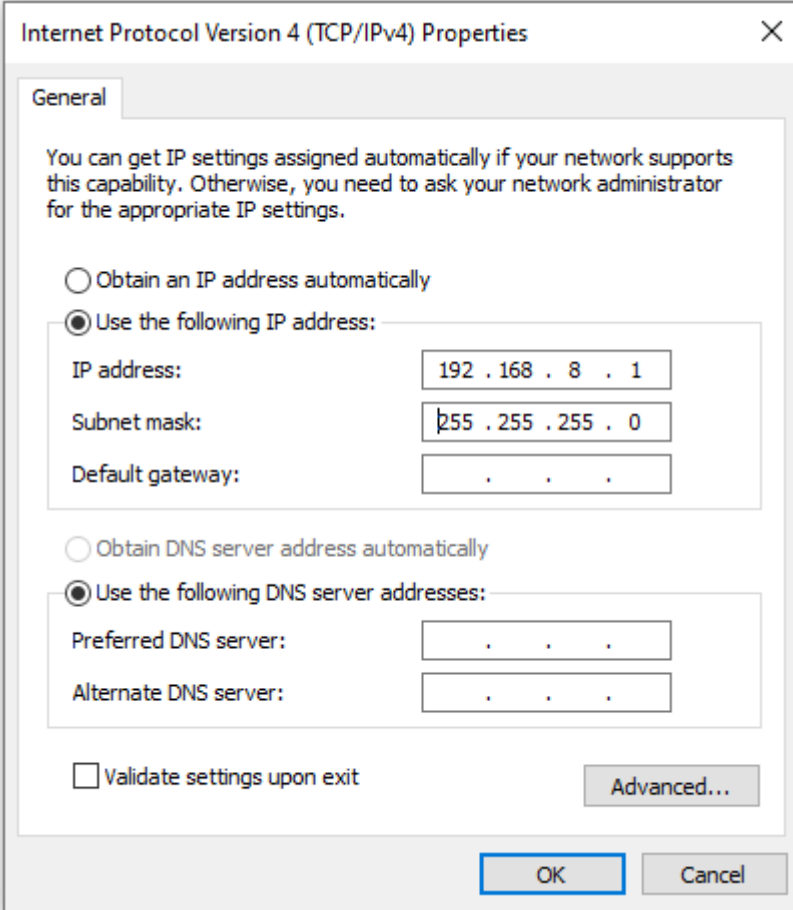
2. Right click the Ethernet adapter that has established a connection with IGT-30, click on properties and double click on  Internet Protocol Version 4 (TCP/IPv4).



3. Enter the following IP parameters and OK.

IP Address: 192.168.8.1

Subnet Mask: 225.225.225.0



Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

Obtain an IP address automatically

Use the following IP address:

IP address: 192 . 168 . 8 . 1

Subnet mask: 255 . 255 . 255 . 0

Default gateway: . . .

Obtain DNS server address automatically

Use the following DNS server addresses:


Preferred DNS server: . . .

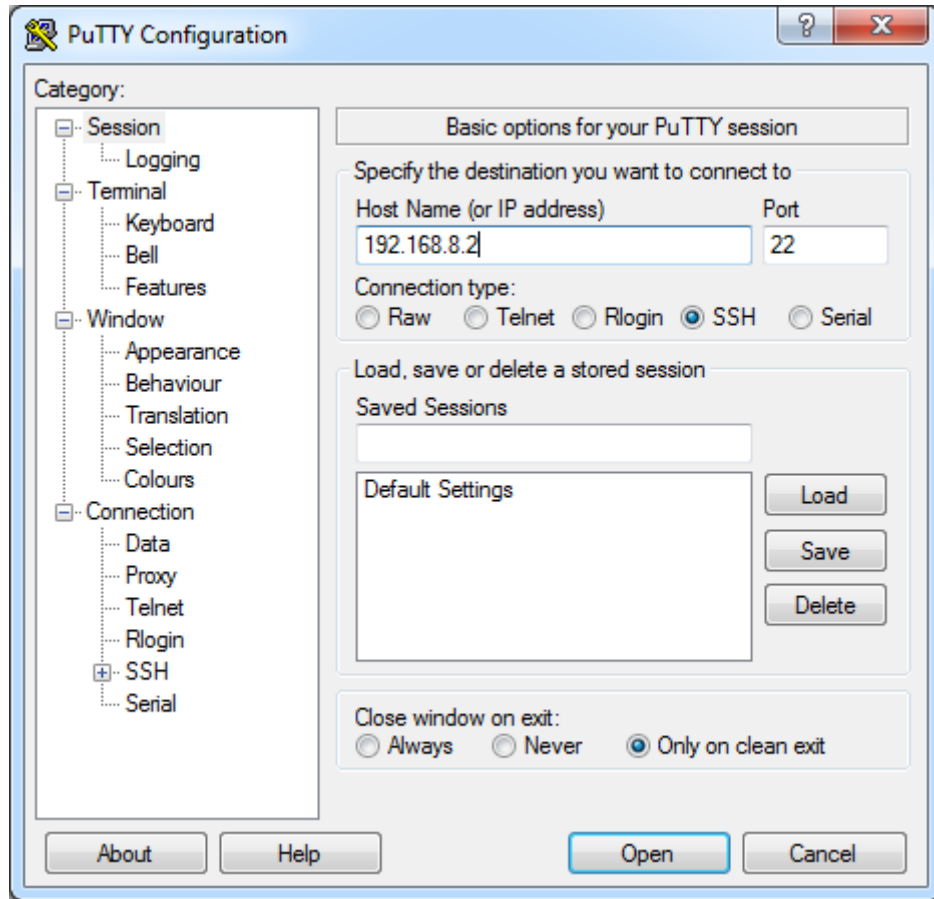
Alternate DNS server: . . .

Validate settings upon exit

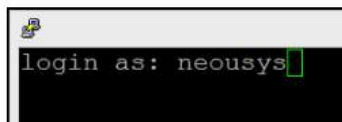
Advanced...

OK Cancel

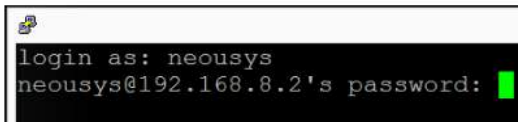
- Power on IGT-30 and right click on  `putty.exe`, click on “Run as administrator” to bring up the PuTTY Configuration window. Under “Session” category, select SSH, enter 192.168.8.2 as the destination you want to connect to. Click on Open when ready.



- A verification prompt may appear, click on Yes to continue and the PuTTY command prompt will show “login as:”, enter “neousys” and press Enter to continue. The default password is: 29169532.



Login



Enter password



NOTE

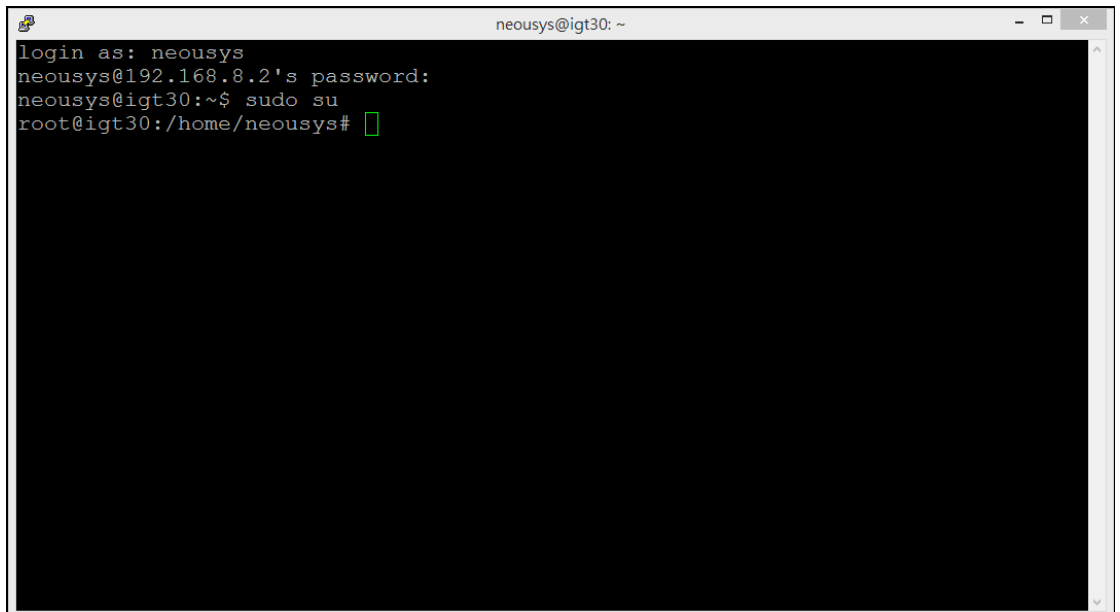
Please remember to change the default password “29169532” to one that you prefer for security purposes.

6. To acquire root rights, type in “~\$ sudo su” and press Enter.



```
neousys@igt30: ~  
login as: neousys  
neousys@192.168.8.2's password:  
neousys@igt30:~$ sudo su
```

7. The root prompt should appear



```
neousys@igt30: ~  
login as: neousys  
neousys@192.168.8.2's password:  
neousys@igt30:~$ sudo su  
root@igt30:/home/neousys#
```

6.3 Utility Script

There is a built-in script named `igt30`, which facilitates serial port mode switching between RS-232, RS-422, RS-485 and test DI/ DO functions. Simply type `igt30 -h` and press enter after you successfully login as root. The usage of the script will be shown. The script covers the following functionalities:

- Get button F0/ F1 status (released button returns value 1)
- Get digital input DI0~7 status (no voltage input return value 1)
- Set and get LED L0~5 status (setting 1 to LED makes the light turn on. Be care that preset LED function might overwrite the value you set)
- Set and get digital output DO0~1 status (setting 1 to digital output closes DO_x_A and DO_x_B)
- Set and get digital output enable pin status (be care that output will only be effective when output enable pin is set to 1)
- Set mode and the termination resistor (RS-485 mode only) of `ttyS1`
- Set termination resistor of CAN bus (IGT-31D only)

7. Digital Input and Output

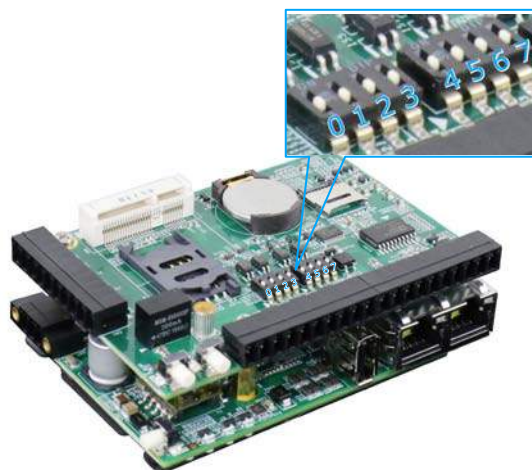
There are eight built-in isolated digital inputs and two digital outputs on IGT-30D and IGT-31D. These digital inputs and outputs are designed for industrial usage and are compatible with most commercial-on-the-shelf buttons, switches, indicators, etc.

7.1 Mode of Digital Inputs

A digital input is usually used to acquire the status of a device out of two expected states, usually named on or off. Though there are only two states, the types of signals could be diversified. In terms of current direction, these devices can be divided into 3 types and they are sink, source or dry contact.

A sinking digital output means current flows into the digital output when it is on, while a sourcing digital output means current flows out of the digital output. Most electric sensors, such as proximity sensors and photoelectric sensors fall into this two categories. Dry contact is an output type which is simply open or short, but polarity do not matter. Most mechanical switches, such as limit switch and buttons fall into this category.

The built-in digital input channels of IGT-30D and IGT-31D support all three types. By default the digital inputs are set to accept either sinking or sourcing outputs. To enable dry contact support, please set the dry contact mode switches (please refer to the illustration below) of the corresponding digital input channel to the “ON” position. Please only set it to the “ON” position if the digital input channel is connected to a dry contact output. Incorrect setting might damage the input channels.



Dip switches on the motherboard. To gain access, please refer to the mini PCIe installation section for system disassembly.

Starting from the dip switch closes to the SIM card slot.

Dip switch: 0 (correspond to X1.3)

Dip switch: 1 (correspond to X1.4)

Dip switch: 2 (correspond to X1.5)

Dip switch: 3 (correspond to X1.6)

Dip switch: 4 (correspond to X1.7)

Dip switch: 5 (correspond to X1.8)

Dip switch: 6 (correspond to X1.9)

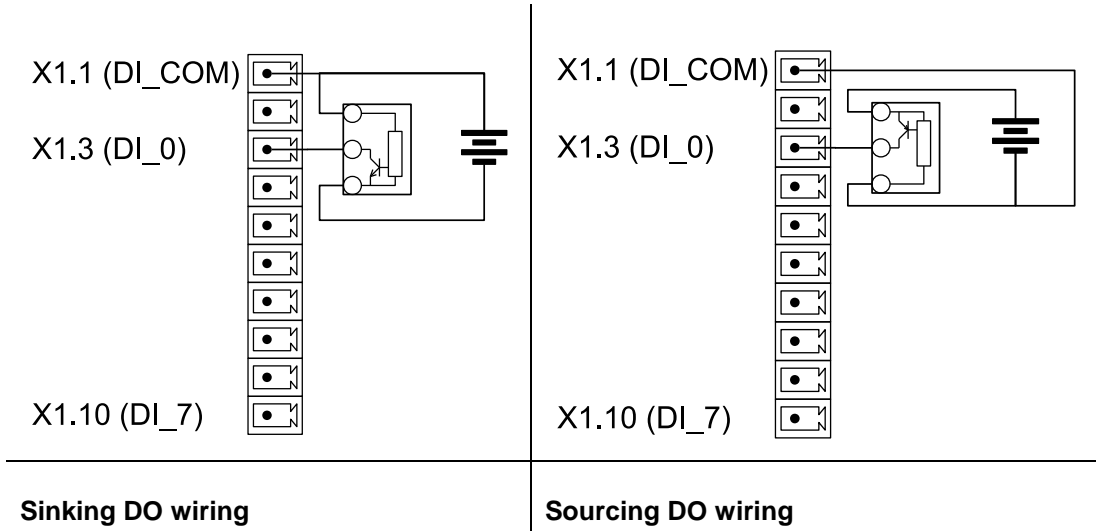
Dip switch: 7 (correspond to X1.10)

Please refer to [Digital Input](#)

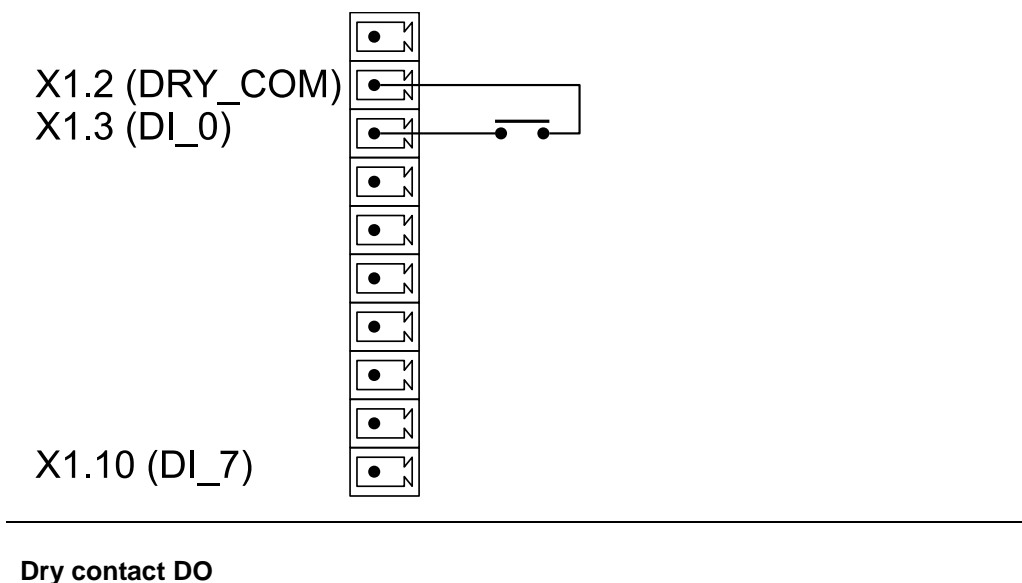
[Connector X1](#) for details.

7.2 Wiring of Digital Input

When the dry contact mode switch of each digital input channel is “OFF”, this digital input channel, along with the DI_COM, accepts either sinking or sourcing digital output signals. The following figure shows how to wire the digital output devices to the digital input channels.

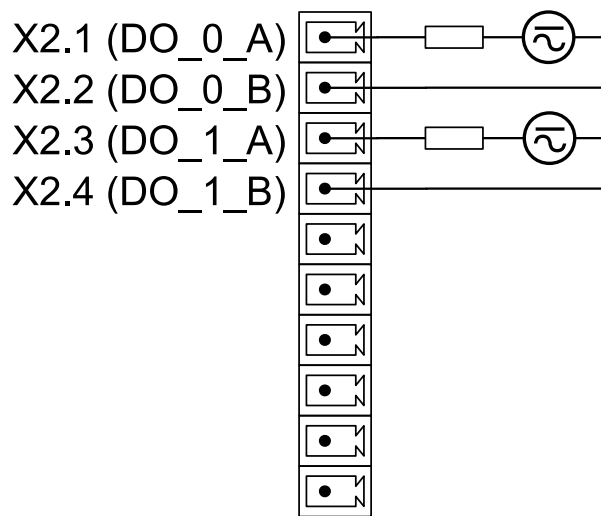


When the dry contact mode switch of each digital input channel is “ON”, this digital input channel, along with the DRY_COM, accepts dry contact digital output signals. The following figure shows how to wire the digital output devices to the digital input channels.



7.3 Wiring of Digital Output

The built-in digital output channels on IGT-30D and IGT-31D is designed with MOSFET SPST-NO relays. SPST-NO stands for single pole single throw and normally open. It works like dry contact mechanical relays. Turning the digital output channels on will “close” the circuit (polarity does not matter). The driving power source can be a DC power source as well as an AC one. The following figure shows how the load and external power sources are wired.



Appendix A

Sysfs Mapping

LEDs, User Buttons, Digital Input and Digital Output on IGT-30D support Linux sysfs. The section, [Utility Script](#) provides a quick access to these peripheral. However, integrated with users' own application, it's also possible to access to these peripherals via the mapped files. Please refer to the following table for mapping.

Category	Name	sysfs path	Supported Properties
LED	L0	/sys/class/leds/igt30::usr0	brightness
	L1	/sys/class/leds/igt30::usr1	invert
	L2	/sys/class/leds/igt30::usr2	trigger
	L3	/sys/class/leds/igt30::usr3	
	L4	/sys/class/leds/igt30::usr4	
	L5	/sys/class/leds/igt30::usr5	
Button	F0	/sys/class/gpio/gpio72	value
	F1	/sys/class/gpio/gpio73	active_low edge
D/I	DI0	/sys/class/gpio/gpio47	value
	DI1	/sys/class/gpio/gpio46	active_low
	DI2	/sys/class/gpio/gpio45	edge
	DI3	/sys/class/gpio/gpio44	
	DI4	/sys/class/gpio/gpio88	
	DI5	/sys/class/gpio/gpio87	
	DI6	/sys/class/gpio/gpio86	
	DI7	/sys/class/gpio/gpio4	
D/O	DO0	/sys/class/gpio/gpio74	value
	DO1	/sys/class/gpio/gpio75	active_low
	DO2	/sys/class/gpio/gpio76	
	DO3	/sys/class/gpio/gpio77	
	DO_EN	/sys/class/gpio/gpio71	