

Neosys Technology Inc.

IGT-30 Series Industrial Gateway

User Manual

Revision 1.2

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Legal Information

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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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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 |
| 1.1 | Aug. 2020 | Added IGT-33V/ IGT-34C |
| 1.2 | Sep. 2021 | Updated: <ul style="list-style-type: none">• IGT-33V analog voltage input wiring• IGT34C current input wiring |

1. Introduction

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

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), one RS-485 (IGT-33V/ 34C only) and a CAN bus port (IGT-31D only). In addition to the ports mentioned, there are built-in isolated digital input channels that accept discrete signals from various sensors or buttons/ switches. There are also 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.

1.1 IGT-30 Series Specifications

| | IGT-30D | IGT-31D | IGT-33V | IGT-34C | |
|------------------------------|--|------------------------------|--|---------|------------------------|
| Processor | Texas Instrument Sitara AM3352 1GHz Processor | | | | |
| Memory module | 1GB DDR3L SDRAM | | | | |
| 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 | | 1x software configurable RS-232/ 422/ 485 port 1x RS-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 2.0 A/ B | NA | NA | |
| Wireless expansion | mini PCIe (USB signal only) + internal SIM slot x1 | | | | |
| Digital input | 8x digital input channels | | 2x digital input channels | | |
| Input signal type | Dry contact/ sinking/ sourcing | | Dry contact/ sinking | | |
| Isolation voltage | 3750Vms | | | | |
| Logic "0" voltage | 11~24V | | | | |
| Logic "1" voltage | 0~1.5V | | | | |
| Digital output | 2x output channels | | 6x output channels | | |
| Output signal type | Sinking/ sourcing | | Sinking | | |
| Isolation voltage | 1500Vms | | | | |
| Rated driving current | 500mA | | | | |
| Rated driving voltage | 24 VDC/ VAC | | | | |
| Analog Input | N/A | | 8-ch | 4-ch | |
| Resolution | | | 16 bit | | |
| Input Range | | | 0-10V/ -5~5V/ -10~10V | | 4-20mA/ 0-20mA |
| Accuracy | | | ±0.1%, FSR @ 25°C | | ±0.3%, FSR @ 0°C, 60°C |
| Response Frequency | | | 100Hz (10ms) all channels | | |
| DC Input Range | | | 12 ~ 25 VDC | | |

2. System Overview

Upon receiving and unpacking your IGT-30 series 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 Neousys Technology.

2.1 IGT-30 Series Packing List

| System Item | IGT-30 series | Qty |
|----------------|------------------------|-----|
| 1 | IGT-30 series | 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 |

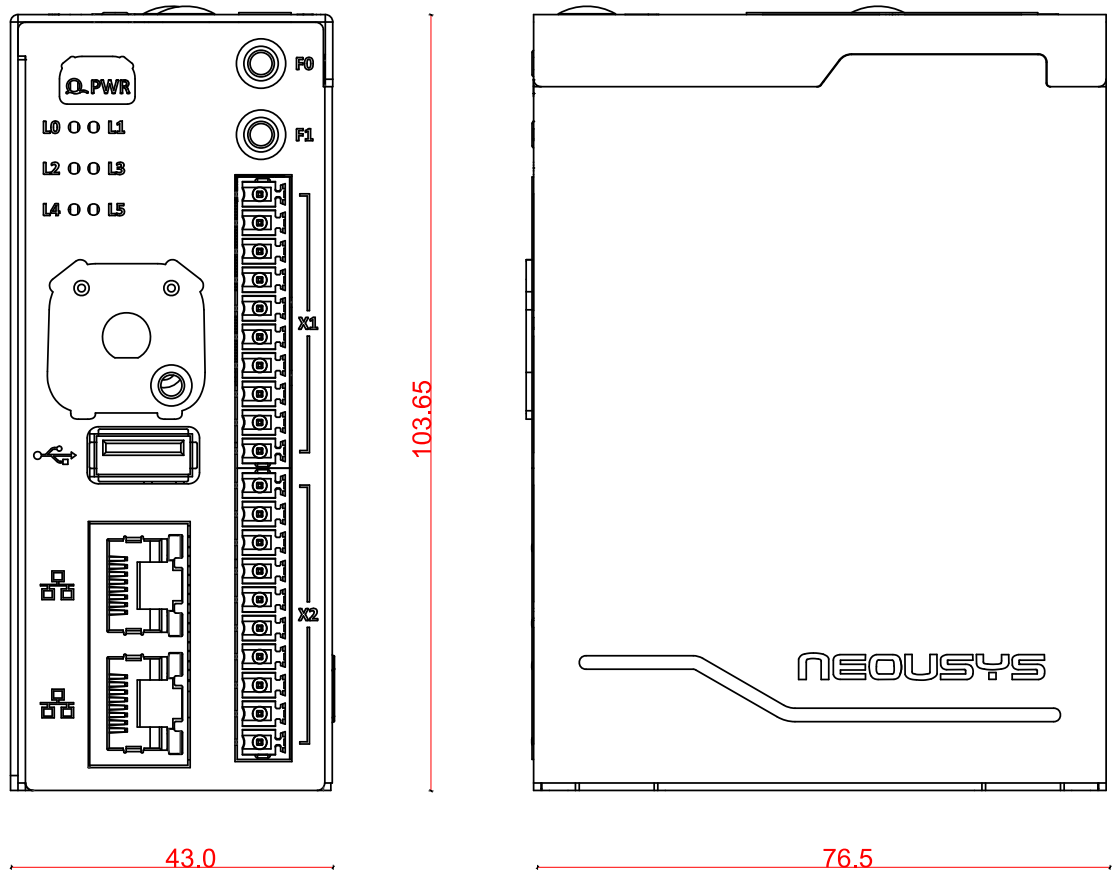


NOTE

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.

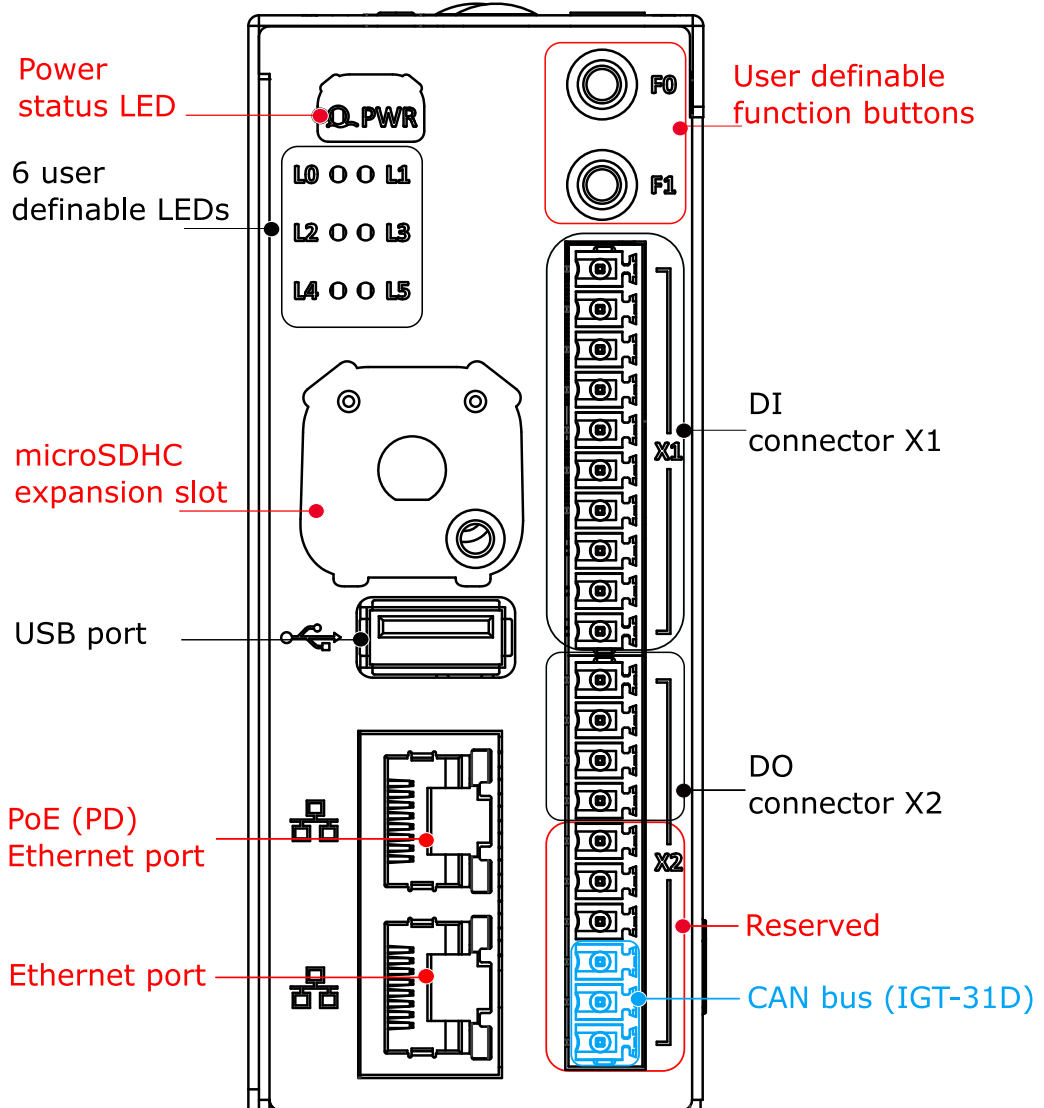
2.2 Enclosure Dimensions

Neosys IGT-30 series 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.



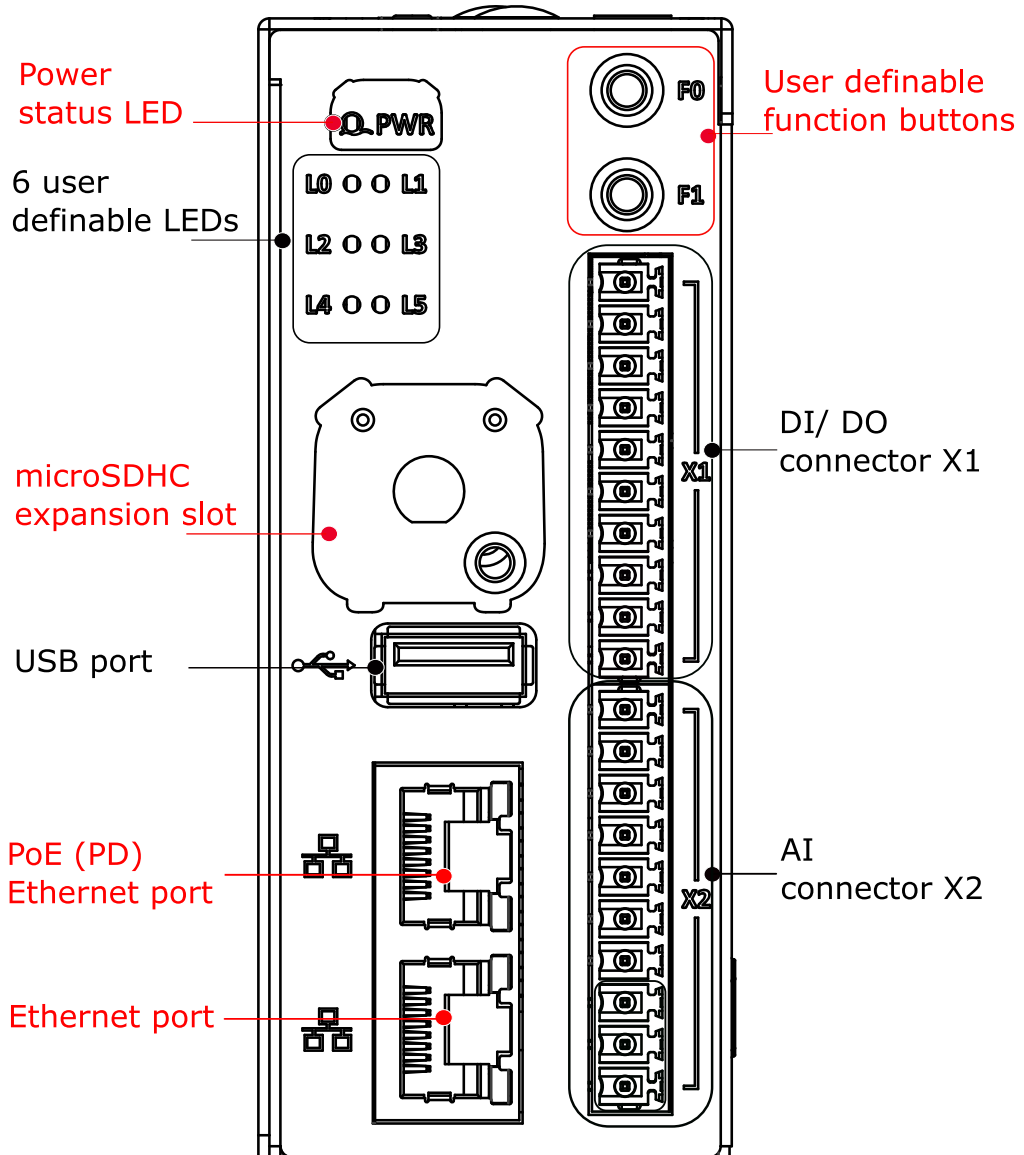
2.3 IGT-30D/ IGT-31D Front Panel

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, console port, DI/ DO connectors, CAN bus (IGT-31D) and reserved ports.



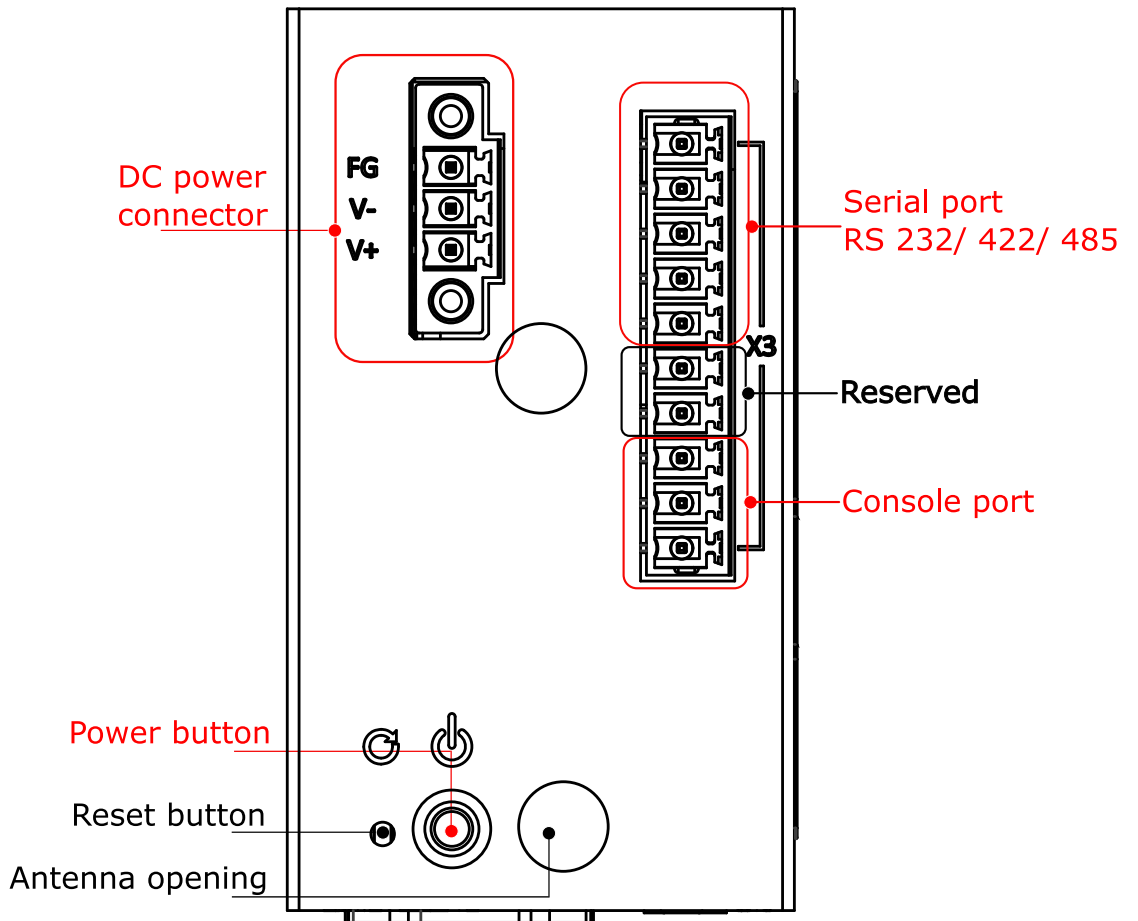
2.4 IGT-33V/ IGT-34C Front Panel

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, console port, DI/ DO connectors and analog input (AI) connectors.



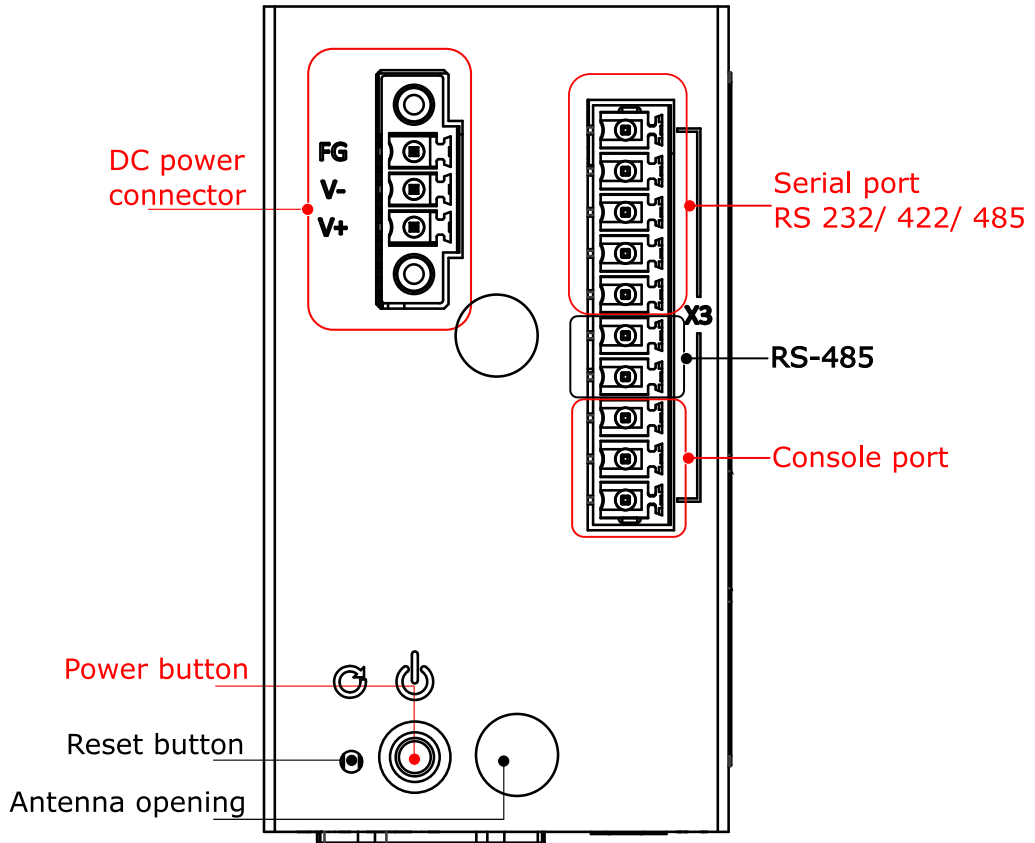
2.5 IGT-30D/ IGT-31D Top Panel

Top of the enclosure features a 3-pin DC power connector, 1x RS-232/ 422/ 485, console port, power button, reset button and an antenna opening.



2.6 IGT-33V/ IGT-34C Top Panel

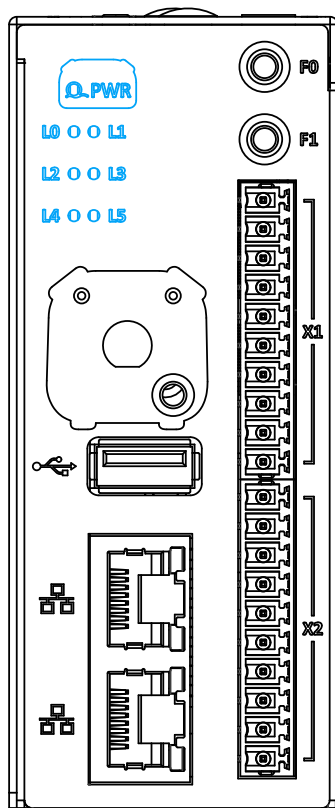
Top of the enclosure features a 3-pin DC power connector, 1x RS-232/ 422/ 485, 1x RS-485, console port, power button, reset button and an antenna opening.



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.

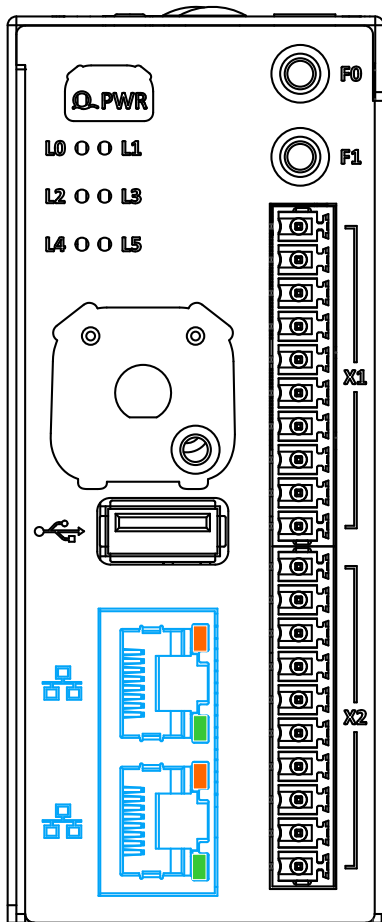
3.1 Power & System Status LED



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



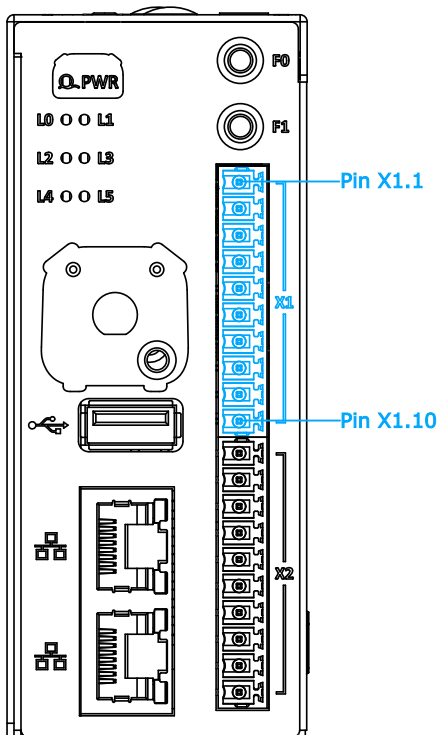
The Ethernet port provides network connectivity. In addition to the console port, it is one of the two ports that may be used for system's initialization. The LED status indicator light functions are described as below.

| 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-30 series, 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.

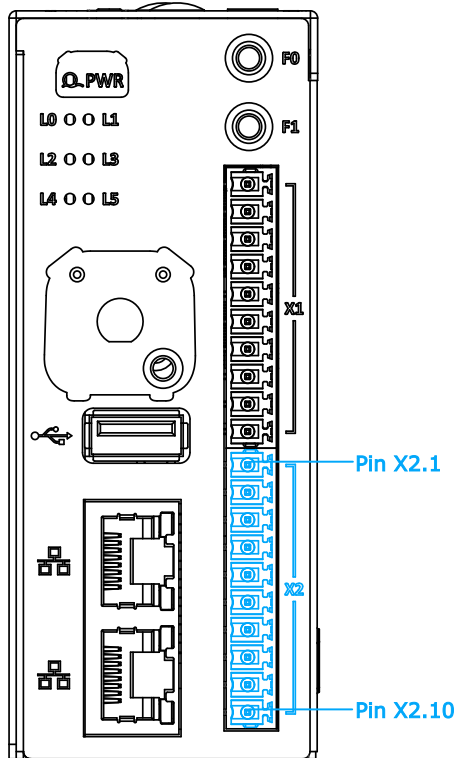
IGT-30D/ IGT-31D X1 Pin Definition

| 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 |

IGT-33V/ IGT-34C X1 Pin Definition

| Pin | Channel | Description | Pin | Channel | Description |
|------|---------|------------------|-------|---------|------------------|
| X1.1 | DI_COM | Common of DI | X1.6 | DO_1 | Digital output 1 |
| X1.2 | DI_0 | Digital input 0 | X1.7 | DO_2 | Digital output 2 |
| X1.3 | DI_1 | Digital input 0 | X1.8 | DO_3 | Digital output 3 |
| X1.4 | DO_GNG | GND of DO | X1.9 | DO_4 | Digital output 4 |
| X1.5 | DO_0 | Digital output 0 | X1.10 | DO_5 | Digital output 5 |

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.

IGT-30D/ IGT-31D X2 Pin Definition

| Pin | Channel | Description | Pin | Channel | Description |
|------|----------|-------------------------------|-------|----------|--|
| X2.1 | DO_0_A | Digital output 0 | X2.6 | Reserved | Reserved pin. Please keep it unconnected |
| X2.2 | DO_0_B | | | | |
| X2.3 | DO_1_A | Digital output 1 | X2.8 | CAN+ | CAN High signal (IGT-31D only) |
| X2.4 | DO_1_B | | X2.9 | CAN- | CAN Low signal (IGT-31D only) |
| X2.5 | Reserved | Reserved pin. Do not connect. | X2.10 | CAN_GND | CAN ground (IGT-31D only) |

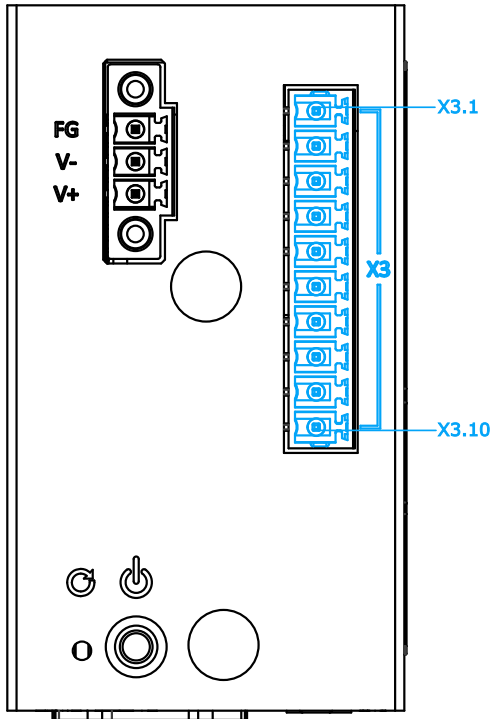
IGT-33V X2 Pin Definition

| Pin | Channel | Description | Pin | Channel | Description |
|-------|---------|---------------|------|---------|---------------|
| X2.1 | GND_VI | GND | X2.6 | GND_VI | GND |
| X2.2 | VI0 | Voltage input | X2.7 | VI4 | Voltage input |
| X2.3 | VI1 | | | | |
| X2.4 | VI2 | | | | |
| X2.5 | VI3 | | | | |
| X2.10 | VI7 | | | | |

IGT-34C X2 Pin Definition

| Pin | Channel | Description | Pin | Channel | Description |
|-------|---------|----------------------|------|---------|----------------------|
| X2.1 | GND_CI | GND | X2.6 | GND_CI | GND |
| X2.2 | CI0+ | Current Input 0,1 | X2.7 | CI2+ | Current Input 2,3 |
| X2.3 | CI0- | | | | |
| X2.4 | CI1+ | | | | |
| X2.5 | CI1- | | | | |
| X2.10 | CI3- | | | | |

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.

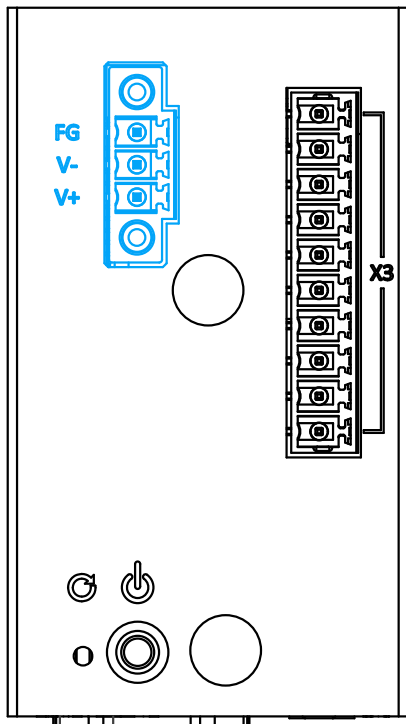
IGT-30D/ IGT-31D X3 Pin Definition

| 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. | | |

IGT-33V/ IGT-34C Pin Definition

| 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. | | |
| X3.6 | Data+ | Data+ of ttyS2 | | |
| X3.7 | Data- | Data- of ttyS2 | | |
| 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. | | |

4.4 DC Connector Definition



The DC connector also locates at the top of the system.

DC Connector Pin

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



WARNING

Please pay attention to the polarity and make sure it is connected correctly.

5. System Setup

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

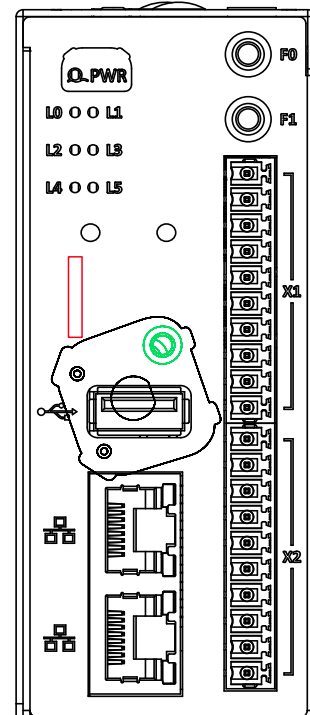
- It is recommended that only qualified service personnel should install and service this product to avoid injury.
- During the process, please observe all ESD procedures to avoid damaging the equipment.
- For internal, external microSDHC installation or replacement, make sure the system has powered off.
- Before disassembling your system, please make sure the system has powered off with all cables (power, video, data, etc.) and antenna 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.



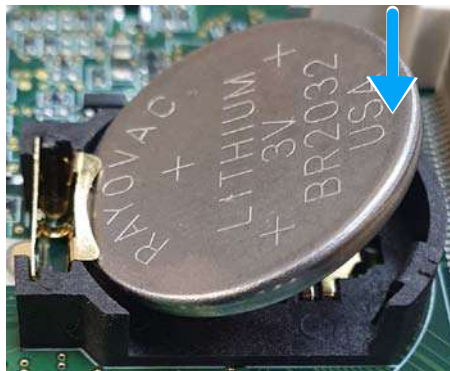
4. Once you have removed the cover, unfasten two screws that secure the PCBA in the enclosure.



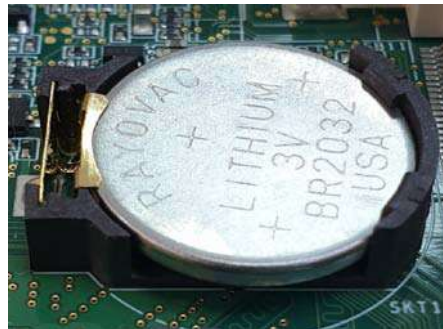
5. Gently pull the PCBA out of the enclosure to access the battery and microSDHC slot.



6. To install the battery, insert the batter 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



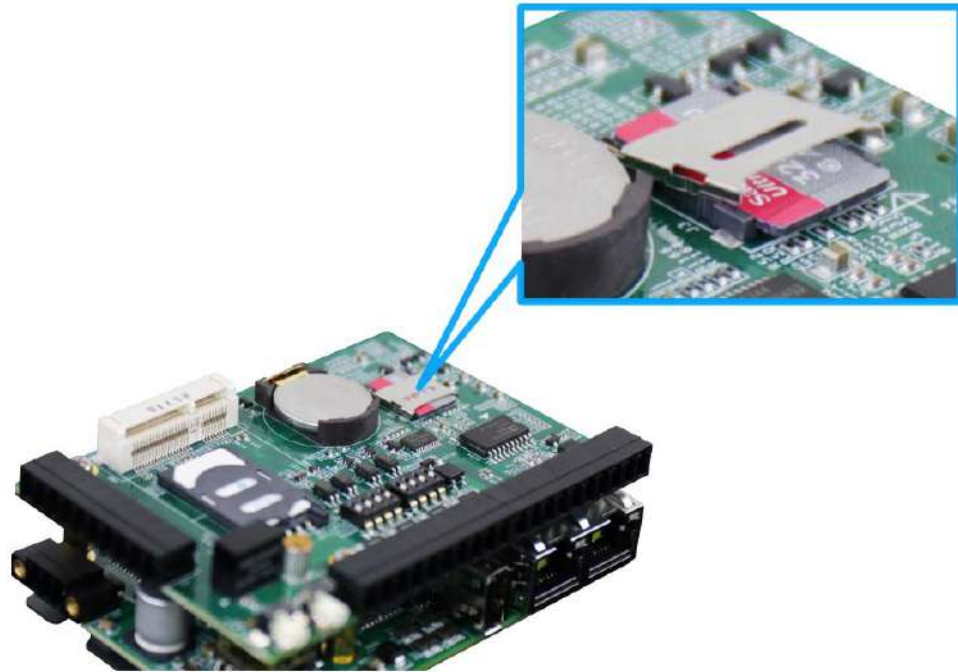
Battery clipped into place



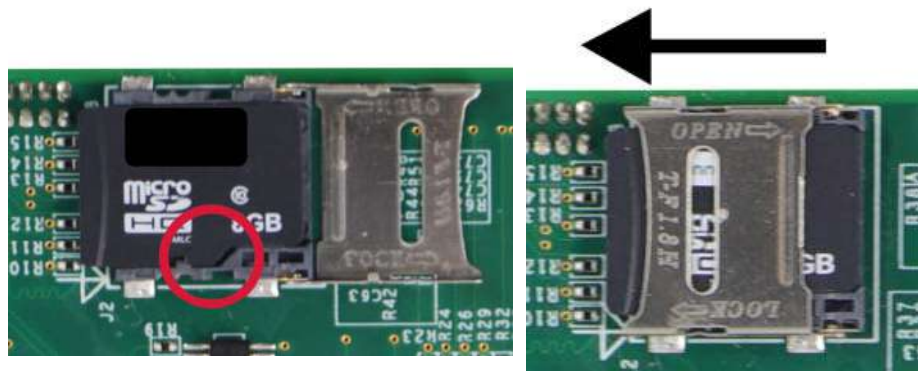
NOTE

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 mini PCIe Installation

To access the mini PCIe 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 mini PCIe 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 mini PCIe module's antenna (please refer to the module's user manual on antenna cable connection).



NOTE

Please note how the antenna 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

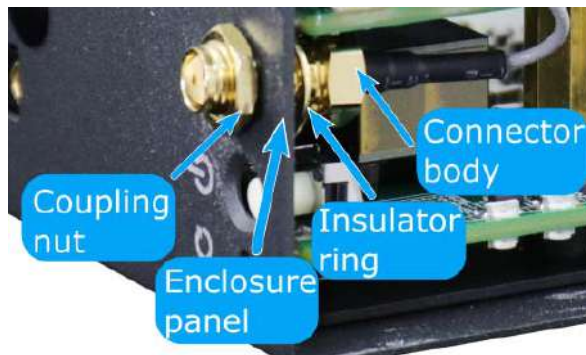
11. Secure the PCBA onto the enclosure by fastening the two screws.



- Remove the antenna 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

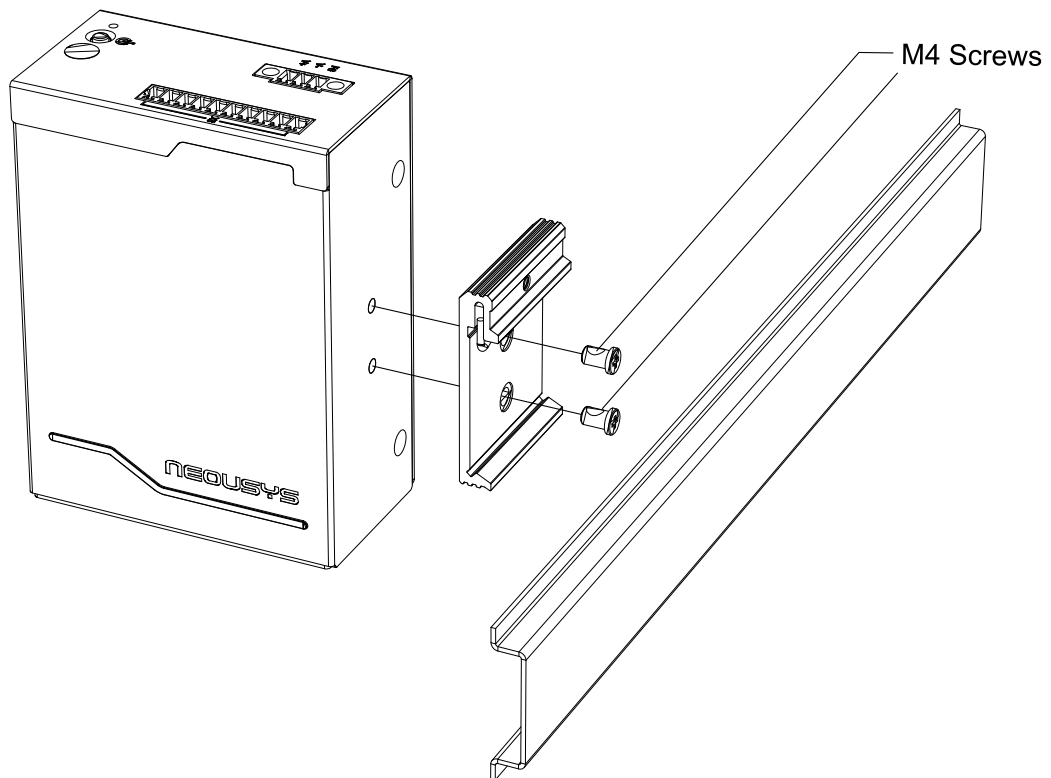
- Install the antenna to complete the installation.



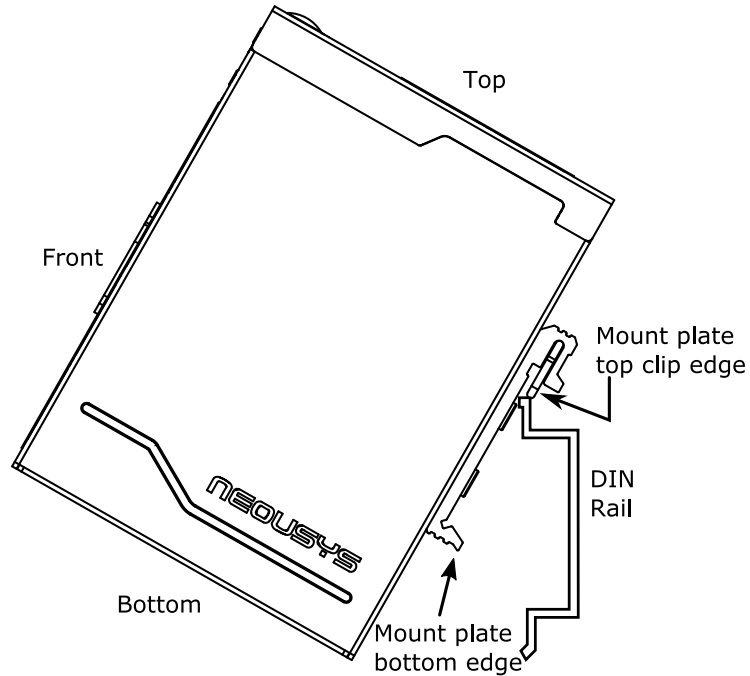
5.4 DIN Rail Installation

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.

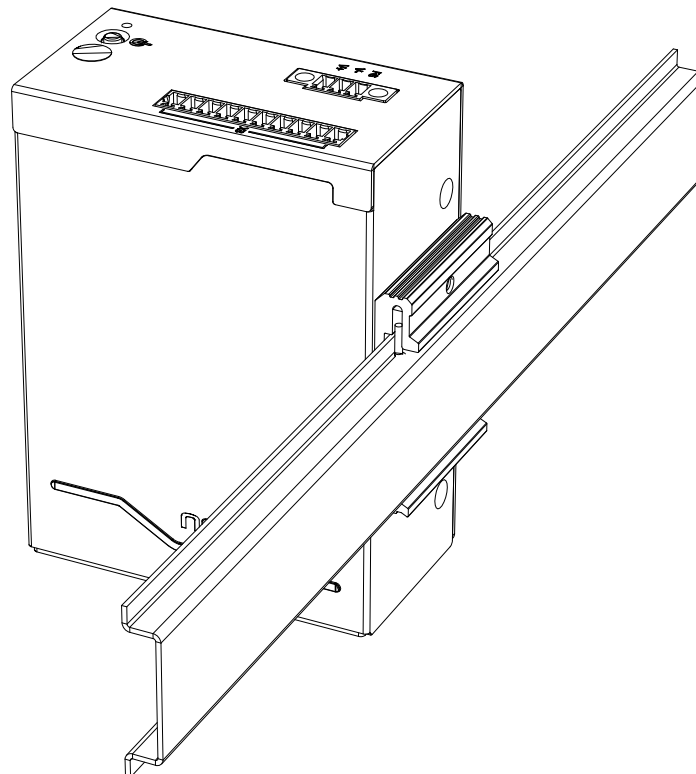
1. To install, secure the mount plate onto the rear of the system enclosure using the M4 screws provided.



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.



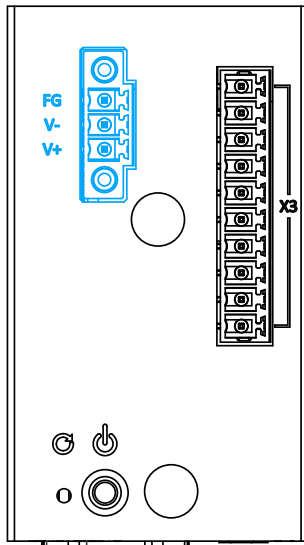
5.5 Powering-on the System

IGT-30 series features two modes to power the system, DC input and Power Device (PD) mode.

5.5.1 DC Input

To power the system via the DC input, please refer to the following procedure:

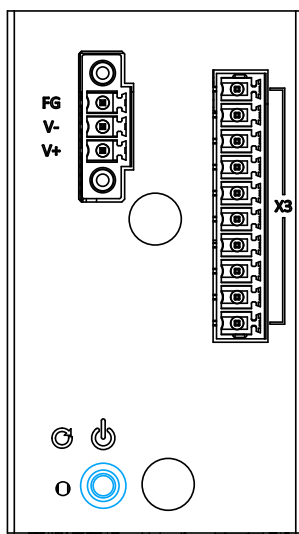
1. Connect and plug in the 3-pole terminal block.



 **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!

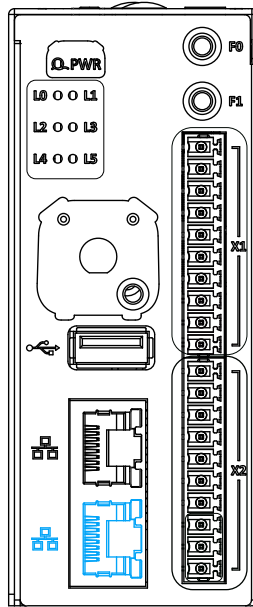
2. Press the power button to turn on the system.



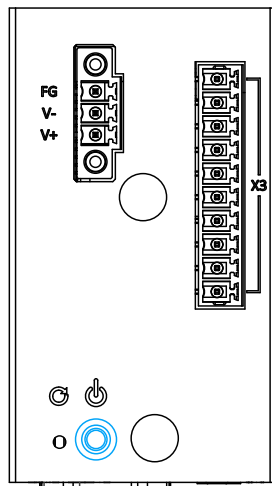
5.5.2 Power Device Mode

To power the system in Power Device (PD) mode, please make sure you have done the following:

1. Connect and plug in the PD Ethernet port.



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



 **WARNING**


If you connect both DC power and PSE (PD mode), please make sure your DC and PSE are isolated. Sharing the same GND will damage the system!

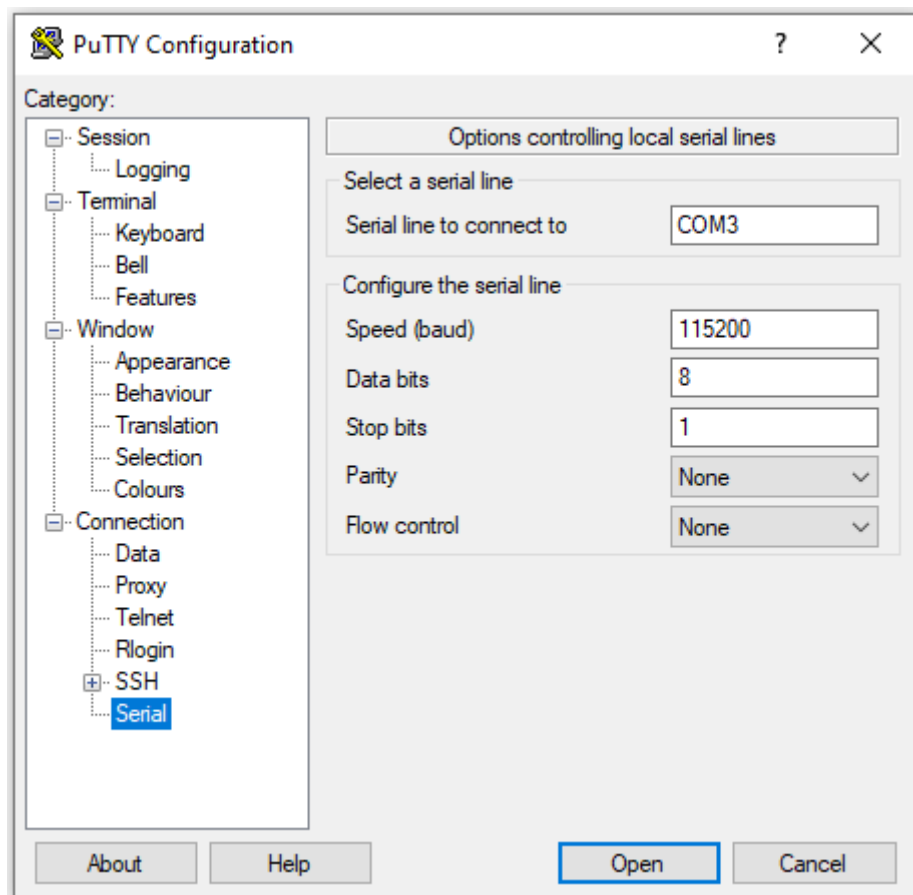
6. Initial Login

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 method two is by connecting to the Ethernet port of IGT-30 and access via a SSH-supported terminal application such as PuTTY.

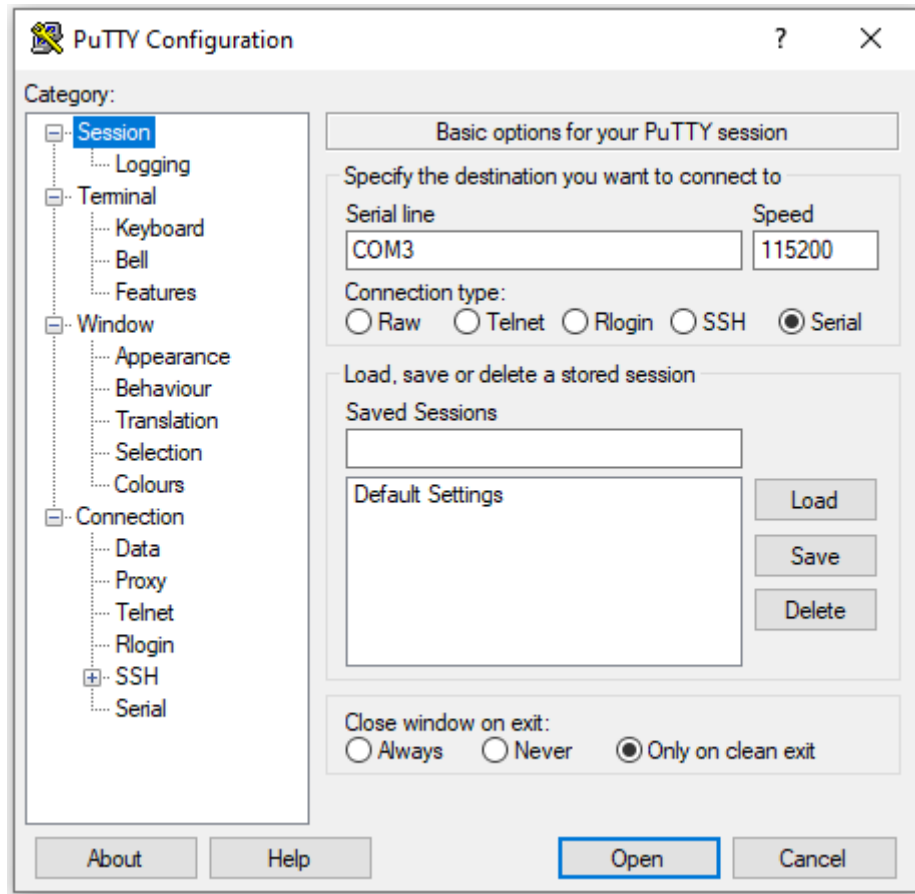
6.1 Login via Console Port

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](#).

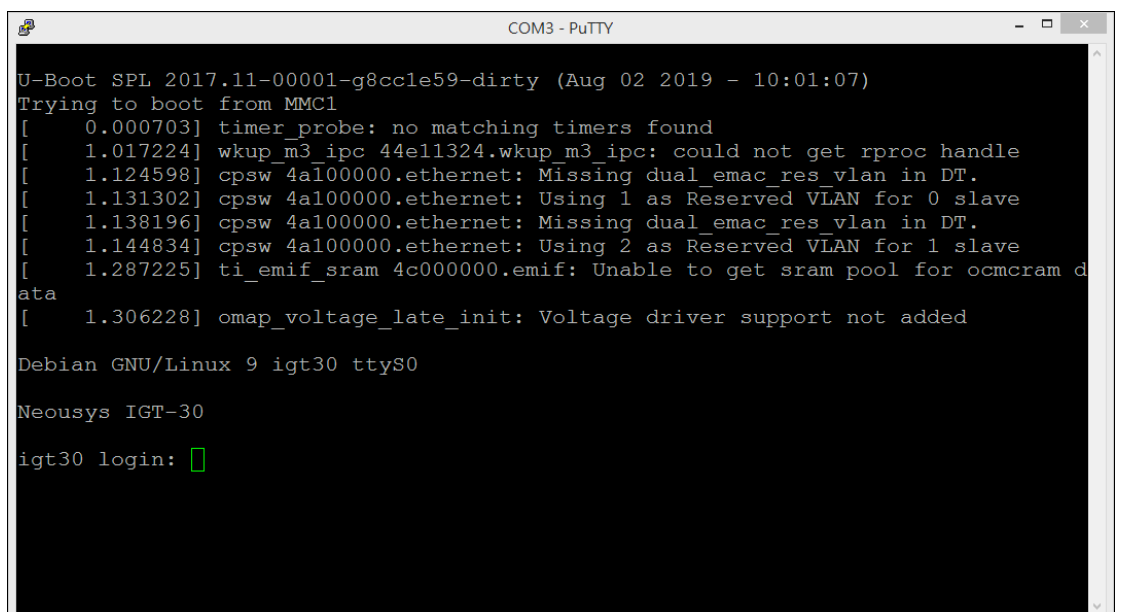
1. Right click on  putty.exe , click on "Run as administrator" to bring up the PuTTY Configuration window.
2. Go to Category > Serial, enter the COM port you connected your host computer to IGT-30 and enter the following parameters:



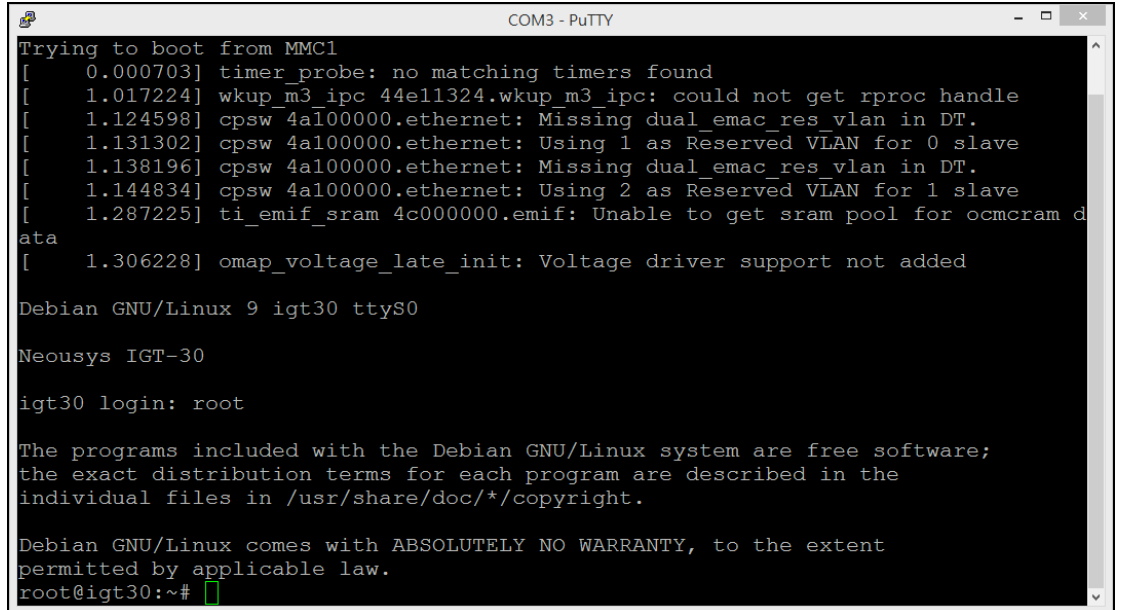
- Go back to Category > Session, select Serial and it should bring up the parameters set in the previous step. Click on Open when ready.



- 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:~#
```

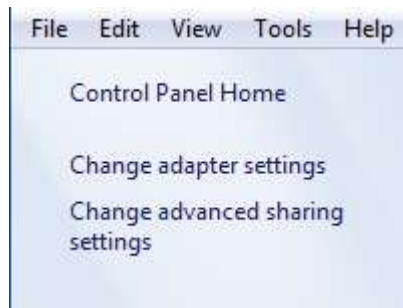
**NOTE**


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

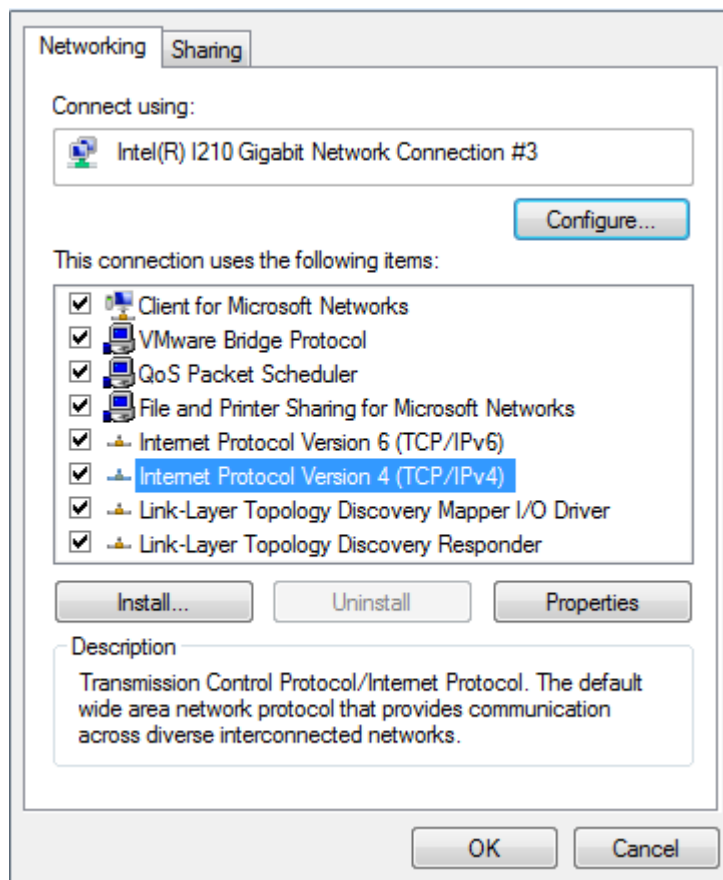
6.2 Login via Ethernet

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”.



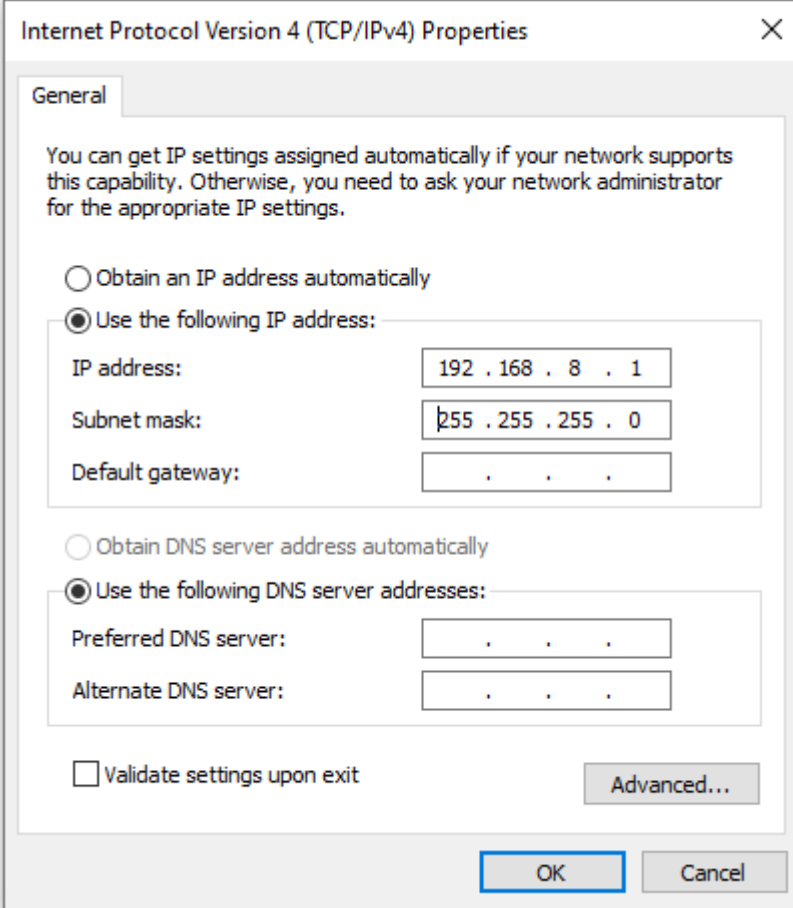
2. Right click the Ethernet adapter that has established a connection with IGT-30, click on properties and double click on  Internet Protocol Version 4 (TCP/IPv4).



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: 225 . 255 . 255 . 0

Default gateway: . . .

Obtain DNS server address automatically

Use the following DNS server addresses:


Preferred DNS server: . . .

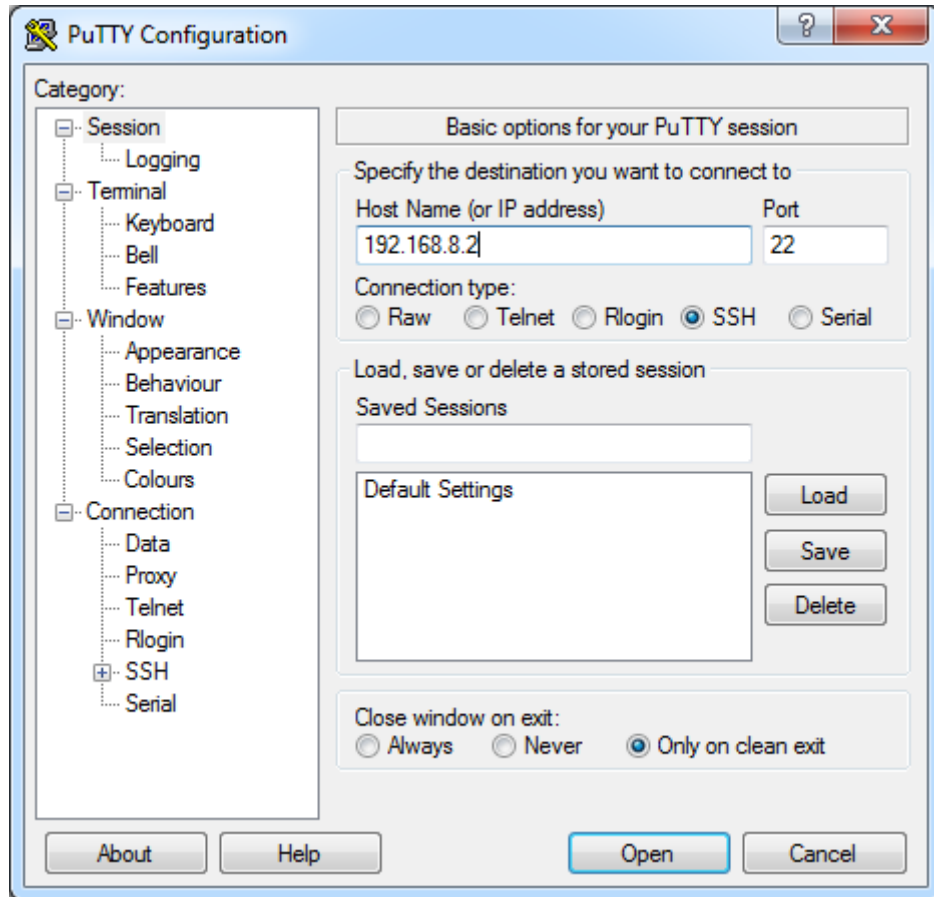
Alternate DNS server: . . .

Validate settings upon exit

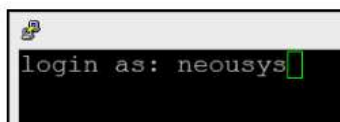
Advanced...

OK Cancel

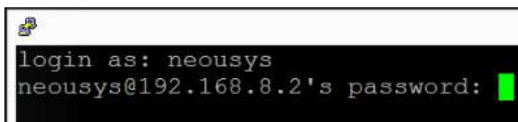
- Power on IGT-30 and right click on  `putty.exe`, click on “Run as administrator” to bring up the PuTTY Configuration window. Under “Session” category, select SSH, enter 192.168.8.2 as the destination you want to connect to. Click on Open when ready.



- 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**

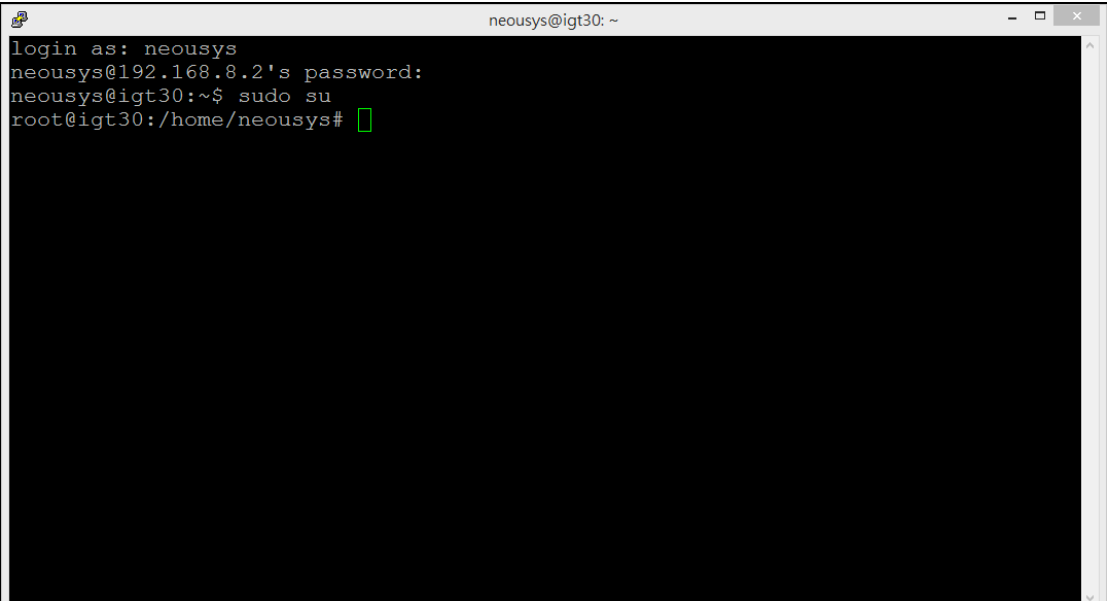
Please remember to change the default password “29169532” to one that you prefer for security purposes.

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

A terminal window titled 'neosys@igt30: ~' with a black background. The text displayed is: 'login as: neosys', 'neosys@192.168.8.2's password:', and 'neosys@igt30:~\$ sudo su' with a green cursor at the end of the command.

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

- The root prompt should appear

A terminal window titled 'neosys@igt30: ~' with a black background. The text displayed is: 'login as: neosys', 'neosys@192.168.8.2's password:', 'neosys@igt30:~\$ sudo su', and 'root@igt30:/home/neosys#' with a green cursor at the end of the prompt.

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

6.3 Utility Script

There is a built-in script named IGT-30, 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 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 status 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)

For detail descriptions, please refer to [Appendix B](#).

7. Digital Input and Output

7.1 IGT-30D/31D

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 off-the-shelf buttons, switches, indicators, etc.

7.1.1 Mode of Digital Inputs

A digital input is usually used to acquire the status of a device via two expected states, usually ON or OFF. Though there are only two states, the types of signals could be diversified. In terms of current signal, it 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. Source or 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 (dry contact) 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)

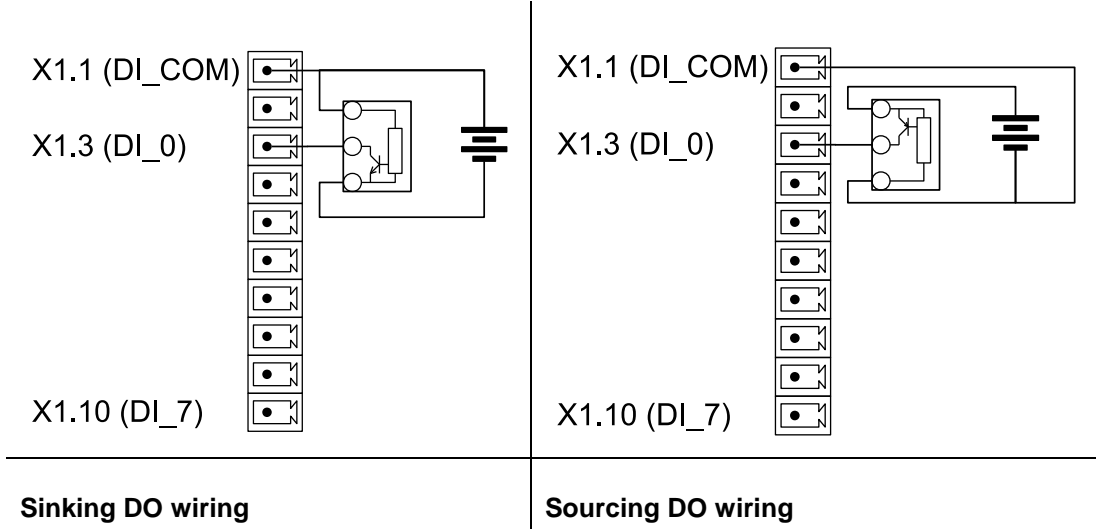
Dip switch: 7 (correspond to X1.10)

Please refer to [Digital Input](#)

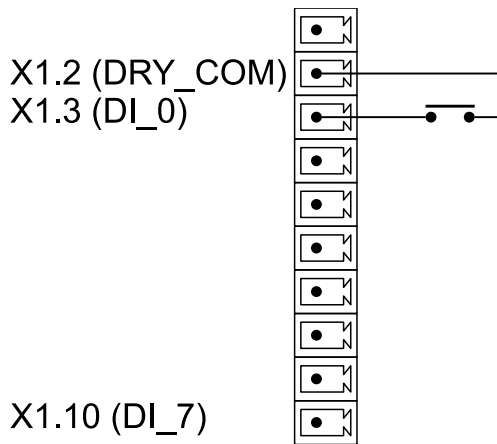
[Connector X1](#) for details.

7.1.2 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.



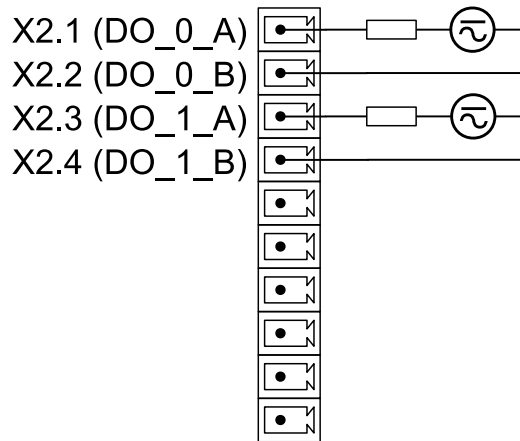
When the dry contact mode switch of each digital input channel is “ON”, this digital input channel, along with the DRY_COM, accepts dry contact digital output signals. The following figure shows how to wire the digital output devices to the digital input channels.



Dry contact DO

7.1.3 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.

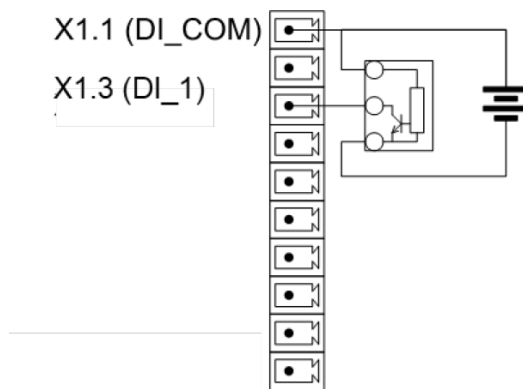


7.2 IGT-33V/ 34C

There are two built-in isolated digital inputs and six digital outputs on IGT-33V and IGT-34C. These digital inputs and outputs are designed for industrial usage and are compatible with most commercial off-the-shelf buttons, switches, indicators, etc.

7.2.1 Wiring of Digital Input

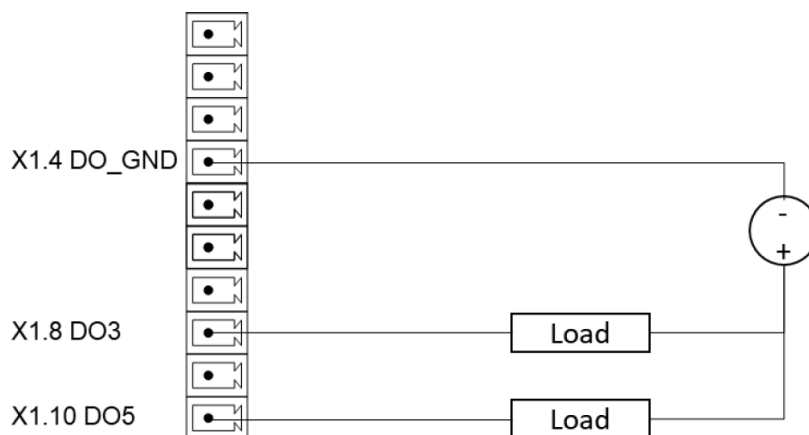
The following figure shows how to wire the digital output devices to the digital input channels.



Sinking DI wiring

7.2.2 Wiring of Digital Output

The built-in digital output channels on IGT-33V and IGT-34C 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 following figure shows how the load and external power sources are wired.



8. Analog Input

These digital inputs and outputs are designed for industrial usage and are compatible with most commercial off-the-shelf buttons, switches, indicators, etc.

8.1 IGT-33V

There are eight 16-bit single-ended isolated voltage inputs for IGT-33V. The voltage inputs are designed for 0-10V. The range and data format can be adjusted by software.

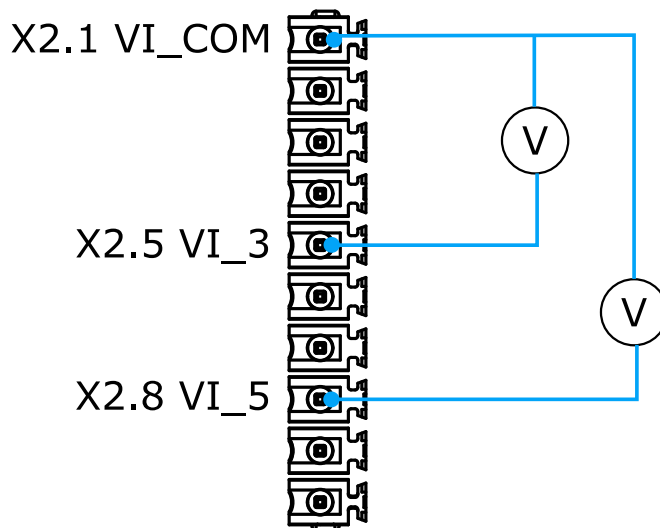
8.1.1 Voltage Input

The IGT-33V/ 34C include an “ilbgt.so” shared library to facilitate user program, you can config and control analog input signal depend IGT analog input function group. Please refer to [Appendix C](#) for IGT-33V/ 34C API functions.

| | Range description | Note |
|--------------------|-------------------------------------|-------------------------------------|
| Input range | 0~10V (default) -10~10V -5~5V | Switch by IGT_AI_Config |
| Data format | 0~65536 -32768~32767 Decimal | The unit of decimal format is Volt. |

8.1.2 Wiring of Voltage Input

IGT-33V support 8-ch single ended 0~10V/ -10~10V/ -5~5V voltage input, the following figure shows how to wire the voltage input channels.



8.2 IGT-34C

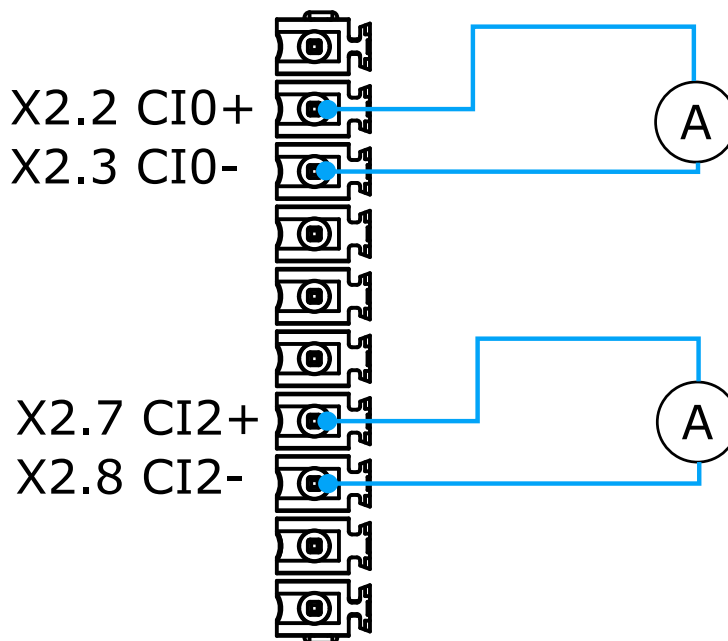
8.2.1 Mode of Current Input

There are four 16-bit isolated current inputs for IGT-34C. The current inputs are designed for 4-20 mA. You can switch the measure range and data format by software.

| | Range description | Note |
|--------------------|---------------------------------|-----------------------------------|
| Input range | 4~20 mA (default) 0~20 mA | Switch by IGT_AI_Config |
| Data format | 0~65536 -32768~32767 Decimal | The unit of decimal format is mA. |

8.2.2 Wiring of Current Input

IGT-34C support 4-ch 4~20mA / 0-20mA current input, the following figure shows how to wire in the current input channels.



Appendix A Sysfs Mapping

LEDs, User Buttons, Digital Input and Digital Output on IGT-30 series 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.

IGT-30D

| 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 |
| | DO_EN | /sys/class/gpio/gpio71 | |

IGT-31D

| Category | Name | sysfs path | Supported Properties |
|----------|-------|-----------------------------|----------------------|
| LED | L0 | /sys/class/leds/igt31::usr0 | brightness |
| | L1 | /sys/class/leds/igt31::usr1 | invert |
| | L2 | /sys/class/leds/igt31::usr2 | trigger |
| | L3 | /sys/class/leds/igt31::usr3 | |
| | L4 | /sys/class/leds/igt31::usr4 | |
| | L5 | /sys/class/leds/igt31::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 |
| | DO_EN | /sys/class/gpio/gpio71 | |

IGT-33V

| Category | Name | sysfs path | Supported Properties |
|----------|-------|-----------------------------|----------------------|
| LED | L0 | /sys/class/leds/igt33::usr0 | brightness |
| | L1 | /sys/class/leds/igt33::usr1 | invert |
| | L2 | /sys/class/leds/igt33::usr2 | trigger |
| | L3 | /sys/class/leds/igt33::usr3 | |
| | L4 | /sys/class/leds/igt33::usr4 | |
| | L5 | /sys/class/leds/igt33::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 edge |
| D/O | DO0 | /sys/class/gpio/gpio74 | value |
| | DO1 | /sys/class/gpio/gpio75 | active_low |
| | DO2 | /sys/class/gpio/gpio87 | |
| | DO3 | /sys/class/gpio/gpio86 | |
| | DO4 | /sys/class/gpio/gpio45 | |
| | DO5 | /sys/class/gpio/gpio44 | |
| | DO_EN | /sys/class/gpio/gpio71 | |

IGT-34C

| Category | Name | sysfs path | Supported Properties |
|----------|-------|-----------------------------|----------------------|
| LED | L0 | /sys/class/leds/igt34::usr0 | brightness |
| | L1 | /sys/class/leds/igt34::usr1 | invert |
| | L2 | /sys/class/leds/igt34::usr2 | trigger |
| | L3 | /sys/class/leds/igt34::usr3 | |
| | L4 | /sys/class/leds/igt34::usr4 | |
| | L5 | /sys/class/leds/igt34::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 edge |
| D/O | DO0 | /sys/class/gpio/gpio74 | value |
| | DO1 | /sys/class/gpio/gpio75 | active_low |
| | DO2 | /sys/class/gpio/gpio87 | |
| | DO3 | /sys/class/gpio/gpio86 | |
| | DO4 | /sys/class/gpio/gpio45 | |
| | DO5 | /sys/class/gpio/gpio44 | |
| | DO_EN | /sys/class/gpio/gpio71 | |

Appendix B Utility Script

IGT-30 Series features a software tool for users to remote/ control the system IO state by simply entering your device name (eg. igt33).

For example, if your device is IGT-33, type

```
neousys@igt33:~$ igt33 -h
```

to get tool's help information.

```
neousys@igt33:~$ igt33 -h
```

```
Version: 20191031
```

```
Usage: igt33 <function> [<mode>]
```

Assign <mode> to <function>. If <mode> is ignored, current status of <function> is returned. Available <function> and <mode> are listed below:

```
igt33 btn[0|1]
```

```
igt33 ai[0-7]
```

```
igt33 di[0-1]
```

```
igt33 led[0-5] _ [<0|1>]
```

```
igt33 do[0-5] _ [<0|1>]
```

```
igt33 do en _ [<0|1>]
```

```
igt33 ttys[1] _ [<232|422|485|fast|slow|open|close>]
```

Button State Monitor

IGT-30 series has two user definable buttons to suit your application needs.

You can type

```
igt33 btn[0|1]
```

to monitor the defined button status.

```
neousys@igt33:~$ igt33 btn0
```

```
btn0: 1
```

```
neousys@igt33:~$ igt33 btn1
```

```
btn1: 0
```

```
neousys@igt33:~$
```

Analog Input monitor

IGT-33V/ IGT-34C have supply 8/ 4-ch voltage/current input channels to suit your application needs.

You can type

```
igt33 ai[0-7]
```

to monitor the analog input signal (unit of IGT-33: Volt, IGT-34: mA).

```
neousys@igt33:~$ igt33 ai0
```

```
0.293371
```

```
neousys@igt33:~$ igt33 ai1
```

```
0.292295
```

```
neousys@igt33:~$ igt33 ai2
```

```
0.293905
```

```
neousys@igt33:~$ igt33 ai3
```

```
0.293133
```

```
neousys@igt33:~$ igt33 ai4
```

```
0.292620
```

```
neousys@igt33:~$ igt33 ai5
```

```
0.295153
```

```
neousys@igt33:~$ igt33 ai6
```

```
0.294101
```

```
neousys@igt33:~$ igt33 ai7
```

```
0.293860
```


Digital Input Monitor

IGT-33V/ IGT-34C have supply 2 digital input channels to suit your application needs.

You can type

```
igt33 di[0-1]
```

to monitor the digital input signal.

```
neousys@igt33:~$ igt33 di0
```

```
di0: 1
```

```
neousys@igt33:~$ igt33 di1
```

```
di1: 1
```

```
neousys@igt33:~$
```

User Definable LED

IGT-33V/ IGT-34C have six digital input channels to suit your application needs.

You can type

```
igt33 led[0-5] [<0|1>]
```

to monitor the digital input signal.

```
neousys@igt33:~$ igt33 led0
```

```
LED0: 0
```

```
neousys@igt33:~$ igt33 led1
```

```
LED1: 0
```

```
neousys@igt33:~$ igt33 led2
```

```
LED2: 0
```

```
neousys@igt33:~$ igt33 led3
```

```
LED3: 0
```

```
neousys@igt33:~$ igt33 led4
```

```
LED4: 0
```

```
neousys@igt33:~$ igt33 led5
```

```
LED5: 0
```

Digital Output Control/ Monitor

IGT-33V/ IGT-34C have six digital output channels to suit your application needs. The DO ports must be enabled before it can be used.

You can type

```
igt33 do_en [<0|1>]
```

to enable/disable DO ports.

```
neousys@igt33:~$ igt33 do_en 1  
set do_en to high  
neousys@igt33:~$ igt33 do_en 0  
set do_en to low
```

Once digital output ports are enabled, you can use the command tool

```
igt33 do[0-5] [<0|1>]
```

to control/ monitor the DO signal.

```
neousys@igt33:~$ igt33 do0 1  
set do0 to high  
neousys@igt33:~$ igt33 do1 1  
set do1 to high  
neousys@igt33:~$ igt33 do2 1  
set do2 to high  
neousys@igt33:~$ igt33 do3 1  
set do3 to high  
neousys@igt33:~$ igt33 do4 0  
set do4 to low  
neousys@igt33:~$ igt33 do5 0  
set do5 to low
```

RS-232/ 422/ 485 Switch

IGT-33V/ IGT-34C have one RS-232/422/485 serial port for connection.

You can type

```
igt33 ttys[1] [<232|422|485 >]
```

to switch your RS-port type.

```
neousys@igt33:~$ igt33 ttys1 232
set ttys1 mode1 to low
set ttys1 mode0 to high
set ttyS1 to RS-232
neousys@igt33:~$ igt33 ttys1 422
set ttys1 mode1 to high
set ttys1 mode0 to high
set ttyS1 to RS-422
neousys@igt33:~$ igt33 ttys1 485
set ttys1 mode1 to high
set ttys1 mode0 to low
set ttyS1 to RS-485
```

If your IGT-30 series is connected on the terminal of RS-485 network, you can type

```
igt33 ttys[1] [<open|close>]
```

to enable/ disable terminal resistant.

```
neousys@igt33:~$ igt33 ttys1 open
set ttys1 term to low
neousys@igt33:~$ igt33 ttys1 close
set ttys1 term to high
```

Appendix C Analog Function

| | | |
|-------------|--|---|
| Syntax | int32_t IGT_AI_Config(uint32 AnalogType, uint32 InputStyle, uint32_t Timeout); | |
| Description | Config IGT D/B behavior | |
| Argument | Function | Description |
| | AnalogType | Voltage Input IGT_AI_TYPE_VOLTAGE |
| | | Current Input IGT_AI_TYPE_CURRENT |
| | Function | Description |
| | InputStyle | Voltage Input Range 0~10 V IGT_AI_VOLTAGE_STYLE_DEFAULT |
| | | Voltage Input Range -0~10 V IGT_AI_VOLTAGE_STYLE_FULLSCALE |
| | | Voltage Input Range -5~5 V IGT_AI_VOLTAGE_STYLE_HALFSCALE |
| | | Current Input Range 4~20 mA IGT_AI_CURRENT_STYLE_DEFAULT |
| | | Current Input Range 0~20 mA IGT_AI_CURRENT_STYLE_FULLSCALE |
| | Function | Description |
| Timeout | Time out in microsecond(μ s) | |

| | |
|-------------|-----------------------------|
| Syntax | int32_t IGT_AI_Enable(void) |
| Description | Enable IGT AI function |

| | |
|-------------|------------------------------|
| Syntax | int32_t IGT_AI_Disable(void) |
| Description | Disable IGT AI function |

| | | |
|-------------|--|---------------------------|
| Syntax | int32_t IGT_AI_ReadlineU16(uint16_t ch, uint16_t* u16); | |
| Description | Read Analog data | |
| Argument | Function | Description |
| | ch | Channel number |
| | u16 | Analog data in U16 format |

| | | |
|-------------|---|---------------------------|
| Syntax | int32_t IGT_AI_ReadlineI16(uint16_t ch, int16_t* i16); | |
| Description | Read Analog data | |
| Argument | Function | Description |
| | ch | Channel number |
| | i16 | Analog data in I16 format |

| | | |
|-------------|--|---------------------------|
| Syntax | int32_t IGT_AI_ReadlineF64(uint16_t ch, double* f64); | |
| Description | Read Analog data | |
| Argument | Function | Description |
| | ch | Channel number |
| | f64 | Analog data in f64 format |