NEXCOM International Co., Ltd.

# Mobile Computing Solutions

# Vehicle Telematics & Railway Computer
# VTC 1030 and nROK 1030 Series

User Manual

**NEXCOM International Co., Ltd.**
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## Copyright



## Disclaimer

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## Acknowledgements

VTC 1030 and nROK 1030 series are trademarks of NEXCOM International Co., Ltd. All other product names mentioned herein are registered trademarks of their respective owners.

## Regulatory Compliance Statements

This section provides the FCC compliance statement for Class A devices and describes how to keep the system CE compliant.

## Declaration of Conformity

### FCC

This equipment has been tested and verified to comply with the limits for a Class A digital device, pursuant to Part 15 of 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 instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area (domestic environment) is likely to cause harmful interference, in which case the user will be required to correct the interference (take adequate measures) at their 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.

# RoHS Compliance


## NEXCOM RoHS Environmental Policy and Status Update

NEXCOM is a global citizen for building the digital infrastructure. We are committed to providing green products and services, which are compliant with European Union RoHS (Restriction on Use of Hazardous Substance in Electronic Equipment) directive 2011/65/EU, to be your trusted green partner and to protect our environment.

RoHS restricts the use of Lead (Pb) < 0.1% or 1,000ppm, Mercury (Hg) < 0.1% or 1,000ppm, Cadmium (Cd) < 0.01% or 100ppm, Hexavalent Chromium (Cr6+) < 0.1% or 1,000ppm, Polybrominated biphenyls (PBB) < 0.1% or 1,000ppm, and Polybrominated diphenyl Ethers (PBDE) < 0.1% or 1,000ppm.

In order to meet the RoHS compliant directives, NEXCOM has established an engineering and manufacturing task force to implement the introduction of green products. The task force will ensure that we follow the standard NEXCOM development procedure and that all the new RoHS components and new manufacturing processes maintain the highest industry quality levels for which NEXCOM are renowned.

The model selection criteria will be based on market demand. Vendors and suppliers will ensure that all designed components will be RoHS compliant.

## How to recognize NEXCOM RoHS Products?

For existing products where there are non-RoHS and RoHS versions, the suffix "(LF)" will be added to the compliant product name.

All new product models launched after January 2013 will be RoHS compliant. They will use the usual NEXCOM naming convention.

# Warranty and RMA

## NEXCOM Warranty Period

NEXCOM manufactures products that are new or equivalent to new in accordance with industry standard. NEXCOM warrants that products will be free from defect in material and workmanship for 2 years, beginning on the date of invoice by NEXCOM.

## NEXCOM Return Merchandise Authorization (RMA)

- Customers shall enclose the "NEXCOM RMA Service Form" with the returned packages.
- Customers must collect all the information about the problems encountered and note anything abnormal or, print out any on-screen messages, and describe the problems on the "NEXCOM RMA Service Form" for the RMA number apply process.
- Customers can send back the faulty products with or without accessories (manuals, cable, etc.) and any components from the card, such as CPU and RAM. If the components were suspected as part of the problems, please note clearly which components are included. Otherwise, NEXCOM is not responsible for the devices/parts.
- Customers are responsible for the safe packaging of defective products, making sure it is durable enough to be resistant against further damage and deterioration during transportation. In case of damages occurred during transportation, the repair is treated as "Out of Warranty."
- Any products returned by NEXCOM to other locations besides the customers' site will bear an extra charge and will be billed to the customer.

## Repair Service Charges for Out-of-Warranty Products

NEXCOM will charge for out-of-warranty products in two categories, one is basic diagnostic fee and another is component (product) fee.

### System Level

- Component fee: NEXCOM will only charge for main components such as SMD chip, BGA chip, etc. Passive components will be repaired for free, ex: resistor, capacitor.
- Items will be replaced with NEXCOM products if the original one cannot be repaired. Ex: motherboard, power supply, etc.
- Replace with 3rd party products if needed.
- If RMA goods can not be repaired, NEXCOM will return it to the customer without any charge.

### Board Level

- Component fee: NEXCOM will only charge for main components, such as SMD chip, BGA chip, etc. Passive components will be repaired for free, ex: resistors, capacitors.
- If RMA goods can not be repaired, NEXCOM will return it to the customer without any charge.

## Warnings

Read and adhere to all warnings, cautions, and notices in this guide and the documentation supplied with the chassis, power supply, and accessory modules. If the instructions for the chassis and power supply are inconsistent with these instructions or the instructions for accessory modules, contact the supplier to find out how you can ensure that your computer meets safety and regulatory requirements.

## Cautions

Electrostatic discharge (ESD) can damage system components. Do the described procedures only at an ESD workstation. If no such station is available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the computer chassis.

# Safety Information

Before installing and using the device, note the following precautions:

- Read all instructions carefully.
- Do not place the unit on an unstable surface, cart, or stand.
- Follow all warnings and cautions in this manual.
- When replacing parts, ensure that your service technician uses parts specified by the manufacturer.
- Avoid using the system near water, in direct sunlight, or near a heating device.
- The load of the system unit does not solely rely for support from the rackmounts located on the sides. Firm support from the bottom is highly necessary in order to provide balance stability.
- The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

# Installation Recommendations

Ensure you have a stable, clean working environment. Dust and dirt can get into components and cause a malfunction. Use containers to keep small components separated.

Adequate lighting and proper tools can prevent you from accidentally damaging the internal components. Most of the procedures that follow require only a few simple tools, including the following:

- A Philips screwdriver
- A flat-tipped screwdriver
- A grounding strap
- An anti-static pad

Using your fingers can disconnect most of the connections. It is recommended that you do not use needle-nose pliers to disconnect connections as these can damage the soft metal or plastic parts of the connectors.

# Safety Precautions

1. Read these safety instructions carefully.

2. Keep this User Manual for later reference.

3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.

4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.

5. Keep this equipment away from humidity.

6. Put this equipment on a stable surface during installation. Dropping it or letting it fall may cause damage.

7. The openings on the enclosure are for air convection to protect the equipment from overheating. DO NOT COVER THE OPENINGS.

8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.

9. Place the power cord in a way so that people will not step on it. Do not place anything on top of the power cord. Use a power cord that has been approved for use with the product and that it matches the voltage and current marked on the product's electrical range label. The voltage and current rating of the cord must be greater than the voltage and current rating marked on the product.

10. All cautions and warnings on the equipment should be noted.

11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.

12. Never pour any liquid into an opening. This may cause fire or electrical shock.

13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.

14. If one of the following situations arises, get the equipment checked by service personnel:
    a. The power cord or plug is damaged.
    b. Liquid has penetrated into the equipment.
    c. The equipment has been exposed to moisture.
    d. The equipment does not work well, or you cannot get it to work according to the user's manual.
    e. The equipment has been dropped and damaged.
    f. The equipment has obvious signs of breakage.

15. Do not place heavy objects on the equipment.

16. The unit uses a three-wire ground cable which is equipped with a third pin to ground the unit and prevent electric shock. Do not defeat the purpose of this pin. If your outlet does not support this kind of plug, contact your electrician to replace your obsolete outlet.

17. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

# Technical Support and Assistance

1. For the most updated information of NEXCOM products, visit NEXCOM's website at www.nexcom.com.

2. For technical issues that require contacting our technical support team or sales representative, please have the following information ready before calling:
   - Product name and serial number
   - Detailed information of the peripheral devices
   - Detailed information of the installed software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wordings of the error messages

Warning!

1. Handling the unit: carry the unit with both hands and handle it with care.

2. Maintenance: to keep the unit clean, use only approved cleaning products or clean with a dry cloth.

3. CFast: Turn off the unit's power before inserting or removing a CFast storage card.

# Conventions Used in this Manual

Warning:
Information about certain situations, which if not observed, can cause personal injury. This will prevent injury to yourself when performing a task.


Caution:
Information to avoid damaging components or losing data.

Note:
Provides additional information to complete a task easily.

# Global Service Contact Information

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# Package Contents

Before continuing, verify that the VTC1030 and nROK1030 package that you received is complete. Your package should have all the items listed in the following table.

**VTC1030**

| Item | Part Number | Name | Description | Qty |
|---|---|---|---|---|
| 1 | 6012200052X00 | PE Zipper Bag #8 | 170x240mm,W/China RoHS Symbol | 1 |
| 2 | 6012200053X00 | PE Zipper Bag #3 | 100x70mm,W/China RoHS Symbol | 1 |
| 3 | 4NCPM00302X00 | (T)Terminal Blocks 3P Phoenix Contact:1777992 | 5.08mm Male DIP Green | 1 |
| 4 | 603POW0234X00 | Power Cable 8Pin to 6Pin 12V DC OUT SUNJET:SLNEX822910 | ATX 2x4 PIT:3.0mm To ATX 2x3 PIT:4.2mm UL1007 22AWG L=200mm | 1 |
| 5 | 50311F0100X00 | (H)Round Head Screw W/Spring+Flat Washer Long Fei:P3x6L | P3x6 iso/SW6x0.5 NI | 4 |
| 6 | 603ANT0115X00 | GPS/GLONASS Antenna Unictron:SM-76G | SMA MALE L=5000mm | 1 |
| 7 | Z300000321X00 | Outside Box Label For VTC1030 VER.A | 60x60mm Art Paper CLW5 | 1 |
| 8 | 6014606898X00 | Label Blank WAI GHA | 60x60mm Art Paper CLW5 | 1 |
| 9 | 6012200104X00 | Antistaic Air Bag Assy FSC_BASE-N FU-DING | (25+29)x20cm  Color: Red | 1 |
| 10 | 5061711731X00 | (N)Bracket M2 42/52 For VTC1030 Series JAN YU | 17x8x2mm SPCC T=1.0mm Nickel Plating | 1 |
| 11 | 50311F0396X00 | I Head Screw Long Fei:I3x3 ISO+NYLOK Black | I3x3 ISO+Nylok Black | 2 |
| 12 | 5060700035X00 | HDMI Wire Mount KANG YANG:SWCM-1VB | 13.85x11x7.8mm Nylon 66 UL94V-0 Black | 1 |
| 13 | 50311F0127X00 | (H)Round Head Screw Long Fei:P3*6ISO | P3x6 Black Nylok | 1 |

# Package Contents

**nROK1030**

| Item | Part Number | Name | Description | Qty |
|---|---|---|---|---|
| 1 | 6012200052X00 | PE Zipper Bag #8 | 170x240mm,W/China RoHS Symbol | 1 |
| 2 | 6012200053X00 | PE Zipper Bag #3 | 100x70mm,W/China RoHS Symbol | 1 |
| 3 | 603POW0234X00 | Power Cable 8Pin to 6Pin 12V DC OUT SUNJET:SLNEX822910 | ATX 2x4 PIT:3.0mm To ATX 2x3 PIT:4.2mm UL1007 22AWG L=200mm | 1 |
| 4 | 50311F0100X00 | (H)Round Head Screw W/Spring+Flat Washer Long Fei:P3x6L | P3x6 iso/SW6x0.5 NI | 4 |
| 5 | 603ANT0115X00 | GPS/GLONASS Antenna Unictron:SM-76G | SMA MALE L=5000mm | 1 |
| 6 | Z300000323X00 | Outside Box Label For nROK1030-A VER.A | 60x60mm Art Paper CLW5 | 1 |
| 7 | 6014606898X00 | Label Blank WAI GHA | 60x60mm Art Paper CLW5 | 1 |
| 8 | 603POW0378X00 | Power Cable ST:MD-5108077 | Waterproof M12 A Coded 5Pin(Female) To Open L=300mm | 1 |
| 9 | 6012200104X00 | Antistaic Air Bag Assy FSC_BASE-N FU-DING | (25+29)x20cm  Color: Red | 1 |
| 10 | 5061711731X00 | (N)Bracket M2 42/52 For VTC1030 Series JAN YU | 17x8x2mm SPCC T=1.0mm Nickel Plating | 1 |
| 11 | 50311F0396X00 | I Head Screw Long Fei:I3x3 ISO+Nylok Black | I3x3 ISO+Nylok Black | 2 |
| 12 | 5060700035X00 | HDMI Wire Mount KANG YANG:SWCM-1VB | 13.85x11x7.8mm Nylon 66 UL94V-0 Black | 1 |
| 13 | 50311F0127X00 | (H)Round Head Screw Long Fei:P3*6ISO | P3x6 Black Nylok | 1 |

# Ordering Information

The following information below provides ordering information for the VTC 1030 and nROK 1030 series.

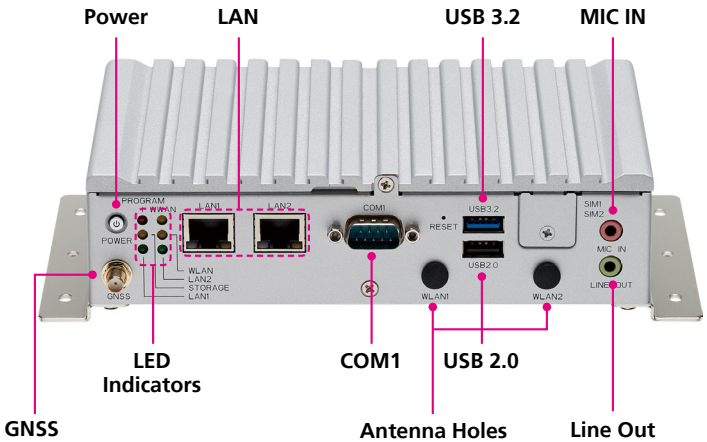
**VTC 1030 (P/N: 10V00103000X0)**
Intel Atom® x6211E dual-core processor 1.3GHz with 4GB DDR4, U-blox NEO-M9N GNSS module, 1 x CAN 2.0B, 1 x VGA output, 1 x HDMI output, 1 x internal SSD tray, 2 x LAN RJ45, 1 x mini-PCIe slot, 2 x M.2 slots, 2 x external micro-SIM, 1 x USB 3.2 Gen 2, 1 x USB 2.0, 2 x full RS232/422/485, 5 x DI & 4 x DO

**nROK 1030-A (P/N: 10A00103000X0)**
Intel Atom® x6211E dual-core processor 1.3GHz with 4GB DDR4, U-blox NEO-M9N GNSS module, 1 x CAN 2.0B, 1 x VGA output, 1 x HDMI output, 1 x internal SSD tray, 2 x LAN M12 X-coded, 1 x mini-PCIe slot, 2 x M.2 slots, 2 x external micro-SIM, 1 x USB 3.2 Gen 2, 1 x USB 2.0, 2 x full RS232/422/485, 5 x DI & 4 x DO

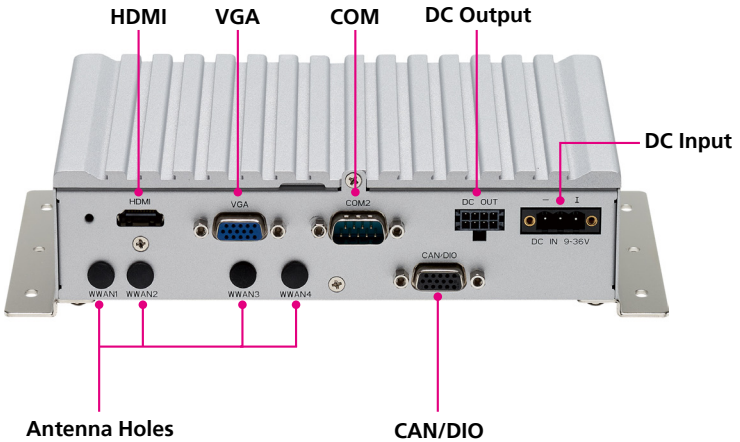
# Chapter 1: Product Introduction

## Physical Features

### VTC 1030 Front View

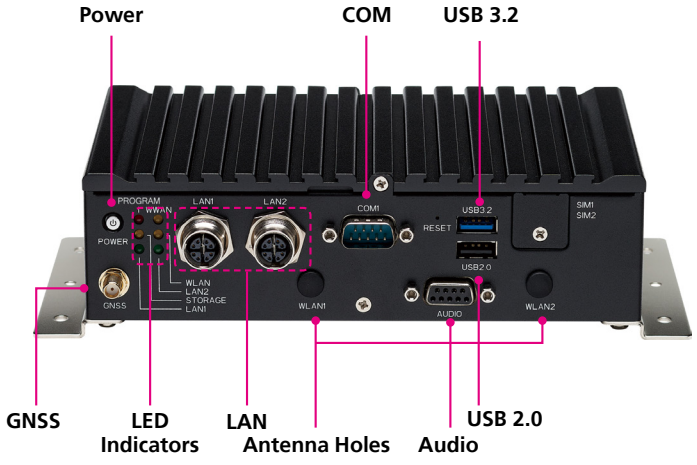



### VTC 1030 Rear View

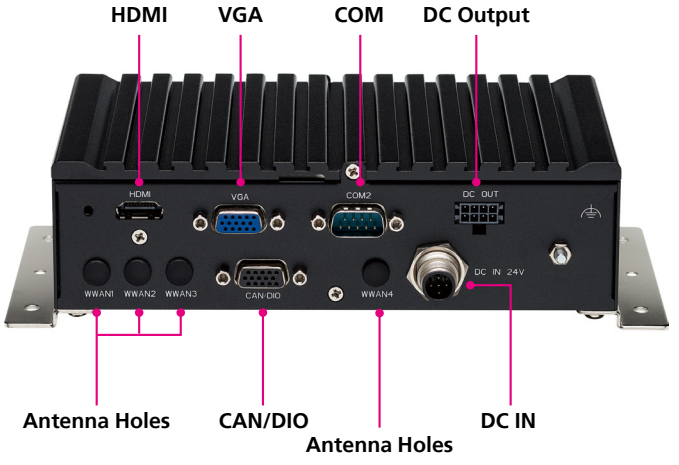


# Physical Features

## nROK 1030 Front View




## nROK 1030 Rear View



# VTC 1030 Overview

VTC 1030, a compact, rugged and entry-level vehicle computer with Intel Atom® x6211E dual-core processor 1.3GHz/3GHz (burst), is designed for the harsh in-vehicle environment. Because of the compact design, it is especially for the vehicles with limited space to locate the computer system, but without compromising with its space to scarify its features

VTC 1030 has onboard CAN 2.0B for vehicle diagnostics and driver behavior management. An advanced GNSS receiver supports GPS/Glonass/QZSS/Galileo/Beidou and optional dead reckoning module is also available. VTC 1030 features optional WLAN Wi-Fi 6/6E/Wi-Fi 5 and WWAN 5G NR/LTE wireless data connectivity. With external micro-SIM socket, it allows user to access micro-SIM card conveniently. 12VDC output can be provided for external display with easy power wire arrangement. VTC 1030 keeps the flexibility to meet different demands for telematics applications, such as wireless gateway, infotainment, fleet management and patching system

# VTC 1030 Key Features

- Intel Atom® x6211E dual-core processor, 6W
- Compact and fanless design
- 5G NR and Wi-Fi 6/6E wireless communication options
- Built-in GNSS receiver with optional dead reckoning function
- Built-in 1 x CAN bus 2.0B (optional SAE J1939)
- Wide range DC input from 9~36V
- Smart power management with Ignition on/off delay via software control and low voltage protection
- Dual display outputs and 2.5 GbE LAN ports
- 1 x mini-PCIe + 2 x M.2 socket expansion
- Certified by CE/FCC/E13 mark

# nROK 1030 Overview

nROK 1030, a compact, rugged and entry-level vehicle computer with Intel Atom® x6211E dual-core processor 1.3GHz/3GHz (burst), is designed for the harsh in-train environment. Because of the compact design, it is especially for the vehicles with limited space to locate the computer system, but without compromising with its space to scarify its features.

nROK 1030 has onboard CAN 2.0B for vehicle diagnostics and driver behavior management. An advanced GNSS receiver supports GPS/Glonass/QZSS/Galileo/Beidou. nROK 1030 features optional WLAN Wi-Fi 6/6E/Wi-Fi 5 and WWAN 5G NR/LTE wireless data connectivity. With external micro-SIM socket, it allows user to access micro-SIM card conveniently. 12VDC output can be provided for
external display with easy power wire arrangement. nROK 1030 keeps the flexibility to meet different demands for rolling stock applications, such as wireless gateway, infotainment, digital radio data/voice transmission system.

# nROK 1030 Key Features

- Intel Atom® x6211E dual-core processor, 6W
- Compact and fanless design
- 5G NR and Wi-Fi 6/6E wireless communication options
- Built-in GNSS receiver
- Built-in 1 x CAN bus 2.0B (optional SAE J1939)
- Smart power management with Ignition on/off delay via software control and low voltage protection
- Dual display outputs and 2.5GbE LAN ports
- 1 x mini-PCIe + 2 x M.2 socket expansion
- Certified by CE, FCC, EN 50155 class OT4

# Hardware Specifications

## VTC 1030

### CPU

- Intel® Atom™ x6211E dual-core processor, 1.3GHz/3GHz (burst), TDP 6W

### Memory

- 1x 260-pin DDR4 SO-DIMM socket support 3200MHz up to 32GB. Default 2666MHz, 4GB
- With in-Band ECC (IBECC)

### Video Output

- 1x HDMI 1.4b up to 3840 x 2160@30Hz
- 1x VGA port 1920 x 1200@60Hz

### Storage

- 1 x 2.5" SATA 3.0 internal drive bay (9.5mm)
- 1 x mSATA slot (occupied mini-PCIe slot)

### Expansion

- 1x Full size mini-PCIe socket (USB 2.0, PCIe 3.0/SATA 3.0)
- 1 x M.2 2230 Key E socket (USB 2.0, PCIe 3.0 x2), BOM optional M.2 2230 Key E socket (USB 2.0, PCIe 3.0, PCIe 3.0)
- 1 x M.2 3042/3050/3052 Key B socket (USB 2.0, USB 3.2 Gen 2) for LTE/5G NR module with 2 x external micro-SIM

### GNSS and Onboard Sensor

- 1 x Default U-blox NEO-M9N GNSS module for GPS+QZSS/Glonass/Galileo/Beidou
- Optional M8U modules with dead reckoning available
- 1 x 3D accelerometer and 3D gyroscope

### LAN

- 2-port LAN RJ45, 10/100/1000/2500 Mbps Ethernet, Intel® I225-IT

### Security

- TPM 2.0: infineon SLB9670VQ2.0 FW7.62

### I/O Interface-Front

- 6 x LED indicators (including 1 x programmable LED)
- 1 x USB 3.2 Gen 2 type A (5V/0.9A)
- 1 x USB 2.0 type A (5V/0.5A)
- 2 x Externally accessible micro-SIM card sockets with cover
- 1 x Reset button
- 1 x Power button
- 1 x DB9 (COM1) for full RS232/422/485
- 1 x Mic-in, 1 x Line-out
- 2 x LAN RJ45, 10/100/1000/2500 Mbps
- 2 x RP-SMA connector holes for WLAN
- 1 x SMA connector for GNSS

### I/O Interface-Rear

- 1 x HDMI
- 1 x VGA
- 1 x DB9 (COM2) for full RS232/422/485
- 1 x DB15 (CAN/DIO)
  - 1 x Isolated CANBus 2.0B
  - 5 x DI and 4 x DO
- 1 x 3-pin terminal block for 9V~36VDC
- 1 x Connector (4 x 2) for 12VDC/2A output, reset, power button, RS232 (Tx/Rx)
- 4 x SMA connector holes for WWAN

### Power Management & Software Support

- Power input 9~36VDC
- Cranking voltage: 6V~9V (< 30 seconds)
- Reverse protection, OCP & UVP
- Selectable boot-up & shut-down voltage for low power protection by software
- Setting 8-level power on/off delay time by software
- 10~255 seconds WDT support, setup by software
- SDK (Windows/Linux) including utility and sample code

### Operating System

- Windows 11/Windows 10/Linux

### Dimensions

- 185mm (W) x 120mm (D) x 45mm (H)

### Weight

- 1.20kg

### Environment

- Operating temperatures
  - -40°C to 70°C (w/ 6W TDP CPU, industrial SSD) with air flow
- Storage temperatures: -40°C to 85°C
- Relative humidity: 90% (non-condensing)
- Vibration (random)
  - 2g@5~500 Hz (in operation, SSD)
- Vibration (SSD)
  - Operating: MIL-STD-810H, Method 514.8C, Procedure 1, Category 4, common carrier US highway truck vibration exposure
  - Storage: MIL-STD-810H, Method 514.8E, Procedure 1, Category 24, minimum integrity test

### Shock (SSD)

- Operating: MIL-STD-810H, Method 516.8, Procedure I, functional shock=40g
- Non-operating: MIL-STD-810H, Method 516.8, Procedure V, crash hazard shock test=75g

### Certifications

- CE
- FCC Class A
- E13 mark

## nROK 1030

### CPU

- Intel Atom® x6211E dual-core processor, 1.3GHz/3GHz (burst), TDP 6W

### Memory

- 1 x 260-pin DDR4 SO-DIMM socket support 3200MHz up to 32GB default 2666MHz, 4GB
- With In-Band ECC (IBECC)

### Video Output

- 1 x HDMI 1.4b up to 3840 x 2160@30Hz
- 1 x VGA port 1920 x 1200@60Hz

### Storage

- 1 x 2.5" SATA 3.0 internal drive bay (9.5mm)
- 1 x mSATA slot (occupied mini-PCIe slot)

### Expansion

- 1 x Full size mini-PCIe socket (USB 2.0, PCIe 3.0/SATA 3.0)
- 1 x M.2 2230 Key E socket (USB 2.0, PCIe 3.0 x2), BOM optional M.2 2230 Key E socket (USB 2.0, PCIe 3.0, PCIe 3.0)
- 1 x M.2 3042/3050/3052 Key B socket (USB 2.0, USB 3.2 Gen 2) for LTE/5G NR module with 2 x external micro-SIM

### GNSS and Onboard Sensor

- 1 x Default U-blox NEO-M9N GNSS module for GPS+QZSS/ Glonass/Galileo/Beidou
- 1 x 3D accelerometer and 3D gyroscope

### LAN

- 2-port LAN M12 X-coded, 10/100/1000/2500 Mbps, Intel®225-IT

### Security

- TPM 2.0: Infineon SLB9670VQ2.0 FW7.62

### I/O Interface-Front

- 6 x LED indicators (including 1 x programmable LED)
- 1 x USB 3.2 Gen 2 type A (5V/0.9A)
- 1 x USB 2.0 type A (5V/0.5A)
- 2 x Externally accessible micro-SIM card sockets with cover
- 1 x Reset button
- 1 x Power button
- 1 x DB9 (COM1) for full RS232/422/485
- 1 DB9 (AUDIO) for 1 x Mic-in, 1 x Line-out
- 2 x LAN M12 X-coded, 10/100/1000/2500 Mbps
- 2 x RP-SMA connector holes for WLAN
- 1 x SMA connector for GNSS

### I/O Interface-Rear

- 1 x HDMI
- 1 x VGA
- 1 x DB9 (COM2) for full RS232/422/485
- 1 x DB15 (CAN/DIO)
  - 1 x Isolated CANBus 2.0B
  - 5 x DI and 4 x DO
- 1 x M12 5-pin A-coded DC input with ignition 24 VDC, non-isolation
- 1 x Connector (4 x 2) for 12VDC/2A output, reset, power button, RS232 (Tx/Rx)

- 4 x SMA connector holes for WWAN
- 1 x Ground connector

### Power Management & Software Support

- Power input 24VDC (9~36VDC) w/o isolation
- Cranking voltage: 6V~9V (< 30 seconds)
- Reverse protection, OCP & UVP
- Selectable boot-up & shut-down voltage for low power protection by
- software
- Setting 8-level power on/off delay time by software
- 10~255 seconds WDT support, setup by software
- SDK (Windows/Linux) including utility and sample code

### Operating System

- Windows 11/Windows 10/Linux

### Dimensions

- 185mm (W) x 120mm (D) x 50m (H)

### Weight

- 1.25kg

### Environment

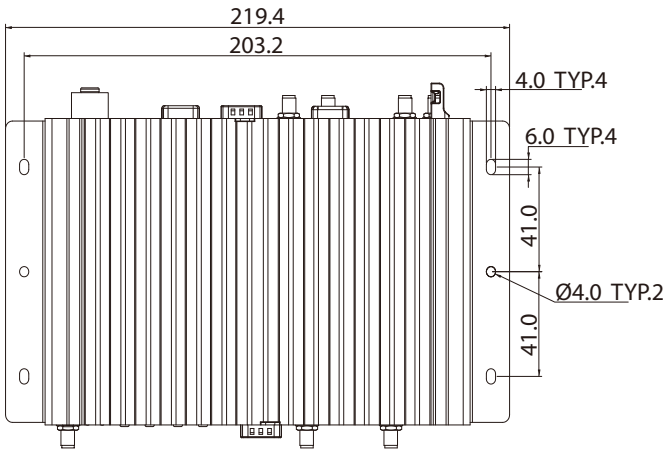
- Operating temperatures
  - EN 50155, class OT4 (-40°C~70°C), 85°C for 10 minutes (w/ 6W TDP CPU, industrial SSD) with air flow
- Storage temperatures: -40°C to 85°C
- Relative humidity: 90% (non-condensing)
- Vibration (random)
  - 2g@5~500 Hz (in operation, SSD)
- Vibration (SSD)
  - Operating: MIL-STD-810H, Method 514.8C, Procedure 1, Category 4, common carrier US highway truck vibration exposure
  - Storage: MIL-STD-810H, Method 514.8E, Procedure 1, Category 24, minimum integrity test
- Shock (SSD)
  - Operating: MIL-STD-810H, Method 516.8, Procedure I, functional shock=40g
  - Non-operating: MIL-STD-810H, Method 516.8, Procedure V, crash hazard shock test=75g

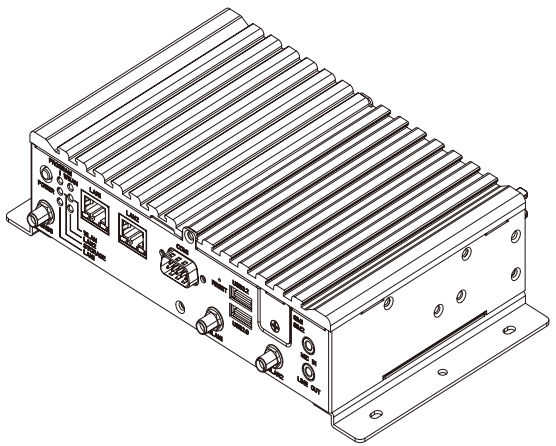
### Certificate

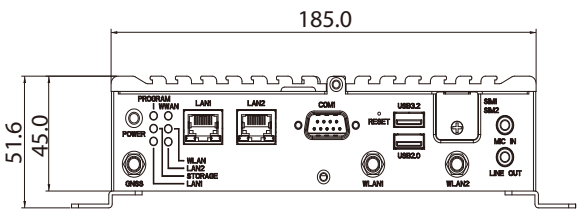
- CE
- FCC Class A
- EN 50155: 2017
  - Ambient temperature EN 50155, Class OT4 (-40°C~70°C), 85°C for 10 minutes
  - Interruptions of voltage supply class S1
  - Supply change over class C1
  - EMC EN 50121-1: 2017, EN 50121-3-2: 2016+A1: 2019
  - Environment EN 60068-2-1, EN 60068-2-2, EN 60068-2-30
  - Shock and vibration IEC 61373 Class B
  - Protective coating class PC1 (PC2, by request)
- EN 45545-2:2020

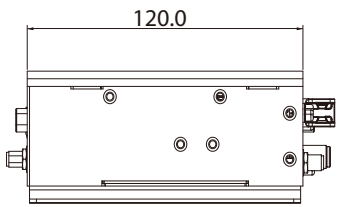
# Mechanical Dimensions

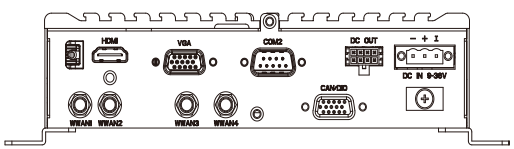
## VTC 1030



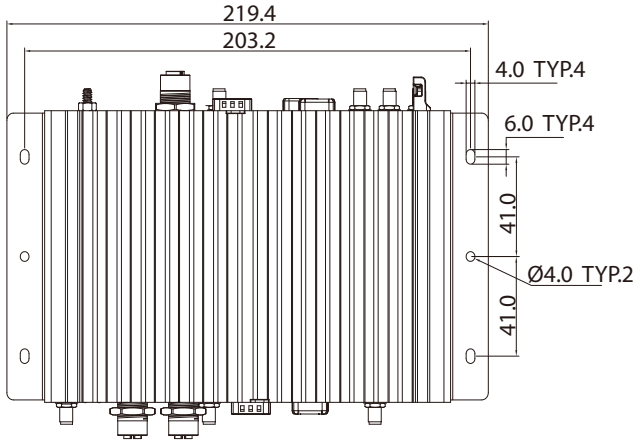



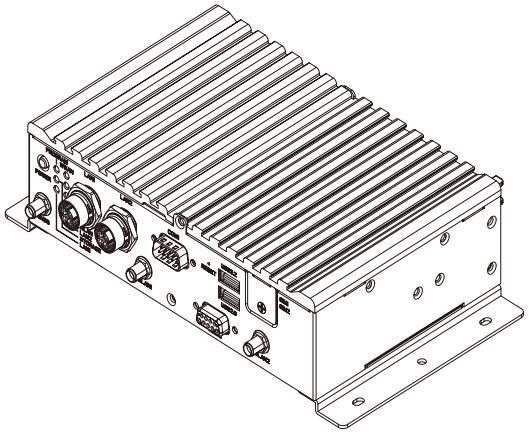


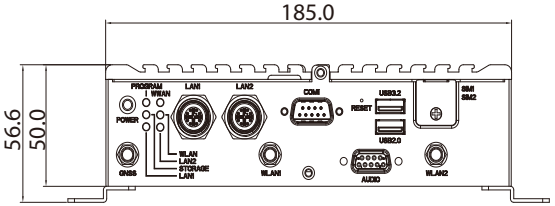



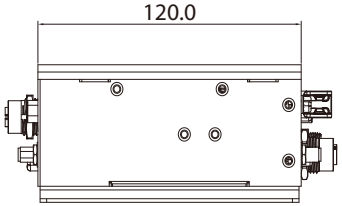



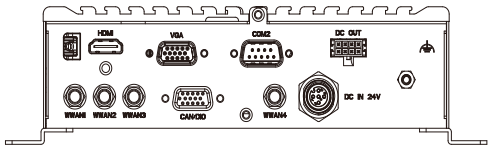
## nROK 1030





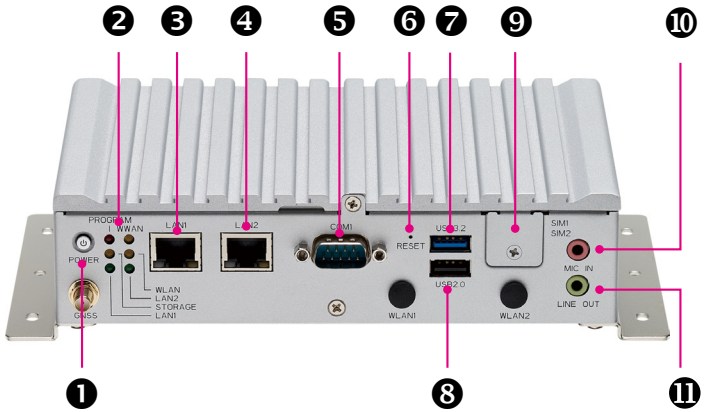



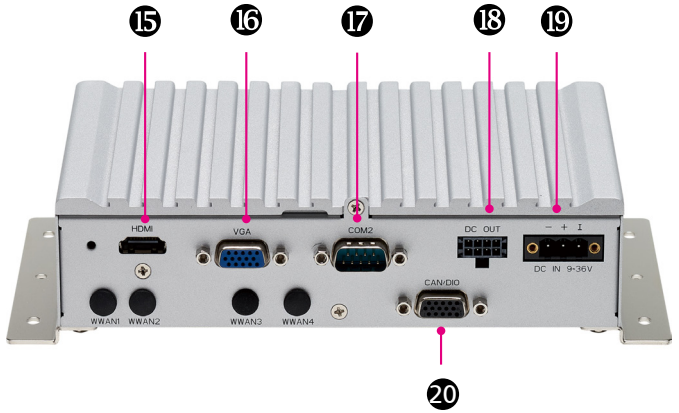
# Connector Numbering

The following diagrams indicate the numbers of the connectors. Use these numbers to locate the connectors' respective pinout assignments on chapter 2 of the manual.

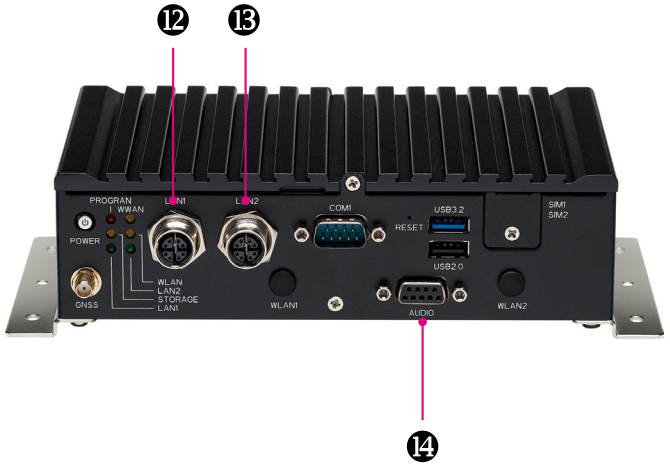
## VTC 1030 Front View




## VTC 1030 Rear View



## nROK 1030 Front View




## nROK 1030 Rear View

# Chapter 2: External Connectors Pinout Description

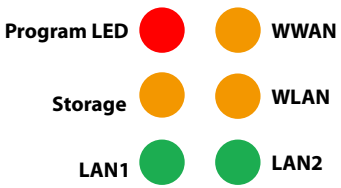
## Power Button

Connector number: 1

- Before OS: Blue Blinking
- Enter OS: Blue Stay on
- Red color (Blinking) when input power is 6~9VDC

## LED Indicators

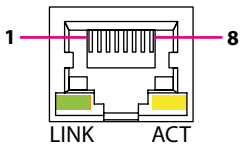
Connector number: 2




| LED | Description |
|---|---|
| Program LED | Red On: Programmable LED |
| WWAN | Yellow On: WWAN active |
| Storage | Yellow Blinking: Storage access |
| WLAN | Yellow On: WLAN active |
| LAN1/LAN2 | Green On/Blinking: LAN active/access |

## LAN1 Port (10/100/1000/2500 Mbps, RJ45)

Connector number: 3

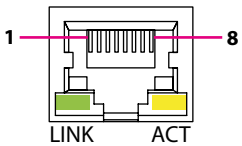



| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | LAN-1_MDI0P | 2 | LAN-1_MDI0P |
| 3 | LAN-1_MDI1P | 4 | LAN-1_MDI2P |
| 5 | LAN-1_MDI2N | 6 | LAN-1_MDI1N |
| 7 | LAN-1_MDI3P | 8 | LAN-1_MDI3N |

Note: LINK LED (Orange: 1GbE, Green: 2.5 GbE)

## LAN2 Port (10/100/1000/2500 Mbps, RJ45)

Connector number: 4

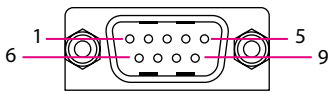



| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | LAN-2_MDI0P | 2 | LAN-2_MDI0N |
| 3 | LAN-2_MDI1P | 4 | LAN-2_MDI2P |
| 5 | LA-2N_MDI2P | 6 | LAN-2_MDI1N |
| 7 | LAN-2_MDI3P | 8 | LAN-2_MDI3N |

Note: LINK LED (Orange: 1GbE, Green: 2.5 GbE)

## DB9 (COM1) for full RS232/RS422/RS485

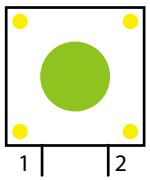
Connector number: 5




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | SP1_DCD#_TX- | 2 | SP1_RX_TX+ |
| 3 | SP1_TX_RX+ | 4 | SP1_DTR#_RX- |
| 5 | COM1_GND | 6 | SP1_DSR# |
| 7 | SP1_RTS# | 8 | SP1_CTS# |
| 9 | SP1_RI# | | |

## Reset Switch

Connector Number: 6

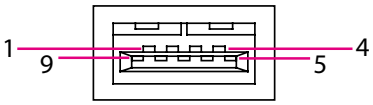



| Definition | Definition |
|---|---|
| Open | Normal (Default) |
| Short | Reset |

Note: Click for hardware reset

## USB 3.2 Gen 2

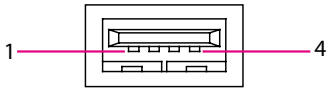
Connector number: 7




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | 5V | 2 | USB_0N |
| 3 | USB_0P | 4 | GND |
| 5 | USB3_RX0N | 6 | USB3_RX0P |
| 7 | GND | 8 | USB3_TX0N |
| 9 | USB3_TX0P | | |

## USB 2.0

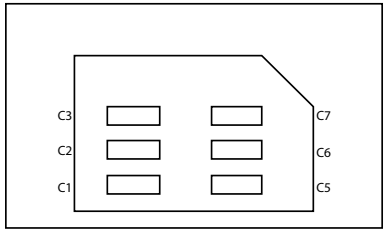
Connector number: 8




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | 5V | 2 | USB_1N |
| 3 | USB_1P | 4 | GND |

## SIM1 and SIM2 Micro-SIM

Connector number: 9




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| C1 | UIM1_PWR | C2 | UIM1_RST |
| C3 | UIM1_CLK | C4 | NC |
| C5 | GND | C6 | NC |
| C7 | UIM1_DAT | C8 | NC |
| CD | CD | | |

| Pin | Definition | Pin | Definition |
|---|---|---|---|
| C1 | UIM2_PWR | C2 | UIM2_RST |
| C3 | UIM2_CLK | C4 | NC |
| C5 | GND | C6 | NC |
| C7 | UIM2_DAT | C8 | NC |
| CD | CD | | |

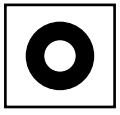
## Mic-In Connector

Connector number: 10

| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | AGND | 2 | MIC_L |
| 3 | AGND | 4 | MIC_JD |
| 5 | MIC_R | | |

## Line-Out Connector

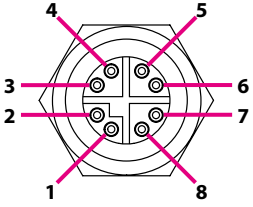
Connector number: 11



| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 22 | FRONT_L | 23 | AGND |
| 24 | FRONT_JD | 25 | FRONT_R |

## LAN1 Port (10/100/1000/2500 Mbps, M12 X-coded)

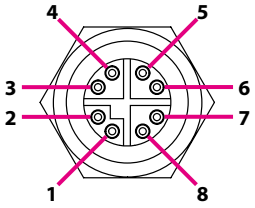
Connector number: 12




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | LAN-1_MDI0P | 2 | LAN-1_MDI0N |
| 3 | LAN-1_MDI1P | 4 | LAN-1_MDI1N |
| 5 | LAN-1_MDI2P | 6 | LAN-1_MDI2N |
| 7 | LAN-1_MDI3P | 8 | LAN-1_MDI3N |

## LAN2 Port (10/100/1000/2500 Mbps, M12 X-coded)

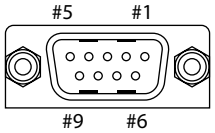
Connector number: 13




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | LAN-2_MDI0P | 2 | LAN-2_MDI0N |
| 3 | LAN-2_MDI1P | 4 | LAN-2_MDI1N |
| 5 | LAN-2_MDI2P | 6 | LAN-2_MDI2N |
| 7 | LAN-2_MDI3P | 8 | LAN-2_MDI3N |

## DB9 (Audio) for 1 x Mic-in, 1 x Line-Out

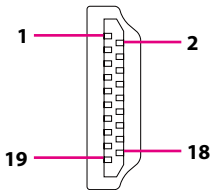
Connector number: 14




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | AGND | 2 | MIC_L |
| 3 | MIC_JD | 4 | FRONT_JD |
| 5 | FRONT_L | 6 | FRONT_R |

## HDMI

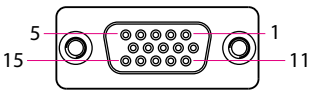
Connector number: 15




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | HDMI_TX2P | 2 | GND |
| 3 | HDMI_TX2N | 4 | HDMI_TX1P |
| 5 | GND | 6 | HDMI_TX1N |
| 7 | HDMI_TX0P | 8 | GND |
| 9 | HDMI_TX0N | 10 | HDMI_CLK_P |
| 11 | GND | 12 | HDMI_CLK_N |
| 13 | NC | 14 | NC |
| 15 | HDMIDDCSCL | 16 | HDMIDDCSDA |
| 17 | GND | 18 | HDMI_P5V |
| 19 | HDMIHPD | | |

## VGA

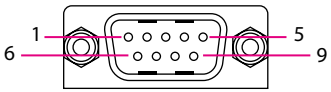
Connector number: 16




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | VGA_RED | 2 | VGA_GREEN |
| 3 | VGA_BLUE | 4 | NC |
| 5 | GND | 6 | GND |
| 7 | GND | 8 | GND |
| 9 | VGA_5V | 10 | GND |
| 11 | NC | 12 | VGA_DAT |
| 13 | VGA_HSYNC | 14 | VGA_VSYNC |
| 15 | VGA_CLK | | |

## DB9 (COM2) for full RS232/RS422/RS485

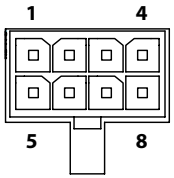
Connector number: 17




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | SP2_DCD#_TX- | 2 | SP2_RX_TX+ |
| 3 | SP2_TX_RX+ | 4 | SP2_DTR#_RX- |
| 5 | COM2_GND | 6 | SP2_DSR# |
| 7 | SP2_RTS# | 8 | SP2_CTS# |
| 9 | SP2_RI# | | |

## 12V DC Output

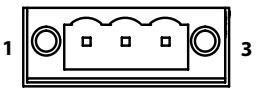
Connector number:18




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | RESET BUTTON## | 2 | SLEEP BUTTON## |
| 3 | GND | 4 | GND |
| 5 | RS232 TX | 6 | RS232 RX |
| 7 | POWER BUTTON# | 8 | 12V |

## DC Power Input

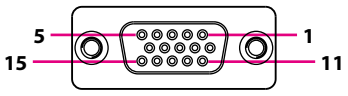
Connector number: 19




| Pin | Definition |
|---|---|
| 1 | GND_IN |
| 2 | V_IN |
| 3 | IGNITION |

## CAN/DIO

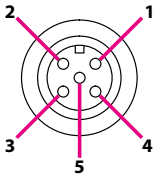
Connector number: 19




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | GPI-1 | 2 | GPI-2 |
| 3 | GPI-3 | 4 | GPI-4 |
| 5 | GPI-5 | 6 | GPO-1 |
| 7 | GPO-2 | 8 | GPO-3 |
| 9 | GPO-4 | 10 | GND |
| 11 | CAN_GND | 12 | CAN-L |
| 13 | CAN-H | 14 | |
| 15 | | | |

## DC Input

Connector number: 21




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | DC IN + | 2 | DC IN + |
| 3 | DC IN - | 4 | DC IN - |
| 5 | IGNITION | | |

# Chapter 3: Jumpers and Connectors

This chapter describes how to set the jumpers and connectors on the VTC 1030 and nROK 1030 series motherboard.

## Before You Begin

- Ensure you have a stable, clean working environment. Dust and dirt can get into components and cause a malfunction. Use containers to keep small components separated.
- Adequate lighting and proper tools can prevent you from accidentally damaging the internal components. Most of the procedures that follow require only a few simple tools, including the following:
  - A Philips screwdriver
  - A flat-tipped screwdriver
  - A set of jewelers screwdrivers
  - A grounding strap
  - An anti-static pad
- Using your fingers can disconnect most of the connections. It is recommended that you do not use needle-nosed pliers to disconnect connections as these can damage the soft metal or plastic parts of the connectors.
- Before working on internal components, make sure that the power is off. Ground yourself before touching any internal components, by touching a metal object. Static electricity can damage many of the electronic components. Humid environments tend to have less static electricity than dry environments. A grounding strap is warranted whenever danger of static electricity exists.

## Precautions

Computer components and electronic circuit boards can be damaged by discharges of static electricity. Working on computers that are still connected to a power supply can be extremely dangerous.

Follow the guidelines below to avoid damage to your computer or yourself:

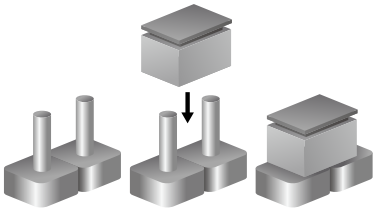
- Always disconnect the unit from the power outlet whenever you are working inside the case.
- If possible, wear a grounded wrist strap when you are working inside the computer case. Alternatively, discharge any static electricity by touching the bare metal chassis of the unit case, or the bare metal body of any other grounded appliance.
- Hold electronic circuit boards by the edges only. Do not touch the components on the board unless it is necessary to do so. Don't flex or stress the circuit board.
- Leave all components inside the static-proof packaging that they shipped with until they are ready for installation.
- Use correct screws and do not over tighten screws.

# Jumper Settings

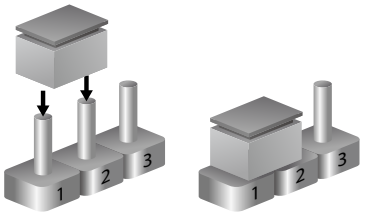
A jumper is the simplest kind of electric switch. It consists of two metal pins and a cap. When setting the jumpers, ensure that the jumper caps are placed on the correct pins. When the jumper cap is placed on both pins, the jumper is short. If you remove the jumper cap, or place the jumper cap on just one pin, the jumper is open.

Refer to the illustrations below for examples of what the 2-pin and 3-pin jumpers look like when they are short (on) and open (off).

Two-Pin Jumpers: Open (Left) and Short (Right)



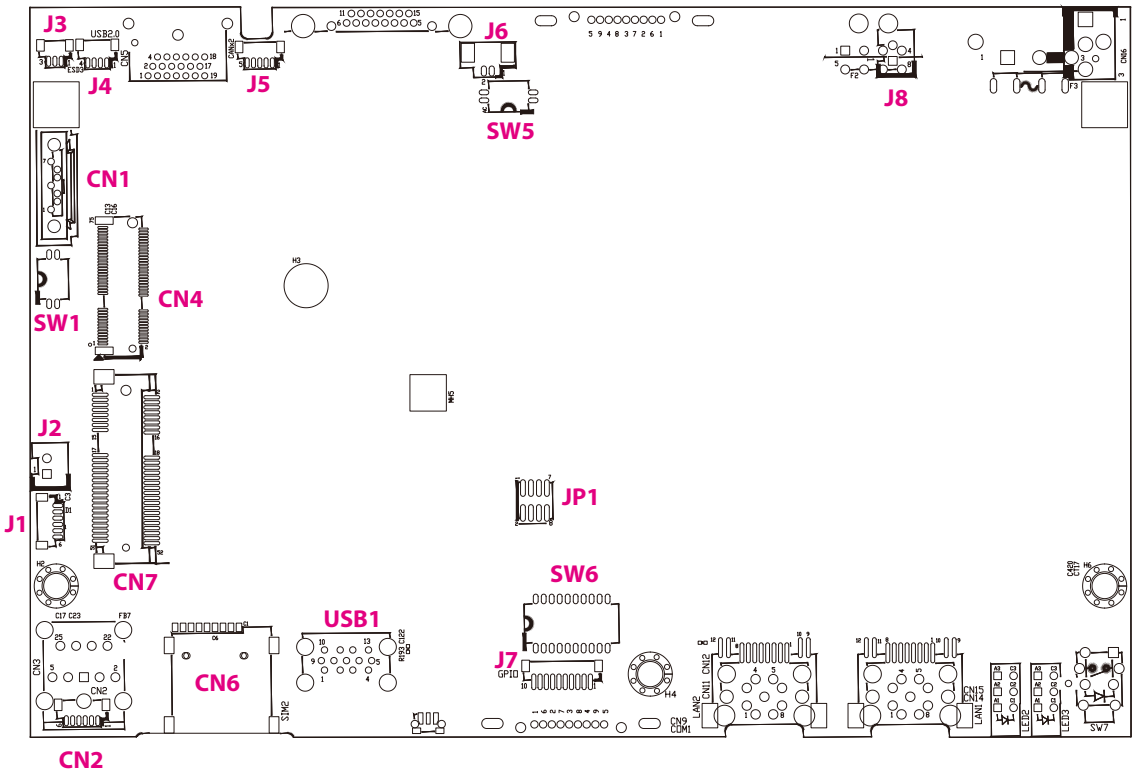
Three-Pin Jumpers: Pins 1 and 2 are Short



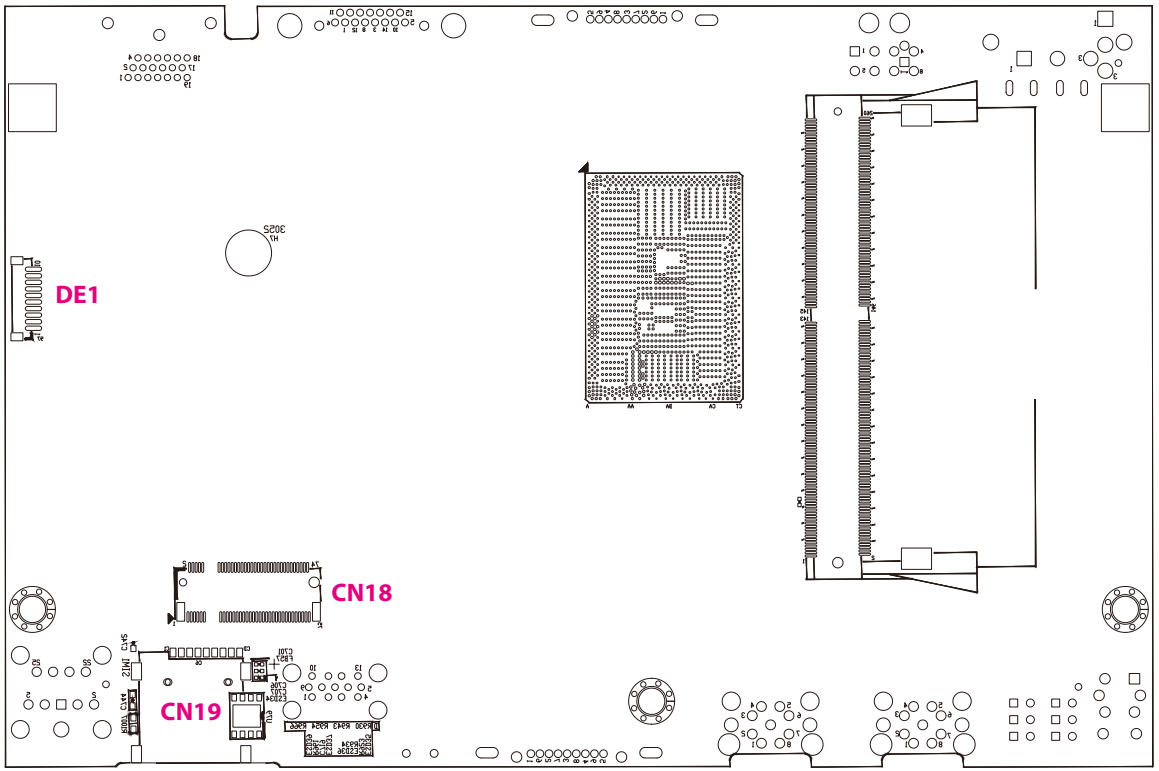
# Locations of the Jumpers and Connectors

This chapter lists the location and pinout assignment of the jumpers and connectors on the VTC 1030 and nROK 1030 series motherboard.

## Top View



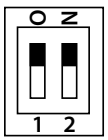
## Bottom View



# Connector Pin Definitions

## RTC Switch

Connector location: SW5

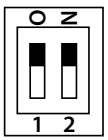



| SRTC_RST(pin1) | RTC_RST(pin2) | Result |
|---|---|---|
| OFF | OFF | Normal (*) |
| ON | ON | Clear CMOS + Clear ME |

(*) Default

## Input Voltage Control Switch

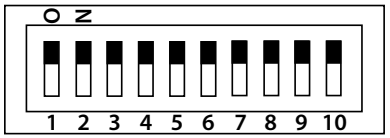
Connector location: SW1




| PowerSW (pin1) | 12V24V (pin2) | Result |
|---|---|---|
| OFF | OFF | 12V |
| OFF | ON | 24V |
| ON | ON | 9~36V (Default) |
| ON | OFF | SECURITY OFF |

## GPIO Pull High Selection Switch

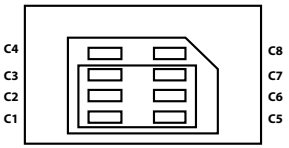
Connector location: SW6




| PIN NO. | On | Off |
|---|---|---|
| 1 | GPI1 Internal Pull High (Default) | External Pull High |
| 2 | GPI2 Internal Pull High (Default) | External Pull High |
| 3 | GPI3 Internal Pull High (Default) | External Pull High |
| 4 | GPI4 Internal Pull High (Default) | External Pull High |
| 5 | GPI5 Internal Pull High (Default) | External Pull High |
| 6 | GPO1 Internal Pull High (Default) | External Pull High |
| 7 | GPO2 Internal Pull High (Default) | External Pull High |
| 8 | GPO3 Internal Pull High (Default) | External Pull High |
| 9 | GPO4 Internal Pull High (Default) | External Pull High |

## Micro-SIM1/Micro-SIM2 SIM Slot

Micro-SIM1 Connector location: CN19
Micro-SIM2 Connector location: CN6




SIM1

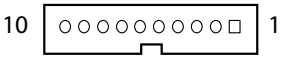
| Pin | Definition | Pin | Definition |
|---|---|---|---|
| C1 | UIM1_PWR | C2 | UIM1_RST |
| C3 | UIM1_CLK | C4 | NC |
| C5 | GND | C6 | NC |
| C7 | UIM1_DAT | C8 | NC |
| | | CD | CD |

SIM2

| Pin | Definition | Pin | Definition |
|---|---|---|---|
| C1 | UIM2_PWR | C2 | UIM2_RST |
| C3 | UIM2_CLK | C4 | NC |
| C5 | GND | C6 | NC |
| C7 | UIM2_DAT | C8 | NC |
| | | CD | CD |

## GPIO Connector

Connector size: 1 x 10 = 10-pin header (1.80mm)
Connector location: J7




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | GND | 2 | GPO-4 |
| 3 | GPO-3 | 4 | GPO-2 |
| 5 | GPO-1 | 6 | GPI-5 |
| 7 | GPI-4 | 8 | GPI-3 |
| 9 | GPI-2 | 10 | GPI-1 |

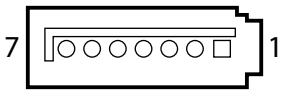
## Audio Connector

Connector size: 1 x 6 = 6-pin header (1.80mm)
Connector location: CN2


| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | FRONT_L | 2 | FRONT_JD |
| 3 | FRONT_R | 4 | MIC_L |
| 5 | MID_JD | 6 | AGND |

## SATA Connector

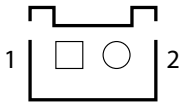
Connector size: Standard Serial ATA 7P (1.27mm, SATA-M-180)
Connector location: CN1




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | GND | 2 | SATA-TXP1 |
| 3 | SATA-TXN1 | 4 | SATA_PCIE_DETP1 |
| 5 | SATA-RXN1 | 6 | SATA-RXP1 |
| 7 | GND | | |

## SATA Power Connector

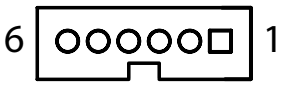
Connector size: 1x2, 2-pin header, 2.5mm pitch
Connector location: J2




| Pin | Definition |
|---|---|
| 1 | SATA_PWR1 |
| 2 | GND |

## GNSS Connector

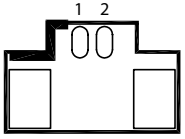
Connector size: 1x6= 6-pin header (1mm)
Connector location: J1




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | 3.3V_BAT | 2 | NC |
| 3 | TX | 4 | RX |
| 5 | GND | 6 | 3.3V |

## RTC Battery Connector

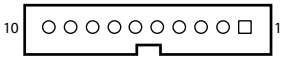
Connector size: 1x2= 2-pin header (1.25mm)
Connector location: J6




| Pin | Definition |
|---|---|
| 1 | GND |
| 2 | VBAT |

## Port 80 Connector

Connector size: 1x10= 10-pin header (1.0mm)
Connector location: DE1




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | GND | 2 | PLTRST# |
| 3 | ESPI_CLK_HDR | 4 | ESPI_CS0_HDR# |
| 5 | ESPI_IO3_HDR | 6 | ESPI_IO2_HDR |
| 7 | ESPI_I01_HDR | 8 | ESPI_IO0_HDR |
| 9 | ESPI_RST_HDR# | 10 | 3VSB |

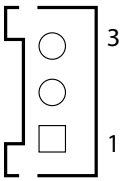
## USB 2.0 Connector (Reserved)

Connector size: 1x4 = 4-pin header (1.0mm)
Connector location: J4


| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | GND | 2 | USB_P |
| 3 | USB_N | 4 | POWER |

## MCU Debug Connector

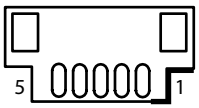
Connector size: 1x3 = 3-pin header (1.0mm)
Connector location: J3




| Pin | Definition |
|---|---|
| 1 | TX |
| 2 | GND |
| 3 | RX |

## CAN Connector

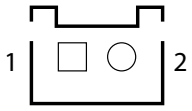
Connector size: 1x5 = 5-pin header (1.0mm)
Connector location: J5




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | NC | 2 | NC |
| 3 | GND | 4 | CAN1_H |
| 5 | CAN1_L | | |

## DC Out Connector

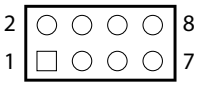
Connector size: 1x2 = 2-pin header (2.50mm)
Connector location: J8




| Pin | Definition |
|---|---|
| 1 | V12S |
| 2 | GND |

## MCU Download Connector

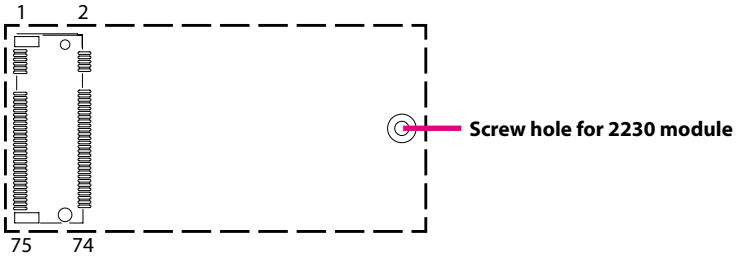
Connector size: 2x4 = 8-pin header (1.27mm)
Connector location: JP1




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | 3.3V | 2 | MCU_RST |
| 3 | NC | 4 | NC |
| 5 | MCU_SWCLK | 6 | MCU_SWDIO |
| 7 | NC | 8 | GND |

## M.2 2230 Key E Socket (USB 2.0, PCIe 3.0x2)

Connector location: WLAN, CN4

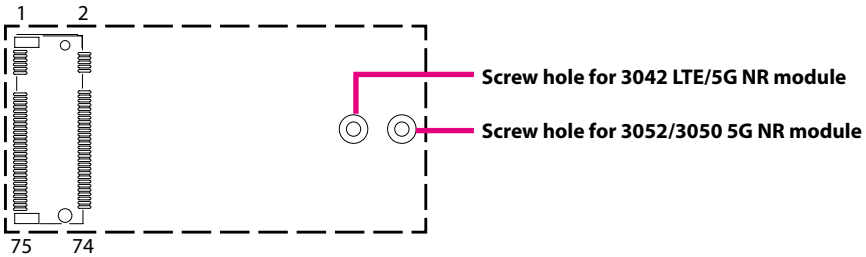



| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | GND | 2 | +V3.3A |
| 3 | USB_D+ | 4 | GND |
| 5 | USB_D- | 6 | M2E_LED1# |
| 7 | GND | 8 | NC |
| 9 | NC | 10 | NC |
| 11 | NC | 12 | NC |
| 13 | NC | 14 | NC |
| 15 | NC | 16 | M2E_LED2# |
| 17 | NC | 18 | GND |
| 19 | NC | 20 | NC |
| 21 | NC | 22 | NC |
| 23 | NC | 32 | NC |
| 33 | GND | 34 | NC |
| 35 | PCIE0_TXP | 36 | NC |
| 37 | PCIE0_TXN | 38 | NC |
| 39 | GND | 40 | GND |

| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 41 | PCIE0_RXP | 42 | NC |
| 43 | PCIE0_RTXN | 44 | NC |
| 45 | GND | 46 | NC |
| 47 | PCIE0_REFCLKP | 48 | NC |
| 49 | PCIE0_REFCLKN | 50 | M2E_SUSCLK(NC_BOM Option) |
| 51 | GND | 52 | PERST0# |
| 53 | CLKREQ0# | 54 | M2E_BT_DISABLE# |
| 55 | GND | 56 | M2E_WIFI_DISABLE |
| 57 | GND | 58 | M2E_SM1_D |
| 59 | PCIE1_TXP | 60 | M2E_SM1_C |
| 61 | PCIE1_TXN | 62 | M2E_I2C_ALERT# |
| 63 | GND | 64 | NC |
| 65 | PCIE1_RXP | 66 | PERST1# |
| 67 | PCIE1_RXN | 68 | CLKREQ1# |
| 69 | GND | 70 | NC |
| 71 | PCIE_REFCLKP | 72 | +V3.3A |
| 73 | PCIE1_REFFLKN | 74 | +V3.3A |
| 75 | GND | | |

## M.2 3042/3050/3052 Key B Socket (USB 2.0, USB 3.2 Gen2) for LTE/5G NR Module with 2 x External Micro-SIM

Connector location: WWAN, CN18
SIM socket: SIM1 (CN19), SIM2 (CN6)

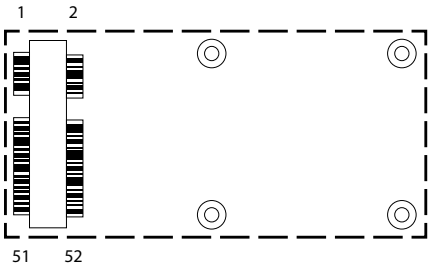



| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | M2A_CONFIG3 | 2 | +V3.3A |
| 3 | GND | 4 | +V3.3A |
| 5 | GND | 6 | M2B1_POWER_OFF# |
| 7 | USB_P | 8 | M2A_W1_DIS# |
| 9 | USB_N | 10 | WWAN1_LED# |
| 11 | NC | 20 | WWAN1_BUS_SEL |
| 21 | M2A_CONFIG0 | 22 | VUSB_DET |
| 23 | SMS1_R1_3.5G | 24 | EM9190_P1 |
| 25 | NC | 26 | M2A_W2_DIS# |
| 27 | GND | 28 | PLA_S2# |
| 29 | USB3_RXN | 30 | UIM1_RST |
| 31 | USB3_RXP | 32 | UIM1_CLK |
| 33 | GND | 34 | UIM1_DAT |
| 35 | USB3_TXN | 36 | UIM1_PWR |
| 37 | USB3_TXP | 38 | EM9190_P2 |
| 39 | GND | 40 | SIM2_DETECT |

| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 41 | NC | 42 | UIM2_DAT(NC_BOM Option) |
| 43 | NC | 44 | UIM2_CLK (NC_BOM Option) |
| 45 | GND | 46 | UIM2_RST (NC_BOM Option) |
| 47 | NC | 48 | UIM2_PWR (NC_BOM Option) |
| 49 | NC | 50 | W1_PERST# (NC_BOM Option) |
| 51 | GND | 52 | NC |
| 53 | NC | 54 | M2A_PEWAKE# |
| 55 | NC | 56 | M2B1_SM1_D |
| 57 | GND | 58 | M2B1_SM1_C |
| 59 | NC | 60 | NC |
| 61 | NC | 62 | NC |
| 63 | NC | 64 | NC |
| 65 | NC | 66 | SIM1_DETECT |
| 67 | P1_3.5G_RST# | 68 | M2A_SUSCLK |
| 69 | M2A_CONFIG1 | 70 | +V3.3A |
| 71 | GND | 72 | +V3.3A |
| 73 | GND | 74 | +V3.3A |
| 75 | M2A_CONFIG2 | | |

## Full Size Mini-PCIe Socket (USB 2.0, PCIe 3.0/SATA 3.0)

Connector location: WLAN, CN7




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | NC | 2 | +V3.3A |
| 3 | NC | 4 | GND |
| 5 | NC | 6 | +V1.5S |
| 7 | PCIE_CLKREQ# | 8 | NC |
| 9 | GND | 10 | NC |
| 11 | PCIE_CLKN | 12 | NC |
| 13 | PCIE_CLKP | 14 | NC |
| 15 | GND | 16 | NC |
| 17 | NC | 18 | GND |
| 19 | NC | 20 | MINIPCIE_DIS# |
| 21 | GND | 22 | P3_RST# |
| 23 | PCIE_RXN | 24 | +3.3A |
| 25 | PCIE_RXP | 26 | GND |

| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 27 | GND | 28 | +V1.5S |
| 29 | GND | 30 | NC |
| 31 | PCIE_TXN | 32 | NC |
| 33 | PCIE_TXP | 34 | GND |
| 35 | GND | 36 | USB_D- |
| 37 | GND | 38 | USB_D+ |
| 39 | +V3.3A | 40 | GND |
| 41 | +V3.3A | 42 | PCIE_WWAN(NC_BOM Option) |
| 43 | NC | 44 | PCIE_WLAN |
| 45 | NC | 46 | NC |
| 47 | NC | 48 | +V1.5S |
| 49 | NC | 50 | GND |
| 51 | MSATA_DET# | 52 | +V3.3A |

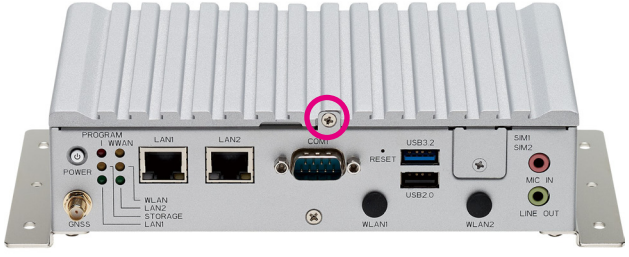
# Chapter 4: System Setup

## Removing the Top Cover for SO-DIMM and WWAN Module Installation

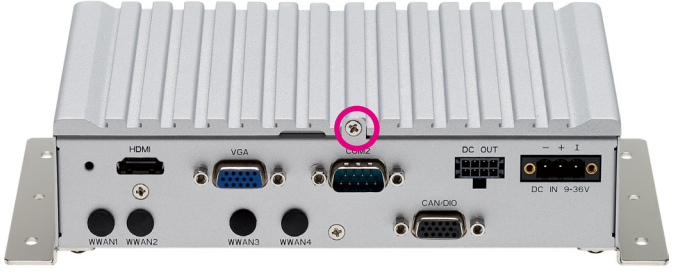
### Opening the Enclosure


Prior to removing the chassis cover, make sure the unit's power is off and disconnected from the power sources to prevent electric shock or system damage.

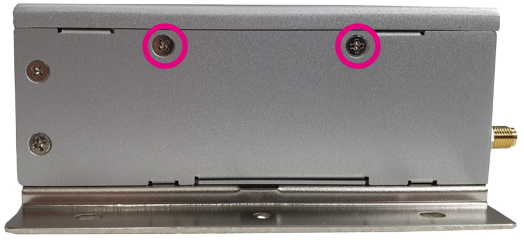
1. Remove the screws on the front panel.




2. Remove the screw on the rear panel.




3. Remove the screw on the double side chassis then remove the top cover.

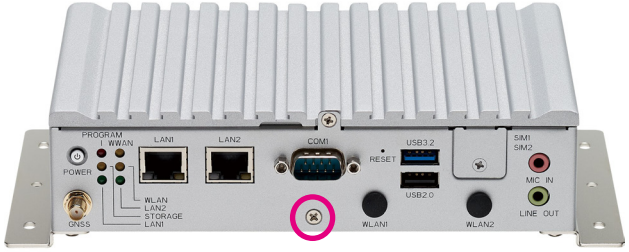


# Removing the Bottom Cover for SSD/HDD Drive, WLAN Module (M.2, mPCIe), and mSATA Module Installation

## Opening the Enclosure

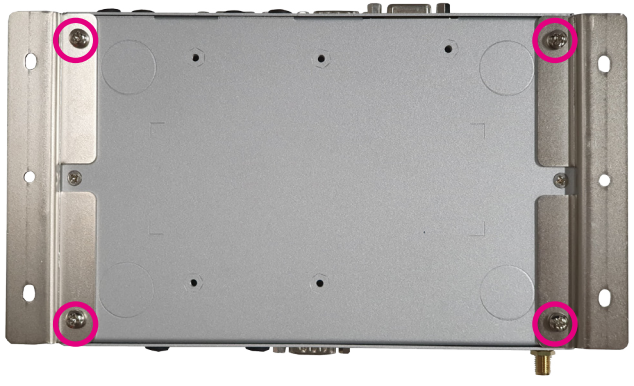

Prior to removing the chassis cover, make sure the unit's power is off and disconnected from the power sources to prevent electric shock or system damage.

1. Remove the screws on the front panel.

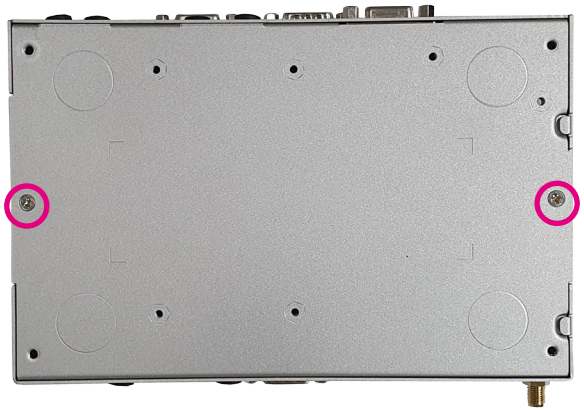



2. Remove the screw on the rear panel.


3. Remove the mounting bracket screws on the bottom of the enclosure.



4. After removing the brackets, loosen the screws on the bottom then remove the bottom cover.

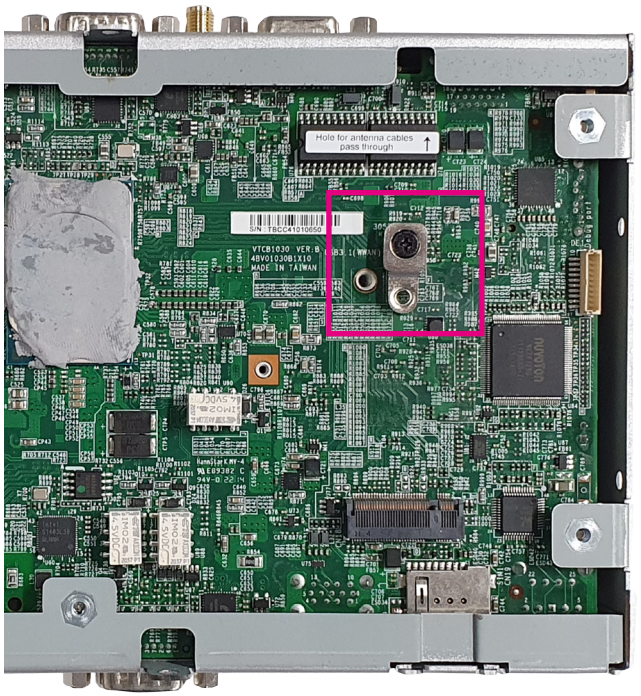


## Installing a SO-DIMM

1. Push the ejector tabs which are at the ends of the socket outward. Then insert the module into the socket at an approximately 30 degrees angle. Apply firm even pressure to each end of the module until it slips down into the socket. The contact fingers on the edge of the module will almost completely disappear inside the socket.

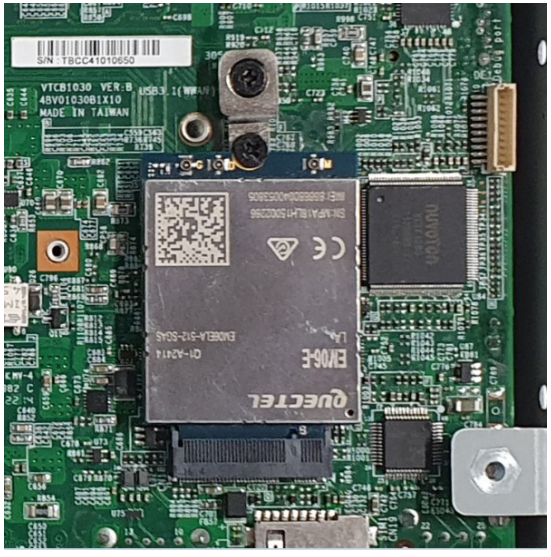

## Installing the WWAN Module (M.2)

1. Locate the WWAN M.2 slot (CN18). For M.2 3042 modules, place a small module bracket over the mounting hole first and secure it with a screw in package (users installing M.2 3050/3052 modules can skip this step).



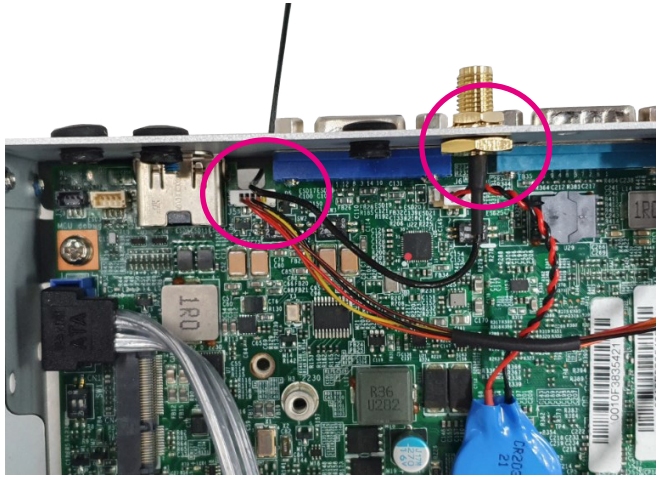
2. Insert the module into the M.2 slot at a 45 degrees angle until the gold-plated connector on the edge of the module completely disappears inside the slot. Then fasten a screw in package into the mounting hole to secure the module.

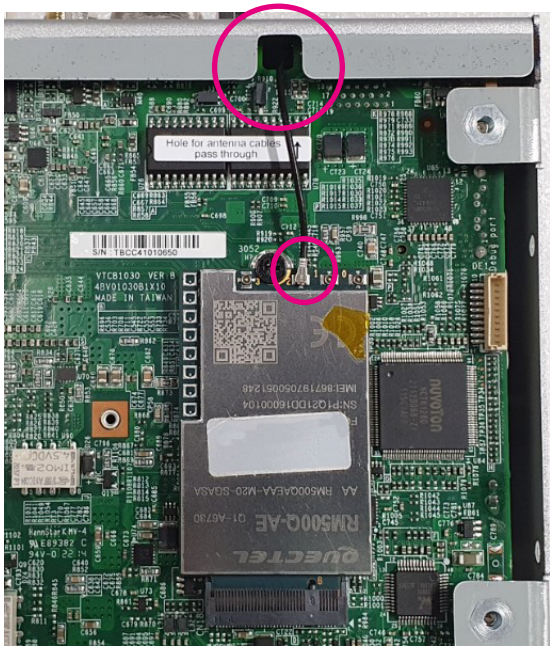
**M.2 3042**




**M.2 3050/3052**

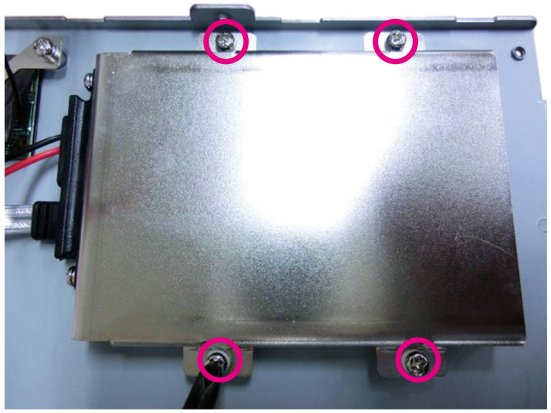
3. The antenna cable connector is installed on the back panel of chassis (the other side of board). The pigtail should be pass through the hole of board shown as below and connected to WWAN module. (Bottom cover should be removed first)





# Installing a SSD/HDD Drive

1. Loosen the mounting screws on the hard drive bracket and remove it from the bottom cover.



2. Insert the hard drive into the hard drive bracket. Align the hard drive's mounting holes with the mounting holes on the hard drive bracket, and use the provided screws to secure the hard drive in place.

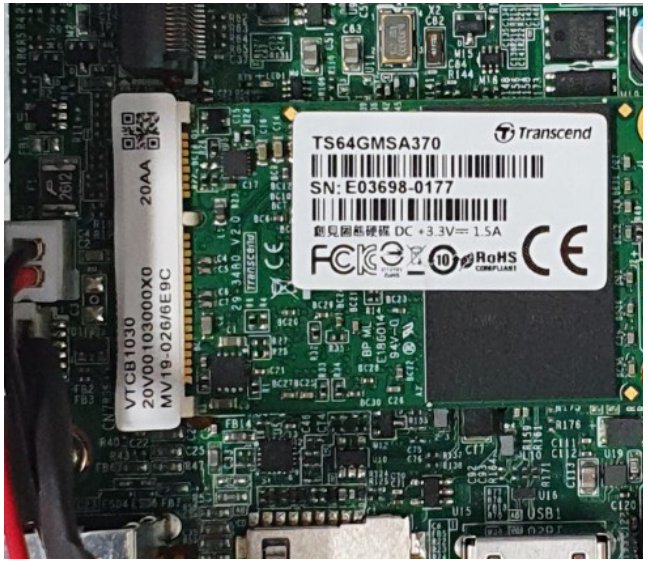
# Installing a WLAN Module

1. Locate the WLAN Mini PCI Express slot (CN7). Insert the module into the Mini PCI Express slot at a 45 degrees angle until the gold-plated connector on the edge of the module completely disappears inside the slot. Then fasten screws into the mounting holes to secure the module.

2. Locate the WLAN M.2 slot (CN4). Insert the module into the M.2 slot at a 45 degrees angle until the gold-plated connector on the edge of the module completely disappears inside the slot. Then fasten screws into the mounting holes to secure the module.

## Installing a mSATA Module

1. Locate the Mini PCI Express slot (CN7). Insert the module into the Mini PCI Express slot at a 45 degrees angle until the gold-plated connector on the edge of the module completely disappears inside the slot. Then fasten screws into the mounting holes to secure the module.




## Installing a SIM Card

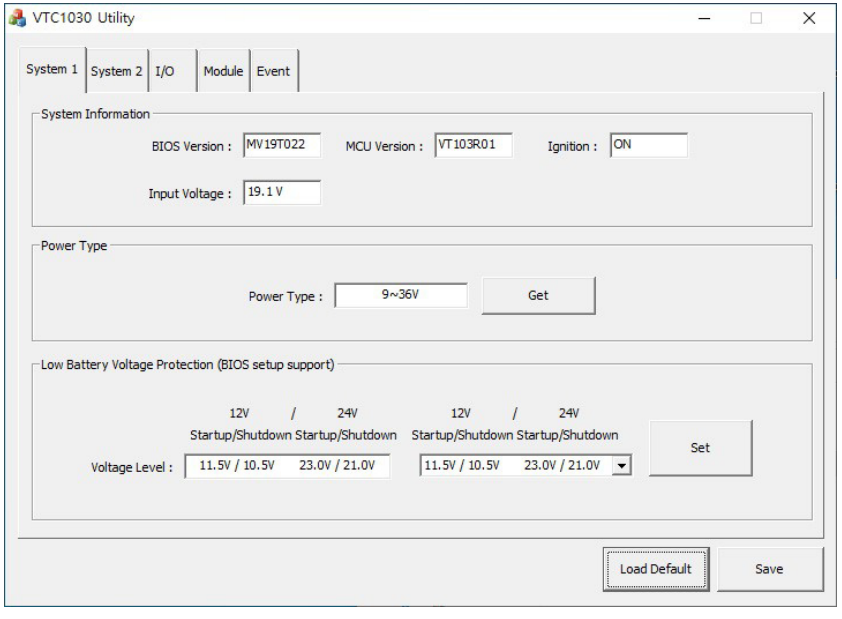
1. Remove the SIM card cover on the front panel and insert the SIM cards. Please take note of the SIM card installation direction as shown in the following pictures.

# Appendix A:
# Software Demo Utility for I/O Ports of Function Control

NEXCOM developed a software demo utility to let users test and control different I/O port functions on VTC1030/nROK1030. This document shows how to use the utility.
There are also the source code files of utility in official website. Users can refer to the source codes to develop their applications.

## Menu Screen

### System 1



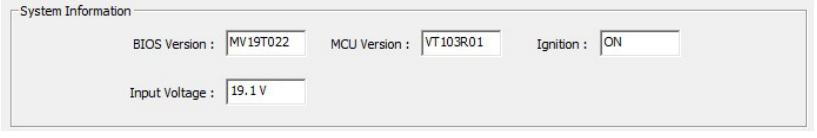
# 1. Config1

## 1.1 System Info

BIOS Version: Shows the BIOS Version.
MCU Version: Shows the MCU Version.
Ignition: Shows the signal of ignition.

- ON: Signal of ignition is high.
- OFF: Signal of ignition is low.

Input Voltage: Shows the voltage level of power-in.



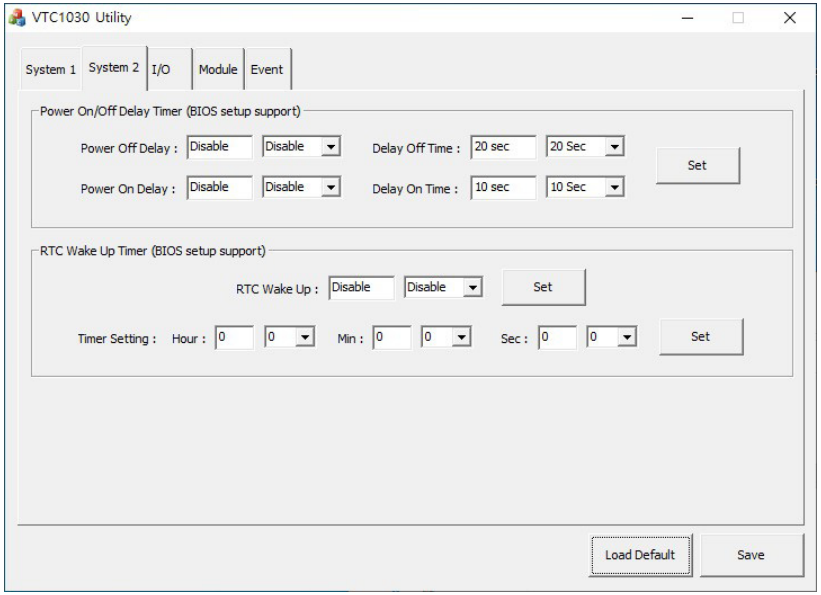

## 1.2 Power Type

Shows the setting of input voltage in DIP switch
If the setting is 12V: 12V is shown.
If the setting is 24V: 24V is shown.
If the setting is 9V~36V: 9V~36V is shown.


## 1.3 Low Battery Voltage Protection

Sets the Low Battery Voltage Protection Startup/Shutdown voltage level during 12V/24V

## System 2

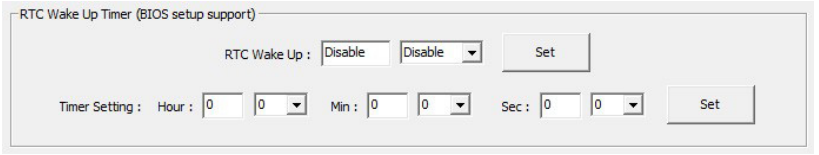



### 2.1 Power ON/OFF Delay Timer

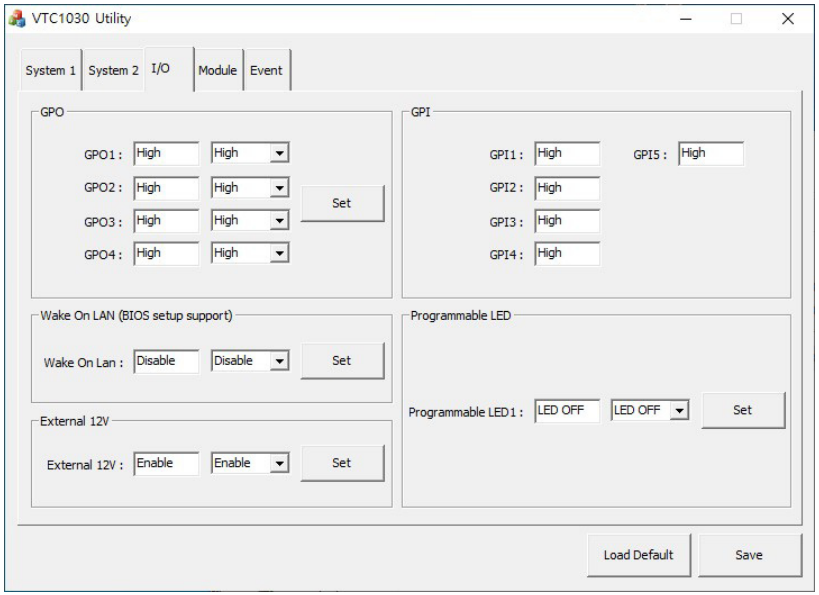
Enables or disables the delay time function. There are several options of delay time.


### 2.2 RTC Wake Up Timer

Enables or disables the Alarm wake up function. The timer setting of Alarm Timer can be configured.

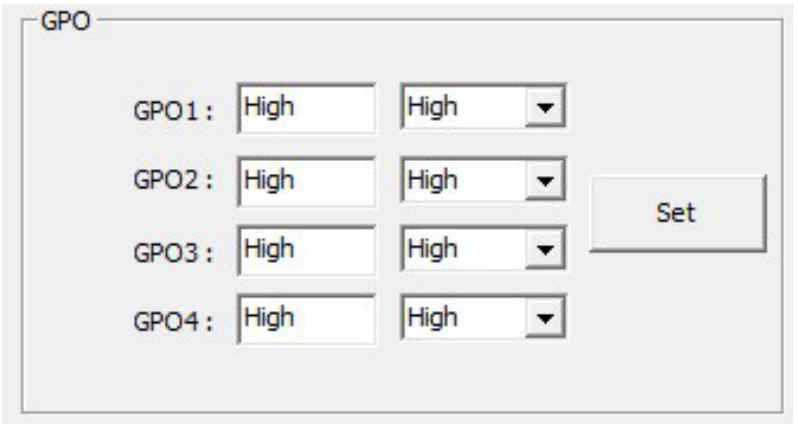


## I/O



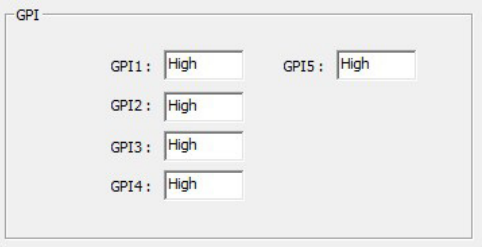

### 3.1 GPO

Defines GPO port as High or Low.



### 3.2 GPI

Get GPI port as High or Low.

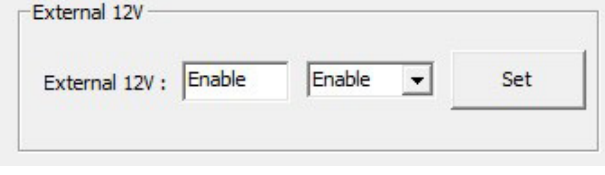



### 3.3 WAKE ON LAN

Enables or disables the Wake on LAN function.

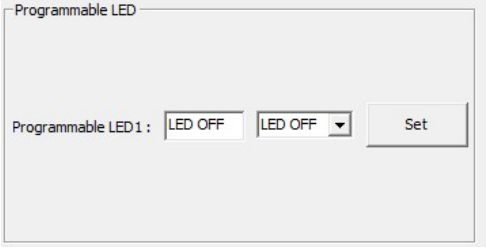

### 3.4 External 12V

Enables or disables external power output.

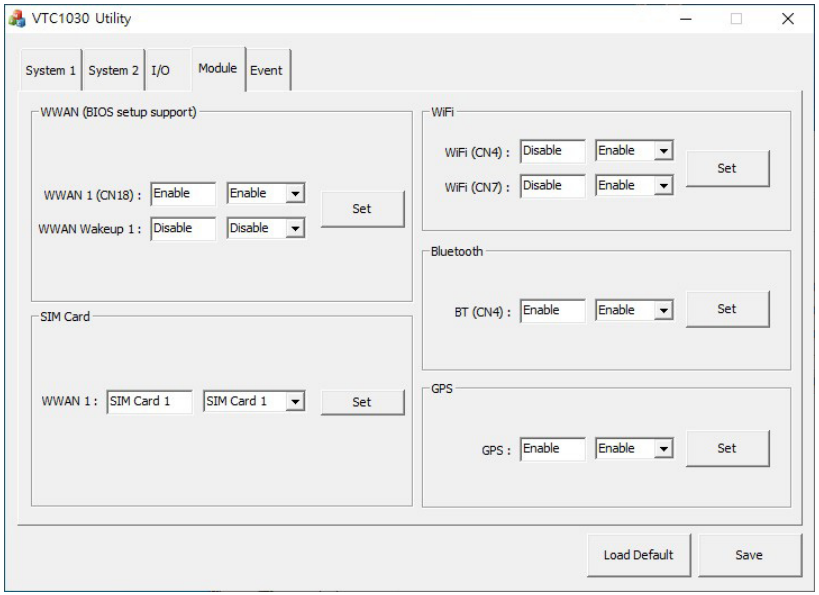



### 3.5 Programmable LED

Defines Program LED as ON or OFF.

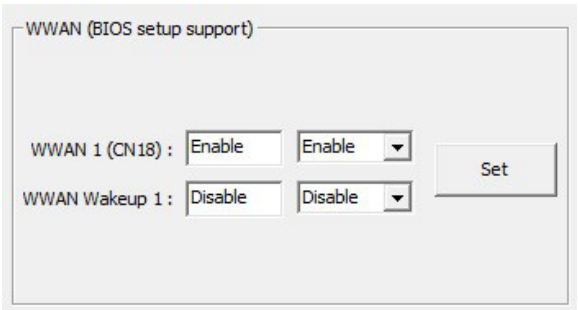


## Module



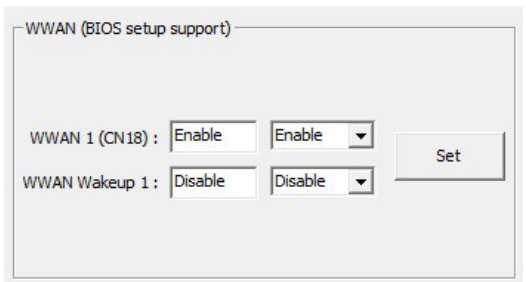

### 4.1 WWAN

Enables or disables the WWAN function on CN18
Enables or disables the WWAN wakeup function
The setting can also be cleared by the Set button.




### 4.2 SIM Card

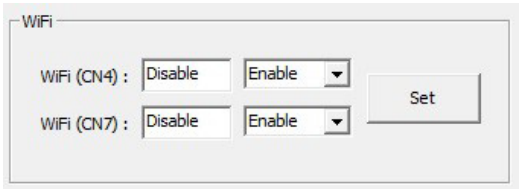
Selects your SIM card setting on WWAN is from SIM Card1 or SIM Card2.



### 4.3 WiFi

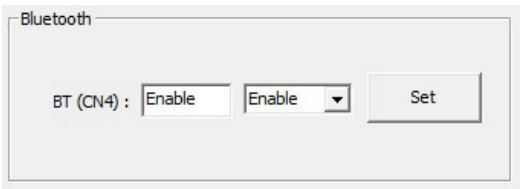
Enables or diables the Wi-Fi module function on CN4 M.2 socket.

Enables or disables the Wi-Fi module function on CN7 Mini-PCIe socket.



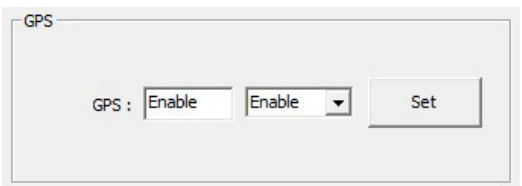

### 4.4 Bluetooth

Enables or disables the Bluetooth function on CN4 M.2 socket.

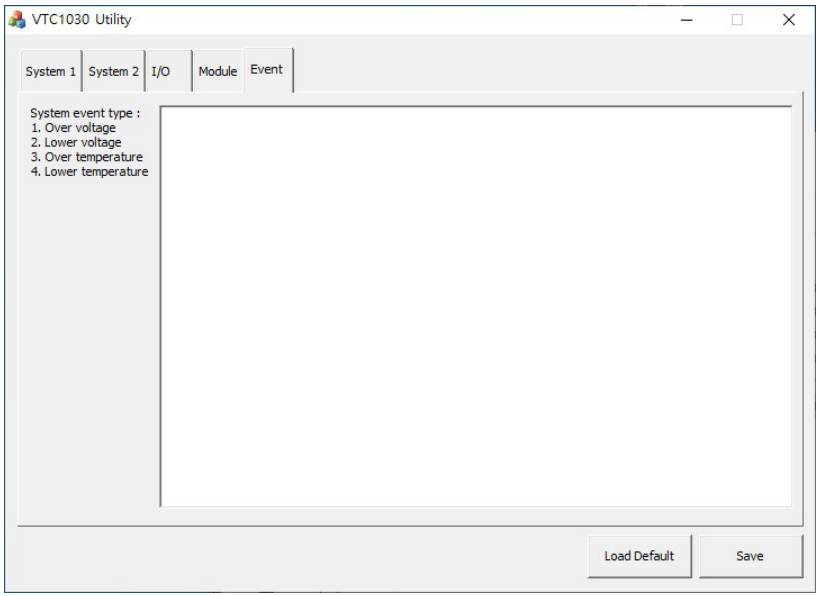



### 4.5 GPS

Enables or disables the GPS function.




### Event




**Shows the Event of VTC1030/nROK1030**

(Information)

Date: YYMMDD

Time: HHMMSS

GPS Status: 0: Searching 1: Fixed

GPS Latitude

GPS Longitude

G Sensor X value: 0 ~ 65535

G Sensor Y value: 0 ~ 65535

G Sensor Z value: 0 ~ 65535

**Activation Time**: Define when tracker function starts after ignition signal becomes low.

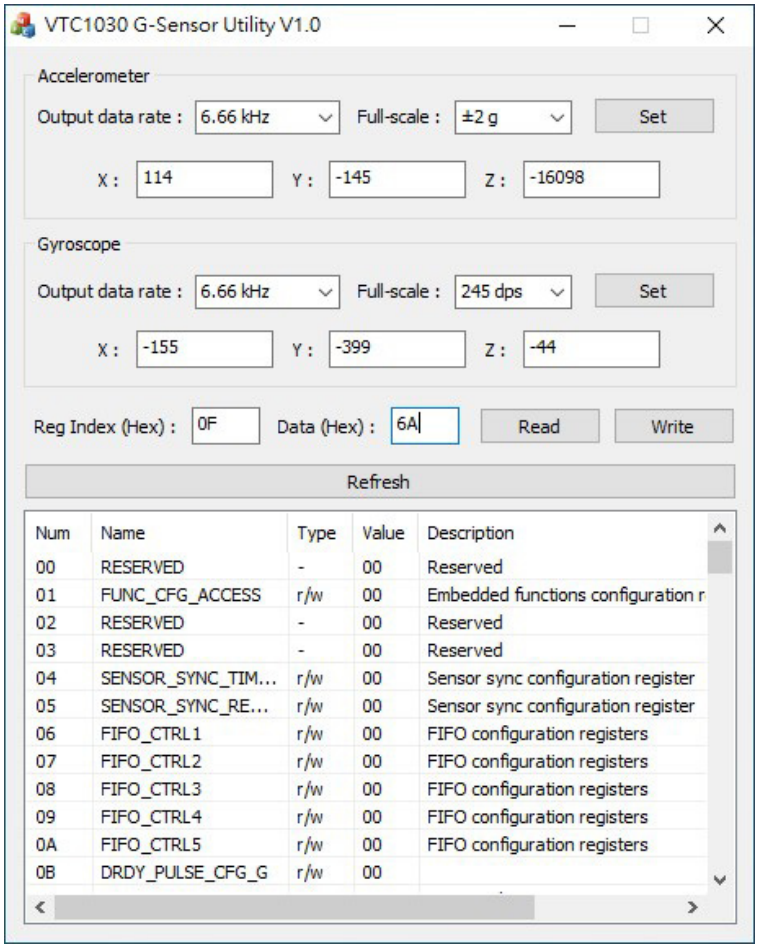
**Send Period**: Define the interval time to send the information to server, when Tracker Mode is "Continue".

**Acceleration Force**: Define the value of G-sensor that triggers the event.

**Tilt Angle**: Define the value of tilt angle that triggers the event.

**IMEI**: IMEI of WWAN module will be shown.

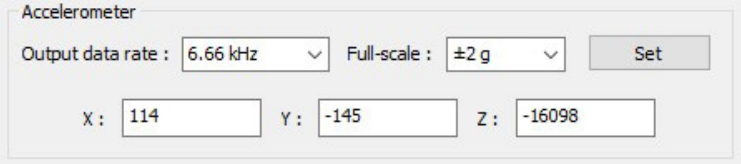
## G-Sensor



## 7.1 Accelerometer

Set Output data rate and Full-scale for accelerometer.

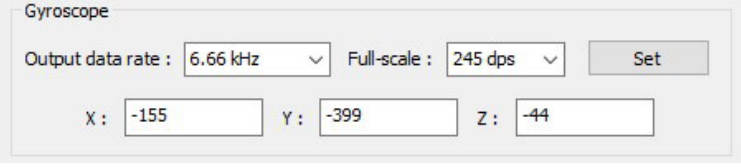
Read the data from accelerometer.




## 7.2 Gyroscope

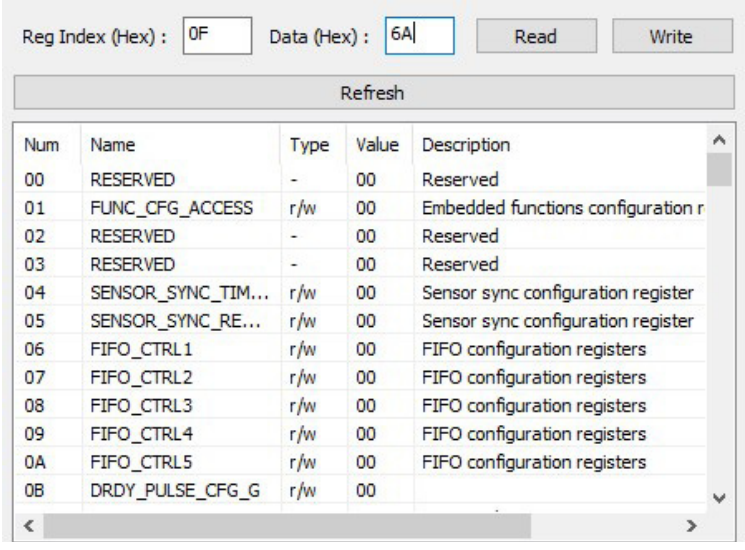
Set Output data rate and Full-scale for gyroscope.

Read the data from gyroscope.

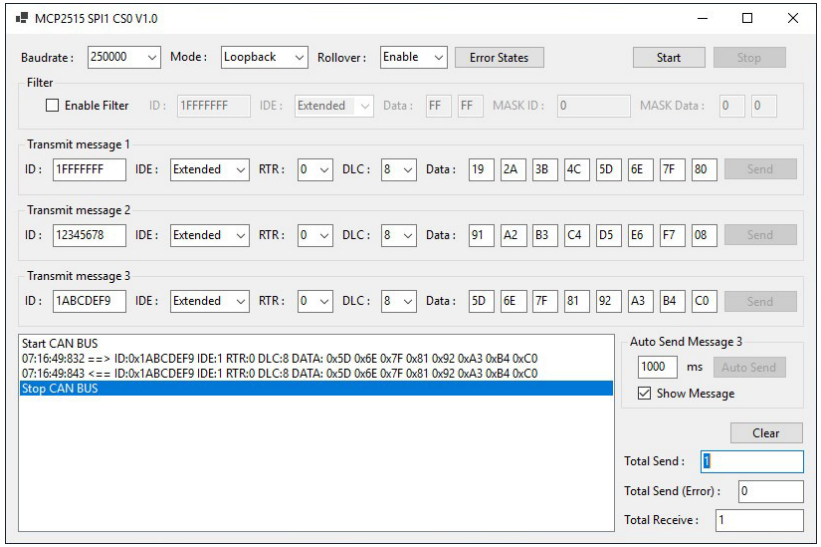



## 7.3 Register Table

Shows the value of all registers in accelerometer and gyroscope, once the Refresh button is pressed.



## CAN Bus




Defines Baudrate.

Defines Mode as the following options.

1. Normal : Send data
2. Sleep : Power saving mode
   (wake up automatically when data is received)
3. Loopback : Self-test mode
4. Listen-Only : Only receive data, including receiving wrong data

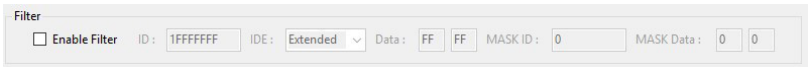
Defines Rollover as the following options.

1. Enable: Receive buffer 1 and buffer 2 data
2. Disable: Only receive buffer data

Error States for showing error states.

Start button: After the setting is completed, press the Start button to start sending data

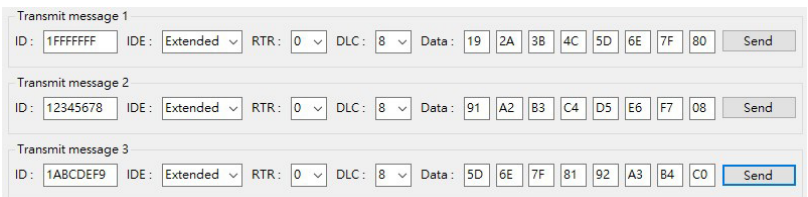
Stop button: Stop sending data



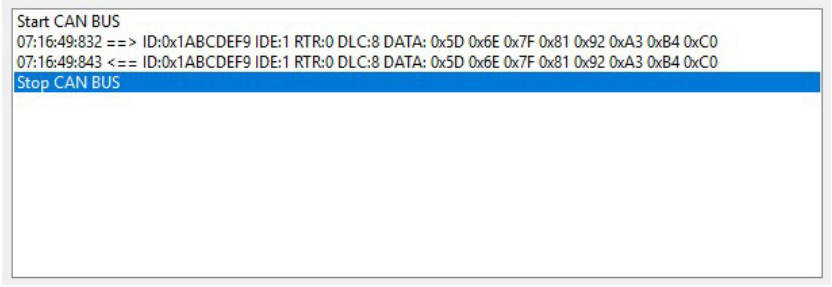

Check Enable Filter to enable the filter

Defines IDE as the following options.

1. Standard (11Bit ID, with Data1, and Data2).
2. Extended (29Bit ID).




Transmit message: 3 groups of transmit buffers.



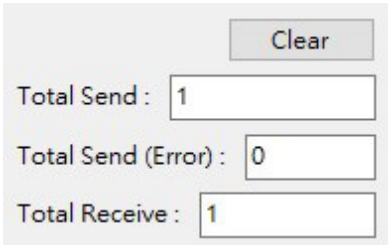

Data display area

"==>": Sending data.

"<==": Receiving data.


The setting of period (ms) for automatic data sending. Press the Auto Send button to send the data automatically (Transmit message 3 data).

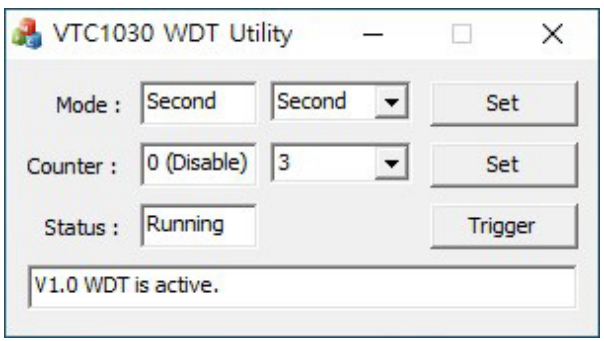
Check Show Message to display the sent information. If not check, it will not display.




Count area for sending data.

Press the Clear button to reset the count to 0.

### Watchdog Timer




Defines Mode as Second or Minute.

Defines Counter from 1 to 255. 0 is default.

Status of watchdog timer.

Press Trigger button for reboot.

# Appendix B: GNSS Feature

## u-Blox NEO-M9N Overview

The NEO-M9N module is built on the robust u-blox M9 GNSS chip, which provides exceptional sensitivity and acquisition times for all L1 GNSS systems. The u-blox M9 standard pre- cision GNSS platform, which delivers meter-level accuracy, succeeds the well-known u-blox M8 product range.

NEO-M9N supports concurrent reception of four GNSS. The high number of visible satellites enables the receiver to select the best signals. This maximizes the position accuracy, in particular under challenging conditions such as in deep urban canyons.

NEO-M9N detects jamming and spoofing events and reports them to the host, so that the system can react to such events. Advanced filtering algorithms mitigate the impact of RF inter- ference and jamming, thus enabling the product to operate as intended.
A SAW filter combined with an LNA in the RF path is integrat- ed in the NEO-M9N module. This setup allows normal opera- tion even under strong RF interferences, for example when a cellular modem is co-located with NEO-M9N.

NEO-M9N offers backwards pin-to-pin compatibility with pre- vious u-blox generations, which saves designers time and cost when upgrading their design. Software migration requires lit- tle effort thanks to the continuous support of UBX messages across product generations.

## Technical Specifications

### Product performance

| | | |
|---|---|---|
| **Receiver type** | 92-channel u-blox M9 engine<br>GPS L1 C/A, QZSS L1 C/A/S, GLONASS L10F<br>BeiDou B1I, Galileo E1B/C<br>SBAS L1 C/A: WAAS, EGNOS, MSAS, GAGAN | |
| **Nav. update rate** | Up to 25 Hz (4 concurrent GNSS) | |
| **Horizontal position accuracy** | 1.5 m CEP (with SBAS)<br>2.0 m CEP (without SBAS) | |
| **Acquisition[1]** | Cold start:<br>Aided start:<br>Hot start: | 24 s<br>2 s<br>2 s |
| **Sensitivity[1]** | Tracking & Nav.<br>Reacquition<br>Cold start<br>Hot start | -167 dBm<br>-160 dBm<br>-148 dBm<br>-159 dBm |

## Tracking features

| | |
|---|---|
| **Power save modes** | On/off, cyclic |
| **Data batching** | Autonomous tracking up to 5 minutes |
| **Data-logger** | Position, velocity, time and odometer data |
| **Geofencing** | Up to 4 circular areas;<br>software message or GPIO for waking up the host CPU |

## Security features

| | |
|---|---|
| **Signal integrity** | RF interference & jamming detection and reporting<br>Active GNSS in-band filtering<br>Spoofing detection and reporting |
| **Device integrity** | Secure boot of firmware downloaded from host or flash |
| **Secure interface** | Signed UBX messages (SHA-256)<br>JTAG port locked |

## Electrical data

| | |
|---|---|
| **Power supply** | 2.7 V to 3.6 V |
| **Power Consumption[1]** | 36 mA at 3.0 V (4 GNSS continous)<br>32 mA at 3.0 V (2 GNSS continous)<br>28 mA at 3.0 V (1 GNSS continous) |
| **Backup Supply** | 1.65 V to 3.6 V |

## Interfaces

| | |
|---|---|
| **Serial interfaces** | 1 UART<br>1 USB (NEO-M9N)<br>1 SPI (optional)<br>1 DDC (I2C compliant) |
| **Digital I/O** | Configurable timepulse<br>1 EXTINT input for Wakeup |
| **Raw Data output** | Code phase data |
| **Timepulse** | Configurable: 0.25 Hz to 10 MHz |
| **Supported antennas** | Active and passive |
| **Protocols** | NMEA 4.10, UBX binary, RTCM 3.3 |

# VIOB-GPS-06 Module and Computer Connector Pin Definitions


J2 (GNSS Side)


J1 (Computer Side)

## J2 Pin Definition

| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | GPS_3V3 | 2 | GND |
| 3 | GPS_TXD_M | 4 | GPS_RXD_M |
| 5 | NC | 6 | +V3.3ALW |

## J1 Pin Definition

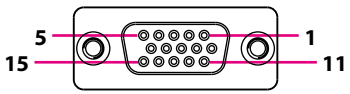
| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | 3.3V_BAT | 2 | NC |
| 3 | TX | 4 | RX |
| 5 | GND | 6 | 3.3V |

## COM Port for GNSS: COM 4
## Baud Rate: 38400

# Appendix C: Signal Connection of DI/DO

## Multi Port Pinout Description

Connector location: CN2

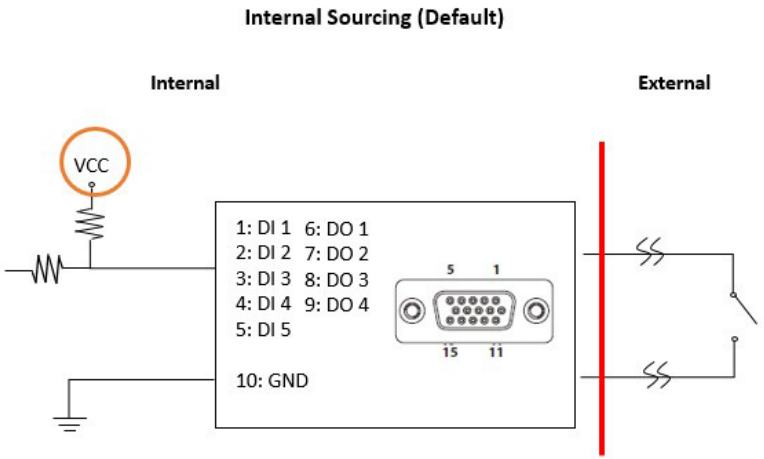



| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | GPI-1 | 2 | GPI-2 |
| 3 | GPI-3 | 4 | GPI-4 |
| 5 | GPI-5 | 6 | GPO-1 |
| 7 | GPO-2 | 8 | GPO-3 |
| 9 | GPO-4 | 10 | GND |
| 11 | | 12 | |
| 13 | | 14 | |
| 15 | | | |

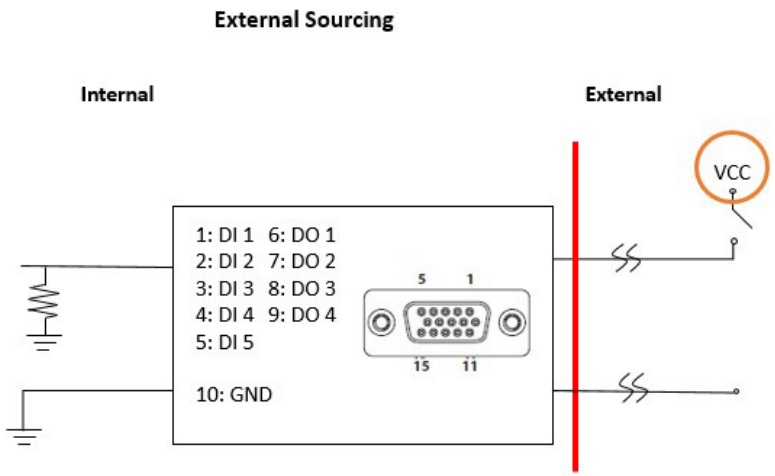
# Digital Input

The GPIO connector (DIO, connector number: 20 for GPI signal (digital signal input)). The GPIO connector has 5 digital input channels by default.

Wet Contact (default)
The SW6 switch needs to switch to "ON" state. The GPI signals have a pull up resistor to Vin Voltage internally.
The figure below shows how to connect an external source to one of the input channels.




Dry Contact:
The SW6 switch needs to switch to "OFF" state. The GPI signal will not have a pull up resistor internally.
The figure below shows how to connect an external source to one of the input channels.

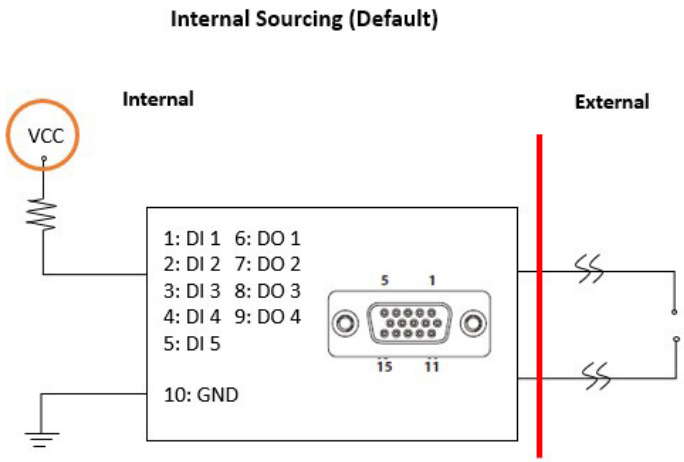


# Digital Output

The GPIO connector (DIO, connector number: 20 for GPO signal (digital signal output). The GPIO connector has 4 digital output channels by default.
The signal connection of GPIO supports two connected methods for output signal type. One is Low level (driven to 0V from GPO signal) other is High level (high voltage is provided from external device).

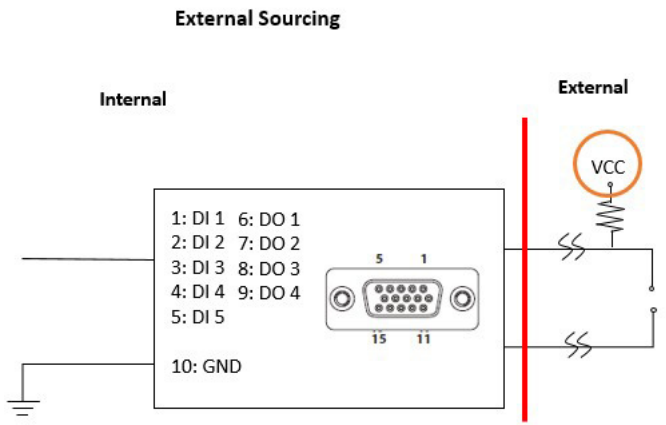
Wet Contact (default)
The SW6 switch needs to switch to "ON" state. The GPO signal will have a pull up resistor to Vin Voltage internally.

The figure below shows how to connect an external source to one of the output channels.




Dry Contact

The SW6 switch needs to switch to "OFF" state. The GPO signal will not have a pull up resistor internally.
The figure below shows how to connect an external source to one of the output channels.



# Appendix D: Vehicle Power Management Setup

## Power-on Delay Setting

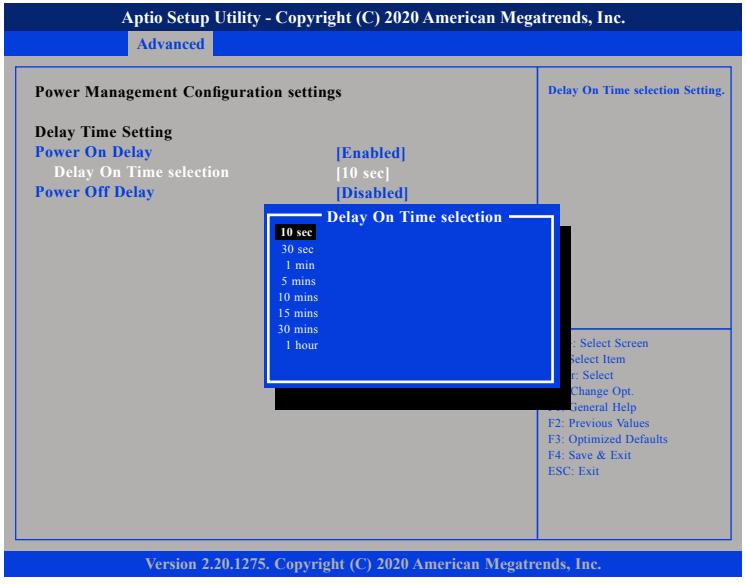
### Disable Power-on Delay

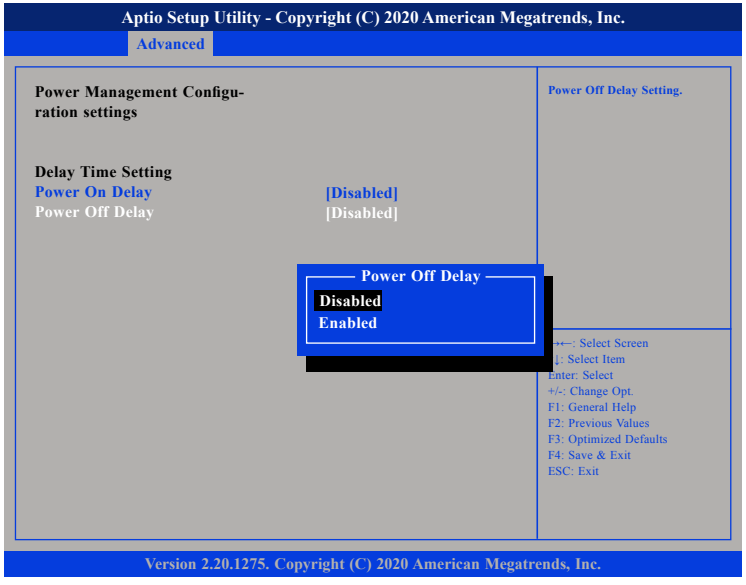

### Enable Power-on Delay

Delay time can be set at 10sec/30sec/1min./5min./10min./15min./30min./1hour.

# Power-off Delay Setting

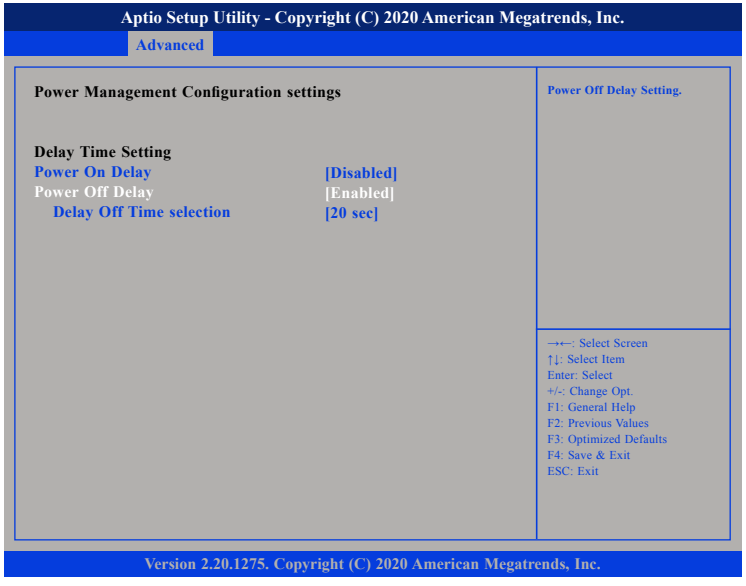
## Disable Power-Off Delay

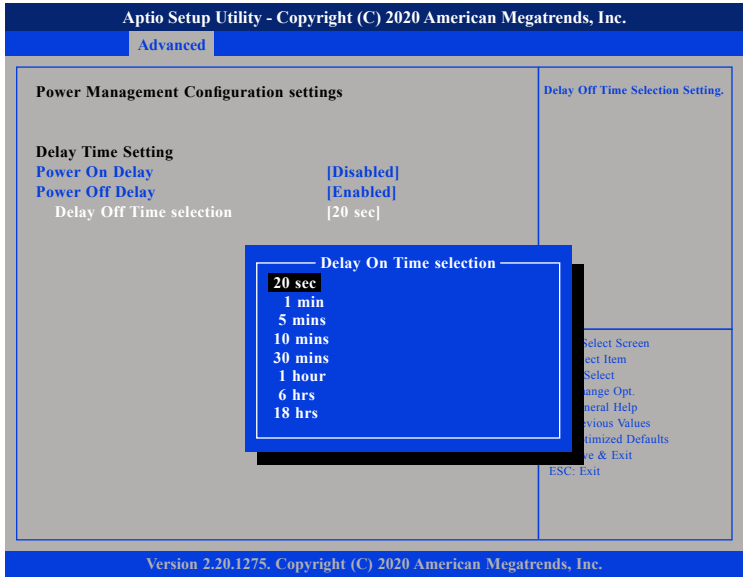


### Enable Power-off Delay

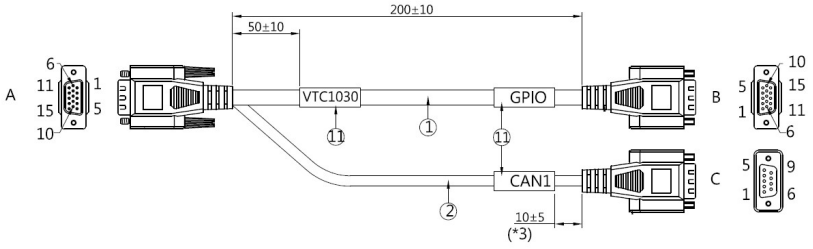
Delay time can be set at 20sec/1min./5min./10min./30min./1hour/6hour/ 18hour.



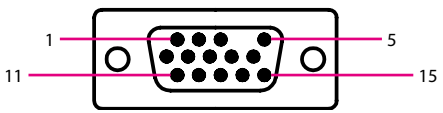



# Appendix E: Pin Definition for the Multiport Cable

**CAN/DIO**: The multiport consists of 15-pin male DB15 connector and multiple output connector. The tables in this appendix list the pin signals of the A connector and its corresponding pin signals to the output connector.

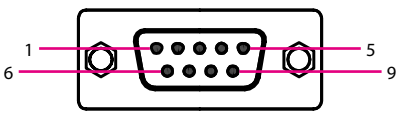
# A Connector Pinout




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | GPI-1 | 2 | GPI-2 |
| 3 | GPI-3 | 4 | GPI-4 |
| 5 | GPI-5 | 6 | GPO-1 |
| 7 | GPO-2 | 8 | GPO-3 |
| 9 | GPO-4 | 10 | GND |
| 11 | CAN_GND | 12 | CAN-L |
| 13 | CAN-H | 14 | |
| 15 | | | |

# B Connector Pinouts

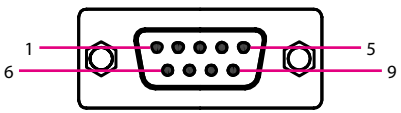
GPIO Connector: B




| A Pin | B Pin | Definition |
|---|---|---|
| 1 | 1 | GPI-1 |
| 2 | 2 | GPI-2 |
| 3 | 3 | GPI-3 |
| 4 | 4 | GPI-4 |
| 5 | 5 | GPI-5 |
| 6 | 6 | GPO-1 |
| 7 | 7 | GPO-2 |
| 8 | 8 | GPO-3 |
| 9 | 9 | GPO-4 |
| 10 | 10 | GND |

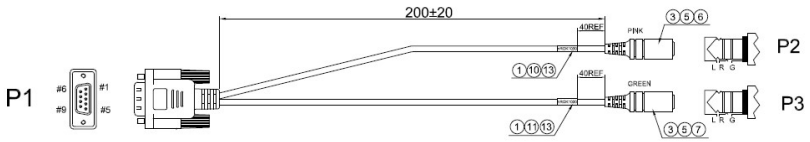
## C Connector Pinouts

GPIO Connector: C

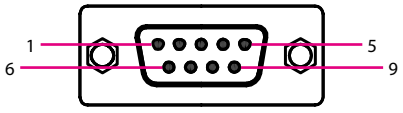



| A Pin | C Pin | Definition |
|---|---|---|
| 11 | 2 | CAN_GND |
| 12 | 5 | CAN-L |
| 13 | 3 | CAN-H |

**Audio**: The multiport consists of a 9-pin male connector and multiple output connectors. The tables in this appendix list the pin signals of the P1 connector and its corresponding pin signals to the output connectors.

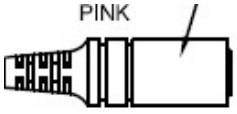
# P1 Connector Pinout




| Pin | Definition | Pin | Definition |
|---|---|---|---|
| 1 | AGND | 2 | MIC_L |
| 3 | MIC_JD | 4 | FRONT_JD |
| 5 | FRONT_L | 6 | FRONT_R |

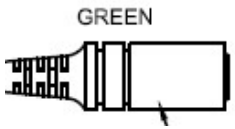
# P2 to P3 Connector Pinouts

Phone Connector: P2




| P1 Pin | P2 Pin | Definition |
|---|---|---|
| 1 | G | AGND |
| 2 | L | MIC_L |
| 3 | G | MIC_JD |

Phone Connector: P3




| P1 Pin | P2 Pin | Definition |
|---|---|---|
| 4 | G | FRONT_JD |
| 5 | L | FRONT_L |
| 6 | R | FRONT_R |

# Appendix F: Power Consumption

Note: The external power supply power consumption is suggested 2 times of system power consumption. Please refer to the following table for system power consumption in different situations.

| Idle | Full | Full+Load |
|---|---|---|
| Into OS<br>Display x2<br>Key Board & Mouse<br>Audio<br>All Storage (Storage x 2 Total 7w)<br>Module (WLAN module x 2, WWAN module x 1) | Idle Status<br>Module (WWAN module x 1, WLAN module x 1)<br>Mini Card Dummy Load (4.36 w)<br>Burn In 100% (CPU + 2D + 3D + Disk + Sound + RAM + Video Playback + GPU) play video<br>COM trans (COM1 + COM2)<br>GNSS link | Full Status<br>USB dummy Load 3.0 (5V/0.9A x1)<br>USB dummy Load 2.0 (5V/0.5A x2) |

| Item | Device | Test Case | | Result | | | |
|---|---|---|---|---|---|---|---|
| | | | | Average | | Maximus | |
| | | | | Current(A) | Watt(W) | Current(A) | Watt(W) |
| 1 | S0 state<br><br>Elkhart Lake x6211E<br><br>6W, 1.3GHz / 3.0GHz(burst) | Idle State | 12V | 1.04 | 12.48 | 1.59 | 19.08 |
| | | | 24V | 0.52 | 12.48 | 0.71 | 17.04 |
| | | | 36V | 0.38 | 13.68 | 0.46 | 16.56 |
| | | Full State (Burn-In) | 12V | 1.62 | 19.44 | 1.82 | 21.84 |
| | | | 24V | 0.81 | 19.44 | 1.06 | 25.44 |
| | | | 36V | 0.58 | 20.88 | 0.69 | 24.84 |
| | | Full State + Loading | 12V | 2.39 | 28.68 | 2.78 | 33.36 |
| | | | 24V | 1.25 | 30 | 1.42 | 34.08 |
| | | | 36V | 0.81 | 29.16 | 1.02 | 36.72 |
| 2 | S3 state | Full state Sleep mode | 12V | 0.015 | 0.18 | N/A | N/A |
| | | | 12V wake up WWAN | 0.312 | 3.744 | N/A | N/A |
| 3 | IGN OFF | Full state IGNITION OFF | 12V | 0.002 | 0.024 | N/A | N/A |
| | | | 12V wake up WWAN | 0.016 | 0.192 | N/A | N/A |
| | | | 24V | 0.002 | 0.048 | N/A | N/A |
| | | | 24V wake up WWAN | 0.008 | 0.192 | N/A | N/A |
| | | | 36V | 0.003 | 0.108 | N/A | N/A |
| | | | 36V wake up WWAN | 0.008 | 0.288 | N/A | N/A |

*WWAN: Enable wakeup function of WWAN module