

Mobile Computing Solutions

Advanced Telematics Computer 8110/8110-F Series

PKBX5910 to 5919-1

User Manual

Published June 2020

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PREFACE

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Disclaimer

The information in this document is subject to change without prior notice and does not represent commitment from DELTA COMPONENTS GmbH. However, users may update their knowledge of any product in use by constantly checking its manual posted on our website: <http://www.delta-components.de>. DELTA COMPONENTS GmbH shall not be liable for direct, indirect, special, incidental, or consequential damages arising out of the use of any product, nor for any infringements upon the rights of third parties, which may result from such use. Any implied warranties of merchantability or fitness for any particular purpose is also disclaimed.

Acknowledgements

ATC 8110 is a trademark. 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



DELTA COMPONENTS GmbH RoHS Environmental Policy and Status Update

DELTA COMPONENTS GmbH 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, DELTA COMPONENTS GmbH 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 DELTA COMPONENTS GmbH development procedure and that all the new RoHS components and new manufacturing processes maintain the highest industry quality levels for which DELTA COMPONENTS GmbH 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 DELTA COMPONENTS GmbH 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 DELTA COMPONENTS GmbH naming convention.

Warranty and RMA

DELTA COMPONENTS GmbH Warranty Period

DELTA COMPONENTS GmbH manufactures products that are new or equivalent to new in accordance with industry standard. DELTA COMPONENTS GmbH warrants that products will be free from defect in material and workmanship for 12 months, beginning on the date of invoice by DELTA COMPONENTS GmbH.

DELTA COMPONENTS Return Merchandise Authorization (RMA)

- Customers shall enclose the DELTA COMPONENTS GmbH 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 DELTA COMPONENTS GmbH 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, DELTA COMPONENTS GmbH 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 DELTA COMPONENTS GmbH 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

DELTA COMPONENTS GmbH 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: DELTA COMPONENTS GmbH 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 DELTA COMPONENTS GmbH 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, DELTA COMPONENTS GmbH will return it to the customer without any charge.

Board Level

- Component fee: DELTA COMPONENTS GmbH 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, DELTA COMPONENTS GmbH 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 needlenose pliers to disconnect connections as these can damage the soft metal or plastic parts of the connectors.

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. CompactFlash: Turn off the unit's power before inserting or removing a CompactFlash storage card.
4. SIM: Do not insert or remove the SIM card when the **system** is **powered** on. Always **power** off the **system** before inserting or removing the SIM card.

Safety Precautions

- Read these safety instructions carefully.
- Keep this User Manual for later reference.
- Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
- For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
- Keep this equipment away from humidity.
- Put this equipment on a stable surface during installation. Dropping it or letting it fall may cause damage.
- Do not leave this equipment in either an unconditioned environment or in a above 40°C storage temperature as this may damage the equipment.
- The openings on the enclosure are for air convection to protect the equipment from overheating. DO NOT COVER THE OPENINGS.
- Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
- 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.
- All cautions and warnings on the equipment should be noted.
- If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
- Never pour any liquid into an opening. This may cause fire or electrical shock.
- Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
- 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.
- Do not place heavy objects on the equipment.
- 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.
- 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 DELTA COMPONENTS products, visit DELTA COMPONENTS website at www.delta-components.de
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.

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.

Package Contents

Before continuing, verify that the ATC 8110/8110-F package that you received is complete. Your ATC 8110/8110-F package should have all the items listed in the following table.

Item		Name	Description
1		Terminal Blocks 5P Dinkle:EC762VNM-05P	Used to attach self-screws to terminal block on chassis.
2		I Head Bolts Screw Long Fei:I3x15.8 ISO NIGP	Used to tighten a 2.5" SSD/HDD to the HDD bay.
3		Thermal Pad EAPUS	Thermal pad for CPU. The user cannot see this if CPU is pre-installed.
4		Damper Anti-Vibrate Grommet Kang Yang:TGM-50G(B)	Used to tighten a 2.5" SSD/HDD to the HDD bay through vibration dampers to sustain vibrations.
5		GPS/Glonass Antenna	Antenna with a 5m length, SMA male-type.
6		Power Cable for ATC 8110 Graphics 01	Used to connect to a 8-pin box header located on discrete graphics cards for power supply. Length 580mm, pitch 4.2mm.
7		Power Cable for ATC 8110 Graphics 02	Used to connect to a 6-pin box header located on discrete graphics cards for power supply. Length 580mm, pitch 4.2mm.
8		ATC 8110 Series DVD Driver VER:1.0	JCL
9		Washer for SMA CONN Kang Yang:WS6-0.8(B)	Reserved for additional SMA antenna use.
10		Washer for SMA CONN Kang Yang:TW-181	Reserved for additional SMA antenna use.



Note: ATC 8110-F features a fan-design architecture while ATC 8110 features a fanless design.

Fixture Kit for Graphics Card

Item	P/N	Name	Description
1		Spring for ATC 8110 VER:A Long Fei	4.2x10mm Stell Nickel Plated
2		Wing Nut VER:A Long Fei	21.5x11mm Stell Silver
3		Spacer Support VER:A Kang Yang	6.3x2mm Nylon66 Natural
4		Spacer Support VER:A Kang Yang	6.3x5mm Nylon66 Natural
5		Spacer Support VER:A Kang Yang	6.3x10mm Nylon66 Natural
6		Washer VER:A Kang Yang	6.8x4.2x1mm Nylon6 Natural
7		Graphics Card Bracket Down for ATC 8110 VER:A CHYUAN-JYH	91x135x34.5mm SPCC NI
8		Graphics Card Bracket Top for ATC 8110 VER:A CHYUAN-JYH	68x37.5x83mm SPCC NI
9		Flat Head Screw Long Fei:F3x5ISO+Nylok NIGP	F3x5 NI Nylok



Note: This fixture kit is used to fix the add-on PCIe graphics card.

Optional Parts

ATC 8110/8110-F is designed to support the 8th/9th generation Intel® Core™ processors (Coffee Lake S) on the LGA1151 socket type and features 3 PCIe slots for expansion. In addition to supporting a variety of CPU models, various memory size, graphics cards and other accessory kits are available and optional for your selection. We strongly recommend that you have them pre-installed to reduce the assembly efforts and complexity at your side. For items other than ones listed in the table below, please contact your **DELTA COMPONENTS** sales representative for further information.

CPU			
Model Name	Core	Frequency	TDP
Xeon® E-2278GE	8c	4.7GHz	80W
Xeon® E-2278GEL	8c	3.9GHz	35W
Core™ i7-9700E	8c	4.4GHz	65W
Core™ i7-9700TE	8c	3.8GHz	35W
Core™ i7-8700T	6c	4.0GHz	35W
Core™ i5-9500E	6c	4.2GHz	65W
Core™ i5-9500TE	6c	3.6GHz	35W
Core™ i3-9100E	4c	3.7GHz	65W
Core™ i3-9100TE	4c	3.2GHz	35W
SO-DIMM DDR4			
4GB	8GB	16GB	32GB
Graphics Card			
RTX 20xx Series (250W/160W)	GTX 16xx Series (120W/75W)		AIBooster-X8 (20W)
Others			
Fixture for PCIe Card	650W Power Supply	4-Port GbE/PoE (GE64/74) Card	Damping Brackets



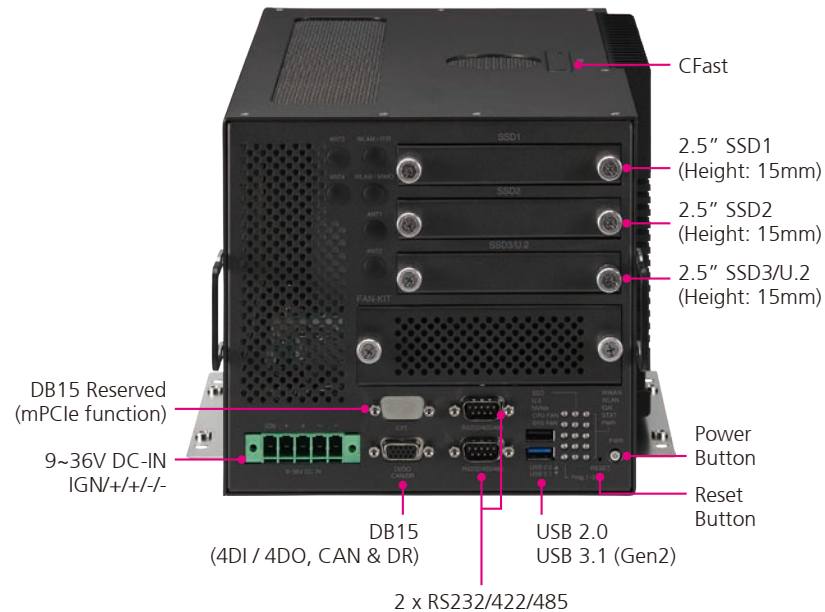
Note:

1. Fixture for PCIe card: If you would like to install off-the-shelf PCIe cards to ATC 8110's first and/or second PCIe slot, we recommend to use this kit to fix the PCIe card so that it can withstand severe vibration and shock in critical environments. Please refer to Installing a Fixture Kit for the 1st & 2nd PCIe Slot on page 45.
2. Damping Brackets: ATC 8110 can sustain up to 2G vibration for 2.5" SSD storage drives. If you would like to install a 2.5" hard drive, you should install damping brackets that are able to withstand 1.5G operating vibration in harsh environments. Please refer to Installing Damping Brackets on page 47.
3. 650W Power Supply: If your power source comes from AC rather than DC, you have to connect the system to a power supply with enough wattage to operate ATC 8110. Please refer to Power Budget and Power Supply on page 49.
4. GE64/74 card: This is a 4-port independent GbE/GigE Vision PoE card with a total 60 watt power budget.

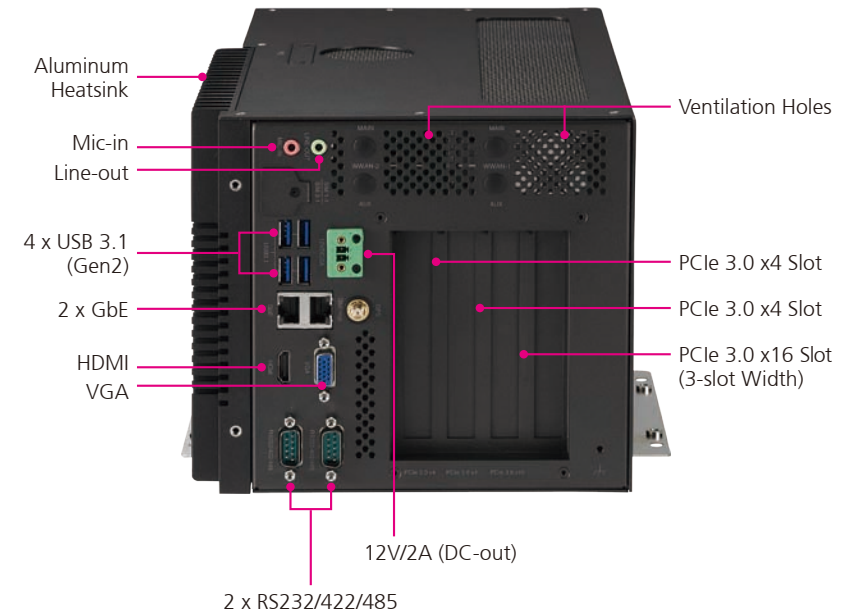
CHAPTER 1: PRODUCT INTRODUCTION

Physical Features

ATC 8110/8110-F Front View



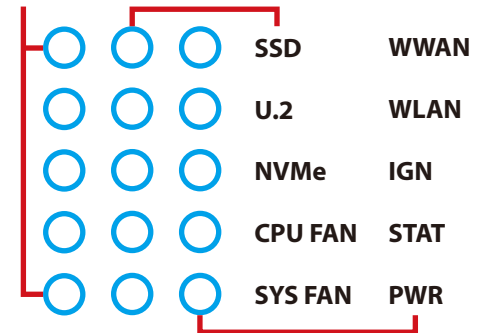
ATC 8110/8110-F Rear View



LED Indicators

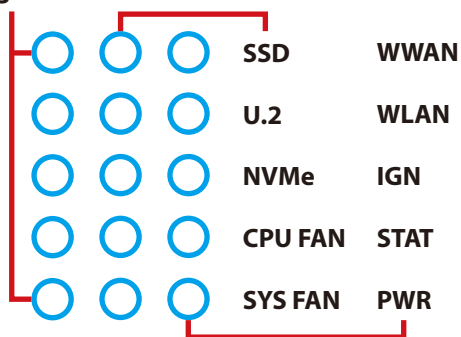


Prog. 1~5



LED Description

Prog. 1~5



LED	Description	LED Behavior
WWAN	WWAN signal/service indicator	<ul style="list-style-type: none"> Solid green: Link active Blinking green: Data transmission
WLAN	WLAN signal/service indicator	<ul style="list-style-type: none"> Solid green: Link active Blink green: Data transmission
IGN	Ignition-ON indicator	<ul style="list-style-type: none"> Off: Ignition off Solid green: Ignition on
STAT	System status indicator	<ul style="list-style-type: none"> Off: System power off Blinking green: System booting (BIOS post) Solid green: System ready 2Hz blinking red: System stalled (Power is on, but system is not running.) Solid red: A fatal error occurred
PWR	Power feed indicator	<ul style="list-style-type: none"> Solid green: Power active Solid red: Power failure Off: Power off
SSD	2.5" SSD activity indicator	<ul style="list-style-type: none"> Off: No storage installed Solid green: Powered on and ready Blinking green: Reading/writing data Solid red: A fatal error occurred
U.2	2.5" U.2 activity indicator	
NVMe	NVMe M.2 media indicator	
CPU FAN	CPU FAN status indicator	<ul style="list-style-type: none"> Solid green: CPU fan is on and working Blinking red: Alarm indicating there is a 20% RPM loss Off: No fan installed (Fan failure, returns RPM=0)
SYS FAN	System FAN status indicator	
Prog. 1~5	User programmed indicator	Please refer to the SDK (Windows) at SetProgramLEDControl & GetProgramLEDStatus, or ST_SYSTEM_GET_33_02_PROGRAM_LED_STATUS for Linux

Overview

AI has become an essential component of automated vehicle technology. With built-in high-performance Intel® Coffee-Lake S/Refresh processing power and the powerful NVIDIA® GeForce® RTX 2080 Ti graphics engine with 4,352 CUDA® cores, ATC 8110 can satisfy a wide variety of applications for Autonomous Vehicle, law enforcement and factory automation fields, like the ANPR, facial recognition, machine vision and self-driving, etc.

Extreme speed of data-storage has become more and more important as a rapid growth of high-speed multi-cameras with a high frame rates has taken place. For that, ATC 8110 is designed with up to 5 USB 3.1 (Gen2) and up to 8 GbE w/ PoE GigE ports for high-end industrial cameras access to achieve a wire-speed performance. Also, the latest ultra-fast u.2/M.2 NVMe media and up to three 2.5" high-density SSD/HDD are carried out for customers to meet the requests of huge data streaming, secure and the integrity for multi-cameras installed.

ATC 8110 also provides an excellent expanding capability for users to install up to three add-on PCIe cards like the frame grabber in GigE and/or USB3 Vision interface, or a discrete graphics engine to enhance the graphics power.

To position where you are and to keep connection with the remote central management while the system is on edge computing, ATC 8110 is the best choice for you to provide a telematics functionality, like up to two LTE/WLAN modems, GNSS w/ DR function and eMTC collaborated with other communication ports, RS232/422/485 and CAN 2.0B/OBD module, etc.

ATC 8110 can be configured to be a fanless or fan scheme as options, so that it's a more elastic design for users to choose which CPU they want to operate. Also, it can support up to station-grade Xeon® processors of up to 80W TDP to work at an operating environment temperature of -30°C~60°C collaborate with the most 250W RTX 2080 Ti discrete graphics card.

In-vehicle mandatory regulation, ATC 8110 supports 9~36VDC power range with an ignition control that can comply with eMark, CE/FCC Class A certification. In addition, based on a rugged design, ATC 8110 can meet US military MIL-STD-810G standard for sustaining vibration and shock even with a heavy graphics card installed in harsh environments.

Key Features

- In-vehicle AI recognition and machine vision applications
- Fanless/fan flexibility design
- Up to 8-core Intel® Coffee-Lake S/ Refresh processing power
- 3 x PCIe 3.0 slots for Discrete Graphics/Inference/Frame Grabber cards
- Ultra-fast u.2/M.2 NVMe (optional)* media for high-speed multi-cameras image capture
- RAID 0/1/5/10 configurable for data secure and integrity
- Rich communication ports, 5 x USB 3.1, 2 x GbE, 4/8 GigE (PoE)* and 4 x RS232/422/485
- Telematics functionality of WWAN/5G NR, WLAN and GNSS with up to 4 x 4 MIMO and 4 SIM slots
- Compliant with E-mark, CE/FCC ClassA and MIL-STD-810G for antivibration/shock with graphics card installed
- Realize M-2-M through CAT-M (NB-IoT & eMTC)



Note:

M.2 NVMe (optional)* is an optional NVMe adapter tray that can be used to install M.2 2280 NVMe storages.
4/8 GigE (PoE)* is an optional expansion function through GE74/64 GbE PoE card.

Hardware Specifications

CPU

- Intel® Coffee-Lake S/ Refresh Core™ Xeon® i7/i5/i3/Pentium®/Celeron® processor (LGA1151)

PCH

- Intel® chipset C246

Memory

- Two 204-pin DDR4 SO-DIMM sockets
- Up to 32GB+32GB in size, 2400MHz

Storage

- 3 x 2.5" SATA 3.0 SSD/HDD (15mm height) or 2 x 2.5" SATA 3.0 SSD/HDD+ 1 x u.2 NVMe SSD
- 1 x CFast (externally accessible)

Expansion

- 1 x Full size mPCIe socket (PCIe 2.0 + USB 2.0)
- 1 x Full size mPCIe socket (USB 2.0 + PCM signal)
- 1 x Key-B 3042/3052 M.2 socket (USB 3.0 + PCM signal) for LTE/5G NR modem
- 2 x Optional M-key 2280 M.2 sockets (PCIe 3.0 x2) for NVMe (GE74 card pre-installed)
- 1 x PCIe 3.0 x16 slot for discrete graphics card, up to 321mm in length
- 2 x PCIe 3.0 x4 slots for PCIe card installation (up to 190mm in length)

GigE/Frame Grabber (Optional)

- GE64/GE74: 4-port independent GbE PoE (IEEE 802.3 af/at), RJ45

Discrete Graphics Card (Optional)

- Up to NVIDIA® RTX 2080Ti, 250W or more advanced in the future

GPS and Sensor

- 1 x Default U-blox NEO-M8N GNSS module for GPSG/Glonass/QZSS/Galileo/Beidou
- Optional modules with dead reckoning available
- Built-in G-sensor

Ethernet

- 2-Port independent GbE LAN, RJ45
- 9K byte jumbo frame
- PTP (IEEE 1588) support
- Controller: Intel® I210-IT, PHY: Intel® I219LM
- vPro (iAMT) & WOL support
- Additional 4/8-port independent GbE/PoE PCIe card for option

Security

- TPM 2.0: Infineon SLB9665TT2.0FW5.62 (optional)

I/O Interface-Front

- 5-pin terminal block for 9~36VDC-IN
- ATX power button
- Reset button
- 5 x LED indicators for power/IGN/WLAN/WWAN/status
- 5 x LED indicators for storage/fan control
- 5 x LED indicators for user to program
- 1 x USB 3.1 + 1 x USB 2.0, type A
- 1 x DB15 ((DI/DO + CAN 2.0B + DR signal))
- 1 x DB15, reserved for expansion
- 6 x SMA antenna holes
- 2 x DB9 (RS232/RS422/RS485 selectable)

I/O Interface-Rear

- 4 x USB 3.1, Type A
- 2 x GbE (RJ45)
- 1 x VGA + 1 x HDMI
- 2 x DB9 (RS232/RS422/RS485 selectable)
- 12V/2A output
- 2 x SIM slots
- 1 x Antenna for GPS
- 1 x PCIe x16 lane slot
- 2 x PCIe x4 lane slots

Display

- 1 x VGA port, up to 2560 x 1600@60Hz
- 1 x HDMI v1.4, up to 4096 x 2304@24Hz

DI/DO (Isolation)

- 4-bit input
 - Source: 9~36V-in (12V@1.1mA/24V@2.2mA)
 - External: 0~33VDC pull-high, high-level, 3.3 - 33 VDC; low-level, 0 - 2 VDC
- 4-bit output
 - Source: 9~36V-in (nominal 35mA@24V):
 - External: 5~27VDC pull-high, sink current w/ 220mA for each bit, 500mA max (@25C)
- Source or external can be selected by software (default: source type)

Audio

- Line-out (green-color): unbalance stereo, left & right channel
- MIC-in (pink-color)

CAN 2.0B (Isolation)

- Controller: SJA1000
- Bit rate up to 1Mbit/s
- Socket CAN supported
- 11-bit & 29-bit identifiers, ISO 11898- 1, ISO 11898-2
- ESD: $\pm 8\text{KV}/15\text{KV}$ (contact/air)
- 2.5KV isolated

In-Vehicle Power Management

- Dual 9~36VDC-IN (each for 12V/30A in max.)
- Cranking voltage: 6V~9V (< 30 seconds)
- Reverse protection, OCP & UVP
- Ignition on/off control/programmable on/off delay timer
- Extra 12V@2A for DC-out

Dimensions & Weight

- ATC 8110 (fanless): 191.2 x 176 x 350 (W x D x H) (mm)
- ATC 8110-F (fan-kit installed): 207.4 x 176 x 350 (W x D x H) (mm)
- ATC 8110/ATC 8110-F: 8kg/8.2kg (w/ o graphics/PCIe card)

Environment

- Operating temperatures
 - -30°C~60°C (fanless design w/ 35W TDP CPU, 60°C for industrial SSD, 45°C for hard drive)
- Storage temperatures: -40°C~85°C
- Relative humidity: 90% (non-condensing)

Vibration (Random)

- IEC 60068-2-64
 - 1.0g@5~500Hz (in operating, HDD), 2.0g for HDD w/ damping brackets
 - 2.0g@5~500Hz (in operating, SSD + graphics card)
- MIL-STD-810G (SSD + graphics card)
 - Operating: MIL-STD-810G, 514.6C, category 4
- Shock (SSD + graphics card)
 - Operating: MIL-STD-810G, Method 516.6, procedure I, functional shock=20g

Certifications

- CE approval
- FCC Class A
- E13



Note:

The NVMe M.2 slot is optional and can be added using add-on GE74 GbE PoE card or other consumer PCIe x4 expansion card (vibration/shock/operating temperature may be limited).

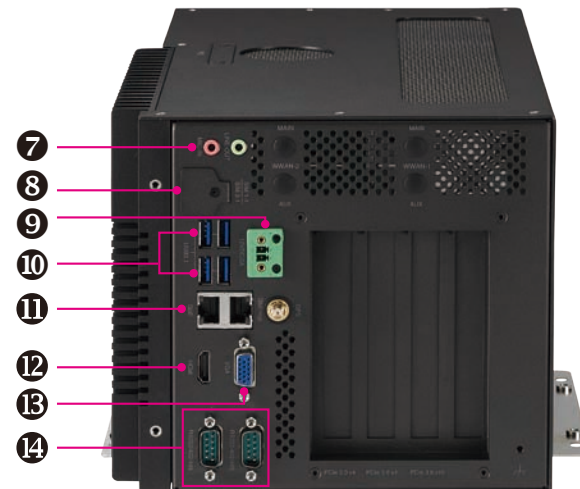
Connector Numbering

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.

ATC 8110/8110-F Front View



ATC 8110/8110-F Rear View



CHAPTER 2: EXTERNAL CONNECTORS PINOUT DESCRIPTION

Power Button

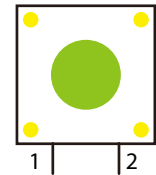
Connector number: 1



Pin	Definition	Pin	Definition
1	GND	2	HW_BT#
3	HW_BT#	4	GND
A1	PWRLED_A	C1	PWRLED_C

Reset Button

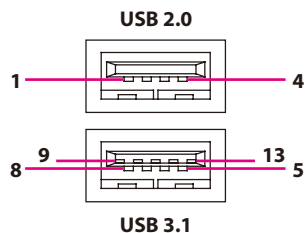
Connector number: 2



Pin	Definition
1	GND
2	RST_BTN#

USB 2.0 and USB 3.1 Port

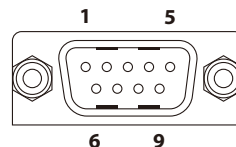
Connector number: 3



Pin	Definition	Pin	Definition
1	VCC	2	USB_1N
3	USB_1P	4	GND
5	VCC	6	USB0_N
7	USB0_P	8	GND
9	USB3_RXN	10	USB3_RXP
11	GND	12	USB3_TXN
13	USB3_TXP	14	

COM1 to COM4 RS-232/RS422/RS485 Connector

Connector number: 4 and 14



Pin	Definition	Pin	Definition
1	RS232 DCD#/RS422 TX-/RS485 DATA-	2	RS232 RX/RS422 TX+/RS485 DATA+
3	RS232 TX/RS422 RX+	4	RS232 DTR#/RS422 RX-
5	GND	6	DSR#
7	RTS#	8	CTS#
9	RI		



Note:

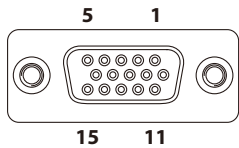
Connector number 14 refers to COM1 & COM2

Connector number 4 refers to COM3 & COM4

You can set pin 9 of COM1 & COM2 from the default RI setting to 5V/12V through JP1 & JP2 (see page 20 & 21 for details).

CAN/DIO Multiport Connector

Connector number: 5



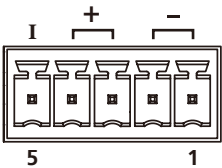
Pin	Definition	Pin	Definition
1	CAN H	2	ODOMETER
3	GPO3	4	GPI1
5	GPO0	6	CAN L
7	DIRECTION	8	GND
9	GPI2	10	GPO1
11	CAN GND	12	GND
13	GPI3	14	GPO2
15	GPI0		



Note:
You can use an optional multi-port DB15 external cable to connect to this port. Please refer to Appendix J for details.

9V-36V DC Power Input

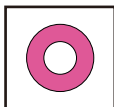
Connector number: 6



Pin	Definition	Pin	Definition
1	GND	2	GND
3	VIN	4	VIN
5	IGNITION		

Mic-in Connector

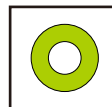
Connector number: 7



Pin	Definition	Pin	Definition
1	GND	2	MIC RIGHT
3	GND	4	MIC DETECT
5	MIC LIFT		

Line-out Connector

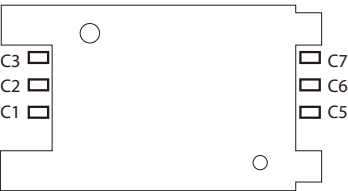
Connector number: 7



Pin	Definition	Pin	Definition
22	FRONT OUT RIGHT	23	GND
24	FRONT OUT DETECT	25	FRONT LIFT

SIM1-1 and SIM2-1 Socket

Connector number: 8



SIM1-1

Pin	Definition	Pin	Definition
C 1	UIM_PWR	C 5	NC
C 2	UIM_RST	C 6	UIM_DAT
C 3	UIM_CLK	C 7	NC

SIM2-1

Pin	Definition	Pin	Definition
C 1	UIM_PWR	C 5	NC
C 2	UIM_RST	C 6	UIM_DAT
C 3	UIM_CLK	C 7	SIM SELECT

DC Out Connector

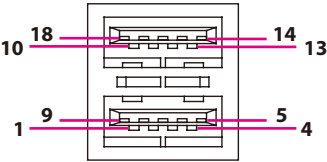
Connector number: 9



Pin	Definition
1	12V
2	Ground

Two Dual USB 3.1 Port

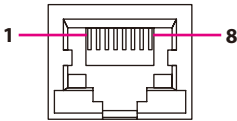
Connector number: 10



Pin	Definition	Pin	Definition
1	5V	2	USB_5N
3	USB_5P	4	GND
5	USB3_RX5N	6	USB3_RX5P
7	GND	8	USB3_TX5N
9	USB3_TX5P	10	5V
11	USB_6N	12	USB_6P
13	GND	14	USB3_RX6N
15	USB3_RX6P	16	GND
17	USB3_TX6N	18	USB3_TX6P

Dual LAN Port

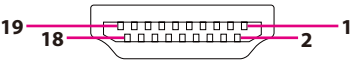
Connector number: 11



Pin	Definition	Pin	Definition
1	LAN_MDI_0P_R	2	LAN_MDI_0N_R
3	LAN_MDI_1P_R	4	LAN_MDI_1N_R
5	LAN_MDI_2P_R	6	LAN_MDI_2N_R
7	LAN_MDI_3P_R	8	LAN_MDI_3N_R

HDMI Connector

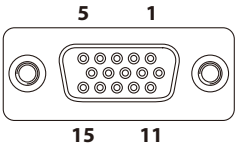
Connector number: 12



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	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_P5V
19	HDMI_HPD		

VGA Connector

Connector number: 13



Pin	Definition	Pin	Definition
1	VGA_RED	2	VGA_GREEN
3	VGA_BLUE	4	NC
5	GND	6	GND
7	GND	8	GND
9	+5V	10	GND
11	NC	12	VGA_DATA
13	VGA_HS	14	VGA_VS
15	VGA_CLK		

CHAPTER 3: JUMPERS AND CONNECTORS

This chapter describes how to set the jumpers and connectors on the ATC 8110 series motherboard and backplane board.

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 environment 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 the 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:

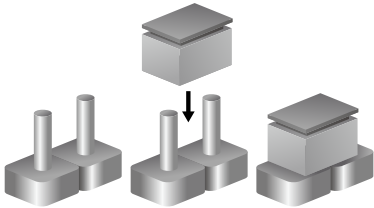
- Always disconnect the unit from the power outlet whenever you are working inside the case.
- If possible, wear a grounded wrist strap when you are working inside the computer case. Alternatively, discharge any static electricity by touching the bare metal chassis of the unit case, or the bare metal 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

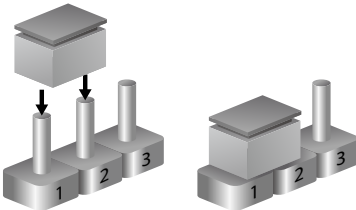
A jumper is the simplest kind of electric switch. It consists of two metal pins and a cap. When setting the jumpers, ensure that the jumper caps are placed on the correct pins. When the jumper cap is placed on both pins, the jumper is short. If you remove the jumper cap, or place the jumper cap on just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

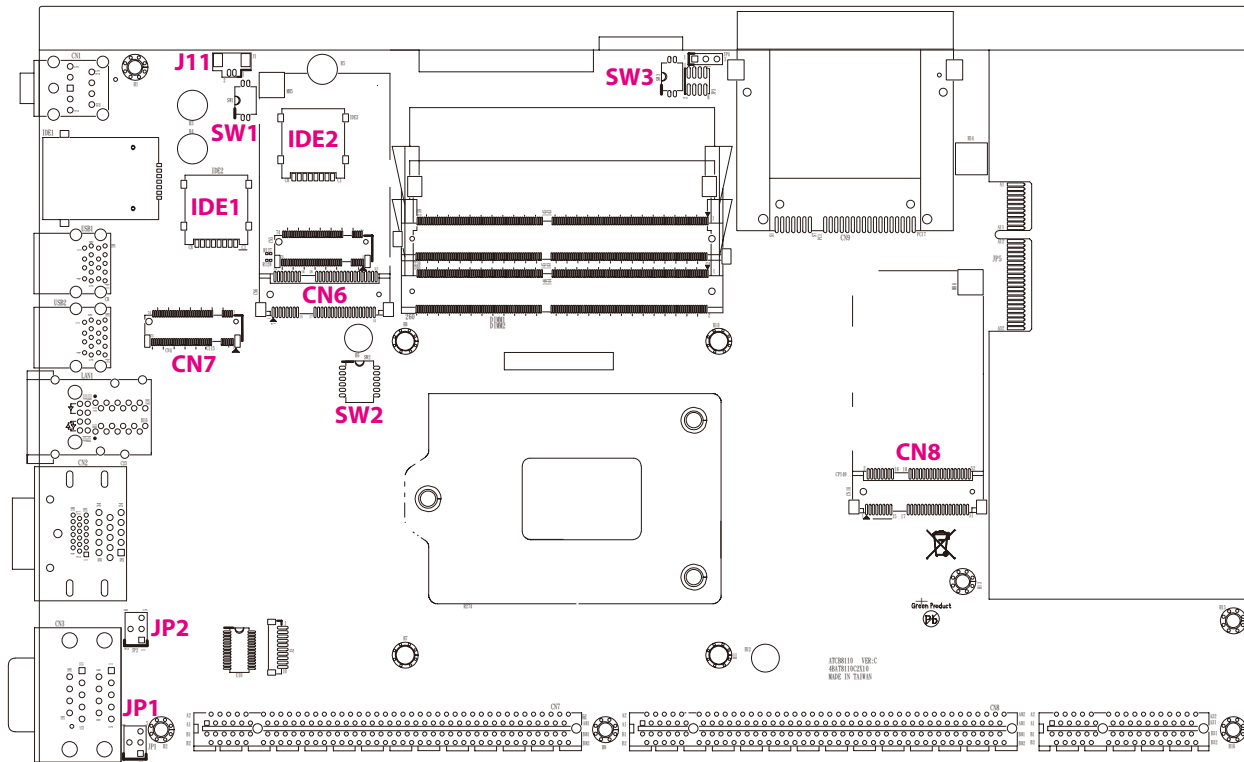


ATC 8110/8110-F System Components

The ATC 8110/8110-F consists of a motherboard and backplane board. This chapter describes the location and pinout assignment of the jumpers and connectors on each component.

Locations of the Jumpers and Connectors for the Motherboard

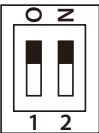
Top View



Jumper and DIP Switch Settings

RTC Clear Selection

Connector type: 2-pin DIP switch
Connector location: SW1

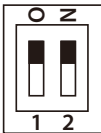


SW	RTC (Pin1)	SRTC/ME (Pin2)
OFF	Normal	Normal
ON	Clear CMOS	Clear ME

Default Setting: Pin1 and Pin2 are set to ON.

Input Voltage Setup Selection

Connector type: 2-pin DIP switch
Connector location: SW3

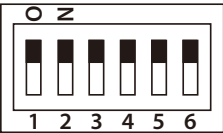


POWERSW (Pin1)	12V24V (Pin2)	Result
OFF	OFF	12V
OFF	ON	24V
ON	ON	9~36V

Default Setting: Pin1 and Pin2 are set to ON and the DC power input is 9~36V DC.

3G/LTE Voice PCM TX/RX Selection Switch

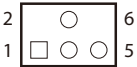
Connector type: 6-pin DIP switch
Connector location: SW2



Pin	Definition
1, 4 ON; 2, 3 OFF	PCM Normal (Default)
1, 4 OFF; 2, 3 ON	PCM Reverse
5 ON, 6 OFF	Enable CN6 to support Reset on pin 22.
5 OFF, 6 ON	Enable CN6 to support Reset on pin 33.

COM1 RI/5V/12V Selection

Connector type: 2x3 6-pin header
Connector location: JP1

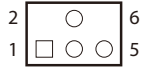


Pin	Definition
1-3 ON	+12V
3-5 ON	+5V
3-4 ON	RI (Default)

COM2 RI/5V/12V Select

Connector type: 2x3 6-pin header

Connector location: JP2

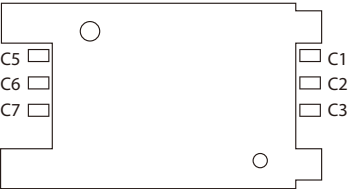


Pin	Definition
1-3 ON	+12V
3-5 ON	+5V
3-4 ON	RI (Default)

Internal Connectors

SIM1/SIM2 Card Slot

Connector location: IDE1/IDE2

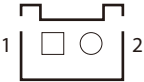


Pin	Definition	Pin	Definition
C1	UIM_PWR	C5	NC
C2	UIM_RST	C6	UIM_DAT
C3	UIM_CLK	C7	NC

RTC Battery Connector

Connector type: 1x2 2-pin header

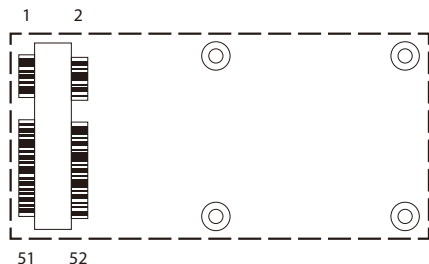
Connector location: J11



Pin	Definition
1	GND
2	VBAT

Mini-PCle Connector (USB 2.0 + PCM Signal) for LTE Modules

Connector location: CN6

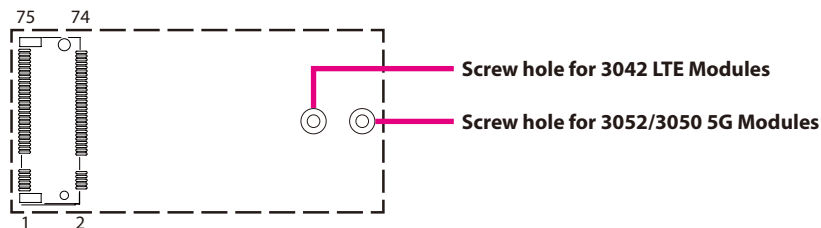


Pin	Definition	Pin	Definition
1	SMS_RI_3.5G	2	+V3.3A_MINI_1 (+3.3V)
3	NC	4	GND
5	NC	6	NC
7	NC	8	SIM3_4_PWR
9	GND	10	SIM3_4_DATA
11	VER_1.8V	12	SIM3_4_CLK
13	NC	14	SIM3_4_RST
15	GND	16	NC
17	NC	18	GND
19	NC	20	MINIPCI1_DIS#
21	GND	22	3.5G_RST#
23	NC	24	+V3.3A_MINI_1 (+3.3V)
25	NC	26	GND

Pin	Definition	Pin	Definition
27	GND	28	NC
29	GND	30	NC
31	NC	32	NC
33	MC73XX_RST#	34	GND
35	GND	36	USB_7N
37	GND	38	USB_7P
39	+V3.3A_MINI_1 (+3.3V)	40	GND
41	+V3.3A_MINI_1 (+3.3V)	42	3.5G_LED#
43	GND	44	NC
45	PCM_CLK	46	NC
47	PCM_RX_SW	48	NC
49	PCM_TX_SW	50	GND
51	PCM_SYNC	52	+V3.3A_MINI_1 (+3.3V)

M.2 B-Key Connector (USB 3.0 + PCM Signal) for LTE/5G Modules

Connector location: CN7



Note:

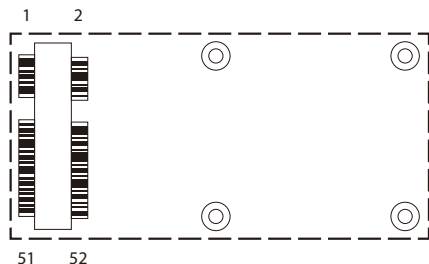
You can install standard 3042 form factor LTE modules or 3052/3050 form factor 5G modules.

Pin	Definition	Pin	Definition
1	CONFIG_3	2	V3.5G_P1 (+3.3V)
3	GND	4	V3.5G_P1 (+3.3V)
5	GND	6	POWER_OFF#
7	USB_6P	8	W_DISABLE1#
9	USB_6N	10	M2A_LTE_LED#
11	GND	12	KEY (Notch Location)
13	KEY (Notch Location)	14	KEY (Notch Location)
15	KEY (Notch Location)	16	KEY (Notch Location)
17	KEY (Notch Location)	18	KEY (Notch Location)
19	KEY (Notch Location)	20	NC
21	CONFIG_0	22	NC
23	NC	24	NC
25	NC	26	W_DISABLE2#
27	GND	28	NC
29	USB3.0_RX6N	30	SIM1_RST
31	USB3.0_RX6P	32	SIM1_CLK
33	GND	34	SIM1_DATA
35	USB3.0_TX6N	36	SIM1_PWR
37	USB3.0_TX6P	38	NC
39	GND	40	SIM2_SELECT

Pin	Definition	Pin	Definition
41	NC	42	UIM2_DATA
43	NC	44	UIM2_CLK
45	GND	46	UIM2_RST
47	NC	48	UIM2_PWR
49	NC	50	NC
51	GND	52	NC
53	NC	54	M2_WAKE#
55	NC	56	SMB_DATA
57	GND	58	SMB_CLK
59	NC	60	NC
61	NC	62	NC
63	NC	64	NC
65	NC	66	SIM1_SELECT
67	RESET#	68	NC
69	CONFIG_1	70	V3.5G_P1 (+3.3V)
71	GND	72	V3.5G_P1 (+3.3V)
73	GND	74	V3.5G_P1 (+3.3V)
75	CONFIG_2		

Mini-PCle Connector (PCIe 2.0 + USB 2.0) for Wi-Fi Modules

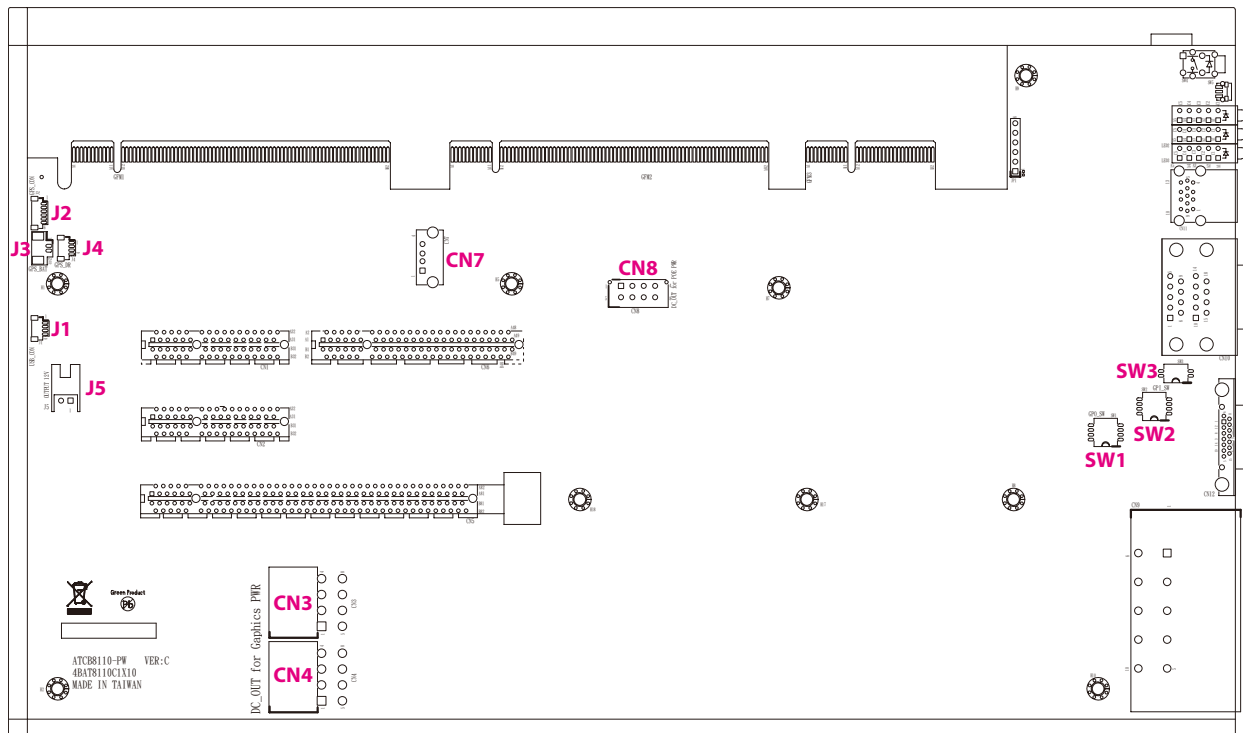
Connector location: CN8



Pin	Definition	Pin	Definition
1	N.C	2	+V3.3_MINI_2
3	N.C	4	GND
5	N.C	6	+V1.5S_MINI_2
7	PCIE_CLKREQ3#	8	NC
9	GND	10	NC
11	PCIE_CLKN3	12	NC
13	PCIE_CLKP3	14	NC
15	GND	16	NC
17	N.C	18	GND
19	N.C	20	WIFI_DISABLE#
21	GND	22	PCIE_RST#
23	PCIE_RXN15	24	+V3.3_MINI_2
25	PCIE_RXP15	26	GND

Pin	Definition	Pin	Definition
27	GND	28	+V1.5S_MINI_2
29	GND	30	NC
31	PCIE_TXN15	32	NC
33	PCIE_TXP15	34	GND
35	GND	36	USB_8N
37	GND	38	USB_8P
39	+V3.3_MINI_2	40	GND
41	+V3.3_MINI_2	42	N.C
43	GND	44	WLAN_LED#
45	NC	46	N.C
47	NC	48	+V1.5S_MINI_2
49	NC	50	GND
51	BT_DISABLE #	52	+V3.3_MINI_2

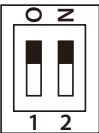
Top View



DIP Switch Settings

CANbus Terminator Resistor Selection

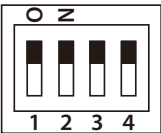
Connector type: 2-pin DIP switch
Connector location: SW3



Pin	Definition
1 ON, 2 ON	CAN Terminator Resistor (Default)
1 OFF, 2 OFF	Bypass CAN Terminator Resistor

GPO Pull High Selection

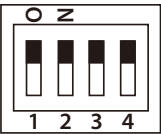
Connector type: 2-pin DIP switch
Connector location: SW1



Pin	Definition
1-4 ON	GPO (1-4) Pull High (Default)
1-4 OFF	GPO (1-4) Float

GPI Pull High Selection

Connector type: 2-pin DIP switch
Connector location: SW2



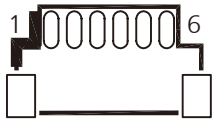
Pin	Definition
1-4 ON	GPI (1-4) Pull High (Default)
1-4 OFF	GPI (1-4) Float

Internal Connectors

GPS Wire to Board Connector

Connector type: 1x6 6-pin header

Connector location: J2

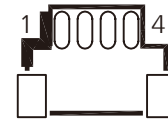


Pin	Definition	Pin	Definition
1	3.3V	2	GPS LED
3	TX	4	RX
5	GND	6	3.3V

Internal USB Connector

Connector type: 1x4 4-pin header

Connector location: J1

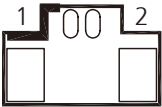


Pin	Definition	Pin	Definition
1	VCC	2	D-
3	D+	4	GND

GPS Battery Connector

Connector size: 1x2 2-pin header

Connector location: J3

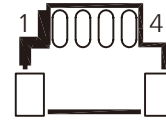


Pin	Definition
1	GND
2	VBAT

GPS Module DR Connector

Connector type: 1x4 4-pin header

Connector location: J4

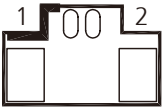


Pin	Definition	Pin	Definition
1	GND	2	NC
3	ODOMETER	4	DIRECTION

12V DC Output

Connector size: 1x2 2-pin header

Connector location: J5

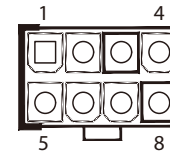


Pin	Definition
1	+V12S
2	GND

Power Connector for Graphics Card

Connector size: 2x4 8-pin header

Connector location: CN3 and CN4



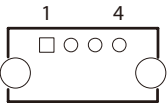
Pin	Definition	Pin	Definition
1	12V_GT	2	12V_GT
3	12V_GT	4	GND
5	GND	6	GND
7	GND	8	GND



Please note that the total power watt to draw from CN3 & CN4 should be no more than 200W. To support the discrete graphics card installed, the nominal power watt should be limited to a total of 275W (75W directly from the PCIe x16 slot + 200W).

USB 2.0 Connector

Connector location: CN7

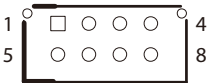


Pin	Definition	Pin	Definition
1	USB_5V	2	DATA- (USB_12N)
3	DATA+ (USB_12P)	4	GND

Power Connector for PoE Card

Connector type: 1x6 6-pin header

Connector location: CN8



Pin	Definition	Pin	Definition
1	GND	2	GND
3	GND	4	GND
5	+12V	6	+12V
7	+12V	8	GND

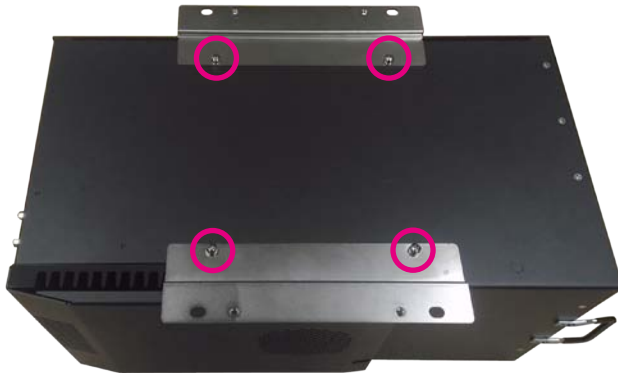
CHAPTER 4: SYSTEM SETUP

Replacing the CPU with a New One

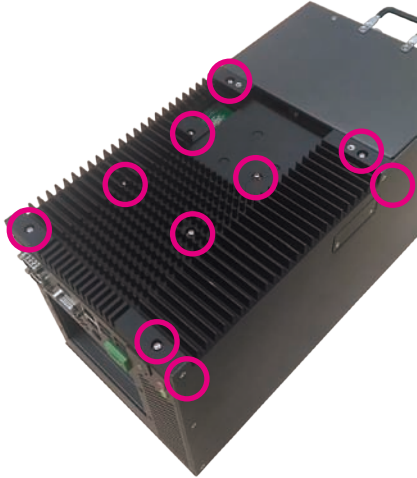


Prior to removing the chassis cover, make sure the unit's power is off and disconnected from the power sources to prevent electric shock or system damage.

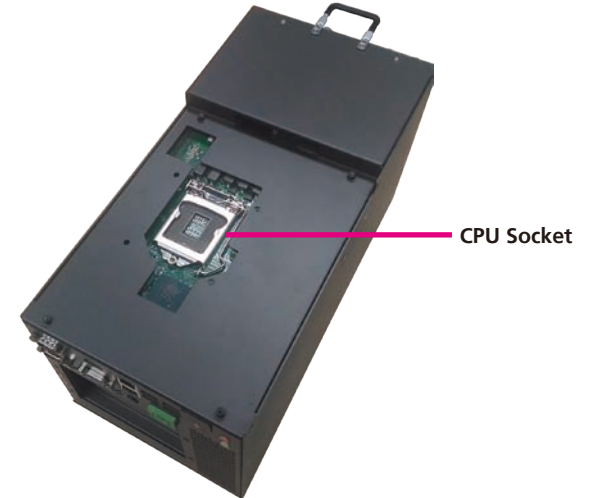
1. Turn to the bottom of the unit and remove the 4 mounting bracket screws (marked in red) to remove the brackets.
2. Remove the 4 screws located on top cover then remove it.



3. Remove the 10 screws located on the heatsink, then remove the heatsink to access the CPU socket.



4. Replace the CPU with a new one.

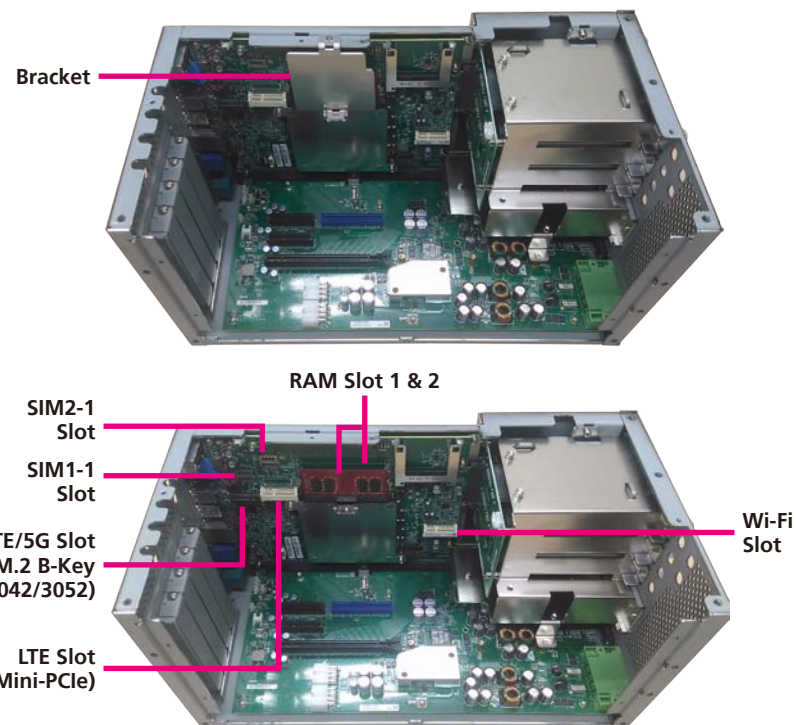


Installing/Replacing Memory, SIM Card and Wi-Fi/LTE Modules

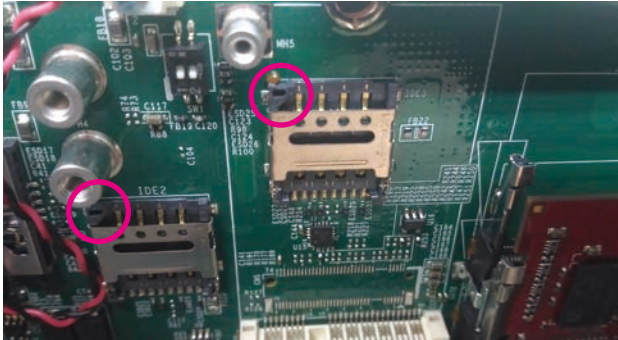
1. A fully assembled ATC8110-F system is shown as below. Turn the upper side (heat-sink) so that it faces down; you will see a L-shape plate with 12 screws. Then remove the 12 screws to remove the cover.



2. Loosen the 2 screws on the bracket and then remove it to access the memory slots. Once removed, you can replace the memory module or add another one. You can also install additional Wi-Fi/LTE/5G modules into the LTE slot (USB 2.0 interface), M.2 slot B-key (USB 3.0 interface) or Wi-Fi slot (PCIe 2.0 + USB 2.0 interface) if needed.

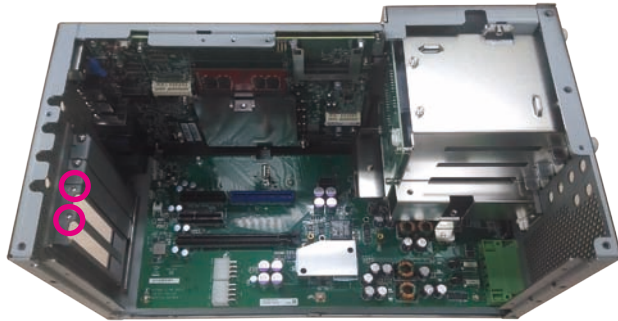


3. Please take note of the cut-off corner on the SIM card slots. The cut-off corner indicates the correct direction to insert the SIM card into the slot.

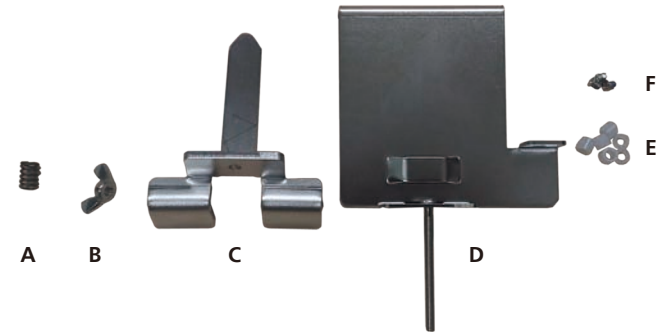


Installing/Replacing the Graphics Card

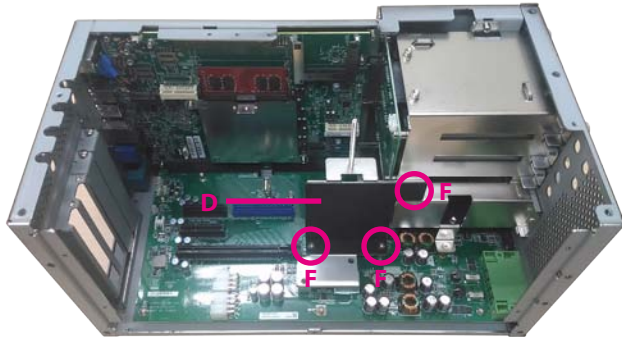
1. Loosen the 2 screws to remove the 2 brackets pictured below.



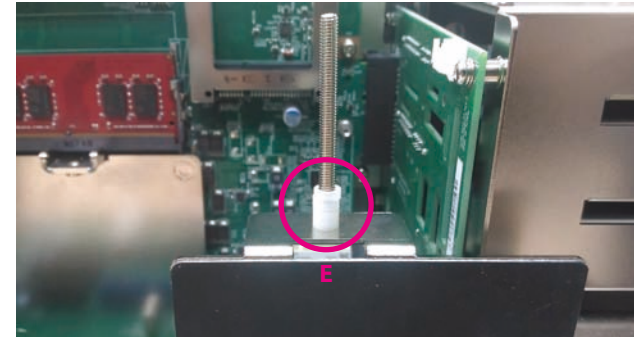
2. Please check the GC Fixture Kit as shown below. This is an optional kit for users to purchase if the user would like to install and fix the graphics card securely.



3. Insert item D to the position as shown below and then tighten 3 screws (item F) to secure it.



4. Place item E through the thread on the bracket. This will avoid the spring to compress over the die point.



We provide four types of plastic cylinders (item E) with the following dimensions: 1mm, 2mm, 5mm and 10mm.



To determine the number of plastic cylinders that should be used, please refer to the guideline below.

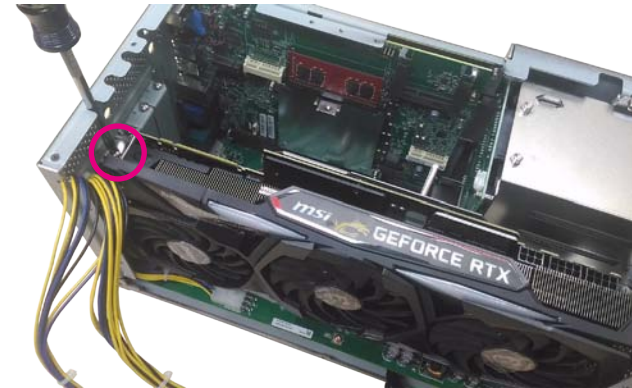
The equation is $A = \text{The height of your graphics card (not including the height of the golden finger) minus } 98\text{mm}$.

For example, if $A = 14\text{mm}$, one 10mm + two 2mm plastic cylinders can be used.

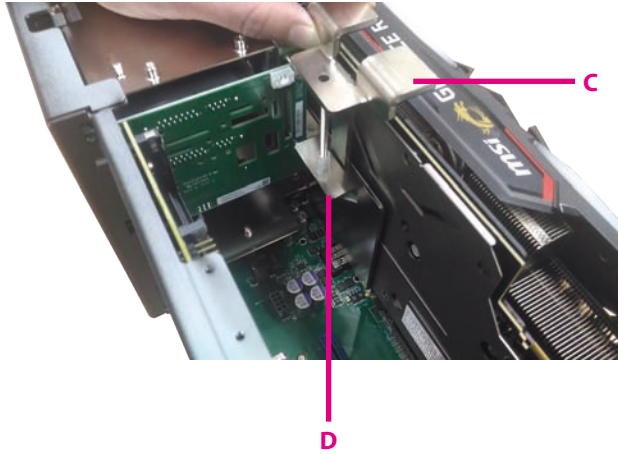
5. Connect the power cables then tilt the graphics card to an angle to insert it to the PCIe slot.



6. Secure the graphics card's bracket with a screw.



7. Insert the item C and D to the locations marked below.



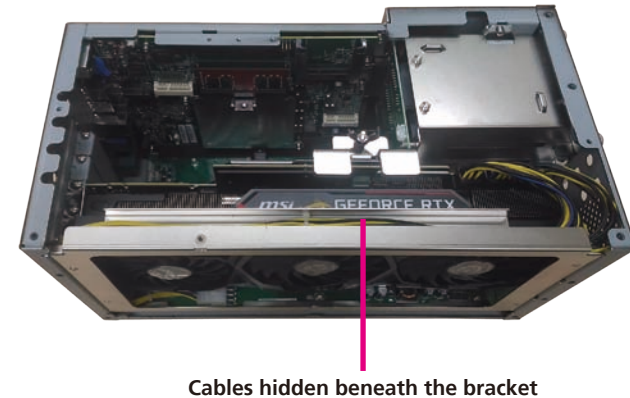
8. Check that the GC Fixture Kit and graphics card are properly positioned as shown below.



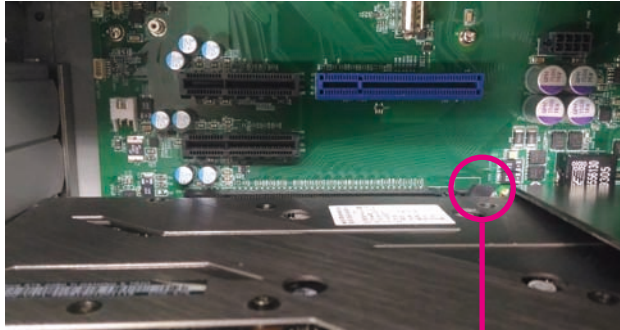
9. Insert item A (short spring) through the thread on the bracket. Then place item B (thumb screw) on item A and tighten the screw to compress A (short spring) to the die point.



10. Place the reinforcing bracket to the chassis and tighten 4 screws to fix it to the chassis. Then manually wire the cables beneath the bracket as shown below.



11. If you would like to remove the graphics card, please note that you have to press the latch to release the card before removing it from the slot.



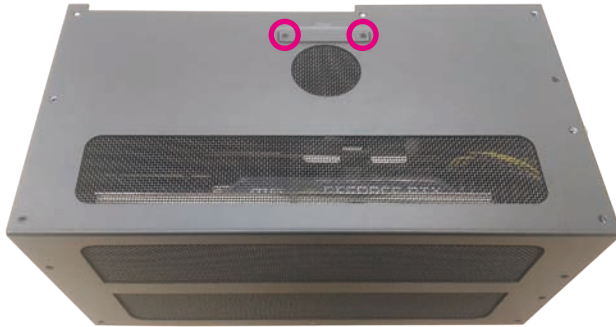
Latch

12. Reinstall the cover with the 12 screws.



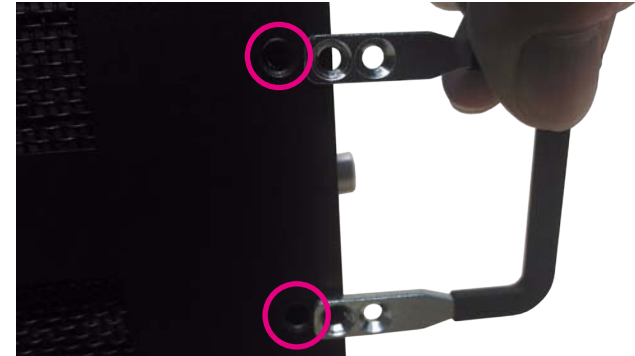
Installing a CFast Card

1. Remove the 2 screws on the CFast cover to access the CFast slot. Insert the CFast card into the slot and reinstall the cover back to its original location.

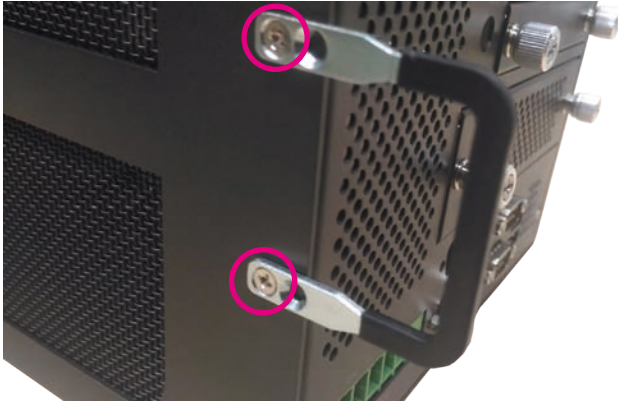


Installing a Pull Handle

1. Remove the 2 screws secured on the mounting holes located on the bottom of the system. Then align the mounting holes on the pull handle to the mounting holes on the bottom of the system.



2. Secure the pull handle to the chassis with 2 screws.

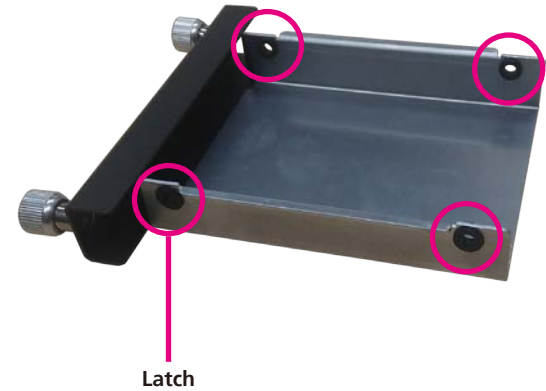


Installing a 2.5" SSD/HDD

1. Loosen the 2 thumb screws on the SSD/HDD tray on the front panel and remove the tray from the chassis.



2. Install the vibration dampers (black rubber) to each screw hole on the storage tray.



2. Place the SSD/HDD into the tray with the mounting holes on the SSD/HDD aligned to the screw holes on the tray and secure it with 4 screws.

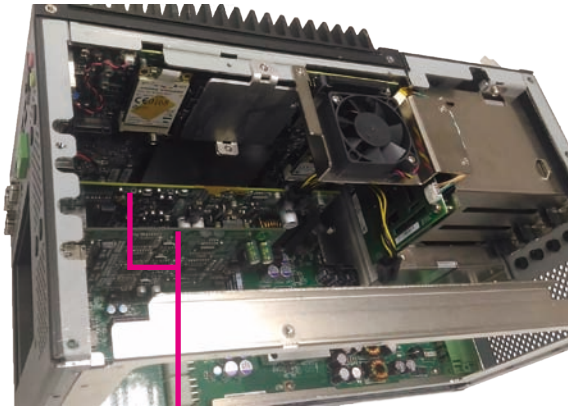


3. Insert the SSD/HDD tray back to the SSD/HDD bay of the chassis and then tighten the thumb screws to complete.

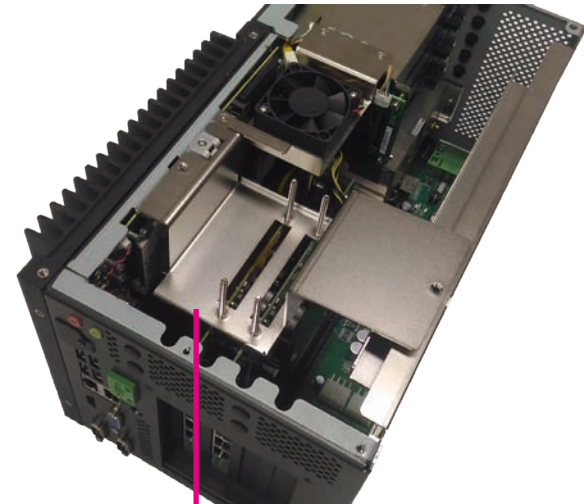


Installing a PCIe Fixture Kit for the 1st & 2nd PCIe Slot

1. Install one or two PCIe add-on cards into the 1st and/or 2nd PCIe slot.
2. Place the PCIe fixture on top of the PCIe cards and push the fixture down.

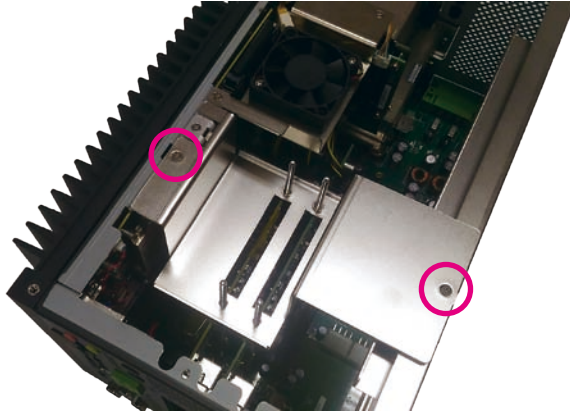


PCIe Add-on Cards

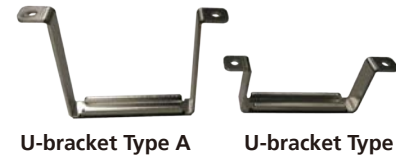
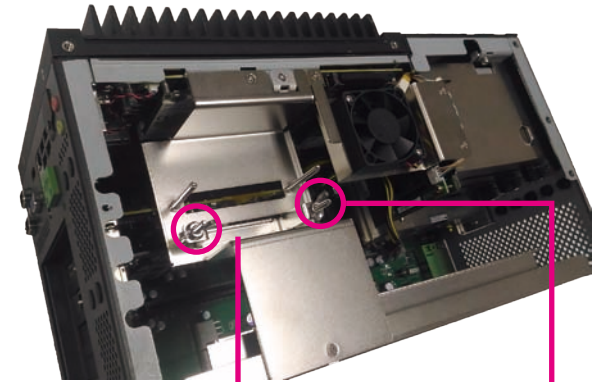


PCIe Fixture

3. Tighten two screws to secure the fixture to the chassis.



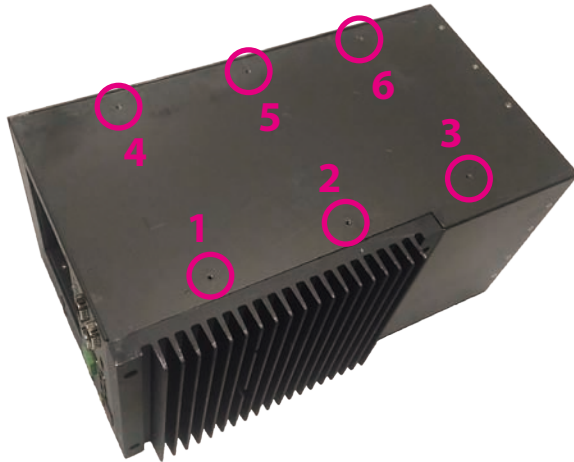
4. Place the U-bracket on the PCIe fixture and fasten thumb screws to hold and secure the PCIe card firmly. There are two types of U-brackets that can be used: Type A and Type B. Use the U-bracket type that matches the height of the PCIe card installed.



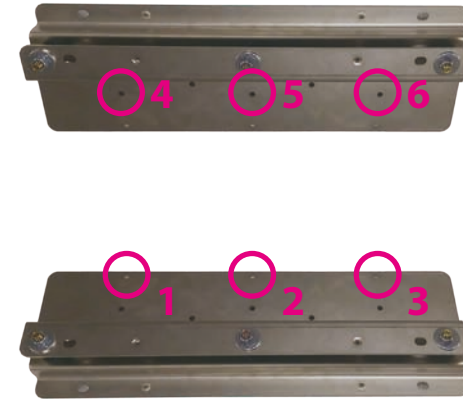
Thumb Screws

Installing Damping Brackets

1. On the bottom of the ATC 8110 system, locate the six mounting holes for securing the damping brackets. Note the number labels on the mounting holes shown below.



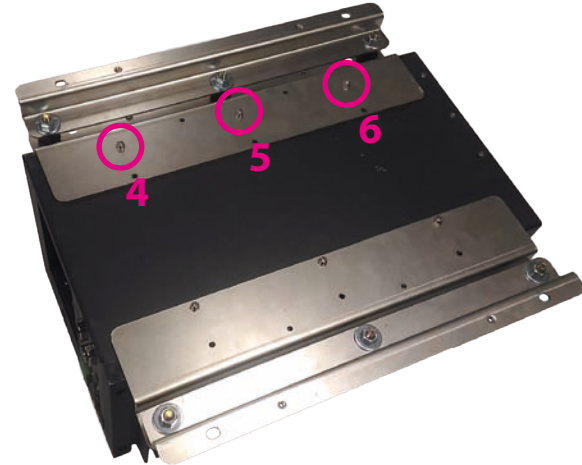
2. Take note of the number labels on the mounting holes of the damping brackets shown below.



3. Align the three mounting holes (#1, #2 and #3) on the damping bracket to the three mounting holes (#1, #2 and #3) on the right side of the ATC 8110 system. Then secure the damping bracket with three screws.



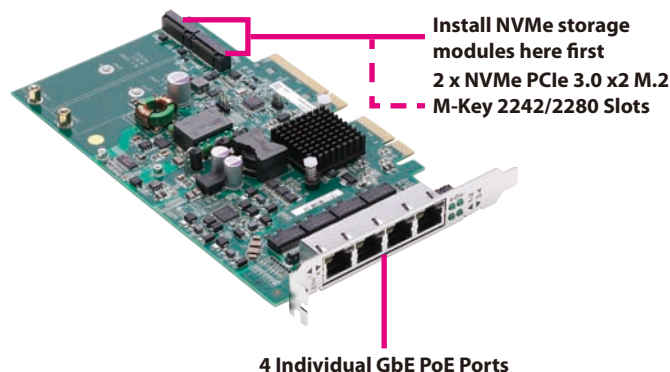
4. Follow the same procedure from the previous step to install the other damping bracket to the left side of the ATC 8110 system.



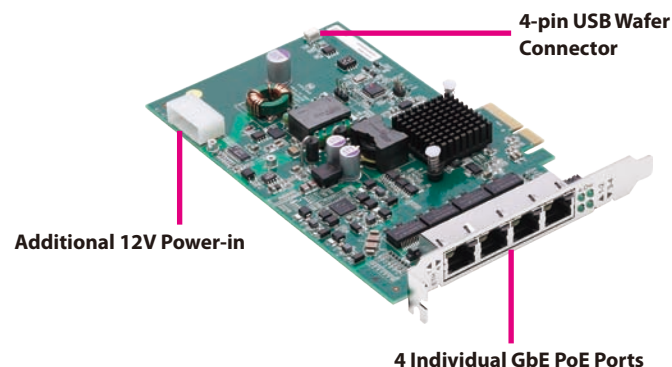
APPENDIX A: INSTALLING GE64/GE74 CARD AND ADDITIONAL NVME M.2 M-KEY 2242/2280 STORAGE

1. To install NVMe storages (up to 2 can be installed), please insert the NVMe storage modules into the M.2 slots on GE74 first.

GE74 PCIe 3.0 GbE PoE Card



GE64 PCIe 3.0 GbE PoE Card



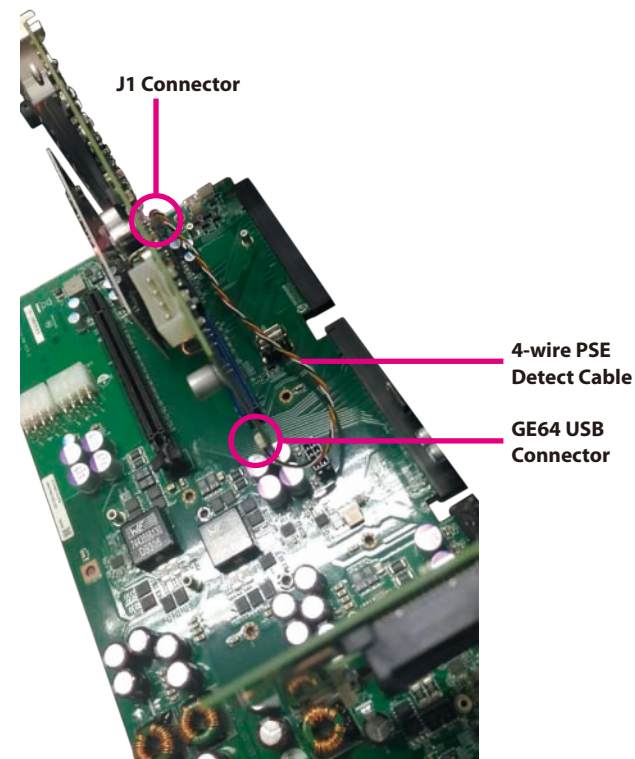
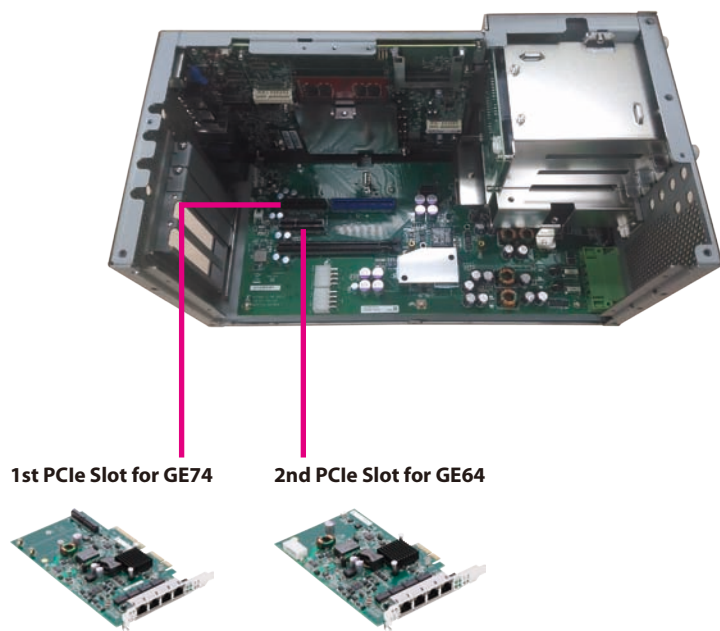
Note:
GE74 is designed with two additional NVMe M.2 slots compared to GE64.

2. If 8 GbE PoE ports are required, one GE74 and one GE64 can be used. In this scenario, install GE74 on the 1st PCIe slot and GE64 on the 2nd PCIe slot.
3. If 4 GbE PoE ports are required, only one GE74 is needed. In this scenario, install GE74 on the 1st PCIe slot.



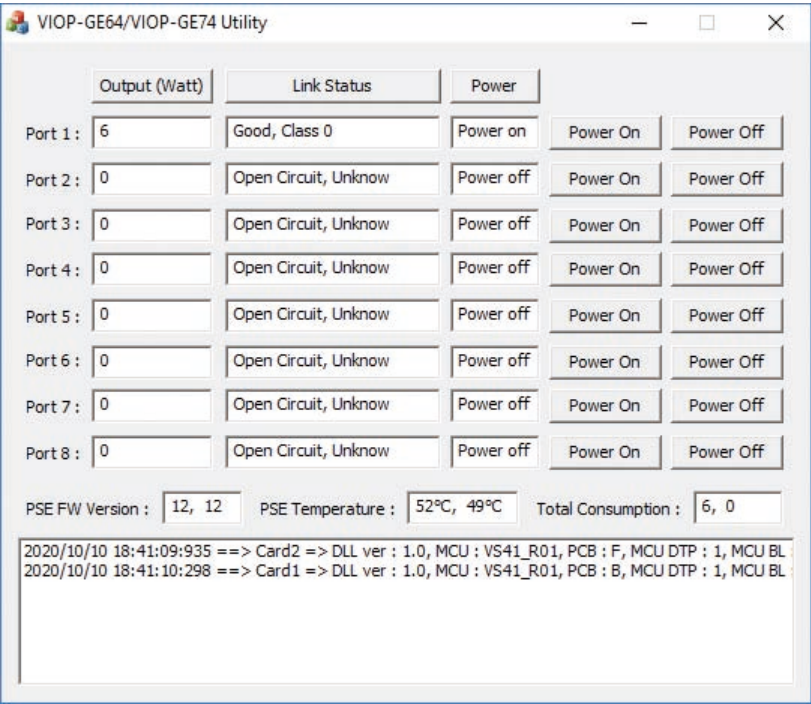
Note:

If GE64 is installed and you would like to monitor the PoE status via PoE SDK/utility, please connect a PSE detect cable from the J1 connector on the mainboard to the USB connector on GE64.

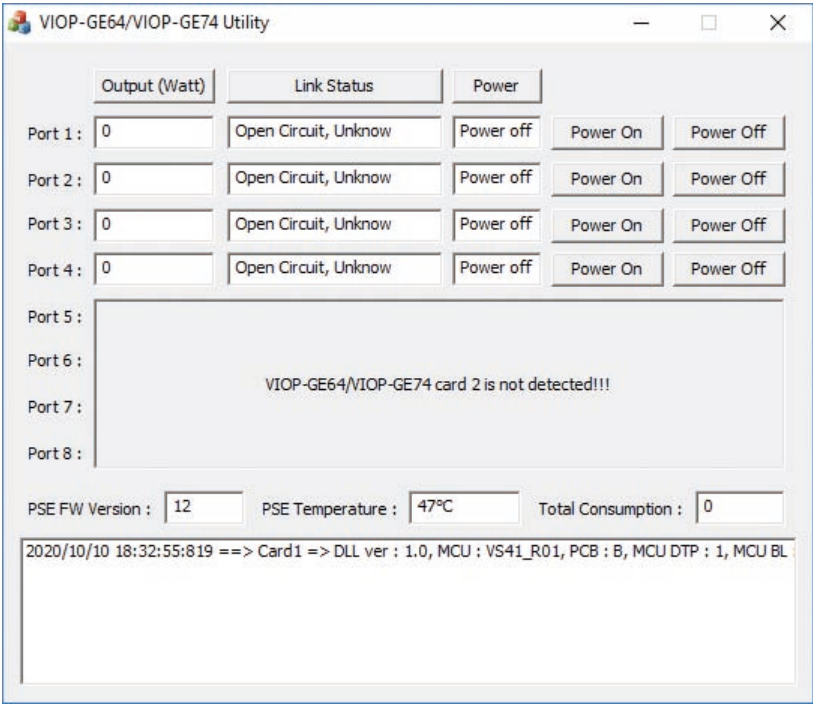


PoE Utility

PoE status menu when the 1st and 2nd PCIe slots are installed with GE74 and GE64 respectively.

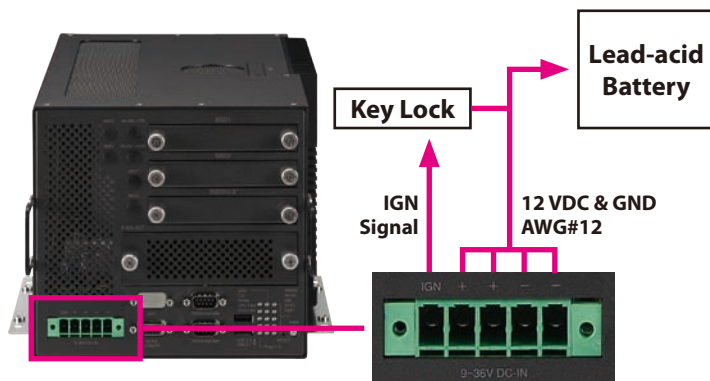


PoE status menu when the 1st PCIe slot is installed with GE74.



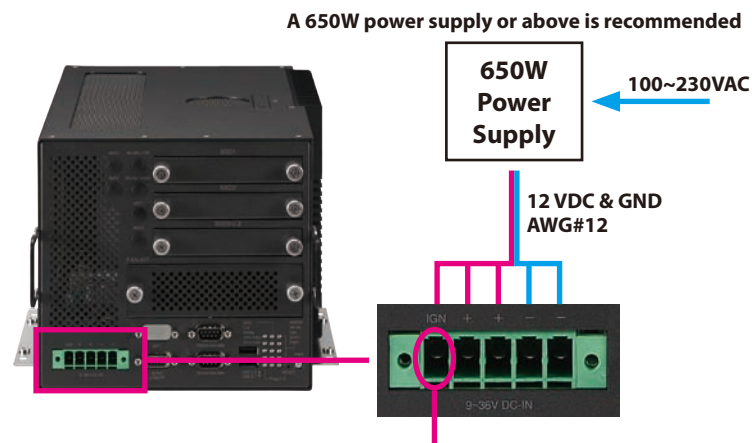
APPENDIX B: POWER CONNECTION

Scenario A: Power from Lead-acid Battery



Note: It is strongly recommended that an AWG#12 wire is used for the power supply.

Scenario B: Power from Off-the-Shelf 650W PSU



Short the IGN pin to 12VDC to keep IGN constantly in high-level



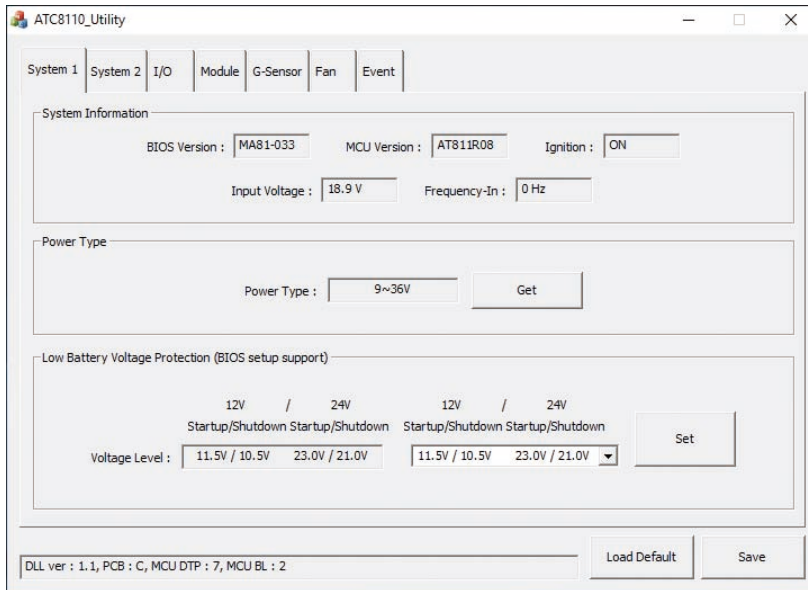
Note: The power supply kit is optional and available for purchase. Ordering Information: Power supply with 12V/IGN power-wire-cable.

APPENDIX C:

SOFTWARE DEMO UTILITY FOR I/O PORTS OF FUNCTION CONTROL

Menu Screen

1. System 1



The screenshot shows the ATC8110_Utility application window. It has a menu bar with 'System 1', 'System 2', 'I/O', 'Module', 'G-Sensor', 'Fan', and 'Event'. The 'System 1' tab is selected. Below the menu bar, there are three main sections:

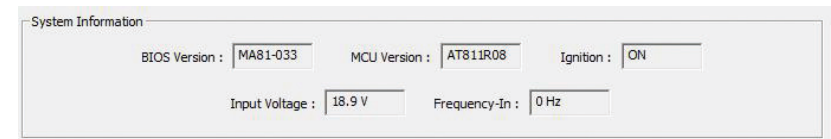
- System Information:** Contains fields for BIOS Version (MA81-033), MCU Version (AT811R08), Ignition (ON), Input Voltage (18.9 V), and Frequency-In (0 Hz).
- Power Type:** Contains a field for Power Type (9~36V) and a 'Get' button.
- Low Battery Voltage Protection (BIOS setup support):** Contains a table for voltage levels and a 'Set' button.

12V / 24V		12V / 24V	
Startup	Shutdown	Startup	Shutdown
11.5V / 10.5V	23.0V / 21.0V	11.5V / 10.5V	23.0V / 21.0V

At the bottom, there is a status bar showing 'DLL ver : 1.1, PCB : C, MCU DTP : 7, MCU BL : 2' and two buttons: 'Load Default' and 'Save'.

1.1 System Information

Displays basic information of the system.



This screenshot shows the 'System Information' section of the software. It contains the following fields:

- BIOS Version : MA81-033
- MCU Version : AT811R08
- Ignition : ON
- Input Voltage : 18.9 V
- Frequency-In : 0 Hz

1.2 Power Type

Shows one of the following power types for input voltage:

- 12VDC
- 24VDC
- 9~36VDC



This screenshot shows the 'Power Type' section of the software. It contains a field for Power Type (9~36V) and a 'Get' button.


1.3 Low Battery Voltage Protection

Enables or disables low battery voltage protection function. Once it is enabled, a total of 4 voltage level types can be selected.

Low Battery Voltage Protection (BIOS setup support)

	12V / 24V	12V / 24V
	Startup/Shutdown	Startup/Shutdown
Voltage Level :	11.5V / 10.5V 23.0V / 21.0V	11.5V / 10.5V 23.0V / 21.0V ▼
	<input type="button" value="Set"/>	

2. System 2



The screenshot shows the ATC8110_Utility application window. The 'System 2' tab is selected. The interface includes three main configuration sections: 'Power On/Off Delay Timer (BIOS setup support)', 'RTC Wake Up Timer (BIOS setup support)', and 'Watchdog Timer'. Each section contains dropdown menus for enabling/disabling the function and input fields for configuring specific parameters like delay times or timer settings. 'Load Default' and 'Save' buttons are at the bottom.

System 1 System 2 I/O Module G-Sensor Fan Event

Power On/Off Delay Timer (BIOS setup support)

Power Off Delay : Delay Off Time :

Power On Delay : Delay On Time :

RTC Wake Up Timer (BIOS setup support)

RTC Wake Up :

Timer Setting : Hour : Min : Sec :

Watchdog Timer

WDT :

Time interval :

2.1 Power On/Off Delay Timer

Enables or disables the Power On/Off Delay function. Once this function is enabled, the delay timer can be configured.



This panel shows the configuration for the Power On/Off Delay Timer. It includes dropdown menus for 'Power Off Delay' and 'Power On Delay', both currently set to 'Disable'. Next to them are input fields for 'Delay Off Time' (20 sec / 20 Sec) and 'Delay On Time' (10 sec / 10 Sec), each with a 'Set' button.

Power On/Off Delay Timer (BIOS setup support)

Power Off Delay : Delay Off Time :

Power On Delay : Delay On Time :

2.2 RTC Wake Up Timer

Enables or disables the RTC Wake Up function. Once this function is enabled, the timer can be configured.



This panel shows the configuration for the RTC Wake Up Timer. It includes a dropdown menu for 'RTC Wake Up' set to 'Disable' with a 'Set' button. Below it is a 'Timer Setting' section with input fields for Hour (0/0), Min (0/0), and Sec (0/0), each with a 'Set' button.

RTC Wake Up Timer (BIOS setup support)

RTC Wake Up :

Timer Setting : Hour : Min : Sec :

2.3 Watchdog Timer

Enables or disables the watchdog function. WDT timeout timer can be configured.



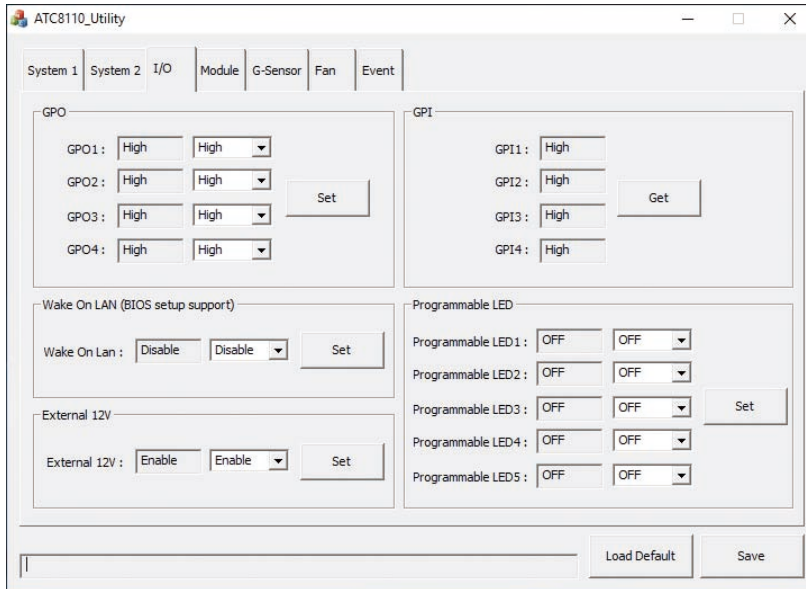
This panel shows the configuration for the Watchdog Timer. It includes a dropdown menu for 'WDT' set to 'Disable' with a 'Set WDT' button. Below it is a 'Time interval' section with input fields for '3 Sec' and '3', with a 'Set time interval' button.

Watchdog Timer

WDT :

Time interval :

3. I/O



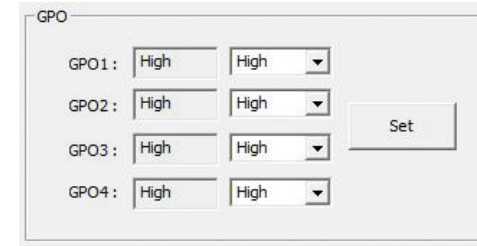
The screenshot shows the ATC8110_Utility software window with the 'I/O' tab selected. The interface is divided into several sections:

- GPO (General Purpose Output):** Four rows (GPO1 to GPO4) each containing two dropdown menus (both set to 'High') and a 'Set' button.
- GPI (General Purpose Input):** Four rows (GPI1 to GPI4) each containing a dropdown menu (all set to 'High') and a 'Get' button.
- Wake On LAN (BIOS setup support):** A section with 'Wake On Lan' set to 'Disable' and a 'Set' button.
- External 12V:** A section with 'External 12V' set to 'Enable' and a 'Set' button.
- Programmable LED:** Five rows (LED1 to LED5) each containing two dropdown menus (all set to 'OFF') and a 'Set' button.

At the bottom of the window are 'Load Default' and 'Save' buttons.

3.1 GPO

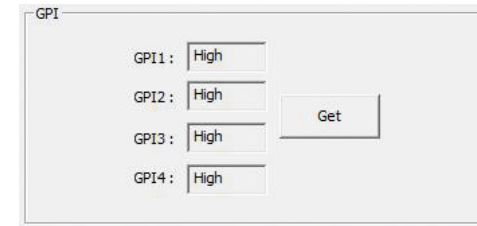
Configures GPO as high voltage level or low voltage level.



This close-up shows the GPO configuration section. It lists GPO1 through GPO4, each with a text box showing 'High' and a dropdown arrow. A 'Set' button is positioned to the right of the GPO3 and GPO4 rows.

3.2 GPI

Reads the status (voltage level) of GPI.



This close-up shows the GPI configuration section. It lists GPI1 through GPI4, each with a text box showing 'High'. A 'Get' button is positioned to the right of the GPI3 and GPI4 rows.

3.3 Wake on LAN

Enables or disables the Wake On LAN function on LAN.

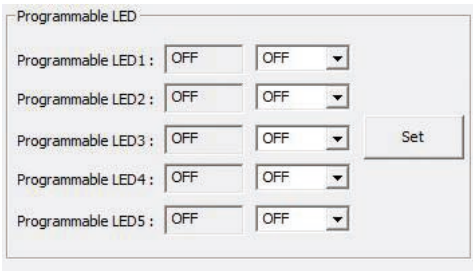


Wake On LAN (BIOS setup support)

Wake On Lan :

3.4 Programmable LED

Turns the LED light on or off.

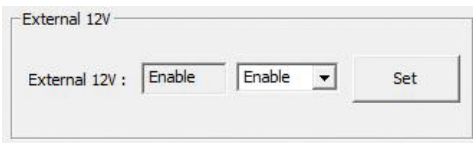


Programmable LED

Programmable LED1 :	<input type="text" value="OFF"/>	<input type="text" value="OFF"/>	<input type="button" value="Set"/>
Programmable LED2 :	<input type="text" value="OFF"/>	<input type="text" value="OFF"/>	
Programmable LED3 :	<input type="text" value="OFF"/>	<input type="text" value="OFF"/>	
Programmable LED4 :	<input type="text" value="OFF"/>	<input type="text" value="OFF"/>	
Programmable LED5 :	<input type="text" value="OFF"/>	<input type="text" value="OFF"/>	

3.5 External 12V

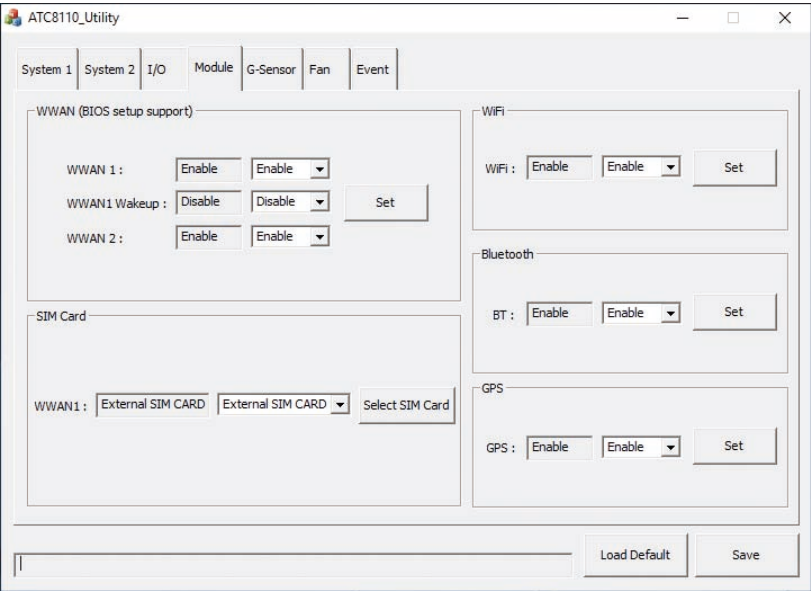
Enables or disables the 12VDC power output.



External 12V

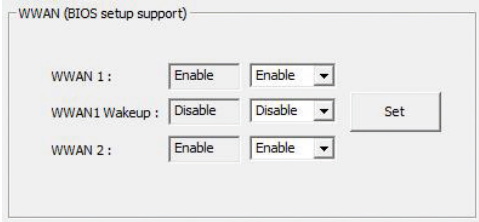
External 12V :

4. Module



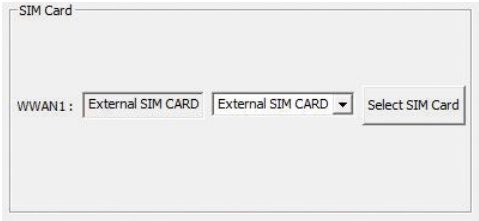
4.1 WWAN

Enables or disables the WWAN function and the wake-up function.



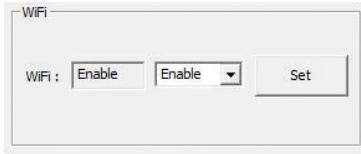
4.2 SIM Cards

Selects the SIM card for WWAN.



4.3 Wi-Fi

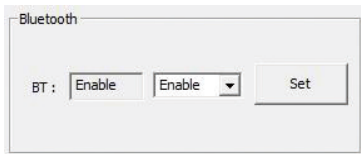
Enables or disables the Wi-Fi function.



The Wi-Fi configuration window has a title bar labeled 'WiFi'. Inside, there is a label 'WiFi:' followed by a text box containing 'Enable', a dropdown menu also showing 'Enable', and a 'Set' button.

4.4 Bluetooth

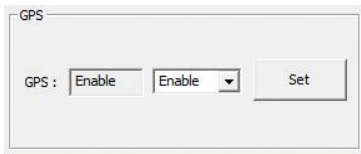
Enables or disables the Bluetooth function.



The Bluetooth configuration window has a title bar labeled 'Bluetooth'. Inside, there is a label 'BT:' followed by a text box containing 'Enable', a dropdown menu also showing 'Enable', and a 'Set' button.

4.5 GPS

Enables or disables the GPS function.



The GPS configuration window has a title bar labeled 'GPS'. Inside, there is a label 'GPS:' followed by a text box containing 'Enable', a dropdown menu also showing 'Enable', and a 'Set' button.



5. G-Sensor

ATC8110_Utility

System 1System 2I/OModuleG-SensorFanEvent

G-Sensor Reg Index : 45 : POWER_CTLRead G-Sensor Data0AWrite G-Sensor Data0AEx : 0xFF or FF

Num	Name	Type	Value	Description
0	DEVID	R	E5	Device ID
1~28	Reserved			Reserved; do not access
29	THRESH_TAP	R/W	00	Tap threshold
30	OFSX	R/W	00	X-axis offset
31	OFSY	R/W	00	Y-axis offset
32	OFSZ	R/W	00	Z-axis offset
33	DUR	R/W	00	Tap duration
34	Latent	R/W	00	Tap latency
35	Window	R/W	00	Tap window
36	THRESH_ACT	R/W	00	Activity threshold
37	THRESH_INACT	R/W	00	Inactivity threshold
38	TIME_INACT	R/W	00	Inactivity time
39	ACT_INACT_CTL	R/W	00	Axis enable control for activity and inactivity detection
40	THRESH_FF	R/W	00	Free-fall threshold
41	TIME_FF	R/W	00	Free-fall time
42	TAP_AXES	R/W	00	Axis control for single tap/double tap
43	ACT_TAP_STATUS	R	00	Source of single tap/double tap
44	BW_RATE	R/W	0A	Data rate and power mode control
45	POWER_CTL	R/W	0A	Power-saving features control
46	INT_ENABLE	R/W	00	Interrupt enable control
47	INT_MAP	R/W	00	Interrupt mapping control

Refresh

DATAx : -6DATAy : 248DATAz : 5

Get all Gsensor Data Success.

Load DefaultSave

5.1 G-Sensor Registers

Selects the registers inside G-Sensor to read or write the data.

G-Sensor Reg Index : 45 : POWER_CTLRead G-Sensor Data?Write G-Sensor Data0AEx : 0xFF or FF

5.2 Register Table

Shows the value of all registers in G-Sensor, once the Refresh button is pressed.

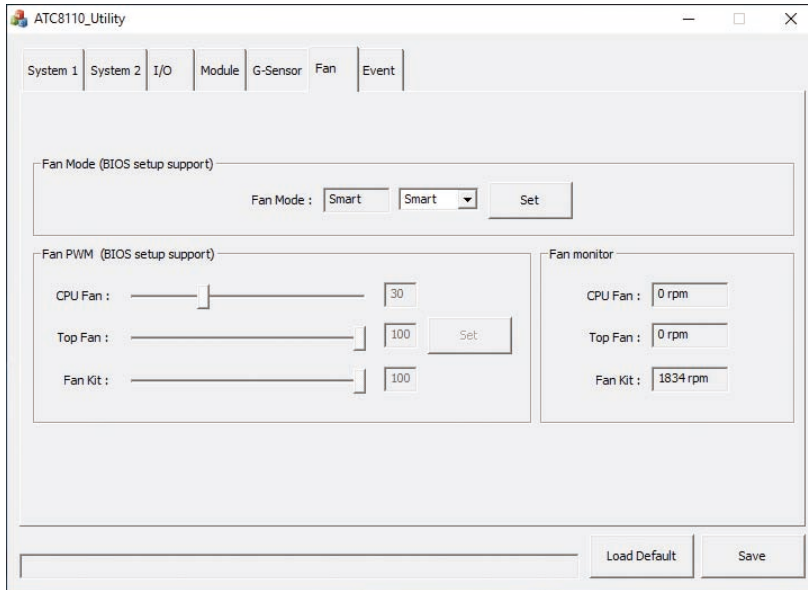
G-Sensor Reg Index : 45 : POWER_CTLRead G-Sensor Data?Write G-Sensor Data0AEx : 0xFF or FF

Num	Name	Type	Value	Description
-----	------	------	-------	-------------

Refresh

DATAx :DATAy :DATAz :

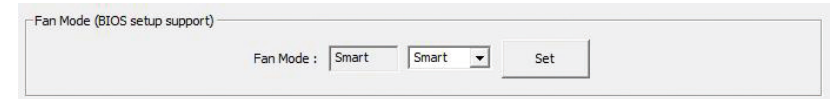
6. Fan



The screenshot shows the ATC8110_Utility window with the 'Fan' tab selected. The interface includes tabs for System 1, System 2, I/O, Module, G-Sensor, Fan, and Event. The 'Fan' tab contains three main sections: 'Fan Mode (BIOS setup support)' with a dropdown menu set to 'Smart' and a 'Set' button; 'Fan PWM (BIOS setup support)' with sliders and input boxes for CPU Fan (30), Top Fan (100), and Fan Kit (100), along with a 'Set' button; and 'Fan monitor' with readouts for CPU Fan (0 rpm), Top Fan (0 rpm), and Fan Kit (1834 rpm). At the bottom are 'Load Default' and 'Save' buttons.

6.1 Fan Mode

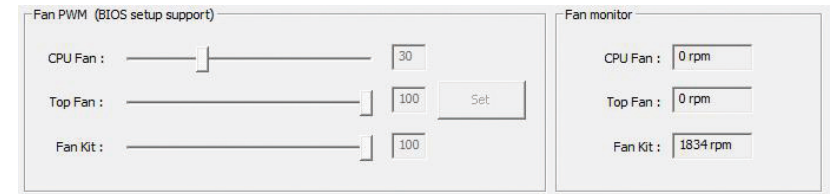
Configure the fans (three fans in total) as smart (the system thermometer will automatically detect the environment temperature to determine the fan's RPM) or manual. (Please refer to 6.2 for setting up fan PWM value and viewing the corresponding fan's RPM.)



This close-up shows the 'Fan Mode (BIOS setup support)' section. It features a 'Fan Mode' label followed by a text box containing 'Smart', a dropdown menu also showing 'Smart', and a 'Set' button.

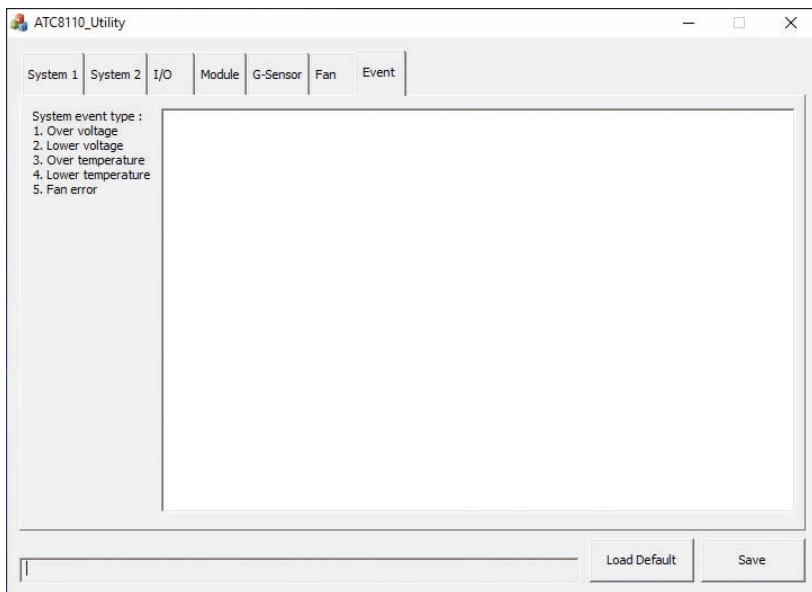
6.1 Fan PWM

Manually configures the PWM of each fan and shows the corresponding fan's RPM.



This close-up shows the 'Fan PWM (BIOS setup support)' and 'Fan monitor' sections. The PWM section has sliders and input boxes for CPU Fan (30), Top Fan (100), and Fan Kit (100), with a 'Set' button. The Fan monitor section shows readouts for CPU Fan (0 rpm), Top Fan (0 rpm), and Fan Kit (1834 rpm).

7. Event



The Event tab shows the following alarm messages:

1. Over voltage alarm
2. Lower voltage alarm
3. Over temperature alarm
4. Lower temperature alarm
5. Fan error alarm

APPENDIX D: GPS FEATURE

uBlox-NEO M8 Overview

The NEO-M8 series of standalone concurrent GNSS modules is built on the exceptional performance of the u-blox M8 GNSS (GPS, GLONASS, Galileo, BeiDou, QZSS and SBAS) engine in the industry proven NEO form factor.

The NEO-M8 series provides high sensitivity and minimal acquisition times while maintaining low system power. The NEO-M8M is optimized for cost sensitive applications, while NEO-M8N and NEO-M8Q provide best performance and easier RF integration. The NEO form factor allows easy migration from previous NEO generations. Sophisticated RF-architecture and interference suppression ensure maximum performance even in GNSS-hostile environments.

The NEO-M8 combines a high level of robustness and integration capability with flexible connectivity options. The future-proof NEO-M8N includes an internal Flash that allows simple firmware upgrades for supporting additional GNSS systems. This makes NEO-M8 perfectly suited to industrial and automotive applications.

The DDC (I²C compliant) interface provides connectivity and enables synergies with most u-blox cellular modules. For RF optimization the NEO-M8N/Q features an additional front-end LNA for easier antenna integration and a front-end SAW filter for increased jamming immunity.

u-blox M8 modules use GNSS chips qualified according to AEC-Q100, are manufactured in ISO/TS 16949 certified sites, and fully tested on a system level. Qualification tests are performed as stipulated in the ISO16750 standard: "Road vehicles – Environmental conditions and testing for electrical and electronic equipment".

Technical Specifications

Features

Receiver type	72-channel u-blox M8 engine GPS/QZSS L1 C/A, GLONASS L10F, BeiDou B1 SBAS L1 C/A: WAAS, EGNOS, MSAS Galileo-ready E1B/C (NEO-M8N)		
Nav. update rate¹	Single GNSS: up to 18 Hz Concurrent GNSS: up to 10 Hz		
Position accuracy	2.0 m CEP		
		NEO-M8N/Q	NEO-M8M
Acquisition	Cold starts:	26 s	27 s
	Aided starts:	2 s	4 s
	Reacquisition:	1 s	1 s
Sensitivity	Tracking & Nav:	–167 dBm	–164 dBm
	Cold starts:	–148 dBm	–147 dBm
	Hot starts:	–156 dBm	–156 dBm
Assistance	AssistNow GNSS Online AssistNow GNSS Offline (up to 35 days) AssistNow Autonomous (up to 6 days) OMA SUPL & 3GPP compliant		
Oscillator	TCXO (NEO-M8N/Q), Crystal (NEO-M8M)		
RTC crystal	Built-in		
Noise figure	On-chip LNA (NEO-M8M). Extra LNA for lowest noise figure (NEO-M8N/Q)		

Features cont.

Anti jamming	Active CW detection and removal. Extra onboard SAW band pass filter (NEO-M8N/Q)
Memory	ROM (NEO-M8M/Q) or Flash (NEO-M8N)
Supported antennas	Active and passive
Odometer	Travelled distance
Data-logger	For position, velocity, and time (NEO-M8N)

¹ For NEO-M8M/Q

Electrical data

Supply voltage	1.65 V to 3.6 V (NEO-M8M) 2.7 V to 3.6 V (NEO-M8N/Q)
Power consumption²	23 mA @ 3.0 V (continuous) 5 mA @ 3.0 V Power Save Mode (1 Hz, GPS only)
Backup Supply	1.4 to 3.6 V

² NEO-M8M

Interfaces

Serial interfaces	1 UART 1 USBV2.0 full speed 12 Mbit/s 1 SPI (optional) 1 DDC (I ² C compliant)
Digital I/O	Configurable timepulse 1 EXTINT input for Wakeup
Timepulse	Configurable 0.25 Hz to 10 MHz
Protocols	NMEA, UBX binary, RTCM

VIOB-GPS-02 Module Connector Pin Definitions



J2 (GPS Side)



J9 (PC 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

J9 Pin Definition

Pin	Definition	Pin	Definition
1	GPS_BAT	2	GPS_LED#
3	GPS_TX	4	GPS_RX
5	GND	6	VCC3_GPS

COM Port for GPS: COM 4 Baud Rate: 9600

APPENDIX E: GPS WITH DEAD RECKONING FEATURE

uBlox-NEO M8L Overview

The NEO-M8L standalone concurrent GNSS module with 3D dead-reckoning (DR) is built on the exceptional performance of the u-blox M8 concurrent GNSS (GPS, GLONASS, Galileo-ready¹, BeiDou, QZSS and SBAS) engine in the compact and industry proven NEO form factor.

The NEO-M8L delivers a complete, self-contained solution for road-vehicle Automotive Dead Reckoning (ADR) applications in an exceptionally compact 16 x 12 mm form-factor. The module combines information from GNSS, on-board 3-Dimensional inertial sensors, and speed data from the vehicle to deliver continuous navigation in road-vehicle applications. Its size and features make it suitable for aftermarket and first-fit navigation and Telematics applications. Position measurement rates of up to 2 Hz are available with optional extrapolation (based on vehicle dynamics) extending reporting rates to 20 Hz. Inertial sensor measurements are available to external applications at rates up to 10 Hz.

For ease of application, both hardware and message interfaces are supported for vehicle speed. u-blox' ADR and GNSS technologies deliver continuous and accurate positioning throughout the journey. u-blox' tightly-coupled navigation solution delivers significant improvements in navigation accuracy, especially in difficult urban environments. Dead reckoning sensors in conjunction with speed information from the vehicle also provide navigation before GNSS signals are acquired and during periods of complete signal loss. The introduction of three dimensional sensing and signal processing (for both acceleration and direction) extend accurate navigation to urban multi-level highways and car-parks as well as extending dead-reckoned range in tunnels and urban canyons. 3D sensing also enables flexibility in orientation of the receiver with respect to the vehicle frame.

The NEO form factor allows easy migration from previous NEO generations. Sophisticated RF architecture and interference suppression ensure maximum performance even in GNSS-hostile environments. The NEO-M8L module includes an internal Flash that allows simple firmware upgrades. These features make the NEO-M8L perfectly suited to industrial and automotive applications. UART, SPI and DDC (I²C compatible) interfaces provide connectivity and enable synergies with most u-blox cellular modules.

u-blox M8 modules use GNSS chips qualified according to AEC-Q100, and are manufactured in ISO/TS 16949 certified sites. Qualification tests are performed as stipulated in the ISO16750 standard: "Road vehicles - Environmental conditions and testing for electrical and electronic equipment".

u-blox' AssistNow Assistance services supply aiding information, such as ephemeris, almanac and time, reducing the time to first fix significantly and improving acquisition sensitivity. The u-blox M8 generation extends validities of AssistNow Offline data (up to 35 days) and AssistNow Autonomous data (up to 6 days), providing the benefits of faster acquisition for longer durations since last use.

¹ With future flash firmware update.

Technical Specifications

Parameter	Specification				
Receiver type	72-channel u-blox M8 engine GPS L1C/A, SBAS L1C/A, QZSS L1C/A GLONASS L1OF, BeiDou B1, Galileo E1B/C ²				
GNSS		GPS & GLONASS	GPS & BeiDou	GPS	
Time-To-First-Fix³	Cold start	27 s	28 s	30 s	
	Hot start	1.5 s	1.5 s	1.5 s	
	Aided starts ⁴	4 s	6 s ⁵	3 s	
Sensitivity⁶	Tracking & Navigation ⁷	-160 dBm	-160 dBm	-160 dBm	
	Reacquisition	-159 dBm	-159 dBm	-159 dBm	
	Cold start	-147 dBm	-147 dBm	-147 dBm	
	Hot start	-156 dBm	-156 dBm	-156 dBm	
Navigation		GPS & GLONASS	GPS & BeiDou	GPS	
Horizontal Position accuracy⁸	Autonomous	2.5 m	2.5 m	2.5 m	
	SBAS	2.0 m	2.0 m	2.0 m	
Velocity accuracy⁹		0.05 m/s	0.05 m/s	0.05 m/s	
Heading accuracy⁹		0.3 degree	0.3 degree	0.3 degree	
ADR position error¹⁰	Gyro + speed pulse + accelerometer		typ. 3 % of distance travelled without GNSS		
Frequency of time pulse signal			0.25 Hz ... 10 MHz		
Maximum navigation rate (High Rate output)¹¹			20 Hz		

Navigation		GPS & GLONASS	GPS & BeiDou	GPS
Maximum navigation rate (Measurement rate)			2 Hz	
Navigation latency¹²			300 ms nominal	
Maximum sensor measurement message output rate			10 Hz	
Sensor measurement message output bandwidth¹³			nominal 50% of output rate	
Accuracy of time pulse signal	RMS 99%	30 ns 60 ns	30 ns 60 ns	30 ns 60 ns
Operational limits	Dynamics		≤ 4G	
	Altitude		50,000m	
	Velocity		500 m/s	

² Ready to support Galileo E1B/C when available with a flash firmware update

³ All signals at - 130 dBm

⁴ Dependent on aiding data connection speed and latency

⁵ BeiDou assisted acquisition is not available

⁶ Demonstrated with a good external LNA

⁷ Optimized for best navigation performance with dead-reckoning

⁸ GNSS fix available, CEP, 50%, 24 hours static, -130dBm, > 6 SVs

⁹ GNSS fix available, 50% @ 30 m/s

¹⁰ Typical road and vehicle conditions

¹¹ For update rates > 2 Hz, extrapolation techniques are applied.

¹² Dependent on signal conditions but measurements are delivered with time-stamp corresponding to measurement time

¹³ Higher bandwidths are used for navigation

¹⁴ Assuming Airborne < 4 g platform

VIOB-GPS-DR02/VTK-GPS-DR02 Module Connector Pin Definitions



J2 (GPS Side)



J9 (PC 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

J9 Pin Definition

Pin	Definition	Pin	Definition
1	GPS_BAT	2	GPS_LED#
3	GPS_TX	4	GPS_RX
5	GND	6	VCC3_GPS

COM Port for GPS: COM 4
Baud Rate: 9600



J3 (GPS Side)



J8 (PC Side)

J3 Pin Definition

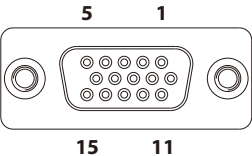
Pin	Definition	Pin	Definition
1	DR_DIRECTIO_M_R	2	DR_ODOMETER_M_R
3	1PPS_R	4	GND

J8 Pin Definition

Pin	Definition	Pin	Definition
1	GND	2	1PPS
3	DR_ODOMETER_M	4	DR_DIRECTIO_M

APPENDIX F: SIGNAL CONNECTION OF DI/DO

GPIO Pinout Description



Pin	Definition	Pin	Definition
1		2	
3	GPO3	4	GPI1
5	GPO0	6	
7		8	
9	GPI2	10	GPO1
11		12	
13	GPI3	14	GPO2
15	GPI0		

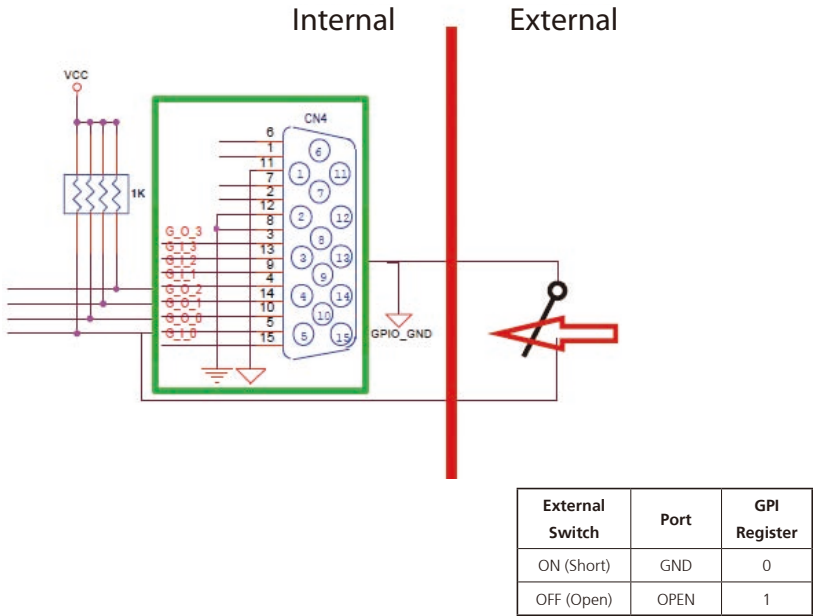
Digital Input

CN12 connector for GPI signal (digital signal input). The CN12 connector has 4 digital input channels by default.

Wet Contact (default)

The SW2 switch needs to switch to “ON” state. The GPI signals have a pull up resistor to Vin Voltage internally.

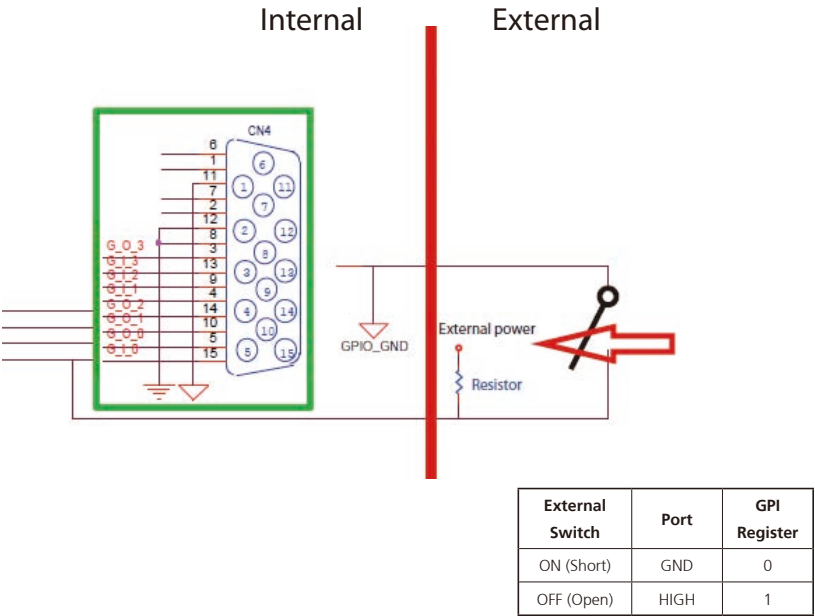
The figure below shows how to connect an external source to one of the input channels.



Dry Contact:

The SW2 switch needs to switch to “Low” 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

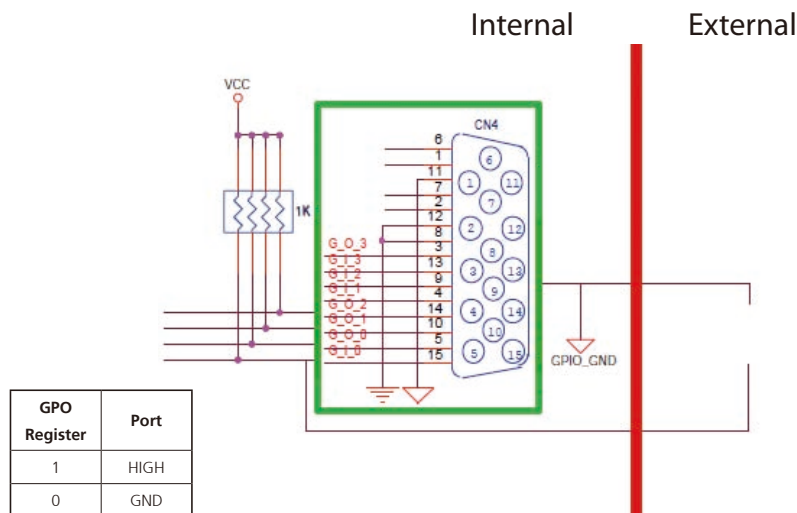
CN12 connector for GPO signal (digital signal output). The CN12 connector has 4 digital output channels by default.

The signal connection of CN12 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 SW2 switch needs to switch to “ON” state. The GPO signal will have a pull up resistor to Vin Voltage internally.

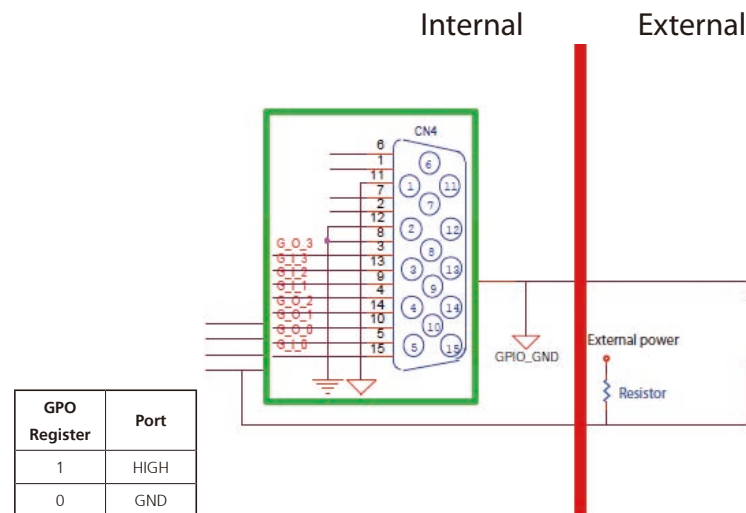
The figure below shows how to connect an external source to one of the output channels.



Dry Contact

The SW2 switch needs to switch to “Low” 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 G: VEHICLE POWER MANAGEMENT SETUP

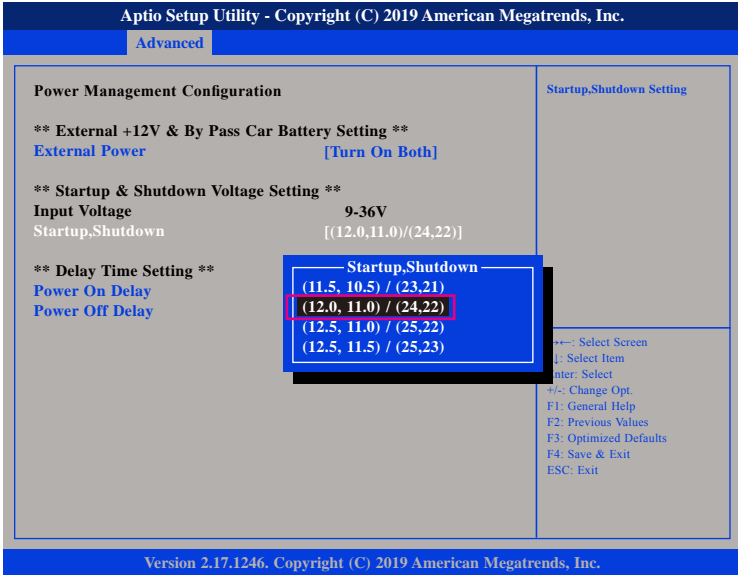
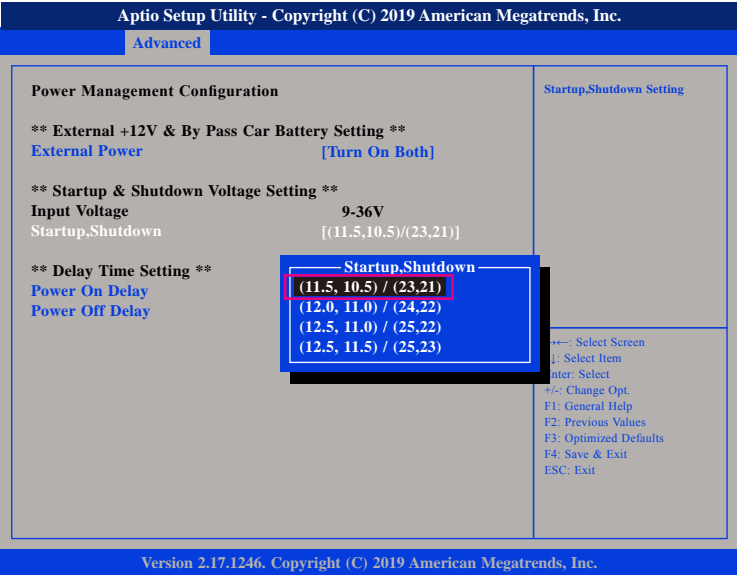
Startup and Shutdown Voltage Setting

Set the startup voltage to 11.5V or 23V and the shutdown voltage to 10.5V or 21V

If the input voltage is 12V: the startup voltage to 11.5V and the shutdown voltage to 10.5V.
If the input voltage is 24V: the startup voltage to 23V and the shutdown voltage to 21V.

Set the startup voltage to 12.0V or 24V and the shutdown voltage to 11.0V or 22V

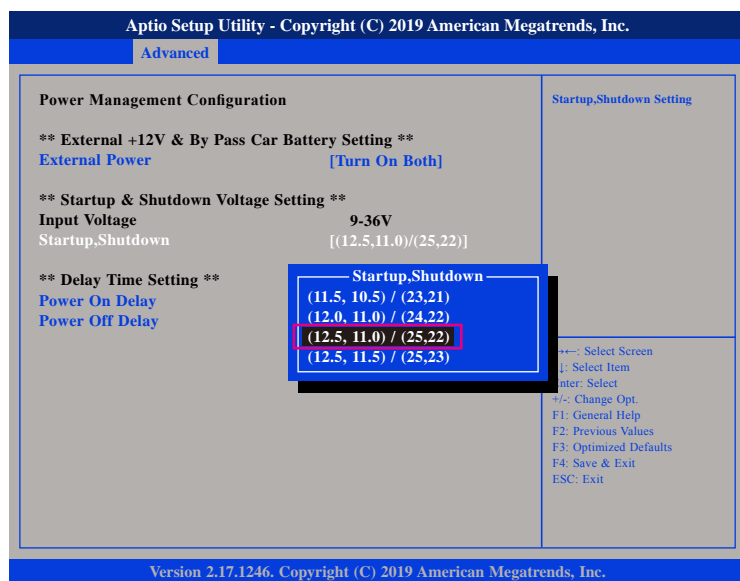
If the input voltage is 12V: the startup voltage to 12V and the shutdown voltage to 11V.
If the input voltage is 24V: the startup voltage to 24V and the shutdown voltage to 22V.



Set the startup voltage to 12.5V or 25V and the shutdown voltage to 11.0V or 22V

If the input voltage is 12V: the startup voltage to 12.5V and the shutdown voltage to 11V.

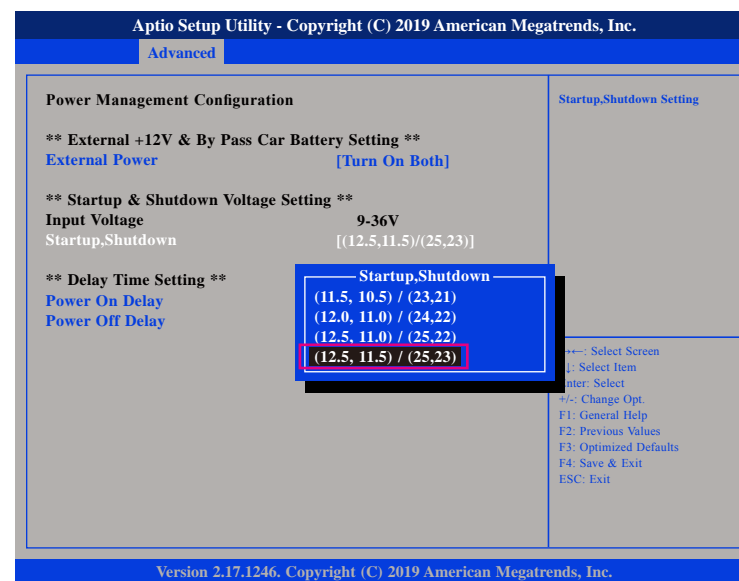
If the input voltage is 24V: the startup voltage to 25V and the shutdown voltage to 22V.



Set the startup voltage to 12.5V or 25V and the shutdown voltage to 11.0V or 22V

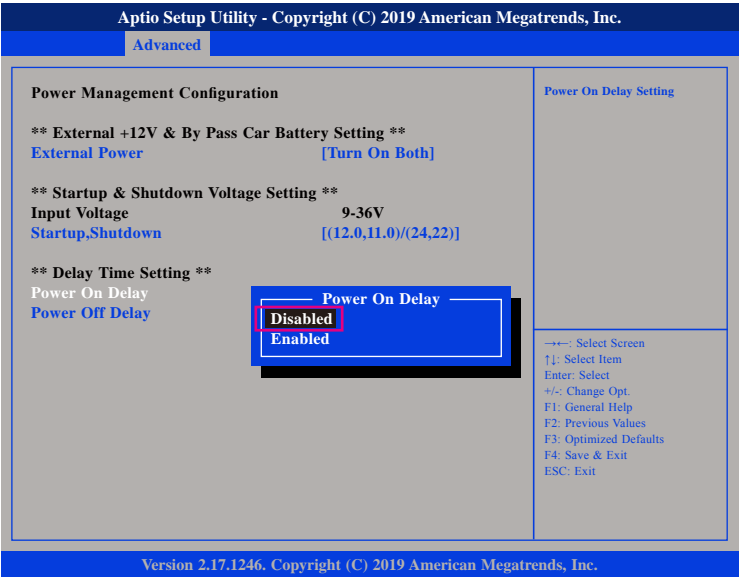
If the input voltage is 12V: the startup voltage to 12.5V and the shutdown voltage to 11.5V.

If the input voltage is 24V: the startup voltage to 25V and the shutdown voltage to 23V.



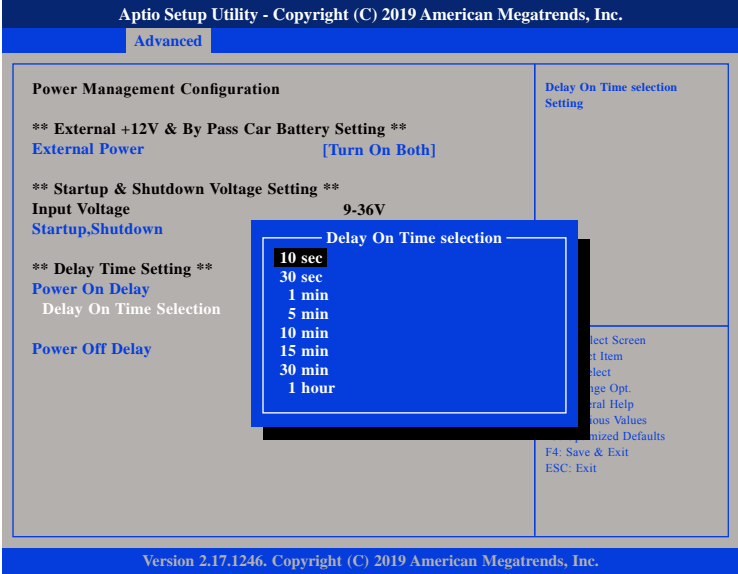
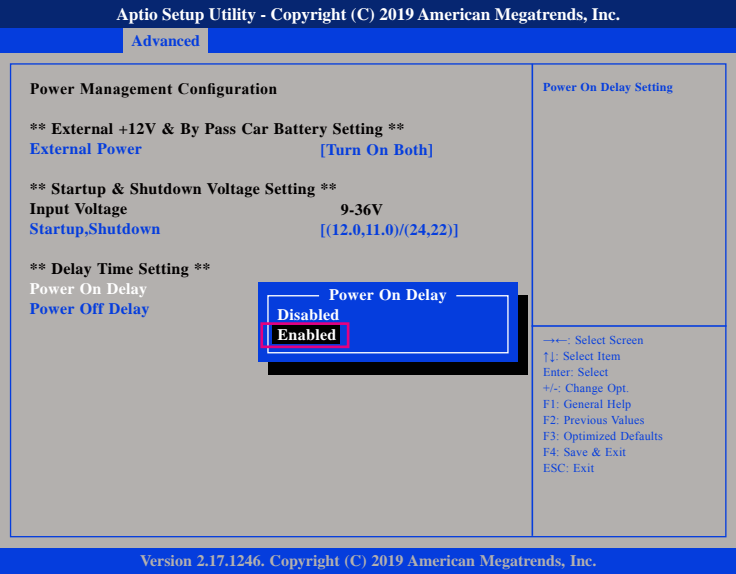
Power-on Delay Setting

Disable Power-on Delay



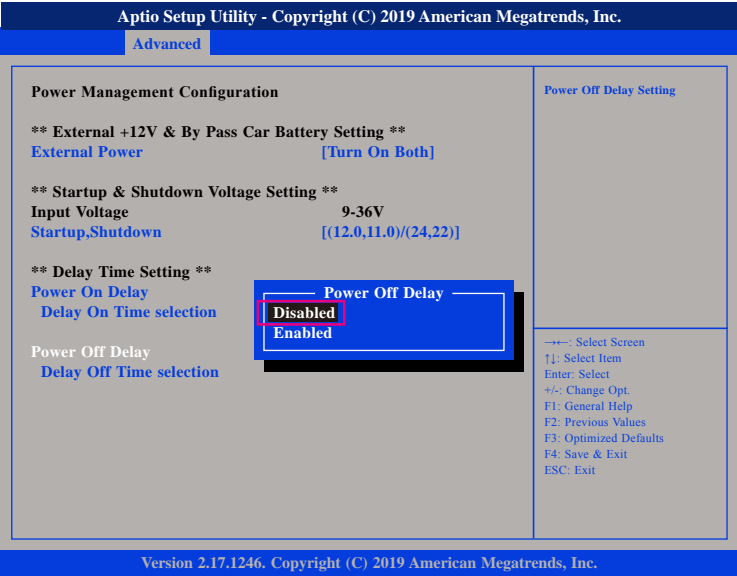
Enable Power-on Delay

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



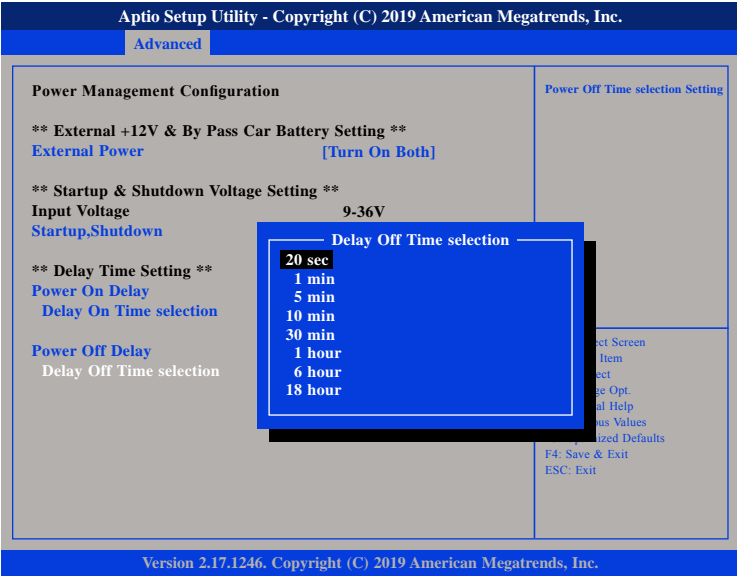
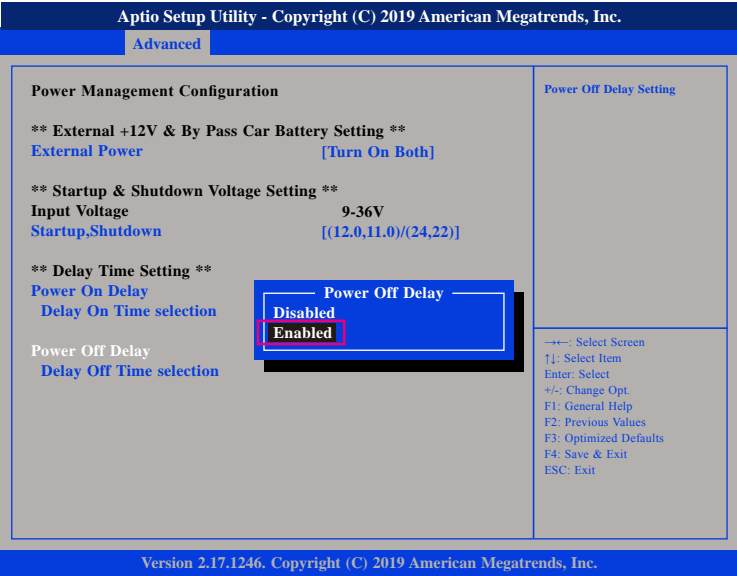
Power-off Delay Setting

Disable Power-off Delay



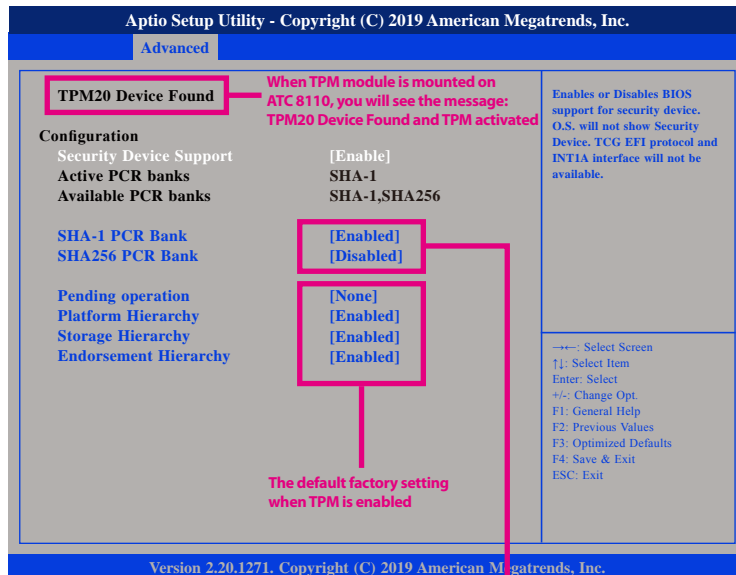
Enable Power-off Delay

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



APPENDIX H: TPM SETUP (OPTIONAL)

BIOS Screen with TPM Module



BIOS Screen with No TPM Module



APPENDIX I: POWER CONSUMPTION

OS: Windows 10

Burn-in Software:

Test Condition: Room temperature

Test Procedure: Idle, Full, Full+load and IGN OFF

Device:

Idle: Into OS + all modules (LTE & Wi-Fi modules) in operation (unlink), HDMI & VGA + keyboard & mouse + audio + RTX 2080Ti installed or Intel 630 GPU

Full State: Burn In 100% + all modules (LTE & Wi-Fi & GPS modules) in operation (unlink) + play video + keyboard & mouse + audio + 4x COM transmitting + PoE card installed + GTX 2080 installed or Intel 630 GPU (Run FurMark)

Full State + Loading: Full state + USB Load: USB 3.0 (5V/1A) x5 / USB 2.0 (5V/0.5A) x2 + COM PWR load (12V/1A) x2 + POE (15W) x4 + RTX 2080Ti or Intel 630 GPU (Run FurMark)

Item	Device	Test Case		Result	
				Current(A)	Watt(W)
1	S0 State (Intel 630)	Idle state	12V	3.07	36.84
			24V	1.48	35.52
			36V	1.13	40.68
		Full-run state	12V	9.5	114
			24V	4.68	112.32
			36V	3.27	117.72
		Full-run state + loading	12V	14.9	178.8
			24V	7.5	180
			36V	5.18	186.48
		Full-run state + loading (PoE w/ 60W)	12V	20.81	249.72
			24V	10.4	249.6
			36V	7.24	260.64

Item	Device	Test Case		Result	
				Current(A)	Watt(W)
1	S0 State	Full-run state+loading (PoE w/ 60W+ DC out 12V/2A)	12V	22.81	273.72
			24V	11.4	273.6
			36V	7.91	284.76
2	S3 State	Full state sleep mode	12V	0.95A	
3	IGN OFF	Full state IGNITION OFF	12V	8mA	
			24V	8mA	
			36V	11mA	

Item	Device	Test Case		Result	
				Current(A)	Watt(W)
1	S0 State (RTX 2080Ti Graphics Card)	Idle state	12V	5.61	67.32
			24V	2.99	71.76
			36V	2.03	73.08
		Full state (FurMark)	12V	42.3	507.6
			24V	21.19	508.56
			36V	14.31	515.16
		Full state+loading	12V	48.1	577.2
			24V	24.1	578.4
			36V	15.8	568.8
		Full state+loading (PoE w/ 60W)	12V	52.9	634.8
			24V	26.5	636
			36V	17.56	635.4
		Full state+loading (PoE w/ 60W + DC out 12V/2A)	12V	54.9	658.8
			24V	27.5	660
			36V	18.32	659.52

Item	Device	Test Case		Result	
				Current(A)	Watt(W)
2	S3 State	Full state sleep mode	12V	0.95A	
3	IGN OFF	Full state IGNITION OFF	12V	8mA	
			24V	8mA	
			36V	11mA	

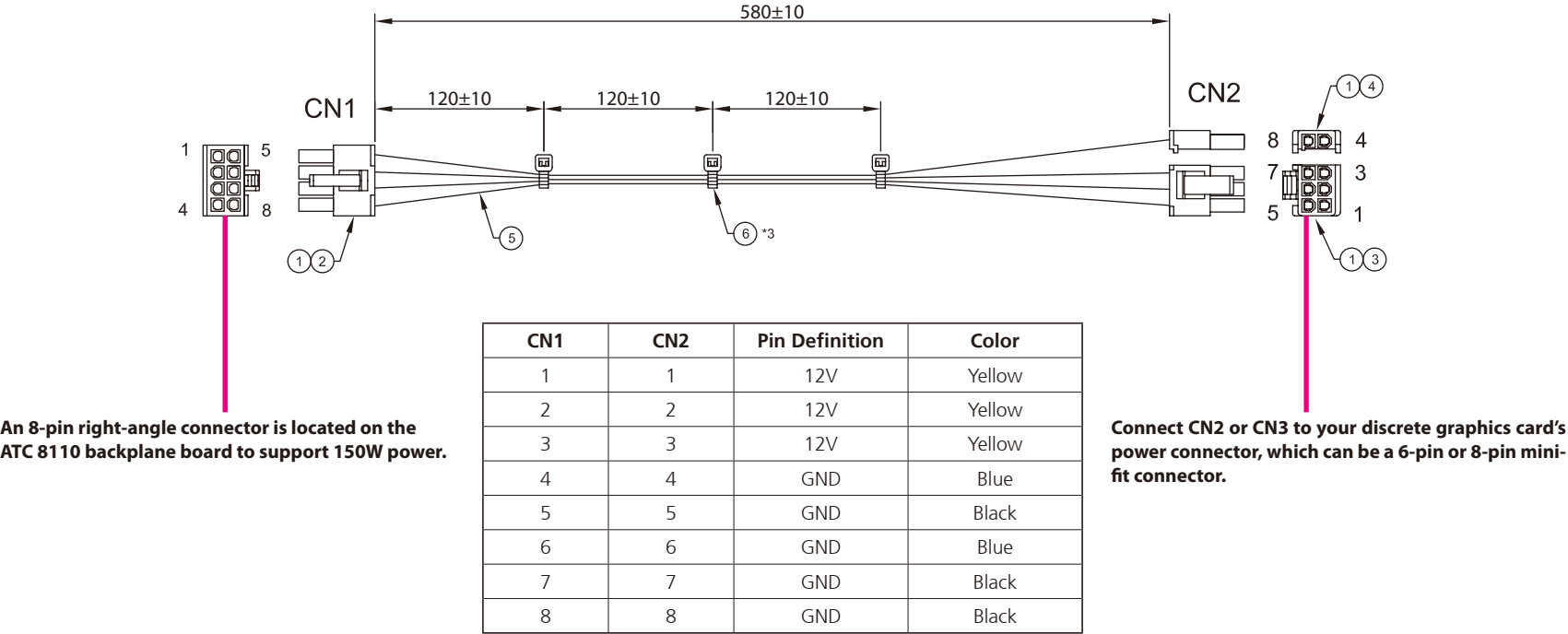
Item	Device	Test Case		Result	
				Current(A)	Watt(W)
1	S0 State CPU_65W (RTX 2080Ti Graphics Card)	Idle state	12V	5.61	67.32
			24V	2.99	71.76
			36V	2.03	73.08
		Full state (FurMark)	12V	45.6	547.2
			24V	22.86	548.64
			36V	15.43	555.48
		Full state+loading	12V	51.35	616.2
			24V	25.77	618.48
			36V	16.92	609.12
		Full state+loading (PoE w/ 60W)	12V	56.4	676.1
			24V	28.17	676.08
			36V	18.77	675.72
2	S3 State	Full state sleep mode	12V	0.95A	
			12V	8mA	
			24V	8mA	
3	IGN OFF	Full state IGNITION OFF	12V	8mA	
			24V	8mA	
			36V	11mA	

Power Consumption Comparison for 9th Generation Intel® Core™ Processors (35W & 80W CPUs)

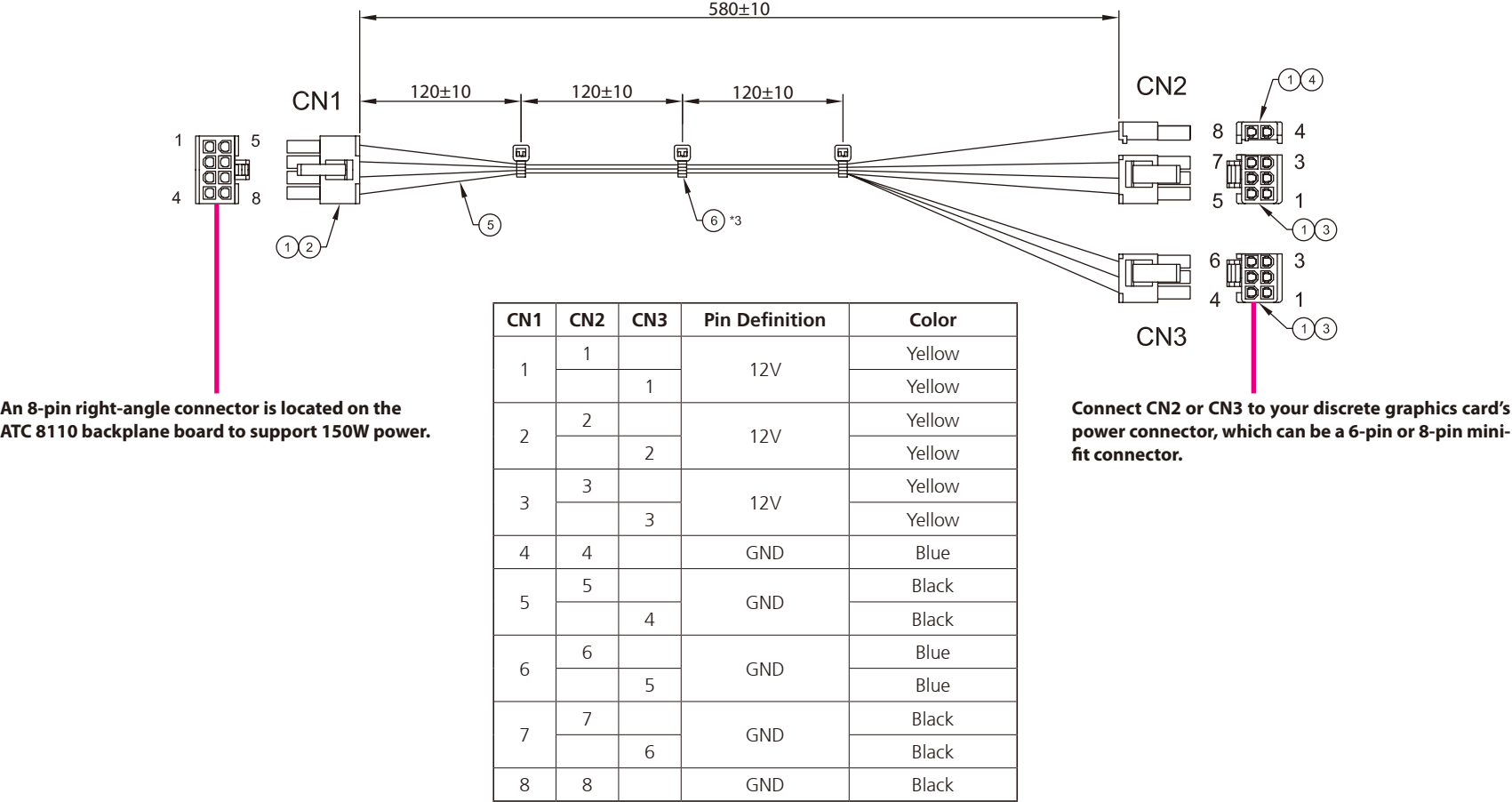
Device	Test Case		35W		80W	
			Current(A)	Watt(W)	Current(A)	Watt(W)
S0 State CPU_35W / 80W Refresh PoE Card (Graphics card not installed)	Idle state	12V	2.08	24.96	2.34	28.08
		24V	1.0	24	1.25	30
		36V	0.71	24.85	0.89	31.15
	Burn In 100% (w/o PoE card)	12V	6.65	79.8	11.6	139.2
		24V	3.35	80.4	5.7	136.8
		36V	2.36	82.6	4.0	140
	Burn In 100% + PoE 60W	12V	12.4	148.8	17.5	210
		24V	6.25	150	8.79	211
		36V	4.49	157.15	6.23	218

APPENDIX J: CABLE INFORMATION

Power Cable for Graphics Card 01

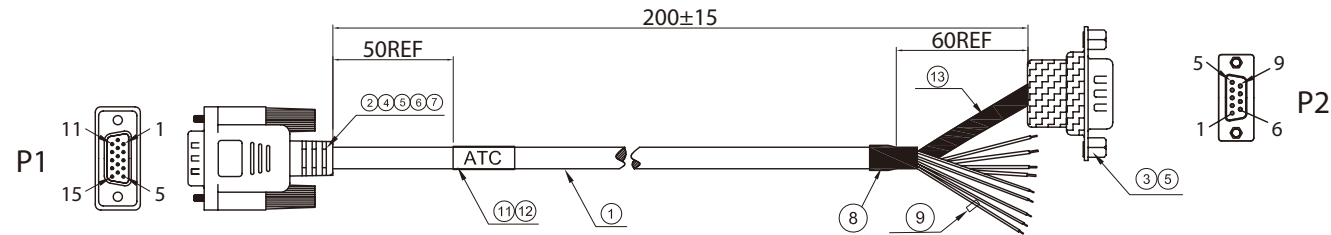


Power Cable for Graphics Card 02



An 8-pin right-angle connector is located on the ATC 8110 backplane board to support 150W power.

Multi-port DB15 External Cable (Optional)



Pin Assignment

P1		Label Description	
ODOMETER	2	Red	ODOMETER
GO3	3	YELLOW	GO3
GI1	4	BLUE	GI1
GO0	5	PURPLE	GO0
DIRECTION	7	GRAY	DIRECTION
GND	8	WHITE	GND
GI2	9	PINK	GI2
GO1	10	LIGHT/GREEN	GO1
GND	12	LIGHT/BLUE	GND
GI3	13	RED/WHITE	GI3
GO2	14	BROWN/WHITE	GO2
GI0	15	GREEN	GI0

P1		P2	
3(CAN_H)	1	Black	3
5(CAN_L)	6	Brown	5
2(CANISO GND)	11	Orange	2