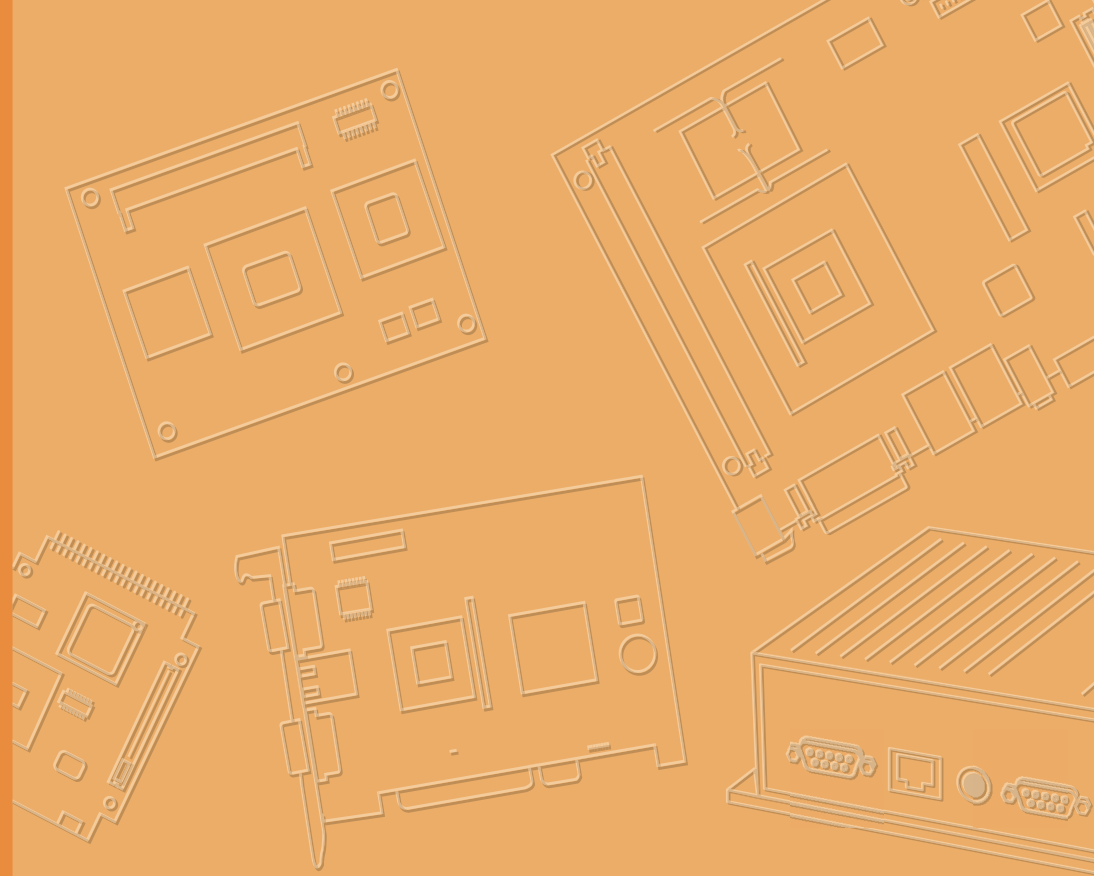


User Manual



TREK-60

**Modular AI Platform for Scalable
Surveillance and Fleet
Management**

ADVANTECH

Enabling an Intelligent Planet

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Product Warranty (2 years)

Advantech warrants the original purchaser that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that have been subject to misuse, abuse, accident, or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe your product is defective, follow the steps outlined below.

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages displayed when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This type of cable is available from Advantech. Please contact your local supplier for ordering information.

Test conditions for passing also include the equipment being operated within an industrial enclosure. In order to protect the product from damage caused by electrostatic discharge (ESD) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

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

Warnings, Cautions, and Notes

Warning! *Warnings indicate conditions that, if not observed, can cause personal injury!*



Caution! *Cautions are included to help prevent hardware damage and data losses. For example,*



“Batteries are at risk of exploding if incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.”

Note! *Notes provide additional optional information.*



Document Feedback

To assist us with improving this manual, we welcome all comments and constructive criticism. Please send all such feedback in writing to support@advantech.com.

Technical Support and Assistance

1. Visit the Advantech website at www.advantech.com/support to obtain the latest product information.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before calling:
 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (operating system, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

Safety Instructions

1. Read these safety instructions carefully.
Veillez lire attentivement ce manuel d'instructions de sécurité.
2. Retain this user manual for future reference.
Veillez conserver ce manuel d'instructions pour référence ultérieure.
3. Disconnect the equipment from all power outlets before cleaning. Use only a damp cloth to clean. Do not use liquid or spray detergents.
Débranchez l'appareil de toutes les prises de courant avant le nettoyage. Nettoyez-le uniquement à l'aide d'un chiffon humide. Ne pas utiliser de détergents liquides ou pulvérisateurs.
4. For pluggable equipment, the power outlet socket must be located near the equipment and easily accessible.
Pour les appareils enfichables, la prise de courant doit être placée près de l'appareil et facilement accessible.
5. Protect the equipment from humidity.
Protégez l'appareil contre l'humidité.
6. Place the equipment on a reliable surface during installation. Dropping or letting the device fall may cause damage.
Placez l'appareil sur une surface fiable pendant l'installation. L'abandon ou la chute de l'appareil pourrait causer des dommages.

7. Do not leave the equipment in an environment where the storage temperature is below -40 °C (-40 °F) or above 80 °C (175 °F) as it may damage the equipment. The operating temperature range depends on the specific model.
Ne laissez pas l'équipement dans un environnement où la température de stockage est inférieure à -40 ° C (-40 ° F) ou supérieure à 80 ° C (175 ° F) car cela pourrait endommager l'équipement. La plage de température de fonctionnement dépend du modèle spécifique.
 - For models with Intel® i7-1365URE and RF/SDP: -20 ~ 50 °C (-4 ~ 122 °F)
 - Pour les modèles avec processeur Intel® i7-1365URE et RF / SDP: -20 ~ 50 ° C (-4 ~ 122 ° F)
 - For models with Intel® x7433RE and RF/SDP: -30 ~ 70 °C (-22 ~ 158 °F)
 - Pour les modèles avec processeur Intel® x7433RE uniquement: -30 ~ 70 ° C (-22 ~ 158 ° F)
8. The openings on the enclosure are for air convection. Protect the equipment from overheating. Do not cover the openings.
Les ouvertures du boîtier sont pour la convection d'air. Protégez l'appareil contre la surchauffe. Ne couvrez pas les ouvertures.
9. Ensure that the voltage of the power source is of the correct voltage and is earthed before connecting the equipment to a power outlet.
Assurez-vous que la tension de la source d'alimentation est correcte avant de connecter l'appareil à une prise de courant. La prise de courant doit avoir une bonne connexion mise à la terre.
10. Position the power cord away from high-traffic areas. Do not place anything over the power cord. The voltage and current rating of the cord should be greater than the voltage and current rating marked on the product.
Placez le cordon d'alimentation à l'écart des zones à fort trafic. Ne placez rien sur le cordon d'alimentation. La tension et le courant du cordon doivent être supérieurs à la tension et au courant indiqués sur le produit.
11. All cautions and warnings on the equipment should be noted.
Attention à toutes les précautions et avertissements indiqués sur l'appareil.
12. If unused for a long time, disconnect the equipment from the power source to avoid damage from transient overvoltage.
Si l'appareil n'est pas utilisé pendant une longue période, déconnectez-le de la source d'alimentation pour éviter les dommages causés par une surtension transitoire.
13. Never pour liquid into an opening. This may cause fire or electrical shock.
Ne versez jamais de liquide dans une ouverture. Sinon, cela pourrait provoquer un incendie ou un choc électrique.
14. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
N'ouvrez jamais l'appareil. Pour des raisons de sécurité, l'appareil ne doit être ouvert que par un technicien qualifié.

15. If one of the following situations occurs, have the equipment checked by service personnel:
Si l'un des cas suivants se produit, demandez aide à un technicien qualifié:
- The power cord or plug is damaged.
Le cordon d'alimentation ou la fiche est endommagé.
 - Liquid has penetrated the equipment.
Le liquide a pénétré dans l'appareil.
 - The equipment has been exposed to moisture.
L'appareil a été exposé à l'humidité.
 - The equipment is malfunctioning or does not operate according to the user manual.
L'appareil est défectueux ou ne fonctionne pas conformément aux instructions.
 - The equipment has been dropped and damaged.
L'appareil a été abandonné et endommagé.
 - The equipment shows obvious signs of breakage.
L'appareil montre des signes évidents de rupture.
16. Any unverified component could cause unexpected damage. To ensure correct installation, always use the components provided in the accessory box.
Tout composant non vérifié peut provoquer des dommages inattendus. Pour garantir une installation correcte, utilisez toujours les composants fournis dans la boîte d'accessoires.
17. CAUTION: Batteries are at risk of exploding if incorrectly replaced. Replace only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.
ATTENTION: Il y a danger d'explosion s'il y a rem placement incorrect de la pile. Remplacer uniquement avec une pile du même type ou d'un type equivalent recommandé par le constructeur.
18. CAUTION: This product is not intended for use by children and is not suitable for use in locations where children are likely to be present (this product is not a toy).
ATTENTION: Ce produit n'est pass un jouet et devrait ètregard Jouet et devrait être gardé hors de la portée des enfants.
19. CAUTION: Always ground yourself to remove any static charge before touching the motherboard, backplane, or add-on cards. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components on a static-dissipating surface or in a static-shielded bag when not installed in the chassis.
ATTENTION: Mettez-vous toujours à la terre pour éliminer toute charge statique avant de toucher la carte mère, le fond de panier ou les cartes d'extension. Les appareils électroniques modernes sont très sensibles aux charges électriques statiques. Par mesure de sécurité, utilisez en tout temps un bracelet antistatique. Placez tous les composants électroniques sur une surface dissipant l'électricité statique ou dans un sac blindé antistatique lorsqu'ils ne sont pas dans le châssis.

Safety Precautions - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage:

Suivez ces précautions simples pour vous protéger contre les dommages et protéger les produits contre les dommages:

- To avoid electrical shock, always disconnect the power from the PC chassis before manual handling. Do not touch any components on the main board or cards while the system is powered on.
Pour éviter tout choc électrique, débranchez toujours l'alimentation du châssis du PC avant toute manipulation manuelle. Ne touchez aucun composant de la carte principale ou des cartes lorsque le système est sous tension.
- Disconnect the power before implementing any configuration changes. A sudden surge of power after connecting a jumper or installing a card may damage sensitive electronic components.
Débranchez l'alimentation avant d'appliquer des modifications de configuration. Une surtension soudaine après la connexion d'un cavalier ou l'installation d'une carte peut endommager les composants électroniques sensibles.

Warning!



1. Rated input voltage: 9 ~ 32 V_{DC} (12/24V power system)
Tension d'entrée nominale: 9 ~ 32 V_{DC} (système d'alimentation 12 / 24V)
2. Transport: Carry the unit with both hands and handle with care
Transport: portez l'appareil à deux mains et manipulez-le avec précaution
3. Maintenance: Use only a damp cloth to clean the surfaces
Entretien: utilisez uniquement un chiffon humide pour nettoyer les surfaces
4. Battery/Micro SD/SIM card/SSD: Power off the equipment before installing or removing any peripherals
Batterie / Micro SD / Carte SIM / SSD: Éteignez l'équipement avant d'installer ou de retirer des périphériques
5. This product is intended to be supplied by a UL-certified power supply or DC power source rated 9 ~ 32 V_{DC}, 14A, with a TMA of 40 °C (104 °F) minimum. Should you require additional assistance, contact Advantech for further information.
Ce produit doit être certifié par UL pour l'alimentation électrique ou en courant continu, Tension nominale 9 ~ 32 V_{DC}, 14A, et TMA 40 °C (104 °F), contactez si vous avez besoin d'aide Advantech en sait plus.

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Chapter 1

General Information

1.1 Introduction

The Advantech TREK-60 is a rugged, modular video AI platform aimed at fleet management and surveillance applications.

Powered by a 13th generation Intel Core i7/i5/Atom x7433RE multi-core processor, TREK-60 supports up to eight camera input channels and AI accelerator expansion to enable scalable video inferences on edge devices. The provision of an RF extension module with automotive-grade FAKRA connector supports GNSS, WLAN, Bluetooth, and WWAN technology to enable real-time communication, vehicle tracking, and data collection. Moreover, the embedded dual CAN bus supports diverse vehicle protocols, including raw CAN, J1939, and OBD-II, for vehicle monitoring and diagnostics, while the intelligent vehicle power management system supports ignition on/off/delay and wake-up event control. Furthermore, to ensure easy integration and connection with vehicle systems, TREK-60 features multiple digital I/O with wet and dry configurations, two 4-wire RS-232/RS-485 ports, and two 2-wire RS-232 ports, as well as dual audio codec packs.

1.2 Key Features

- Intel® Atom™ x7433RE/Core™ i7-1365URE/i5-1345URE processor
- RF extension module with automotive-grade connector (FAKRA) enables easy installation and customization
- Modular I/O expansion facilitates the integration of edge AI modules, 5G communication, and DSRC/V2X devices
- Eight 802.3at PoE IP camera ports for video surveillance applications
- GNSS, WLAN, Bluetooth, and WWAN communication technology
- Easily paired with second-generation TREK displays via a single cable
- Accessible external SSD tray with key-lock protection
- Supports 12/24V input power (ISO 7637-2) with intelligent power management that supports ignition on/off/delay functions, wake-up event control, and system monitoring and diagnostics
- Wide operating temperature range (-30~70°C/-22~158°F)
- EN60721-3-5 Class 5M3 certified for shock and vibration tolerance
- TREK-60 is certified to ECE R118 and ITxPT standards, ensuring enhanced fire safety, interoperability, and compliance with international vehicle requirements.

1.3 Modular Design

The TREK-60 consists of an industrial computer with a ruggedized metal enclosure and RF and IO extension modules that enable flexible expansion and integration with existing infrastructure. The modular design allows TREK-60 to be easily customized for entry-level or high-end computing applications.



Figure 1.1 TREK-60 Architecture

Table 1.1: TREK-60 Modular Design SKU		
	TREK-60 SKU1	TREK-60 SKU2
Platform (blue components)	Intel® Core™ i7/i5 ■ CPU: i7-1365URE ■ Memory: DDR5	Intel® Atom™ X series ■ CPU: X7433RE ■ Memory: DDR5
Surveillance (red components)	8 IPCAM channels ■ 8 x RJ-45 ports ■ 2.5" SSD tray	
Other features	■ External RF module ■ SDP port ■ GPS	

1.4 General Specifications

Platforms

- Intel Amston Lake (ASL):
 - Processor: Intel® Atom™ X7433RE 4 cores 1.5GHz
 - Memory: 1 x SODIMM socket, supports up to 32GB of DDR5 5600
 - Graphics: Intel® 4K@60 Hz
 - BIOS: AMI UEFI (64 Mbit) on CPU
- Intel Raptor Lake (RPL):
 - Processor: Intel® Core™ i7-1365URE 10 cores, 4.9 GHz
 - Memory: 2 x SODIMM socket, supports up to 96GB of DDR5 5600
 - Graphics: Intel® 4K UHD 4096 × 2160 @60Hz
 - BIOS: AMI UEFI (64-Mbit) on CPU

OS: Windows 11 IoT Enterprise LTSC, 64 bit (default), Ubuntu 24.04, 64 bit

Storage

- 1 x internal M.2 M-Key 2242 NVMe PCIe Gen4 x4 slot (default) supports up to 512GB industrial-grade storage (3D sTLC) (128 GB as default)
- 1 x externally accessible 2.5" SSD tray (maximum height 9.5 mm) with key-lock protection, supports an optional TLC industrial-grade SSD up to 8TB
- 1 x externally accessible micro SD card reader (optional) with push-push mechanism and key-lock protection, supports an optional SDHC Class 10 UHS-I MLC industrial-grade SD card, up to 128 GB (available upon request)

Display (Graphical Output)

- 1 x DisplayPort 2.0 (for direct pairing with a second generation TREK display via a single-cable connection) with hot plug detection via a GT32-10-pin automotive connector:
 - 12V/2.0A power output for the TREK-306 (1024 x 768 default resolution) and TREK-303 (800 x 480 default resolution) displays
 - 1 x High-resolution video and audio input
 - 1 x USB 2.0
 - 1 x Power button
 - 1 x Reset button
- 1 x HDMI 2.0

Expansion

- 1 x Internal full-size M.2 M-Key 2242 for PCIe or SATA SSD slot for optional expansion
- 1 x External RF extension module
- 1 x External I/O extension module (optional)

Sensors

- 1 x Accelerometer; linear acceleration zero-g level offset accuracy ±40 mg
- 1 x Gyroscope
- 3 x Thermal sensors reserved (for CPU, top side of main board, and bottom side of main board)

I/O Interface

- Virtual I/O via GT25, 16-pin, automotive connector:
 - 2 x CAN bus (supports RAW CAN, J1939, OBD-II/ISO 15765; configurable via firmware)
 - 1 x J1708 (supports J1587)
 - 1 x Ignition and battery power input
- Generic I/O via GT25, 40-pin, automotive connector:
 - 2 x 4-wire RS-232 (default) and RS-485 (configure in BIOS)
 - 2 x 2-wire RS-232
 - 6 x Digital input with 2.5 kV isolation
 - Wet/Dry configuration via SDK (default for all ports is dry contact)
 - Low up to 1.3V; High at least 4V; maximum 36V_{DC}
 - 4 x Digital output with 2.5 kV isolation
 - Output current up to 48V/300mA maximum
 - 2 x Line-Out
 - 2 x Mic-In
- Standard I/O:
 - 1 x USB 2.0 Type-A (Front)
 - 2 x USB 3.2 Type-A (Rear)
 - 2 x GigaLAN (default RJ-45 connector, optional M12 X-coded connector)
- LED: 5 x LED, Power (red), Storage (yellow), WLAN (green), WWAN (green), and GPS (yellow)
- Buttons:
 - 1 x Power button on TREK-30x G2 display (power on ignition as default)
 - 1 x Clear CMOS button with key-lock protection
 - 1 x Reset button with key-lock protection

Video Surveillance

- IP Camera:
 - 8 x RJ-45 for 10/100Mbps
 - Supports IEEE802.3af Class 2 (7 W), Class 3 (15.4 W), IEEE802.3at Class 4 (30 W)
 - Power output shared with all cameras limited to 61.6W
 - SDK for PoE control

RF (WLAN/WWAN Support via RF Extension)

- 1 x full-size mini PCIe slot, supports IEEE 802.11a/b/g/n/ac and Bluetooth V5.0 (combo module as default)
- 1 x full-size mini PCIe slot, supports WWAN (LTE, HSPA+, GSM/GPRS) module for US/EU bands (Sierra wireless WP7607 for EU and WP7610 for US as default)
- 1 x Externally accessible mini SIM card socket (with cover), 1 x optional embedded SIM available upon request
- 1 x Built-in u-blox NEO-M9L BeiDou, Galileo, GLONASS, GPS / QZSS with 3D dead reckoning (DR available) and onboard sensors
- 5 x FAKRA-type antenna FAKRA male connectors, not holes for 1 x GPS, 2 x Wi-Fi+BT, 2 x WWAN/LTE with Wi-Fi/WWAN MIMO supported

RTC Battery

3.0V @ 200 mAH lithium battery

Watchdog Timer

timer interval setup by IVCP SDK, setup by IVCP SDK

Power System

- Supports 12/24V power system (ISO 7637-2 and SAE J1113 compliance)
- Intelligent Power Management (IVCP FW):
 - System power on/off/hibernate management (programmable ignition on/off/delay)
 - Supports wake-up events: wake-on-alarm (RTC), wake-on-call/SMS, and wake-on-G-sensor
 - System power protection (battery low voltage protection)
 - System monitoring and diagnostics
 - System power usage management (Table 1.3)
 - Optional features power usage table (for reference only) (Table 1.4)

Table 1.2: Power Input and Output

Input Power	Description	Remark
Input 12 ~ 32V	Supports platform and POE	Note 1
Input 9 ~ 12V	Supports platform power only	Note 2

Note 1: Supports platform and PoE power management via IVCP firmware

Note 2: Does not support PoE function when input power is 9 ~ 12V

Mechanical Design

- Aluminum chassis with IP65-rated ingress protection; IP65-rated protection available with extended I/O cover (depending on specific I/O ports)
- Dimensions (W x D x H): 314 x 165.5 x 75.1 mm (12.36 x 6.51 x 2.95 in)
- Weight: (without SSD) 4.3 kg/9.47 lb; (without SSD or RF extension module) 3.8 kg/8.37 lb

Environmental Specifications

- Operating Temperature:
 - -20 ~ 50°C (-4 ~ 122°F) for TREK-60 SKU 1
 - -30 ~ 70 °C (-22 ~ 158°F) for TREK-60 SKU 2
- Storage Temperature: -40 ~ 85°C (-40 ~ 176°F)
- Relative Humidity: 95% @ 40°C/104°F (non-condensing)
- Vibration and Shock Tolerance: MIL-STD-810G, EN60721-3(5M3), SAE J1455,
- IP Rating: IP65 an optional IP65-rated M12 system I/O cover is available upon request
- Power Regulation: E-Mark (E13), SAE J1455, ISO-7637-2, SAE J1113
- Safety: UL 62368-1, CSA 62368-1, IEC/EN 62368-1 (certified temperature 50°C/122°F and 70°C/158°F)
- EMC:
 - Emissions: FCC Part 15 Subpart B Class A, IC ICES-003 Class A, EN 55032 Class A, EN 61000-6-3, EN 61000-3-2, EN 61000-3-3
 - Immunity: EN 55035, EN 61000-6-2/EN 61000-6-4

Power Consumption

Table 1.3: Power Consumption for Intel® Core™ i7-1365URE CPU Model

Mode	PoE Loader	SDP2.0
Power off	NA	0.086W
Idle	0W	41W
Burn-in	0W	53W

Note 1: The converter efficiency is 90~95%. Thus, if the PoE loader setting is 30W, the input power must be at least 33W (for sufficient power at 90% efficiency).

Note 2: The system tested was a TREK-60 platform equipped with 128GB NVMe, u-Blox-M9L, RF extension module with WLAN and WWAN, SDP 2.0, and a TREK-306PH2 display.

Note 3: Tested at an environmental temperature of 25°C/77°F.

Note 4: Burn-in setting test items: CPU, memory, 2D/3D GPU, video, and SSD.

1.5 Dimensions

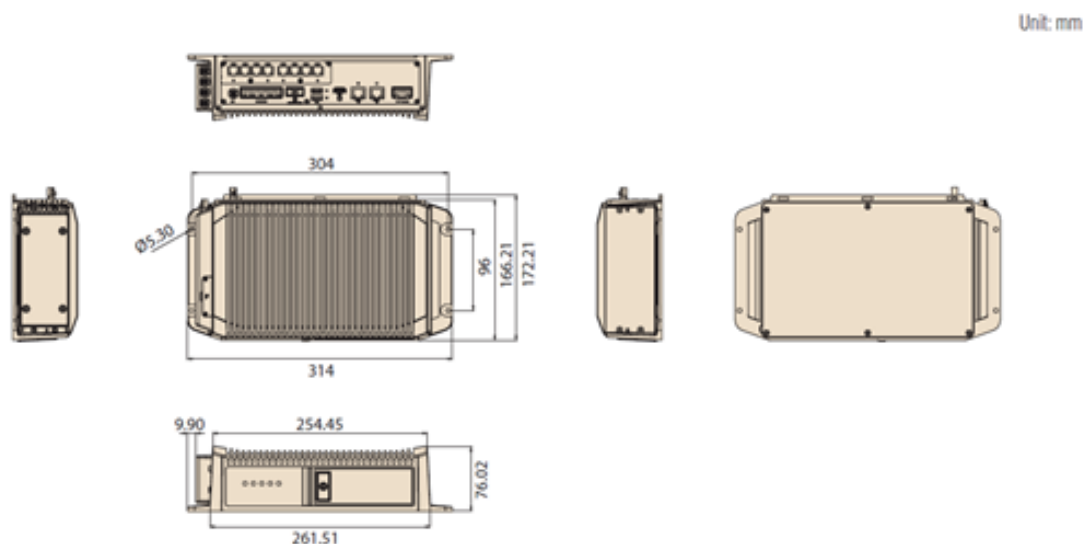


Figure 1.2 TREK-60 Dimensions

Chapter 2

System Setup

2.1 Introduction

This chapter explains the connector and port pin definitions and provides information regarding setting up the TREK-60 device.

2.2 Quick Tour



Figure 2.1 TREK-60 Front View



Figure 2.2 TREK-60 Rear View (PoE Configuration)



Figure 2.3 TREK-60 Front Door with Key Lock Protection



Figure 2.4 TREK-60 Front I/O



Figure 2.5 TREK-60 RF Extension Module

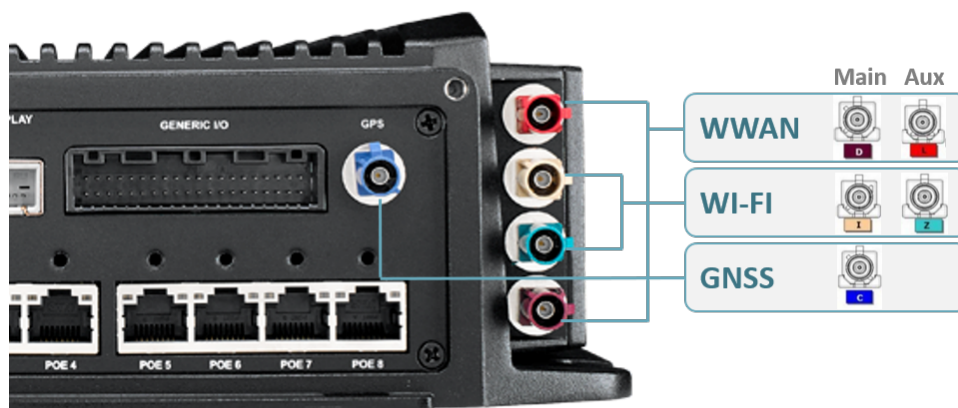


Figure 2.6 TREK-60 RF Extension Module - FAKRA Connector Types

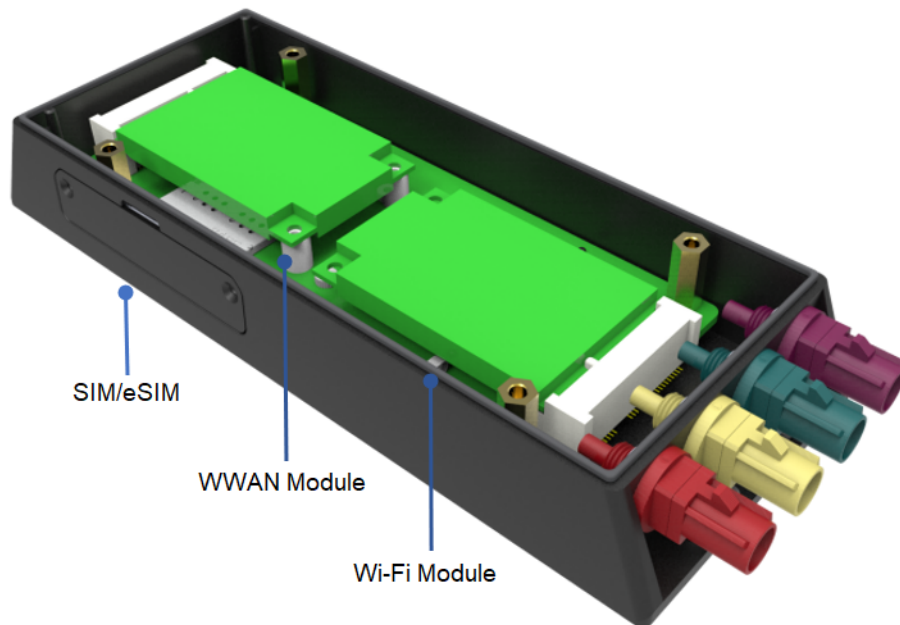


Figure 2.7 TREK-60 RF Extension Module - SIM Card Location



Figure 2.8 TREK-60 I/O View (with PoE)

2.3 Installation

To install the device, first connect the TREK-60 power input port to the vehicle ignition system. The power cable should be connected directly to the battery. This allows TREK-60 to be powered on/off via the device power button or vehicle ignition signals.

Note! *TREK-60 supports 12/24 V_{DC} input power.*



The default setting is 9 ~ 32 V_{DC}.

2.3.1 Connecting the Power Cord

Connect the VI/O cable to the TREK-60 VI/O connector. At the open-wire end, one pin marked “+” is reserved for positive voltage and must be connected to the “+” connector on the power side; one pin marked “-” is reserved for grounding and must be connected to the “-” connector on the power side. Finally, one pin marked “ignition” is reserved for ignition signals.

Note! *Ignition on/off setting: TREK-60 supports ignition on/off function, which allows the device to be powered on/off via the vehicle ignition signals.*



Connector Part Number: GT25H2-16DP-2.2H, HRS 775-0089-4

Plug Part Number: GT25-16DS-HU/R / GT25H-2024SCF

2.3.2 Wake-On-Ignition

For the wake-on-ignition function, there is a 5 second delay from when the vehicle ignition is turned on to the TREK-60 device being powered on. This is designed to ameliorate the impact of power fluctuations, which could damage the device.

2.3.3 Wall and DIN Rail Mounting

The TREK-60 device can be mounted on a wall or DIN rail in various configurations, as shown in Table 2.1. The device should be fully assembled before mounting. To mount TREK-60, use four M5x10L screws to affix the device to a wall mount bracket, or use four M3x5L screws to affix the device to a DIN rail bracket).

Note! Use suitable mounting apparatus and orientation to avoid personal injury.



Utilisez un montage et une direction appropriés pour éviter tout risque de blessure.

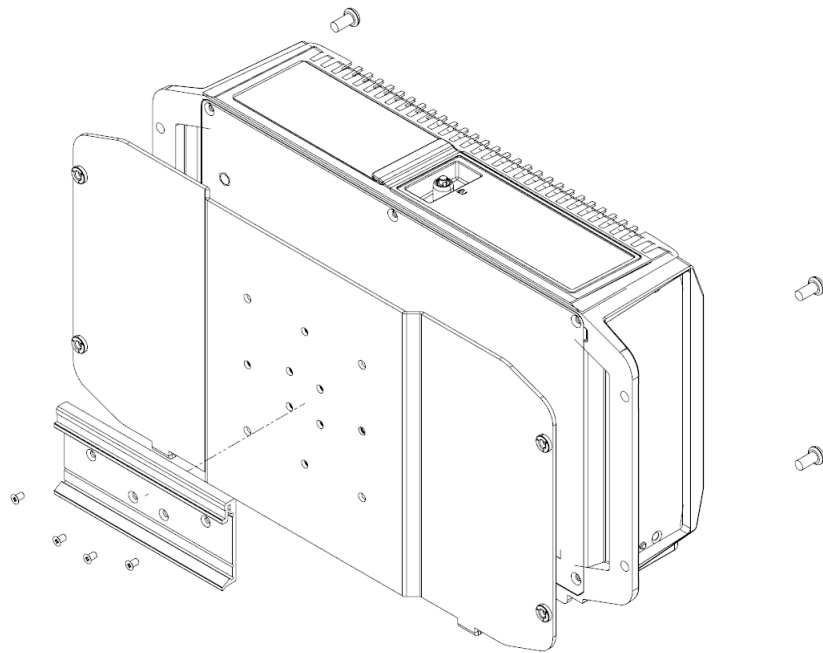
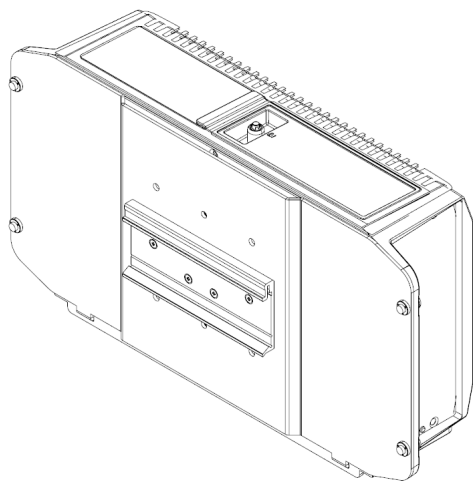


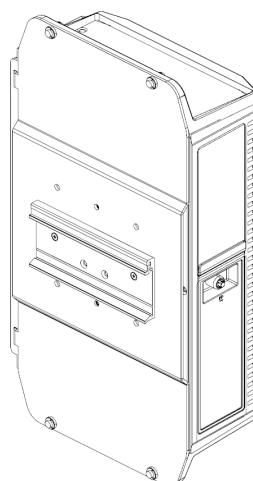
Figure 2.9 TREK-60 Wall and DIN Rail Mounting

Table 2.1: Wall Mount Bracket Orientations

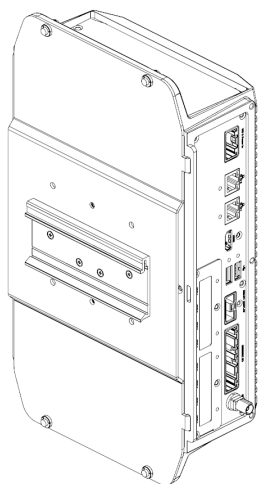
Mode 1: Downward facing I/O



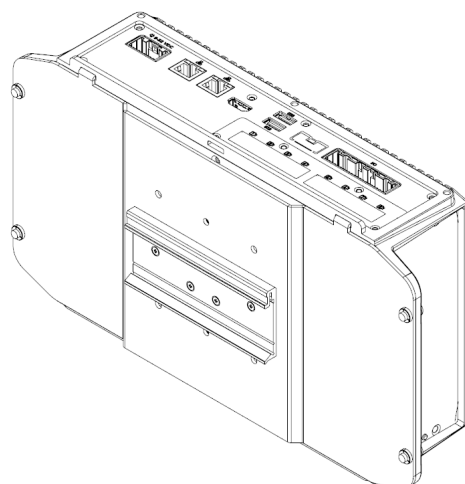
Mode 2: Right facing I/O



Mode 3: Left facing I/O



Mode 4: Upward facing I/O



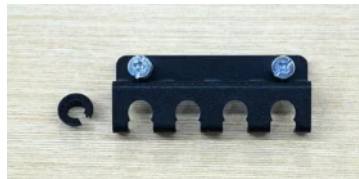
2.3.4 Locking Kit Mounting Tutorial

To enhance the stability of commonly used I/O ports in harsh environments, brackets and cable locks are provided for RJ-45, HDMI, and USB. Additionally, two cable holders are included for the 8-port PoE. This design ensures secure connection and resistance to vibration while simplifying installation and maintenance. All these accessories are included in the standard accessory box, allowing customers to decide whether or not to install them based on their application needs.

Assembly SOP:

<https://connect.advantech.com/videos/details/trek-60-locking-kit-mounting-tutorial>

Locking of PoE



Locking of LAN/HDMI/USB

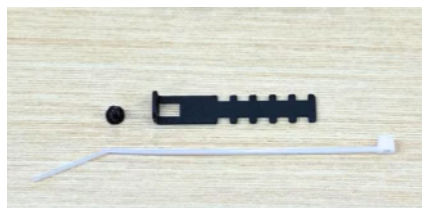


Figure 2.10 TREK-60 IO Brackets

Chapter 3

Hardware & Peripheral Installation

3.1 Overview of Hardware Installation & Upgrading

The TREK-60 features an Intel® Raptor Lake Core™ i7/i5 for high-performance computing, as well as up to eight camera input channels and an integrated AI accelerator for scalable video stream edge inferencing. Maintenance and hardware upgrades can be easily performed by removing the bottom cover plate.

3.2 Installing the Storage Device and Memory

The In-Vehicle Computing Box supports only NVMe as the storage device.

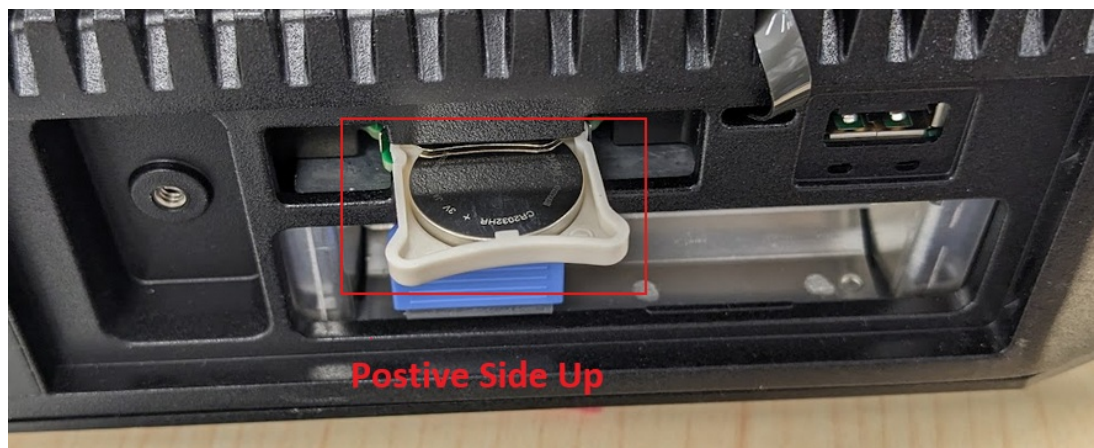
Insert an M.2 M-Key 2242 SSD into the designated slot, and install the DDR5 module into the SODIMM socket located on the SOM board, which is covered by a heat sink.

3.3 Installing Optional Accessories

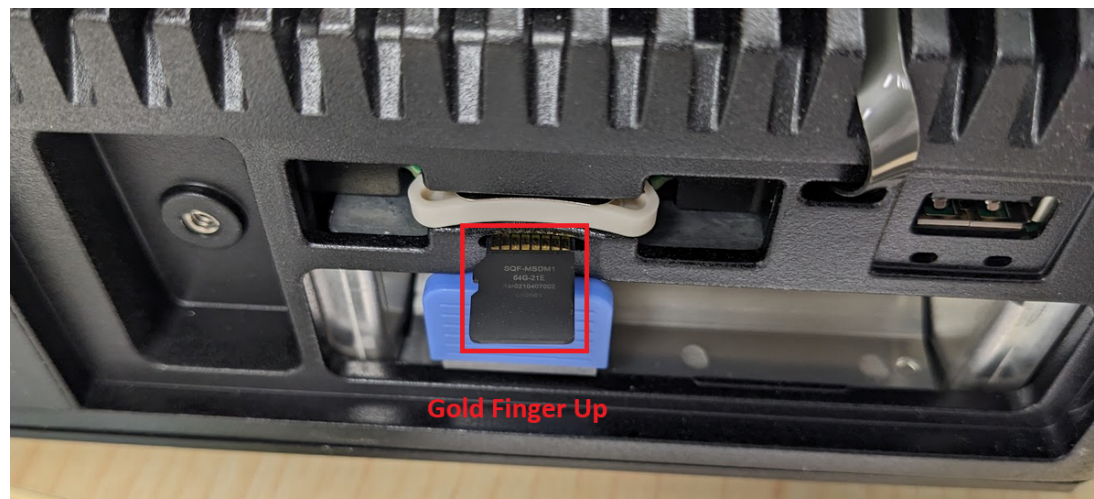
Optional accessories, like other functional modules are available for purchase to complement the TREK-60. The following are instructions for accessory installation.

3.3.1 Installation Direction of Coin Battery/Micro SD Card

Coin Battery



Micro SD Card



3.3.2 Antenna installation Method

When installing on a bus, the adhesive antenna can be placed at this location, for better signal reception.



3.3.3 Expansion Modules & Additional Items

[TOP Side]

CN16: M.2 E-Key 2230 for AI Accelerator or others.

CN15: COM-Express Type 6 for SOM modules

[BOTTOM side]

CN15: M.2 M-Key 2242 for PCIe or SATA SSD (project based)

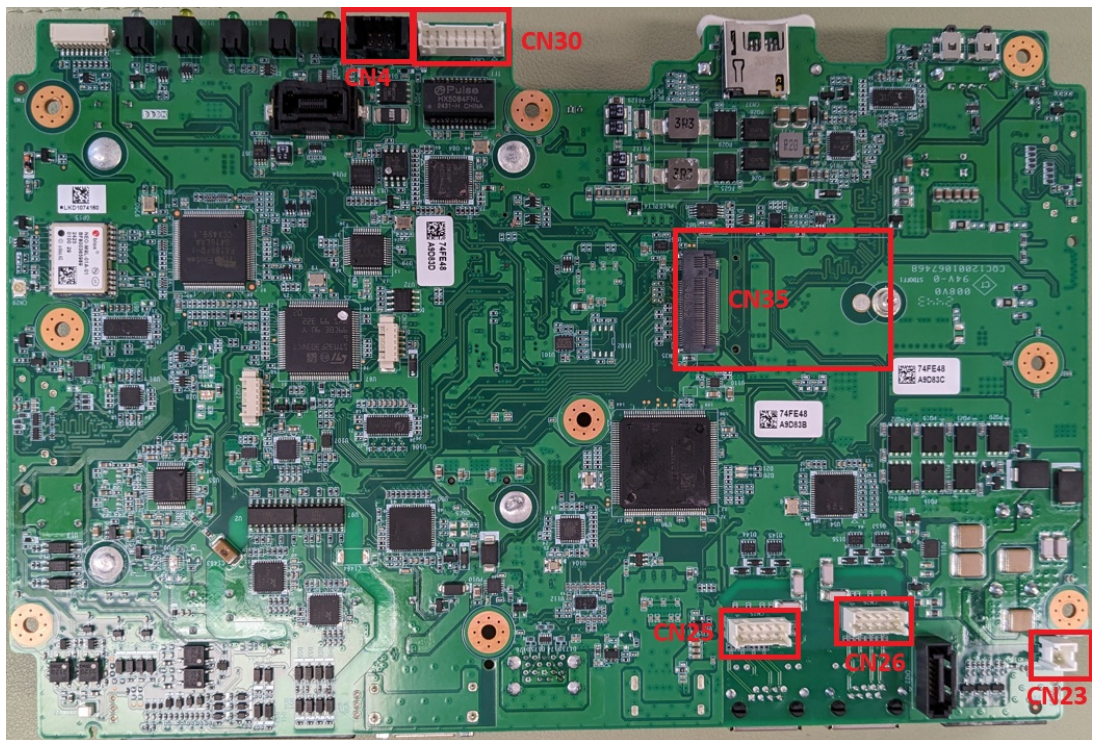
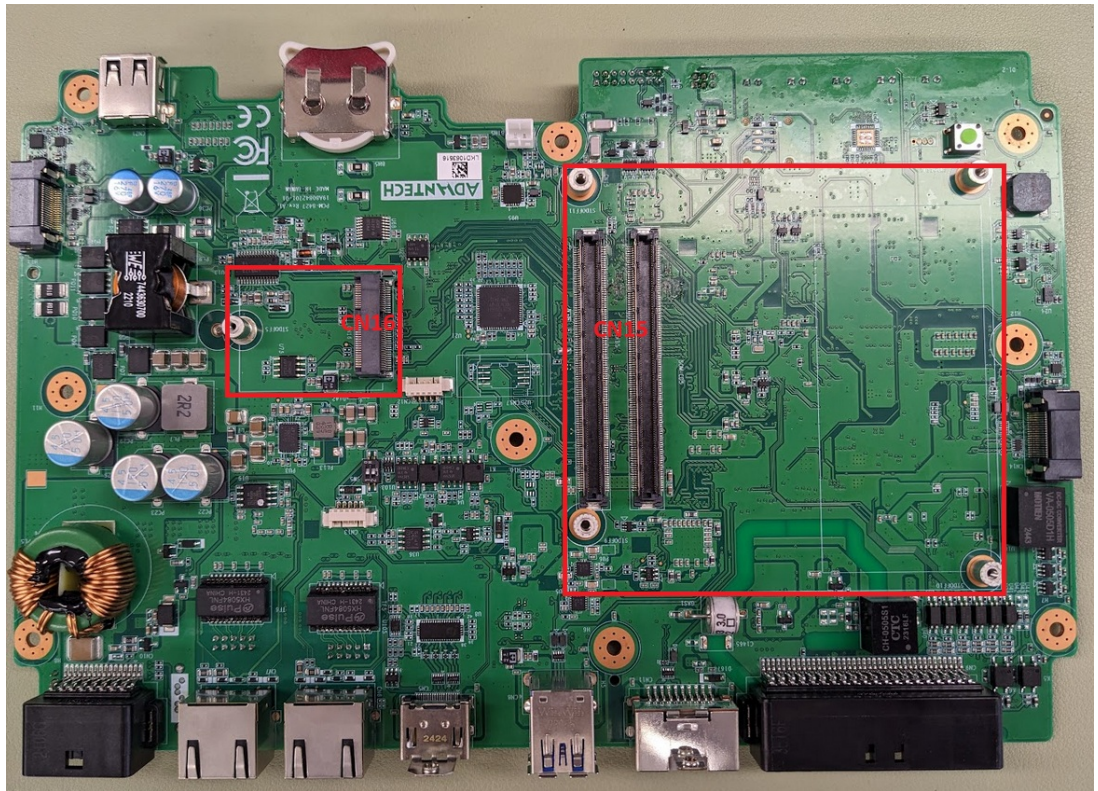
CN4: Power Connector for PSE Board

CN30: Ethernet & Other I/Fs for PSE Board

CN25: Reserved for M12 Circular Connector for LAN1

CN26: Reserved for M12 Circular Connector for LAN2

CN23: Power Connector for secondary storage



Chapter 4

Pin Assignments

4.1 Vehicle I/O



Table 4.1: Vehicle I/O

Pin No.	Signal Name	Description	Note
9	CAN1_L	CAN Bus Port 1	
1	CAN1_H	CAN Bus Port 1	
10	GND_CAN	Ground Return	
2	CAN2_L	CAN Bus Port 2	
11	CAN2_H	CAN Bus Port 2	
3	J1708_L	J1708 Port	
12	J1708_H	J1708 Port	
8	GND_1	Ground Return	
16	GND_2	Ground Return	
7	GND_3	Ground Return	
15	GND_4	Ground Return	
6	+VCB	Car Battery Input	
14	+VCB	Car Battery Input	
5	+VCB	Car Battery Input	
13	+VCB	Car Battery Input	
4	Ignition	Ignition Input	

4.1.1 Vehicle I/O External Cable

4.1.1.1 CAN#1/CAN#2/J1708 (DB9 Male connector)

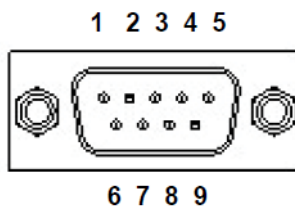


Table 4.2: CAN#1 Pin Definition (DB9 Male)

GT25-16PIN Pin Number	Signal	DB9 Male Pin Number
1	CAN1_H	7
9	CAN1_L	2

Table 4.3: CAN#2 Pin definition (DB9 Male)

GT25-16PIN Pin Number	Signal	DB9 Male Pin Number
2	CAN2_L	2
11	CAN2_H	7

Table 4.4: J1708 Pin definition (DB9 Male)

GT25-16PIN Pin Number	Signal	DB9 Male Pin Number
3	J1708_L	4
12	J1708_H	8

4.1.1.2 Power and Ignition Pin Definition

Table 4.5: Power and Ignition Pin definition (for office test only)

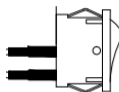
GT25-16PIN Pin Number	Signal	Power Input
8	GND_1	Power Line#1 (black)
16	GND_2	
7	GND_3	
15	GND_4	
6	+V12_1	Power Line#2 (red)
14	+V12_2	
5	+V12_3	
13	+V12_4	
4	Ignition	Switch  

Table 4.6: Power and Ignition Pin definition

GT25-16PIN Pin Number	Signal	Power Input
8	GND_1	Power Line#1 (black)
16	GND_2	
7	GND_3	
15	GND_4	
6	+V12_1	Power Line#2 (red)
14	+V12_2	
5	+V12_3	
13	+V12_4	
4	Ignition	Ignition (orange)

4.2 Generic I/O

**Table 4.7: Generic I/O**

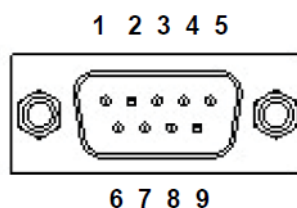
Pin No.	Signal Name	Description	Note
17	COM3_RXD_485P	RS-232/485 Port 3	
37	COM3_CTS_485N	RS-232/485 Port 3	
18	COM3_TXD	RS-232/485 Port 3	
38	COM3_RTS	RS-232/485 Port 3	
16	GND_COM3_4	Ground Return	
19	COM4_RXD_485P	RS-232/485 Port 4	
39	COM4_CTS_485N	RS-232/485 Port 4	
20	COM4_TXD	RS-232/485 Port 4	
40	COM4_RTS	RS-232/485 Port 4	
35	COM5_RXD	RS-232 Port 5	
14	COM5_TXD	RS-232 Port 5	
16	GND_COM5_6	Ground Return	
36	COM6_RXD	RS-232 Port 6	
15	COM6_TXD	RS-232 Port 6	
13	+12V	+12V output	Optional, Project Based
34	GND_12V	Ground Return	Optional, Project Based
9	DI1	Digital Input Port 1	
30	DI2	Digital Input Port 2	
10	DI3	Digital Input Port 3	
31	GND_DI1_2_3	Ground Return	
11	DI4	Digital Input Port 4	

Table 4.7: Generic I/O

32	DI5	Digital Input Port 5
12	DI6	Digital Input Port 6
33	GND_DI4_5_6	Ground Return
5	GND_DO1	Ground Return
26	DO1	Digital Output Port 1
6	GND_DO2	Ground Return
27	DO2	Digital Output Port 2
28	GND_DO3	Ground Return
7	DO3	Digital Output Port 3
29	GND_DO4	Ground Return
8	DO4	Digital Output Port 4
21	LO1_MIXED	Line Out Port 1
1	GND_LO1	Ground Return
22	LO2_MIXED	Line Out Port 2
2	GND_LO2	Ground Return
25	GND_MIC1_MIC2	Ground Return
4	MIC1	Mic In Port 1
24	MIC2	Mic In Port 2
3	GND	Ground Return
23	GND	Ground Return

4.2.1 Generic I/O External Cable

4.2.1.1 COM#3/COM#4/COM#5/COM#6 (DB9 Male connector)

**Table 4.8: COM#3 Pin Definition (DB9 Male)**

GT25-40PIN Pin Number	Signal	DB9 Male Pin Number
16	GND_COM	5
17	COM3_RXD_485p	2
18	COM3_TXD	3
37	COM3_CTS_485n	8
38	COM3_RTS	7

Table 4.9: COM#4 Pin Definition (DB9 Male)

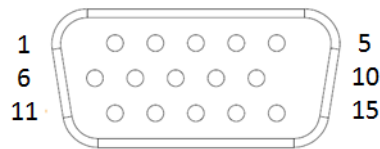
GT25-40PIN Pin Number	Signal	DB9 Male Pin Number
16	GND_COM	5
19	COM4_RXD_485p	2
20	COM4_TXD	3
39	COM4_CTS_485n	8
40	COM4_RTS	7

Table 4.10: COM#5 Pin Definition (DB9 Male)

GT25-40PIN Pin Number	Signal	DB9 Male Pin Number
34	GND_COM	5
14	COM5_TXD	3
35	COM5_RXD	2

Table 4.11: COM#6 Pin Definition (DB9 Male)

GT25-40PIN Pin Number	Signal	DB9 Male Pin Number
34	GND_COM	5
15	COM6_TXD	3
36	COM6_RXD	2

4.2.1.2 6 x DI / 4 x DO (DB15 Male Connector)**Table 4.12: 6x DI Pin Definition (DB15 Male)**

GT25-40PIN Pin Number	Signal	DB15 Male Pin Number
9	DI1	1
10	DI3, Speed line of DR GPS	3
11	DI4, Forward line of DR GPS	4
12	DI6	6
30	DI2	2
31	GND_DI1_2_3	10
32	DI5	5
33	GND_DI4_5_6	13

Table 4.13: 4x DO Pin Definition (DB15 Male)

GT25-40PIN Pin Number	Signal	DB15 Male Pin Number
5	GND_DO1	9
6	GND_DO2	10
7	DO3	3
8	DO4	4
26	DO1	1
27	DO2	2
28	GND_DO3	11
29	GND_DO4	12

4.2.1.3 LINE-OUT/MIC-IN (3.5mm audio jack (Female))

Table 4.14: Line-out / MIC Pin Definition (3.5mm audio jack Female)

GT25-40PIN Pin Number	Signal	3.5mm Audio Jack Female
1 (Line-Out#1)	GND_LO1	3
21(Line-Out#1)	LO1_MIXED	1
2 (Line-Out#2)	GND_LO2	3
22(Line-Out#2)	LO2_MIXED	1
25 (MIC#1)	GND_MIC1	3
4 (MIC#1)	MIC1	1
25 (MIC#2)	GND_MIC2	3
24 (MIC#2)	MIC2	1

4.3 Smart Display Port

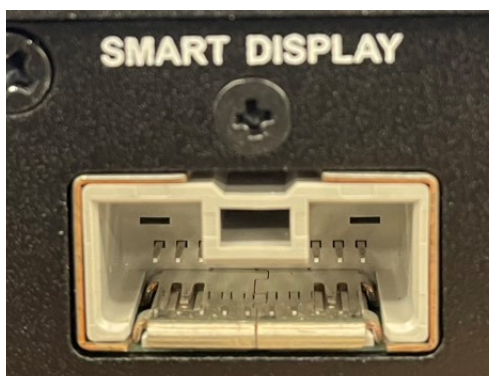


Table 4.15: Smart Display Port

Pin No.	Signal Name	Description	Note
1	+V12	+12V Output	
2	+V12	+12V Output	
3	GND	Ground Return	
4	GND	Ground Return	
5	USB_DP	Positive of USB2.0 pair	
6	USB_DN	Negative of USB2.0 pair	
7	GND	Ground Return	
8	FPD LINK+	Positive of FPD LINK pair	
9	FPD LINK-	Negative of FPD LINK pair	
10	GND	Ground Return	

Chapter 5

SDK Demo Utility
Setup

5.1 Introduction

To simplify hardware access for developers, Advantech has developed a demo utility that allows customers to test various functions on the TREK-60.

This document provides detailed information on each demo utility, helping application developers become more familiar with their usage. It includes instructions for SDK installation, feature overviews, BIOS settings, and the corresponding OS support for various I/O ports.

5.2 Installation of the MRM SDK

The install package is named **MRM_SDK_<PLATFORM NAME>_<PLATFORM NAME>.4.xx.yy.zz.zip**. The steps are listed below to setup MRM SDK package on the Windows host machine.

- Copy package to installation folder
- Right click to zip file and select Extract All..
- Enter the password. The password is same as the filename

Note! "xx", "yy" and "zz" in MRM_SDK_<PLATFORM NAME>_<PLATFORM NAME>.4.xx.yy.zz.zip need to be replaced with the correct mirror version, revision version and build version in the release package.



Once the package is installed the directory structure seen on <MRM_SDK_BASE>/sdk folder should look like below

- bin
- doc
- driver
- include
- lib
- samples

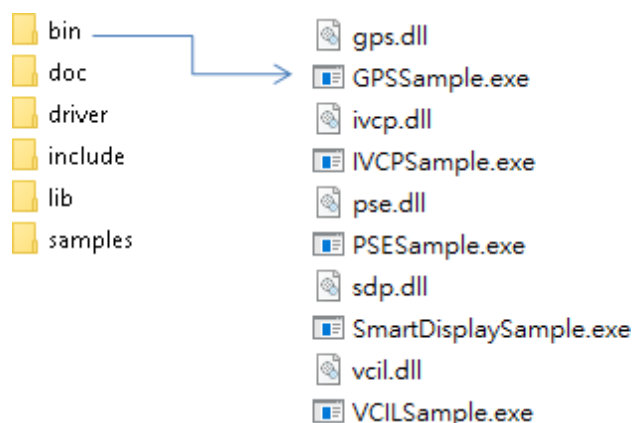
The description of each of the folder at the top level is listed below:

Table 5.1: Description of the Folder

Files/Directories	Description
bin	Sample execution file and DLL binary file
doc	Document and Release Note
driver	Advantech I/O Port Driver
include	The library C header file
lib	Library file
samples	Sample code source

Running the pre-build sample on the target platform

The pre-build sample is placed on bin folder as below. Double click to binary file to execution pre-build sample.



User Authentication & File Access

1. Default Login Credentials for Linux OS (Ubuntu 24.04)

For initial access to the system, the default credentials for the root-level account are as follows:

- **Username:** adv
- **Password:** 123456

Warning! For your system's security, it is imperative that you change the default password immediately after your first login. This default password is for initial setup only and is highly vulnerable to unauthorized access.



To change the password, please use the following command in the terminal: `sudo passwd adv`

2. SDK Package Extraction Password

For all SDK packages, the file extraction password is the filename, excluding the extension. This convention is used to ensure a consistent authentication method tied to the specific software version you have downloaded.

To extract the files, you must enter the exact filename as the password.

Example:

- **Filename:** MRM_SDK_TREK-60FL_WIN.4.0.15.0.zip
- **Extraction Password:** MRM_SDK_TREK-60FL_WIN.4.0.15.0

Note! The password is case-sensitive and must be entered exactly as shown, without any spaces.



5.3 Function Introduction

5.3.1 GPS

The GPS demonstration application demonstrate the usage of MRM GPS API which is a lightweight interface between OS (Operating system) and GPS module allows user to easily get GPS information.

5.3.1.1 Information

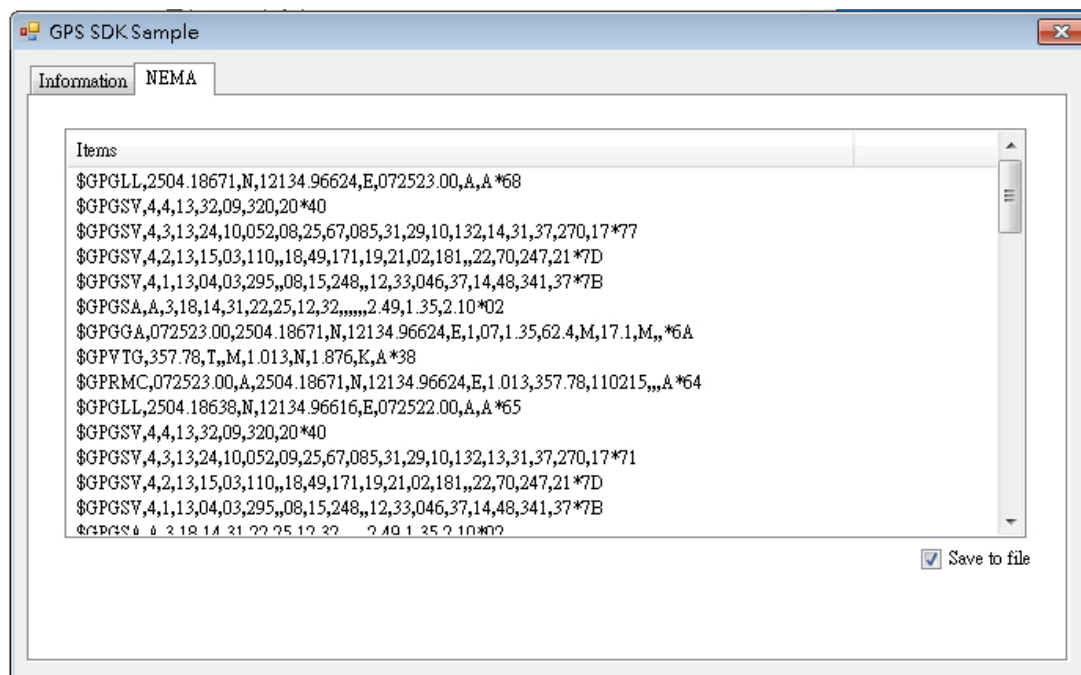
In this page, the demo application shows the current GPS status.

- 1.GPS Status
- 2.Function demonstration selection
- 3.Satellite location Information



5.3.1.2 NMEA Code Callback Demonstration

In this page, the demo application shows the incoming NMEA code. Check ' Save to file ' to logging the NMEA code to file.

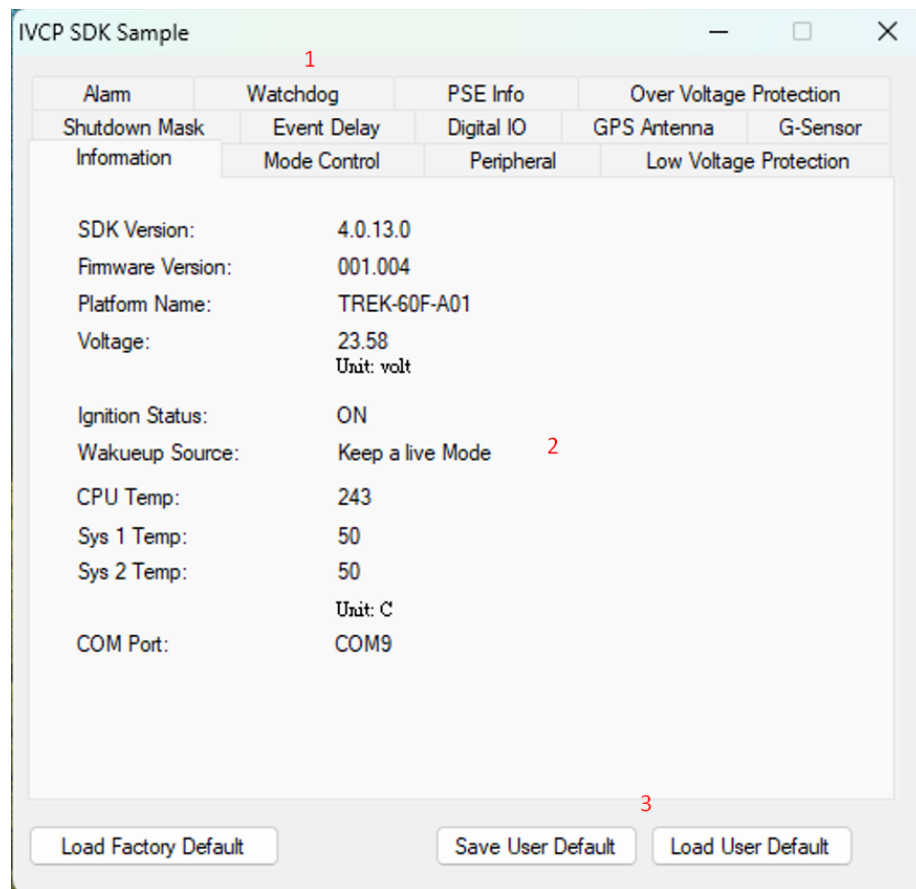


5.3.2 IVCP

The IVCP demonstration application demonstrate the usage of MRM IVCP API which is a lightweight interface between OS (Operating system) and IVCP (Intelligent Vehicle Co-Processor) allow user to access the status of machine and change machine behavior such as power management, boot behavior, peripheral control etc.

5.3.2.1 System Menu

The IVCP Sample as below figure



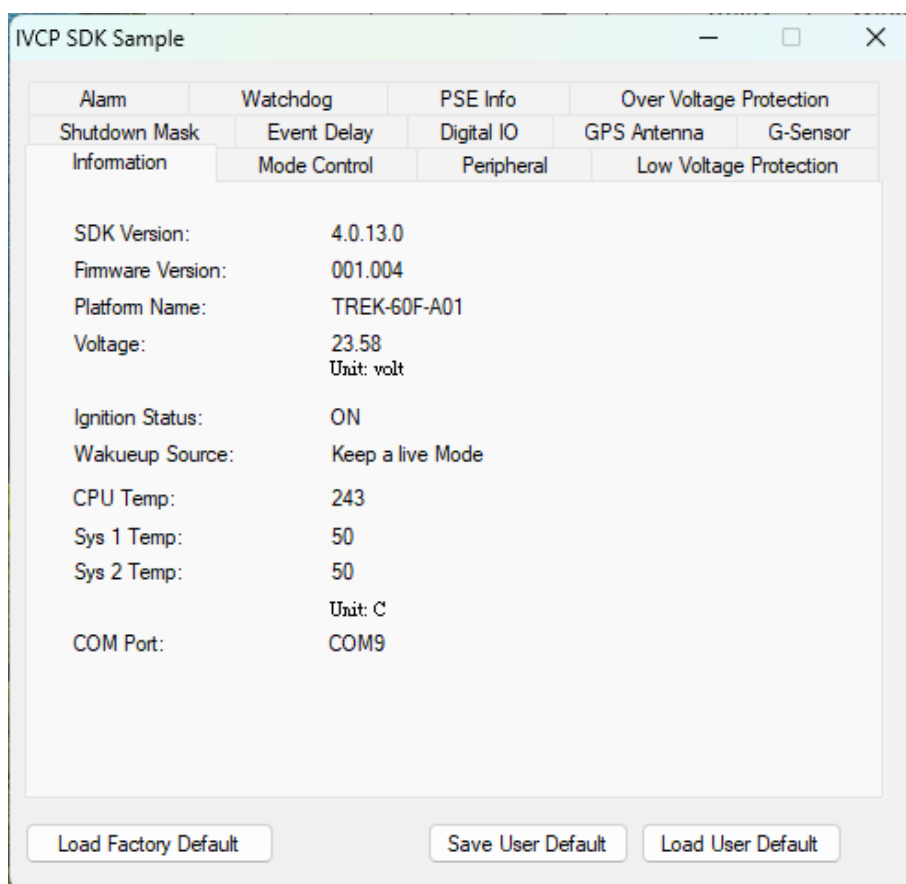
1.Function demonstration selection

2.Function page

3.Configuration Save/Load

5.3.2.2 Information

In this page, the demo application shows the current status and basic information.



The screenshot shows a window titled "IVCP SDK Sample" with a tabbed interface. The "Information" tab is selected. The window displays various system parameters and their current values. At the bottom, there are three buttons: "Load Factory Default", "Save User Default", and "Load User Default".

Alarm	Watchdog	PSE Info	Over Voltage Protection
Shutdown Mask	Event Delay	Digital IO	GPS Antenna
Information	Mode Control	Peripheral	G-Sensor
Low Voltage Protection			

SDK Version:	4.0.13.0
Firmware Version:	001.004
Platform Name:	TREK-60F-A01
Voltage:	23.58
	Unit: volt
Ignition Status:	ON
Wakeup Source:	Keep a live Mode
CPU Temp:	243
Sys 1 Temp:	50
Sys 2 Temp:	50
	Unit: C
COM Port:	COM9

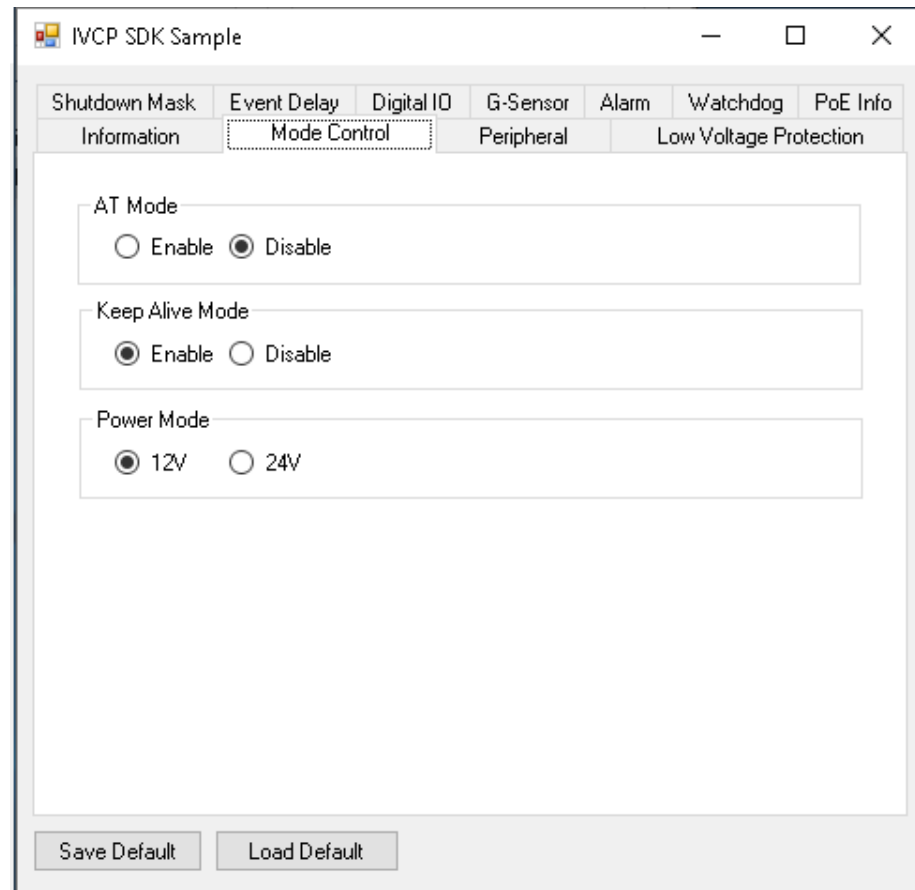
Load Factory Default Save User Default Load User Default

5.3.2.3 Mode Control

In this page, you can toggle "AT Mode" and "Keep Alive Mode".

Press "Save Default" to set current settings as default value of VPM(Vehicle Power Management) controller.

Press "Load Default" to load the default v



The screenshot shows a software window titled "IVCP SDK Sample". It features a tabbed interface with the following tabs: Shutdown Mask, Event Delay, Digital IO, G-Sensor, Alarm, Watchdog, PoE Info, Information, Mode Control (selected), Peripheral, and Low Voltage Protection. The "Mode Control" tab is active and contains three sections:

- AT Mode:** Contains two radio buttons: "Enable" (unselected) and "Disable" (selected).
- Keep Alive Mode:** Contains two radio buttons: "Enable" (selected) and "Disable" (unselected).
- Power Mode:** Contains two radio buttons: "12V" (selected) and "24V" (unselected).

At the bottom of the window, there are two buttons: "Save Default" and "Load Default".

5.3.2.4 Peripheral

In this page, you can enable/disable the peripheral functions and set WWAN as system wakeup source.

Note! Some device will not capability to control some peripheral.



IVCP SDK Sample

Shutdown Mask	Event Delay	Digital IO	GPS Antenna	G-Sensor
Alarm	Watchdog	PSE Info	Over Voltage Protection	
Information	Mode Control	Peripheral	Low Voltage Protection	

Power Control

☐ WWAN ☐ WIFI ☒ GPS ☐ DIO ☒ GIO

☐ PSE NV ☒ SDP ☒ EXT-IO

☐ Line-out #1 un-mute ☐ Line-out #1 Power

☒ CAN

Wakeup Source (Enable / Disable)

☒ Power Button ☒ Ignition ☐ G-Sensor

☐ DI 1 ☐ DI 2 ☐ RTC Alarm

SIM Switch

☒ SIM0 ☐ SIM1

5.3.2.5 Low Voltage Protection

You can enable/disable and set the pre-boot/post-boot low voltage protection threshold in this page.

Press "Get" to get the current threshold value and Press "Set" to set the value. Press "Save Default" to set current value as default value of VPM controller.

Press "Load Default" to load the stored default values.

The screenshot shows a software window titled "IVCP SDK Sample". It features a tabbed interface with the following tabs: Shutdown Mask, Event Delay, Digital IO, GPS Antenna, G-Sensor, Alarm, Watchdog, PSE Info, Over Voltage Protection, Information, Mode Control, Peripheral, and Low Voltage Protection. The "Low Voltage Protection" tab is active. Inside this tab, there is a section titled "Low Voltage Protection Range" with the following values: Min: 10.1046, Max: 12.2569, Default: 11.4300, and Unit: volt. Below this, there are two sections: "Pre-boot Low Voltage Protection" and "Post-boot Low Voltage Protection". Each section has radio buttons for "Enable" and "Disable", a "Threshold:" label followed by a text input field containing "11.4300", and "Get" and "Set" buttons. At the bottom of the window, there are three buttons: "Load Factory Default", "Save User Default", and "Load User Default". A "Reset Threshold" button is also present near the bottom right of the main configuration area.

5.3.2.6 Over Voltage Protection (OVP)

On this page, you can enable or disable Over Voltage Protection and configure the pre-boot and post-boot threshold values.

- Press "Get" to retrieve the current threshold value.
- Press "Set" to apply a new value.
- Press "Reset Threshold" to reset the default threshold as the system's maximum voltage.
- Press "Save Default" to save the current value as the VPM controller's default.
- Press "Load Default" to load the stored default value.

Default LVP/OVP Thresholds

The SDK's default thresholds for the Low-Voltage Protection (LVP) and Over-Voltage Protection (OVP) functions are set as follows:

- 12V System:
 - LVP: 11.43V
 - OVP: 13.00V
- 24V System:
 - LVP: 22.42V
 - OVP: 25.00V

Voltage Threshold Ranges

You can configure the Low-Voltage Protection (LVP) and Over-Voltage Protection (OVP) thresholds within the following supported ranges for both 12V and 24V systems.

- 12V System:
 - LVP: 10.11V to 12.26V
 - OVP: 12.26V to 32V
- 24V System:
 - LVP: 21.09V to 23.29V
 - OVP: 23.29V to 32V

- Note!**
- *The minimum OVP threshold must be set to a value greater than the LVP threshold to ensure proper functionality.*
 - *The maximum threshold is capped at 32V for all systems.*
 - *The recommended default values are outlined in the previous section.*



IVCP SDK Sample

Shutdown Mask

Event Delay

Digital IO

GPS Antenna

G-Sensor

Information

Mode Control

Peripheral

Low Voltage Protection

Alarm

Watchdog

PSE Info

Over Voltage Protection

Pre-boot Over Voltage Protection

☐ Enable

Threshold:

☒ Disable

Get

Set

Post-boot Over Voltage Protection

☐ Enable

Threshold:

☒ Disable

Get

Set

Reset Threshold

Note: The minimum range of OVP (Over Voltage Protection) must not exceed the value of LVP(Low Voltage Protection). The maximum range is limited to the system's supported maximum power threshold.

Load Factory Default

Save User Default

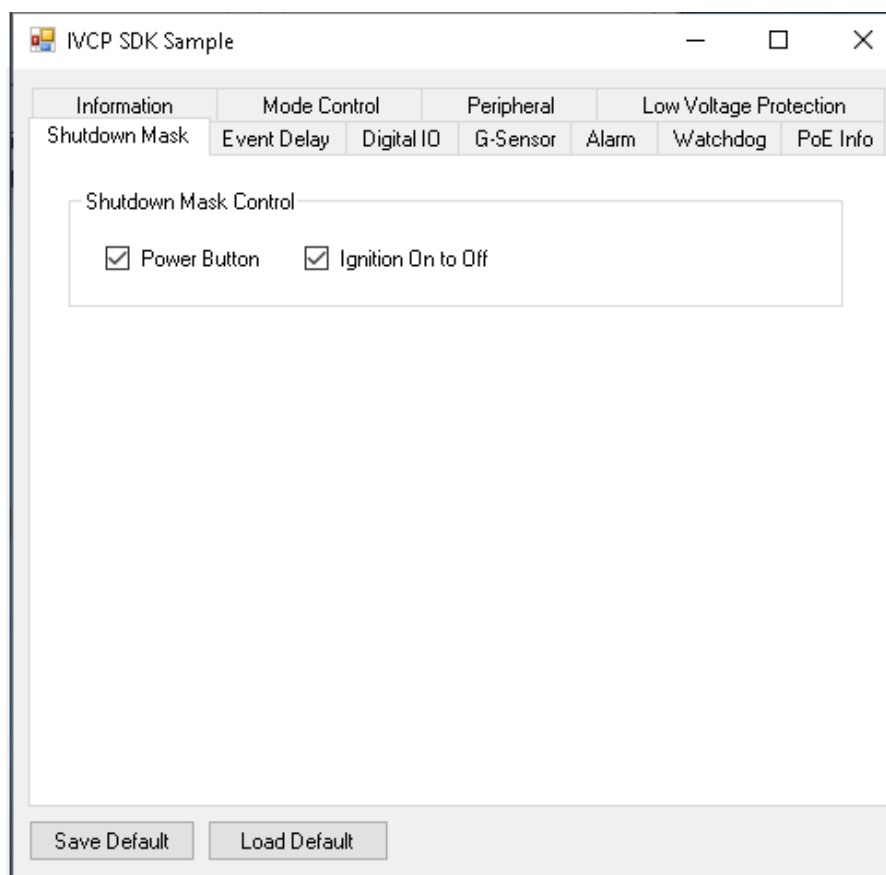
Load User Default

5.3.2.7 Shutdown Mask

In this page, set the shut-down event mask, The shut-down event definition is let system enter power off mode (G3) from power on mode (S0).

PS. The Power Button and Ignition cannot mask simultaneously.

This command not only set the data to the specified EEPROM address, but also update the VPM parameter, it means it doesn't restart VPM to update the parameter.



5.3.2.8 Event Delay

You can set the delay and hard delay time of the low voltage event and ignition event.

- Low Voltage Event

- Delay:
The delay time before VPM trigger a power off event (i.e. power button press).
- Hard Delay:
The delay time counted down after a power off event is triggered. VPM will force power off the machine if the hard delay time is counted down to zero.

- Ignition Event

- On Delay:
The delay time before VPM trigger an power on event (power on the machine).
- Off Delay:
The delay time before VPM trigger an power off event (i.e. power button/Ignition off press).
Hard Off Delay:
The delay time counted after an power off event is triggered. VPM will force power off the machine if the hard delay time is counted down to zero.

Press "Save Default" to set current value as default value.

Press "Load Default" to load the stored default values.

The screenshot shows a software window titled "IVCP SDK Sample". It has a tabbed interface with the following tabs: Information, Mode Control, Peripheral, and Low Voltage Protection. Under the "Low Voltage Protection" tab, there are sub-tabs: Shutdown Mask, Event Delay (which is selected), Digital ID, G-Sensor, Alarm, Watchdog, and PoE Info. The "Event Delay" tab contains two sections: "Low Voltage Event" and "Ignition Event". The "Low Voltage Event" section has input fields for "Delay:" (value 30) and "Hard Delay:" (value 60), with "Get" and "Set" buttons to the right. The "Ignition Event" section has input fields for "On Delay:" (value 2), "Off Delay:" (value 5), and "Hard Off Delay:" (value 60), with "Get" and "Set" buttons to the right. At the bottom right of the configuration area, it says "Unit: second". At the bottom of the window, there are two buttons: "Save Default" and "Load Default".

5.3.2.9 Digital IO

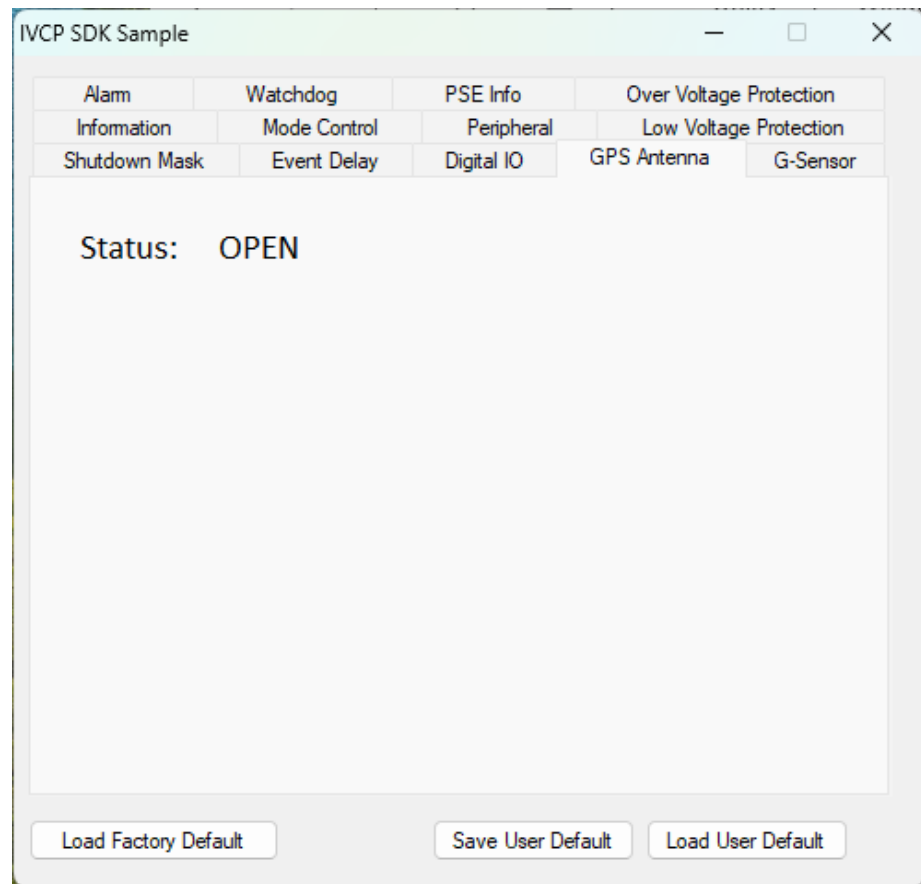
In this page, you can monitor the digital input status and enable/disable digital output.

The screenshot shows the 'IVCP SDK Sample' application window with the 'Digital IO' tab selected. The window contains several configuration sections:

- Navigation Tabs:** Alarm, Watchdog, PSE Info, Over Voltage Protection, Information, Mode Control, Peripheral, Low Voltage Protection, Shutdown Mask, Event Delay, Digital IO (selected), GPS Antenna, G-Sensor.
- Digital DI Type:**
 - PIN 0 & 1: dry contact (dropdown)
 - PIN 2 & 3: dry contact (dropdown)
 - PIN 4 & 5: dry contact (dropdown)
 - Buttons: Get, Set
- Digital DI Active Level:**
 - PIN 0: High (dropdown)
 - PIN 1: High (dropdown)
 - PIN 2: High (dropdown)
 - PIN 3: High (dropdown)
 - PIN 4: High (dropdown)
 - PIN 5: High (dropdown)
 - Buttons: Get, Set
- Digital Input:**
 - 0: ON 1: ON 2: ON 3: ON 4: ON 5: ON
- Digital Output:**
 - ☐ Output 0 ☐ Output 1 ☐ Output 2 ☐ Output 3 ☐ Output 4 ☐ Output 5
- Digital DI1 Type:**
 - DI1 (dropdown)
 - Buttons: Get, Set
- Digital DI1 Odometer Counter:**
 - Text field (empty)
 - Buttons: Get, Clear
- Buttons at the bottom:** Load Factory Default, Save User Default, Load User Default

5.3.2.10 GPS Antenna

GPS Antenna Status: (NORMAL / SHORT / OPEN)



5.3.2.11 G-Sensor

In this page, you can enable/disable the G-sensor. Also, you can set G-sensor as a system wakeup source and set the threshold to trigger system wakeup.

The screenshot shows the 'IVCP SDK Sample' application window with the 'G-Sensor' tab selected. The window contains several sections for configuring the G-sensor:

- G-Sensor Control:** Includes radio buttons for 'Enable' and 'Disable' (selected). Below is a 'Range' dropdown menu set to '2G'. 'Get' and 'Set' buttons are to the right.
- G-Sensor Wakeup Threshold:** Includes a 'Threshold' input field set to '0' and a 'Unit: mg' label. 'Get' and 'Set' buttons are to the right.
- G-Sensor Value:** Displays 'x: --', 'y: --', and 'z: --' with a 'Unit: mg' label.
- Gyro Sensor Value:** Displays 'x: --', 'y: --', and 'z: --' with a 'Unit: dps' label.
- 6 Axes Rotation:** Displays 'Yaw : 0.0000', 'Pitch : 0.0000', and 'Roll : 0.0000' with a 'Unit : Angle' label. Below is a 'Calibration Status : 0' label.

At the bottom of the window are three buttons: 'Load Factory Default', 'Save User Default', and 'Load User Default'.

5.3.2.12 Alarm

In this page, you can set the time and set alarm wakeup time to VPM controller and enable/disable the alarm as a system wakeup source.

Press "Save Default" to set current value as default value. Press "Load Default" to load the stored default values.

The screenshot shows a software window titled "IVCP SDK Sample" with standard Windows window controls (minimize, maximize, close). The window contains a tabbed interface with the following tabs: Information, Mode Control, Peripheral, Low Voltage Protection, Shutdown Mask, Event Delay, Digital IO, G-Sensor, Alarm (selected), Watchdog, and PoE Info. The "Alarm" tab is active and displays two main sections: "Real Time" and "Alarm Wakeup".

Real Time Section:

- A date field shows "2/ 5/2000" with a calendar icon to its right.
- A time field shows "4:57:36 PM" with a time selection icon to its right.
- A "Set" button is located to the right of the time field.

Alarm Wakeup Section:

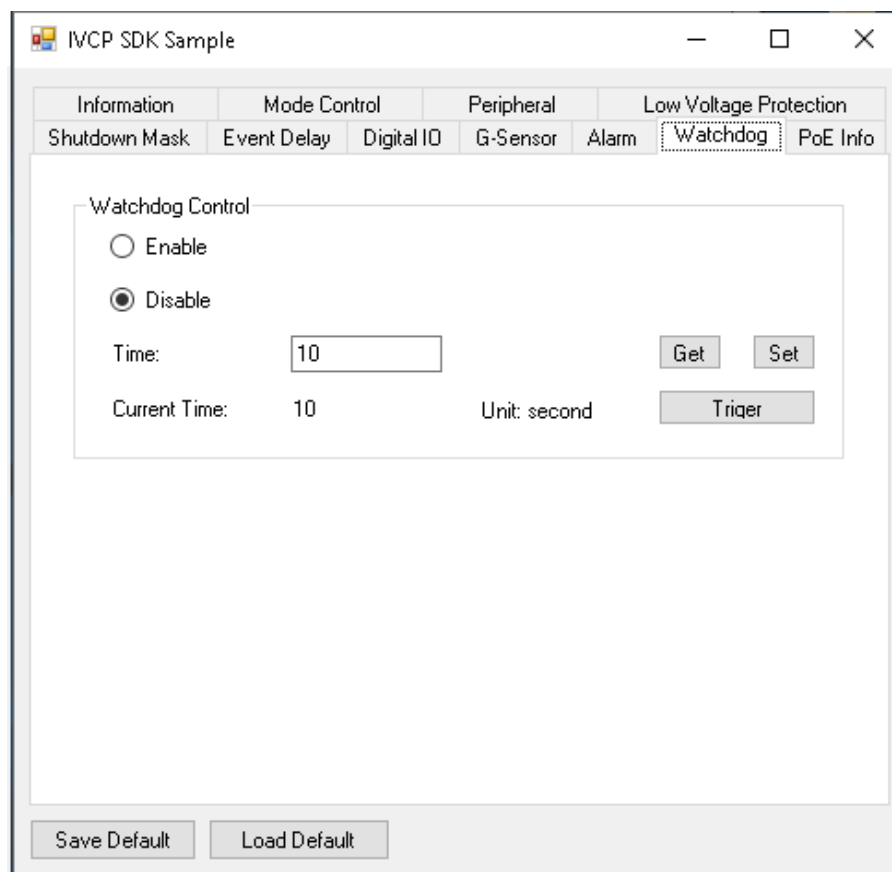
- A "Mode:" label is followed by a dropdown menu currently set to "Hourly".
- A "Day of Week" label is followed by a dropdown menu currently set to "Sunday" and a "Get" button.
- An "Hour" label is followed by a dropdown menu currently set to "0" and a "Set" button.
- A "Minute" label is followed by a dropdown menu currently set to "0".

At the bottom of the window, there are three buttons: "Load Factory Default", "Save User Default", and "Load User Default".

5.3.2.13 Watchdog

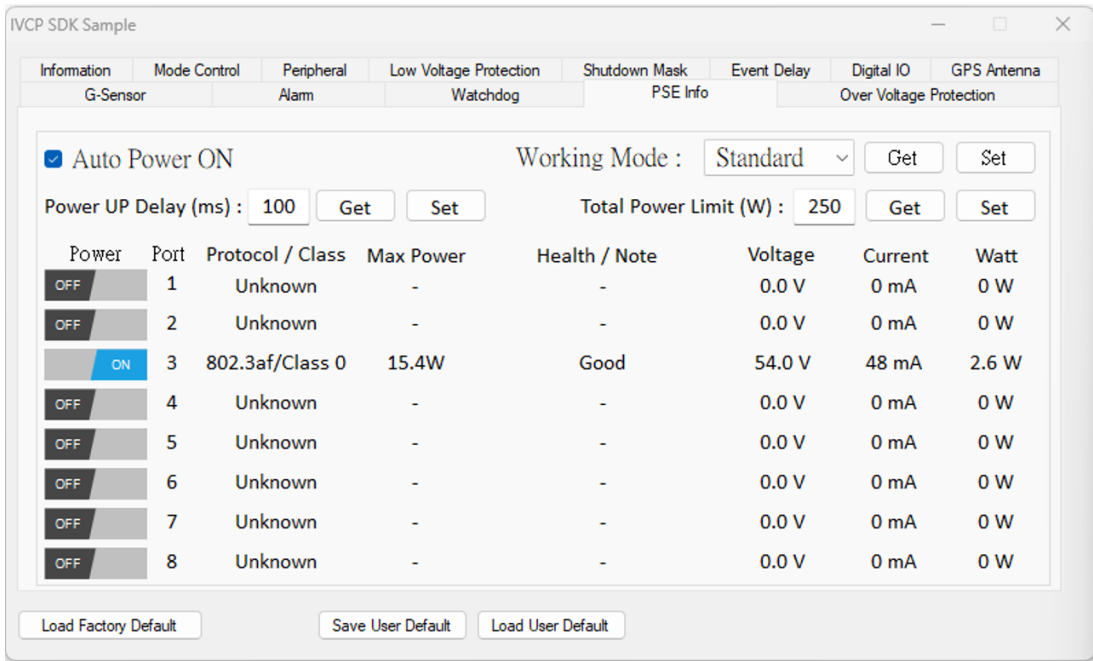
In this page, you can enable/disable the watchdog function and set the count time (second) for the watchdog to avoid unexpected system hang.

When watchdog is enabled, the VPM controller will start counting down the time set for watchdog and power off the machine if it is counted to 0. You can press "Trigger" button while watchdog is counting to reset the count down time and keep it counting. Press "Save Default" to set current value as default value. Press "Load Default" to load the stored default values.



5.3.2.14 PSE Info

The Default power control is auto power mode, the power will auto power up after detection and classification.

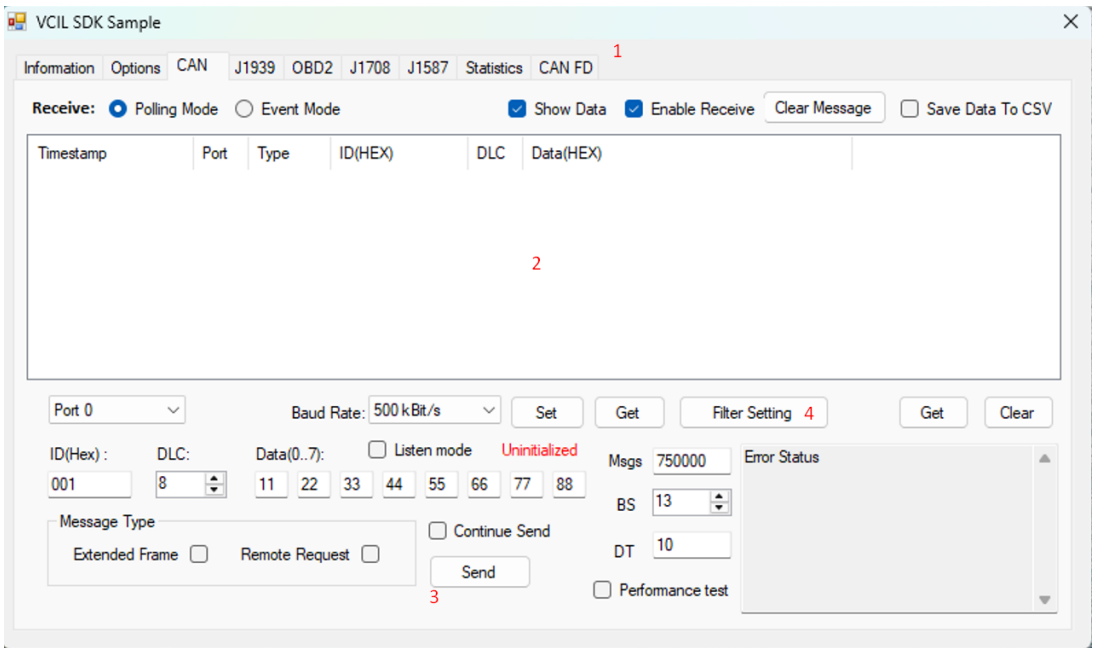


5.3.3 VCIL

The VCIL demonstration application demonstrate the usage of MRM VCIL (Vehicle Communication Interface Layer) API which allow user to access vehicle protocol easily.

5.3.3.1 System Menu

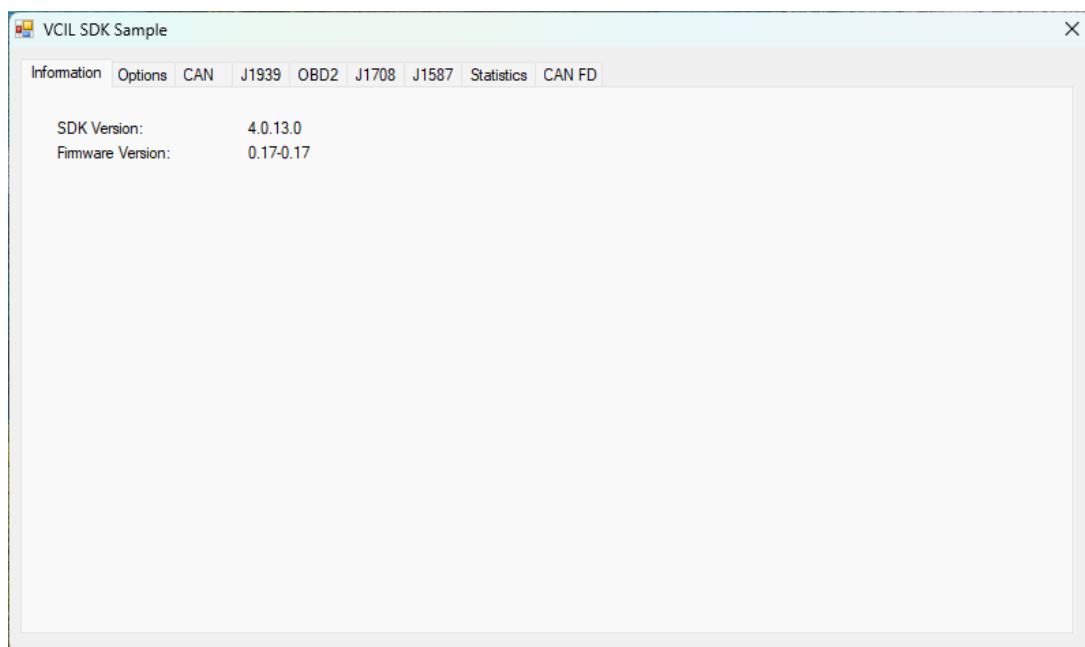
The VCIL Sample as below figure



1. Function demonstration selection
2. Receive list
3. Send
4. Filter setting

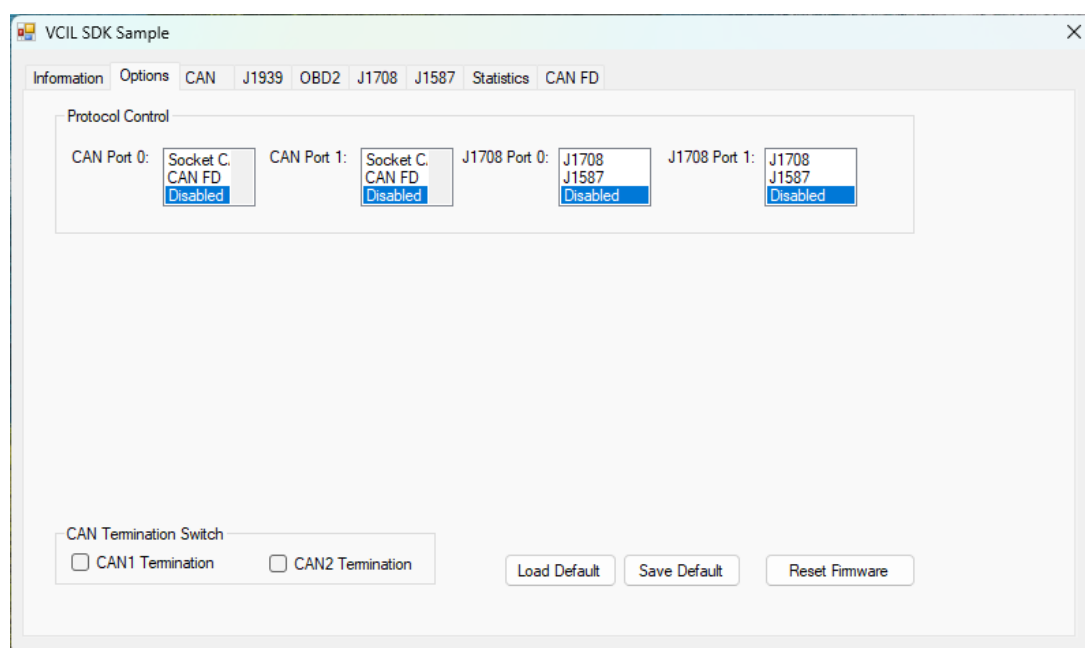
5.3.3.2 Information

In this page, the demo application shows the current status and basic information.



5.3.3.3 Option

In this page, you can select the protocol for each port.



5.3.3.4 CAN / J1939 / OBD2 / J1708 / J1587/CAN FD

To use CAN / J1939 / OBD2 / J1708 / J1587/ CAN FD protocol on each port, please click on corresponding tab to switch to the page of specific protocol, then you can send/read message on specific port by setting the detail items.

The screenshot shows the 'VCIL SDK Sample' application window with the 'CAN' tab selected. The interface includes a 'Receive' section with 'Polling Mode' selected and 'Show Data' and 'Enable Receive' checked. Below this is a table for received messages with columns: Timestamp, Port, Type, ID(HEX), DLC, and Data(HEX). The 'Port 0' dropdown is set to 'Port 0' and the 'Baud Rate' is '500 kBit/s'. The 'ID(Hex)' is '001' and 'DLC' is '8'. The 'Data(0..7)' is '11 22 33 44 55 66 77 88'. The 'Message Type' section has 'Extended Frame' and 'Remote Request' unchecked. The 'Send' button is visible. The 'Error Status' section shows 'Uninitialized' and 'Msgs' at '750000'.

The screenshot shows the 'VCIL SDK Sample' application window with the 'J1939' tab selected. The interface includes a 'Receive' section with 'Polling Mode' selected and 'Enable Receive' checked. Below this is a table for received messages with columns: Timestamp, Port, PRI, PGN, DST, SRC, DLC, and Data(HEX). The 'Port 0' dropdown is set to 'Port 0'. The 'PGN(Hex)' is '00FEF6' and 'DLC' is '8'. The 'Data(0..64)' is 'FF86FFFFFFFFFFFF'. The 'Priority' is '6', 'Destination' is 'FF', and 'Source' is 'FC'. The 'Send' button is visible. The 'Filter Setting' and 'Continue Send' options are also present.

VCIL SDK Sample

Information Options CAN J1939 OBD2 J1708 J1587 Statistics CAN FD

Receive: ☒ Polling Mode ☐ Event Mode ☒ Enable Receive ☐ Save Data To CSV

Timestamp	Port	ID(Hex)	Type	DST	SRC	DLC	Data(HEX)
-----------	------	---------	------	-----	-----	-----	-----------

Port 0 Baud Rate:

Priority: Type: Destination: Source: Service: PID: ☐ Continue Send

Type: ☐ 11 bits ☒ 29 bits DLC: ID: Data(0..64):

VCIL SDK Sample

Information Options CAN J1939 OBD2 J1708 J1587 Statistics CAN FD

Receive: ☒ Polling Mode ☐ Event Mode ☒ Enable Receive ☐ Save Data To CSV

Timestamp	Port	MID	DLC	Data(HEX)
-----------	------	-----	-----	-----------

Port 0

MID(Hex): DLC: Data(0..20): ☐ Continue Send

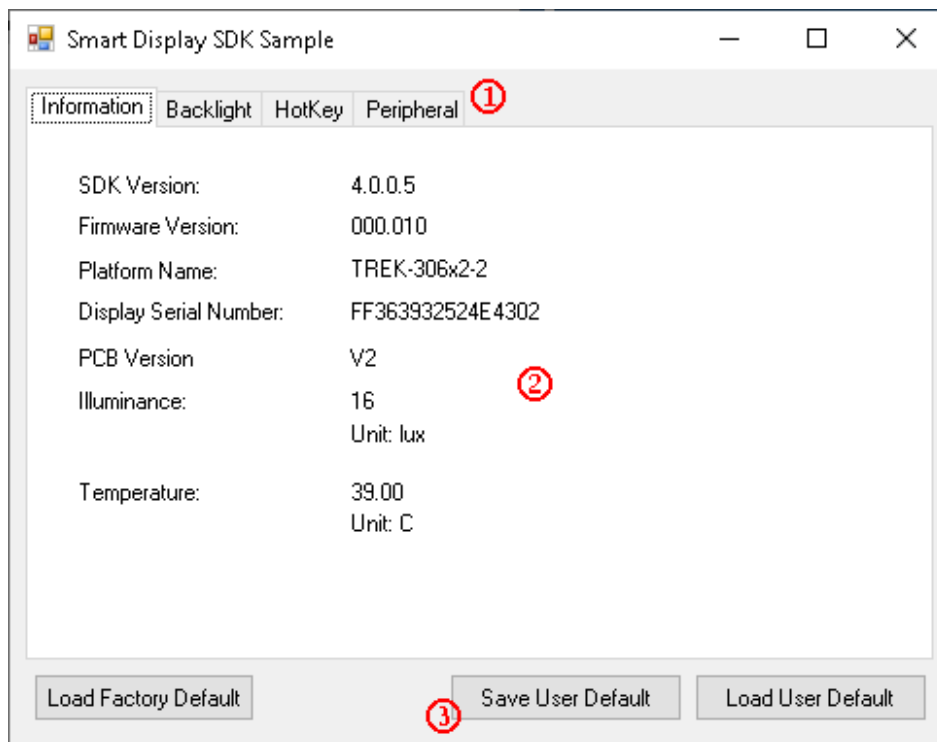
Priority:

5.3.4 SDP

The smart display demonstration application demonstrate the usage of MRM SDP API which is a lightweight interface between OS (Operating system) and SDP (Smart Display Co-Processor) allow user to control the font-end display, backlight setting, hotkey, peripheral control, etc.

5.3.4.1 System Menu

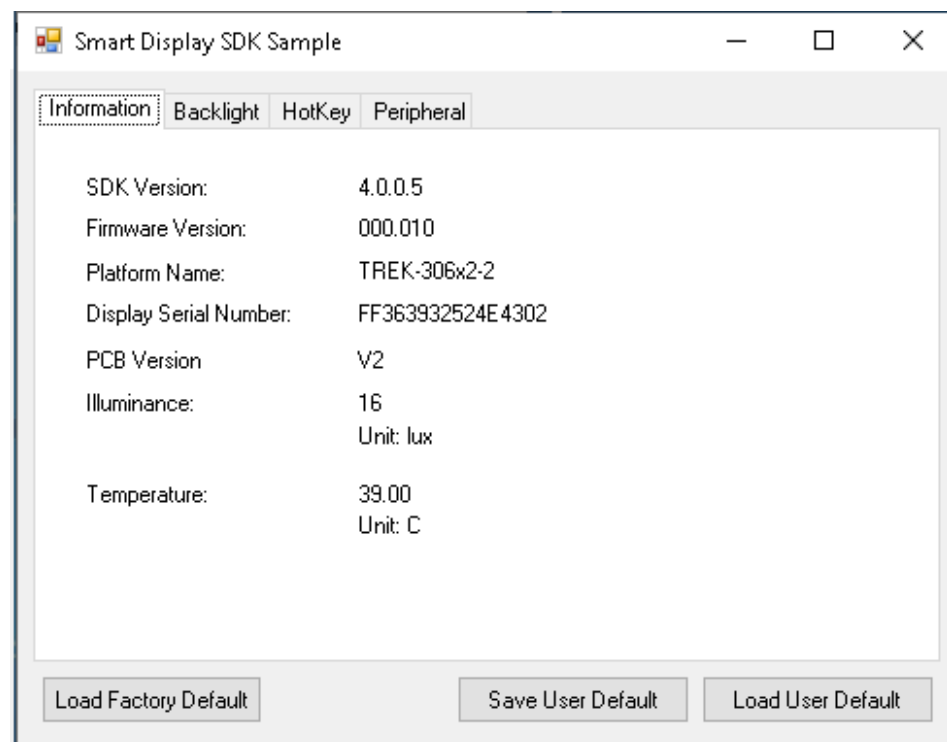
The SDP Sample as below figure



1. Function demonstration selection
2. Function page
3. Configuration Save/Load

5.3.4.2 Information

In this page, the demo application shows the current status and basic information.



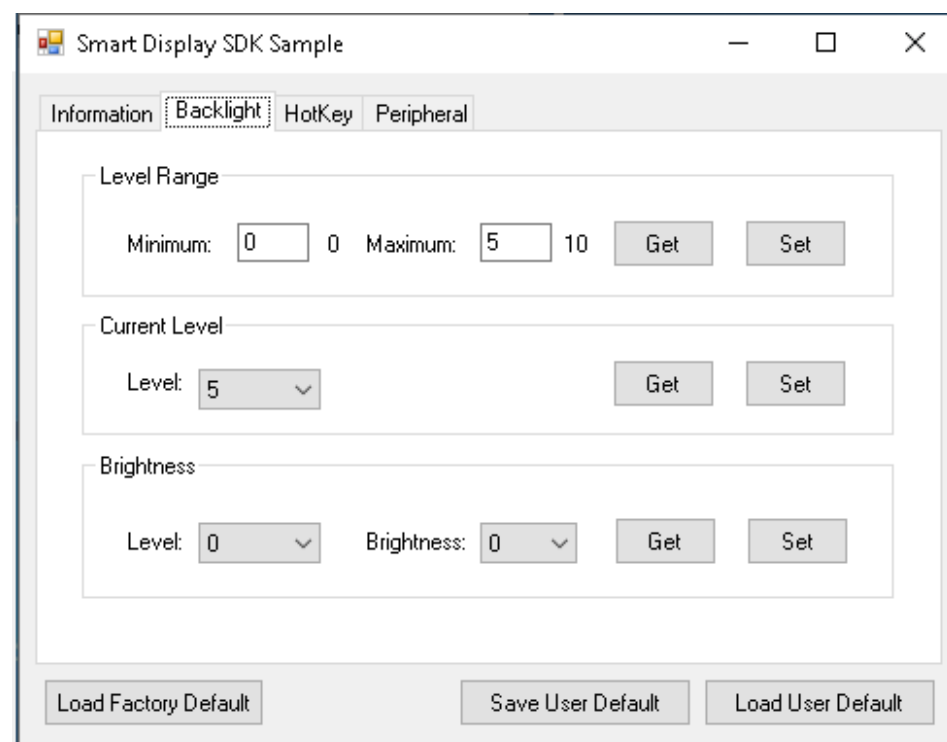
The screenshot shows a window titled "Smart Display SDK Sample" with four tabs: "Information", "Backlight", "HotKey", and "Peripheral". The "Information" tab is selected. It displays the following data:

SDK Version:	4.0.0.5
Firmware Version:	000.010
Platform Name:	TREK-306x2-2
Display Serial Number:	FF363932524E4302
PCB Version	V2
Illuminance:	16
	Unit: lux
Temperature:	39.00
	Unit: C

At the bottom of the window are three buttons: "Load Factory Default", "Save User Default", and "Load User Default".

5.3.4.3 Backlight

In this page, you can set the levels for backlight, the brightness for each level and the current brightness level.



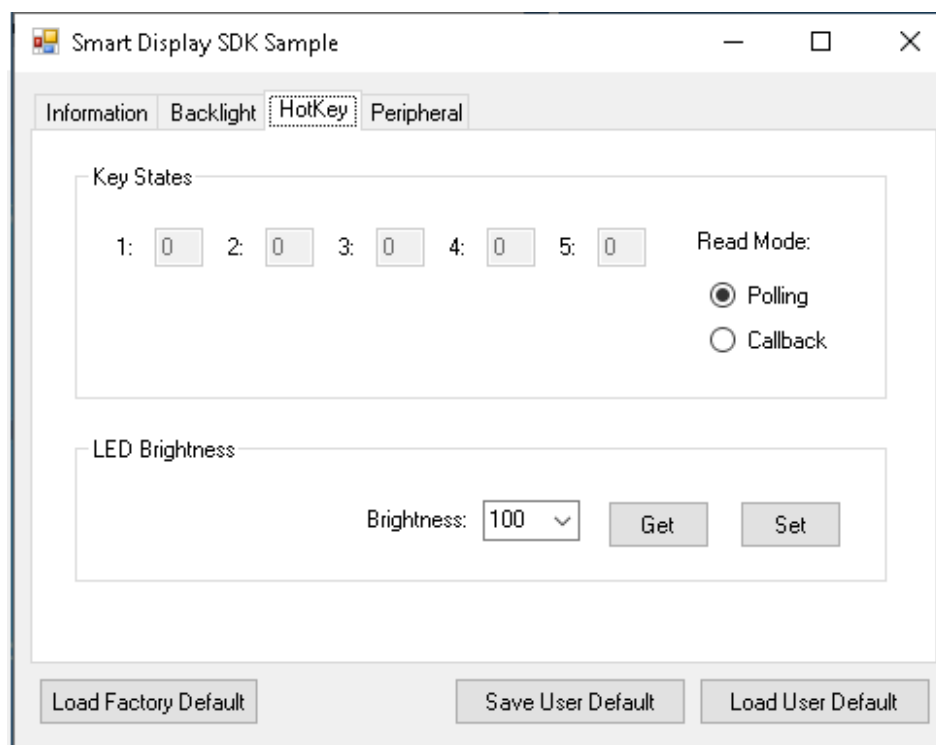
The screenshot shows the same window as before, but with the "Backlight" tab selected. It contains three sections for configuration:

- Level Range:** Minimum: 0 Maximum: 10. Buttons: "Get", "Set".
- Current Level:** Level: (dropdown). Buttons: "Get", "Set".
- Brightness:** Level: (dropdown) Brightness: (dropdown). Buttons: "Get", "Set".

At the bottom are the same three buttons: "Load Factory Default", "Save User Default", and "Load User Default".

5.3.4.4 Hot Key

In this page, you can monitor the press state of each hot key and set the LED brightness of the hot keys.



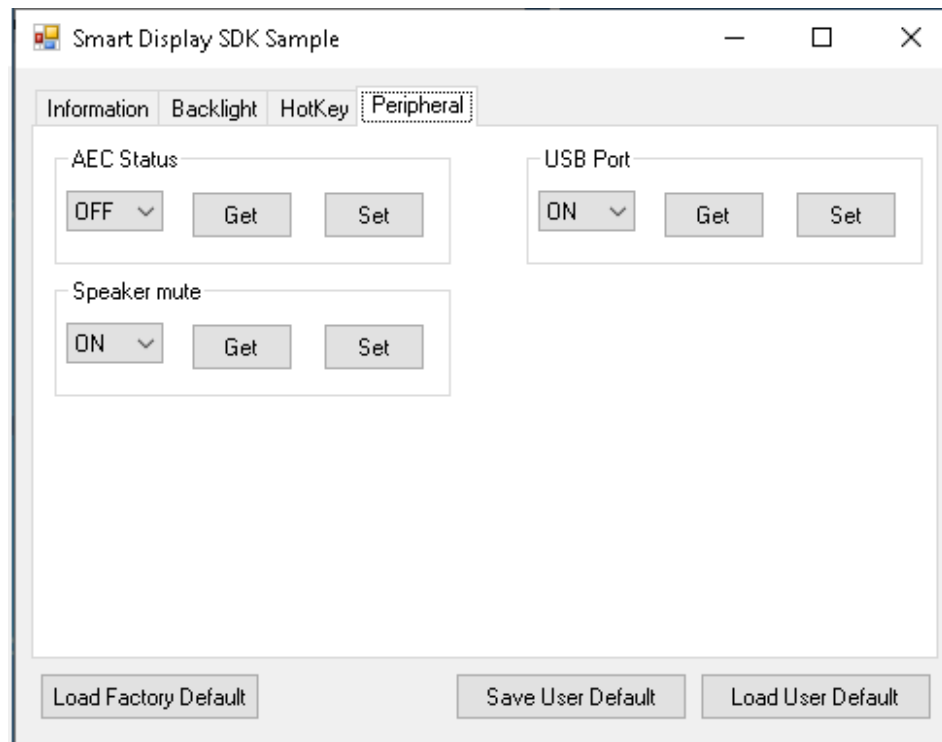
5.3.4.5 Peripheral

In this page, you can control the status of peripheral devices.

Note! Some device will not capability to control some peripheral.



- AEC
Enable/disable power of Audio status .
- USB
Enable/disable power of front-end USB.port.
- Speaker
Enable/disable speaker volume.



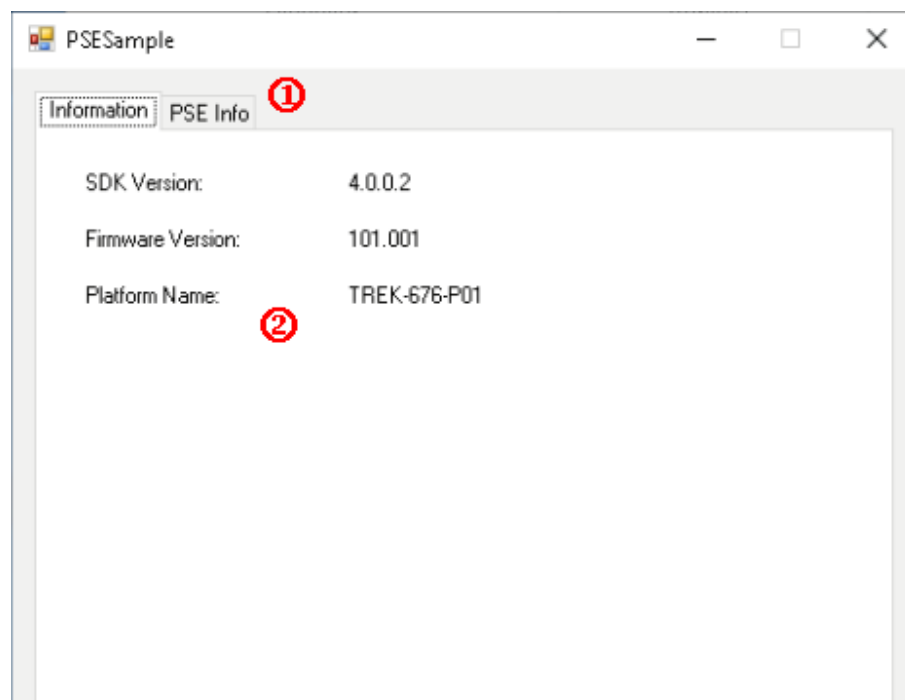
5.3.5 PSE

The PSE Demonstration application demonstrates the usage of MRM PSE API which is a lightweight interface between OS (Operating system) and PSE (Power Sourcing Equipment).

5.3.5.1 System Menu

The PSE Sample as below figure

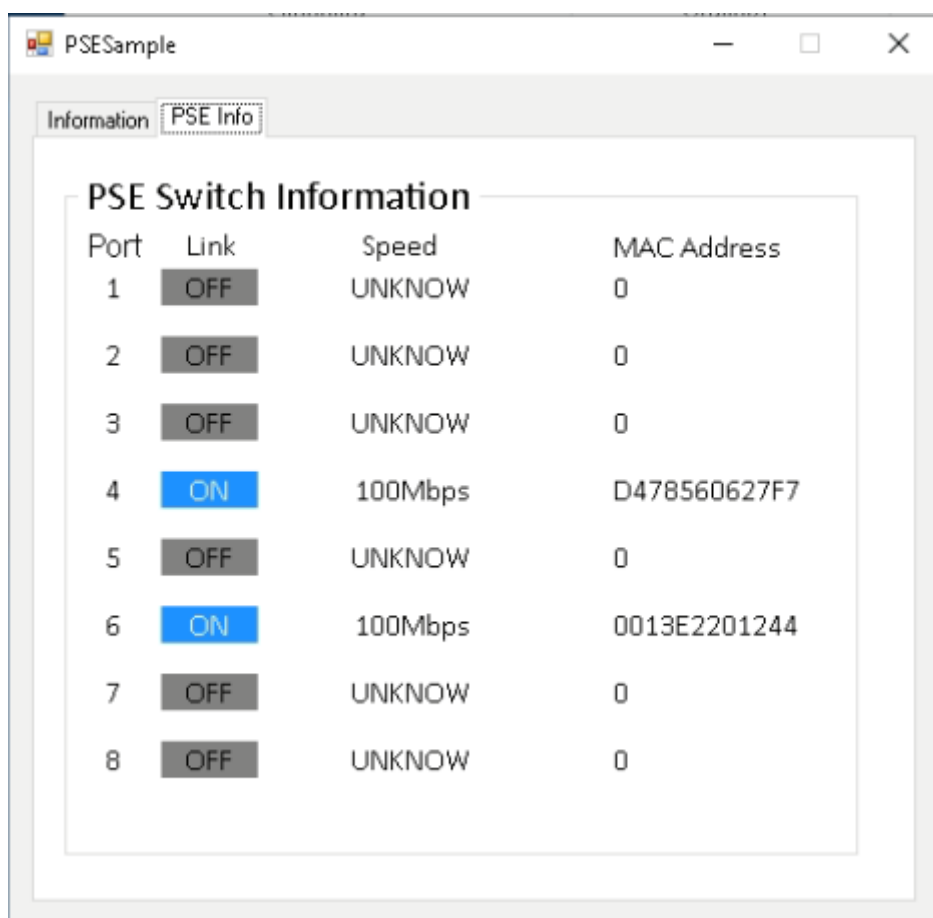
In this page, the demo application shows the current status and basic information.



1. Function demonstration selection
2. Function page

PSE Info

In this page, the demo application shows the PSE Device information.



5.4 I/O Resource Mapping by the Operating System

5.4.1 Common I/O Port Mapping under OS

Table 5.2: Common I/O Port Mapping under OS

I/O Connector	Windows 11	Linux (Ubuntu)
LPC-to-Serial #3 for RS-232/485	COM3	/dev/ttyS4
LPC-to-Serial #4 for RS-232/485	COM4	/dev/ttyS5
LPC-to-Serial #5 for 2-wire RS-232	COM5	/dev/ttyS6
LPC-to-Serial #6 for 2-wire RS-232	COM6	/dev/ttyS7
USB-CDC for Port1 of CANFD-MCU	COM7	/dev/CAN1
USB-CDC for Port2 of CANFD-MCU	COM8	/dev/CAN2
USB-CDC for VPM-MCU	COM9	/dev/VPM
USB-CDC for GNSS module	COM10	/dev/ACM4
USB-CDC for TREK-303/6 SDP 2.0	COM11	/dev/SDP
USB-CDC for modem port of Sierra Wireless EM9291	COM12	
USB-CDC for DM port of Sierra Wireless EM9291	COM13	
USB-CDC for XX port of Sierra Wireless EM9291	COM14	

5.4.2 Ethernet Port Naming Under OS

Table 5.3: Ethernet Port Naming Under OS

LAN	Windows 11	Linux (Ubuntu)
LAN 1	Intel(R) I210 Gigabit Network Connection #2	enp2s0
LAN 2	Intel(R) I210 Gigabit Network Connection	enp3s0
8 port of PoE	Intel(R) Ethernet Controller I226-IT	enp5s0

5.4.3 Ethernet Port LED Behavior and Meaning

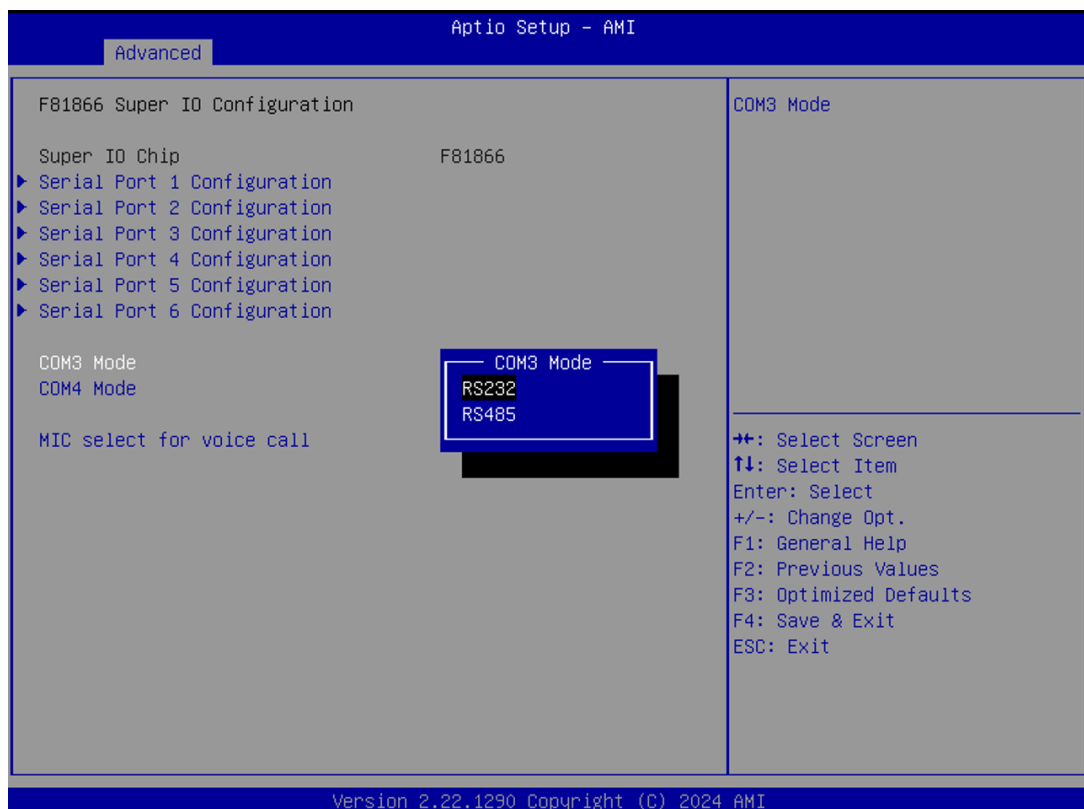
Table 5.4: Ethernet Port LED Behavior and Meaning

LED 1 (Link/Activity)	LED 2 (Speed)	Meaning
Off	Off	No Link
Solid On	Off	Link at 10 Mbps (no activity)
Blinking	Off	Link at 10 Mbps (with activity)
Solid On	Green	Link at 100 Mbps (no activity)
Blinking	Green	Link at 100 Mbps (with activity)
Solid On	Amber / Yellow	Link at 1 Gigabit per second (1 Gbps) (no activity)
Blinking	Amber / Yellow	Link at 1 Gigabit per second (1 Gbps) (with activity)

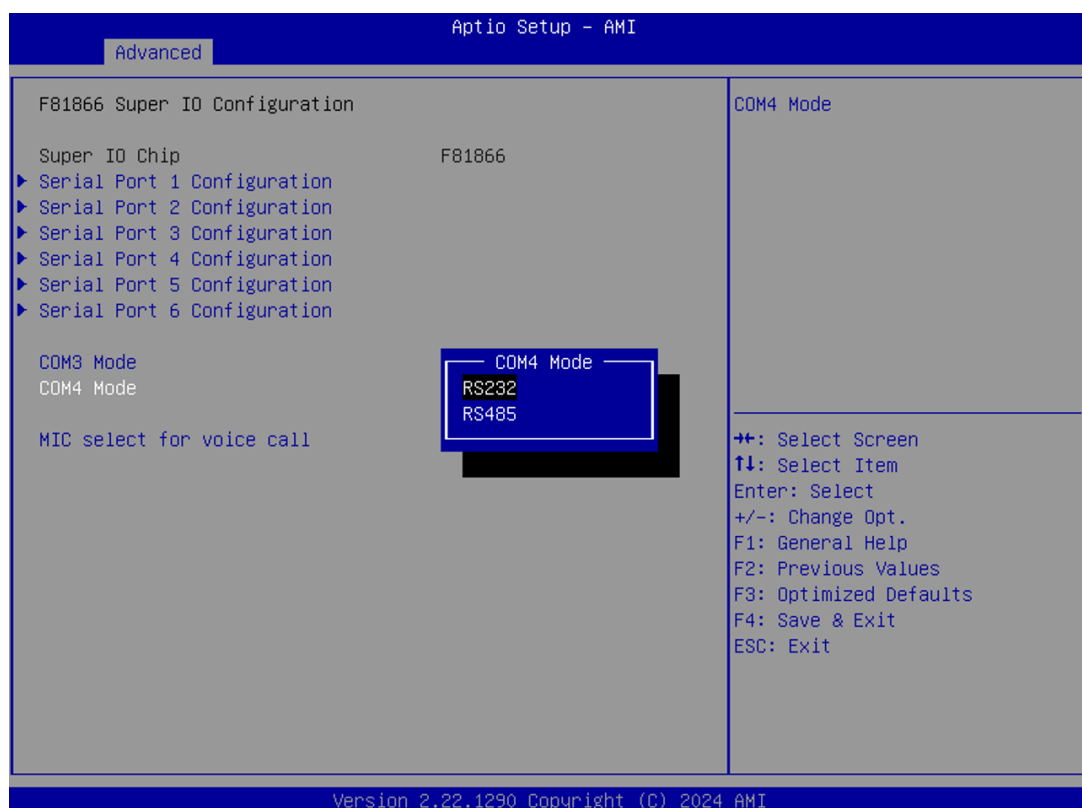
5.5 BIOS settings

1) COM 3 RS232/485 control

Select the COM port mode for COM 3.



- 2) COM 4 RS232/485 control
Select the COM port mode for COM 4

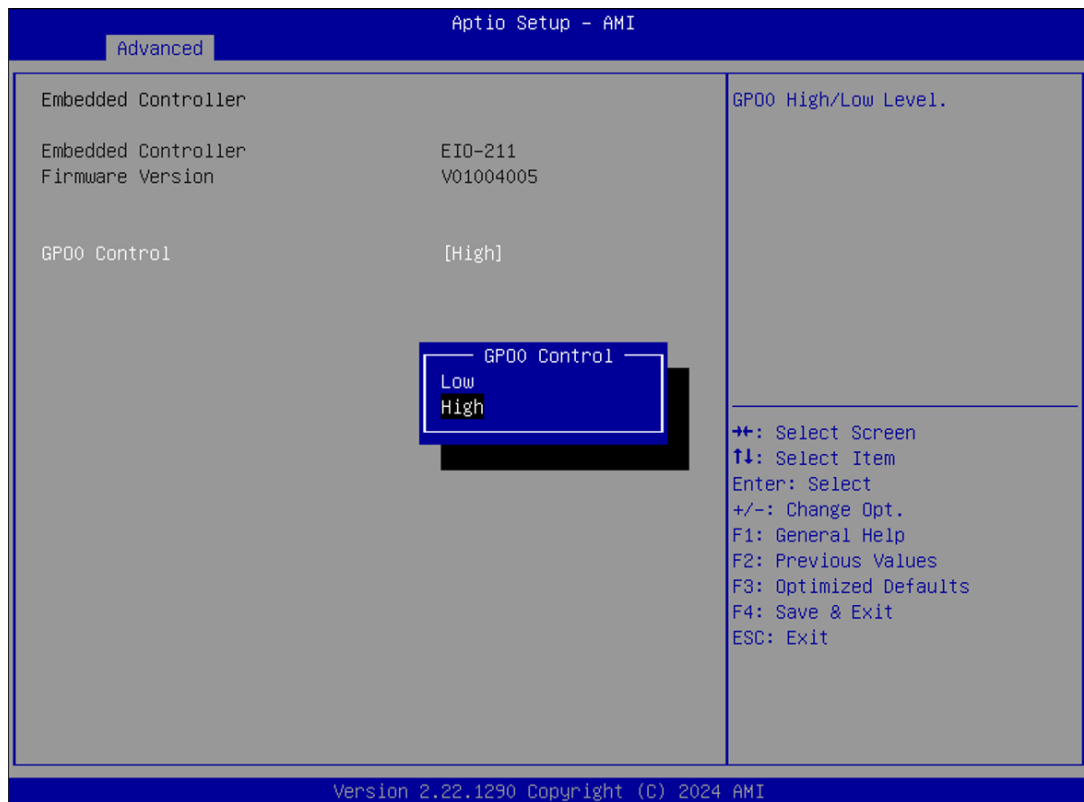


3) G00 SDP setting

Turn ON/OFF SDP:

Advanced -> Embedded Controller -> GP00 Control -> High (SDP ON - Default)

Advanced -> Embedded Controller -> GP00 Control -> Low (SDP OFF)



4) BIOS Lock

To enable BIOS flash, navigate to Chipset -> PCH-IO Configuration -> Security config -> bios lock -> disabled (Enabled by default).





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