



VULCAN 10A

Vehicle Mount Computer

User Manual



v1.1



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Safety Precautions

1. Read these safety instructions carefully before using equipment.
2. Keep this user manual for future reference.
3. Disconnect this equipment from any power source before cleaning. Use only damp cloth. Do not use liquid cleansers or aerosol sprays.
4. For plug-in equipment, ensure the power outlet is located near the unit and is easily accessible.
5. Keep the equipment away from humidity and moisture.
6. Install the equipment on a stable surface. Dropping or improper placement may cause damage.
7. Do not store the equipment in unconditioned environments or in area where the temperature exceeds 40°C, as this may cause damage.
8. The openings on the enclosure are designed for ventilation to prevent overheating. Do NOT COVER or BLOCK THESE OPENINGS.
9. Verify that the voltage of the power source matches the rating on the product label before connecting the equipment.
10. Route the power cord to prevent it from being stepped on or pinched. Do not place objects on top of the power cord. Use only power cords approved for this product, ensuring their voltage and current ratings exceed those marked on the equipment.
11. Observe all cautions and warnings indicated on the equipment.
12. If the equipment will not be used for an extended period, disconnect it from the power source to prevent damage from transient overvoltage.
13. Do not pour any liquid into the equipment openings. This may cause fire or electric shock.
14. Do not attempt to open or disassemble the equipment. Only qualified service personnel should perform servicing.
15. Contact service personnel if any of the following conditions occur:
 - a. The power cord or plug is damaged.
 - b. Liquid has entered the equipment.
 - c. The equipment has been exposed to moisture.
 - d. The equipment is not operating normally or does not function as describe in the manual.

- e. The equipment has been dropped or physically damaged.
- f. The equipment shows obvious signs of damage.
- 16. Do not place heavy objects on the equipment.
- 17. This unit is equipped with a three-wire grounding plug for safety. Do not disable or remove the grounding pin. If your outlet does not support this type of plug, consult a licensed electrician to replace the outlet.
- 18. **CAUTION:** Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.
- 19. **CAUTION:** Hot surface Do not touch.



 **WARNING**

An external fuse is required when the power cord is connected to the power source to avoid the risk of burning the vehicle due to a short circuit in the power path.

Regulatory and Certification

FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if it is not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for assistance.

Shielded interconnect cables and shielded power cables must be used with this equipment to ensure compliance with the applicable RF emission limits. Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



This device operates in 5.15 – 5.25GHz frequency range and is restricted to indoor use only. Outdoor operations in this frequency range is prohibited.

RF exposure warning

This device must be installed and operated in accordance with provided instructions. The antenna(s) used for this transmitter must be installed to ensure a minimum separation distance of 20 cm from all people and must not be co-located or operated in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions to ensure compliance with RF exposure requirements.

CE Marking

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. Please contact your local representative for ordering information.

This product has passed the CE test under the condition that it is operated within an industrial enclosure. To prevent damage from ESD (Electrostatic Discharge) and EMI(Electromagnetic Interference), we strongly recommend using CE-compliant industrial enclosure.

VULCAN 10A Conforms to the Following Specifications

LVD 2014/35/EU

EN 62368-1: 2014 +A11: 2017

EMCD 2014/30/EU

EN 55032

EN 55035

RED 2014/53/EU

ETSI EN 300 328

ETSI EN 300 440

ETSI EN 301 893

ETSI EN 303 413

ETSI EN 301 489-1

ETSI EN 301 489-17

ETSI EN 301 489-19

EN 62311

	BE	BG	CZ	DK	DE	EE	IE
	EL	ES	FR	HR	IT	CY	LV
	LT	LU	HU	MT	NL	AT	PL
	PT	RO	SI	SK	FI	SE	

Lithium Battery Safety Statement



Lithium battery inside. Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type of battery recommended by battery manufacturer.

Disposal of a BATTERY in fire or in a hot oven, or mechanically crushing or cutting of a BATTERY, may result in an EXPLOSION.

Leaving a BATTERY in an extremely high-temperature environment may cause an EXPLOSION or the leakage of flammable liquid or gas.

A BATTERY subjected to extremely low air pressure may cause an EXPLOSION or the leakage of flammable liquid or gas.

THIS PRODUCT CONTAINS LITHIUM-ION BATTERY PACKS. IT MUST BE DISPOSED OF PROPERLY. CONTACT YOUR LOCAL ENVIRONMENTAL AGENCIES FOR INFORMATION ON RECYCLING AND DISPOSAL PLANS IN YOUR AREA.

Chapter 1. Product Introduction

VULCAN 10A(VA-501) is a 10.4-inch in-vehicle terminal featuring a high-brightness 1200-nit display and support for a wide range of wireless connectivity options. The device is well-suited for warehouse management, harbor management, and asset management applications. The VULCAN 10A's optimized power system is designed to withstand cold cranking, load dump, transient voltage fluctuations, and electronic discharge (ESD) events. The device is engineered with IP66 protection rating, wide operating temperature design, wide input voltage range, and versatile expansion interfaces, the device ensures reliable in-vehicle connectivity and robust performance in demanding environment.

Hardware Specifications

Item	Description
Processor	Qualcomm® QCS6490 Qcta-Core, 2.7GHz
Memory	8GB LPDDR4x SDRAM
Storage	128GB UFS storage 1 x Micro SD card slot
Display	<ul style="list-style-type: none">● Display Size: 10.4" XGA● Resolution: 1024 x 768● Contrast: 1:700 (typ)● Brightness: Min. 960nits / Typs. 1200 nits● Viewing angle: 160/160 (H/V) (CR>10)
Touch Panel	<ul style="list-style-type: none">● Capacitive multi touch (PCT)
Wireless Connectivity	<ul style="list-style-type: none">● GNSS (GPS/ GLONASS/ BeiDou/ Galileo), optional dead-reckoning, RTK support● IEEE 802.11ax (Wi-Fi 6), supporting 802.11v/r/k● Bluetooth V5.2● Optional 4G LTE/ 5G

Item	Description
Power Input	9~60VDC, 14A
Battery	LI-ION battery pack for graceful shutdown
Housing (Mechanical)	Die-casting aluminum, fanless design
Certification	CE, FCC, CB

Environment

- **Operating temperature:**
 - -30°C (-22°F) to 60°C (140°F)
 - In accordance with MIL-STD-810H CHANGE 1 Method 501.7 High Temperature Procedure II - Operation
 - In accordance with MIL-STD-810H CHANGE 1 Method 502.7 Low Temperature Procedure II - Operation
- **Storage temperature:**
 - -40°C (-40°F) to 70 °C (158°F)
 - In accordance with MIL-STD-810H CHANGE 1 Method 501.7 High Temperature Procedure I - Storage
 - In accordance with MIL-STD-810H CHANGE 1 Method 502.7 Low Temperature Procedure I - Storage
- **Relative humidity:** 5% to 95% @ 30°C (86°F) to 60°C (140°F) non-condensing in accordance with MIL-STD-810H CHANGE 1 Method 507.6 Humidity Procedure II Aggravated Cycles (Figure 507.6-7)
- **Vibration Test:**
 - Operating: MIL-STD-810H CHANGE 1 Method 514.8 Category 4,
Fig 514.8C-2 Common carrier (US highway truck vibration exposure);
Fig 514.8C-4 Composite two-wheeled trailer;
Fig 514.8C-6 Composite wheeled vehicle.
 - Operating: IEC 60721-3-5 Class 5M3
 - Non-Operating: MIL-STD-810H CHANGE 1 Method 514.8 Category 24 Fig 514.8E-1 (General minimum integrity exposure)
- **Shock Test:**
 - Operation: MIL-STD-810H CHANGE 1 Method 516.8 Procedure 1 Functional Shock 40g/11ms
 - Non-Operation: MIL-STD-810H CHANGE 1 Method 516.8 Procedure V Crash Hazard Shock 75g/6ms

I/O Ports

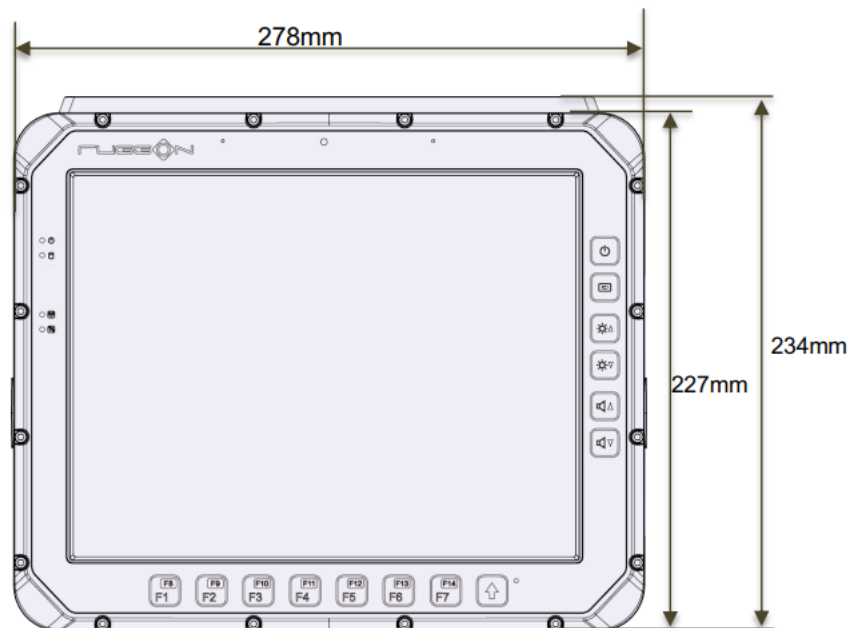
Item	Description
Serial	RS-232 full pin with power x 1 (COM1)* RS-232 (TX/RX)/422/485 x 1 (COM2)* RS-232(TX/RX) x 2 (COM3/COM4)*, RS-485 x 2 (COM5, COM6)* *Operate up to 115K bps *The transmission speed in counter-relationship to the transmission distance
USB	USB 2.0 Type A x 1, USB 2.0 x 2 USB 3.1 type C x 1 (DisplayPort Mode Supported)
Ethernet	Gigabit Ethernet x 1
CAN	CAN bus 2.0B or SAE J1939 x 1
Digital I/O	DI x 2 , DO x 2
Audio	Mic in x 2, Line out (L/R) x 1
Video	Optional video input
Speaker	Dual speakers (3W)

Dimension and Weight

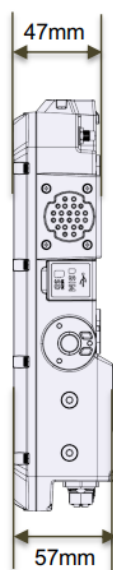
Dimension: 278 x 234 x 57 (mm) / 10.95 x 9.21 x 2.24 (in.) (W x H x D)

Weight: 3.2 kg/ 7.05 lbs.

Front View Dimension



Side View Dimension



Package List

Before you begin the installation or configuration process, make sure to inspect all the components and accessories. Contact your representative if there are any missing or damaged items.

Please verify the delivery of the contents upon receipt.

- VULCAN 10A vehicle mount computer
- Quick start guide
- Touch screen protection film
- Accessory Box enclosed containing one M12 cable with fork terminals (Length: 2 Meter)

NOTE:

- The packaging material provides optimal protection to your device. After unpacking, store the original packaging material in case the product needs to be returned for shipment.
- The protection film included in the package is designed to enhance the durability of the touch screen and protect it from scratches, etching, and other damage. The film uses a low-tack adhesive, making it easy to apply and remove, while remaining fully touch-sensitive. It is recommended that you apply the film to the touch screen for added protection.

Chapter 2. Hardware Installation

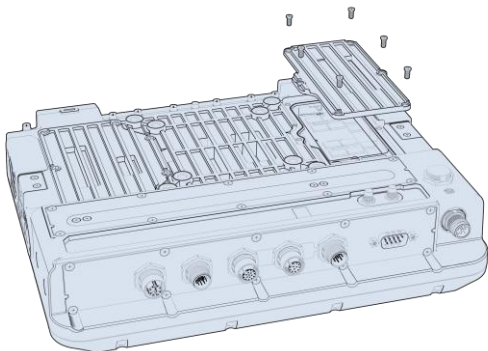
This chapter provides information for the installation and removal of M.2 WWAN module.



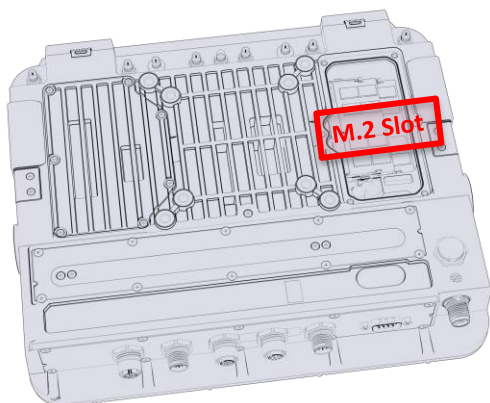
Please make sure the device is completely powered off and that the power status LED light is off before installing or removing the module or SIM card.

Installing/Removing the WWAN module

1. Shut down the system properly and disconnect the device from all power sources.
2. Unmount the device from the mounting apparatus; make sure that the display surface is protected.
3. Remove the screws(x6) from the left service door.

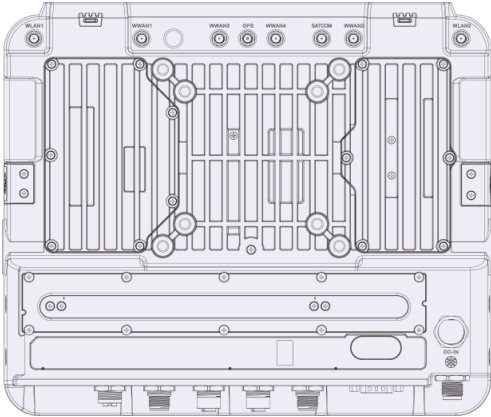


4. Locate the M.2 module slot, see the following image.



5. Insert the M.2 module into the slot and fasten the screw(x1). / Loosen the screw(x1) on the module and remove it from the slot

6. Replace the service door cover and fasten the six screws(x6).



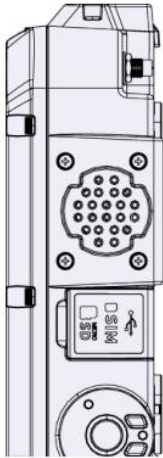
Installing/Removing the SIM card

If you have ordered VULCAN 10A with the optional WWAN module, you can use the device's micro-SIM and eSIM design for cellular and wireless connection. The SIM1 slot is accessible from the side cover, while SIM2 is an eSIM.

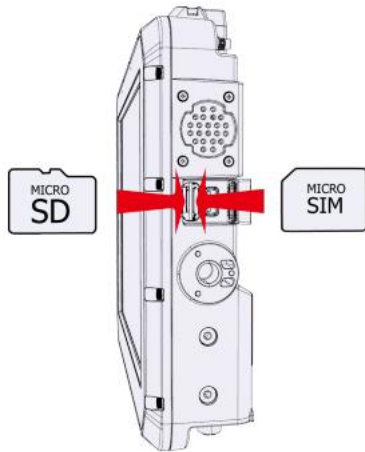
To select which SIM slot to use, go to **Setting**→ **Networking & internet**, then select the preferred SIM. The default setting is SIM1. Follow the instructions below for installing or removing your SIM cards.

SIM1 slot (Side Cover)

1. The SIM1 slot supports hot-swap functionality, allowing you to insert or remove the SIM card without shutting down the system.
2. Icons for the SD card, micro-SIM card, and USB port can be found on the right-side cover (facing the panel).



3. Open the cover and insert the SIM card. Ensure that the angled corner of the card is correctly positioned.



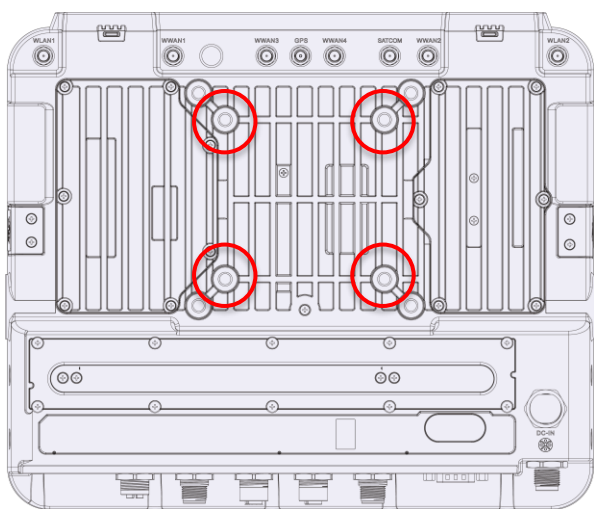
Before use, check whether the waterproofing rubber is damaged or contaminated with foreign objects. Ensure the side cover is tightly closed to maintain waterproof protection.

Chapter 3. Hardware Mounting

Installation must be performed by trained personnel only.

The VULCAN 10A supports VESA standard MIS-D, 75/100, C (75/100mm square pattern, M5 thread, depth 9mm) with four mounting holes on the rear panel.

The recommended screw-in depth is **9mm** and **M5 x Pitch 0.8mm bolts**.



Notes: To prevent any damage or injury, ensure the mounting bracket is securely attached.

Chapter 4. Start up

Powering the System

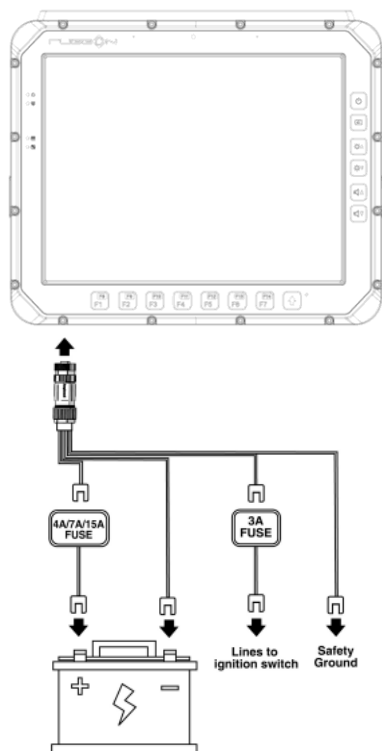
Installation Instructions

Fuses* are required when connecting the power cable to vehicle battery. Install a 3A fuse on the ACC/ignition line to prevent wire damage or fire hazards.

Notes:

- * 4A fuse for 48VDC power input
- * 7A fuse for 24VDC power input
- * 15A fuse for 12VDC power input

Refer to the installation diagram below for VULCAN 10A power connection.



! WARNING
An external fuse is required when the power cord is connected to the power source to avoid the risk of burning the vehicle due to a short circuit in the power path.

Power on the System

The VULCAN 10A provides two power modes, configurable via Setting → System → Power Management.

- If connected to the vehicle battery, enable ACC Wakeup → Wakeup enable.
- If using power adapter, disable ACC Input Detection.

When connected to the vehicle battery:

- In **ACC sense mode**, regardless of whether the power button is enabled, the system is controlled only by ACC signals.
 - Example: When the system is off, switching the ignition from OFF to ON powers up the system with the on/delay function.
- In **ACC sense mode, with the Power button enabled**, the system can be controllable via its ACC signals or the power buttons.
 - Example: When the system is off without under-voltage protection(UVP) and ignition is ON, pressing the power button will turn on the system.

When connected to power adapter:

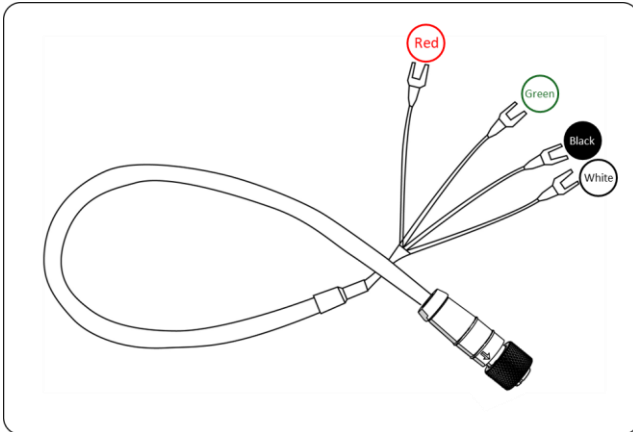
The power source is not controlled by ACC/Ignition signals; disable “ACC sense” mode in Setting → System → Power Management.

- In **Disabled ACC sense mode with Power button enabled**, the system is controllable only via the power button.
 - Example: When the system is off without UVP, pressing the power button turns on the system.
- In **Disabled ACC sense mode with the Power button disabled**, the system will automatically power on when the external power source is connected (without UVP).

Connector Power

The VULCAN 10A accepts a wide range of DC input range (9~60VDC) via an M12 S-CODE 4-pin power connector. It can be powered through a vehicle power cable or an external power adapter.

Refer to the M12 S-CODE 4-PIN power connector and its wire definition in the following.



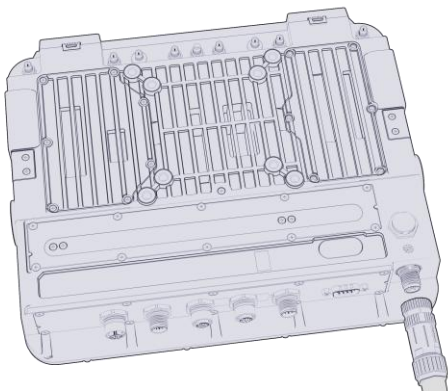
1. Use only power cables supplied or verified by RuggON to meet requirements for voltage, current, low-temperature flexibility, UV resistance, oil resistance.
2. Do not bend or kink the power cables. Ensure they are protected from crushing and abrasion.
3. Ensure all power cables are correctly connected to the safety ground.
4. Connect the VULCAN 10A power cable directly to the vehicle battery through the appropriate fuse. Do not share power lines with other equipment to avoid interference.
5. To minimize voltage drop, use cable with adequate cross-sectional area to support sufficient current capacity.

The wire definition

Wire Color	Signal
RED	V+
BLACK	V-
GREEN	PE (Safety Ground)
WHITE	ACC/ Ignition

Power on through Vehicle Power Cable

1. The bare-wire lead cable allows direct connection to 12V, 24V or 48V vehicle power supplies. Follow the wire definition above and install the appropriate fuse (4A, 7A, or 15A) between the power cable and power source.
2. Plug the power cord into the power connector and adjust it in the correct position. (Refer to power connector diagram on page 20)



3. The VULCAN 10A powers on automatically when the ACC signal switched ON.

Power on through External Power Adapter

To power the VULCAN 10A, using an adapter, connect the red (V+) wire to white (ACC/ Ignition) wire. ACC ignition mode is not supported in this configuration.



Ensure all the power supplies are disconnected before plugging the power cord into the power connector.



To turn off the system, press the power button. If the external power source is removed directly, the system will switch to the internal battery and perform a graceful shutdown within one minute, which may reduce battery lifespan.

Internal Battery

If VULCAN 10A is disconnected from external power, the internal battery can keep it running up to 1 minute.

When power is restored, VULCAN 10A will continue normal operation.

When VULCAN 10A is connected to external power, an internal charger will automatically charge the internal battery. If external power is disconnected and the device has continued to run for 1 minute on its internal battery, please charge the internal battery for at least 3 minutes.

Limitation charge from internal battery

When vehicle power is unstable such as experiencing voltage drops, VULCAN 10A's internal battery can only keep the system's core computing logic running above -10°C, while with following functions are temporarily affected until vehicle power is restored*1 :

1. Type-C interface disabled
2. COM1 power output turned off
3. Backlight is forcibly dimmed *2
4. Speaker muted
5. WWAN TX power output reduced*3
6. Defrost/ defog function disabled
7. CPU throttling *4

*1 If vehicle power is restored immediately after the device suffers from an instant voltage drop, the affected functions will return to normal conditions.

*2 VULCAN 10A offers two backlight modes. Under normal mode, the backlight is dimmed; under night mode, the backlight remains at the same brightness.

*3 Reduced WWAN TX power output might result in abnormal signal reception.

*4 Processor throttling might cause slower system performance.

When external power is present, an internal charger will automatically charge the internal battery. The ratio of charging time to discharging time is approximately 3:1. This means it takes 3 minutes to charge the battery after it has been discharged for 1 minute.

Powering Down the System

When VULCAN 10A is connected to a vehicle battery

- When the system is on, switch the ignition from ON to OFF to turn off the system or initiate delay-off.
- When the system is on, long-press the “Power button” to enter the Power menu and select “Power off”.

When VULCAN 10A is connected to a power adapter

- When system is on, long-press the “Power button” to enter the Power menu and select “Power off”.

Unexpected Power Outage

When VULCAN 10A is connected to a vehicle battery

The system will follow your “Delay Off” setting but will still perform graceful shutdown within 1 minute.

When VULCAN 10A is connected to a power adapter

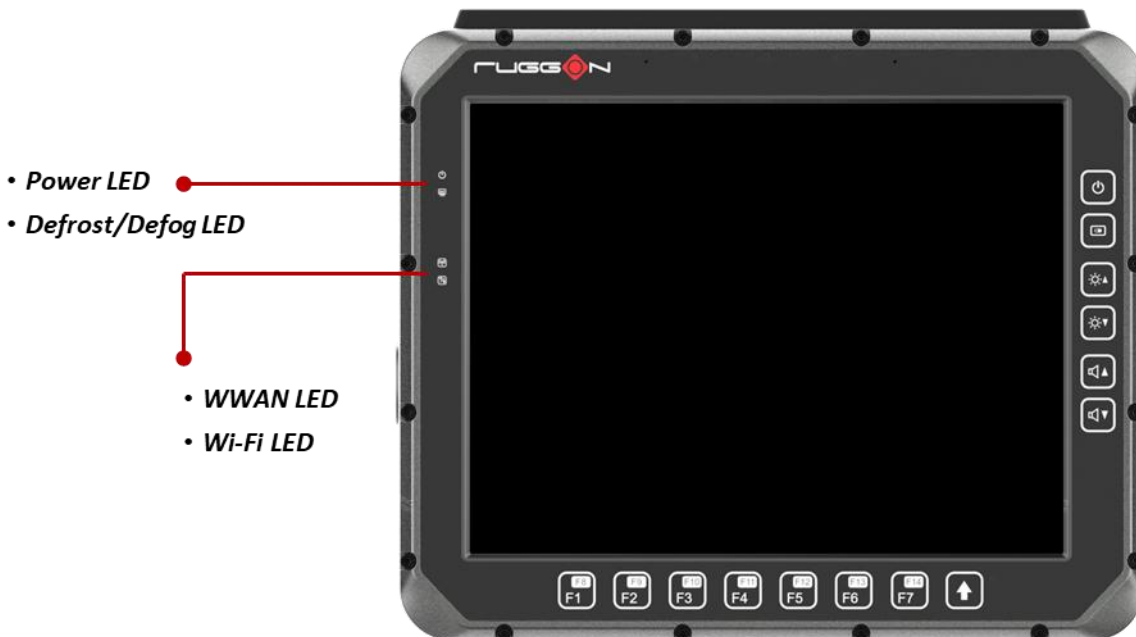
The system will switch to the internal battery and perform a graceful shutdown within 1 minute.

LED Status

The LEDs on VULCAN 10A are status indicators that show the operating status of the system. These indicators can help identify possible hardware failures causing specific symptoms. Refer to the description below.



LED	Status	Description
Power	Blink Green	System Powering up
Power	Blink Yellow	System Loading
Power	Solid Green	System ready
Power	Blink Red	Vehicle battery abnormal
Defrost	Solid Green	Defrost function enabled <i>(LED available only on defrost versions)</i>
WWAN	Solid Green	WWAN module detected (LED behavior varies by module type)
WIFI	Solid Green	WI-FI enabled

* The WWAN indicator status behavior depends on the module you choose.



Adjust the Speaker Volume

VULCAN 10A allows you to adjust volume using the volume buttons

- Press the  button to increase the volume.
- Press the  button to decrease the volume.

Auto-Brightness Adjustment

When you use VULCAN 10A, you may encounter different lighting conditions that make it difficult to view the screen. VULCAN 10A's built-in ambient light sensor on the front panel supports auto-dimming. You can also disable this function to manually adjust the brightness via Android Setting.

Internal Microphone

VULCAN 10A is equipped with an internal microphone, so no external microphone is required. In addition to the built-in speaker and microphones, you can also plug in external headsets via the audio jack.

Display on/off

To turn display on or off, press the Power button located on the right side of the device.

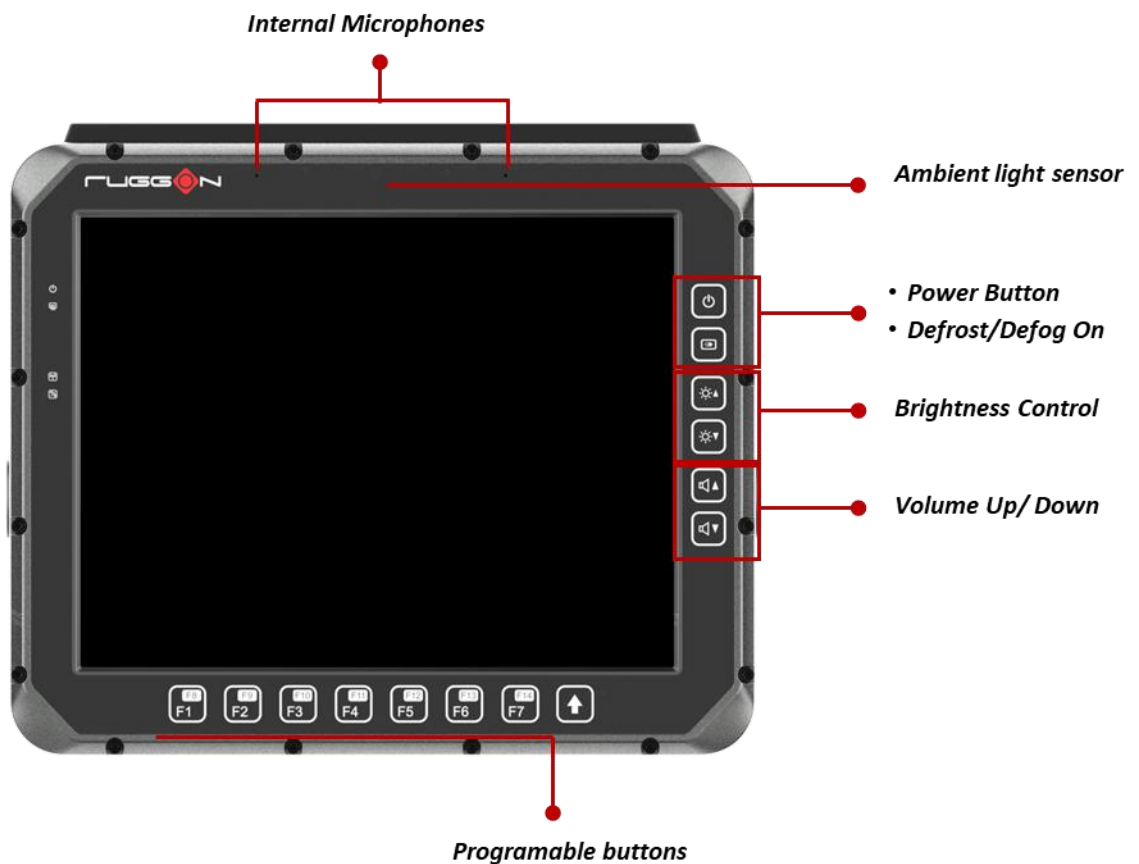
Programmable Buttons

VULCAN 10A provides seven programmable buttons with default commands. You can configure these buttons via Android Setting to assign different commands or keyboard shortcuts for your workflow.

Power Management

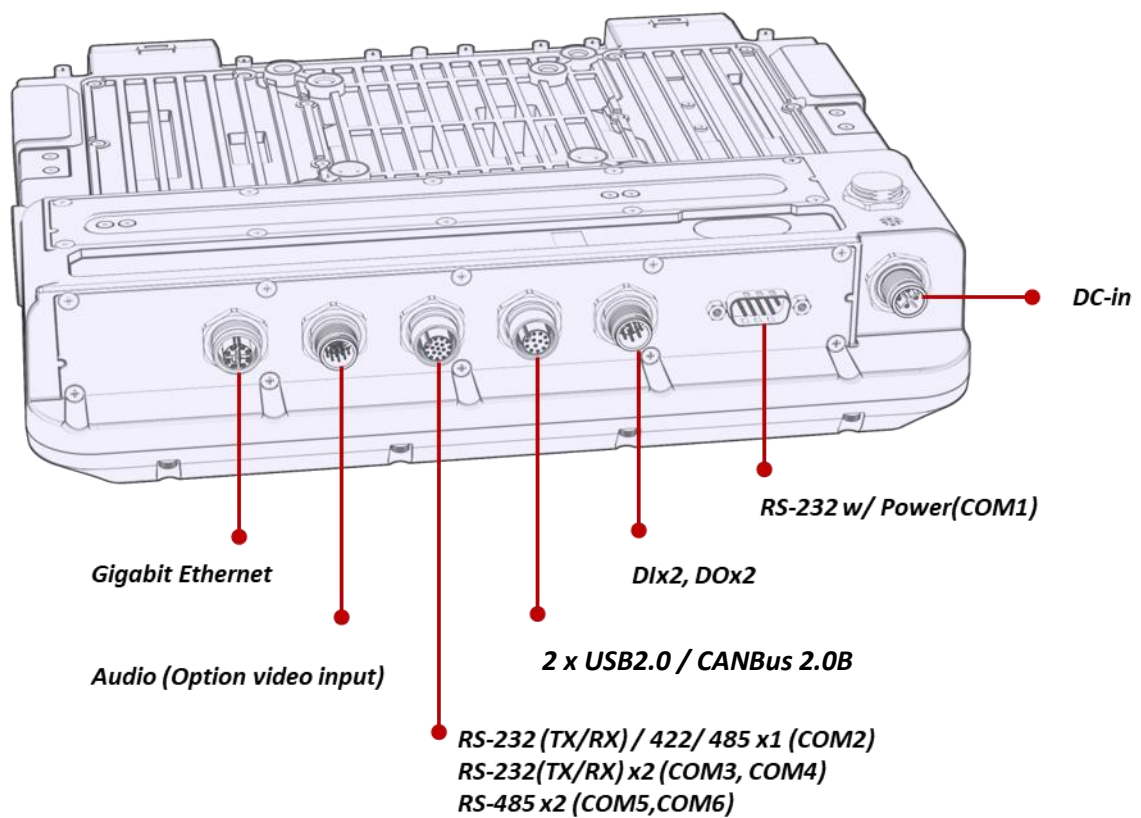
VULCAN 10A provides Android Setting for configuration, including power management and system setup.

Please note the power management, I/O configuration, and button settings can be configured in Android Setting → Settings.



Chapter 5. Jumpers and Connectors

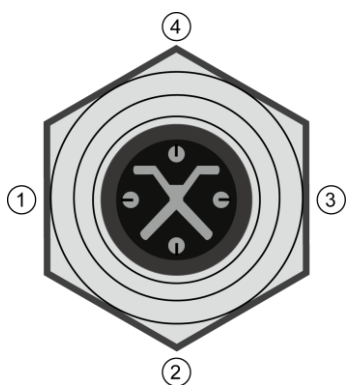
Bottom View



External Connectors Pin Assignments

Use this section as a reference for the pin assignments of the external ports available on the VULCAN 10A.

Power Connector

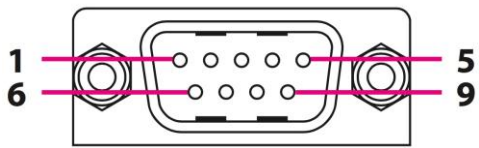


TYPE: M12 S-CODE 4-PIN male connector

Pin	Signal
1	V+
2	ACC
3	V-
4	PE (Safety Ground)

Note: Please refer to Power on through vehicle power cable on page 20 for connecting the external power cable to power source.

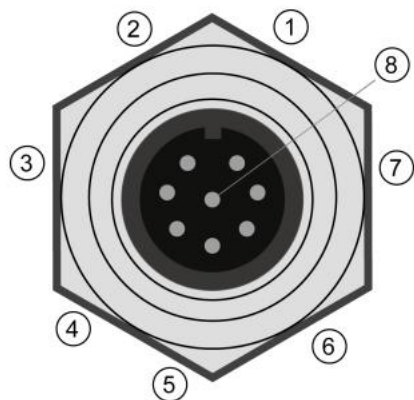
RS-232 Port (COM1)



TYPE: DSUB 9-PIN male connector

Pin	Signal
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	PWR (0/5/12V@600mA , default 0V)

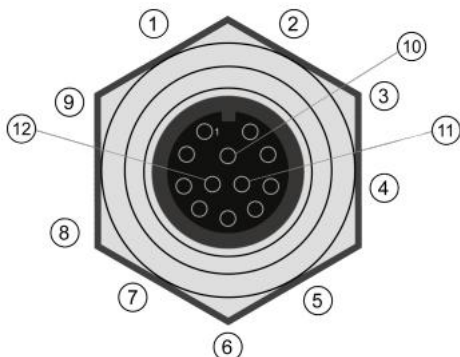
Digital I/O



TYPE: M12 A-CODE 8-PIN male connector

Pin	Signal
1	Do not use
2	Digital Output 0
3	Digital Output 1
4	Digital Input 0
5	Digital Input 1
6	Do not use
7	Digital I/O GND
8	NC

CAN Bus Port and Dual USB

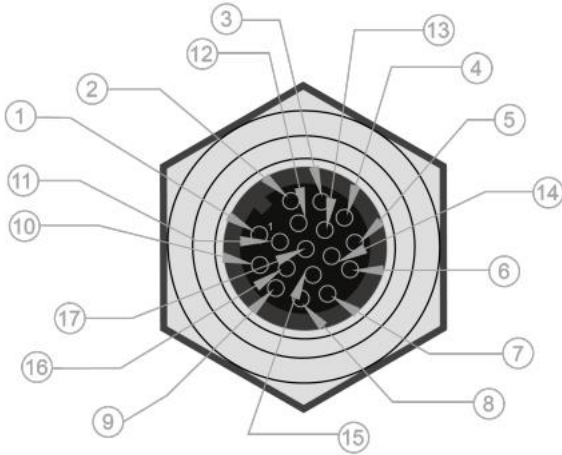


TYPE: M12 A-CODE 12-PIN female connector

Pin	Signal
1	USB Port1: 5V
2	USB Port1 DP
3	USB Port1 DN
4	GND for USB Port1 · CAN · USB Port2
5	CAN Bus CAN_H (RAW CAN)
6	CAN Bus CAN_L (RAW CAN)
7	Isolation_GND *
8	CAN Bus Isolation_CAN_H (RAW CAN/ SAE J1939)
9	CAN Bus Isolation_CAN_L (RAW CAN/ SAE J1939)
10	USB Port2 5V
11	USB Port2 DP
12	USB Port2 DN

*Only with CAN Bus Signal Isolation

RS-232/422/485 Port (COM2-COM6)



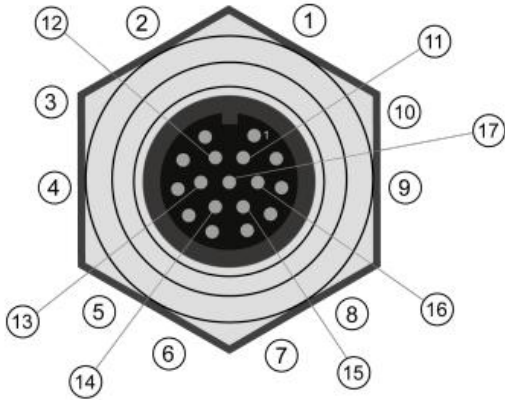
VULCAN 10A is equipped with 1 x RS-232(TX/RX)/ 422/ 485, 2 x RS-232(TX/RX) and 2 x RS-485. Refer to the pin definition of RS-232/422/485 Port in the following.

TYPE: M12 A-CODE 17-PIN female connector

Pin	Signal
1	COM2 RS232 DTR or RS422 RN
2	COM2 RS232 TXD or RS422 RP
3	COM2 RS232 DCD or RS422 TN or RS485 DN
4	COM2 RS232 RXD or RS422 TP or RS485 DP
5	COM3 RS232 RXD
6	COM3 RS232 TXD
7	COM4 RS232 RXD
8	COM4 RS232 TXD
9	COM5 RS485 DN
10	COM5 RS485 DP
11	GND
12	GND
13	GND
14	COM6 RS485 DN
15	GND
16	GND
17	COM6 RS485 DP

M12 A CODE 17-PIN connector to DSUB connector adapter cable is also available. Please contact your local sales representative for ordering information.

Video Capture/ Headset

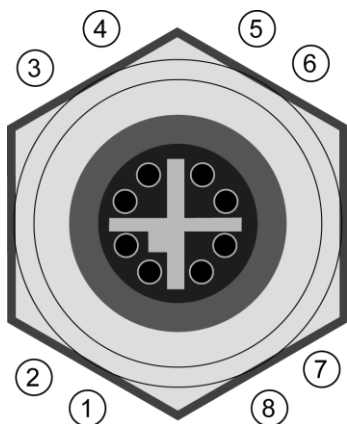


TYPE: M12 A-CODE17-PIN male connector

Pin	Signal
1	CH1 AUDIO
2	CH4 AUDIO
3	CH4 VIDEO
4	HEADPHONE_OUT_R
5	HEADPHONE_OUT_L
6	HEADPHONE_GND
7	HEADPHONE_MIC
8	CH2 VIDEO
9	CH2 AUDIO
10	CH1 VIDEO
11	CAPTURE CARD GND
12	CAPTURE CARD GND
13	HEADPHONE_DETECT*
14	HEADPHONE GND
15	CAPTURE CARD GND
16	CH3 AUDIO
17	CH3 VIDEO

*Please contact PIN13 (DETECT) wire and PIN14 (GND) wire in diverts audio to headset from the

Ethernet Port



TYPE: M12 X-CODE 8-PIN female connector

Pin	Signal
1	DA+
2	DA-
3	DB+
4	DB-
5	DD+
6	DD-
7	DC-
8	DC+

Chapter 6. Key Mapping

Please refer to the following link for programmable button key mapping.

<https://developer.android.com/reference/android/view/KeyEvent>