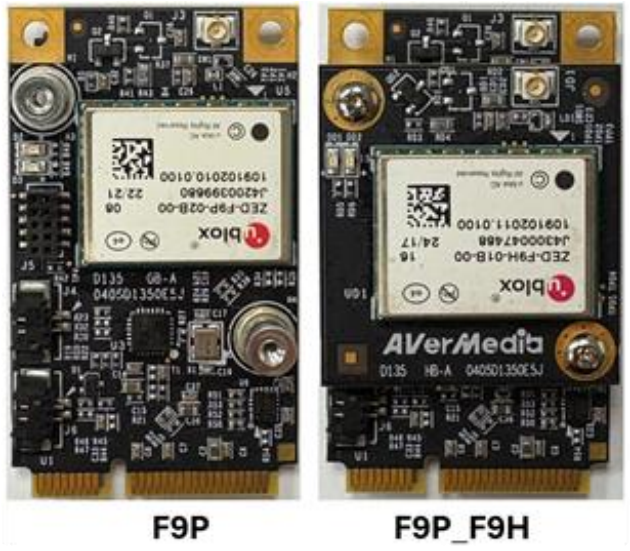
AVerMedia's
RTK-GNSS With 6-axis IMU board
(Preliminary)



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Preface

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If you experience any difficulty after reading this manual and/or using the product, please contact the reseller from which you purchased the product. In most cases, the reseller can help you with the product installation and the difficulty you encountered.

In case the reseller is not able to resolve your problem, our highly capable global technical support team can certainly assist you. Our technical support section is available 24 hours a day and 7 days a week through our website For more contact information, you may find it in the section of AVerMedia Global Offices.

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Revision History

Revision	Date	Updates
V0.1	Apr. 17, 2025	1st Released.
V0.2	Jul. 15, 2025	Updated content.
V0.3	Sep. 15, 2025	Modify Product warranty

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Product Warranty

Please refer to [Support | Warranty And Rma Services | AVerMedia]

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ESD Warning

Electronic components and circuits are sensitive to Electrostatic Discharge (ESD). When handling any circuit board assemblies including AVerMedia products, it is highly recommended that ESD safety precautions can be observed. ESD safe best practices can include, but are not limited to, the following:

1. Leave the circuit board in the antistatic package until it is ready to be installed.
2. Use a grounded wrist strap when handling the circuit board. At a minimum, you need to touch a grounded metal object to dissipate any static charge, which may be present on you.
3. Avoid handling the circuit board in carpeted areas.
4. Handle the board by the edges and avoid the contact with the components.
5. Only handle the circuit boards in ESD safe areas, which may include ESD floor and/or table mats, wrist strap stations, and ESD safe lab coats.

Safety Precaution:

1. All cautions and warnings on the device should be noted.
2. For safety consideration, do NOT open the device if not a qualified service staff.
3. Place the device on a solid surface during installation to prevent falls.
4. Keep the device away from humidity.
5. Do NOT leave this device in an un-controlled environment with temperatures beyond the device's permitted storage temperature to avoid damage.
6. All adaptors and cables supplied by AVerMedia are verified. Do NOT use any others not supplied by AVerMedia to avoid any malfunction or fires.
7. Make sure the power source matches the power rating of the device.
8. Place the power cord where people cannot step on it. Do not put anything on the power cord.
9. Always completely disconnect the power while the device is not in use or idle for a long time.
10. Disconnect the device from any AC supply before cleaning. While cleaning, use a damp cloth instead of liquid or spray detergents.
11. Make sure the device is installed near a power outlet and easily accessible.
12. Do not cover the openings on the device to ensure optimal heat dissipation.
13. Pay attention to the heatsink or heat spreader of the device when the system is running.
14. Never pour any liquid into the openings. This could cause fire or electric shock.
15. Static electricity should be noted while installing any internal components. Consider using a grounding wrist strap and put all electronic parts in static-shielded containers.

If the following situations occur, please contact our service personnel:

(1) The device is dropped or damaged
(2) Damaged power cord or plug
(3) Exposure to excessive moisture
(4) Liquid intrusion into the device
(5) Any obvious signs of damage displayed on the device
(6) Device is not working as expected or in a manner as described in this manual

Introduction

AVerMedia’s RTK GNSS with 6-axis IMU board is designed to expand the RTK GNSS and 6-axis IMU capabilities of AVerMedia's D135 product and must be used in combination with the AVerMedia AI BOX PC.

Utilizing the U-blox ZED F9 series, it brings high-precision GNSS technology with RTK functionality to the AVerMedia AI BOX PC.

This board includes a 6-axis IMU (Inertial Measurement Unit), which provides a 3-axis accelerometer and a 3-axis gyroscope for motion tracking and gesture detection applications.

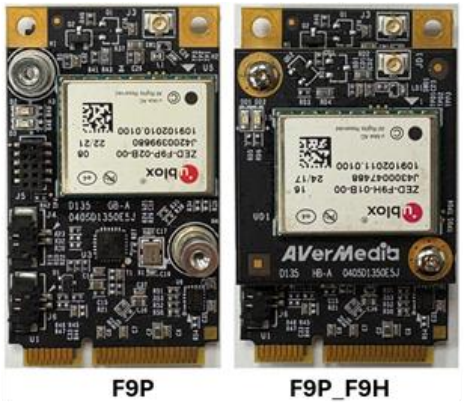
1. Specification

The RTK-GNSS with 6-axis IMU board is designed to expand the RTKGNSS and 6-axis IMU capabilities of AVerMedia's D135 product and must be used in combination with the AVerMedia AI BOX PC.

- note : IMU is option

Utilizing the U-blox ZED F9 series, it brings high-precision GNSS technology with RTK functionality to the AVerMedia AI BOX PC.

This board includes a 6-axis IMU (Inertial Measurement Unit), which provides a 3-axis accelerometer and a 3-axis gyroscope for motion tracking and gesture detection applications.



Model	RTK-GNSS With 6-axis IMU board
Applicable product	D135
Connector type	mPCIe / USB wafer
RTK-System GNSS receiver (moving base)	U-blox ZED-F9P
Heading GNSS receiver (rover)	U-blox ZED-F9H (Optional)
inertial measurement unit	6-axis IMU, 3-axis accelerometer and 3-axis gyroscope
GNSS	BeiDou, Galileo, GLONASS, GPS / QZSS
GNSS bands	B1I, B2I, E1B/C, E5b, L1C/A, L1OF, L2C, L2OF
External I/O	- 1 x MHF for RTK-GNSS active Antenna - 1 x MHF for Heading-GNSS active Antenna (Optional)
Internal I/O	- 1 x 4pin wafer for GNSS (5V power input & USB 2.0) - 1 x 4pin wafer for IMU (3.3V Power input & I2C) - 1 x 2pin wafer for RTK-GNSS PPS output - 1 x 2pin wafer for Battery input - Reserved 1 x 5 pin header for RTK-GNSS control (I2C/UART/SPI mode)
Expansion	10pin wafer for Dual-RTK Heading-GNSS module expansion
Indication	- 2x LED for RTK-GNSS Status indication - 2x LED for Heading-GNSS Status indication (Option) - Indicates the current geofence status and RTK positioning status
Power Input	- 3.3V +/- 5% (supplied by the Mini PCIe socket) - Reserved 5V +/- 5% (4pin GNSS wafer) - Reserved 3.3V +/- 5% (4pin IMU wafer)
Environment	- Operating temperature -40˚C ~ 85˚C - Storage temperature -40˚C ~ 85˚C
PCB/Electronics Mechanical Info	U-blox ZED-F9P: Mini PCIe standard (full size) : 30 x 50.8 x 10.2 mm U-blox ZED-F9P+F9H: Mini PCIe standard (full size) : 30 x 50.8 x 13.7mm PCB Thickness: 1.6mm

Table 4: RTK GNSS Module Top View Interface

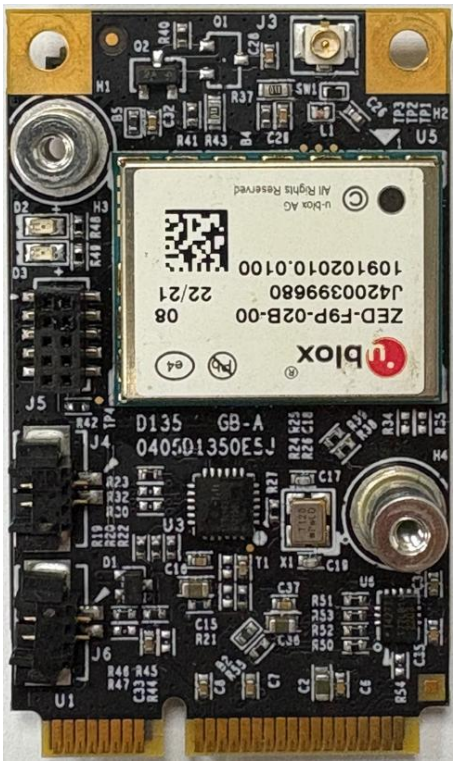
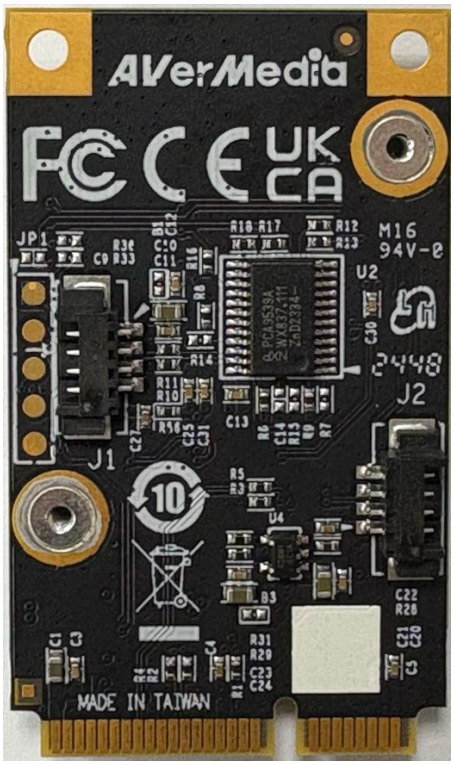


Table 5: RTK GNSS Module Bottom View Interface



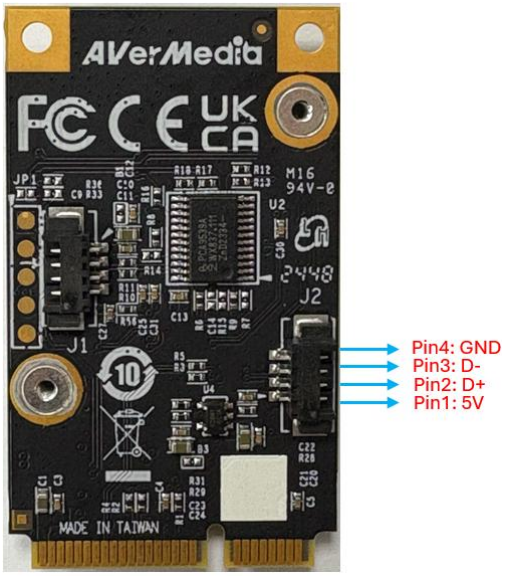
2. RTK GNSS Module STANDARD and CUSTOM EXPANSION CONNECTORS

mPCIe Pin Definition:

Row	Pin	Symbol	Type	Description	Status
TOP	7	GND			
TOP	9	GND	G		
TOP	15	GND	G		
TOP	-	KEY	-	Mechanical Key	
TOP	17	RTC_BAT	I	connect a backup supply to the GNSS modules to keep configuration and positioning data	Proprietary
TOP	19	IMU_INT_2	I	IMU Interrupt output	Proprietary
TOP	21	GND	G		
TOP	27	GND	G		
TOP	29	GND	G		
TOP	35	GND	G		
TOP	37	GND	G		
TOP	39	+3.3 Vaux	P	Max 500mA	
TOP	41	+3.3 Vaux	P	Max 500mA	
TOP	43	GND	G		
TOP	45	IMU_INT_1	P	IMU Interrupt output	Proprietary
BOT	2	+3.3 Vaux	P	Max 500mA	
BOT	4	GND	G		
BOT	-	KEY	-	Mechanical Key	
BOT	18	GND	G		
BOT	22	PERST#	I	Module Reset (Internally pulled up. active LOW)	
BOT	24	+3.3 Vaux	P	Max 500mA	
BOT	26	GND	G		
BOT	30	SMB_CLK		I2C_SCL	
BOT	32	SMB_DATA		I2C_SDA	
BOT	34	GND	G		
BOT	36	USB_D-	I/O	USB 2.0 differential data (-)	
BOT	38	USB_D+	I/O	USB 2.0 differential data (+)	
BOT	40	GND	G		
BOT	50	GND	G		
BOT	52	3.3 Vaux	P	Max 500mA	

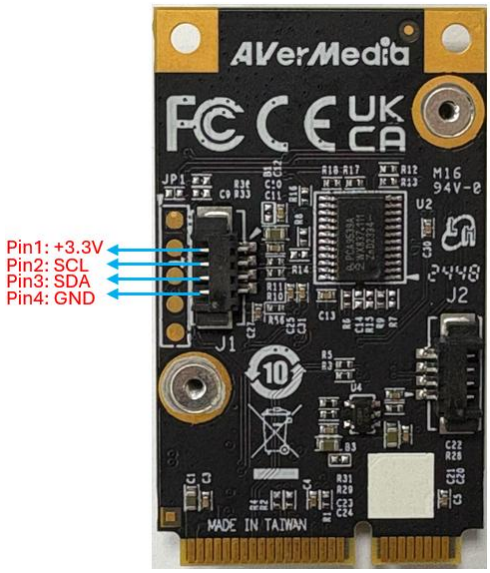
2.1.1 USB Ports

The RTK GNSS module's USB interface allows connection to processor boards with a standard USB 2.0 interface.

Function	Description	
Location	BOT / J2	
Type	1.25mm Pitch WTB Wafer	
Part Number	ACES 50271-0040N-001/SA	
Mating Connector	Mates With: Housing: ACES 50276-004H; Terminal: 85106-T/8520	
Voltage / Current	Input (Max): 5V / 500mA	

2.1.2 I2C Wafer

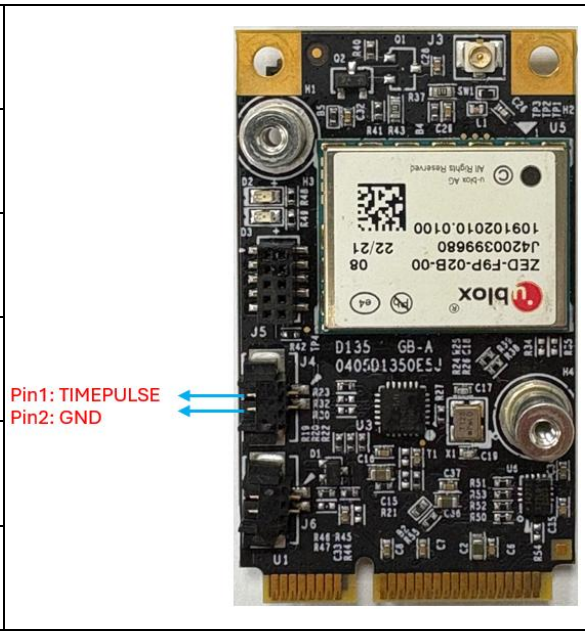
The RTK GNSS module I2C interface allows connection to processor boards with a standard I2C interface. The host system must provide the I2C SDA and SCL pullup resistors.

Function	Description	
Location	BOT / J1	
Type	1.25mm Pitch WTB Wafer	
Part Number	ACES 50271-0040N-001/SA	
Mating Connector	Mates With: Housing: 50276-004H; Terminal: 85106-T/8520	
Voltage / Current	Input (Max): 5V / 500mA	

2.1.3 TIMEPULSE Interface

The F9P timepulse (PPS) output of the base GNSS can be directly connected by connector J4 to a receiver with 1.8V CMOS.

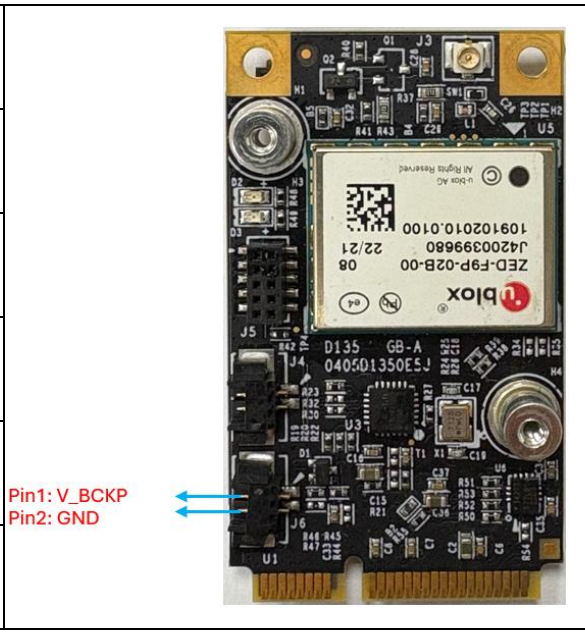
Function	Description
Location	TOP / J4
Type	1.25mm Pitch WTB Wafer
Part Number	ACES 50271-0020N-001/SA
Mating Connector	Mates With: Housing: 50276-002H; Terminal: 85106-T/8520
Voltage / Current	Output (Max): 3.3V / 5A



2.1.4 Backup Supply

The J6 connector enables connection of a backup power supply to the GNSS modules, ensuring that configuration and positioning data are retained when power from the mPCIe or USB interface is disconnected.

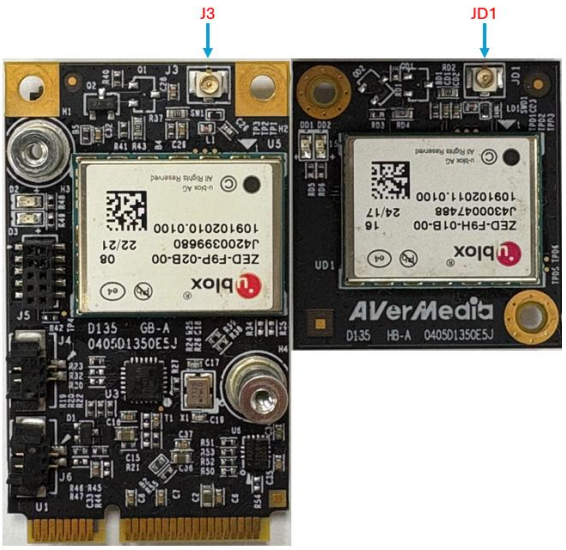
Function	Description
Location	TOP / J6
Type	1.25mm Pitch WTB Wafer
Part Number	ACES 50271-0020N-001/SA
Mating Connector	Mates With: Housing: 50276-002H; Terminal: 85106-T/8520
Voltage / Current	Input (typ): 3.3V / 15uA



2.1.5 Antenna Interface

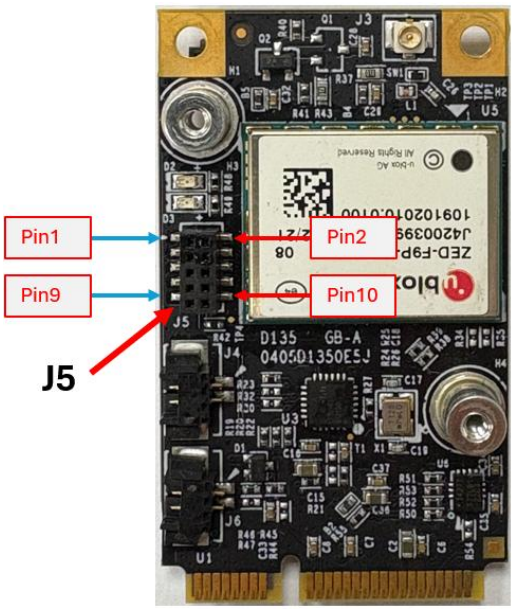
The GNSS antenna is connected via a 50-ohm impedance I-PEX MHF (U.FL-compatible) male connector to the ZED-F9P module at port J3 and to the ZED-F9H module at port JD1.

Function	Description
Location	TOP / J3 & JD1 (50-ohm impedance)
Type	I-PEX MHF
Part Number	N/A
Mating Connector	N/A
Voltage / Current	Output (typ): 3.3V / 300mA



2.1.6 Board to Board connect Pin Definition

The board-to-board connector is used to connect the ZED-F9P and ZED-F9H modules.



J5 Connector pin definition

Pin	Symbol	Type	Description
1	F9H_RTK_STAT	I	Provides an indication of the RTK positioning status
2	+3.3V_GPS	P	Max 500mA
3	F9H_TIMEPULSE	I	F9H_TIMEPULSE Output
4	USB_D+	I/O	USB 2.0 differential data (+)
5	GND	G	
6	USB_D-	I/O	USB 2.0 differential data (-)
7	GNSS_RESET	O	Reset ZED-F9P
8	GND	G	
9	V_BKCP	P	Backup Supply
10	F9P_TX2	O	base and the rover are connected via corresponding UART2 interfaces of the modules.