Antzer Tech
Vehicle Tracking Solution

High Precision GNSS mPCIe Card

ANNA-F9 Series User Manual

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ANTZER TECH CO., LTD.
Website：www.antzer-tech.com
Facebook：www.facebook.com/ANTZERTECH/
Tel：+886-2-7729-9223
Email：sales@antzer-tech.com
Office：7F-7, No.237, Sec. 1, Datong Rd., Xizhi Dist., New Taipei City 221 Taiwan

Important User Information

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Antzer Tech In-Vehicle Cards User Manual

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Change History

Version	Date	Author	Description
1.0	2020/11/25	Haney Huang	First version released

1. Introduction

ANTZER TECH's ANNA-F9 High Precision GNSS Mini-PCIe card integrates u-blox F9 receiver platform providing multi-band GNSS and RTK positioning. ANNA-F9 series offer support for RTCM formatted corrections and centimeter-level positioning from local base stations or from virtual reference stations (VRS) in a Network RTK setup. Moreover, the GNSS module is available to upgrade for future SSR-type correction service which is suitable for mass market penetration.

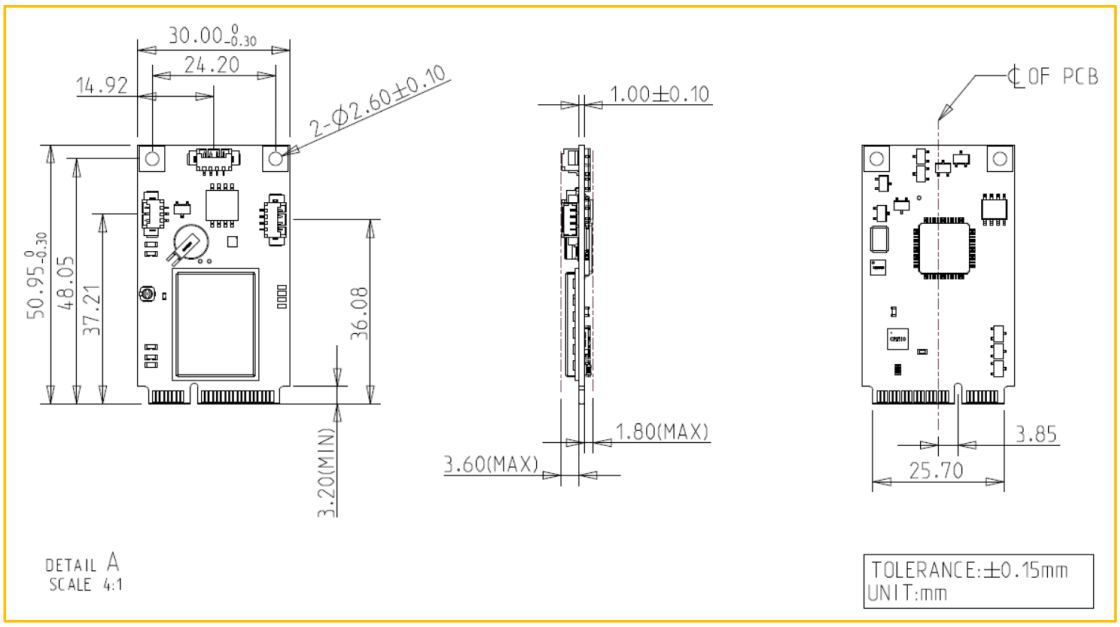
ANNA-F9 series has optional configuration including 3D inertial measurement unit (IMU) which support Dead Reckoning technology: UDR (Untethered Dead Reckoning), ADR (Automotive Dead Reckoning) or Antzer Tech patented CAN-to-ADR solution. ANNA-F9 mini-PCIe card provides optimal positioning accuracy which is the ideal solution for agricultural machinery, heavy trucks and modern autonomous vehicles.

2. Specification

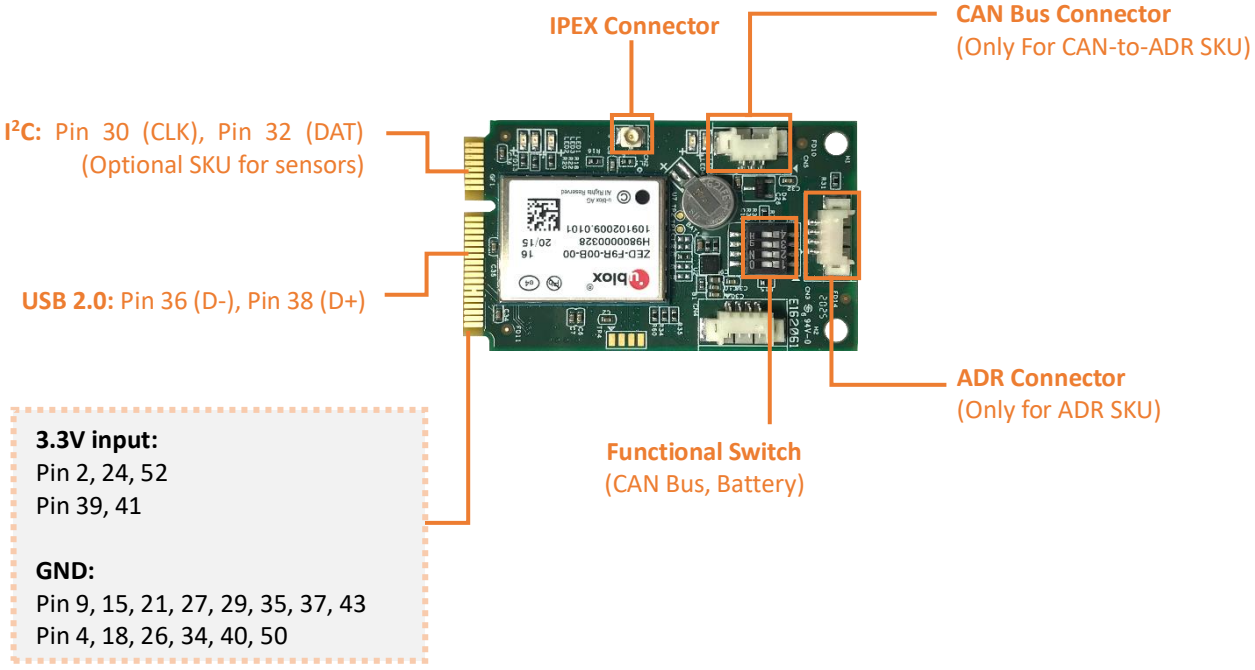
Interface	Form Factor	Full-sized PCI Express Mini Card
	Host Interface	USB 2.0 via PCI Express Mini Card Socket
GNSS	GNSS Module	u-blox ZED-F9P, ZED-F9R
	Receiver Type	184-channel u-blox F9 engine GPS: L1C/A L2C / Glonass: L1OF L2OF / Galileo: E1B/C E5b Beidou: B1I B2I / QZSS L1C/A L1S / SBAS [1] L1C/A
	Position Accuracy (RTK)	ANNA-F9xPx: <0.01m + 1 ppm CEP ANNA-F9xRx: <0.2m + 1 ppm CEP
	Convergence time (RTK)	<10 sec
	GNSS Antenna	External, IPEX connector onboard (Support active antenna)
	Dead Reckoning	Only supported on ANNA-F9xRx: UDR, ADR, CAN-to-ADR
	Input Connector	Wheel-tick and direction inputs for ANNA-F9xRx
CAN/Sensor	Sensor [2]	3D Gyroscope, 3D Accelerometer, 3D Magnetometer
	CAN [3]	Support ISO15765-4 on-board diagnostic or J1939 protocol to get speed from vehicle CAN Bus for CAN-to-ADR application.
Environment	Operating Temp	-40°C ~ 85°C (without Li-Coin Battery) -20°C ~ 60°C (with Li-Coin Battery)
	Vibration Test	Pass 7.69G@ 20~2000Hz, compliant with MIL-STD-810G category 24
	ESD Protection	8kV Contact, 15kV air
	Certification	CE, FCC Class B
Dimension	L x W x H	50.9 x 30 x 6.45mm

[1] SBAS is only supported on ANNA-F9xPx
[2] Sensor on ANNA-F9xPx default with Host PC through SMBus on mPCIe Socket, whereas the USB interface is designed for ANNA-F9xRx.
[3] Only supported on ANNA-F9xRx for CAN-to-ADR application

3. Dimensions



4. Connectors and Pin Assignment



4.1. GNSS IPEX Antenna Connector

Coaxial cable connector: 3 pin,180°, Female, 3V, SMD
Manufacture part number: U.FL-R-SMT-1(10), Hirose

4.2. ADR Connector (only for the SKU with ZED-F9R)

WAFER BOX, 1x4 pin, pitch:1.25mm, 90 O, Male, SMD
Manufacture part number: CI4404M1HR0-NH, CviLux

4.3. CAN Bus Connector (only for the SKU with ZED-F9R)

WAFER BOX, 1x3 pin, pitch:1.25mm, 90°, Male, SMD
Manufacture part number: CI4403M1HR0-NH, CviLux

4.4. Functional Switch

- **SW #1:** Reserved
- **SW #2:** Back-up Battery ON/OFF (Default: OFF)
- **SW #3:** CAN bus Tx ON/OFF (Default: ON)
- **SW #4:** CAN bus Terminal Resistor (Default: OFF)

***Please turn SW#2 on before assembly to enable the back-up battery.*

5. Back-up Battery for GNSS module

Lithium Rechargeable Battery, 5mAh, 3V
Manufacture part number: MS621FE, Seiko

- The modified settings of the GNSS module remain effective until power-down or reset. If these settings have been stored in BBR (Battery Backed RAM), then the modified configuration will be retained, as long as the backup battery supply is not interrupted.
- To prevent over-discharge without the main power of the card, the battery will be turned off by default. Please turn the SW#2 to be "ON" before use. Once the card was removed from the host PC, please turn the SW#2 to be "OFF".

6. Connection between ANNA-F9 and the Host PC

There is an UART-to-USB bridge IC (2 channels) on ANNA-F9 card. Therefore, you will find two COM ports shown on the Host PC.

Please find the default settings of the card below:

- **Windows:** Enhanced COM Port / **Linux:** ttyUSB0
  - ✧ Default COM port baud rate: 921600 bps
  - ✧ NEMA data, ADR commands, UBX commands
- **Windows:** Standard COM Port / **Linux:** ttyUSB1
  - ✧ Default COM Port baud rate: 38400 bps
  - ✧ RTCM 3.3 (GNSS correction data)

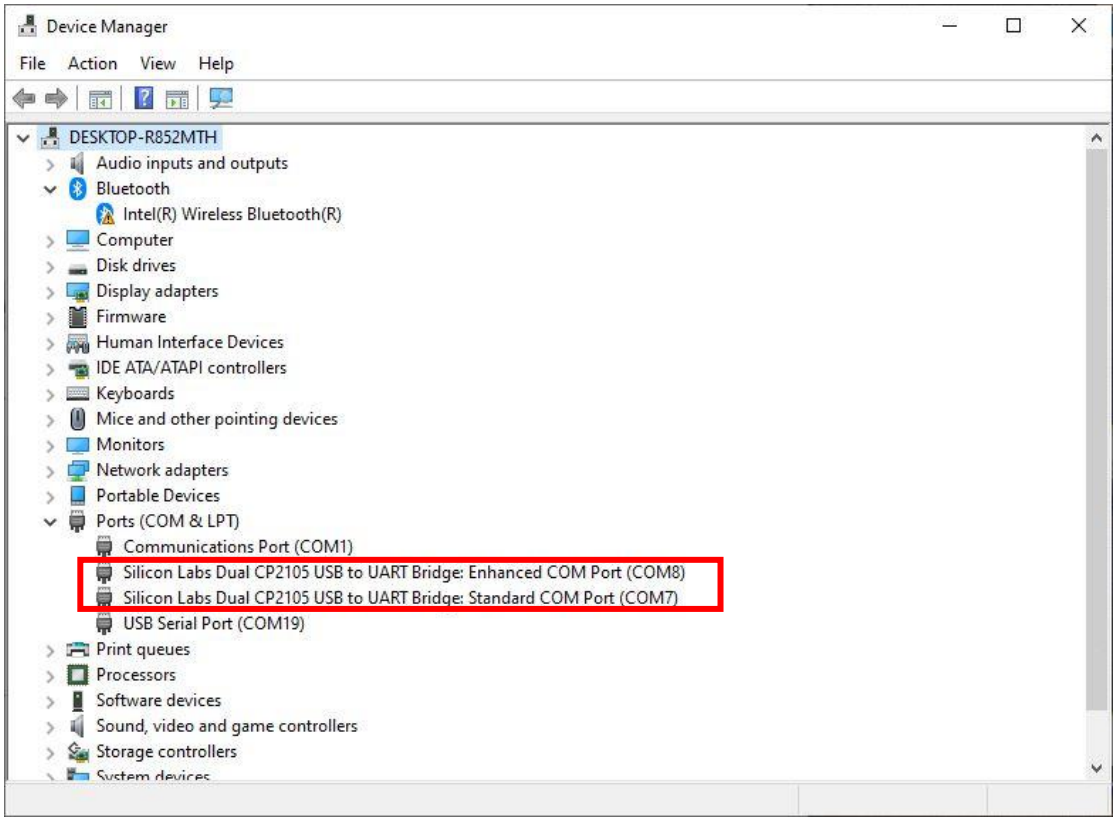
7. Driver

We use CP210x UART to USB bridge IC on our card.

- **Windows driver:**
  Please download the driver from the official website of Silicon Labs:
  https://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers

- **Linux driver:**
  The driver is already included in Ubuntu 14.04 and later.
  The Linux 3.x.x and 4.x.x version of the driver is maintained in the current Linux 3.x.x and 4.x.x tree at www.kernel.org.

- **Find the COM port of the GNSS module:**
  As mentioned in the Chapter 6. The GNSS module is connected to Host PC through "Standard COM Port" and "Enhanced COM Port".



- **Fix the COM port number on your PC:**
  If it is necessary, please execute CP21xWR patch provided by Antzer Tech after the driver installation to fix the COM port number on your PC.

8. Reliability Specifications

8.1. Environmental

Environment	Specifications
Temperature	Operating: -40°C to 85°C (without Li-Coin Battery) Operating: -20°C to 60°C (with Li-Coin Battery)
Vibration	Operating: Random, 7.69(Grms), 20~2000(Hz) Compliant with MIL-STD-810G

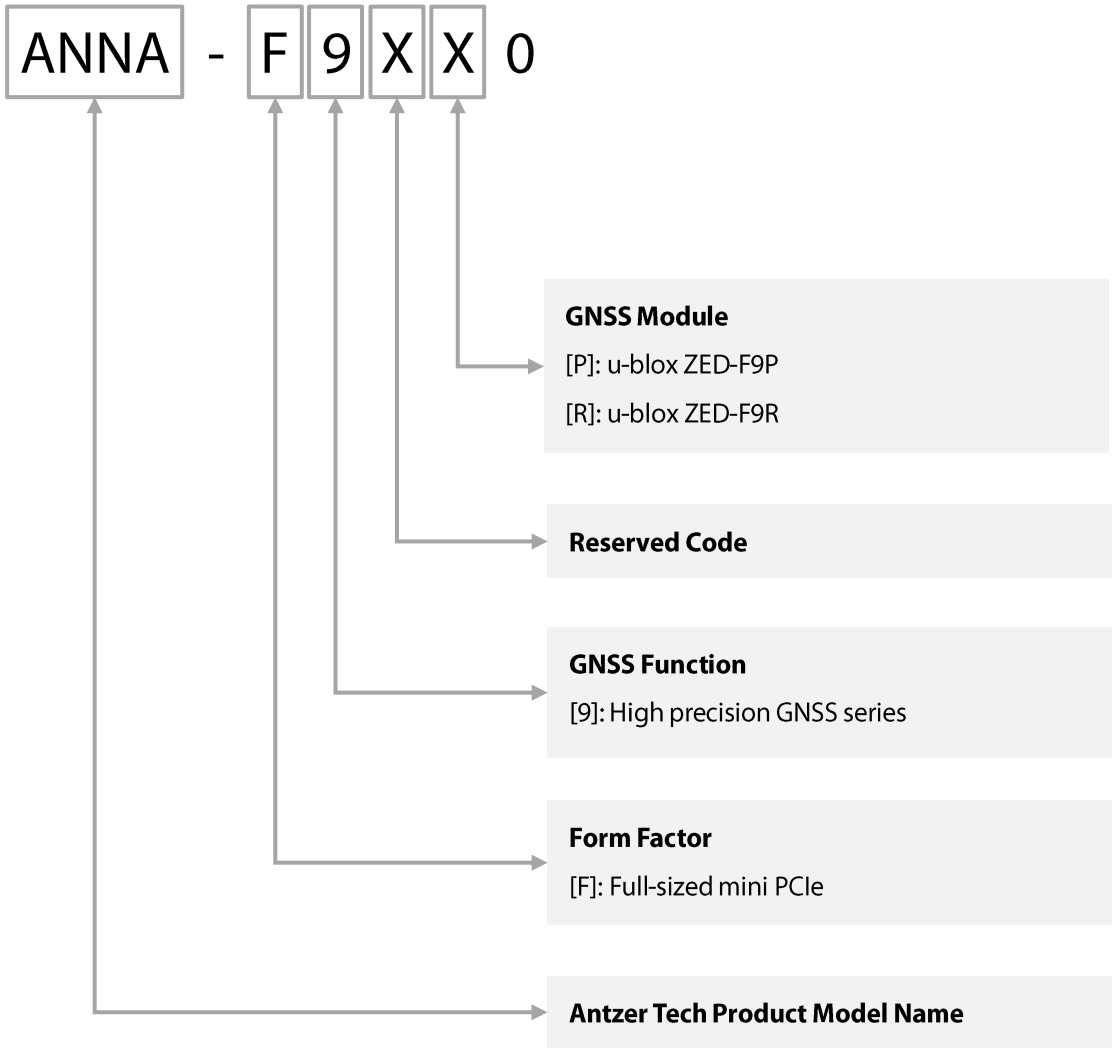
8.2. Certification and Compliance

The ANNA-F9 series product complies with the following standards:

- CE
- FCC
- RoHS
- MIL-STD-810G Vibration Compliant

9. Ordering Information

9.1. Naming Rules



9.2. Part Number

Model Name	Description
ANNA-F90P0	ZED-F9P, Full-Sized Mini-PCIe Card, Gyroscope, Accelerometer, Magnetometer
ANNA-F90R0	ZED-F9R, Full-Sized Mini-PCIe Card, Gyroscope, Accelerometer, Magnetometer with DR function

10. Reference Documents

- **[GNSS Correction Data]**

  The document demonstrates how to receive RTCM correction data through internet protocol using u-center.

- **[Antzer Tech DR Calibration Instructions]**

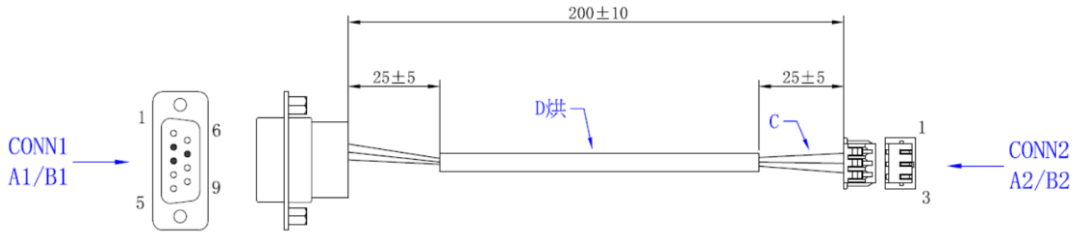
  To enter DR mode, please follow the instructions in the document.

- **[CAN-to-ADR Test Guidelines]**

  Please follow the guidelines to enable Antzer Tech's CAN-to-ADR function.

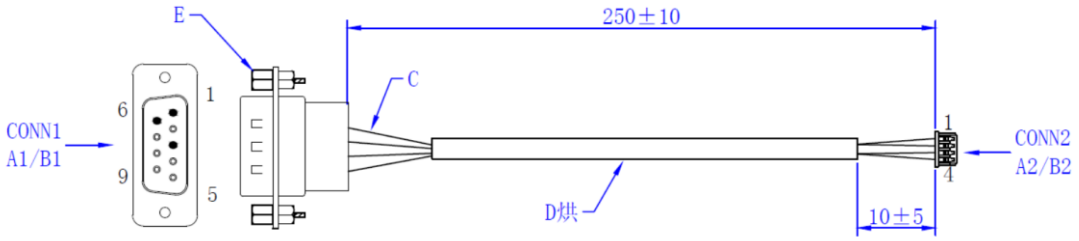
Appendix A Optional Cable & Accessory

- Cable: T1700000032 (For **CAN-to-ADR** Application)
  ANNA CAN bus cable, Box Header 3P to DB9 (Male) Cable, 1 ch CAN, 200mm



CONN1			CONN2
PIN No.	**FUNCTION**	**COLOR**	**PIN No.**
2	CAN_Low	BROWN	2
3	GND	BLACK	3
7	CAN_High	RED	1

- Cable: T1700000021
  ADR Cable for ANNA-F, Wafer Box 1.25mm to D-SUB 9 Pin Male, ADR 250mm



CONN1			CONN2
PIN No.	**FUNCTION**	**COLOR**	**PIN No.**
1	Wheel-tick Signal	RED	3
3	GND	BLACK	4
6	Reverse Signal	BROWN	2