GNSS mPCIe/M.2 Cards

ANNA Series User Manual

Version 1.3
Dec 22, 2020

ANNA-M Series

M.2 2242 B key

ANNA-F Series

Mini PCIe

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Antzer Tech In-Vehicle Cards User Manual

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Change History

Version	Date	Author	Description
1.0	2020/7/6	Haney Huang	First version release
1.1	2020/7/13	Haney Huang	Added driver information to the document
1.2	2020/7/16	Haney Huang	Fixed the typo in Chapter 8.2
1.3	2020/12/22	Haney Huang	1. Updated the SKU in ordering information 2. Modified the naming rules 3. Added cable P/N in Appendix A

1. Introduction

ANTZER TECH's ANNA Mini-PCIe/M.2 card integrates high performing u-blox M8 module that have concurrent reception of up to 3 GNSS (GPS/Galileo together with GLONASS or BeiDou). ANNA series has optional configurations which support Dead Reckoning Technology: UDR (Untethered Dead Reckoning), ADR (Automotive Dead Reckoning) or Antzer Tech patented CAN-to-ADR solution [*]. ANNA Mini-PCIe/M.2 card provides outstanding positioning accuracy which is the ideal solution for industrial and automotive applications.

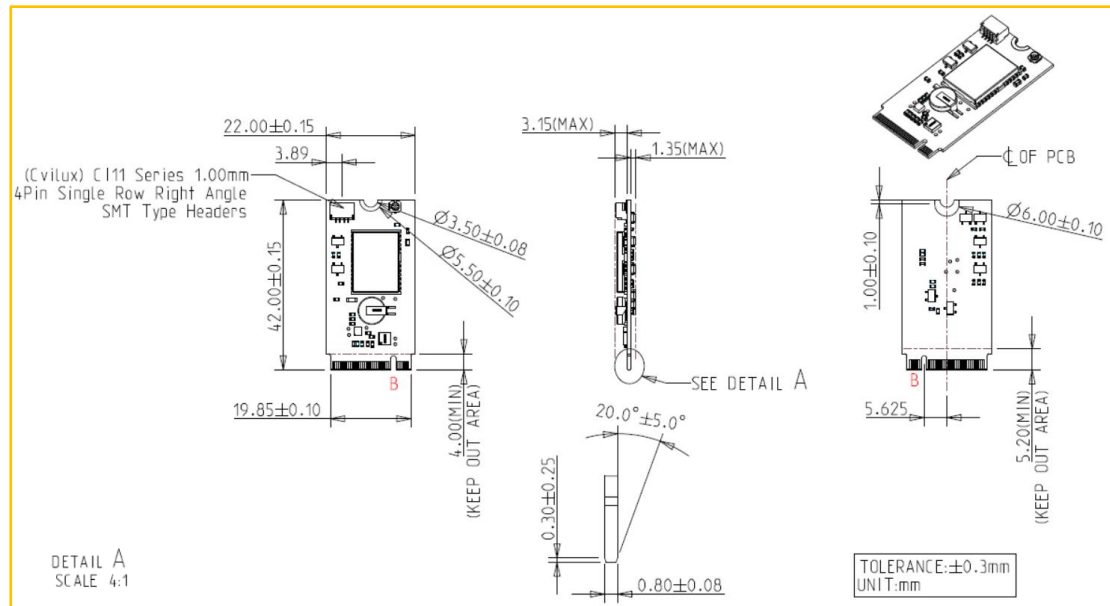[*] The CAN-to-ADR function is only available on ANNA-F (Mini-PCIe) series.

2. Specification

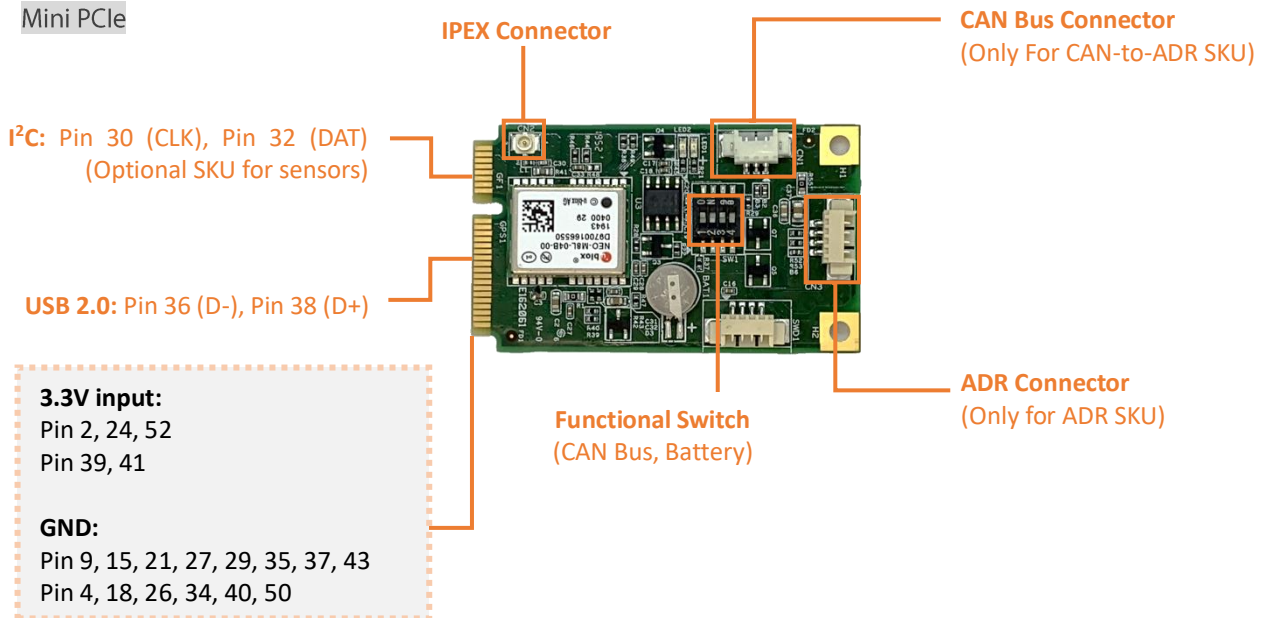| Interface	Form Factor	**ANNA-F/H:** Full/Half Sized PCI Express Mini Card **ANNA-M:** M.2 2242 B-Key
	Host Interface	USB 2.0 via PCI Express Mini Card Socket / M.2 B-key * Optional SKU with sensors via I²C interface
GNSS	GNSS Module	u-blox NEO-M8N, NEO-M8U, NEO-M8L
	Receiver Type	72-channel u-blox M8 engine Concurrent reception of up to 3 GNSS (GPS, Galileo, GLONASS, BeiDou)
	Position Accuracy	2.0m CEP
	Dead Reckoning	UDR / ADR / CAN-to-ADR (only for ANNA-F series)
	Quick Hot Start	Supported (Li-Coin Battery is Required)
	GNSS Antenna	External, IPEX connector onboard (Default Support Active Antenna) * Optional SKU for Passive Antenna
	Input Connector	Wheel-tick and Direction Inputs for the ADR SKU
CAN/Sensor	Sensor (Optional SKU)	3D Gyroscope 3D Accelerometer
	CAN (Only for CAN-to-ADR SKU)	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

3. Dimensions

3.1. ANNA-F Series (Mini PCIe)
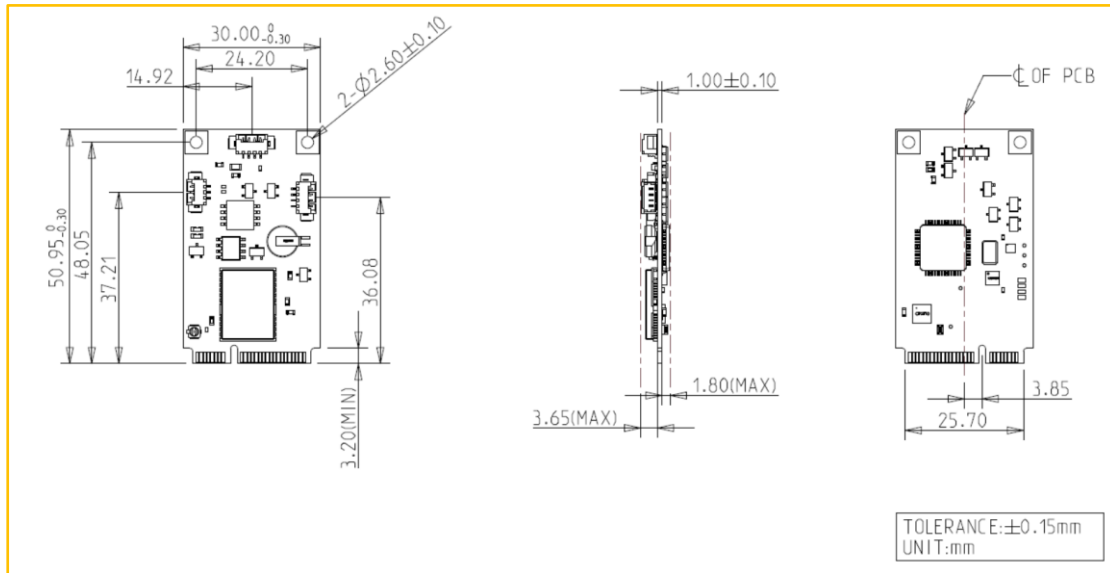
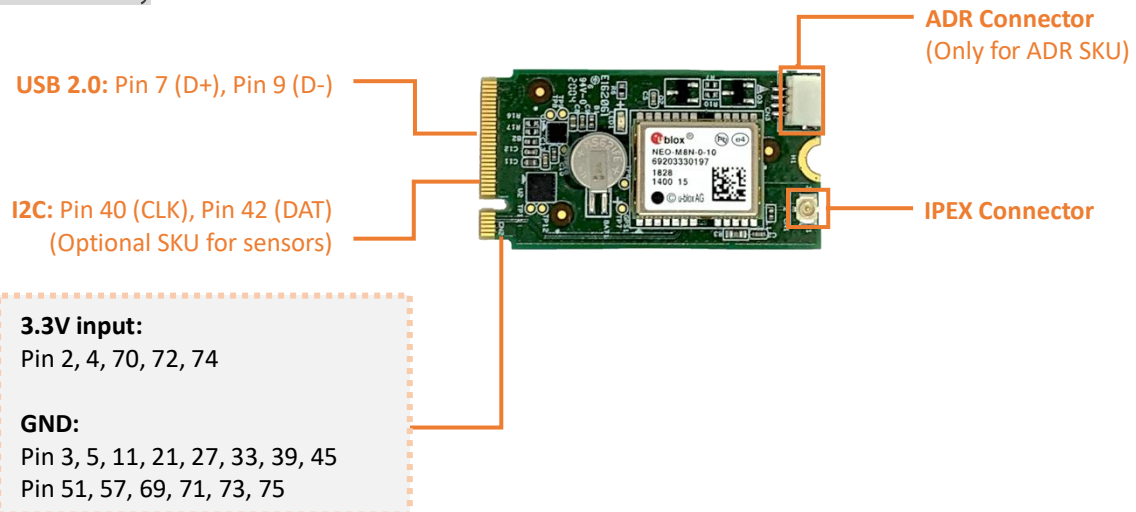## 3.2. ANNA-M Series (M.2 2242 B-key)

4. Connectors and Pin Assignment

ANNA-F Series

Mini PCIe

IPEX Connector

CAN Bus Connector
(Only For CAN-to-ADR SKU)

I²C: Pin 30 (CLK), Pin 32 (DAT)
(Optional SKU for sensors)

USB 2.0: Pin 36 (D-), Pin 38 (D+)

3.3V input:
Pin 2, 24, 52
Pin 39, 41

GND:
Pin 9, 15, 21, 27, 29, 35, 37, 43
Pin 4, 18, 26, 34, 40, 50

Functional Switch
(CAN Bus, Battery)

ADR Connector
(Only for ADR SKU)

ANNA-M Series

M.2 2242 B key

ADR Connector
(Only for ADR SKU)

USB 2.0: Pin 7 (D+), Pin 9 (D-)

I2C: Pin 40 (CLK), Pin 42 (DAT)
(Optional SKU for sensors)

IPEX Connector

3.3V input:
Pin 2, 4, 70, 72, 74

GND:
Pin 3, 5, 11, 21, 27, 33, 39, 45
Pin 51, 57, 69, 71, 73, 75

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 NEO-M8L)

- **ANNA-F Series:**
  WAFER BOX, 1x4 pin, pitch:1.25mm, 90°, Male, SMD
  Manufacture part number: CI4404M1HR0-NH, CviLux

- **ANNA-M Series:**
  WAFER BOX, 1x4 pin, pitch:1.0mm, 90°, Male, SMD
  Manufacture part number: CI1104M1HR0-NH, CviLux

4.3. CAN Bus Connector (only for ANNA-F series with NEO-M8L)

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

4.4. Functional Switch (only for ANNA-F series)

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

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.

- With the default setting of SW2 to be "ON", our card will enable the battery when main power is connected. After enabled, the battery might over-discharge without the main power of the card if you store it for a long time. To prevent that, after the main power is removed, turn the SW2 from "ON" to "OFF" and then switch back to "ON" before storage. The battery will not be enabled until power-up.

6. 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:**
  The GNSS module is connected to Host PC through "Standard COM Port".
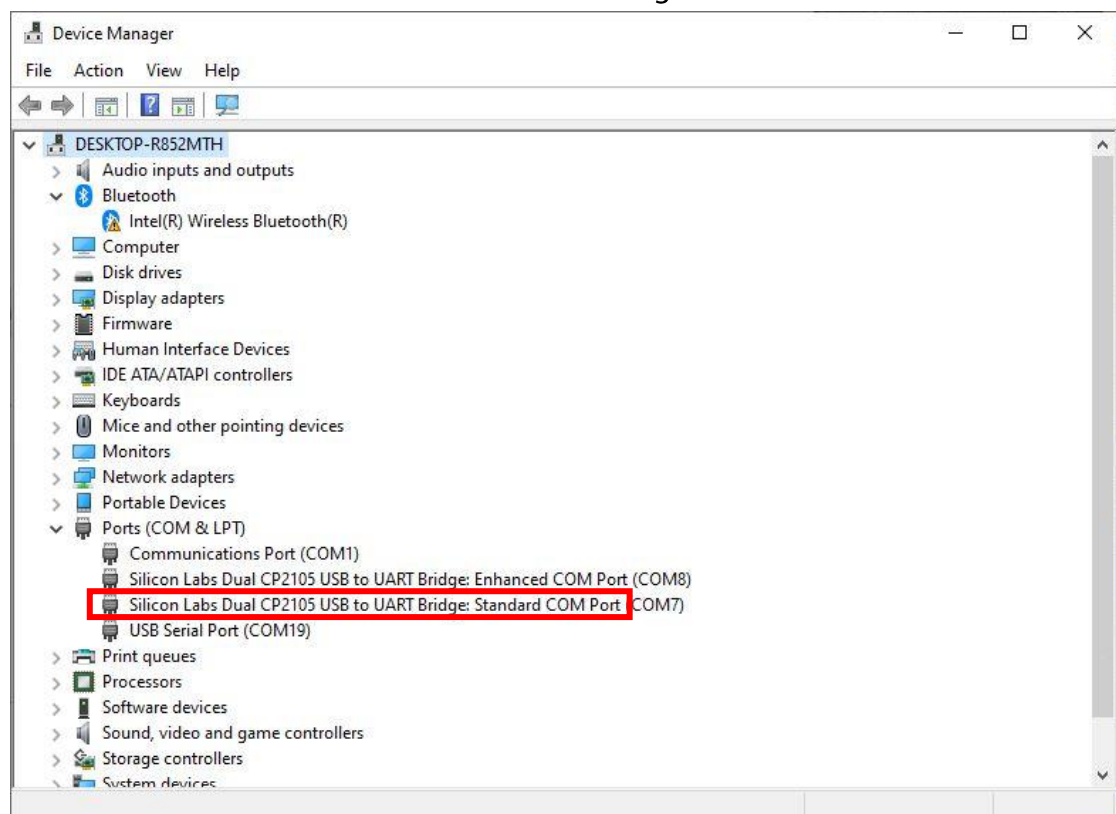
- **Fix the COM port number on your PC:**
  If it is necessary, please execute CP21xWR patch provided by Antzer Tech after
  the driver installation to fix the COM port number on your PC.

7. Reliability Specifications

7.1. Environmental

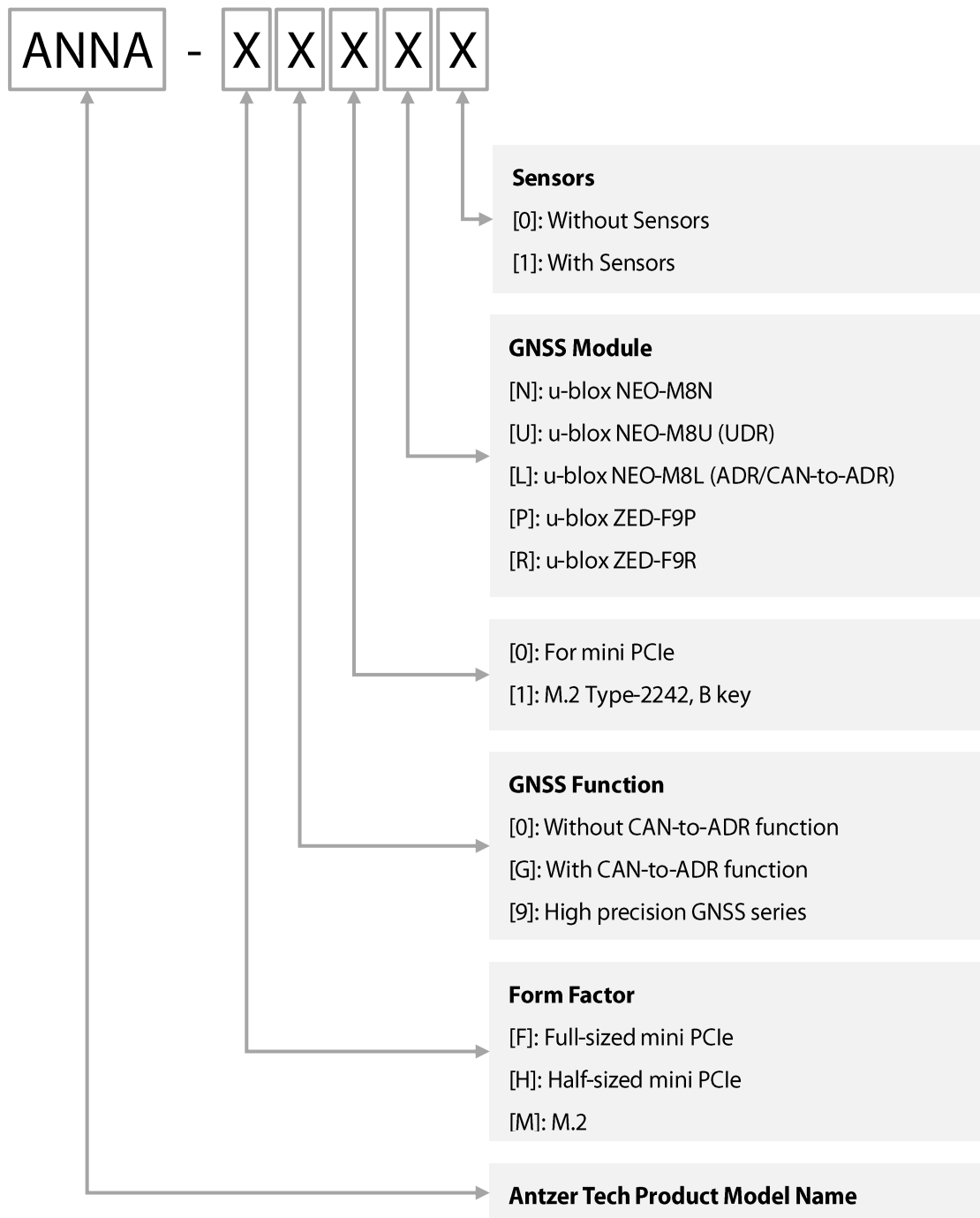| Environment	Specifications
Temperature	Operating: -40°C to 85°C (without Li-Coin Battery)
	Operating: -20°C to 60°C (with Li-Coin Battery)
Vibration	Operating: Random, 7.69(Grms), 20~2000(Hz)
	Compliant with MIL-STD-810G

7.2. Certification and Compliance

The ANNA series product complies with the following standards:

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

8. Ordering Information

8.1. Naming Rules

ANNA - X X X X X

Sensors

[0]: Without Sensors

[1]: With Sensors

GNSS Module

[N]: u-blox NEO-M8N

[U]: u-blox NEO-M8U (UDR)

[L]: u-blox NEO-M8L (ADR/CAN-to-ADR)

[P]: u-blox ZED-F9P

[R]: u-blox ZED-F9R

[0]: For mini PCIe

[1]: M.2 Type-2242, B key

GNSS Function

[0]: Without CAN-to-ADR function

[G]: With CAN-to-ADR function

[9]: High precision GNSS series

Form Factor

[F]: Full-sized mini PCIe

[H]: Half-sized mini PCIe

[M]: M.2

Antzer Tech Product Model Name

8.2. Part Number

Form Factor GNSS Feature	ANNA-F/H Series		ANNA-M Series	
	Mini PCIe		M.2 2242 B-Key	
	w/o Sensors	w/ Sensors [1]	w/o Sensors	w/ Sensors [3]
Standard	ANNA-H00N0 ANNA-F00N0	ANNA-H00N1 ANNA-F00N1	ANNA-M01N0	ANNA-M01N1
UDR	ANNA-H00U0 ANNA-F00U0	ANNA-H00U1 ANNA-F00U1	ANNA-M01U0	ANNA-M01U1
ADR		ANNA-F00L1	ANNA-M01L0	ANNA-M01L1
CAN-to-ADR		ANNA-FG0L1 [2]		

[1]
The default interface of the sensors is I2C on the mPCIe socket. Please contact our sales representative if you need the SKU with USB 2.0 interface for the sensors.
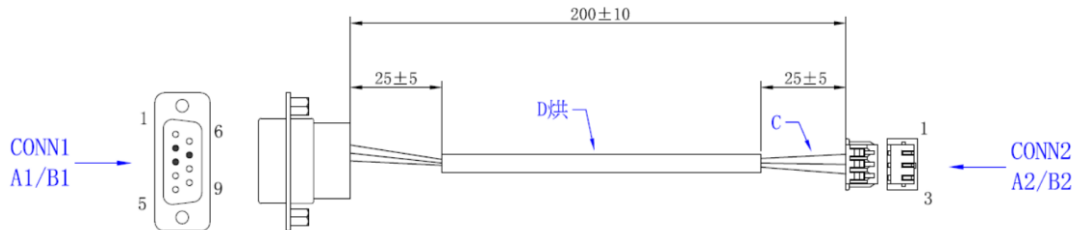
[2]
For the SKU with CAN-to-ADR function, the default interface of the sensors would be USB 2.0 on the mPCIe socket.

[3]
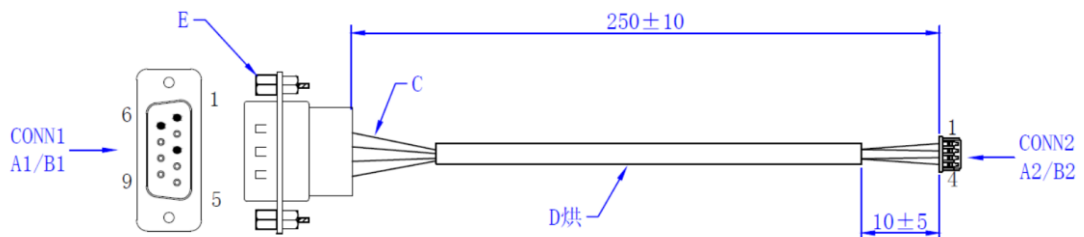The interface of the sensors is I2C on the M.2 socket.

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
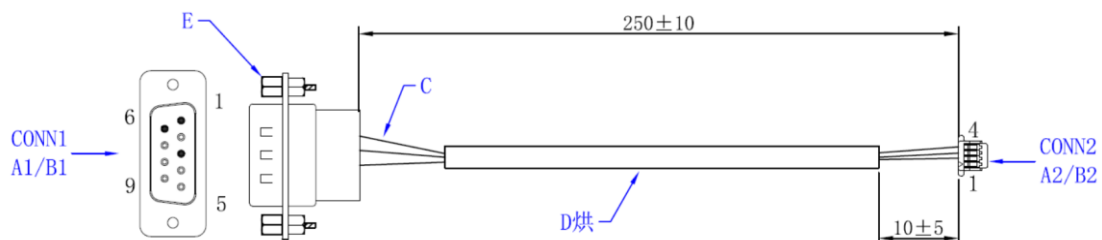

CONN1			CONN2
PIN No.	FUNCTION	COLOR	PIN No.
2	CAN_Low	BROWN	2
3	GND	BLACK	3
7	CAN_High	RED	1

- 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

- Cable: T1700000035
  ADR Cable for ANNA-M, Wafer Box 1.0 mm 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