NarinFC-H7E

Manual

1. Overview

1.1 Introduction

This product is a high-reliability embedded control system that integrates a flight controller, which executes high-precision flight control algorithms, and a mission computer, dedicated to secure data processing and heterogeneous network communication, into a hybrid single-board architecture.

Conventional drone and ground robot systems exhibit structural vulnerabilities to security threats, such as data interception and tampering, when transmitting flight control and payload data wirelessly via a companion computer. To overcome these limitations, this integrated system is engineered to simultaneously achieve physical weight reduction through hardware integration and robust data security based on software encryption.

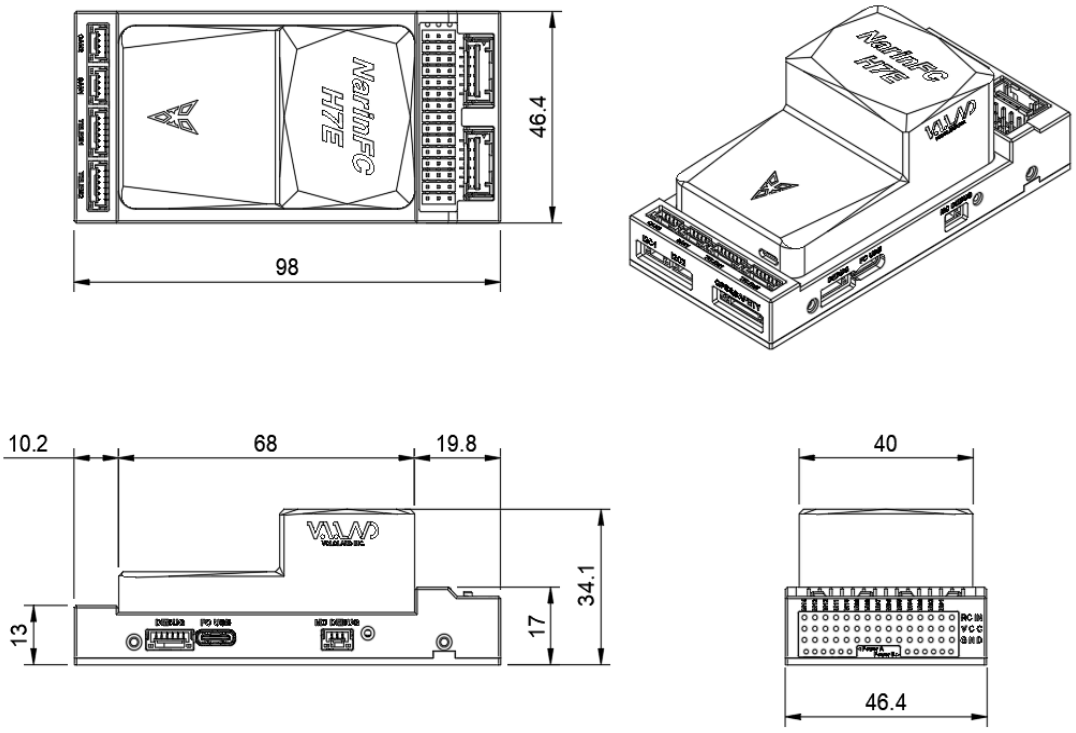
1.2 Key Features

To ensure flexible transmission of encrypted secure data to external devices or wireless modems, the system provides a physical configuration of one Gigabit Ethernet (Gb Ethernet) port and two USB 2.0 ports as standard interfaces. This setup enables a direct connection to LTE/5G modems or dedicated wireless data-link equipment equipped with encryption capabilities.

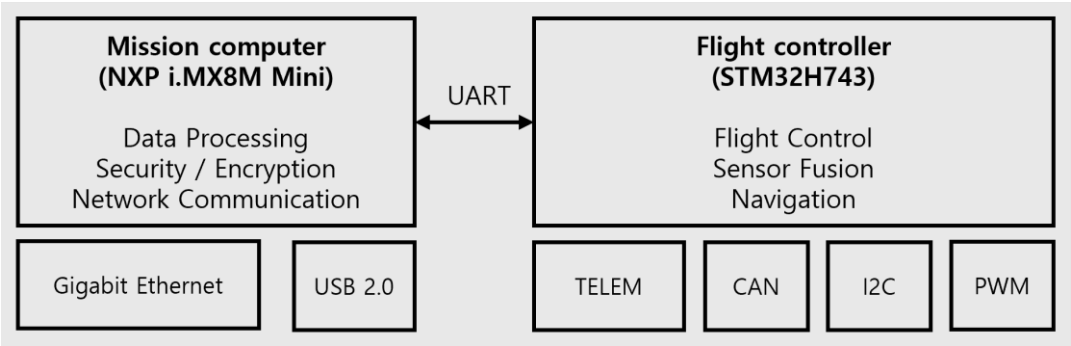
2. Basic Parameters

Category	Item	Description
Flight controller	Main Processor	STM32H743
	On-board sensor	Accelerometer/Gyroscope: ADIS16470 Accelerometer/Gyroscope: ICM-20649 Accelerometer/Gyroscope: BMI088 Magnetometer: RM3100 Barometer: MS5611*2
	Interfaces	14 PWM Output Support multiple RC inputs (S.Bus / CPPM / DSM) Telem1, Telem2 GPS 1-ports I2C 2-Port CAN1, CAN2 2-Port Power 2-Port USB 1-Port
Mission Computer	Main Processor	NXP I.MX 8M Mini Primary Arm® Core (4x Cortex®-A53 up to 1.6 GHz) Secondary Arm® Core (1x Cortex-M4F up to 400 MHz)
	System memory	1GB DDR3L RAM / 4GB eMMC ROM
	Interfaces	Gigabit Ethernet 1-Port USB 2.0 2-Port USB OTG 1-Port Debug UART 1-PORT
Power & Environment	Input Power	Main Power 4.3V ~5.4V (Dual Input) USB 4.75V ~ 5.25V
	Operating Temp	-25℃ ~ +85℃
	Weight	TBD

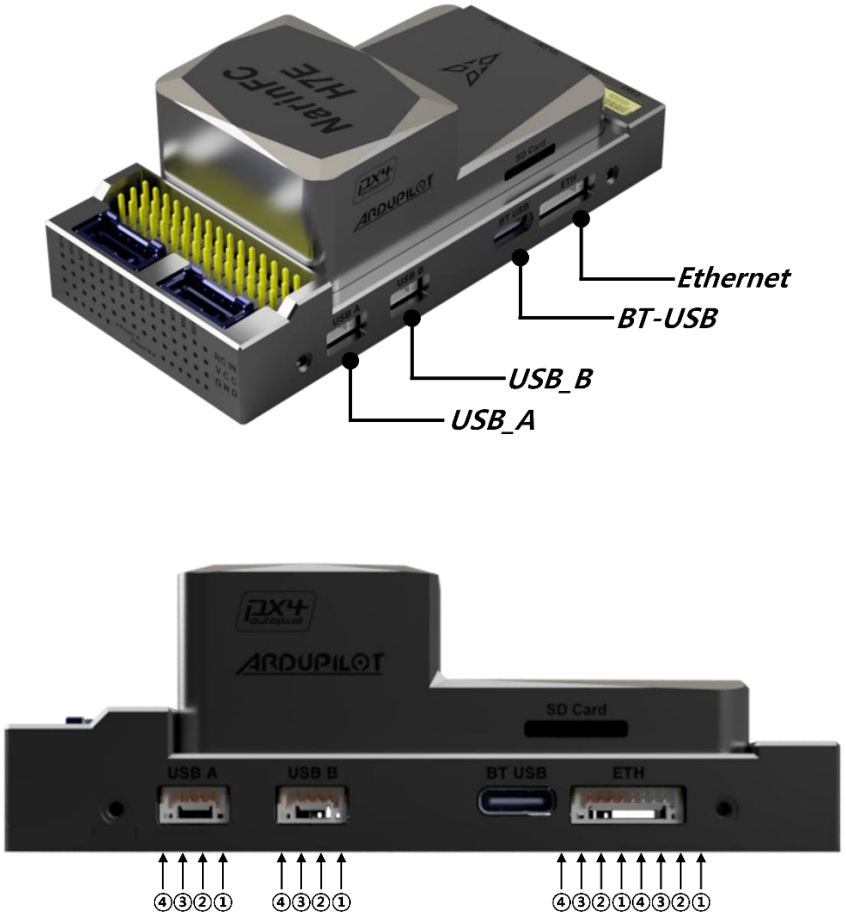
3. Outline Dimensions



4. System Architecture



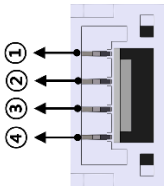
5. Port Diagram & Pin outs -1



[Port Diagram-A]

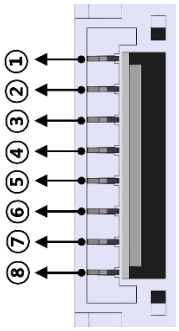
5.1 USB-A, USB-B Port (JST GH 4P Connector)

• USB 2.0 Port (USB-A, USB-B)

Connector	No.	Description
	①	5VDC Output
	②	USB_D_P
	③	USB_D_N
	④	GND

5.2 Ethernet Port (JST GH 8P Connector)

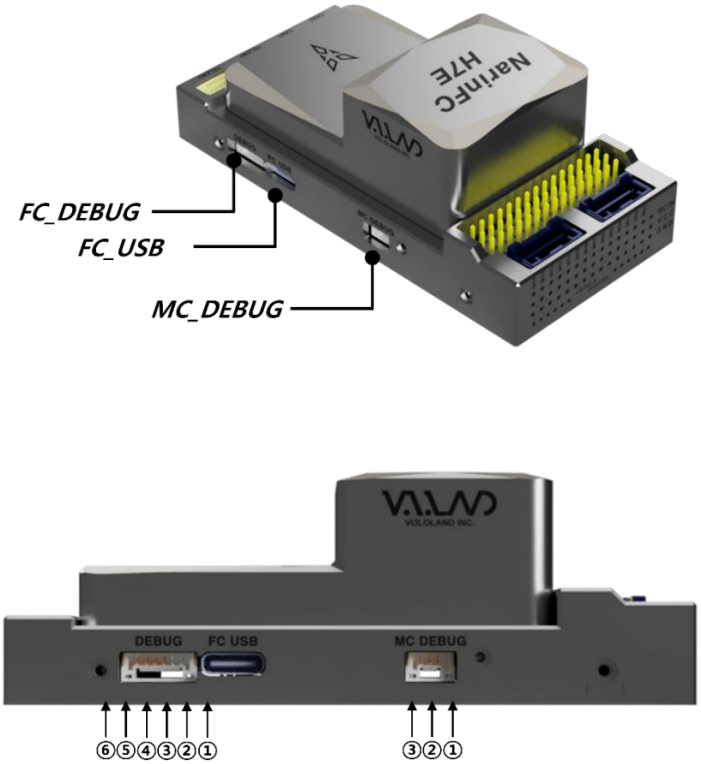
• Gigabit Ethernet Port

Connector	No.	Description
	①	ETH0_P
	②	ETH0_N
	③	ETH1_P
	④	ETH1_N
	⑤	ETH2_P
	⑥	ETH2_N
	⑦	ETH3_P
	⑧	ETH3_N

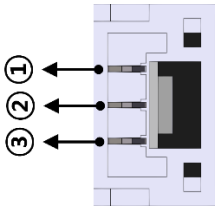
5.3 BT-USB Port (USB-C Port)

- Default Device Mode: Used for downloading system firmware targets and debugging.
  i. Flashing firmware and updating the kernel image of the Mission Computer's (MC) internal operating system.
- Host Mode: Reserved for connecting external communication modems for secure data transmission.

5. Port Diagram & Pin outs -2

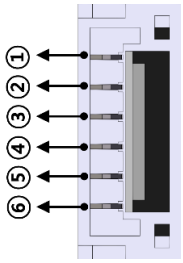


5.4 MC_DEBUG Port (JST GH 3P Connector)

Connector	No.	Description
	①	Debug UART1_TX
	②	Debug UART1_RX
	③	GND

- **System Monitoring:** Provides real-time output of OS boot logs and kernel messages.
  - i. **Real-Time Boot Log Output:** Displays U-BOOT and kernel messages in real time during system boot.
  - ii. **System Error Monitoring:** Monitors system errors and anomalies that occur during runtime operation.
- **Console Access:** Provides a serial terminal interface.

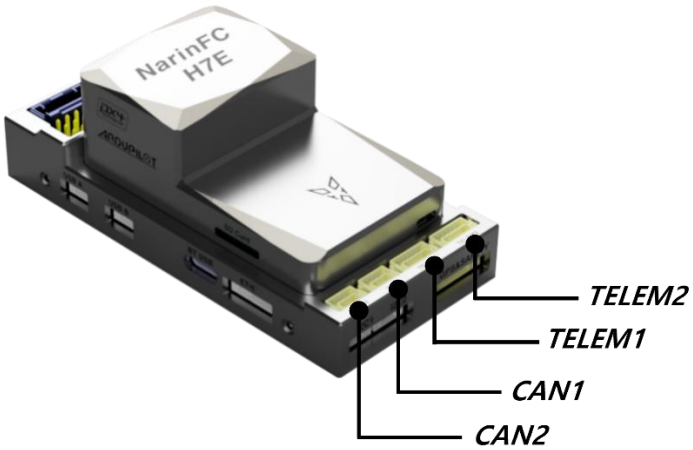
5.5 FC_DEBUG Port (JST GH 3P Connector)

Connector	No.	Description
	①	5VDC Output
	②	Debug UART TX
	③	Debug UART RX
	④	SWDIO
	⑤	SWCLK
	⑥	GND

5.6 FC_USB (USB-C Port)

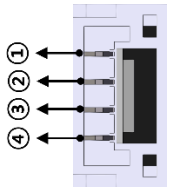
- **Firmware Management:** Uploading and updating firmware.
- **System Configuration:** Connecting to the GCS (Ground Control Station) and configuring flight parameters.
- **Device Diagnostics:** Real-time sensor streaming and status monitoring.

5. Port Diagram & Pin outs -3



5.7 CAN1, CAN2 Port (JST GH 4P Connector)

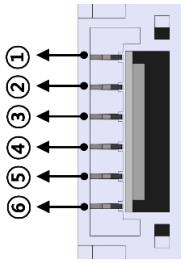
• Enables connection to UAVCAN devices such as CAN GPS.

Connector	No.	Description
	①	5VDC Output
	②	CAN_H
	③	CAN_L
	④	GND

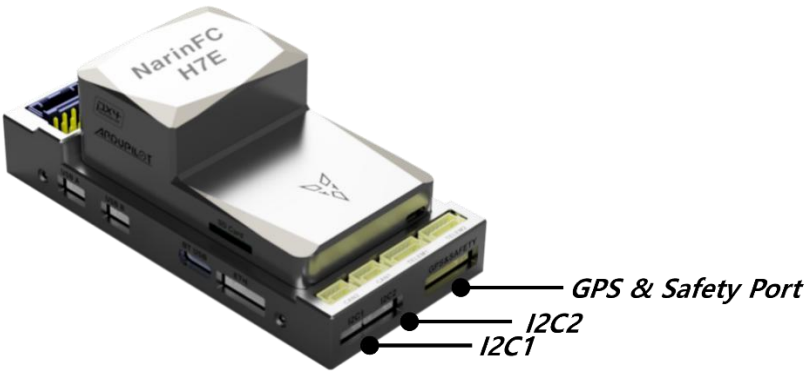
5.8 TELEM1, TELEM2 Port (JST GH 6P Connector)

• Enables connection to telemetry systems.

• TELEM1 = SERIAL1(MAVLINK 2 Default), TELEM2 = SERIAL2(MAVLINK 2 Default)

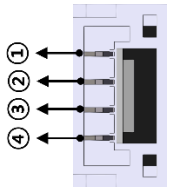
Connector	No.	Description
	①	5VDC Output
	②	TELEM_TX
	③	TELEM_RX
	④	TELEM_CTS
	⑤	TELEM_RTS
	⑥	GND

5. Port Diagram & Pin outs -4



5.9 I2C1, I2C12 Port (JST GH 4P Connector)

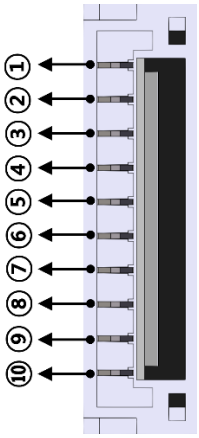
• Enables connection to I2C devices such as an external compass.

Connector	No.	Description
	①	5VDC Output
	②	SCL
	③	SDA
	④	GND

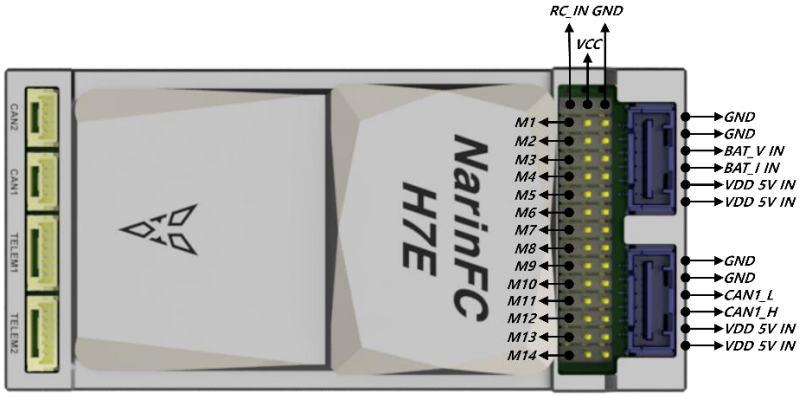
5.10 GPS & Safety Port (JST GH 4P Connector)

• Enables connection to a GPS that utilizes UART and includes an integrated safety switch.

• GPS & Safety port = SERIAL3 = USART1

Connector	No.	Description
	①	5VDC Output
	②	GPS1_TX
	③	GPS1_RX
	④	GPS_SCL1
	⑤	GPS_SDA1
	⑥	SAFETY_SW
	⑦	SAFETY_LED
	⑧	SAFETY_VCC
	⑨	BUZZER
	⑩	GND

5. Port Diagram & Pin outs -5



5.11 PWM Port (2.54mm pitch Dupont Connector)

- Provides PWM outputs and an RC IN port to connect the remote-control receiver.
- Does not supply separate power to the controller.

5.12 Power Input Port (Molex 502443-0670 Connector)

- Features a dual-input configuration for the device power supply port.

No.	Input 1	Input 2
①	VDD_5V IN	VDD_5V IN
②	VDD_5V IN	VDD_5V IN
③	CAN1_H	BATT I IN
④	CAN1_L	BATT V IN
⑤	GND	GND
⑥	GND	GND