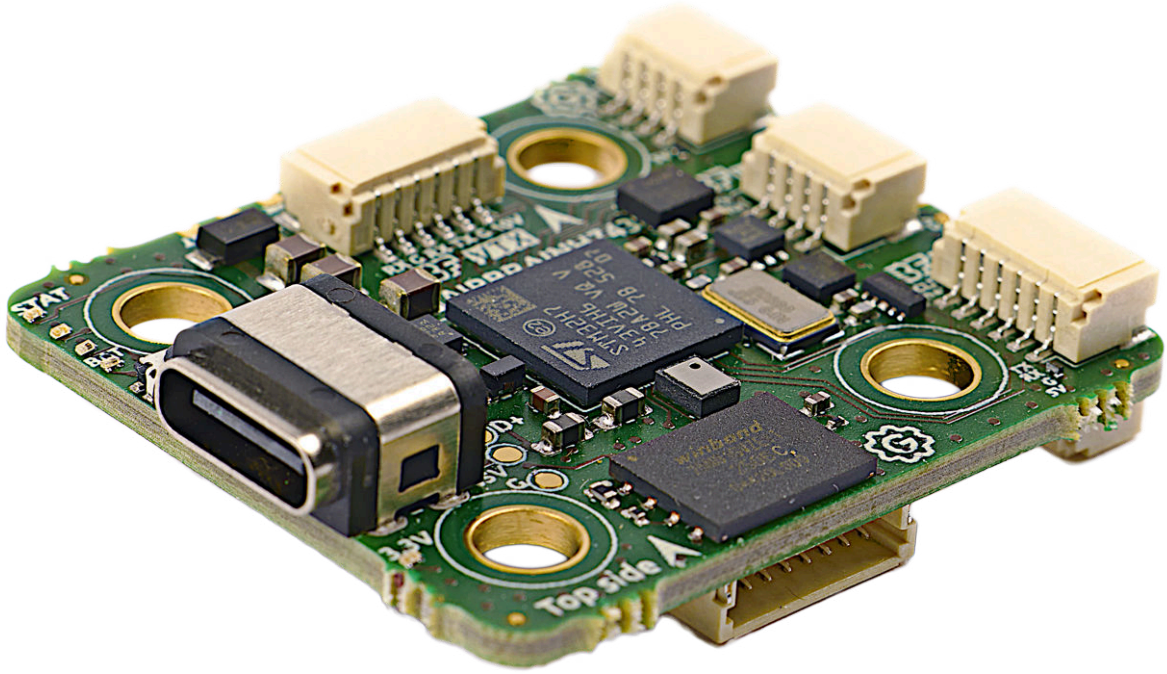


EU-BUILT FLIGHT CONTROLLER

AirBrain H743.

Any firmware. Every mission.

Compact 20×20 flight controller built around the STM32H7. Synchronised with an TDK IMU IMU for low-latency, low-noise flight on Betaflight, ArduPilot, and PX4.

NDAA compliant | Made in Belgium | STM32H7 | TDK IMU | 20 × 20 mm | 3-10S

MCU STM32H7, 480 MHz	**MOUNTING** 20 × 20 mm, 4 × M3
BOARD 36 × 31 × 10 mm	**PINOUT** Betaflight standardised

AT A GLANCE

Differentiators

FIRMWARE LANES

3 stacks

Upstream target in Betaflight, ArduPilot, and PX4. No vendor lock-in.

NDAA COMPLIANT

100% EU sourced

Belgian assembly, trusted EU supply chain.

CLOCK-SYNCED IMU

0 drift

MCU clock drives the TDK IMU. No software interpolation between sample and PID.

WIDE INPUT RANGE

3-10S 10-42 V

Same board across compact race builds and heavy-lift cinema rigs.

HIGHLIGHTS

Key features

- **STM32H7 MCU.** 480 MHz Cortex-M7 with double-precision FPU, 2 MB program flash, 1 MB RAM.
- **3-axis magnetometer.** LIS2MDL, tilt-compensated compass. ArduPilot driver upstream since 2025-11.
- **128 MB onboard flash.** Continuous-read NAND for blackbox / persistent log storage.
- **USB-C 2.0 receptacle.** Sealed connector body, IP67 when panel-mounted with gasket.
- **Wide BEC outputs.** 5 V @ 2 A and 10 V @ 2.5 A for GPS, RX, VTX, LED strip, cameras.
- **TDK IMU IMU.** Industrial-grade gyro, clock-synced with MCU, isolated power rail.
- **Barometric sensor.** Robust pressure + temperature for harsh environments.
- **EMC + ESD protected.** Pre-compliance EMC sweeps before each rev.
- **20×20 mm mount.** 36 × 31 × 10 mm overall, ≈ 8 g, low-profile stack-up.
- **NDAA compliant.** Exclusively EU / US / JP / TW components. Made in Belgium 🇧🇪.

FEATURES IN DETAIL

Features in detail

STM32H7 MCU

32-bit Arm® Cortex®-M7 core running at 480 MHz with double-precision FPU. 2 MB on-chip Flash with read-while-write and 1 MB system RAM give modern autopilot stacks (PX4, ArduPilot) headroom for state estimators, EKFs, and onboard logging without preempting the control loop.

CLOCK-SYNCED IMU WITH ISOLATED POWER

The STM32H7 clock drives the TDK TDK IMU sample timing directly, so there is no software interpolation between sensor read and the PID loop. The gain budget is wider before stick filtering needs to step in. The IMU sits on its own ultra-low-noise regulator, isolated from motor rails, so commutation transients do not reach the gyro path. Blackbox logs stay cleaner at sustained high throttle.

3-AXIS MAGNETOMETER

STMicroelectronics LIS2MDL, tilt-compensated compass for map rotation and orientation. ArduPilot driver upstream since 2025-11.

HIGH-PRECISION BAROMETRIC PRESSURE SENSOR

Infineon DPS368, robust pressure and temperature for harsh-environment altitude hold, rate-of-climb estimation, and EKF height fusion.

LARGE FLASH FOR PROGRAM AND PERSISTENT LOGGING

2 MB of on-chip Flash hosts the firmware itself with read-while-write support. Separately, a Winbond W25N01 128 MB NAND with continuous-read mode is fitted for blackbox logging, enough capacity for a full inspection-mission session at high log-rate without rotation.

WIDE-RANGE POWER INPUT + DUAL BEC OUTPUTS

3 - 10S LiPo support spans the full range from compact race quads up to heavy-lift cinema rigs, all on the same hardware. A TVS protection diode and reverse-polarity protection are fitted on the battery input. Two large DC/DC converters supply 5 V at 2 A and 10 V at 2.5 A, more than enough headroom for GPS, receiver, LED strip, video transmitter, cameras, and other accessories without an external regulator.

HIGH-QUALITY ACTIVE AND PASSIVE COMPONENTS

Switching-IC power topology instead of dissipative diodes, ultra-low-noise voltage regulators, and Würth inductors. Industrial-grade BOM throughout.

BATTERY MONITORING

Built-in battery voltage monitoring and dedicated current input from the ESC for closed-loop power awareness in the autopilot.

SWD DEBUG ON CONNECTOR + SMALL FORM FACTOR

Symmetric SWD debug pads exposed on a connector for in-field flashing or live debugging without disassembly. The 20 × 20 mm hole pattern with low overall profile (10 mm) drops the AirBrain into compact stack-ups without forcing redesign.

EMC + ESD PROTECTION · NDAA · MADE IN EUROPE

Every external connector is ESD-protected. Pre-compliance EMC sweeps are run before each revision so the controller survives realistic ESC / VTX / RX coexistence, not just bench-perfect conditions. The component bill of materials sources exclusively from EU / US / JP / TW countries (NDAA-compliant). Final assembly and test are done in Belgium 🇧🇪.

I/O QUICK REFERENCE

— Hardware specifications, full list

Same content as the spec table, in compact bullet form for quick scan.

- 7 × UART
- 1 × I²C
- 1 × SWD debug
- 3 × programmable LED
- 1 × AUX GPIO output
- BOOT button
- BEC 5 V @ 2 A, for FC peripherals, RX, GPS, optical-flow sensors
- Betaflight standardised connectors
- 20 × 20 mm hole pattern, low profile
- Made in Belgium 🇪🇺
- 8 × PWM (DShot supported)
- 1 × SPI
- 2 × ADC (VBat, current)
- 2 × power LED (H7 power, battery present)
- 1 × AUX GPIO through transistor (buzzer –)
- USB-C 2.0 receptacle, sealed body (IP67 panel-mounted with gasket)
- BEC 10 V @ 2.5 A, for video transmitter and cameras
- Castellated pins for ESC and UART2 in addition to connectors
- NDAA compliant. EU / US / JP / TW components

ENGINEERING DEEP-DIVE

The decisions that show up in flight logs

Clock-synced IMU

The STM32H7 clock drives the TDK IMU sample timing directly, so there is no software interpolation between sensor read and the PID loop. The gain budget is wider before stick filtering needs to step in.

Isolated power rails

Sensor rails are physically separated from motor rails on the layout. Commutation noise from the ESCs does not couple back into the gyro path. Blackbox logs are cleaner at sustained high throttle.

Industrial-grade BOM

Components are sourced through EU, US, and Japanese channels and the board is NDAA compliant. A per-line supplier breakdown is available on request for integrators who need to certify.

EMC tested layout

Pre-compliance EMC sweeps are run on every revision before the BOM is locked. The board is tested against ESC, VTX, and RX coexistence on a real airframe, not just on the bench.

WHAT PARTNERS BUILD WITH IT

One controller, six platforms

RACE CINE FPV
Cinematic FPV with predictable rates and ultra-low latency on Betaflight.

LONG-RANGE MAPPING
ArduPilot autonomy with reliable GPS + magnetometer fusion.

INDUSTRIAL INSPECTION
Survey-grade flights with PX4 autopilot.

RESEARCH LABS
Hardware target upstream in PX4 and ArduPilot, no private fork needed.

FIXED-WING LONG-RANGE
ArduPilot Plane on the same hardware target.

CUSTOM AIRFRAMES
Standard upstream firmware target across stacks; integrate without forking the firmware.

SPECIFICATIONS

Hardware specifications

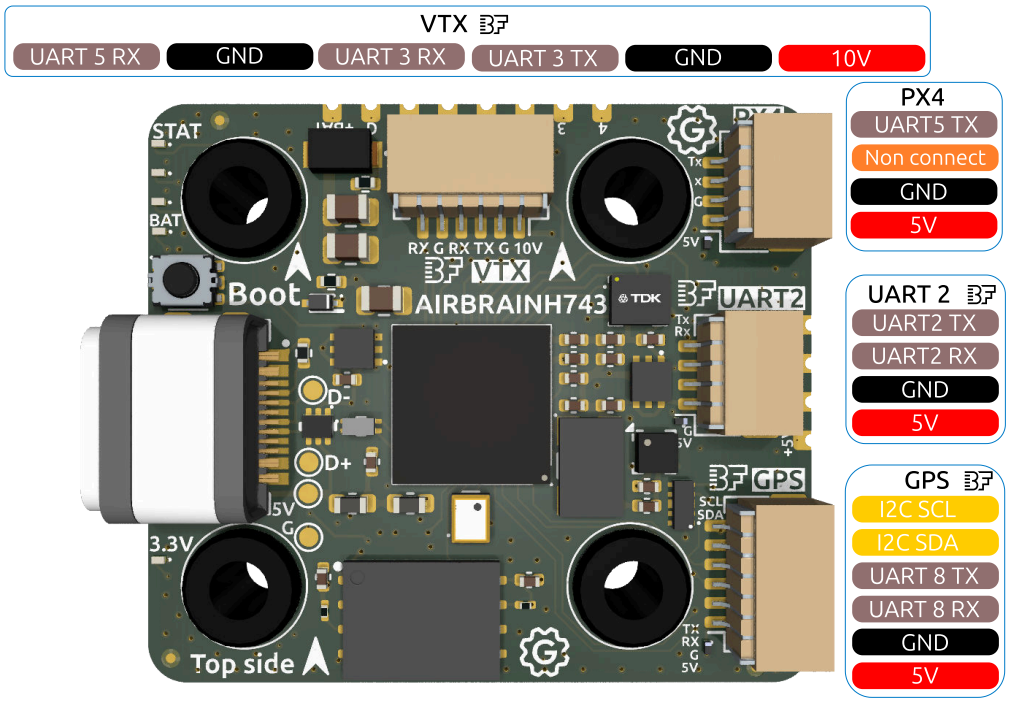
MCU & SENSORS	
MCU	STM32H7, 480 MHz, 2 MB flash, 1 MB RAM
IMU	TDK TDK IMU, clock-synced with MCU
Magnetometer	STMicro LIS2MDL, 3-axis
Barometer	Infineon DPS368
Onboard storage	Winbond W25N01, 128 MB NAND, blackbox

I/O	
UARTs	7
Motor outputs	8 × DShot PWM
Other busses	1 × I²C, 1 × SPI, LED-strip on connector
USB	USB-C 2.0 receptacle, sealed body (IP67 when panel-mounted with gasket)
SWD	Debug port on connector
ADC	2 × (VBat + Current)
GPIO	1 × AUX, 1 × buzzer (open-drain transistor)
Connectors	Betaflight standardised + castellated pins for ESC/UART2

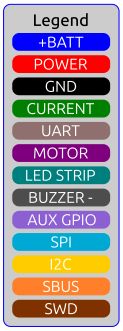
POWER	
Battery input	3-10S LiPo, 10-42 V
BEC outputs	5 V @ 2 A, 10 V @ 2.5 A
3.3 V output	0.5 A max
Monitoring	Battery voltage + current sensing
Protection	TVS diode, reverse polarity, EMC, ESD

MECHANICAL	
Mounting	20 × 20 mm pattern, M3 holes
Dimensions	36 (L) × 31 (W) × 10 (H) mm
Weight	≈ 8 g
Operating temp	0 - 60 °C
Humidity	0 - 90% RH, non-condensing
Compliance	NDAA, RoHS, CE, made in Belgium

Pinout, top side

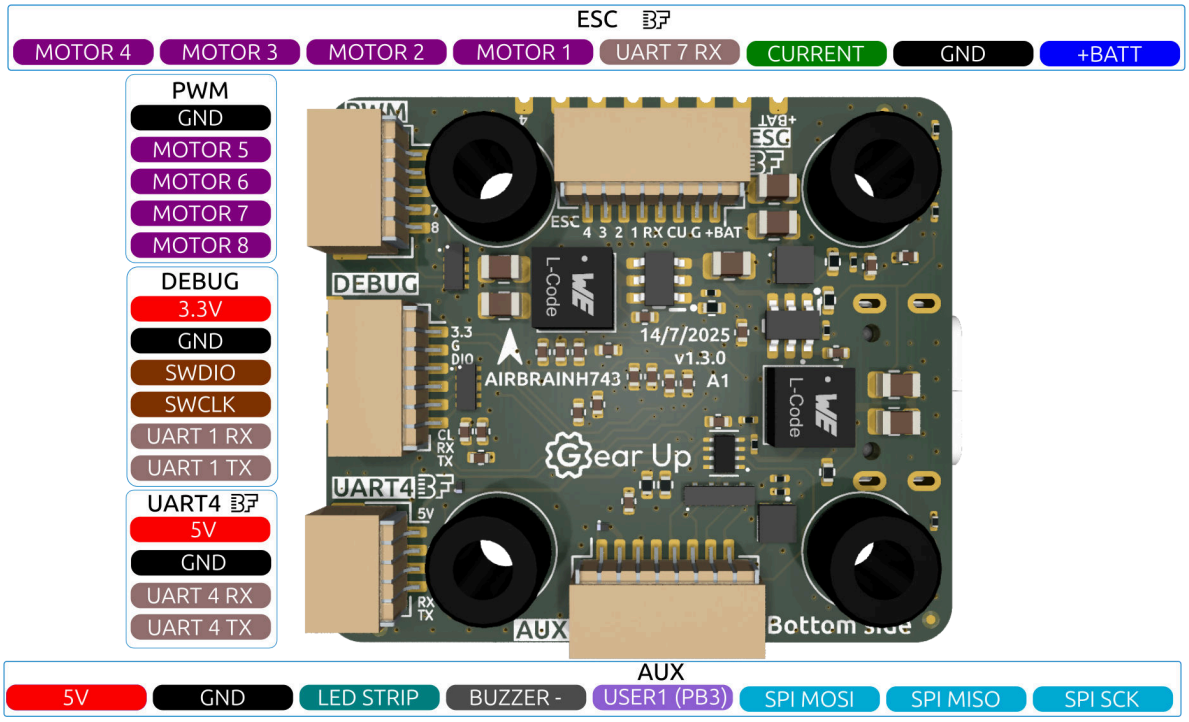


Top-side connector and pad layout. Refer to silkscreen for definitive labels.

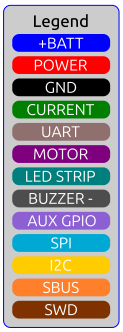


Pin function colour legend (applies to both pinout pages).

Pinout, bottom side



Bottom-side castellated pads + auxiliary connector.

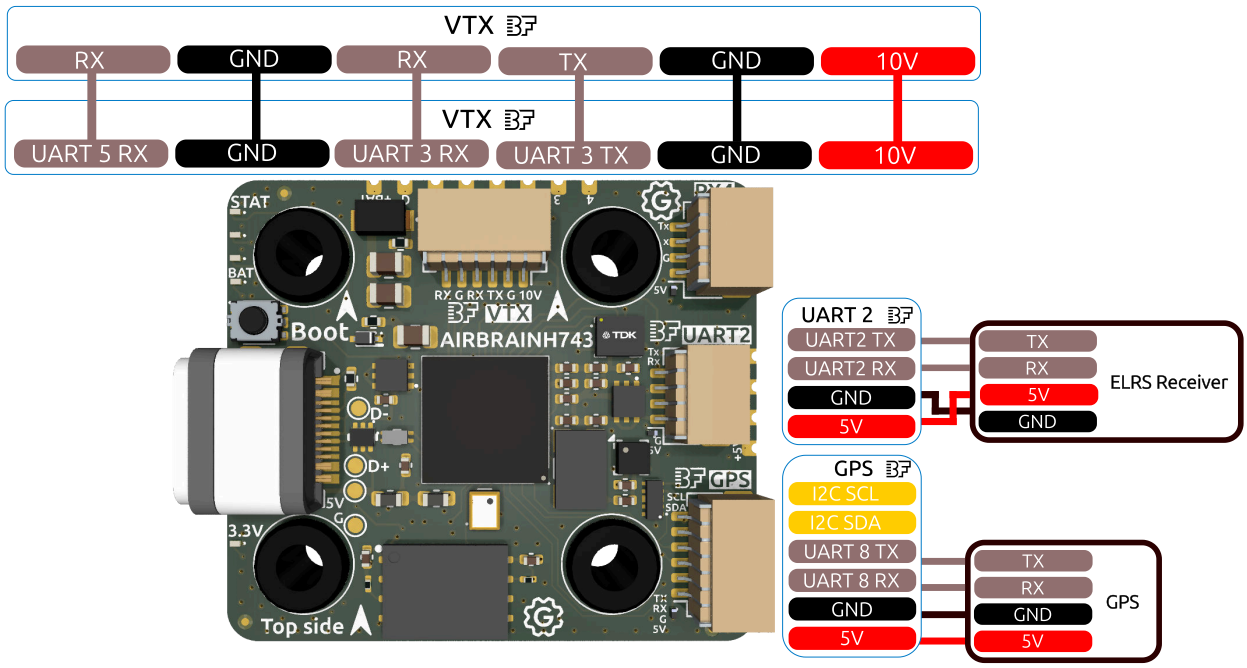


Pin function colour legend (applies to both pinout pages).

HARDWARE REFERENCE

Connection diagram, top side

Suggested wiring for accessories (VTX, GPS, UART2, PX4 telemetry, I²C peripherals). Each block shows the connector face from the AirBrain side; route signal pins to the matching wire on the accessory.

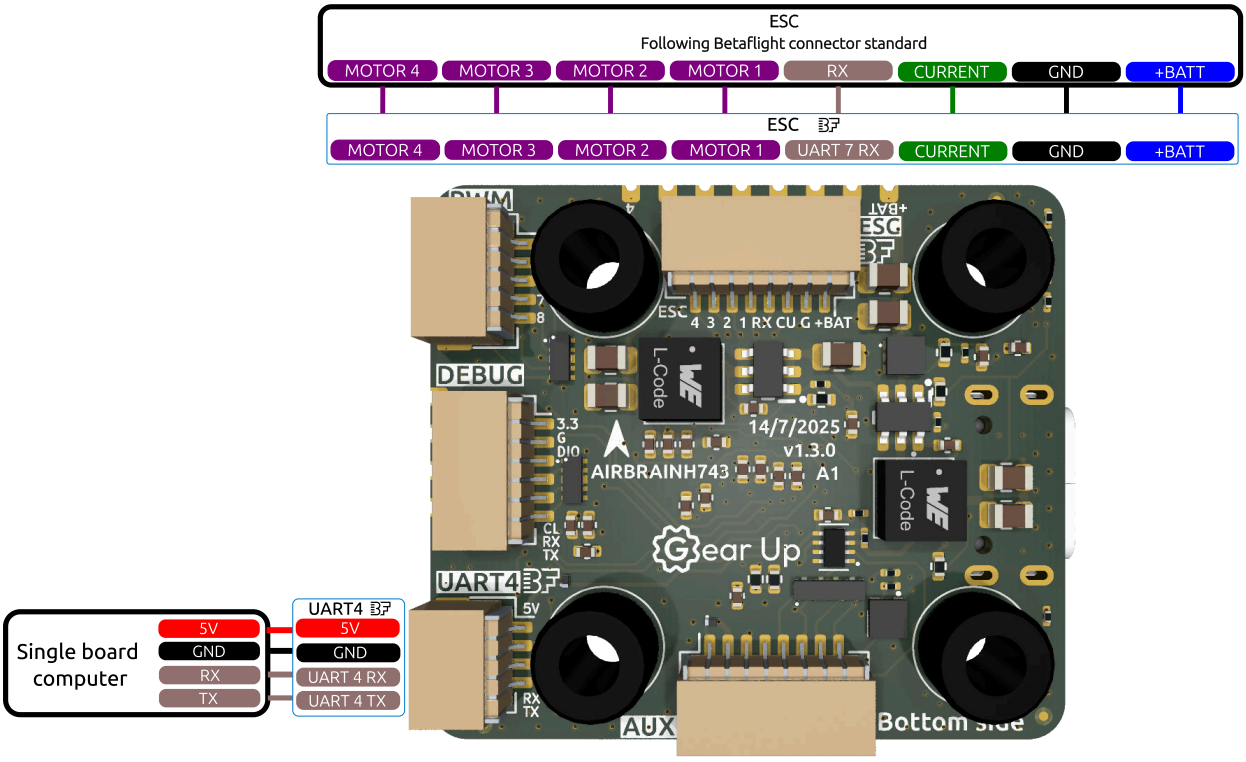


Top-side accessory wiring: VTX, GPS, UART2, PX4 telemetry, I²C.

HARDWARE REFERENCE

Connection diagram, bottom side

Bottom-side accessory wiring: ESC connector (Betaflight standardised), single-board-computer UART, AUX peripherals (LED strip, buzzer, SPI, I²C).

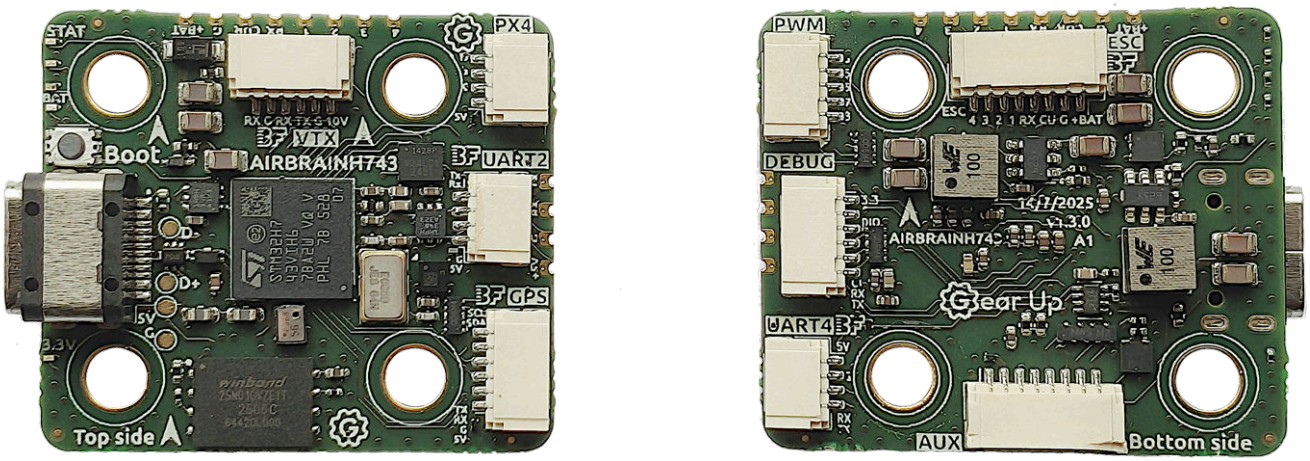


Bottom-side accessory wiring: ESC, single-board computer, AUX devices.

PRODUCT VIEWS

Front and back

Top and bottom of the AirBrain H743. Use these for reference when planning component placement, connector access, and stack-up clearance on the airframe.



Front (left) and back (right).

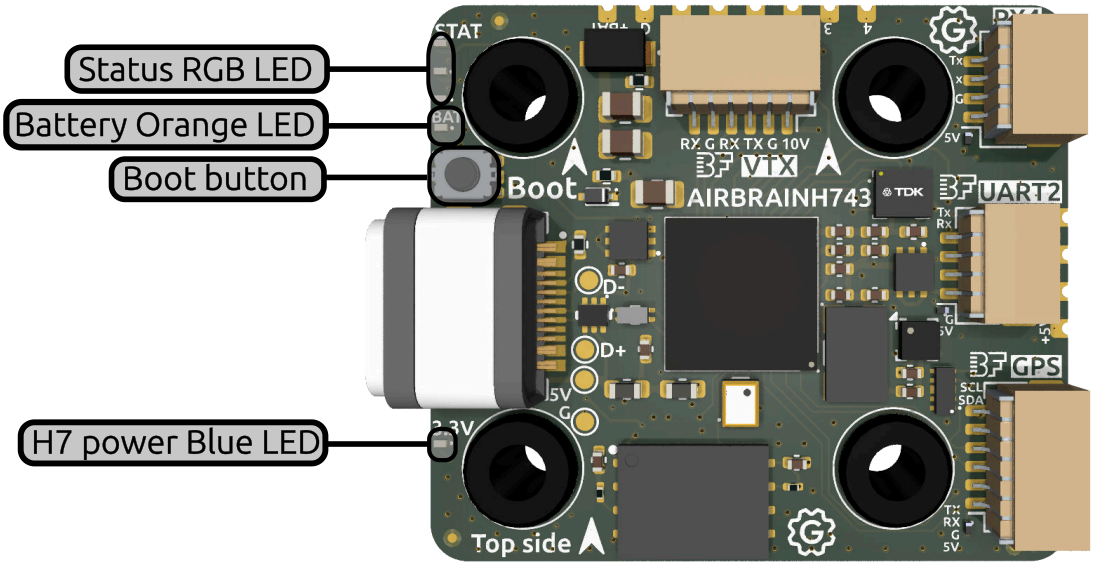
MECHANICAL

Dimensions

Compact 20 × 20 mm mounting pattern, low overall height. The Pinout pages above show connector positions on the silkscreen.

Length	36 mm
Width	31 mm
Height (overall)	10 mm including connectors
Mounting pattern	20 × 20 mm, M3 holes
Weight	≈ 8 g

LEDs & buttons



Top-side render with LED and button positions annotated.

H7 power	Blue	Lit whenever the STM32H7 3.3 V rail is stable. Useful as a hardware sanity check during bring-up. Off means the MCU has no power.
Battery present	Orange	Lit whenever a flight battery is connected and VBat is above the detect threshold. Independent of USB power, so you can confirm the battery harness is live without firmware running.
RGB	R / G / B	Programmable status LED. Driven by the firmware. See per-firmware patterns below.
BOOT button	·	Hold during USB connect to enter DFU mode for manual firmware flashing.

RGB LED, PER-FIRMWARE BEHAVIOUR

BETAFLIGHT

Patterns are not centrally documented; they come from the LED Strip STATUS profile defaults plus the firmware heartbeat. Customise per LED role in BF Configurator → LED Strip tab.

Armed	Solid colour for the active flight-mode profile
Disarmed	Slow heartbeat blink
Failsafe	Red strobe
Low battery	Amber pulse at the configured threshold
Beacon	High-rate strobe to locate a lost airframe

ARDUPILOT

Driven by the Notify driver. Enable in NTF_LED_TYPES; patterns follow the AP_Notify state machine. Reference: ardupilot.org/copter/docs/common-leds-pixhawk.html

Initialising	Red double-flash
Pre-arm fail	Yellow flashing
Armed (no GPS)	Blue solid
Armed (GPS lock)	Green solid
Auto / Guided	Cyan
Failsafe	Magenta strobe
Low battery	Red strobe

PX4

Driven by the RGBLED driver, auto-selected for the airframe. Patterns map directly to the PX4 vehicle state machine. Reference: docs.px4.io/main/en/getting_started/led_meanings.html

Initialising	Red, fast blink
Calibrating	White, blink
Ready to arm	Green, slow blink
Armed	Green, solid
Pre-arm fail	Yellow
Failsafe	Red, strobe / solid
Low battery	Amber, blink

Patterns are firmware defaults. Each stack lets you remap or recolour the RGB LED through its configurator (BF Configurator LED Strip tab, ArduPilot NTF parameters, PX4 RGBLED driver).

SOFTWARE

Firmware support

AirBrain H743 is upstream-supported in three flight stacks. The hardware target is `AIRBRAINH743`. Always flash from the official upstream channel for your stack (links per section below). The hardware definition is upstream in all three projects.

Betaflight `AIRBRAINH743`

For racing, freestyle, and race cine FPV platforms. Betaflight Configurator detects the AIRBRAINH743 target and builds the correct firmware image automatically.

- **Project** https://betaflight.com
- **Web configurator** https://app.betaflight.com
- **Desktop configurator** https://github.com/betaflight/betaflight-configurator/releases
- **Board documentation** https://www.betaflight.com/docs/wiki/boards/current/AIRBRAINH743
- **Hardware definition** https://github.com/betaflight/config/tree/master/configs/AIRBRAINH743
- **Switching from ArduPilot/PX4** https://github.com/GearUp-Company/AirBrainH743 (Switching firmware stacks)
- **Build from source** https://github.com/GearUp-Company/AirBrainH743/blob/main/BUILD.md

ArduPilot `AIRBRAINH743`

For autonomous, mapping, and long-range platforms. Copter, Plane, Rover, Sub, and Blimp targets all flash this hardware. Mission Planner and QGroundControl auto-detect the board over USB.

- **Project** https://ardupilot.org
- **Mission Planner** https://ardupilot.org/planner
- **QGroundControl** http://qgroundcontrol.com
- **Latest Copter binary** https://firmware.ardupilot.org/Copter/latest/AIRBRAINH743
- **Hardware definition** https://github.com/ArduPilot/ardupilot/blob/master/libraries/AP_HAL_ChibiOS/hwdef/AIRBRAINH743/README.md
- **Switching from Betaflight/PX4** https://github.com/GearUp-Company/AirBrainH743 (Switching firmware stacks)
- **Build from source** https://github.com/GearUp-Company/AirBrainH743/blob/main/BUILD.md

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PX4 `gearup_airbrainh743`

For research, advanced autonomy, and custom airframes, the AirBrain H743 is documented as *gearup_airbrainh743* in the PX4 hardware tree. Build from source via the standard PX4 toolchain, or use QGroundControl to flash a pre-built image.

- **Project** https://px4.io
- **Board documentation** https://docs.px4.io/main/en/flight_controller/gearup_airbrainh743
- **QGroundControl** http://qgroundcontrol.com
- **Hardware definition (PX4 main)** https://github.com/PX4/PX4-Autopilot/tree/main/boards/gearup/airbrainh743
- **Source repository** https://github.com/PX4/PX4-Autopilot
- **Building from source** https://docs.px4.io/main/en/dev_setup/building_px4.html
- **Latest CI binary** https://px4-travis.s3.amazonaws.com/Firmware/master/gearup_airbrainh743_default.px4
- **Upgrading from earlier build** https://github.com/GearUp-Company/AirBrainH743/blob/main/firmware/PX4/UPGRADING.md
- **Switching from Betaflight/ArduPilot** https://github.com/GearUp-Company/AirBrainH743 (Switching firmware stacks)

Hardware repository (Gear Up)

Firmware target sources, datasheet, mechanical adapter STEP files, switching guide, and integration resources for the AirBrain H743 live in our public GitHub repository.

- **Repository** `https://github.com/GearUp-Company/AirBrainH743`
- **Switching firmware stacks** `https://github.com/GearUp-Company/AirBrainH743 (README, Switching firmware stacks)`
- **Build instructions** `https://github.com/GearUp-Company/AirBrainH743/blob/main/BUILD.md`
- **Datasheet (PDF)** `https://github.com/GearUp-Company/AirBrainH743/blob/main/datasheet/Datasheet_AirBrain.pdf`
- **Firmware target sources** `https://github.com/GearUp-Company/AirBrainH743/tree/main/firmware`
- **License** `https://github.com/GearUp-Company/AirBrainH743/blob/main/LICENSE.md`
- **Issue tracker** `https://github.com/GearUp-Company/AirBrainH743/issues`

DFU MODE

Entering DFU mode for manual flashing

1. Power off the flight controller.
2. Press and hold the **BOOT** button.
3. Plug in the USB-C cable while still holding BOOT.
4. The blue Status LED will dim to half-brightness and the host OS will mount the device as a USB mass-storage / DFU device.
5. Use Betaflight Configurator, ArduPilot Mission Planner, QGroundControl, or `dfu-util` directly to flash.

OPERATING ENVELOPE

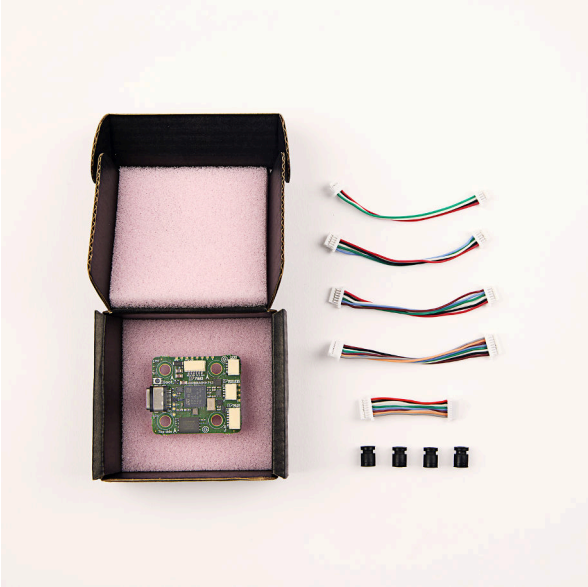
Electrical & environmental characteristics

ELECTRICAL	
Max IO voltage	3.3 V
Max VBat	42 V (10S)
Max 3.3 V current	0.5 A
Max 5 V current	2 A
Max 10 V current	2.5 A
USB cable length	≤ 2 m
Power cable length	≤ 0.5 m

ENVIRONMENT	
Operating temp	0 to 60 °C
Humidity	0 to 90% RH, non-condensing
ESD handling	ESD-safe environment required
Storage temp	-20 to 70 °C

PACKAGE CONTENTS

What's in the box



Each AirBrain H743 ships in a cardboard box with ESD-protective foam. The box contains:

Qty	Item	Used for
1 ×	AirBrain H743 flight controller	The board itself
1 ×	4-pin JST-SH cable, 60 mm soft silicone	UART2, UART4, or PX4 telemetry
1 ×	5-pin JST-SH cable, 60 mm soft silicone	PWM motor outputs
1 ×	6-pin JST-SH cable, 60 mm soft silicone	VTX, GPS, or DEBUG / SWD
1 ×	8-pin JST-SH cable, 60 mm soft silicone	ESC or AUX (long version, frame mount)
1 ×	8-pin JST-SH cable, 30 mm soft silicone	ESC short-stack version (board-on-board)
4 ×	M3 soft-silicone vibration-damping mounts	Mechanical isolation from frame

FREQUENTLY ASKED — FAQ

Which firmware should I flash first?

Use whatever your team already runs in production. The hardware definition (target AIRBRAINH743) is upstream in Betaflight, ArduPilot, and PX4, so all three flash and run out of the box.

Is it really NDAA compliant?

Yes. The bill of materials sources exclusively from EU / US / JP / TW countries; final assembly and test in Belgium.

Does it work with my existing 30×30 stack?

AirBrain H743 uses a 20×20 mount. We offer 20×20 to 30×30 adapters via our resellers; many cine FPV and mapping platforms have already retro-fitted it.

What is the warranty / RMA process?

Hardware defects are covered for 24 months. Contact info@takeyourgear.com or your reseller. Field-damaged units can usually be repaired at cost.

Does it have CAN?

AirBrain H743 does not. It exposes 7 UARTs, I^2C, SPI, and DShot motor outputs. A separate flight controller with CAN will join the lineup alongside AirBrain for integrators who need DroneCAN/UAVCAN. Name and timing are not announced yet, email us to be notified.

NDAA, LAYER BY LAYER

Procurement-grade evidence, not just a checkbox

SECTION 889

Covered telecommunications equipment

Restricts federal agencies from procuring covered telecommunications equipment from designated foreign vendors. UAS components fall under follow-on provisions.

AirBrain: no designated covered-list vendors in the BOM.

SECTION 848

Covered foreign entities for UAS

Restricts federal agencies from procuring drones or drone components from covered foreign entities and their state-controlled affiliates. Effective 2025 for new federal procurement.

AirBrain: no critical components sourced from covered countries.

SECTION 1260H

DoD restricted-entity list

Annual DoD list of restricted foreign industrial entities. Federal procurement and capital-markets restrictions reference this list.

AirBrain: no listed entities in the supplier chain.

BOM TRANSPARENCY

NDAA-clean BOM at the manufacturer level

Procurement-bound integrators need to show their own supply chain. We document every BOM line with manufacturer country of origin so you can roll our posture into yours.

AirBrain: available on request through a scoping engagement.

SAFETY & REGULATORY

Safety information

> **Intended use.** AirBrain H743 is a flight controller for unmanned aerial vehicles. Not a toy. Install only by qualified users familiar with UAV safety. Always follow local UAV regulations.

INSTALLATION & OPERATION

- Maximum input voltage **42 V DC**. Exceeding may damage the device.
- Connect only to **3 - 10S LiPo** supported UAV power systems.
- Mount securely to minimise vibration. Do not operate near flammable materials.
- Operating envelope **0 - 60 °C, 0 - 90% RH**, non-condensing.
- Ensure correct polarity. Reverse polarity may cause permanent damage.
- Handle only in **ESD-safe environments** with proper grounding.

Regulatory & compliance

CE	EUnify BV declares conformity with EMC Directive 2014/30/EU and RoHS Directive 2011/65/EU (as amended by 2015/863). Declaration of Conformity at takeyourgear.com/pages/compliance.
EMC	Pre-compliance EMC tested at Würth Elektronik eiSos. Install and operate per this datasheet to maintain EMC performance.
RoHS	All electronic components and assemblies are RoHS-compliant.
WEEE	Subject to EU Waste Electrical and Electronic Equipment regulations. Do not dispose with household waste; return to an authorised collection facility at end-of-life.
NDAA	Supplied components are sourced exclusively from EU / US / JP / TW countries.

> **Disclaimer.** Improper installation or misuse may result in loss of vehicle control. The manufacturer is not liable for damages resulting from misuse or modification. Always verify your build against local regulations before flight.

Sub-assembly intended for integration. This datasheet describes a sub-assembly (a flight controller / carrier board / ESC) intended for integration into a final UAV or robotics product. **CE conformity declared by EUnify BV.** Integrator declares conformity for the final product (against the EU Machinery Directive 2006/42/EC, Radio Equipment Directive 2014/53/EU, EU UAS regulation 2019/947, civil-aviation rules, or any application-specific standards). Re-test as a system if you change EMC-relevant elements (motors, ESCs, transmitters, antennas, enclosures).

DOCUMENT CONTROL

Datasheet revisions

v2.4 · 2026-06-22	Quick-spec strip moved onto the cover (MCU / Mounting / Board / Pinout), mirroring AirPilot H743 layout. Cover-footer block removed; page-1 footer suppressed via shared @page :first rule.
v2.3 · 2026-06-22	Added standardized quick-spec strip at top of page 2 (Mounting / Board / Pinout / Weight), parallel to AirPilot H743.
v2.2 · 2026-05-20	Theme refresh aligned with takeyourgear.com.
v2.1.1 · 2026-05-08	Per-stack switching guide and build-from-source links to GearUp repo.
v2.1 · 2026-05-08	Pinout colour legend; BUILD.md, LICENSE.md, PX4 board source links.
v2.0 · 2026-04-28	Full rebuild. Brand-aligned layout, expanded firmware reference, dimensions and connection diagrams.
v1.1.0 · 2025-11-05	Original datasheet.

REVISIONS

Hardware changelog

v1.0 · 2025-09	First production release. STM32H7 + clock-synced TDK IMU, isolated power rails, EMC-tested layout, 20 × 20 form factor, sealed USB-C.

Sales & support

Direct route to the engineering desk. Wholesale, integration, and OEM enquiries welcome.

takeyourgear.com

info@takeyourgear.com

github.com/GearUp-Company/AirBrainH743

Made in Belgium

Gear Up is a brand of EUnify BV · Lierde, Belgium · Datasheet v2.5, 2026-06-23