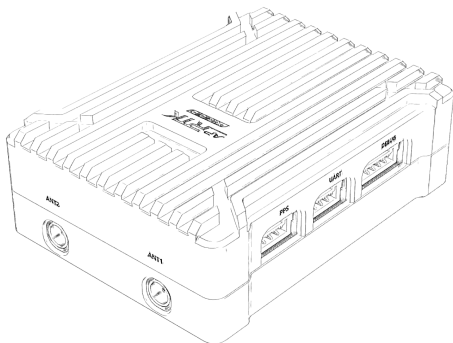


AP-RTK X20D

User Guide



AP-RTK X20D Overview



One u-blox ZED-X20D all-band receiver and two antennas provide RTK position and heading, forwarded with RM3100 compass data to the flight controller over DroneCAN (engineering evaluation).

AP-RTK X20D Specifications

• Basic Specifications

Receiver	u-blox ZED-X20D — single module, dual antenna, HDG 2.00
GNSS Bands	All-band GNSS on both antennas (L1 / L2 / L5 / L6)
MCU	STM32F412Rx, ARM Cortex-M4, 512 KB flash
Compass	PNI RM3100 on I2C3 — axis qualification pending
Heading	Receiver-computed ANT1-to-ANT2 heading; UBX-NAV-DAHEADING v2
Update Rate	Firmware requests 5 Hz navigation at 230400 baud; end-to-end CAN rate requires measurement

AP-RTK X20D Specifications

• Basic Specifications

Comm. Protocol	DroneCAN — position, ardupilot.gnss.Heading and separate magnetometer data
I/O Ports	2× MMCX antenna · CAN · UART (RTCM input) · DEBUG (SWD + console) · PPS/EVENT · USB-C (MCU)
PCB	R3 · 33.00 × 45.17 mm · 4 layers · 0.8 mm
Firmware	AP_Periph · novaX 1.0.1 engineering release · board ID 6205
Validation Status	Windows GCC 10.2.1 build verified; first-article hardware and flight qualification pending

AP-RTK X20D Pinout

• Pinout



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AP-RTK X20D Pinout

• Pinout Notes

Pin definitions below are checked pin by pin against the R3 schematic netlist. CAN and UART: pin 1 = GND and pin 4 = 5 V, the reverse of the Pixhawk numbering (pin 1 = 5 V). DEBUG: pin 1 = 5 V and pin 6 = GND. PPS: pins 1 and 3 = GND. Pin order and cables follow AP-RTK dual; check both ends before using a generic 1:1 Pixhawk cable. Power can come from the CAN/UART 5 V pin, the DEBUG 5 V pin or USB VBUS, each through its own 2 A PPTC fuse and Schottky diode. USB-C is wired to the STM32F412 (service, bootloader, DFU), not to the ZED-X20D; the receiver talks to the MCU over USART2 (GPS port 4). ANT1 is the heading reference at the rear and ANT2 goes at the front, the reverse of AP-RTK dual; swapped cables turn the heading by 180°. Status LEDs on the side of the case: PWR red = power, STAT green = AP_Periph status, SAFE red = safety, HDG green = heading valid, RTK blue = RTK fixed. Images are renders of the case design with the engraved port and LED names.

AP-RTK X20D Pin Definition

• CAN

JST-GH 4P · DroneCAN to the flight controller · power input

Pin	Signal	Function
1	GND	Ground
2	CAN_L	CAN bus low
3	CAN_H	CAN bus high
4	5V	5 V supply input — shared with UART pin 4

• UART

JST-GH 4P · RTCM correction input · power input

Pin	Signal	Function
1	GND	Ground
2	TX	MCU transmit (PC6, USART6_TX) — not used by firmware 1.0.1
3	RX	RTCM corrections into the ZED-X20D UART2 (also MCU PC7, USART6_RX)
4	5V	5 V supply input — shared with CAN pin 4

AP-RTK X20D Pin Definition

• DEBUG

JST-GH 6P · SWD programming · MCU debug console

Pin	Signal	Function
1	5V	5 V supply input
2	SWDIO	SWD data (PA13) — bootloader programming and firmware recovery
3	SWCLK	SWD clock (PA14)
4	RX	Debug console receive (PB7, USART1_RX)
5	TX	Debug console transmit (PB6, USART1_TX)
6	GND	Ground

AP-RTK X20D Pin Definition

• PPS

JST-GH 4P · Receiver timing — PPS output · EVENT input

Pin	Signal	Function
1	GND	Ground
2	EVENT	External event input to the receiver (EXTINT) — e.g. camera trigger time stamps
3	GND	Ground
4	PPS	Pulse-per-second output from the receiver (TIMEPULSE, also MCU PA7)

• ANT1 · ANT2

MMCX · GNSS antenna inputs · 3.3 V antenna bias · ESD protected

Pin	Signal	Function
ANT1	RF_IN_1	Heading reference antenna — mount at the rear of the vehicle
ANT2	RF_IN_2	Mount at the front — heading = direction from ANT1 to ANT2

AP-RTK X20D Setup

1. **Antenna direction** — ANT1 (RF_IN_1) at the rear, ANT2 (RF_IN_2) at the front, on the centerline at equal height; measure the baseline.
2. **H7E connection** — Connect over DroneCAN and set the parameters below. No X20D-specific H7E firmware build is needed.
3. **Position offset** — Measure ANT1 relative to the centre of gravity and enter GPS1_POS_X/Y/Z (+X forward, +Y right, +Z down).
4. **First-article checks** — On the bench, confirm receiver startup, RTK corrections, position, heading at known directions, reacquisition, RM3100 axes, power and update paths.

AP-RTK X20D Setup

• Flight Controller Parameters

Parameter	Value	Description
CAN_P1_DRIVER	1	Enable CAN1; reboot after changes
CAN_D1_PROTOCOL	1	DroneCAN
GPS1_TYPE	9	DroneCAN GPS (GPS_TYPE on older firmware)
GPS1_MB_TYPE	0	No moving-baseline offset conversion; receiver already supplies forward heading
AHRS_EKF_TYPE	3	Use EKF3
EK3_ENABLE	1	Enable EKF3
EK3_SRC1_YAW	2	GPS yaw; use 3 for compass fallback only after the RM3100 axes and calibration have been qualified

AP-RTK X20D Firmware

• Available Firmware

Type	Version	Date
AP_Periph (DroneCAN OTA)	1.0.1	2026-09-07
AP_Periph (.apj package)	1.0.1	2026-09-07
Bootloader + App (merged HEX)	1.0.1	2026-09-07
Release verification (JSON)	1.0.1	2026-09-07

Download files from the product page (QR).

AP-RTK X20D Safety Notes

- Always remove propellers while wiring, configuring or updating firmware.
- Pull connectors by the housing, never by the wires.
- Beware of static discharge; do not operate in wet or dusty conditions.
- Firmware 1.0.1 is an engineering release — do not fly before first-article hardware and flight qualification.
- Antenna direction is opposite to AP-RTK dual (ANT1 rear, ANT2 front); swapped cables give a 180° heading error.
- Board ID 6205 only — never flash dual (1085) or G5H (6206) images.

AP-RTK X20D Safety Notes



<Detailed Manual>

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