



GNSS X5 PPK Module for DJI Phantom 4 Pro

Convert your Phantom 4 Pro v.1 / v.2 / Advance into a PPK system. Easy integration without the need to open or modify your Drone.



Description

The X5 PPK Module for Phantom 4 Pro is a non-intrusive GNSS adapter system to connect to a DJI Phantom 4 Pro v.1/v.2 or Advance Drone (not included).

Main Advantages:

- Contains its own high quality GNSS Receiver module with state-of-the-art components
- No need to open or modify your Drone (keep your Drone's original warranty)
- The X5 PPK Module attaches and disattaches in seconds
- No Batteries required
- Ultra-fast image triggering detector sensor
- Lightweight microelectronics: 80 grams

Trigger Sensor:

A sensor installed externally on the P4P drone detects the triggering of each photograph and records a time stamp in the log file of the MULTIBAND X5 GNSS module. Timestamps are extracted from the module after flight and combined with the in-flight imagery as centimeter-accurate position geotags (geotagging) using various specialized software options available on the market. The new X5 GNSS Module is a centimeter-accurate multiband GNSS system for UAV mapping.

NEW HIGH PRECISION X5 GNSS RECEIVER:

The X5 GNSS receiver module is a multiband GNSS system, with centimeter precision for UAV mapping.



Image: Multiband X5 GNSS receiver.

Specifications:	
Mechanical	<ul style="list-style-type: none">• Dimensions: 52 x 37 x 13 mm• Weight: 50g• Operation temperature: -40 to 85 °C
Electrical	<ul style="list-style-type: none">• Input voltage: 4.75 - 5.5 V• Antenna DC bias: 3.3 V• Peak current consumption: 5V @ 500 mA• Average current consumption: 5V @ 250 mA• Current limit on USB OTG: 1000 mA
Positioning	<ul style="list-style-type: none">• Static horizontal 4 mm + 0.5 ppm• Static vertical 8 mm + 1 ppm• Kinematic horizontal 7 mm + 1 ppm• Kinematic vertical 14 mm + 1 ppm
Connectivity	<ul style="list-style-type: none">• Wi-Fi 2.4 GHz 802.11b/g/n• Bluetooth V4.2 BR/EDR
Data	<ul style="list-style-type: none">• Position output NMEA, RXM (for RINEX)• Data logging UBX file with events with update rate up to 20 Hz• External storage up to 32 GB
GNSS	<ul style="list-style-type: none">• Concurrent reception of GPS, GLONASS, Galileo and BeiDou• Receives both L1C/A and L2C bands• Signal tracked GPS/QZSS L1 C/A, L2 GLONASS L1OF, L2 BeiDou B1I, B2I Galileo E1-B/C, E5b• Number of channels 184• Update rates 10 Hz GNSS

	<ul style="list-style-type: none"> ● Time to First Fix: 25s (cold), 2s (hot) ● Max Altitude: 50km (31 miles) ● Max Velocity: 500m/s (1118mph)
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Module Components:

1. **GNSS X5 Module** unit with Micro-USB cable for power up (plug and play)
2. **Multi-band Aerial Antenna HeliX5** for UAV
3. **Antenna mount, connection cable** and high resistance 3M synthetic velcro
4. **Photo Trigger Sensor** attached to the module support
5. **16Gb MicroSD memory card** for recording GNSS data



Image: X5 PPK Module Components.



Image: Multi-band Aerial Antenna HeliX5 included.

METTATEC X5 App

The app is a user-friendly software for configuration and data collection that is available for Android (iOS version currently being developed). Supports several coordinate systems. With METTA X5 App, you can control all the features of X5 GNSS receivers. Our Beta Testers will receive via email a link to download the app that is in beta version.

PPK Flight Operation Requirements:

For integration is required:

1. One GNSS X5 PPK Module for Phantom 4 Pro
2. Multi-band GNSS UAV Antenna HeliX5
3. One Drone: DJI Phantom 4 Pro v1/v2 or Phantom 4 Advance (Not included)
4. One RINEX compatible GPS Base Receiver (Not included)

Installation on the Drone:

1. Attach the Module into the drone's left side leg
2. Insert a MicroSD memory card into the **GNSS X5 Module**
3. Plug the Micro-USB cable into the USB slot of the P4P
4. Carefully insert the Trigger Sensor under the motor of the Drone's left front arm
5. Install the GNSS Antenna HeliX5 on top of the antenna mount by screwing it to the short connector of the cable provided (unscrew the supplied fixing nut and save it, in case there is one)

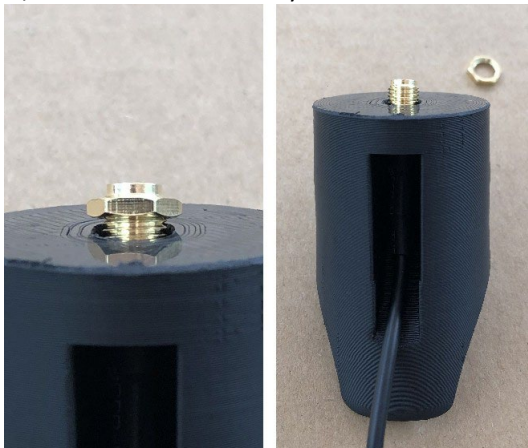


Image: Unscrewed nut before Antenna installation.

6. Firmly attach the Antenna Mount to the top of the Drone using the 3M Velcro provided. The correct installation position of the antenna mount is just above the location of the Drone camera. Once placed, validate that the propellers of the Drone do not touch the support.
7. Connect the antenna cable to the X5 GNSS module. Be careful not to block the view of the Drone's anti-collision system

Drone Configuration

1. Turn on the Drone Phantom 4 Pro v.1/v.2 or Advance and its remote control.
2. Enter the DJI GO 4 App and activate the front red lights of the Drone arms: Settings / MC Settings / Advanced Settings / Turn on Aircraft Arm LEDs.

Topographic Survey Flights

Before Flight:

1. Program your flight mission following the instructions of the flight control application you use: DJI GSP, Pix4D, DroneDeploy, MapsMadeEasy or others.
2. The provided MicroSD memory card (Max. 64GB capacity) **MUST BE INSERTED** in the **GNSS X5 PPK Module**.
3. Turn **ON** the previously installed **GNSS X5 PPK Module** by connecting the Micro-USB cable to the Drone.
4. Turn on your Phantom 4 Pro v.1/v.2 or Advance Drone.
5. Wait for the red LED of the **GNSS X5 PPK Module** light to be **ON**. It takes around 30 seconds to automatically start recording the data log file.
6. Once these verifications and recommendations have been made, you can now proceed to fly the Drone and capture the flight mission photos.

After Flight:

1. By the end of each flight, the **GNSS X5 PPK Module** will already have recorded one UBX file, so it is ready to be powered **OFF** without the need of stopping the recording.
2. All data logs (UBX files) are automatically saved in the MicroSD memory card.
3. The data logs can be downloaded by extracting the MicroSD memory card or via WiFi in the configuration mode.

As a result of the flight session and in order to perform a correct processing in PPK, you must obtain the following data set:

1. Photos captured by the Phantom 4 Pro v.1/v.2 or Advance
2. RAW LOGS UBX of the **X5 GNSS** module of each flight performed
3. RAW LOGS (UBX or RINEX) from a ground-based GNSS receiver
4. List of Ground Control Point coordinates

With this information, you will be ready to process the data through different photogrammetric software options.

Post Process - PPK

The final PPK (Post Processing Kinematic) mapping workflow can be performed using the following software options. Each of them has its own steps to follow at the user choice. This is a list of post-processing programs according to their degree of difficulty and knowledge requirement in topography:

1. Toposetter 2.0 Pro (Trial Version / Paid Version)
2. REDtoolbox (Trial Version / Paid Version)
3. RTKLIB (Free Version)
4. Emlid Studio (Free Version)

Once the information is processed, you can import the image set into any mapping software, such as Agisoft Metashape, DroneDeploy, Pix4D and others of your choice.

The UAV PPK App for event interpolation

The best online App for UAV PPK Event Interpolation. Corrects the millisecond difference between the DJI drone's camera trigger, the Drone's indicator LEDs and the event capture in the GNSS X5 PPK Module for maximum accuracy, so ground control points are no longer needed.

Two post processed files need to be input to the App: the RINEX post-processing file (.POS) and the event file (.POS). And the precalculated delay time in seconds for DJI Drone LEDs: 0.3. The resulting geotagged file can be downloaded in CSV and TXT format, ready to input into any popular photogrammetry software:

- Exports a photo geotagging file
- Exports a file with the flight path of the drone

Being an online service, you can use the App anywhere without the need for software installations or license activation. Developed by our technological partner SolucionesGeográficas (Geographic Solutions).

Link: www.solucionesgeograficas.com/app-uav-ppk/

	References	gpst	latitude	longitude	height	sdn	sde	sdu
1	DJI_0083.JPG	570966.331	-12.10186240014	-77.067693221345	33.4306284999998	0.0035	0.0065	0.0119
2	DJI_0084.JPG	570961.811	-12.101862413285	-77.067693190485	33.4360559999998	0.0035	0.0065	0.011994499999703

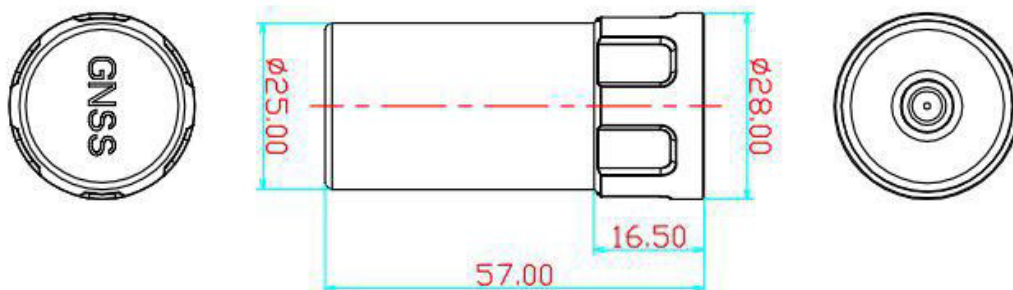


***Aerial Antenna for UAV
Multi-band GNSS Module
METTA-HELIX5-DR-11***

1. Antenna image



2. Cylindrical Antenna Dimensions



Antenna Specifications

Antena			
Antenna	1	Constelations	GPS, BEIDOU, GLONASS, GALILEO
	2	Frequency	GPS: L1: $1575,42 \pm 1,023$ MHz L2: 1227 ± 1.023 MHz BEIDOU: B1 : 1561 ± 2.046 MHz B2 : 1207 ± 2.046 MHz B3 : $1268 \pm 10,23$ MHz GLONASS: L1= $1602+0,5625*k$ (MHz) L2= $1246+0,4375*k$ (MHz) GALILEO: E1: 1575
	3	Frequency Range	1197-1278/1559-1612MHz
	4	V.S.W.R.	≤ 2.0
	5	Axial Ratio	Elevation Angle 90 Degrees: ≤ 3 Elevation Angle 15 Degrees: ≤ 5
	6	Gain	Elevation Angle 90 Degree: ≥ 6 Elevation Angle 20 Degree: ≥ 0
	7	Front to Back Power	± 60 Degrees ≥ 15 dB
	8	Centro de fase (mm)	< 2
	9	Impedence	50 Ω
	10	Polarization	RHCP
LNA	1	LNA Gain	38 \pm 2dB
	2	V.S.W.R.	< 2
	3	Noise Figure	< 1.0
	4	DC Voltage	3,3 ~ 18V
	5	Current	25 ~ 40 mA