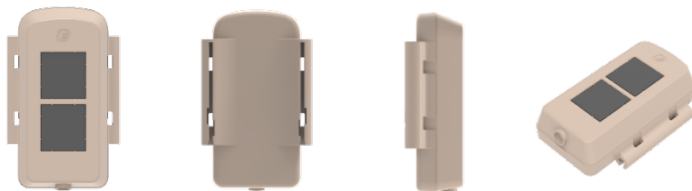# FLEX

Debut FLEX series comprises solar-powered GNSS-ACC trackers designed for harness attachment or use as a neck collar. These trackers feature ASA injection-molded housing for optimal durability and utilize highly efficient and independently functioning solar units to accommodate feather coverage.

Weighing between 25 and 30 grams, the trackers offer a range of transmission options including 2G, 4G, Argos, UBILINK X2, and LoRa.

CONTENTS

BASIC SPECIFICATIONS

| MODEL	FLEX
Appearance	
Dimensions	65mm*32mm*17mm (LWH)
Battery	210mAh lithium polymer rechargeable battery, with under-and-over-charging protection
Battery Life	Over 2000 GNSS positions under optimal GNSS satellite view at 5-minute interval
Antenna	Internal for 2G/4G/UBILINK X2, external for Argos/LoRa
Housing	ASA injection molding with excellent toughness and environment tolerance, multiple harness threading holes
Available Colors	Light brown
GNSS Module	Precision: CEP (50%) 5m Maximum update rate: 10 Hz
Working Temperature	-20°C~60°C (enough for very cold winter if close to warm-blood animal body)
Waterproof	IP 68 (7 ATM for the main part)
Data Types	- GNSS: longitude, latitude, altitude, altitude (ellipsoid), course, satellite quantity - ENV: voltage, light intensity, temperature - ODBA (overall dynamic body acceleration) - ACC: x/y/z acceleration data (upon request) - Beacon: with Debut series gateway devices
Data Storage	Collected data will be stored in memory before transmission. - Flash memory: 32 MB - Regular data storage: 460 days at default setting (1h GNSS+1h ENV+10 min ODBA) - BOOST data storage: 280,000 pieces - ACC data storage: 1,110,000 pieces
Working Schedule	Programmable from 1 min, changeable via 2G/4G network, or instantly via INTELINK (Bluetooth)
Firmware Upgrade	Remotely via 2G/4G network, or instantly via INTELINK (Bluetooth)

FLEX 2G/4G

SUB-MODELS

Name	Weight	Solar Unit
FLEX 2G	26±0.3g	2 (working independently against partial shielding)
FLEX 2G INTELINK [1]	26.3±0.3g	1
FLEX 4G	26±0.3g	2 (working independently against partial shielding)
FLEX 4G C3 [2]	42±0.5g	2 (working independently against partial shielding)

[1] As shown in the left photo, for FLEX 2G INTELINK we removed one solar unit to add a specific BLE antenna inside the housing. In this way, the device enjoys enhanced INTELINK distance of 500~1000 meters to facilitate specific tasks.

(For more about what INTELINK can do, please refer to other related documents or contact your sales representative.)
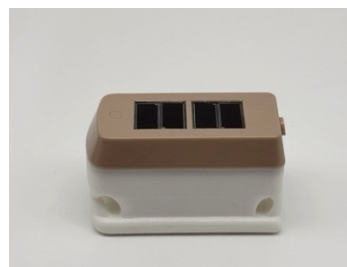
[2] As shown in the left photo, FLEX 4G C3 has an elevated base for the purpose of ensuring solar charging against feather coverage. The total height is 38mm. The lower housing is 3D-printed from nylon material. The color can be customized.

TRANSMISSION MODULE

2G:

Band	Uplink（MHz）	Downlink（MHz）	Output Power（dBm）
GSM850	824.2 ~ 848.8	869.2 ~ 893.8	33
EGSM900	880.2 ~ 914.8	925.2 ~ 959.8	33
DCS1800	1710.2 ~ 1784.8	1805.2 ~ 1879.8	30
PCS1900	1850.2 ~ 1909.8	1930.2 ~ 1989.8	30

Maximum uplink/downlink data rate: 85.6 Kbps/85.6 Kbps

4G:

Band	Uplink（MHz）	Downlink（MHz）	Output Power（dBm）
LTE-FDD B1	1920 ~1980	2110 ~2170	23 dBm±2.7 dB
LTE-FDD B3	1710 ~1785	1805 ~1880	23 dBm±2.8 dB
LTE-FDD B5	869 ~ 894	824 ~ 849	23 dBm±2.9 dB
LTE-FDD B8	880 ~915	925 ~960	23 dBm±2.1 dB

Maximum output power: 23 dBm

Maximum uplink/downlink data rate: 5 Mbps/10 Mbps

FLEX Argos

FLEX Argos provides both GNSS data, and Doppler locations estimated by the Argos system. Additionally, it is equipped with multiple sensors capable of generating data that reflects ambient environmental conditions and animal activity and behaviors.

In addition to scheduled Argos transmission, FLEX Argos utilizes patented INTELINK® technology to transmit data to smartphones or Debut series gateway devices. This facilitates ground search operations, retrieval of data stored onboard (often exceeding the capacity for Argos transmission), and enables real-time modeling based on raw acceleration data downloading and tagging using specialized tools.

To know more about how Debut® series Argos system works, please read document "*About Argos-GNSS System*".

SUB-MODELS

Name	Weight	Antenna	Solar Unit
FLEX Argos	30.4±0.3 g	Titanium-alloy braided wire/ steel wire with protective coating, extra protection on antenna root	2 (working independently against partial shielding)

TRANSMISSION BANDS

Duplex mode	f (MHz)	Uplink (MHz)	Duplex spacing (MHz)	Bandwidths (KHz)	Downlink (MHz)
Single frequency	401.65	399.99-401.690	65	10	466

FLEX LORA

FLEX LoRa utilizes a proprietary LoRa protocol for data transmission. When paired with a professional gateway device like the HUB from Druid, FLEX LoRa enables data downloading from distances of 8 to 10 kilometers in an ideal environment.

If you anticipate deploying FLEX LoRa in environments with poor GNSS signal reception, such as areas with dense overhead canopy or for tracking amphibians that remain close to the ground, we provide the option of incorporating a ceramic antenna. This antenna enhances radio-frequency sensitivity, while also removing one solar unit to ensure adequate antenna clearance.

SUB-MODELS

Name	Weight	Antenna	Solar Unit
FLEX LoRa	30.4±0.3 g	Titanium-alloy braided wire/ steel wire with protective coating	2 (working independently against partial shielding)
FLEX LoRa C1 [1]	30.2±0.2g	Titanium-alloy braided wire/ steel wire with protective coating	1 (working independently against partial shielding)

[1] FLEX LoRa C1 refers to the customized version with ceramic GNSS antenna introduced above.

TRANSMISSION BANDS

Specifications	LoRa	INTELINK
Frequency Bands	150~960 MHz	2.4 GHz
Maximum Output Power	22 dbm	8 dBm
Maximum Data Rate	62.5 kbps	1 Mbps
Transmission Distance (ideal condition in field)	10 km	50 m

TRANSMISSION STRATEGY

FLEX LoRa employs either LoRa or INTELINK for data transmission, necessitating the configuration of signal broadcasting duty cycles for both transmission modes. When the device is within range of an INTELINK connection (and within range of LoRa connection as well), it adheres to the duty cycle configuration to determine which type of connection should be established.

By default, the duty ratio for LoRa is set lower than that for INTELINK due to its higher power consumption. This approach enhances data transmission efficiency while also managing energy consumption more effectively.

FLEX UBILINK X2

FLEX UBILINK X2 is designed to collect high-precision GNSS data and use satellite network for real-time GPS location update. It does NOT have other sensors (e.g. accelerometer, barometer) like other FLEX series devices.

With two independently working GaAs solar units, it can efficiently harvest energy from the nature and provide nearly real-time GNSS location update.

Besides, FLEX UBILINK X2 has a memory to store over 6000 GNSS locations. If you anticipate the animal to arrive at a known site, you can configure the device to collect extra data and store on board, and then you can download the data via Bluetooth.

SUB-MODELS

Name	Antenna	Weight (g)	Dimensions (LWD, mm)	Solar Units
FLEX UBILINK X2 C2	Internal	23.5±0.3	61.6 x 28.2 x 16.5	2

SATELLITE RF OUTPUT

Output	Frequency (configurable)
24.5 dBm (the conducted power going into the antenna)	1611.25 MHz/1616.25 MHz/1618.75 MHz

To know more about how Debut® series UBILINK X2 system works, please read document "*About UBILINK X2 System*".

FLEX LORA UBILINK X2

FLEX LoRa UBILINK X2 is an upgraded version of FLEX LoRa, with an additional satellite transmission module integrated to provide GNSS location update when the device is out of your LoRa gateway coverage.

With FLEX LoRa as the main device, it is still capable of collecting various data types and transmitting detailed data to LoRa gateway once connected.
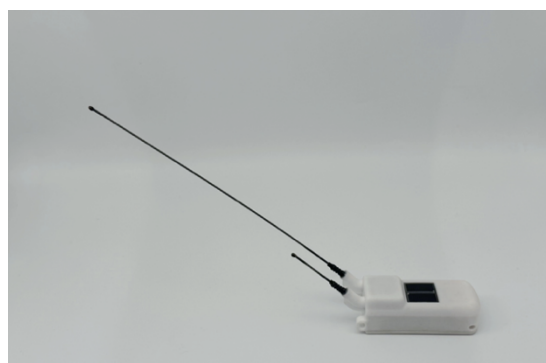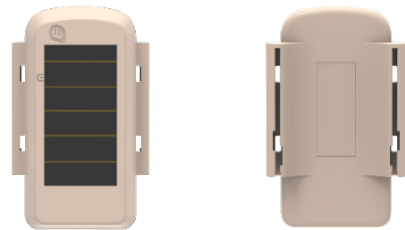
ACCESSORIES

FLEX series is designed with flexible holes to support both backpack harness and neck-collar attachment method.

BACK-MOUNT

Each device will be provided along with 2 meters of 5mm wide UHMWPE tape (for harness use) and 6 aluminum rings (for binding the harness) for free.

NECK-COLLAR

Injection-molding collars at 38/43/55 mm diameter are provided at the price of USD 6.99 for each.

FLEX 2G/4G version with internal antenna is suitable for such application.

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