CollarID
BY NEW LENS LABS

CollarID Mk II

Solar-Charged Wildlife Monitoring Collar with Multi-GNSS, Bioacoustic Recording, Motion and Environmental Sensing, and BLE + LoRa/LoRaWAN Radios

FEATURES

155 g complete unit without mounting hardware, 112.8 mm × 40 mm × 26.2 mm
2.96 Wh Li-ion battery, solar charged; USB-C charging at 400 mA
Concurrent multi-GNSS: GPS, GLONASS, Galileo, BeiDou
    ≤1.5 m CEP, open sky
    Activity-adaptive fix rate from on-collar accelerometer
MEMS microphone, 100 Hz to 80 kHz response
    8 kHz to 192 kHz sampling, 8- or 16-bit, FLAC or WAV
3-axis accelerometer, ±2/±4/±8 g, 25 Hz or 50 Hz, 12-bit
    On-collar ODBA/VeDBA and mortality (immobility) detection
3-axis magnetometer, ±50 gauss
Temperature, humidity, pressure, gas/VOC resistance
PM1.0/PM2.5/PM10 particulate sensor (optional)
Ambient light sensor, clear + ALS channels, 18-bit
Bluetooth Low Energy 5.x for configuration and firmware update
LoRa/LoRaWAN, 868 MHz or 915 MHz band, fixed at order
    LoRaWAN Class A (OTAA/ABP), US915/EU868/AU915, or peer-to-peer
    SF7 to SF12, 125/250/500 kHz, CR 4/5 to 4/8
microSD, exFAT, tested to 2 TB; all data logged on device
Per-sensor recording schedules, changeable remotely over LoRaWAN
Polycarbonate cover on an aluminium base, gasket sealed
Operating temperature −20°C to +60°C

APPLICATIONS

Wildlife movement and behaviour studies
Passive acoustic monitoring on the animal, including ultrasonic
Livestock behaviour and grazing studies
Environmental exposure (smoke, particulate, temperature, humidity)
Human–wildlife conflict, geofence and mortality alerts
Anti-poaching: vehicles, aircraft, gunshots and chainsaws on the acoustic record
Unattended remote-site and perimeter monitoring with solar autonomy
Tracking and acoustic logging of vehicles, vessels and field equipment
Distributed air-quality and environmental sensing without mains power

GENERAL DESCRIPTION

The CollarID Mk II is a low-power, GPS-tracked wildlife monitoring collar for behavioural and environmental research. It combines a multi-GNSS receiver, a bioacoustic microphone, 3-axis motion and magnetic sensing, an environmental sensor set and an optional particulate sensor in a 155 g sealed housing, powered by a 2.96 Wh Li-ion battery that is charged from an integrated solar panel.

All sensor data is logged at full resolution to a microSD card on the device. Summary statistics (position, battery, activity and status flags) are transmitted over LoRaWAN to an installed gateway, or over peer-to-peer LoRa to a handheld receiver, for monitoring during a deployment. Recording schedules are set over Bluetooth from a phone or browser and can be changed remotely over LoRaWAN after deployment.

The same sensing and radio set suits unattended monitoring of sites, perimeters and equipment: the unit logs continuously without mains power or a network, and reports in over LoRa where a receiver is in range.

The housing is a polycarbonate cover on an aluminium base with a curved saddle, sealed by a gasket and six screws. The cover was validated by finite-element analysis against lion and hyena bite forces (Table 2) and the sealed unit tested with pressurised warm-water washdown. Current production hardware is Rev C.

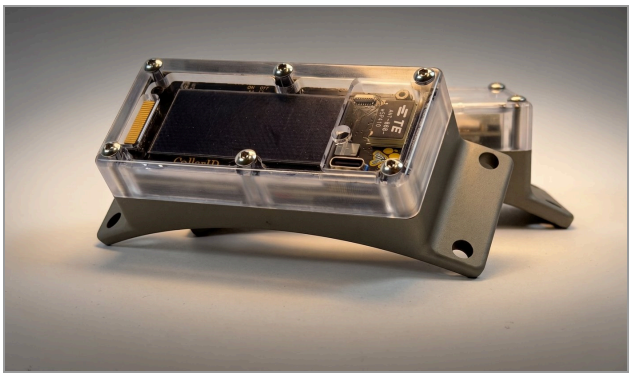


Figure 1. CollarID Mk II, cover fitted

FUNCTIONAL BLOCK DIAGRAM

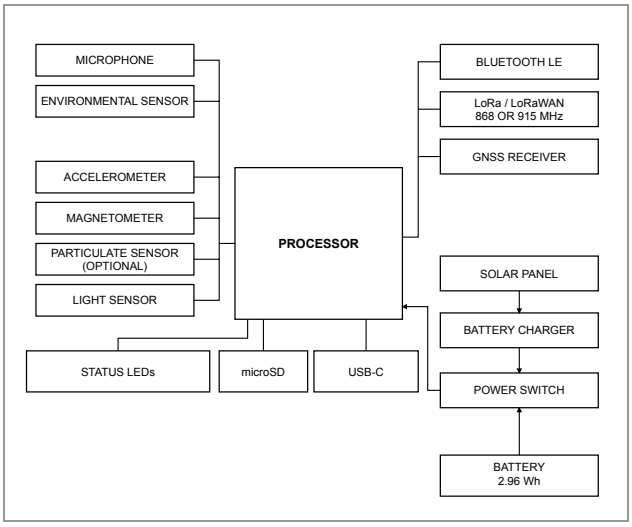


Figure 2. Functional block diagram

SPECIFICATIONS

Typical values are for the Rev C production hardware at 25°C unless otherwise noted. Values marked † are settings of the standard firmware release, not hardware limits; other values can be enabled on request.

Table 1. Operating Conditions

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
Operating temperature		−20		+60	°C
Storage temperature		−40		+85	°C
Ingress	Bench test: two cycles of pressurised warm-water spray, 55°C to 65°C, with detergent; no ingress, no functional degradation. Formal IPX certification planned.				

Table 2. Physical and Mechanical

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
Overall length	Cover fitted, including mounting tabs at each end		112.8		mm
Body length	Across the body alone		87		mm
Width			40		mm
Height	Cover fitted		26.2		mm
Mass	Complete unit, without band or mounting hardware		155		g
Mounting slot diameter	Four slots, two at each end		5.5		mm
Slot spacing across band	Depends on collar version; housing size is the same		20 / 30		mm
Outer slot centres	End to end (4 in)		101.6		mm
Saddle radius	Underside of base		R110		mm
Cover	Polycarbonate				
Base	Aluminium, curved saddle, mounting foot at each end				
Seal	Gasket compressed by six perimeter screws				
Bite loading	Cover validated by finite-element analysis against documented canine bite forces of the spotted hyena and lion, applied over a 2.5 mm canine tip. Localised denting predicted; bulk fracture not predicted	773		1768	N

Table 3. Power

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
Battery capacity	Li-ion / LiPo		2.96		Wh
USB-C charge current	Approximately 0.5 C; full charge from empty about 2 h		400		mA
Solar charging	Charges the battery from the integrated panel; tolerant of partial-shade canopy conditions				
Hibernation entry	State of charge at or below which the firmware hibernates		10		%
Hibernation resume	State of charge above which operation resumes		20		%
Hibernation re-check interval	Collar wakes to re-check state of charge; with solar, recovers unattended		8		h
Energy budgeting	Each subsystem is budgeted from bench measurements; the configurator reports the solar exposure a schedule needs				
Field-validated duty cycle	GNSS fix plus LoRaWAN uplink, sustained for several consecutive months on free-grazing cattle[1]		5		min

[1] Achievable cadence depends on solar exposure, animal behaviour and gateway coverage.

Table 4. GNSS

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
Constellations	GPS, GLONASS, Galileo, BeiDou, concurrent; integrated antenna				
Horizontal position accuracy	CEP, open sky			1.5	m
Timing accuracy	RMS; used to synchronise the collar clock		30		ns
Fix rate	Set per schedule; optionally adaptive to activity measured by the accelerometer (faster when moving, slower at rest)				

Table 5. Radios

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
BLUETOOTH LOW ENERGY					
Standard	BLE 5.x. Used for schedule configuration, read-back and firmware update from the phone app or a Chrome/Edge browser				
LoRa / LoRaWAN					
Frequency band	Each unit is built for one band, set by its fitted antenna; specify at order		868 or 915		MHz
LoRaWAN regions	US915, EU868, AU915; set per collar in the configurator to match the unit\'s band				
Modes	LoRaWAN Class A, OTAA or ABP; or peer-to-peer LoRa (carrier frequency free)				
Spreading factor		SF7		SF12	
Bandwidth			125 / 250 / 500		kHz
Transmit power	Configurable; limited by the regional parameters of the LoRaWAN region in use			22	dBm
Range to gateway	Installed gateway, clear line of sight; less in thick bush		10		km
Range to handheld receiver	Line of sight		a few		km
Uplink content	Position, battery, activity, mortality flag and status; location optionally encrypted				

Table 6. Audio

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
Microphone	Digital MEMS, mono				
Frequency response	Sensitive into the ultrasonic	100		80 k	Hz
Sample rate	8, 16, 48, 96 or 192 kHz per schedule; 16 kHz default	8	16	192	kHz
Bit depth	Signed; 16-bit default	8	16		bits
File format	Lossless FLAC (default) or WAV				

Table 7. Sensors

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
ACCELEROMETER (3-AXIS MEMS)					
Full-scale range	Selectable; ±2 g default	±2		±8	g
Output data rate	25 Hz default	25		50†	Hz
Resolution			12		bits
On-collar processing	ODBA and VeDBA computed on the collar, sent with every uplink, and used for adaptive GNSS and mortality detection				
MAGNETOMETER (3-AXIS MEMS)					
Full-scale range			±50		gauss
Sensitivity			1.5		mG/LSB
Sample rate	One reading per minute, or a continuous stream to the card	1		16†	Hz
ENVIRONMENTAL					
Measurands	Temperature, relative humidity, barometric pressure, gas/VOC resistance; on-device calibration				
Pressure range		300		1100	hPa
PARTICULATE MATTER (OPTIONAL)					
Size fractions	PM1.0, PM2.5, PM10				
Duty cycle	Default measurement interval		15†		min
AMBIENT LIGHT					
Channels	Clear and ALS; logged as raw counts				
Integration time	Gain 1†		100†		ms

† Setting of the standard firmware release, not a hardware limit; other values can be enabled on request.

Table 8. Storage and Firmware

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
microSD card	Push-push socket, exFAT; all recordings and logs held on the card			2	TB
Configuration	Per-sensor recording schedules set over Bluetooth from the app or browser; changeable remotely over LoRaWAN after deployment				
Firmware update	Over Bluetooth from a Chrome/Edge browser, or over USB-C				

OUTLINE DIMENSIONS AND MOUNTING

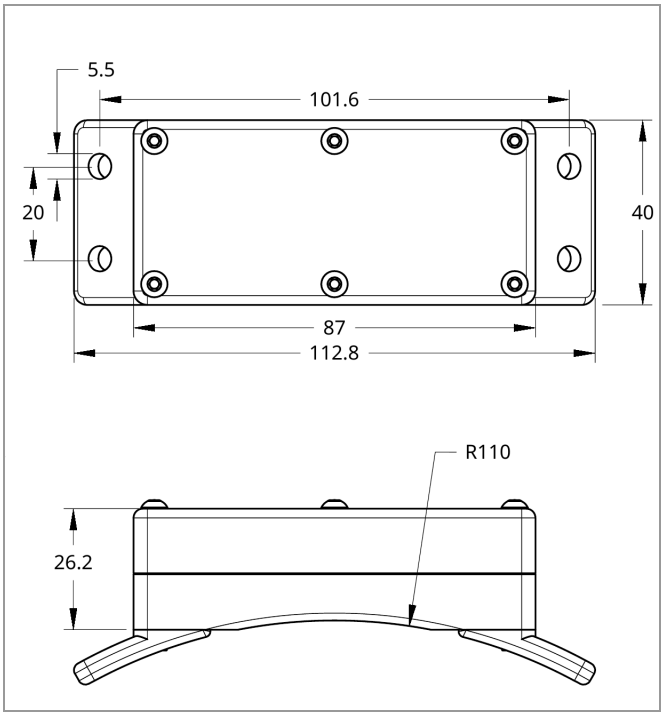


Figure 3. Housing outline. Dimensions in millimetres. Full drawings: collarid.org/fitting

The housing rides on the outside of the band. A backing plate under the band carries two studs at each end; the studs pass up through the band and the slots in each mounting foot, and domed cap nuts close them on top, so the band is clamped rather than threaded. Band width, thickness and fastener length depend on the collar being built and are chosen per species.

Table 9. Mounting Summary

Parameter	Value
Footprint	112.8 mm × 40 mm including mounting tabs; 87 mm body
Height	26.2 mm, cover fitted
Slots	Four, Ø5.5 mm, two at each end; 20 mm or 30 mm across the band by collar version; outer centres 101.6 mm (4 in)
Saddle radius	R110

Table 10. CollarDT Detachment Module (Pilot)

Parameter	Value
Function	Release unit that lets the collar drop off at a set date and time; runs standalone on any collar band with its own battery and clock
Release triggers	Scheduled; on command or by geofence through a paired CollarID Mk II Mesh collar; manual over Bluetooth; automatic safety release at low battery (above 0°C only)
Mass	135 g (290 g with a CollarID Mk II, before band and fasteners)
Footprint	72.8 mm × 43 mm; 23.6 mm tall. Replaces a section of the band; band ends bolt to M4 fixings on each side of the partition line
Battery life	4+ years; refurbishable between deployments

ORDERING GUIDE

Model	Description	Band	Status
CollarID Mk II	Collar unit, Rev C hardware; without band. Particulate sensor optional at order	868 or 915 MHz, specify at order	Production
CollarID Mk II Mesh	As above, with pairing for CollarDT and other add-ons; particulate sensor optional at order	868 or 915 MHz, specify at order	Production
CollarDT	Detachment module, 135 g; see Table 10	—	Pilot
Handheld receiver	Portable LoRa receiver with antenna; hears collars directly and gives a bearing to the animal or a dropped collar	Matches collars	Available
LoRaWAN gateway	Off-the-shelf gateway for a mast at camp, about 10 km with clear line of sight; set-up support provided	Matches collars	Available

Collars are quoted per deployment. State the species or application, number of units, site and, if known, band stock and neck measurements. Quotes and consultation: patrick@collarid.org. Support: support@collarid.org. Full data sheet, device manual and fitting guide: collarid.org/docs.

COMPLIANCE

End-product certification is in progress; FCC, IC and CE are to be determined. Formal IPX ingress certification is planned. Operate the LoRaWAN radio only in the region configured for the collar.