ToF(Time of Flight) Sensor

MacRay-LToF

MACNMAN

MacRay-LToF Overview

MacRay-LToF is a compact Time-of-Flight (ToF) distance sensor engineered for high-precision, non-contact measurement in both indoor and outdoor environments. Leveraging LoRaWAN® communication, it delivers real-time data for accurate object detection, level monitoring, and event-based alerts.

MacRay-LToF is ideal for smart parking systems (detecting vehicle presence), waste bin monitoring (filling levels), liquid tank level sensing, people counting, and proximity-based automation. Its fast response and precise range make it well-suited for smart city infrastructure, industrial automation, and resource management use cases.

Sensors	ToF (Time of Flight)
Wireless Technology	LoRa

Features

True distance measurement

independent of target size, color, or reflectivity

High-speed & accurate

Distance sensing with millimeter-level precision

Truly invisible IR beam

940nm wavelength for safe & undetectable sensing

LoRaWAN® Class A & C communication

Communication for flexible uplink strategies

IP66-Rated Enclosure (Sensor)

Designed for industrial & outdoor environments

Low power consumption

Optimized for battery-powered operations

Supports Macnman Beam Protocol

Direct control, & local device-to-device actions

Secure onboarding with pre-flashed DevEUI / AppEUI / AppKey

Supports periodic, threshold-based, & event-driven uplinks

Compatible with all LoRaWAN® network servers & gateways

Specifications

Measurement

Distance Range	Short Range Mode - 4 cm to 130 cm
	Long Range Mode - 4 cm to 400 cm *
Accuracy	±3% typical *
Repeatability	< ±5 mm (Indoor lighting conditions)
	< ±10 mm (under strong ambient light)
Resolution	Up to 1 mm
Measurement Rate	Up to 60 Hz (adjustable)
Field of View (FoV)	Programmable, up to 27°
Ambient Light Immunity	Up to 100k Lux (sunlight)
Wavelength	940 nm (IR, eye-safe & invisible)
Response Time	< 25 ms (typical)
Target Reflectivity Tolerance	Works reliably on dark, light, and low-reflective surfaces

Led Status

LED Type	1 Internal Multi-Color LED
Solid Blue	Device is connected with Maya App
Flashing Blue	OTA (Over-the-Air) update in progress
Slow Blinking Green	Attempting to connect to the LoRaWAN® network
Single Red Blink	A confirmed parameter of MacRay is being modified

Wireless Transmission

Technology	LoRaWAN® (v1.0.4), Macnman Beam Protocol
Antenna	Internal high-efficiency antenna
Supported Bands	IN865 / RU864 / EU868 / US915 / AU915 / KR920 / AS923-1/2/3/4
Tx Power	16 dBm @ 868 MHz 20 dBm @ 915 MHz 19 dBm @ 470 MHz
Sensitivity	-137 dBm @ 300 bps
Activation	OTAA / ABP
LoRaWAN® Class	Class A (default), Configurable to Class C via Maya

Configuration

Configuration	Via Macnman Maya Android App
Maya Fatures	Threshold / Trigger / Sample based alarm triggers
Stored Records	30,000 Records (accessible via Maya)
Remote Configuration	Yes - JSON format Data

Physical Characteristics

Power Supply	Inbuilt Battery - 12,000 mAh / Optional Power Operated
Operating Temp	-40°C to +80°C
Humidity Range	0% to 100% RH (non-condensing)
Ingress Protection	IP65 standard (IP67 optional variant)
Housing Material	ABS Plastic
Color	Matte Black
Weight	~140g (with 19Ah battery)
Dimensions	Approx. 96 mm X 96 mm X 23 mm (customizable branding available)
Mounting Options	Wall Mounting - Screw fix type

Certifications

Regulatory	WPC
Environmental	RoHS compliant

Product Dimension

MacRay - U1 - Standard Version

Image Credits : Best Sensors

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