

# TFmini-S

## Compact Time-of-Flight LiDAR Distance Sensor

12 m-class miniature ranging module for robotics, UAVs, embedded systems and industrial sensing



| Parameter           | Specification                              |
|---------------------|--------------------------------------------|
| Measurement range   | 0.1–12 m                                   |
| Maximum update rate | Up to 1000 Hz (source feature information) |
| Distance resolution | 1 cm                                       |
| Typical accuracy    | ±6 cm from 0.1–6 m; ±1% from 6–12 m        |
| Field of view       | 2°                                         |
| Optical source      | 850 nm VCSEL                               |
| Supply              | 5 V ±0.1 V                                 |
| Communication       | UART / I <sup>2</sup> C                    |
| Size                | 42 × 15 × 16 mm                            |
| Weight              | 5 g ±0.3 g                                 |

## 1. Product Overview

TFmini-S is a compact single-point Time-of-Flight (ToF) laser ranging module. The supplied product information describes it as an upgraded member of the TFmini family, combining a small mechanical envelope with improved performance and multiple host-interface options. Its optical, structural and electronic design targets applications where low size, weight and power are important.

## 2. Key Selling Points

- Long-range sensing in a miniature package: up to 12 m under high-reflectivity target conditions.
- High-speed ranging: product feature material states support for output rates up to 1000 Hz.
- Low power consumption: specified power  $\leq 0.7$  W.
- Very low mass: 5 g  $\pm 0.3$  g.
- Compact 42 × 15 × 16 mm body for space-constrained embedded designs.
- Narrow 2° field of view for focused single-point distance measurement.
- Multiple embedded interfaces: UART and I<sup>2</sup>C, with LVTTTL 3.3 V communication level.
- 850 nm VCSEL optical source with Class 1 laser classification per EN 60825.
- Ambient-light capability specified to 70 klux.
- PC/ABS enclosure and 0°C to 60°C operating-temperature range.

## 3. Ranging Performance

| Parameter                                                         | Specification |
|-------------------------------------------------------------------|---------------|
| Range at 90% reflectivity                                         | 0.1–12 m      |
| Range at 10% reflectivity                                         | 0.1–7 m       |
| Accuracy, 0.1–6 m                                                 | $\pm 6$ cm    |
| Accuracy, 6–12 m                                                  | $\pm 1\%$     |
| Distance resolution                                               | 1 cm          |
| Nominal frequency listed in parameter table                       | 100 Hz        |
| Maximum configurable/output frequency stated in feature statement | up to 1000 Hz |
| Ambient-light tolerance                                           | 70 klux       |
| Field of view                                                     | 2°            |

*The source material presents both a 100 Hz frequency value in the detailed parameter table and a feature statement of up to 1000 Hz. This datasheet preserves both values rather than treating them as identical specifications.*

## 4. Optical Specifications

| Parameter         | Specification      |
|-------------------|--------------------|
| Light source      | VCSEL              |
| Center wavelength | 850 nm             |
| Laser safety      | Class 1 (EN 60825) |
| Field of view     | 2°                 |

## 5. Electrical Specifications

| Parameter                | Specification           |
|--------------------------|-------------------------|
| Supply voltage           | 5 V $\pm$ 0.1 V         |
| Average current          | $\leq$ 140 mA           |
| Power consumption        | $\leq$ 0.7 W            |
| Peak current             | 200 mA                  |
| Logic level              | LVTTTL (3.3 V)          |
| Communication interfaces | UART / I <sup>2</sup> C |

## 6. Mechanical & Environmental Specifications

| Parameter             | Specification   |
|-----------------------|-----------------|
| Dimensions            | 42 × 15 × 16 mm |
| Housing material      | PC/ABS          |
| Weight                | 5 g $\pm$ 0.3 g |
| Operating temperature | 0°C to 60°C     |
| Storage temperature   | -20°C to 75°C   |
| Cable length          | 10 cm           |



## 7. Functional Characteristics

TFmini-S performs non-contact distance measurement using Time-of-Flight optical ranging. The module emits near-infrared light and measures the returned signal to determine target distance. Its narrow field of view and high update capability make it suitable for fast point-distance measurements where a compact sensor must be integrated close to the controlled mechanism.

## 8. Interface & System Integration

The supplied material identifies UART and I<sup>2</sup>C communication interfaces and a 3.3 V LVTTTL communication level. This allows integration with embedded controllers, autopilots and microcontroller-based systems. The product material also references use with Pixhawk and Arduino-class platforms.

## 9. Typical Applications

- UAV altitude / terrain distance sensing
- Robotics obstacle and proximity sensing
- Embedded distance measurement
- Autonomous and mobile platforms
- Industrial position or presence detection
- Smart equipment and compact instrumentation
- Microcontroller and autopilot sensor integration

## 10. Integration Notes

- Use a regulated 5 V supply consistent with the stated  $\pm 0.1$  V supply tolerance.
- Observe 3.3 V LVTTTL interface levels when connecting UART signals.
- Account for target reflectivity when estimating usable range; the supplied data specifies different range limits for 90% and 10% reflectivity.
- Keep the optical apertures unobstructed and mechanically aligned with the measurement direction.
- Consider ambient-light conditions when designing outdoor applications; the supplied specification states 70 klux.
- Select the output/update rate according to host-processing and application bandwidth requirements.

## 11. Source Notes

This datasheet was created from the supplied product package. Chinese-language source images were used only to extract technical information and are intentionally not reproduced in this document. Parameters not explicitly present in the supplied material have not been invented.