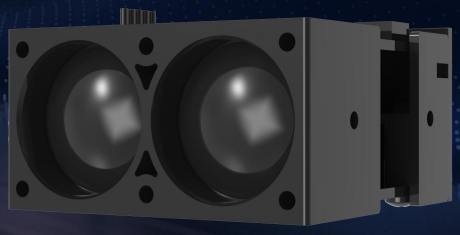
Benewake

TFA1500-L single point LiDAR

Datasheet

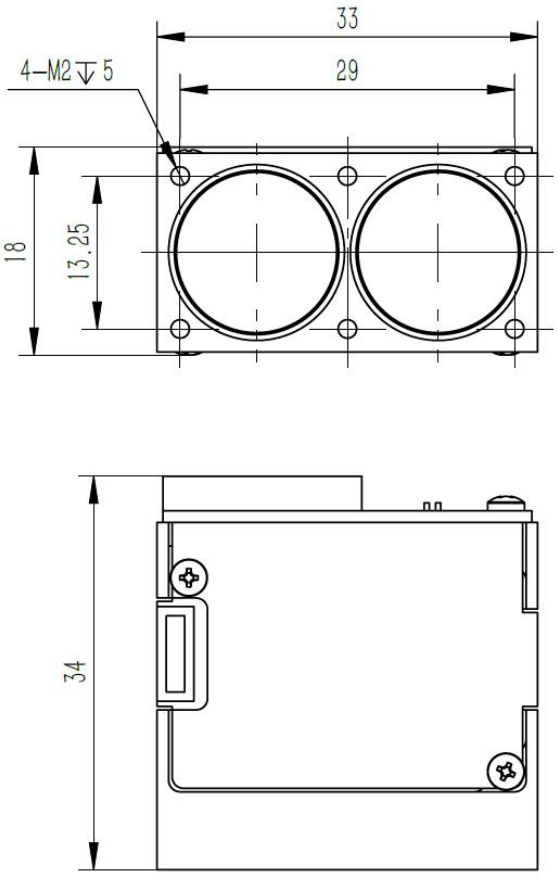


The TFA1500-L is a long-range distance measurement dToF LiDAR that can achieve high-precision measurements for targets with varying reflectivity, even in strong sunlight conditions. It features a compact size and lightweight design, making it particularly suitable for integration into UAV gimbals. Additionally, it is widely used in industries such as perimeter security, overhead crane hook collision prevention, and engineering surveying.

1 Technical Specifications

Performance Parameter	
Detection range①	0.05 m~1500 m
Accuracy①	±50 cm @＜100 m, 1.5% @100 m~200 m
Repeatability①	＜20 cm @＜200 m
Distance resolution	1 cm
Frame rate②	50 Hz @long range, 1000 Hz @close range
Optical Parameter	
Light source	EEL
Central wavelength	905 nm
FoV	＜0.5°
Eye safety	Class 2 [EN60825]
Ambient light resistance	100 KLux
Mechanical/Electrical Parameters	
Average power consumption③	＜1.1W
Power supply	DC 9V ~ 36V
Data output	3.3V TTL
Operating temperature	-40℃ ~ +60℃ (Non-condensing)
Storage temperature	-40℃ ~ +85℃
Operating humidity	35~85% RH (Non-condensing)
Dimensions	TYP. 33*34*18 mm^3
Weight	20g
Communication Protocol	

Communication interface	UART
Baud rate	Default 460800
Data bit	8
Stop bit	1
Parity	None
Dimensions (Unit: mm)	



Notes to the specifications:

1. Measured during the day outdoors, with a target reflectivity of 90%, and when the laser spot is entirely on the target object;
2. The frame rate is adaptively adjusted based on the intensity of the light signals returned from the target. When the energy is strong, it will output at 1000 Hz;
3. Measurements were taken at a temperature of 25°C.

2 Communication Protocol

2.1 Pin Diagram

Pin definitions of the distance measuring module in order, 3.3V TTL serial output.

Table 1 Pin Definitions

Pin	Blue	Green	Yellow	Black	Red
Definition	RX	TX	GND	GND	DC 9~36V

2.2 Data protocol

After the LiDAR is powered on, it actively outputs data (one frame of data consists of 5 bytes). If no measurement is detected, it outputs 0.
Example of one frame of data: 5C 02 11 03 EC.

Table 2 Data Frame

Data bit	Definition	Description
Byet 1	Fixed frame header	Fixed as 5C
Byet 2-4	3 bytes indicates the measurement distance	Such as 02 11 03,three bytes indicate the measured distance of 200962cm,Little-endian mode,range 0-16777215cm
Byet 5	Parity bit	Like EC, start from 02 and end at 03, perform a checksum calculation and take the complement. The checksum function can be found in the example below the table.

Note: Checksum function (from the second byte to the second-to-last byte, calculate the sum and take the complement).

```
uint8_t Check_Sum(uint8_t *_pbuff, uint16_t _cmdLen)
{
   uint8_t cmd_sum=0;
   uint16_t i;
   for(i=0;i<_cmdLen;i++)
   {
      cmd_sum += _pbuff[i];
   }
   cmd_sum = (~cmd_sum);
   return    cmd_sum;
```

}

2.3 Custom configuration

Table 3 Common configuration instructions

Configurable Items	Upward Command	Downward Command	Description
Standby	5A 8A 02 00 00 73	5A 0A 02 00 00 F3	/
Output Raw Data	5A 8A 02 01 00 72	5A 0A 02 01 00 F2	/
Output Measurement Distance	5A 8A 02 02 00 71	5A 0A 02 02 00 F1	/
Single Measurement	5A 8A 02 03 00 70	5A 0A 02 03 00 F0	/
Read Distance Module Serial Number	5A 8D 02 XX XX Checksum (complement of the sum)	5A 0D 02 0D 0D Checksum (complement of the sum)	XX XX represents the serial number: Little-endian format, for example, 0x10 01 displays the module serial number on the host computer (with an 'S' in front of the number): S00272
Distance Module Baud Rate Setting	5A 86 02 80 04 Checksum (complement of the sum)	5A 86 02 80 04 Checksum (complement of the sum)	80 04: Little-endian format, which means 1152, indicates that the set baud rate is 115200 = 1152 * 100
Distance Module Software Version Number	5A 96 02 03 02 Checksum (complement of the sum)	5A 16 02 16 16 Checksum (complement of the sum)	03 02 indicates software version V2.3: Little-endian format, where 02 represents 2, 03 represents 3, with a dot (.) in between