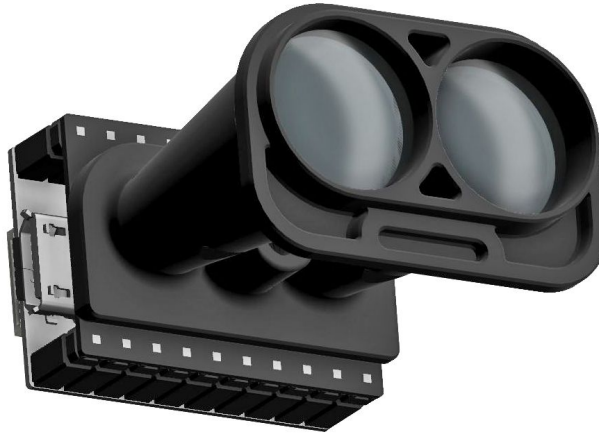


## LiDAR API development kit



### Features

- *Application:* API development for LiDAR applications
- *Key features:* Multiple return signals, signal strength, noise measurement etc.  
*Upgradable through the **LightWare Studio** application*
- *Measuring range:* 0.2 ... 100 m (80% reflective, large target)
- *Size:* 40 mm x 30 mm x 20 mm
- *Weight:* 10 grams
- *Measuring speed:* 10 to 1000 readings per second (configurable)
- *Interfaces:* Serial, I2C and USB
- *Integration:* User APIs, **LightWare Studio**
- *Safety:* Eye safe laser emission Class 1M
- *Environmental:* Open frame, no IP rating



FM 654831

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## Product ordering codes

Model family	Model name	Model description
SF22	SF22/C (100 m)	Open frame LiDAR sensor, max 100 m

## Disclaimer

Information found in this document is used entirely at the reader's own risk and whilst every effort has been made to ensure its validity, neither LightWare Optoelectronics (Pty) Ltd nor its representatives make any warranties with respect to the accuracy of the information contained herein.

## 1. Overview

The SF22/C is a LiDAR API development kit that can be used to test out new applications before investing in more expensive devices. It is a small form factor, general purpose LiDAR sensor that measures the distance to objects by timing a laser flash. Accuracy is not generally affected by the colour or texture of the target surface, nor the angle of incidence of the laser beam. The SF22/C is tolerant to changes in background lighting conditions, wind and noise.

The following capabilities are included in the SF22/C as standard:

- Measurement to the nearest detected surface (first return).
- Measurement to the farthest detected surface (last return).
- Selectable filters to adjust the dynamic response to moving targets.
- Adjustable measuring update rate.
- Internal status monitoring.

There are three communication interfaces available:

- A micro USB port that connects to a PC running the **LightWare Studio** application for visualisation of results, to make configuration changes and for upgrading the firmware.
- A serial port (3.3V logic level) with configurable baud rate to connect to a host controller.
- An I2C serial bus (3.3V logic level and 3.3k pull up resistors) with configurable address as an alternative to the serial port when multiple devices are connected on a common bus.

Application software support is available from the LightWare **API** repository.

The SF22/C LiDAR API development kit is rated laser Class 1M eye safe. Do not view the laser with magnifying optics such as microscopes, binoculars or telescopes.

## 2. Specifications

<b>Performance</b>	
<b>Range</b>	0.2 ... 100 m (white wall in daylight conditions)
<b>Resolution</b>	1 cm
<b>Update rate</b>	10 ... 1000 readings per second
<b>Accuracy</b>	±10 cm
<b>Connections</b>	
<b>Power supply voltage</b>	4.5 V ... 5.5 V
<b>Power supply current</b>	100 mA
<b>Outputs &amp; interfaces</b>	Serial and I2C (3.3 V), micro USB
<b>Mechanical</b>	
<b>Dimensions</b>	40 mm x 30 mm x 20 mm
<b>Weight</b>	10 g (excluding cables)
<b>Optical</b>	
<b>Laser safety</b>	Class 1M (refer to <a href="http://www.lightware.co.za/safety">www.lightware.co.za/safety</a> for full details)
<b>Optical aperture</b>	28 mm x 15 mm
<b>Beam divergence</b>	< 0.5°
<b>Environmental</b>	
<b>Operating temperature</b>	-10 ... +50°C
<b>Approvals</b>	FDA: 1710193-000 (2019/08)
<b>Enclosure rating</b>	N/A
<b>Accessories</b>	
<b>Main cable</b>	Main cable - 6 way, DigiKey 455-3003-ND; Mating socket, DigiKey 455-1806-1-ND
<b>USB cable</b>	USB cable - DigiKey AE10418-ND
<b>Default settings</b>	
<b>Serial port settings</b>	115200 baud, 8 data bits, 1 stop bit, no parity, no handshaking
<b>I2C address</b>	0x66 (Hex), 102 (Dec)
<b>Update rate</b>	20 readings per second
<b>Main cable connections</b>	
<b>1</b>	GND - power supply negative
<b>2</b>	+ 5 V - power supply positive (4.5 V to 5.5 V at 100 mA)
<b>3</b>	TXD - serial data transmitted
<b>4</b>	RXD - serial data received
<b>5</b>	SCL - I2C clock line
<b>6</b>	SDA - I2C data line

### 3. Quickstart guide

#### Caution

The SF22/C laser rangefinder contains a laser and should never be aimed at a person or an animal. Do not look at the beam directly with optical instruments.

- Download the **LightWare Studio** application to your PC or laptop.
- Install and start the application by following the prompts.
- Connect the SF22/C to the PC using the USB cable provided.
- The SF22/C will automatically be detected by the application.
- Settings options will be displayed in the main window along with a visualisation of the data coming from the SF22/C.
- Change the settings to suit your application.
- Unplug the USB cable.

Once the settings have been entered, your host controller can communicate with the SF22/C through the serial or I2C ports. API support is available from the LightWare **API** repository. To test the serial and I2C ports the **LightWare Communication Adaptor** is available.

Firmware updates and additional features will become available from time to time. These can be installed into the SF22/C using the USB port and the **LightWare Studio** application.

## 4. Safety instructions

The SF22/C emits ionizing laser radiation. The level of the laser emission is Class 1M which indicates that the laser beam is safe to look at with the unaided eye but must not be viewed using binoculars or other optical devices. Notwithstanding the safety rating, avoid looking into the beam and switch the unit off when working in the area.

### Caution

**The use of optical instruments with this product will increase eye hazard.**

The SF22/C should not be disassembled or modified in any way. The laser eye safety rating depends on the mechanical integrity of the optics and electronics so if these are damaged do not continue using the SF22/C. There are no user serviceable parts and maintenance or repair must only be carried out by the manufacturer or a qualified service agent.

No regular maintenance is required for the SF22/C but if the lenses start to collect dust then they may be wiped with suitable lens cleaning materials.

### 4.1. Labelling



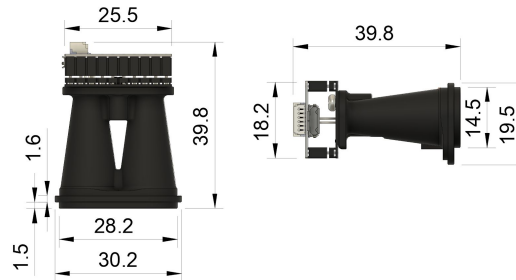
*Laser radiation information and product identification labels*

### 4.2. Laser radiation information

Specification	Value / AEL	Notes
Eye safety classification	Class 1M	
Laser wavelength	905 nm	
Pulse width	15 ns	
Pulse frequency	20 kHz	
Average power	< 2.5 mW	
NOHD	0.5 m	Distance beyond which binoculars with may be used safely

## 5. Hardware

### 5.1. Dimension drawings



Dimension drawings, units in mm

### 5.2. Installation

SF22/C requires a clear line-of-sight to measure distance to a target surface. It can be mounted with a vertical or horizontal lens orientation.



Several mounting accessories can be purchased or downloaded from the [LightWare website](https://www.lightware.co.za).

Do not mount the rangefinder within the cavity of an airframe, rather mount it directly at the surface boundary. This can prevent beam divergence from causing false readings in short range distances, or out of range conditions.



## Precautions

**Ensure that nothing is in the path of the laser beam.**

**Ensure that no shiny or highly reflective surfaces are near the path of the beam.**

**Secure the cable with zip ties to protect it from pulling on the connectors.**

## 2. Revision history

Revision	Date	Comments
Rev 0	2019/08/29	First edition