# Single Photon Counting Module COUNT® S Series

## Description

Laser Components' COUNT® S Series of Single Photon Counting Modules has been developed to offer a unique combination of high quantum efficiency, large active area and ease of use for photon counting applications. Combining LASER COMPONENTS' SAP500 silicon avalanche photodiode with specially developed passive quenching and signal processing electronics, the module offers everything needed for single photon detection from 400-1000 nm. Incoming photons generate corresponding electrical pulses which may be conveniently read out at the TTL output. The optional FC connector provides a convenient method for connecting the module to the sample using a multimode or singlemode optical fiber.

## Features

- Optional FC fiber connector
- Single 12 V DC supply operation
- Stable count rate (no bi-stability)

## Applications

- Particle sizing
- Fluorescence analysis
- LIDAR
- Astronomy
- Quantum cryptography
- Spectroscopy



Germany & Other Countries
Laser Components GmbH
Tel: +49 8142 2864 – 0
Fax: +49 8142 2864 – 11
info@lasercomponents.com
www.lasercomponents.com

France
Laser Components S.A.S.
Tel: +33 1 39 59 52 25
Fax: +33 1 39 59 53 50
info@lasercomponents.fr
www.lasercomponents.fr

United Kingdom
Laser Components (UK) Ltd.
Tel: +44 1245 491 499
Fax: +44 1245 491 801
info@lasercomponents.co.uk
www.lasercomponents.co.uk

Nordic Countries
Laser Components Nordic AB
Tel: +46 31 703 71 73
Fax: +46 31 703 71 01
info@lasercomponents.se
www.lasercomponents.se

USA
Laser Components USA, Inc.
Tel: +1 603 821 – 7040
Fax: +1 603 821 – 7041
info@laser-components.com
www.laser-components.com

## Technical Specifications for COUNT® Module

| Parameter | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|
| Spectral range | 400 | | 1000 | nm |
| Dark count rate<br>COUNT-1000S<br>COUNT-2000S<br>COUNT-5000S | | | <br>1000<br>2000<br>5000 | <br>Counts/s<br>Counts/s<br>Counts/s |
| Photon detection efficiency Pd[1] at:<br>405 nm<br>670 nm<br>810 nm | <br>-<br>-<br>- | <br>60<br>65<br>45 | | <br>%<br>%<br>% |
| Pd variation at constant temperature | | TBC | | % |
| Active area diameter (nominal) [2] | | 500 | | µm |
| Timing resolution | | 600 | | ps |
| Dead time | 300 | 700 | 1500 | ns |
| TTL output pulse length | | 22 | | ns |
| TTL output pulse amplitude (into 50 Ohm) | | 2 | | V |
| Delay between photon impact and TTL pulse | | 20 | | ns |
| Supply voltage | 11.5 | 12.0 | 12.5 | V |
| Supply current (switch on) | | 0.5 | | A |
| Supply current operation at 100 Kcps | | 0.15 | | A |

[1] Specifications valid for modules without FC-connector

[2] Timing resolution depends on count rate and wavelength.



Germany & Other Countries
Laser Components GmbH
Tel: +49 8142 2864 – 0
Fax: +49 8142 2864 – 11
info@lasercomponents.com
www.lasercomponents.com

France
Laser Components S.A.S.
Tel: +33 1 39 59 52 25
Fax: +33 1 39 59 53 50
info@lasercomponents.fr
www.lasercomponents.fr

United Kingdom
Laser Components (UK) Ltd.
Tel: +44 1245 491 499
Fax: +44 1245 491 801
info@lasercomponents.co.uk
www.lasercomponents.co.uk

Nordic Countries
Laser Components Nordic AB
Tel: +46 31 703 71 73
Fax: +46 31 703 71 01
info@lasercomponents.se
www.lasercomponents.se

USA
Laser Components USA, Inc.
Tel: +1 603 821 – 7040
Fax: +1 603 821 – 7041
info@laser-components.com
www.laser-components.com

## Absolute Maximum Ratings

| | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|
| Supply voltage | 11.5 | 12.0 | 12.5 | V |
| Operating temperature | 10 | | 30 | °C |
| Storage temperature | -20 | | 70 | °C |
| Count rate | | 500 | | Kcps |

## Fiber Connection Option

The COUNT®-XX-FC has a FC-style fiber-optic receptacle pre-aligned to the optical detector surface. The GRIN lens used in this assembly is optimized and AR-coated for the range 440 – 1000 nm.

## TTL Output & Power Supply

In order to not damage the APD it is recommended to put ferrite beads or ferrite clamp-ons on all cables leading to the APD. This includes TTL output and power supply input.

## Optical Fiber Shielding

To avoid stray light impinging on the detector and affecting the count rate, any optical fiber assembly attached to the FC connector must be completely opaque. LASER COMPONENTS offers suitably shielded optical fiber assemblies, please contact us for details.



Germany & Other Countries
Laser Components GmbH
Tel: +49 8142 2864 – 0
Fax: +49 8142 2864 – 11
info@lasercomponents.com
www.lasercomponents.com

France
Laser Components S.A.S.
Tel: +33 1 39 59 52 25
Fax: +33 1 39 59 53 50
info@lasercomponents.fr
www.lasercomponents.fr

United Kingdom
Laser Components (UK) Ltd.
Tel: +44 1245 491 499
Fax: +44 1245 491 801
info@lasercomponents.co.uk
www.lasercomponents.co.uk

Nordic Countries
Laser Components Nordic AB
Tel: +46 31 703 71 73
Fax: +46 31 703 71 01
info@lasercomponents.se
www.lasercomponents.se

USA
Laser Components USA, Inc.
Tel: +1 603 821 – 7040
Fax: +1 603 821 – 7041
info@laser-components.com
www.laser-components.com

## Warranty

A standard 12-month warranty following shipment applies. Any warranty is null and void if the module case has been opened. Warranty is void if the module input exceeds 12.5 V.

## ESD Information

Modules should only be handled at an ESD-safe work station.

## Individual Module Test Data

Each module is supplied with test data indicating the module's actual dark count, dead time, photon detection efficiency @ 405 nm, 670 nm and 810 nm and afterpulsing probability.

## Safety

The COUNT® Series contains a high voltage power supply. Users may be injured if the case is opened. All internal settings are pre-set; there are no user adjustments.

Units that appear defective or have suffered mechanical damage should not be used because of possible electrical shorting of the high voltage power supply. Opening the case may damage sensitive components and expose the user to the risk of electrical shock. Please contact factory for repairs.

## RoHS Compliance

The COUNT® Series is designed and built to be fully compliant with the European Union Directive 2002/95/EC.



Germany & Other Countries
Laser Components GmbH
Tel: +49 8142 2864 – 0
Fax: +49 8142 2864 – 11
info@lasercomponents.com
www.lasercomponents.com

France
Laser Components S.A.S.
Tel: +33 1 39 59 52 25
Fax: +33 1 39 59 53 50
info@lasercomponents.fr
www.lasercomponents.fr

United Kingdom
Laser Components (UK) Ltd.
Tel: +44 1245 491 499
Fax: +44 1245 491 801
info@lasercomponents.co.uk
www.lasercomponents.co.uk

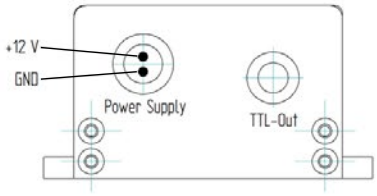
Nordic Countries
Laser Components Nordic AB
Tel: +46 31 703 71 73
Fax: +46 31 703 71 01
info@lasercomponents.se
www.lasercomponents.se

USA
Laser Components USA, Inc.
Tel: +1 603 821 – 7040
Fax: +1 603 821 – 7041
info@laser-components.com
www.laser-components.com

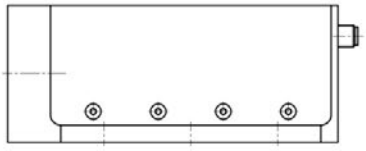
## Package Drawings

### Window Version

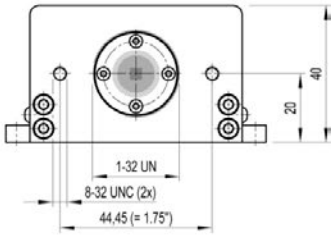
Rear



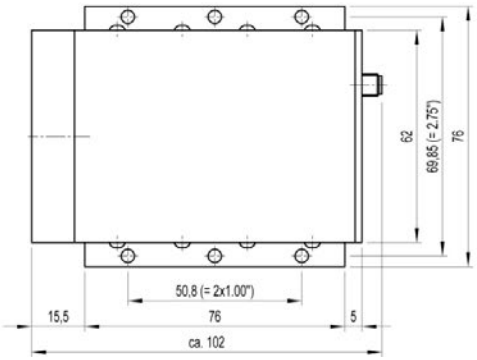

Side view



Front



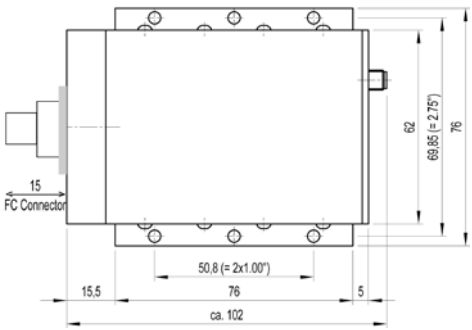

Top view




Optical distance from top of window to active area plane: typ. 1.35 mm
Dimensions in mm

### Fiber Connector Version

Top view




## Interface Information

- Power Supply: LEMO connector, item number FGG.0B.302.CLAD42
  (optional COUNT® power supply is available upon request).
- TTL output: LEMO connector, compatible with LEMO/BNC adapter ABF.00.250.CTCE31. An optional cable with the appropriate LEMO connector at one end and BNC connector at the other is available upon request.
- Optical input (FC connector version): compatible with standard FC/PC-connector, suitable for fiber core diameters up to 105 µm.



Germany & Other Countries
Laser Components GmbH
Tel: +49 8142 2864 – 0
Fax: +49 8142 2864 – 11
info@lasercomponents.com
www.lasercomponents.com

France
Laser Components S.A.S.
Tel: +33 1 39 59 52 25
Fax: +33 1 39 59 53 50
info@lasercomponents.fr
www.lasercomponents.fr

United Kingdom
Laser Components (UK) Ltd.
Tel: +44 1245 491 499
Fax: +44 1245 491 801
info@lasercomponents.co.uk
www.lasercomponents.co.uk

Nordic Countries
Laser Components Nordic AB
Tel: +46 31 703 71 73
Fax: +46 31 703 71 01
info@lasercomponents.se
www.lasercomponents.se

USA
Laser Components USA, Inc.
Tel: +1 603 821 – 7040
Fax: +1 603 821 – 7041
info@laser-components.com
www.laser-components.com

## Product Number Designations

**COUNT®** – **XX** **S** – **FC**

| Dark count rate |
|---|
| 1000 = 1000 c/s |
| 2000 = 2000 c/s |
| 5000 = 5000 c/s |

| FC-Connector (optional) |
|---|

## Fiber Number Designations

| Part number | Fiber Type | Connector Type | Diameter | | | Numerical Aperture |
|---|---|---|---|---|---|---|
| | | | Core | Cladding | Outer | |
| COUNT®-FP-050-FC-FC-2 | Multimode | FC/PC // FC/PC | 50 µm | 125 µm | 1.8 mm | 0.20 |
| COUNT®-FP-050-FC-SMA-2 | Multimode | FC/PC // SMA | 50 µm | 125 µm | 1.8 mm | 0.20 |
| COUNT®-FP-062-FC-FC-2 | Multimode | FC/PC // FC/PC | 62.5 µm | 125 µm | 1.8 mm | 0.275 |
| COUNT®-FP-062-FC-SMA-2 | Multimode | FC/PC // SMA | 62.5 µm | 125 µm | 1.8 mm | 0.275 |
| COUNT®-FP-100-FC-FC-2 | Multimode | FC/PC // FC/PC | 100 µm | 140 µm | 1.8 mm | 0.29 |
| COUNT®-FP-100-FC-SMA-2 | Multimode | FC/PC // SMA | 100 µm | 140 µm | 1.8 mm | 0.29 |

## Product Changes

LASER COMPONENTS reserves the right to make changes to the product(s) or information contained herein without notice. No liability is assumed as a result to their use or application.

## Ordering Information

Products can be ordered directly from LASER COMPONENTS or its representatives. For a complete listing of representatives, visit our website at www.lasercomponents.com

Custom designed products are available on request.



Germany & Other Countries
Laser Components GmbH
Tel: +49 8142 2864 – 0
Fax: +49 8142 2864 – 11
info@lasercomponents.com
www.lasercomponents.com

France
Laser Components S.A.S.
Tel: +33 1 39 59 52 25
Fax: +33 1 39 59 53 50
info@lasercomponents.fr
www.lasercomponents.fr

United Kingdom
Laser Components (UK) Ltd.
Tel: +44 1245 491 499
Fax: +44 1245 491 801
info@lasercomponents.co.uk
www.lasercomponents.co.uk

Nordic Countries
Laser Components Nordic AB
Tel: +46 31 703 71 73
Fax: +46 31 703 71 01
info@lasercomponents.se
www.lasercomponents.se

USA
Laser Components USA, Inc.
Tel: +1 603 821 – 7040
Fax: +1 603 821 – 7041
info@laser-components.com
www.laser-components.com