



# Caspian S-39N0-158

## Overview

This Caspian module integrates a fixed lens module and an Arctic 39N0 variable focus liquid lens in an M12x0.5 receptacle (S-mount). The module is built-in with an FPC cable, and can be connected to a standard 1 mm pitch FPC connector. It can therefore be very easily integrated in a standard S-mount sensor board. The module is compatible with imaging sensor formats up to 1/3". This module can be driven by the same drivers as the Arctic 39N0 lens. For more information on this module, please refer to TEDS- Caspian S-39N0-158

## Ordering information

- o **C-S-39N0-158-04:** with bent flex cable (FPC-A-4) and no IR-cut filter.
- o **C-S-39N0-158-04I:** with bent flex cable (FPC-A-4) and IR-cut filter.

## Performance summary

- |                          |                  |
|--------------------------|------------------|
| o Effective Focal Length | 15.8 mm          |
| o F number               | 4                |
| o Image circle diameter  | 6 mm             |
| o Focus range            | 7 cm to infinity |

## Example of applications

- o Industrial cameras
- o Medical imaging
- o Biometrics
- o Machine vision
- o Industrial endoscopes

## Contents

Overview.....	1
Ordering information.....	1
Performance summary.....	1
Example of applications.....	1
Contents .....	1
Opto-Electrical performance .....	2
Electrical Specifications.....	2
Absolute Maximum Ratings .....	3
Mechanical dimensions .....	3
Module setting recommendations .....	4

## Opto-Electrical performance

Performances described below are for 25°C and for a lens setting as described in this specification (see 'Module Setting' conditions).

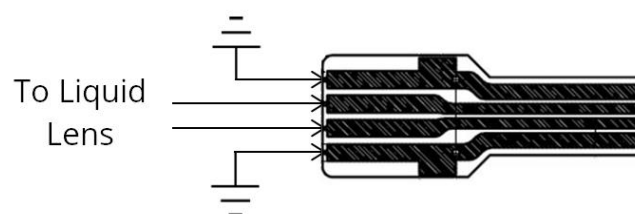
<b>Optical Performances at <math>V_{\infty}</math></b>	<b>Symbol</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Unit</b>	<b>Notes</b>
Voltage for infinite focus	$V_{\infty}$		44		V	(1)
Focal length at $V_{\infty}$	EFL		15.8		mm	
Image circle diameter			6		mm	
Corner Chief Ray Angle	CRA			5.5	°	
Mechanical back focal length at $V_{\infty}$ , without IR-cut filter			6.02		mm	
Mechanical back focal length at $V_{\infty}$ , with IR-cut filter			6.2		mm	
F- number	F#		4		-	
Diagonal Field of view	DFOV			22	°	(2)
IR filter cut-off wavelength	$\lambda_c$		650		nm	
Optical distortion				2	%	
<b>Focus control performances</b>						
Focus distance	x	7		$\infty$	cm	(1)
Voltage for x= 7 cm	$V_{7cm}$		60		V	(3)
Slope	S		1		$m^{-1}/V$	(1)

### Notes:

- (1) For more information on the behavior of Arctic 39N0 lens with voltage, please refer to Arctic 39N0 Technical Data Sheet
- (2) For a sensor size of 1/3"
- (3) For shorter focusing distances, see "Module Settings Recommendations"

## Electrical Specifications

### Electrical connection



The following FPC connectors are compatible with the FPC tip:

- SFW4S-2STE9LF from FCI
- 04FMN-BTK-A (LF)(SN) from JST

## Driver

Varioptic has qualified several drivers for variable focus liquid lenses (see Arctic 39N0 Data Sheet). The customer should choose the driver depending on its application. One important item to be checked is the resolution of the driver, compared to the depth of field of the system. See driver datasheets for more details.

## Absolute Maximum Ratings

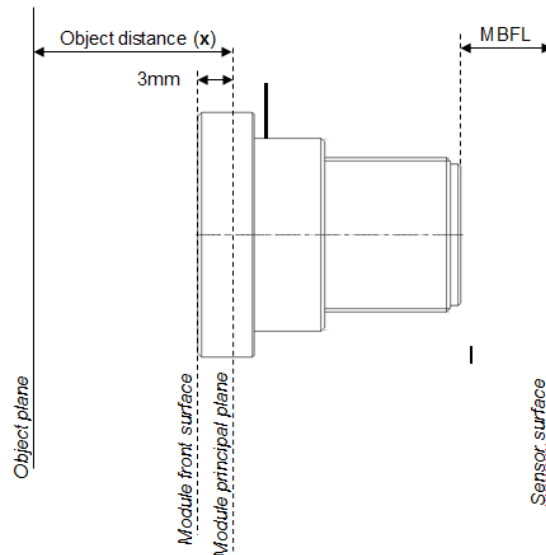
<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Notes</i>
Operating Temperature	T	-20	..	60	°C	
Storage Temperature	T <sub>stg</sub>	-40	..	85	°C	
AC Input RMS Voltage	V <sub>max</sub>			60	V	(1)
Input Voltage Frequency	f		1		kHz	(1)

### Notes:

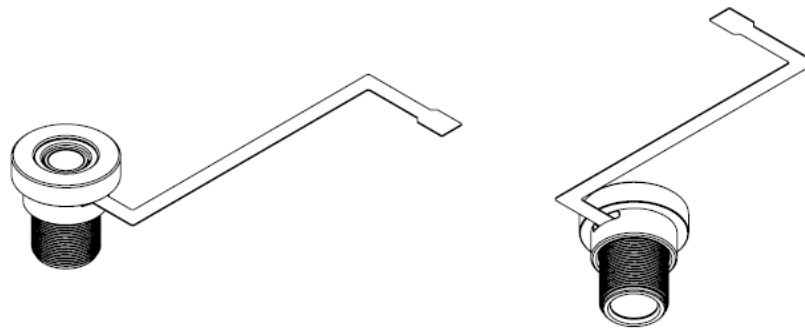
- (1) For more information on Arctic 39N0 electrical driving, please refer to Arctic 39N0 Technical Data Sheet.

## Mechanical dimensions

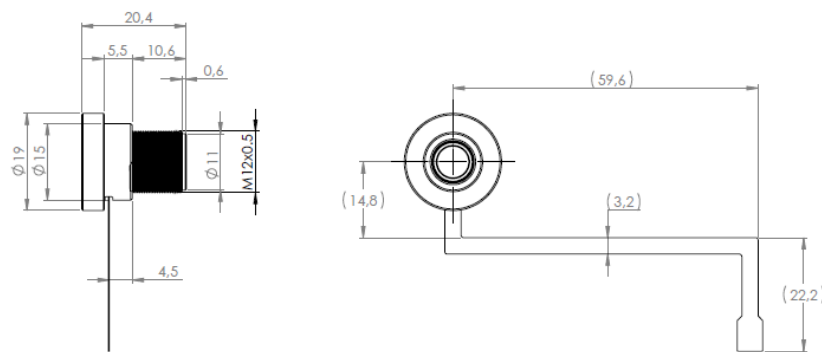
### Definition of the MBFL, object distance



### 3D view of the module



### Mechanical dimensions



### Module setting recommendations

The customer should take care about the initial setting of the lens module; indeed, there are infinity of configurations to set the module by playing both on the back focal distance and the voltage of the lens. However, only a limited number of configurations will provide optimum image quality.

#### Setting procedure without voltage:

Here is a simple procedure to set the Caspian S-39N0-158 module, for a 7cm to  $\infty$  usage:

1. Set a scene which is at a distance of at least 5m from the camera.
2. Insert and slightly screw the Caspian module on the M12 camera lens holder (Caspian module unpowered).
3. The image should be out of focus.
4. Screw the module clockwise until the center of the image becomes sharp.
5. From this position, screw the module clockwise an additional 8 and  $\frac{1}{4}$  with accuracy of  $\pm \frac{1}{4}$  turn: the image becomes out of focus again.
6. Fix the module in this position.



7. Power the Caspian module: the infinite focus will be obtained for  $V_{\infty}$  and the focus at a closer position will be obtained by applying a higher voltage, up to  $V_{\max}$ .

For a usage of the module for a maximum focus distance  $x_0$ , modify the above steps:

1. Set a scene which is at a distance  $x_0$  from the camera.
7. Power the Caspian module: the focus at  $x_0$  will be obtained for  $V_{\infty}$  and the focus at a closer position will be obtained by applying a higher voltage, up to  $V_{\max}$ .

With this setting, the minimum object distance is reduced from 7cm to:

$$\frac{1}{14 + \frac{1}{x_0}}$$

in meters, with  $x_0$  in meters.

### Setting procedure with voltage

1. Plug the module on the driver and adjust the voltage control to  $42V_{\text{rms}}$
1. Switch on the camera and orientate the camera in the direction of a scene which is at a distance of at least 5m from the module, or at a distance  $x_0$  in the case of a usage at the maximum focus distance  $x_0$ .
2. Screw the module clockwise until the image becomes sharp.
3. Optionally, block the module in that position.

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