



Corning® Varioptic® C-S-39N0-158 Auto Focus Lens Module

Overview

The Corning® Varioptic® C-S-39N0-158 auto focus lens module integrates a fixed lens module with a Corning® Varioptic® A-39N0 variable focus lens in an M12x0.5 receptacle (S-mount). The C-S-module has an FPC cable and can be connected to a standard 1 mm pitch FPC connector. It can be easily integrated in a standard S-mount sensor board. The C-S-module is compatible with imaging sensor formats up to 1/3". The C-S-module can be controlled by the same driver as the A-39N0 lens. For more information on this module, please refer to the C-S-39N0-158 Technical Datasheets (TEDS).

Ordering Information

- **Corning® Varioptic® C-S-39N0-158-14 auto focus lens module:** 6-pin, 0.5 mm pitch, bent flex cable with thermistor (FPC-A-14) without IR-cut filter.
- **Corning® Varioptic® C-S-39N0-158-14I auto focus lens module:** 6-pin, 0.5 mm pitch, bent flex cable with thermistor (FPC-A-14) with IR-cut filter.

Performance Summary

- | | |
|--------------------------|------------------|
| • Effective focal length | 15.8 mm |
| • F number | 4 |
| • Image circle diameter | 6 mm |
| • Focus range | 7 cm to infinity |

Applications

Corning Varioptic C-S-39N0-158 liquid lens modules have been used in:

- Industrial cameras
- Biometrics
- Machine vision
- Industrial endoscopes
- ...



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Opto-Electrical Performance

Performances described below are for 25°C and for the lens setting described in the ‘Module Setting Recommendations’ section of this document.

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

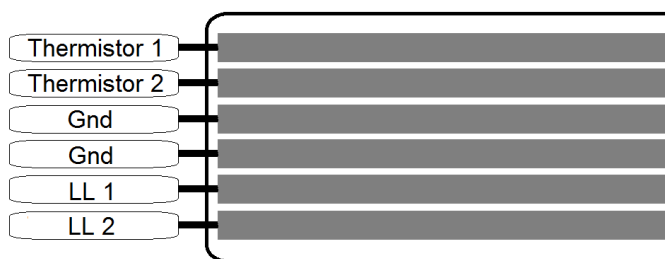
Notes:

- (1) For more information on the behavior of the A-39N0 lens with voltage, please refer to the A-39N TEDS.
- (2) For a sensor size of 1/3".
- (3) For shorter focusing distances, see “Module Setting Recommendations”.

Electrical Specifications

Electrical Connection

FPC-A-14:



The following 0.5 mm pitch, 6-pin FPC connectors are compatible with the FPC tip:

- 525590652 from Molex
- 5034800600 from Molex

FPC-A-14 is populated with a 0402 thermistor (Reference: ERTJ0ES104F from Panasonic).

Driver

A dedicated compact IC has been designed to drive Corning Varioptic Lenses, namely the Maxim MAX14574. For details, please contact your local sales channel.

When using Maxim driver, a 5 k Ω resistor should be added. Please refer to **MAAN - Maxim integration tips** for details.

Important note:

Corning Varioptic Lenses are sensitive to electrostatic discharge (ESD). Use caution when handling.

Absolute Maximum Ratings

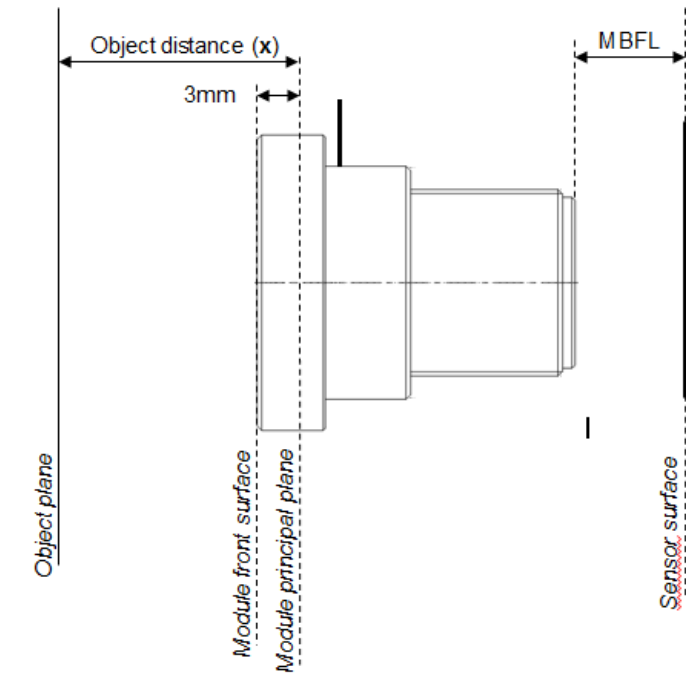
<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Notes</i>
Operating Temperature	T	-20	..	60	°C	
Storage Temperature	T _{stg}	-40	..	85	°C	
AC Input RMS Voltage	V _{max}			60	V	(1)
Input Voltage Frequency	f		1		kHz	(1)

Notes:

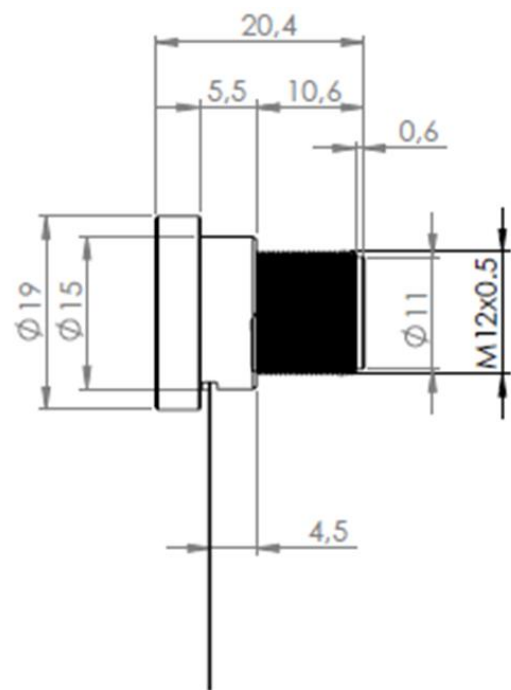
- (1) For more information on A-39N electrical driving, please refer to the A-39N TEDS.

Mechanical Dimensions

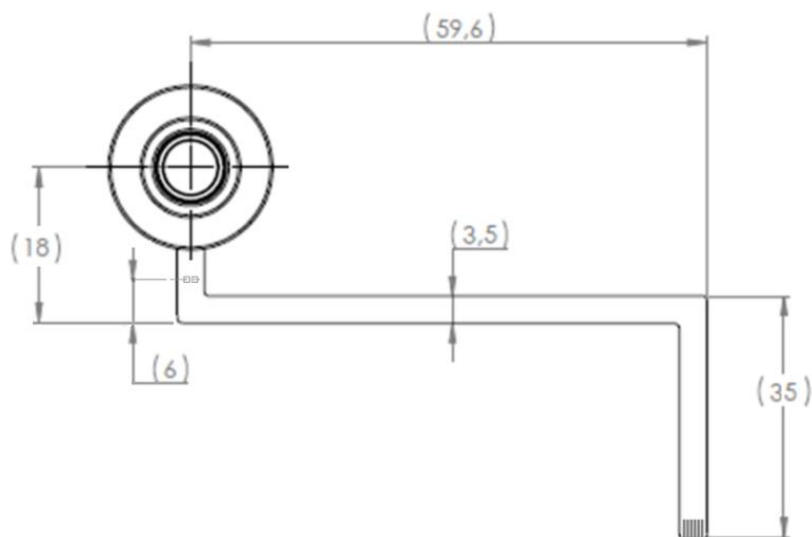
Definition of the MBFL, Object Distance



Mechanical Dimensions



FPC-A-14:



Module Setting Recommendations

Use caution when configuring the initial lens module settings. Although the user has complete control over module configuration settings, only a limited number of configurations will provide optimum image quality.

Setting Procedure without Voltage:

Here is a simple procedure to set the C-S-39N0-158 module for a 7 cm to ∞ usage:

1. Set a scene at a distance of at least 5 m from the camera.
2. Insert and slightly screw the C-S-module on the M12 camera lens holder (C-S-module unpowered).
3. The image should be out of focus.
4. Screw the C-S-module clockwise until the center of the image becomes sharp.
5. From this position, screw the C-S-module clockwise an additional 8 and 1/4 turn with accuracy of $\pm 1/4$ turn: the image becomes out of focus again.
6. Fix the C-S-module in this position.
7. Power the C-S-module: the infinite focus will be obtained for V_{∞} and the focus at a closer position will be obtained by applying a higher voltage, up to V_{\max} .

To use the C-S-39N0-158 module for a maximum focus of distance x_0 , modify the above steps:

1. Set a scene at a distance of x_0 from the camera.
2. Power the C-S-module: the focus at x_0 will be obtained for V_{∞} 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 7 cm to:

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

in meters, with x_0 in meters.

Setting Procedure with Voltage:

1. Connect the C-S-module to the driver and adjust the voltage control to 44 V_{rms} .
2. Turn on the camera and point the camera in the direction of a scene that is at least 5 m from the module, or at a distance of x_0 if using at the maximum focus distance x_0 .
3. Screw the C-S-module clockwise until the image becomes sharp.
4. Optional: Block the C-S-module in that position.

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