



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 0.5 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-39N0-158-47 auto focus lens module:** 6-pin, 0.5 mm pitch, bent flex cable with thermistor (FPC-A-47) without IR-cut filter.
- **Corning® Varioptic® C-S-39N0-158-47I auto focus lens module:** 6-pin, 0.5 mm pitch, bent flex cable with thermistor (FPC-A-47) 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)

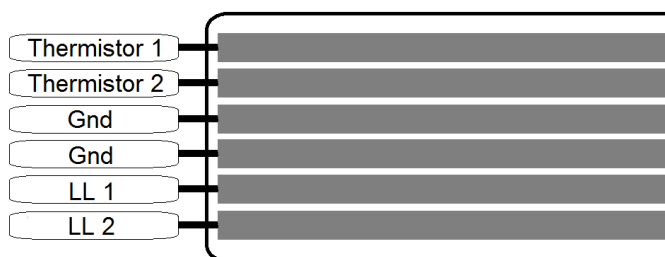
Notes:

- (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-47:



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

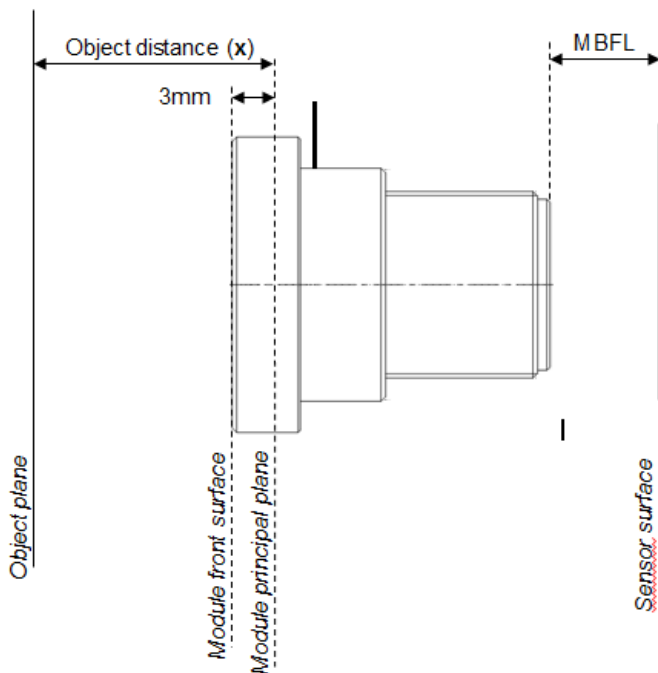
<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Notes</i>
Operating Temperature	T	-20	..	60	°C	
Storage Temperature	T _{stg}	-40	..	85	°C	
AC Input RMS Voltage	V _{max}			60	V	(1)
Input Voltage Frequency	f		1		kHz	(1)

Notes:

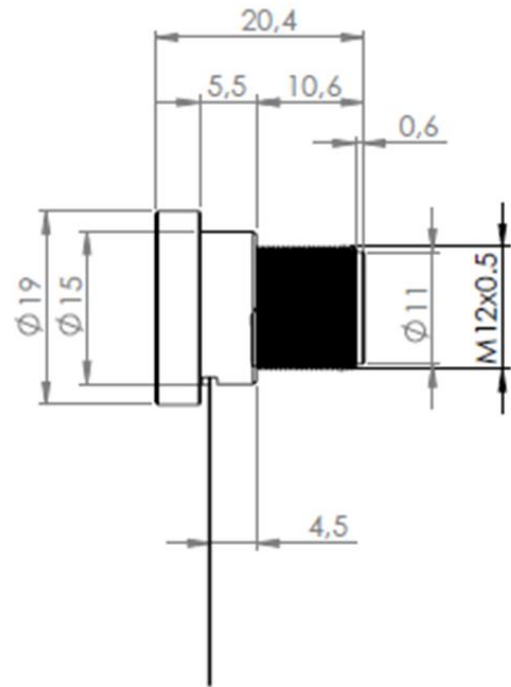
- (1) For more information on A-39N electrical driving, please refer to the A-39N TEDS.

Mechanical Dimensions

Definition of the MBFL, Object Distance



Mechanical Dimensions



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 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 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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