



# Corning® Varioptic® C-S-25H0-096 Auto Focus Lens Module

## Overview

The Corning® Varioptic® C-S-25H0-096 auto focus lens module integrates a fixed lens module with a Corning® Varioptic® A-25H0 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 M12 sensor board. The C-S-module is compatible with most imaging sensor formats, from 1/4" to 1/1.8". This C-S-module can be controlled by the same driver as the A-25H0. For more information on this module, please refer to the C-S-25H0-096 Technical Datasheets (TEDS).

## Ordering Information

- **Corning® Varioptic® C-S-25H0-096-03 auto focus lens module:** 4-pin, 1 mm pitch bent flex cable (FPC-A-3) without IR-cut filter.
- **Corning® Varioptic® C-S-25H0-096-03I auto focus lens module:** 4-pin, 1 mm pitch bent flex cable (FPC-A-3) with IR-cut filter.

## Performance Summary

- |                          |                  |
|--------------------------|------------------|
| • Effective focal length | 9.6 mm           |
| • F number               | 3.7              |
| • Image circle diameter  | 9.1 mm           |
| • Focus range            | 7 cm to infinity |



## Applications

Corning Varioptic C-S-25H0-096 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.

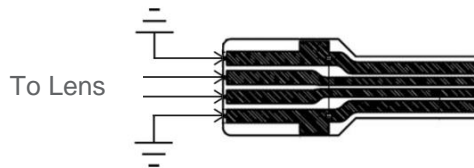
<i>Optical Performances at <math>V_{\infty}</math></i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Notes</i>
Voltage for infinite focus	$V_{\infty}$		39.5		V	(1)
Focal length at $V_{\infty}$	EFL		9.6		mm	
Image circle diameter			9.1		mm	
Corner Chief Ray Angle	CRA			12.5	°	
Mechanical back focal length at $V_{\infty}$ , without IR-cut filter			6.12		mm	
Mechanical back focal length at $V_{\infty}$ , with IR-cut filter			6.3		mm	
F- number	F#		3.7		-	
Diagonal Field of view	DFOV			51	°	(2)
IR filter cut-off wavelength	$\lambda_c$	640	650	660	nm	
<i>Focus control performances</i>						
Focus distance	x	7		$\infty$	cm	(1)
Voltage for x= 7 cm	$V_{7cm}$		54	60	V	(3)
Slope	S	0.7	0.85	1.0	$m^{-1}/V$	(1)

### Notes:

- (1) For more information on the behavior of the A-25H0 lens with voltage, please refer to the A-25H TEDS.
- (2) For a sensor size of 1/1.8”.
- (3) For shorter focusing distances, see “Module Setting Recommendations”.

## Electrical Specifications

### Electrical Connection



The following FPC connectors are compatible with the FPC tip:

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

### 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.

### Important note:

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

## Absolute Maximum Ratings

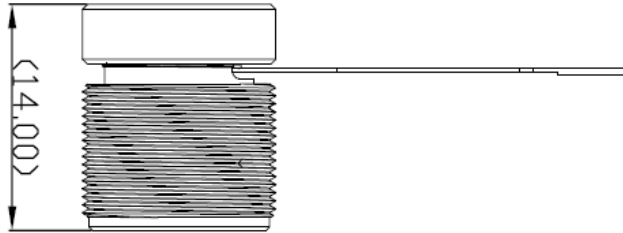
<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Notes</i>
Operating Temperature	T	-30	..	85	°C	
Storage Temperature	T <sub>stg</sub>	-40	..	85	°C	
AC Input RMS Voltage	V <sub>max</sub>			60	V	(1)
Input Voltage Frequency	f		1		kHz	(1)

Notes:

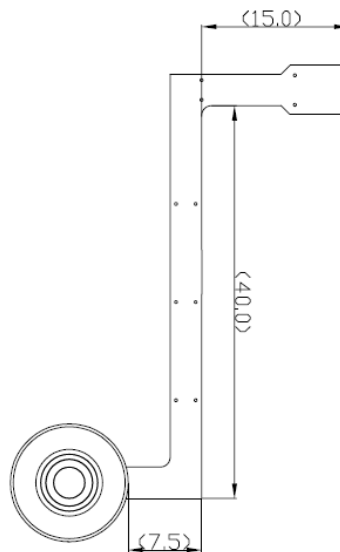
(1) For more information on A-25H electrical driving, please refer to the A-25H TEDS.

## Mechanical Dimensions

### Module



### FPC Details



## 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-25H-096 module for a 7 cm to  $\infty$  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 2 turns 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  $V_{\infty}$  and the focus at a closer position will be obtained by applying a higher voltage, up to  $V_{\max}$ .

To use the C-S-25H-096 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  $V_{\infty}$  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 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 39.5  $V_{\text{rms}}$
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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