



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 0.5 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-25H0-096-43 auto focus lens module:** 6-pin, 0.5 mm pitch bent flex cable (FPC-A-43) without IR-cut filter.
- **Corning® Varioptic® C-S-25H0-096-43I auto focus lens module:** 6-pin, 0.5 mm pitch bent flex cable (FPC-A-43) 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.

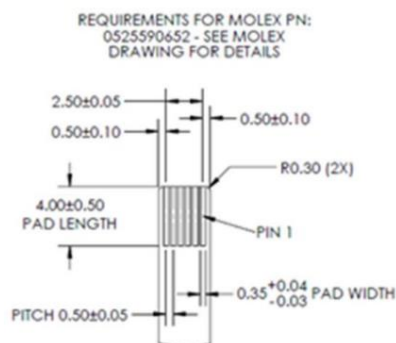
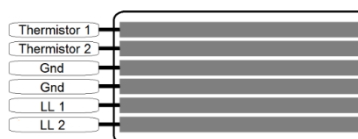
<i>Optical Performances at V_{∞}</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Notes</i>
Voltage for infinite focus	V_{∞}		39.5		V	(1)
Focal length at V_{∞}	EFL		9.6		mm	
Image circle diameter			9.1		mm	
Corner Chief Ray Angle	CRA			12.5	°	
Mechanical back focal length at V_{∞} , without IR-cut filter			6.12		mm	
Mechanical back focal length at V_{∞} , with IR-cut filter			6.3		mm	
F- number	F#		3.7		-	
Diagonal Field of view	DFOV			51	°	(2)
IR filter cut-off wavelength	λ_c	640	650	660	nm	
<i>Focus control performances</i>						
Focus distance	x	7		∞	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 0.5 mm pitch, 6-pin FPC connectors are compatible with the FPC tip:

- 525590652 from Molex
- 5034800600 from Molex

FPC-A-43 is populated with a 0402 thermistor (Reference: ERTJ0ES104F from Panasonic).

<i>Parameter</i>	<i>Unit</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Notes</i>
Capacitance	pF	C		100	175	
Q Factor	-	Q		26		(1)
Current consumption	μA	I _{max}			200	(2)

Notes:

- (1) Measured at a frequency of 1 kHz and a voltage of 1 V and 20 V.
- (2) Adjustable lens current only – does not include the driver.

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

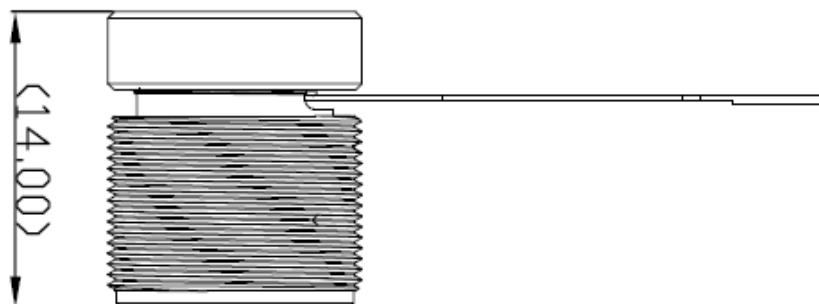
<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Notes</i>
Operating Temperature	T	-30	..	85	°C	
Storage Temperature	T _{stg}	-40	..	85	°C	
AC Input RMS Voltage	V _{max}			60	V	(1)
Input Voltage Frequency	f		1	5	kHz	(1)

Notes:

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

Mechanical Dimensions

Module



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 ∞ 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_{∞} 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 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 $39.5 V_{\text{rms}}$
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 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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