



Caspian S-25H0-038

Overview

This Caspian module integrates a fixed lens module and an Arctic 25H0 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 M12 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 25H lens.

Ordering information

- o **C-S-25H0-038-03:** bent flex cable (FPC-A-3) without IR-cut filter.
- o **C-S-25H0-038-03I:** bent flex cable (FPC-A-3) with IR-cut filter.
- o **C-S-25H0-038-06:** bent flex cable (FPC-A-6) without IR-cut filter.
- o **C-S-25H0-038-06I:** bent flex cable (FPC-A-6) with IR-cut filter.
- o **C-S-25H0-038-07:** straight flex cable (FPC-A-7) without IR-cut filter.
- o **C-S-25H0-038-07I:** straight flex cable (FPC-A-7) with IR-cut filter.

Performance summary

- | | |
|--------------------------|-------------------|
| o Effective Focal Length | 3.85 mm |
| o F number | 2.2 |
| o Image circle diameter | 6.1 mm |
| o Focus range | ~7 cm to infinity |

Example of applications

- o Videoconferencing
- o Medical imaging
- o Industrial endoscopes

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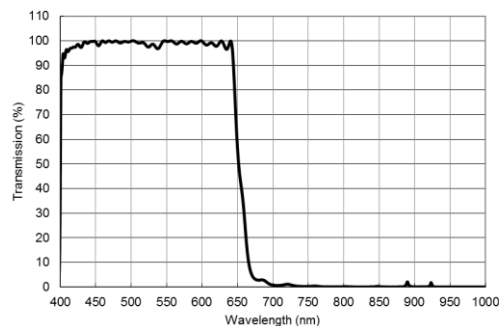
Opto-Electrical performance

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

Optical Performances at V_{∞}	Symbol	Min	Typ	Max	Unit	Notes
Voltage for infinite focus	V_{∞}		39.5		V	(1)
Focal length at V_{∞}	EFL		3.85		mm	
Image circle diameter					mm	
Corner Chief Ray Angle	CRA			32.4	°	
Mechanical back focal length at V_{∞} , without IR-cut filter			0.98		mm	
Mechanical back focal length at V_{∞} , with IR-cut filter			0.84		mm	
F- number	F#		2.2		-	
Diagonal Field of view	DFOV			76.8	°	(2)
IR filter cut-off wavelength	λ_c		650			(5)
Focus control performances						
Focus distance	x	7		∞	cm	(1)
Voltage for x= 7 cm	V_{7cm}		54	60	V	(3); (4)
Slope	S		0.85		m^{-1}/V	(1)

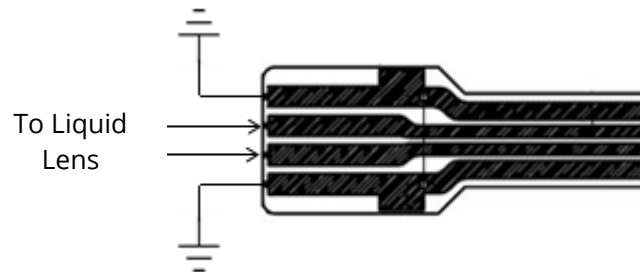
Notes:

- (1) For more information on the behavior of Arctic 25H0 lens with voltage, please refer to Arctic 25H Technical Data Sheet
- (2) For a sensor size of 6.1mm diagonal (1/3")
- (3) For shorter focusing distances, see "Module Settings Recommendations"
- (4) Refer to drawing page 6
- (5) For 50% transmission. Typical performance of IR cut filter is given below:



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

Electrical specifications

<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	150	
Q Factor	-	Q		26		(1)
Current consumption	μA	I_{max}			200	(2)

Notes:

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

Driver

Varioptic has qualified several drivers for variable focus liquid lenses (see Arctic 25H 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

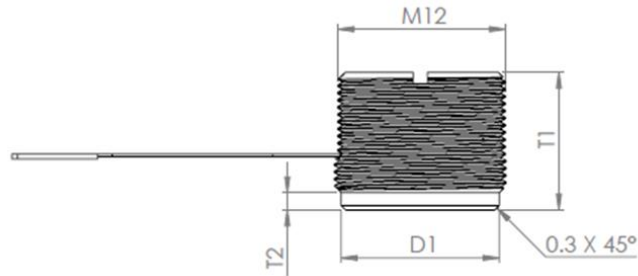
<i>Parameter</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	<i>Notes</i>
Operating Temperature	T	-30	..	85	°C	
Storage Temperature	T_{stg}	-40	..	85	°C	
AC Input RMS Voltage	V_{max}			60	V	(1)
Input Voltage Frequency	f		5		kHz	(1)

Notes:

- (1) For more information on Arctic 25H0 electrical driving, please refer to Arctic 25H Technical Data Sheet.

Mechanical dimensions

Module



Parameter	Unit	Symbol	Min	Typ	Max	Notes
Centering diameter	mm	D1	10.95		11	
Height	mm	T1	9.2	9.4	9.6	
Centering height	mm	T2	1.1	1.2	1.3	

FPC Details

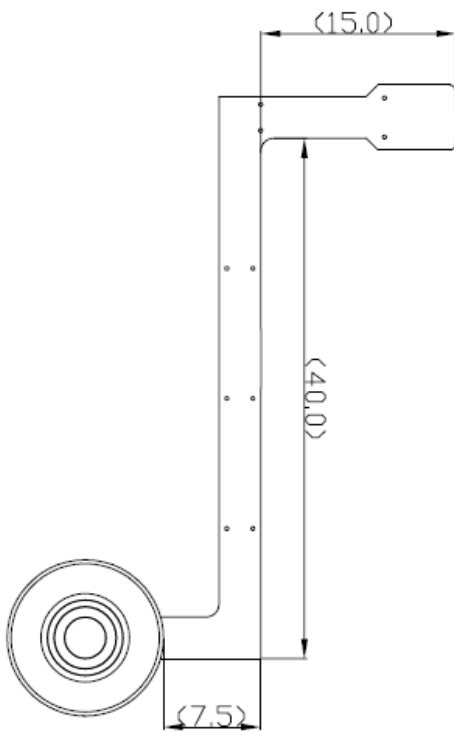


Figure 1: FPC-A-3 (ordering "-03")



Figure 2: FPC-A-7 (ordering "-07")





Figure 3: FPC-A-6 (ordering "-06")

Module orientation

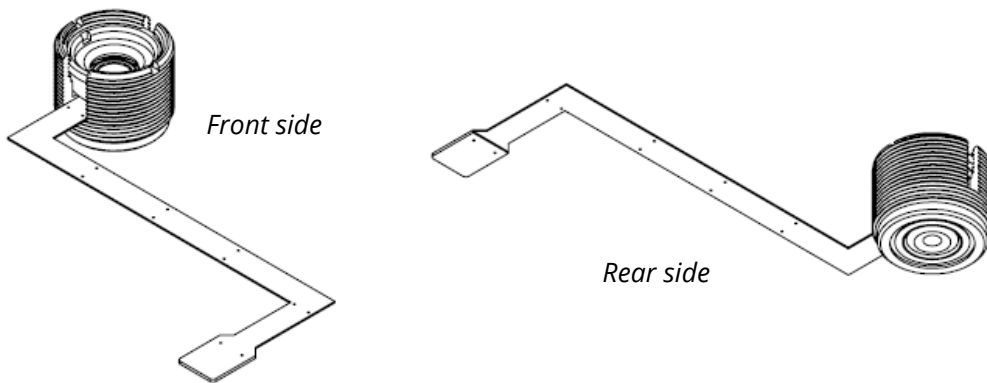
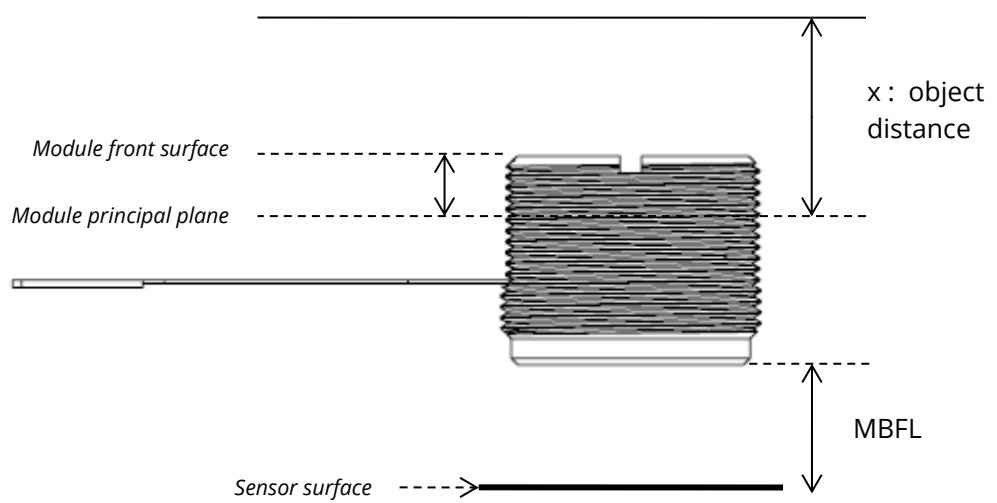


Figure 4: Module 3D view (here illustrated with FPC-A-3 (-03))



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-25H0-038 module, for a 7cm to ∞ 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 1/2 turn with accuracy of $\pm 1/8$ 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_{∞} 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 module principal plane.
7. Power the Caspian 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 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 $39.5V_{\text{rms}}$
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 principal plane, 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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