



Corning® Varioptic® A-PE-16F Series Variable Focus Lens

Overview

A-PE-16F Series is based on Corning® Varioptic® A-16F liquid lens providing a fast and robust variable focus, it is designed to compensate for temperature related variation using V-temp® feature and relieve customer from calibration work. In addition, it embeds V-speed® response time optimization algorithm further accelerating the liquid lens change from one optical power to another. Pre-implemented V-sweep® algorithm allows customer to make linear change of the optical power of the variable focus lens with time.

Ordering Information

- **Corning® Varioptic® A-PE-16FX-31 variable focus lens:** Packaged A-16FX (X=0,1) with electronic board and 6-pins, 0.5 mm pitch straight flex cable with on-flex thermistor.
 - Coating options:
 - X = 0: has anti-reflective (AR) coatings optimized in the visible range
 - X = 1: has AR coatings optimized in near infrared range

Performance Summary

- 20 diopters dynamic range
- Low wave front error, 20 nm typical
- Embeds liquid lens driver, temperature sensor and microcontroller
- Integrate individual lens thermal calibration parameters
- Embeds response time optimization algorithm
- I²C / RS 232 interface

Applications

Corning Varioptic A-PE-16F liquid lenses have been used in:

- Barcode readers, machine vision
- Biometrics
- Lasers



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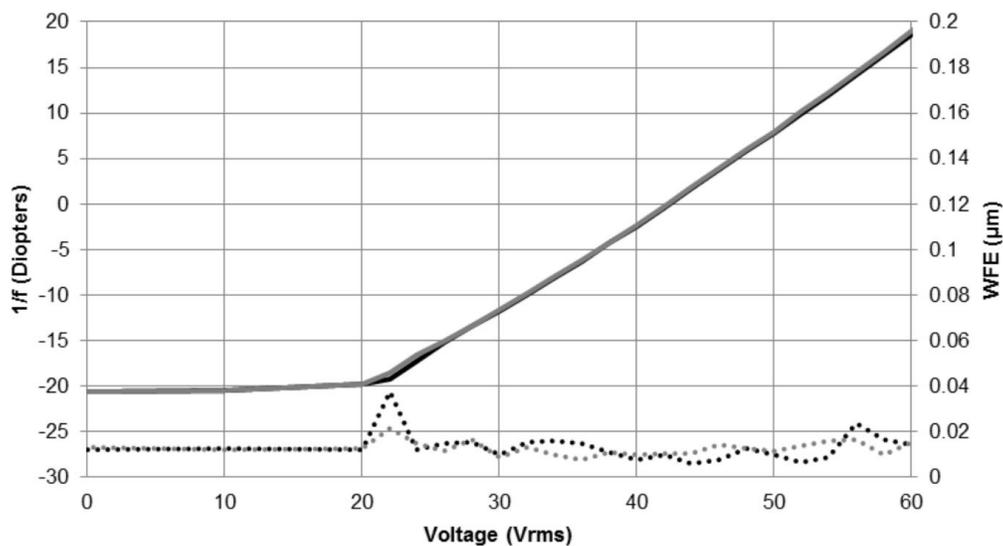
Opto-Electrical Performance

@25°C, @635 nm unless otherwise stated

<i>Parameter</i>	<i>Unit</i>	<i>Symbol</i>	<i>Typ</i>	<i>Notes</i>
Aperture size	mm	\varnothing_e	1.6	(1)
Low optical power	m^{-1}	P_L	-5	
High optical power	m^{-1}	P_H	+15	
Optical power @ 0V	m^{-1}	P_o	-20	
Wave Front Error, rms	nm	WFE_{rms}	20	(2); (3); (4)
Transmission @ 587 nm	%	T_{587}	97	

Notes:

- (1) Pupil size on the bottom part of the adjustable lens.
- (2) Measured on pupil size and on $[P_L; P_H]$ – WFE is mainly astigmatism.
- (3) Parameter is compiled on $[P_L; P_H]$.
- (4) Parameters measured through 42 acquisition points within the optical range.



Transmission Performance

The two outer surfaces of the glass windows of the adjustable lenses have AR coatings. These AR coatings have been optimized for different wavelengths.

Transmission curves of the complete adjustable lens including AR coatings:

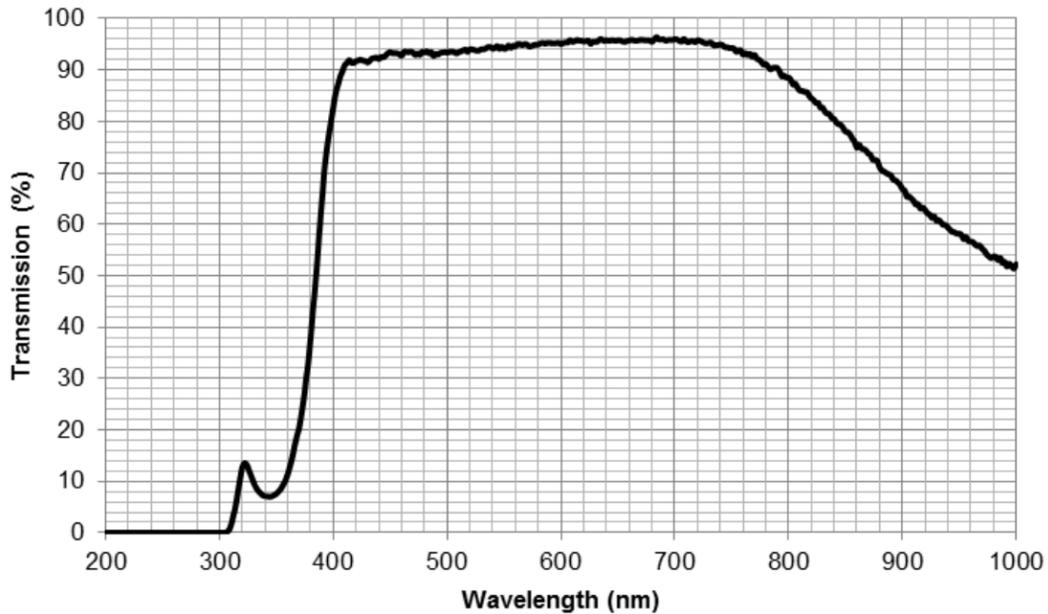
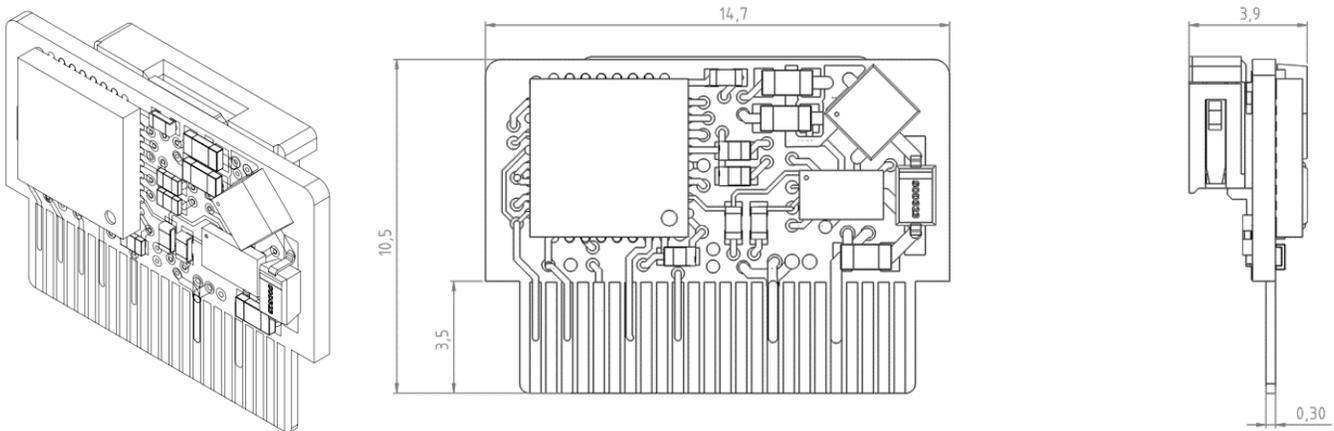


Figure 1: A-16F0 transmission performance

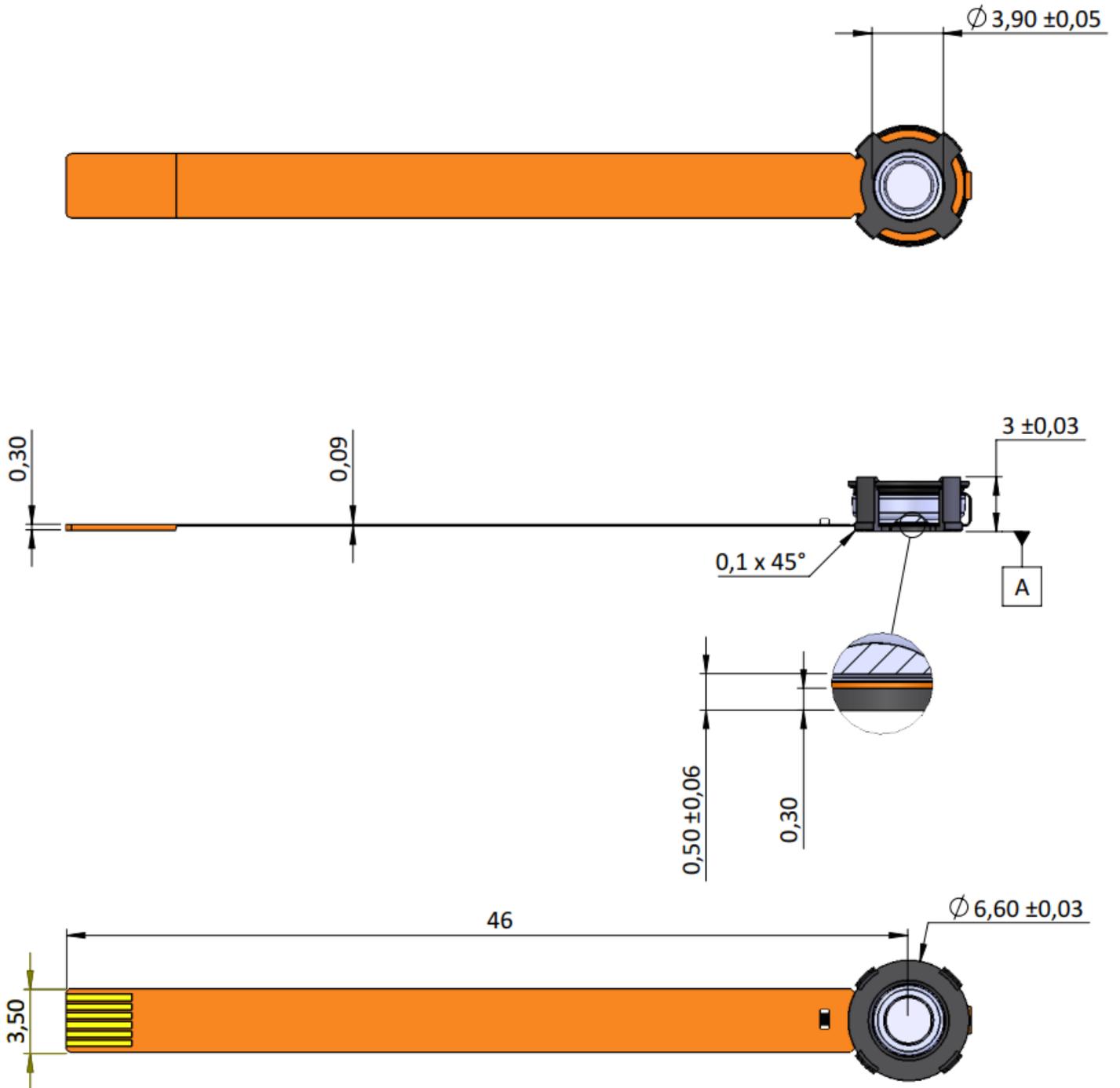
A-PE electronic board



For additional information on the A-PE board, please refer to MAAN - 251003 - A-PE series hardware

Mechanical Dimensions

Packaged Lens



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	
Input Voltage	V _{in}	2.8	3.3	3.6	V	

Important note:

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

Embedded Features

- **V-Speed:** Up to x5 faster compared to standard response time (coming soon)
- **V-Temp:** Up to x5 improvement on thermal stability (coming soon)
- **V-Sweep:** Driving profile of the liquid lens with linear change of the optical power of the lens with time, allowing the user to take pictures while the lens is still moving with virtually no settling time. For more information on this feature, please refer to the A-PE-16F Technical Data Sheet (TEDS).

For additional information on the register map, please refer to MAAN - 251003 - Serial Communication Protocols.

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