

Control Electronics EL-E-OF-A

The EL-E-OF-A enables the control of the EL-10-42-OF lens via an analog input signal. Several digital signals are available for status verification. The electronics essentially provides an analog-to-digital stage to read the control and set voltage signal, digital processing with an implemented PID-loop and current sources to drive the lens and the heater unit. The board is optimized for OEM-integration in laser marking systems and therefore comes without housing. The main features are:



- Analog control voltage from 0 to 5 V (ADC resolution 16 bit)
- Sampling rate 1.1 kHz
- Lens driving current ranging from 0 to 300 mA
- Integrated optical feedback (OF) control
- JTAG or USB interface for firmware updates

Mechanical specifications

Dimensions (L x W x H)	85 x 75 x 30 (height with connector plugged)	mm
Weight	40	g
Interface connector P4	Male header dual row (6 x 2 pins), 2.54 mm pitch	
Connectors to lens P2, P3	Male header dual row (5 x 2) and (3 x 2 pins), 2.54 mm pitch	
Connector for power supply	Male header 2 pin, 2.54 mm pitch	

Electrical specifications

Supply voltage Vcc	24	V
Max power output for the lens	3	W
Max current output for the lens	350	mA
Max heater power consumption	22	W
Total max power consumption	30	W
Total max heat dissipation	1.5	W

Thermal specifications

Operating temperature	+10 to +50	°C
Storage temperature	-40 to +85	°C

Description and Features

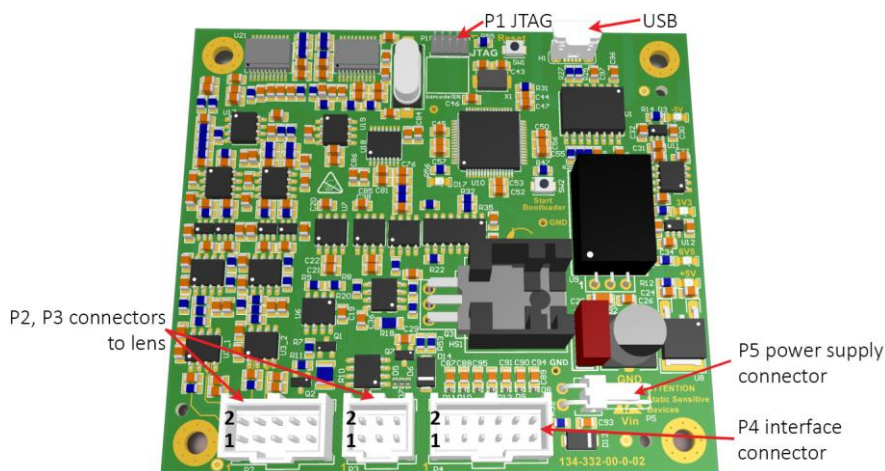


Figure 1: Control electronics EL-E-OF-A. The pin header P1 allows to flash new software versions onto the micro-processor through JTAG interface. The connectors P2, P3 are the interface connectors to the lens module EL-10-42-OF. Connector P4 constitutes the interface to external signals. The power supply has to be connected to P5.

Connector P2			
Pin	Signal	Value	Function
1	PD anode ref	0..100 μ A	Current signal of reference photo diode
2	PD cathode	-	
3	LED - cathode	-	
4	PD anode sig	0..100 μ A	Current signal of signal photo diode
5	LED + anode	30 mA @ 1.5V	Driving current for LED
6	GND	-	GND is connected to shielding of cable
7	n.c.	n.c.	
8	n.c.	n.c.	
9	Current +	0..300 mA	Lens control current
10	Current -	-	Lens control current

Connector P3			
Pin	Signal	Value	Function
1	GND	-	
2	Heat +	0..1 A	Current to supply heater unit of EL-10-42-OF
3	Heat -	-	
4	I2C SDA	digital	Signal of temperature sensor readout
5	I2C SCL	digital	Clock signal of temperature sensor
6	Vcc	3.3V	Voltage supply for temperature sensor

Connector P4			
Pin	Signal	Value	Function
1	n.c.	n.c.	
2	Temperature control in range	3.3 V TTL out	High: Temperature within set temperature +3°C/-1.5°C The middle LED on the board is turned on when TTL reaches high
3	n.c.	n.c.	
4	Lens control in range	3.3 V TTL out	High: Lens with EEPROM reaches the set signal
5	Temperature indication	3.3 V TTL out	High: Temperature below (set temperature – 1°C)
6	AGND	-	Analog ground
7	GPIO5	Digital	Not in use
8	Analog In	0..5 V (< 50 μ A)	Analog set signal to control the focal length of EL-10-42-OF
9	n.c.	n.c.	
10	AGND	-	Analog ground
11	GPIO4	digital	If actively pulling it low, linearizing focal powers versus applied voltages
12	Error	3.3 V TTL out	High: no EEPROM, no lens connected

Connection kit: In order to connect the EL-E-OF-A to the tunable lens EL-10-42-OF, a cable (length 50 cm) is delivered together with the electronics.

Power supply of EL-E-OF-A: Most of the power is used during the initial heating phase until the EL-10-42-OF reached its operation temperature. Afterwards, the power consumption of about 5 W is mainly due to the lens current. In order to provide enough power under all conditions, the EL-E-OF-A has to be supplied by a DC-voltage of 24V (with 30 W). The peak-to-peak voltage ripple (full load) needs to be \leq 200 mV.

Ground connection: In order to avoid electronic noise due to possible ground loops, it has to be assured that the electronics connected to the EL-E-OF-A board is on the same ground level (AGND).

Suggestions for connectors:

- P4 connector: Digi-key no. WM8038-ND in combination with no. WM2558-ND. For prototyping, assembled jumper cables are also useful (e.g. no. 1706, www.pololu.com)
- P5 connector: Digi-key no. WM2613-ND in combination with no. WM2624-ND. For prototyping, assembled cables are also useful (e.g. no. 741637 – 62, www.conrad.com)

Usable laser repetition rates

The EL-E-OF-A electronics is especially developed to control the EL-10-42-OF laser processing lens. In laser processing applications, pulsed and high-power laser beams are used, posing considerable challenges on the precision of the optical feedback (OF) control. Although optical filters and the mechanical design are optimized, tiny amounts of stray light introduce an offset on the OF, shifting the actual set value. The remaining shift is canceled electronically, implemented on the EL-E-OF-A board. However, for efficient OF control, laser repetition rates ≥ 20 kHz are recommended.

Mechanical Dimensions

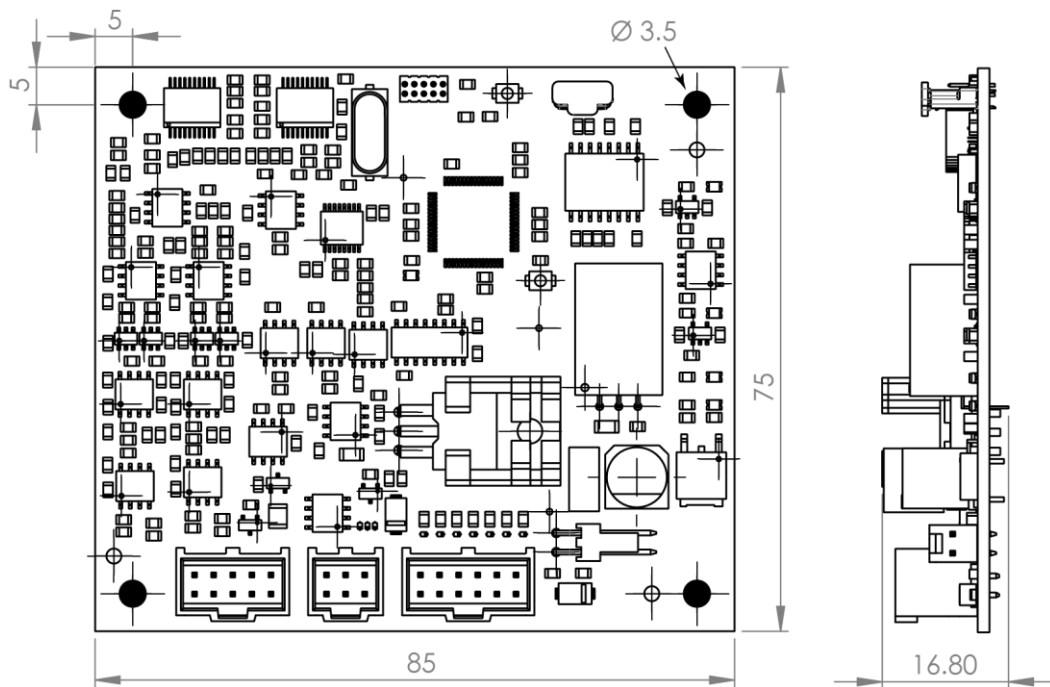


Figure 2: Mechanical dimensions of the EL-E-OF-A control electronics.

Safety and compliance

The product fulfills the RoHS and REACH compliance standards. The product is delivered without housing. The customer is solely responsible to comply with all relevant safety regulations for integration and operation.

For more information on optical, mechanical and electrical parameters, please contact sales@optotune.com.