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ECC-1C OEM Version

Optotune's ECC-1C allows to control liquid lenses directly from camera or embedded systems, thus offering a compact and convenient solution for fast integration.

Main features:

- Connects directly to cameras and embedded systems
- Current control from -300 to +300 mA in 80 µA steps
- Communication interfaces:
  - USB-C interface
  - UART and I2C (autodetect)
  - Analog input (0 - 10V)
  - GPIO trigger
- Read-out of calibration data & temperature for compensation ("Focal Power Mode")
- Graphic user interface *Optotune Cockpit* for control via UART, USB to UART cable available
- Software SDKs for Python and C# available
- RoHS, REACH and CE declaration of conformity

Mechanical specifications

Dimensions (L x W x H)	30 x 42 x 7.45[1]	mm
Weight	7	g
Connector: Lens OEM wire connection OEM Board to Board USB-C	 Flex connector SFV6R-2STE1HLF PicoBlade 532610671 M20-7810445R USB4105-GF-A-120	
Max. OEM wire connection	0.6	m
Max. USB cable length extension[2]	5	m
Max. lens cable length [3]	1	m

Electrical specifications

Supply voltage range	5 / 9-24 (tolerance ± 5%) Two input voltage ranges (no operating window in between)	VDC
Absolute maximum supply voltage	26	VDC
Nominal control current [4]	-300 to 300	mA
Current step	80	µA
Current accuracy	± 1	mA
Maximum power consumption (5V / 9-24V)	1.5 / 2.5	W
Analog voltage inputs level	0-10	V
Absolute maximum analog voltage input	11	V
Analog input resolution	12	Bits
Analog input impedance	70	kΩ
Digital input interfaces	GPIO, UART, I2C, USB	

[1] Final height depends on the mounting execution - see Manual
[2] Maximum tested cable length in lab conditions, actual performance may depend on electromagnetic environment. Longer lengths are possible using active USB cables.
[3] Maximum tested cable length in lab conditions. Maximum cable length may depend on electromagnetic environment. Higher cable lengths should comprehend lower baud rates.
[4] Input voltages and thermal limitations apply, see Figure 5, 6 and 7.

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Digital signal logic level[5]	3.3 (5V tolerant)	V
UART Simple mode command latency[6]	310	µs
I2C command latency[7]	max. 100	µs

Thermal specifications

Operating temperature	-0 to 65	°C
Storage temperature	-40 to 85	°C

Ordering information

Part number	Description
187-858-00	ECC-1C OEM

Mechanical layout

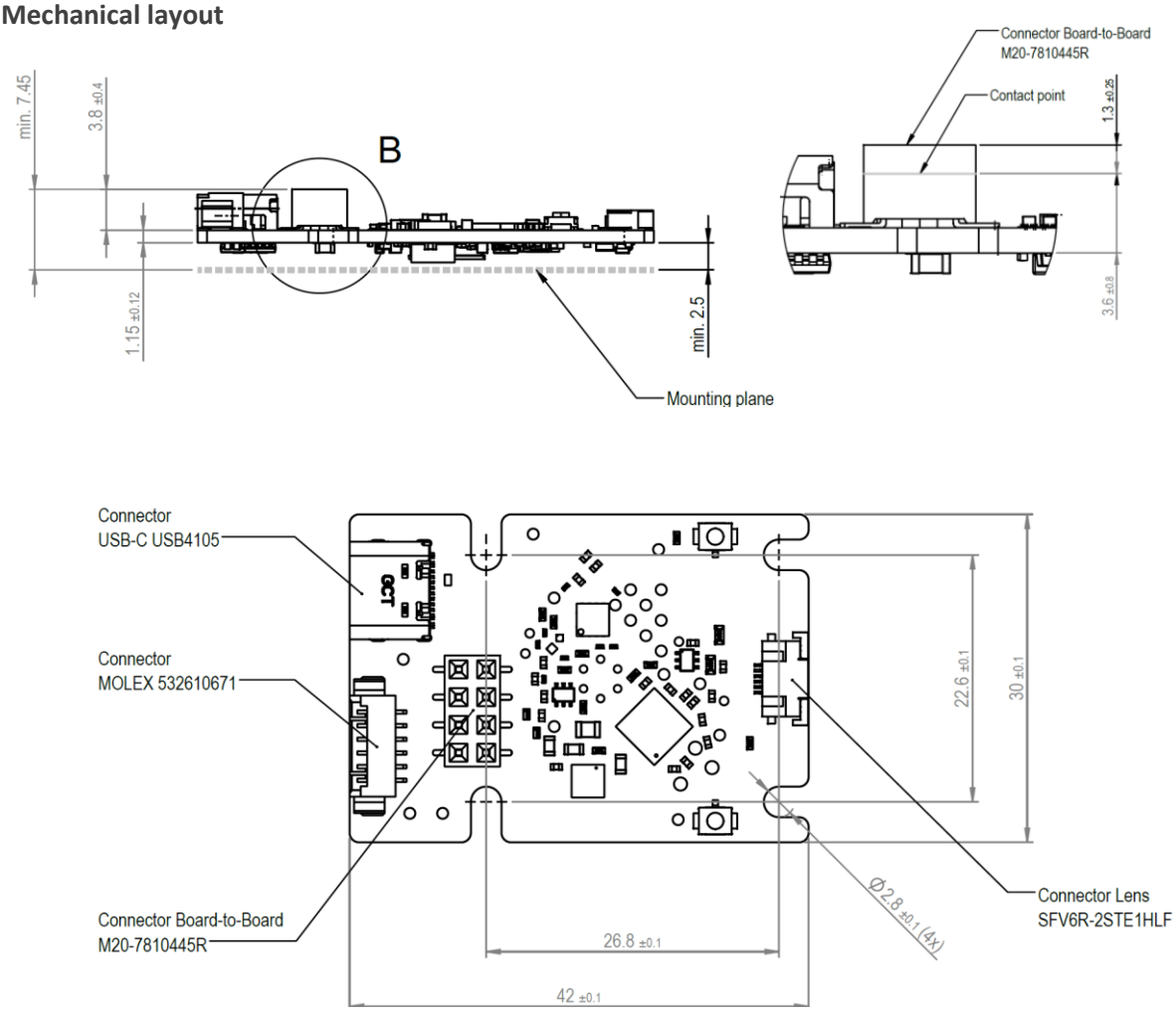

Figure 1: Mechanical drawing of ECC-1C OEM

[5] Pins are 5V tolerant. Never exceed 5.5V, otherwise permanent damage will result
[6] Average delay between end of command on UART RX line and output change using simple mode commands in Terminal app. Generally, the whole configuration time varies with command length, speed of communication and its mode, infrastructure, control host, operating system, programing language etc. This delay time variation also applies for protocol mode commands.
[7] Analogically defined delay but using I2C communication bus. It corresponds also to latency of GPIO input trigger by both rising and falling edge.

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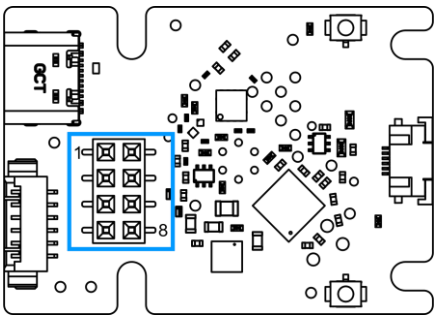
Electrical connection

The ECC-1C OEM provides three main input connection options: OEM wire connection, OEM board-to-board connection, and USB-C. These inputs are used not only for power supply, but also for communication and control signals such as UART, GPIO, and analog input.

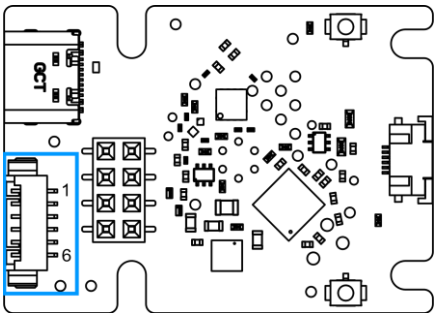
Warning: Do not connect the OEM wire connection and the OEM board-to-board connection simultaneously to multiple devices. Using both connections at the same time can cause permanent damage to connected devices.



Pin out M20-7810445R		
Position	**Function**	**Value**
1	GPIO Trigger	3V3 logic
2	Analog In	0-10V
3	UART Tx / I²C SCL	3V3 logic
4	UART Rx / I²C SDA	3V3 logic
5	GND	-
6	VCC input	See electrical specifications on page 1
7	nRst button	
8	Boot button	

Figure 2: Pin out of M20-7810445R connector

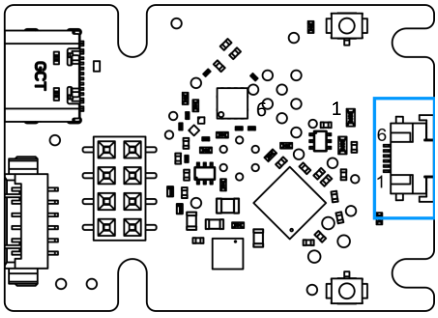
The M20-7810445R board-to-board connector provides the main OEM interface for power supply, communication, and control signals. It includes GPIO trigger, analog input, UART/I²C communication lines, ground, supply input, and the reset and boot pins used for service functions.



Pin out PicoBlade 532610671		
Position	**Function**	**Value**
1	GPIO Trigger	3V3 logic
2	Analog In	0-10V
3	UART Tx / I²C SCL	3V3 logic
4	UART Rx / I²C SDA	3V3 logic
5	GND	-
6	VCC input	See electrical specifications on page 1

Figure 3: Pin out of PicoBlade 532610671

The PicoBlade 532610671 wire connection provides the same main OEM interface signals in a compact cable-based connection. It can be used for power supply, GPIO trigger, analog control, and UART/I²C communication when a wire harness connection is preferred over the board-to-board connector.



Pin out flex cable connector		
Position	**Function**	**Value**
1	GND	-
2	Lens coil -	-300 to 300 mA
3	Lens coil +	-300 to 300 mA
4	I²C SDA Lens	3.3 V logic
5	I²C SCL Lens	3.3 V logic
6	VCC - Lens supply	3.3 V

Figure 4: Electrical connections of flex cable connector.

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6-pin flex cable connector is the connection between lens and ECC-1C controller. Controller provides current control for lens coil and internal I2C communication with lens' EEPROM and temperature sensor readout. **Lens flex cable pins must face upwards when connected.**

Interface options

The ECC-1C is best controlled using the digital interfaces UART or I2C. The respective communication protocol is detected automatically. While both protocols offer a pro-mode with register-based command structure, the UART protocol offers also a simple mode based on ASCII text commands. Furthermore, it is also possible to pre-configure a look-up table, which allows for analog 0-10 V control, or vector-based waveforms, which can be triggered via the GPIO pin.

Available drive current vs. temperature

The guaranteed drive current available from ECC-1C depends on the lens type, voltage supply and ambient temperature as detailed in the graphs below (Figure 5, 6 and 7).

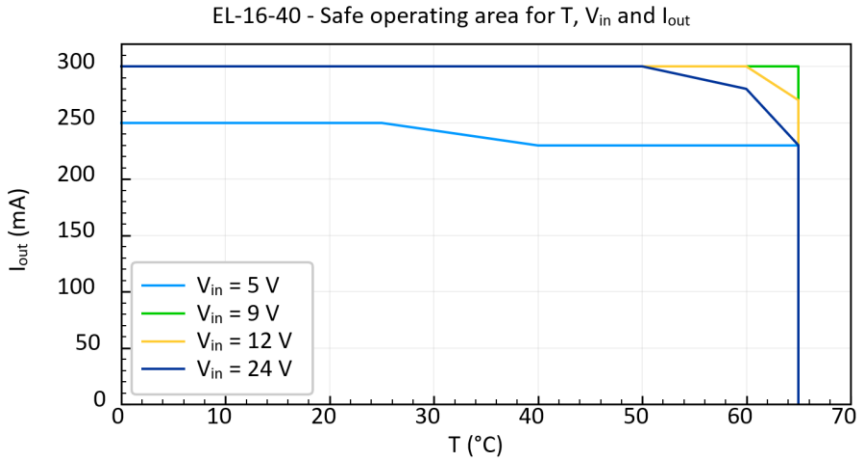

Figure 5: Guaranteed drive current for EL-16-40 lens available from ECC-1C.

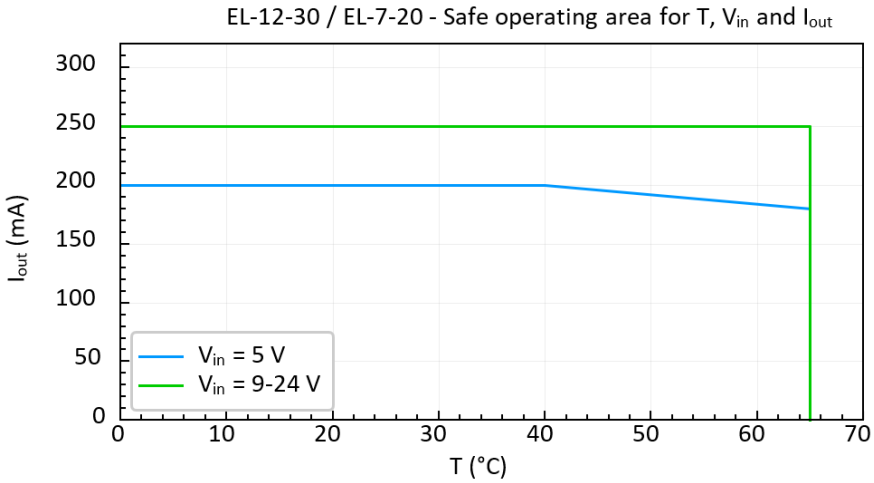

Figure 6: Guaranteed drive current for EL-12-30 / EL-7-20 lens available from ECC-1C.

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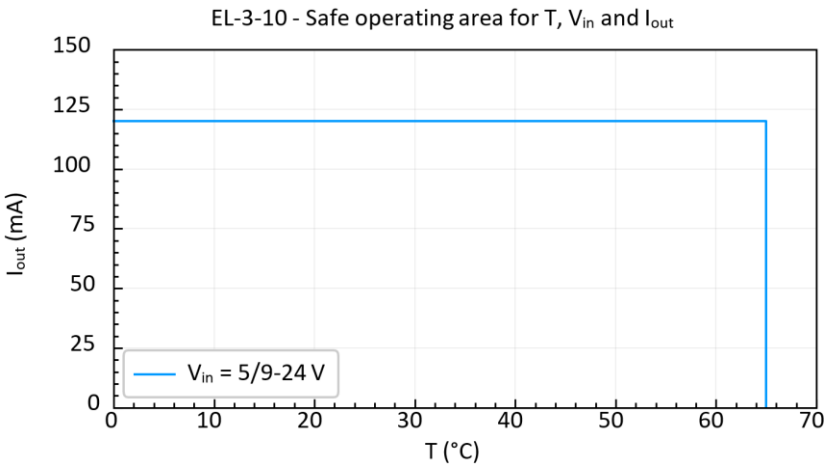

Figure 7: Guaranteed drive current for EL-3-10 lens available from ECC-1C.

Safety and compliance

The product fulfills the RoHS, REACH and CE compliance standards. The customer is solely responsible for complying with all relevant safety regulations for integration and operation.

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

Supporting documentation (available on request)

The following support documentation is available on request:

- Firmware documentation and I2C/UART communication protocol
- ECC-1C Slave I2C communication protocol

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