



Advanced UV-LED Light Engine ONE C

ALE/1C – Lithography UV-LED Exposure Systems



Key Applications

- + Mask Aligners for 4", 6", and 8" wafers
- + 1X Wafer Steppers and Mini-Steppers
- + Highly uniform precision flood exposure

ALE/1C UV-LED Light Source Highlights

- + Built-in solution for maximum exposure efficiency and performance
- + Up to 50 Watts of broadband exposure (350 - 450 nm)
- + Closed-loop controlled optical output
- + LED process stability and TCO benefits
- + No external cooling required
- + No mercury! Save and future-proof LED light source
- + Quality made in Germany

ALE/1C UV-LED Exposure Systems Replace Conventional 1 kW Lamps

Output Spectrum and Performance

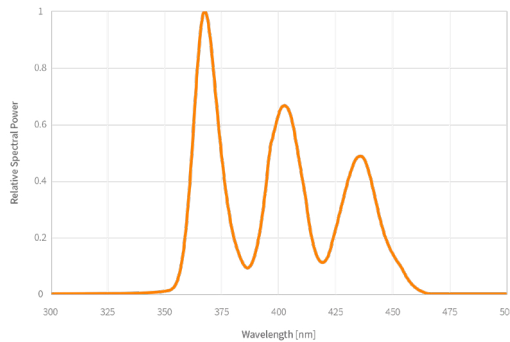
ALE/1C

3 NUV-LEDs:

365 / 405 /
436 nm

Application:

- + Standard lithography setups using i-, h-, and g-line exposure.



Radiation [W]

| ALE1/C | i-line CWL 365 nm | Broaband 350 - 450 nm |
|------------------|----------------------|--------------------------|
| Standard Mode | 17 | 40 |
| Performance Mode | 21 | 50 |

| Mercury Discharge Lamp | | |
|------------------------|----|----|
| 350 W | 7 | 14 |
| 500 W | 10 | 20 |
| 1,000 W | 20 | 40 |

CWL of emitters: 367.5±2.5 nm, 387.5±2.5 nm, 402.5±2.5 nm, and 435.0±2.5 nm.
Output power deviation of ±10% possible.

Integration of ALE/1C UV-LED Exposure Systems in Mask Aligners

ALE/1C Distributed Design Approach (ESS / CSS)



Our High-Power UV-LED Exposure System ALE/1C follows a distributed design approach with a Control Subsystem (CSS) separated from a small footprint Exposure Subsystem (ESS) to be directly integrated into collimated exposure equipment, i.e., Mask Aligners.

We offer a selection of homogenizing light pipes, flexible liquid light guides, and condensing optics which you can combine with ALE/1C Exposure Subsystems. These components may be particularly helpful if you want to adjust uniformity or the collimation angle of the output radiation.

Control Subsystem (CSS)

- + Low-footprint or 4U 19" rack mount system
- + Includes power supply, cooling system, and control interfaces

Exposure Subsystem (ESS)

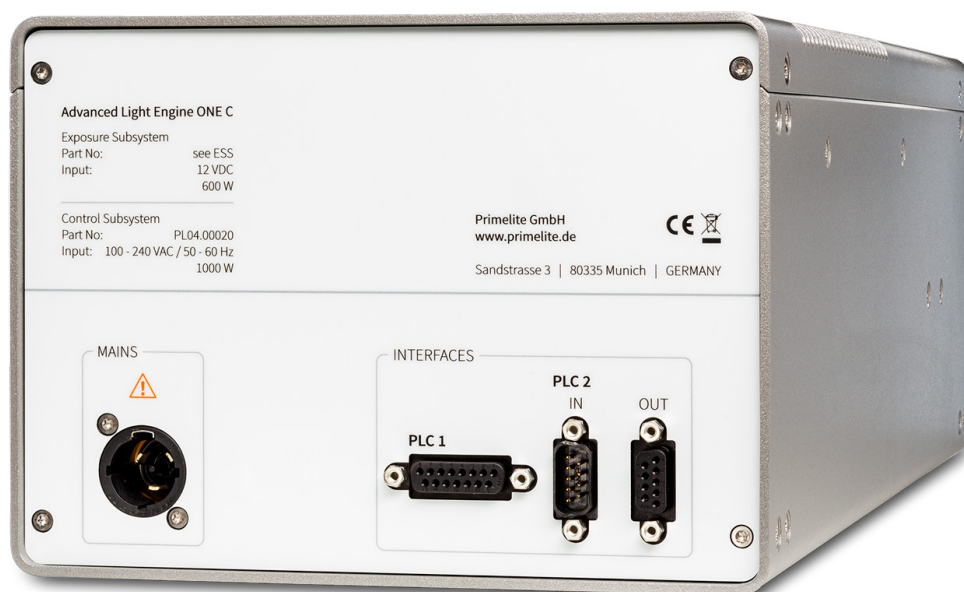
- + Compact design for direct integration into exposure tool
- + Includes i-, h-, and g-line LED Modules and the LED drivers



ALE/1C: The Industry's Workhorse in Production Mask Aligners

System Properties and Specifications

| | | | |
|--------------------------|--|-------------------|----------------------|
| Emitter Options | 3 LEDs with CWL 365 nm, 405 nm, and 436 nm | | |
| Numerical Aperture | NA 0.6 ($2\alpha \sim 70^\circ$) with light pipe only, down to NA 0.15 ($2\alpha \sim 17^\circ$) with condenser | | |
| Output Control | <ul style="list-style-type: none"> + Individual LED power management and presets + High-resolution intensity adjustment (10 - 100%) + LED rise time under 1 millisecond + Continuous monitoring of optical output and feedback control | | |
| Communication Interfaces | <ul style="list-style-type: none"> + Discrete PLC interface (TTL) + USB (serial) + Ethernet / Modbus (optional) | | |
| Thermal Management | <ul style="list-style-type: none"> + Liquid cooling with internal radiator + Optional thermoelectric chiller (required for performance mode operation) | | |
| Dimensions (W H D) | ESS | 20 X 13 X 20.5 cm | (7.9 X 5.1 X 8.1") |
| | CSS | 20 X 15 X 45 cm | (7.9 X 5.9 X 17.7") |
| | CSS (Rack) | 44 X 18 X 37 cm | (17.3 X 7.1 X 14.6") |
| Weight | ESS | 5 kg | (11 lbs) |
| | CSS | 9 kg | (20 lbs) |
| | CSS (Rack) | 10 kg | (22 lbs) |
| Power Supply | 110 - 240 VAC / 50 - 60 Hz / 1,000 W | | |





Accessories for the ALE/1C

Performance Optics

Primelite's standard Performance Optics are very compact add-ons to be combined with our Advanced Light Engines. You may connect a flexible LED Light Guide or our light pipes / homogenizers to the ALE/1C Light Engines. In many cases, it's also worth taking a closer look at our condensing optics. Our LED optics are an economical addition to reduce divergence and match the collimation requirements of your exposure tool.

Primelite's LED Performance Optics exclusively use UV-grade material.

Standard LED Performance Optics



Homogenizers

| | | |
|----------------|--------------|--------------|
| Crossplane | Round | Ø6.5 mm |
| | Square | 7.5 X 7.5 mm |
| | Hexagonal | Ø8.0 mm |
| Length | 58 mm | |
| Spectral Range | 250 - 470 nm | |

Condensers

| Type | ASP | |
|----------------------|----------------------------------|----------------------------------|
| Clear Aperture | Ø25 mm | Ø34 mm |
| Numerical Aperture | 0.22 ($2\alpha \sim 25^\circ$) | 0.15 ($2\alpha \sim 17^\circ$) |
| Min Working Distance | 75 mm | |
| Spectral Range | 250 - 470 nm | 330 - 470 nm |