



**LINEAR LED**  
P L A T F O R M

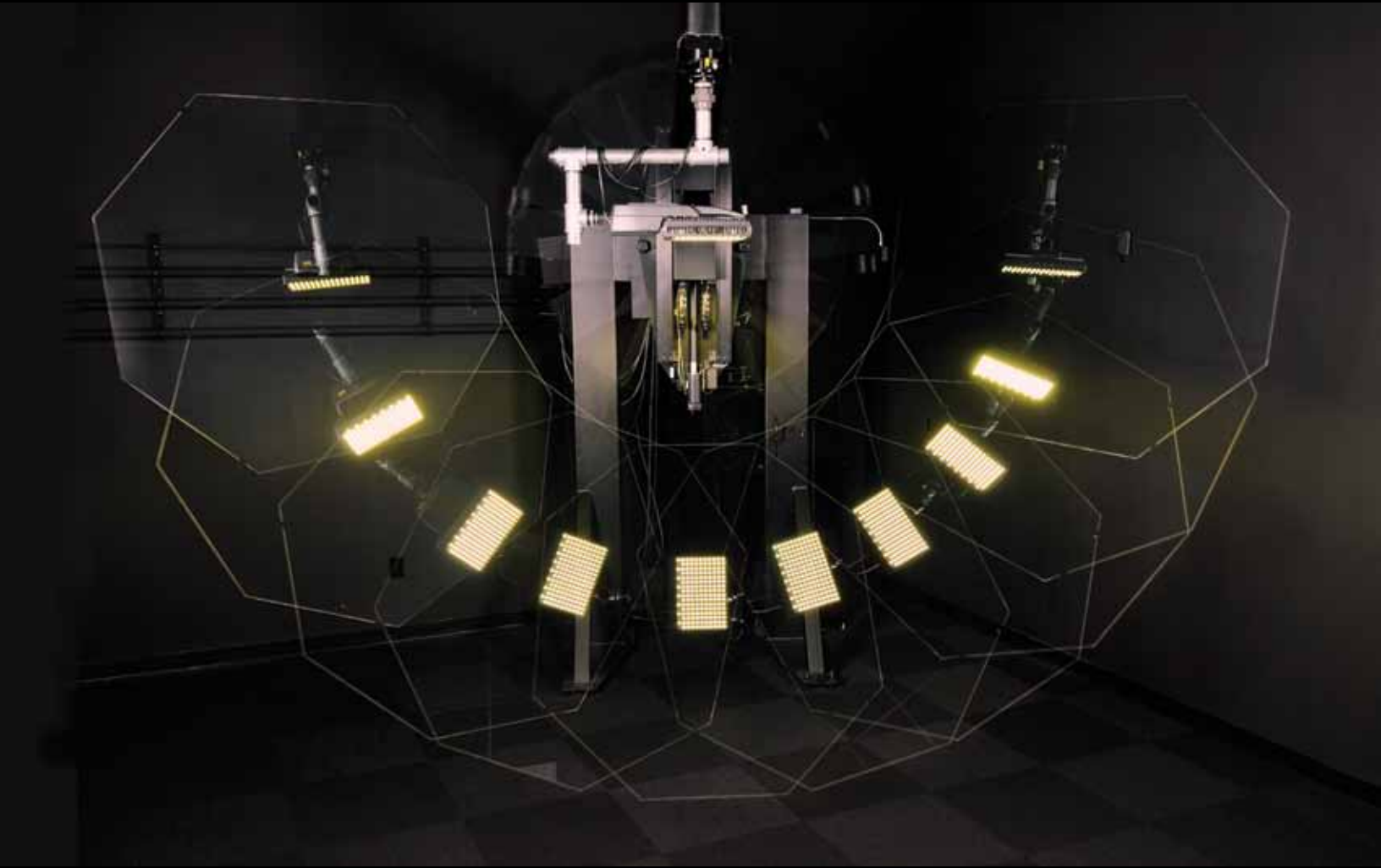
## Accord Series LED

Architectural Recessed

# LINEAR LED

P L A T F O R M

Technology by **COOPER** Lighting



Goniophotometer performing LED module light direction measurement in Cooper Lighting's photometric lab.

# LED Technology Supported by 175+ Years of Industry Expertise



## The Innovation Center

Cooper's 60,000-square-foot Innovation Center opened its doors in 2009. The multi-million dollar facility is home to the research, development, design, validation, and manufacturing of proprietary LED and other advanced lighting technologies. Teams of highly skilled Mechanical, Electrical, Thermal, Optical, and Reliability Engineers work hand-in-hand with Industrial Designers, Lab Technicians, and Manufacturing personnel to accelerate the development and commercialization of relevant industry-leading LED solutions.



### Design

Cooper has made significant investments in talented personnel, state-of-the-art equipment, and the latest analytical and design software. Our world-class Innovation Center teams execute multiple LED design and performance assessments, including visual renderings, thermal simulations, electrical analysis, and optical ray-tracing. Our stringent product development process ensures a highly reliable product every time.



### Electrical & Optical Labs

Our highly qualified lab and research development teams take great pride in their active involvement in creating and driving industry standards. Cooper Lighting's Certified Test Laboratory conducts extensive testing of electrical, optical, and thermal properties for robustness in application and intended performance over rated life. The testing performed is capable of validating products to industry standards such as LM-79, LM-80, ENERGY-STAR® and UL.



### Quality Testing & Assurance

Manufacturing and assembly is a critical and final step in the LED product development process. By involving the Innovation Center operations team throughout the design process, utilizing tools like Production Failure Modes and Effects Analysis (PFMEA), we have optimized our manufacturing process and mitigated risk of premature failure.

Our state-of-the-art Pilot Production area incorporates modular and transferable cell construction, a temperature and humidity controlled environment, and ESD protection for a well manufactured fixture each and every time.

Our products are further evaluated and qualified through 100% end-of-line testing for power (wattage), light output, and color temperature. Finally, our products are bar coded and the production data is captured in a manufacturing database to provide system and assembly level traceability and quality control.



### Prototyping

The Research and Development Prototyping area houses world-class rapid prototype equipment and lean manufacturing workcell development capabilities to reliably deploy new advanced lighting technologies. The modernized rapid prototyping lab includes the latest milling and Computer Numeric Control (CNC) equipment and an advanced quality lab for layout and validation. In addition, operations such as painting, welding, and fused deposition modeling are performed.



### Reliability & Thermal Testing

Reliability is one of the most important elements of LED lighting. Cooper's Reliability and Thermal Laboratory is vital to ensure our LED luminaires meet their stated performance over the lifetime of the product. Our experts use the most advanced environmental and thermal mapping test equipment along with a rigorous testing protocol and statistical analysis tools to ensure long-term performance of LED components, systems, and finished luminaires.



## Architectural Linear Module

Version 1.0

The ALM 1.0 is a proprietary Cooper Lighting LED module assembly designed to integrate into luminaire platforms geared for ambient and surface lighting applications. The beauty of the component lies in its low-power discrete LED configuration that runs exceptionally cool, hence requiring minimal heat-sinking to ensure an easy fit into any fixture platform - either new or existing.

Finally, low-powered arrays create the ideal condition for delivering high lumens per watt. The ALM's constant DC current drives each LED to less than half of its maximum rated wattage, enabling the achievement of 90 lumens per watt\*, which meets or exceeds most fluorescent lumen packages.

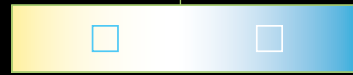


# ALM 1.0

PATENT PENDING



- Low-Power 0.25 Watt Discrete LED Array
- 90 Lumens Per Watt\*
- 2 Light Levels (100% / 75%)
- Future Proof Modular Design
- Dimmable 0-10v (15%-100%)
- 2 Color Temperatures
- 85 CRI
- 50,000 Hours Rated Life (L70)
- Virtually No Maintenance
- No Socket Shadows
- Low Brightness, No LED Pixelation
- No Mercury
- 75 Lumens Per Watt Delivered



3500K

4000K

### Technical Data

**Luminous Efficacy:** 90 lamp ("hot") lumens per watt.\*

**Compliance:** Modules are UL recognized components and indoor luminaires are UL listed for 25°C ambient environments, RoHS compliant, and LED modules comply with IESNA LM-79 and LM-80 standards.

**Reliability:** Each module receives over 4000 hours of reliability testing which includes Thermal Shock, Thermal Cycling, and Humidity Testing.

**End of Line Testing:** Each certified Cooper Lighting LED manufacturing facility performs an end-of-line pass/fail test for all components with regard to color temperature, luminous output and wattage.

**Warranty:** 5 year warranty on LED components and driver.

**Driver:** Standard LED drivers are Class 2, 24v DC constant current with standard 0-10v dimming built-in. Dimming range is 15%-100%.

**Rated Life:** 50,000 hours L70, 70% lumen maintenance over life.

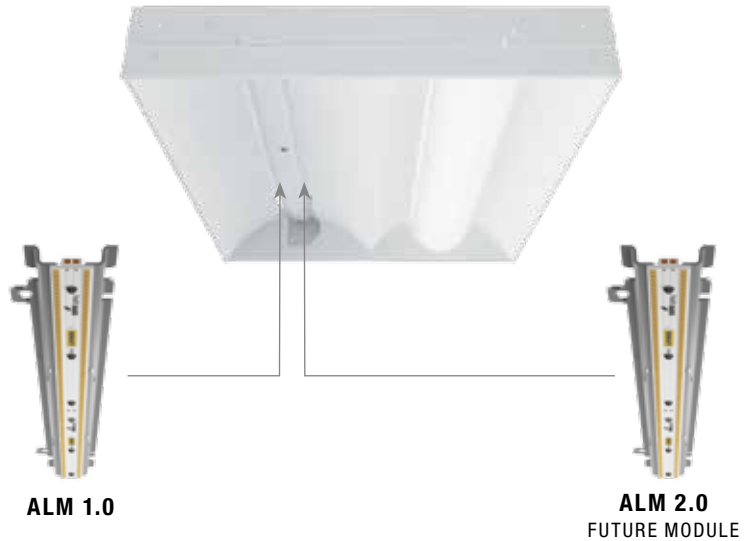
**Traceability:** During assembly, each module's signature is scanned into a database and matched to a corresponding sales order number to ensure proper color and lumen output match for future replacements.

**Components:** .25 watt max discrete LED array configured onto a PCB in a series parallel matrix to avoid string outages. Highly reflective white FR4 PCB composed of flame resistant reinforced woven fiberglass. Connectors located below PCB surface to avoid shadows.

\* LED Module plus driver produce greater than 90 "lamp" lumens per watt; fixture lumen losses are not factored into this value. See product page for delivered fixture lumens (p10-11).

# Future Proof Module Design

The explosion of performance growth within LED technology guarantees the availability of higher lumens-per-watt packages in the future. To address future retrofits of higher performing packages, Cooper Lighting has designed critical features into the module design to allow for simple physical replacement of the module.



### Plug-N-Play Connectors

Plug-N-Play quick disconnects offer safe and simple snap together wiring for simple service in the field.



### Serialized Module

Each module carries a bar code or serial number that offers traceability to every component to ensure color matching for future replacements.



### Simple Replacement

Each module has been designed to be easily removed with standard hardware so that any maintenance person can easily service in the field.

## Color Temperature Creates Mood

The ALM module is available in two color temperatures, each offering a unique color characteristic that will impact the mood of an environment. Warmer tones tend to evoke feelings of comfort ideal for restaurant, retail and hospitality applications, whereas cooler tones tend to have a stimulating effect and in turn enhance occupant alertness.



3500K



4000K

## Low Power Mitigates "LED" Pixelation

The dense low-powered array delivers crisp white light while carrying excellent light diffusion characteristics. The overall light energy is divided into numerous point sources, thus allowing the module to be mounted close to lens surfaces without revealing the LED "pixel" effect.



High-Powered LED Array



Linear LED Module, Low-Powered Array



## 2x2 Recessed / General Illumination

Metalux's Accord® Series LED marries its optimal illumination design and contemporary styling with the technology of Cooper Lighting's Linear LED Platform. Accord's high performance LED system, advanced light distribution and attractive appearance deliver unprecedented energy savings, comfort and aesthetics. The results below clearly demonstrate that Cooper Lighting's LED technology outperforms fluorescent in many cases and officially makes LED a vehicle for achieving best case watts-per-square foot scenarios.

	Accord 2x2 LED* (Light Level 2)	Accord 2x2 Fluorescent (2-24W T5HO)
Lumens Per Watt	76	57
Delivered Lumens	3493	2972
Input Watts	45	52

\*Based on IES report # P21047

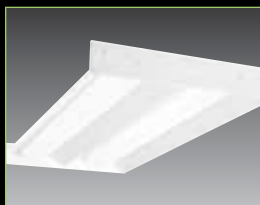


## Features

- Standard "Built-in" 0-10V Dimming
- 2 Color Temperatures – 3500K, 4000K
- 2 LED Light Levels (45W – 3400 Lumens / 33W – 2600 Lumens)\*
- Advanced Refractive Optics Deliver Greater Distribution and Uniformity of Light
- 3 Shielding Options (Smooth Frosted, Square Perf Pattern, Round Perf Pattern)
- Shallow Depth (3 1/4") and Tool-less Design Make for Quick and Easy Installation

\* Approximate lumen values. Visit [www.cooperlighting.com](http://www.cooperlighting.com) for more information.

## Companion LED Product



Accord 2x4 LED



Accord 1x4 LED



# Features & Benefits

## ALM 1.0

- 90 Lumens Per Watt – 11 Watts Per Foot
- 0.25W with High Efficacy LEDs
- Low Brightness Eliminates "Pixelation"
- Superior Thermal Management Reduces Heat Sink Size
- No Socket Shadows
- Series Parallel Matrix Prevents String Outages
- CRI 85/3500K Or 4000K
- L70 @ 50K Hours
- 0–10V Dimming Driver
- Modular Design with Quick Disconnects = Future Proof

## Fixture

- Soft white frosted acrylic lens fills the space with even illumination.
- High-reflectance matte white finish blends discreetly into the ceiling, yet is efficient.
- Shallow depth (3-1/4") and structural integrity makes for a quick and easy installation.
- Lamp maintenance is as simple as removing the refractors.
- Evenly distributes light; more pleasing to the eye.
- Dark spots (cave effect) associated with parabolics are eliminated.
- Driver is accessible from below through the removable cover. (No tools required)

## LED Environmental Impact

- LED's Provide Up To 75% Energy Savings
- 50,000+Hour Life Is 2X Fluorescent
- Extended Maintenance Cycles
- No Mercury or Lead Content
- Reduce Co<sub>2</sub> Emissions
- Upgradable Light Engines
- 100% Recyclable at End of Life

## Product Controls

Accord Series LED is control-friendly, offering compatibility with occupancy & daylight sensors, dimmers and full-scale lighting control systems. Using products from Cooper Controls and others will provide optimal energy savings and extend service life while providing light level flexibility.

### • 0–10V Dimmers

Works with Common 0–10V Fluorescent Wallbox Dimmers

### • Lighting Control Panels

Integrates with Lighting Control Panels' 0-10V (4-wire) modules

### • 120/277V Sensors

Compatible with Typical Commercial Occupancy Sensors

 **COOPER** Controls

 **COOPER** Wiring Devices

# The Future of Lighting is Officially Here

Cooper Lighting's proprietary low-power, low-brightness LED system delivers a soft, diffuse volume of pure white light that carries the general character of a fluorescent source but improves upon fluorescent by eliminating unsightly socket shadows, increasing energy savings, providing longer life and delivering more light.



## LED Advantage vs. Fluorescent

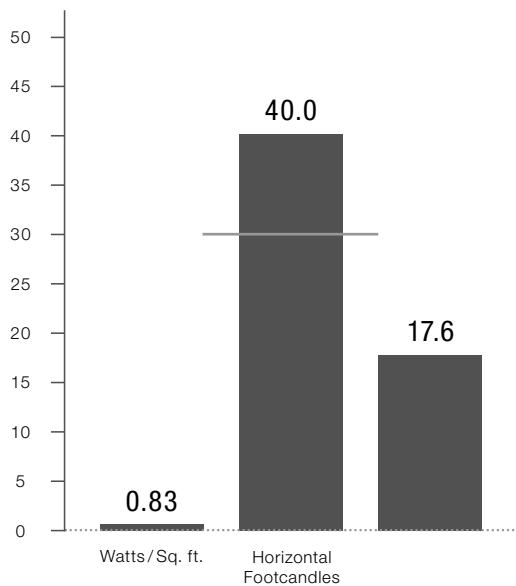
- Improved Energy Savings\* (+18%)
- Greater Delivered Lumens
- Superior Uniformity & Light Distribution
- Equal or Greater Color (85 CRI)
- Longer Life (L70 at 50K hours)
- Reduced Maintenance Costs
- Simple and Flexible Control Integration

\* 33W solution delivers equivalent light levels to fluorescent (meeting IES requirements) with 26% additional energy savings compared to 45W option.

## Application Comparison: Fluorescent vs. LED

### Accord 2 Lamp, T5HO

(2) 24 T5HO lamps, 156 Fixtures  
Electronic Ballast  
53 watts per fixture

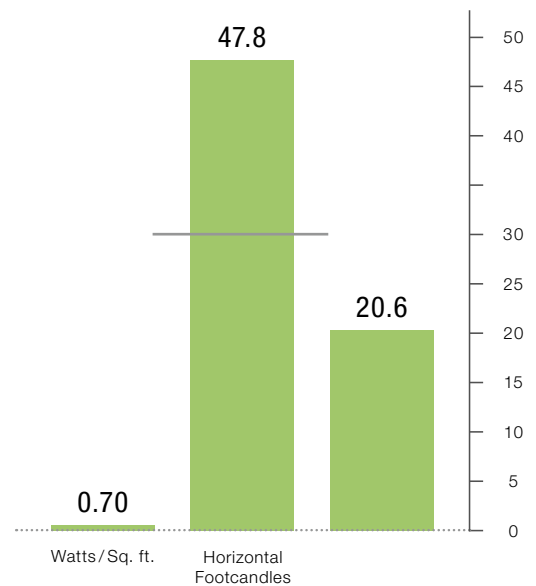


Based on:  
Room Size: 100' x 100'  
Ceiling Height: 9'  
Workplace: 2.5'  
Reflectance: 80/50/20  
Layout: 8x8 Centers

\* IES recommends 30-35 footcandles in open office environments

### Accord 2 Lamp, LED

(2) LED Modules, 156 Fixtures  
Dimming Driver  
45 watts per fixture

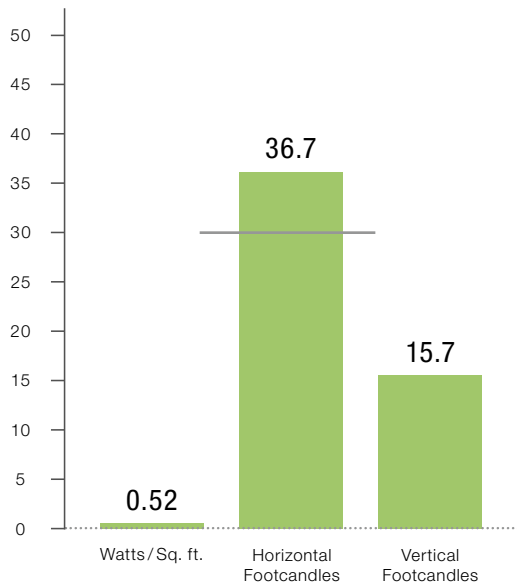




## Application Comparison: 33W LED vs. 45W LED

### Accord 2 Lamp, LED

(2) LED Modules, 156 Fixtures  
 Dimming Driver  
 33 watts per fixture

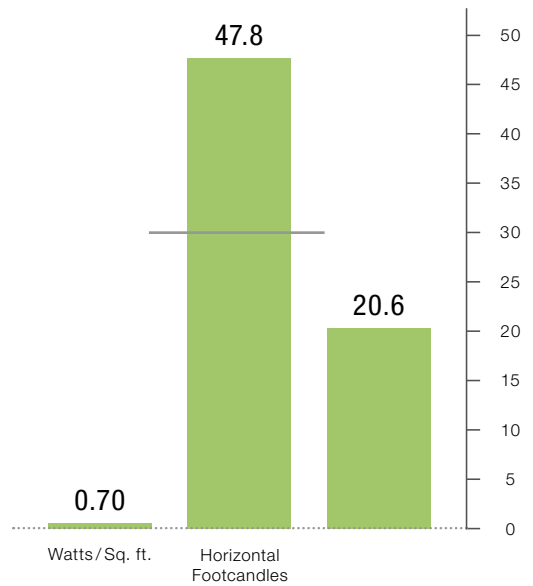


Based on:  
 Room Size: 100' x 100'  
 Ceiling Height: 9'  
 Workplace: 2.5'  
 Reflectance: 80/50/20  
 Layout: 8x8 Centers

\* IES recommends 30-35 footcandles in open office environments

### Accord 2 Lamp, LED

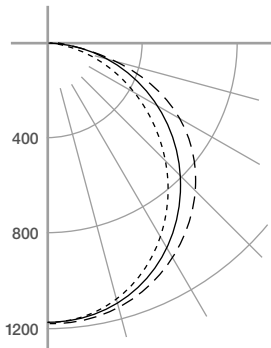
(2) LED Modules, 156 Fixtures  
 Dimming Driver  
 45 watts per fixture



# Photometry

## ACCORD – 2' x 2', LED

2AC-23-UNV-L835-CD1



Dimming Driver (2) LED Linear Modules 3438 Lumens

Spacing Criterion:

0-Deg: 1.2x mounting height

90-Deg: 1.3x mounting height

Efficiency: 100%

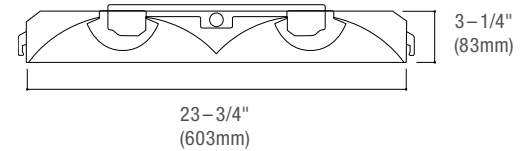
Input Watts: 45W

### CANDELA DISTRIBUTION

D	0.0	22.5	45.0	67.5	90.0
0	1177	1177	1177	1177	1177
5	1171	1172	1173	1178	1185
15	1121	1126	1137	1149	1155
25	1014	1029	1056	1079	1088
35	864	886	934	976	991
45	694	723	788	850	872
55	517	551	625	701	732
65	345	379	455	522	543
75	184	218	264	272	271
85	47	60	60	58	58
90	0	0	0	0	0

### ZONAL LUMEN SUMMARY

ZONE	LUMENS	%FIXT
0-30	919	26.7
0-40	1502	43.7
0-60	2668	77.6
0-90	3438	100.0
90-180	0	0.0
0-180	3438	100.0



ANGLE	AVG. 0°	AVG. 45°	AVG. 90°
45°	2640	2998	3317
55°	2425	2931	3433
65°	2196	2896	3456
75°	1912	2744	2817
85°	1451	1852	1790

IN CANDELA / SQ METER

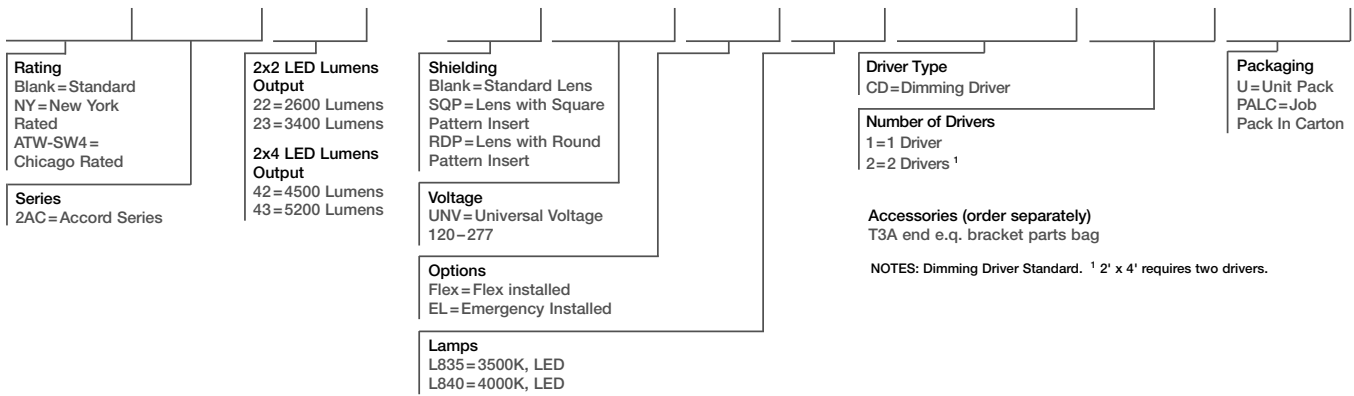
# Ordering Information

CATALOG NUMBER	FIXTURE SIZE	MOUNTING	DELIVERED LUMENS	INPUT WATTS	EFFICACY (LPW)
AC-12-UNV-L835-CD1-U	1x4	Recessed	2345	27	87
AC-13-UNV-L835-CD1-U	1x4	Recessed	3152	39	81
2AC-22-UNV-L835-CD1-U	2x2	Recessed	2634	33	80
2AC-23-UNV-L835-CD1-U	2x2	Recessed	3439	45	76
2ACS-22-UNV-L835-CD1-U	2x2	Surface	2634	33	80
2ACS-23-UNV-L835-CD1-U	2x2	Surface	3439	45	76
2AC-42-UNV-L835-CD1-U	2x4	Recessed	4598	52	88
2AC-43-UNV-L835-CD1-U	2x4	Recessed	5284	62	85

NOTE: Values subject to change. Consult factory for updated performance.

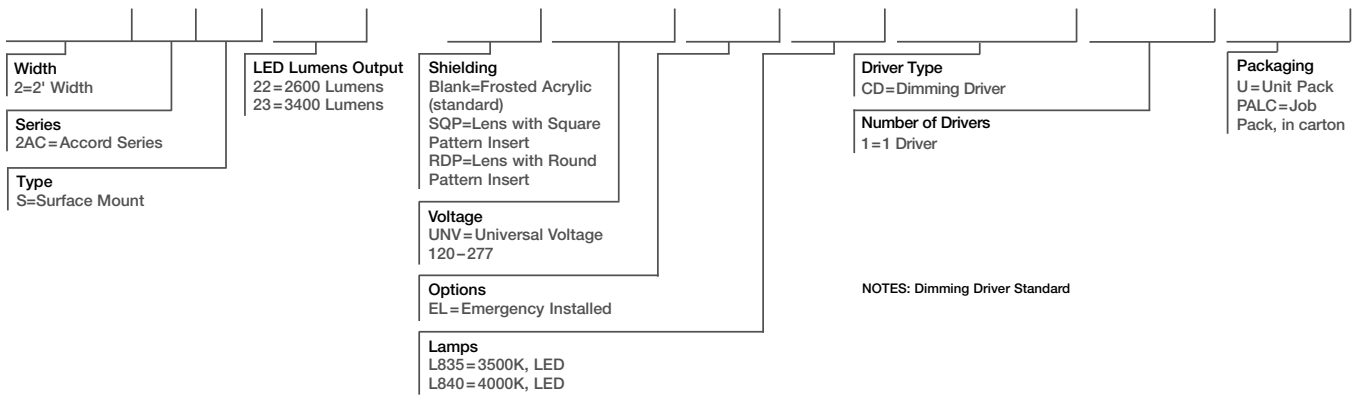
## ACCORD LED: 2' x 2' & 2' x 4'

SAMPLE NUMBER: 2AC-23-UNV-L835-CD1-U



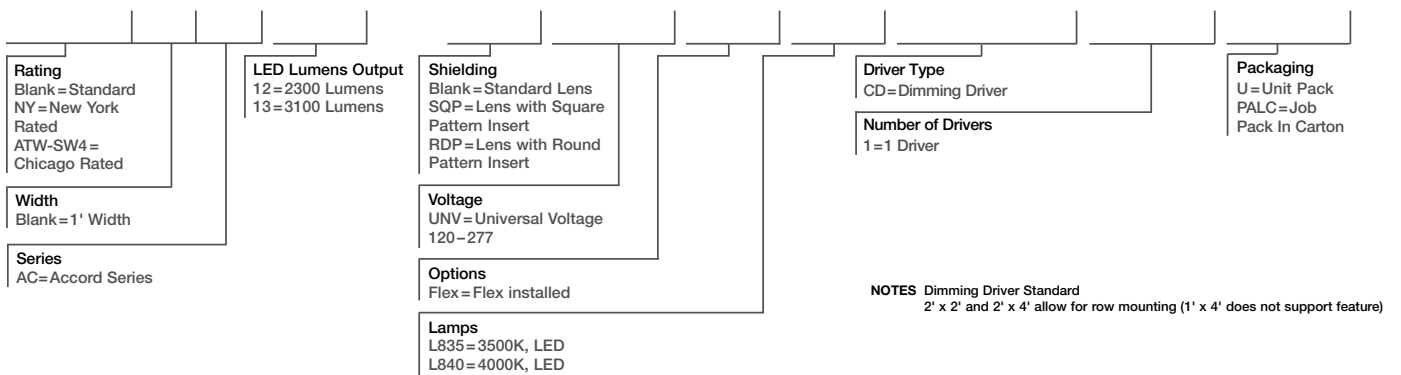
## ACCORD LED: 2' x 2' SURFACE

SAMPLE NUMBER: 2ACS-23-UNV-L835-CD1-U



## ACCORD LED: 1' x 4'

SAMPLE NUMBER: AC-13-UNV-L835-CD1-U



### Diffuser Options



Smooth Design (standard)



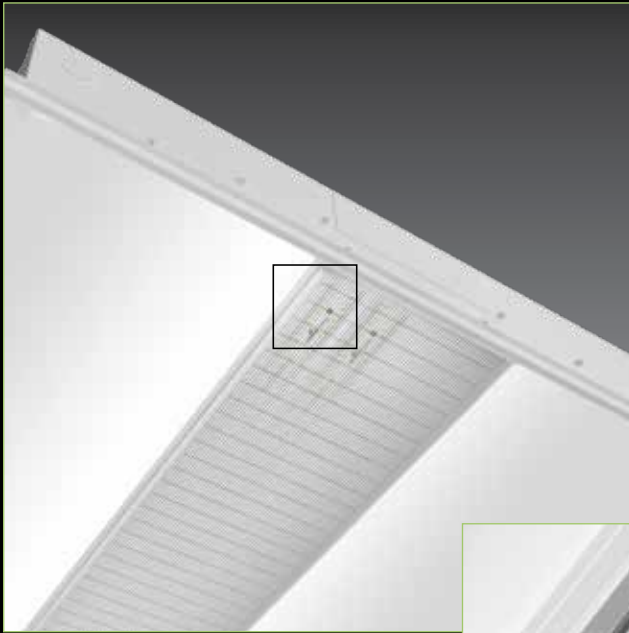
Round Perf Design (RPD)



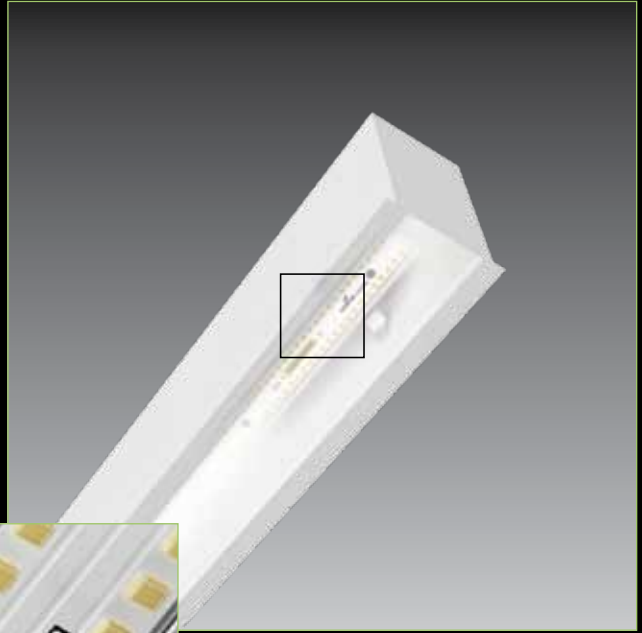
Square Perf Design (SQP)

### Surface Mount

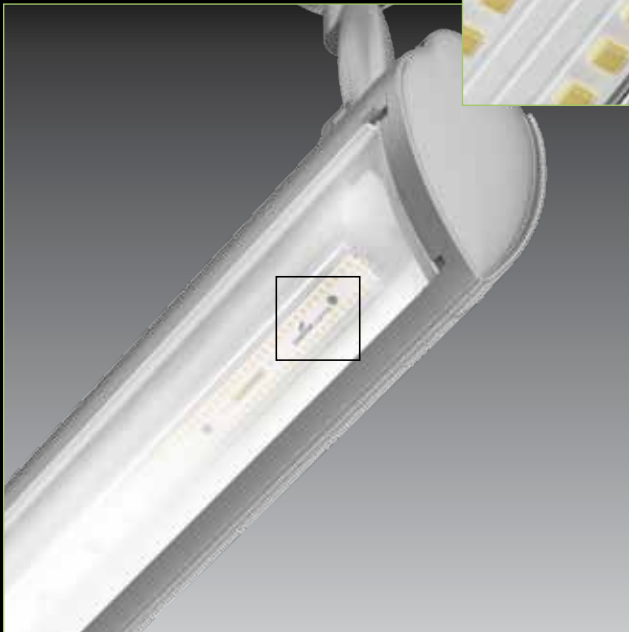




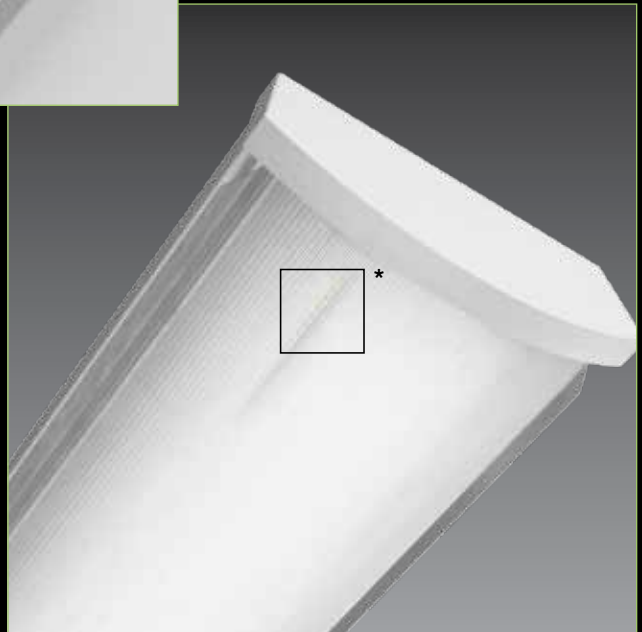
**CORELITE/RZ Series**  
Recessed General Illumination



**NEORAY /Straight and Narrow**  
Recessed General Illumination



**AMETRIX/Arrowlinear**  
Linear Asymmetric Illumination



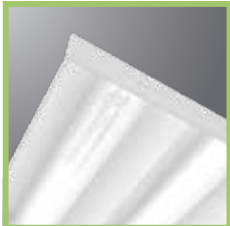
**FAIL SAFE/HVL**  
Surface General Illumination

\*Fail-Safe LED Module

# LED Breadth of Line

## Indoor, Outdoor & Specialty Lighting Solutions

It's time to redefine expectations and embrace a new generation of outdoor and indoor luminaires that allow for meaningful energy reductions and improved maintenance cycles. With the introduction of Cooper Lighting's patent-pending Linear LED Platform, we have created a beautiful synthesis of technology and design and revolutionized the approach to lighting interior work environments. Leading-edge solid-state components have been elegantly infused into a wide array of Cooper Lighting's premier linear fluorescent luminaires to catapult LED into the mainstream by providing leading performance, energy, maintenance, and environmental benefits.



**Ambient**



**Wall Mount**



**Decorative**



**Area / Site**



**Canopy**



**Recessed**



**Track**



**Specialty**



**Exit**



**Pathway**



**Landscape**



**Accent**

**Cooper Lighting, LLC.**

Customer First Center  
1121 Highway 74 South  
Peachtree City, GA 30269

P: 770-486-4800  
F: 770-486-4801

[www.cooperlighting.com](http://www.cooperlighting.com)

**International Sales, USA**

Cooper Lighting, LLC.  
1121 Highway 74 South  
Peachtree City, GA 30269  
P: 770-486-4800  
F: 770-486-4801

**Canada**

Cooper Lighting, LLC.  
5925 McLaughlin Road  
Mississauga, Ontario L5R 1B8  
P: 905-507-4000  
F: 905-568-7049

**The Cooper Lighting Family**

Halo  
Metalux  
Lumark  
Sure-Lites  
Neo-Ray  
Corelite  
Portfolio  
Iris  
Shaper  
IO  
Lumière  
Invue  
McGraw-Edison  
Streetworks  
Fail-Safe  
PDS  
MWS  
RSA  
Ametrix

**Domestic Facilities**

Cranbury, New Jersey  
Elk Grove Village, Illinois  
Irving, Texas  
Ontario, California  
Peachtree City, Georgia

**Canadian Facility**

Calgary, Alberta T2E 7V9  
Mississauga, Ontario L5R 1B8



25% PCRf

Cooper Lighting, Metalux, Ametrix, Corelite, Fail-Safe, Neo-Ray, and SustainabLEDesign are valuable trademarks of Cooper Industries in the United States and other countries. You are not permitted to use the Cooper Trademarks without the prior written consent of Cooper Industries.

**Cooper Industries plc**  
600 Travis, Ste. 5600  
Houston, TX 77002-1001  
P: 713-209-8400  
[www.cooperindustries.com](http://www.cooperindustries.com)