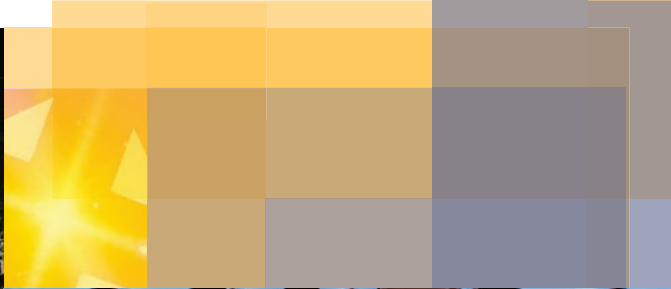


ARROW | LIGHTING



Fall | 08

ARROW LIGHTING SELECTOR GUIDE

Making Bright Ideas BrilliantSM

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Photos on the cover
 Courtesy of Peter Paige
 Courtesy of Cree

Arrow Electronics Lighting Group

Making Bright Ideas BrilliantSM

Dedicated to providing LED alternatives to incandescent, halogen, and fluorescent lighting. Our focus is on providing a wide range of solutions from components to total systems that deliver high reliability, lighting efficiency, shock resistance, and vivid color effects for a lower total cost of ownership. We offer solutions developed around products containing High Brightness Light Emitting Diodes (HB-LEDs) to support your designs for solid-state lighting as your requirements evolve and expand. Whether you need solutions for signage, flashlights, architectural, automotive, commercial, or backlighting applications, Arrow offers real-world components, solutions, and value-added assemblies.

Complete HB-LED Solutions from Concept through Production >>

The Arrow Lighting line card features the latest RoHS-compliant materials and process technologies, including InGaN

and AlInGaP HB-LEDs, LED drivers, optics, and thermal management solutions. Our supplier base consists of many of the world's leading LED lighting suppliers and integrators,

which means we can deliver complete solutions from individual components, through integrated devices, or design kits, when you need them.

Arrow's unsurpassed supply chain management services allow you to streamline your supply chain from start to finish. Services include vendor managed inventory, in-plant store and consignment programs, and supply chain integration, resulting in greater flexibility and responsiveness for your supply chain. Our staff, facilities, and infrastructure are ready to meet your needs at every point.

The Right Team for the Job >>

Our diverse team specializes in various vertical markets and can help you find solutions for your most complicated lighting designs. The Arrow Electronics Lighting Group is comprised of experienced Regional Lighting Specialists, dedicated Account Development Specialists, and specially trained Lighting Applications Engineers who are among the industry's most knowledgeable experts.

Environmentally Friendly, RoHS Compliant Products Can Help Change the World >>

Consider this. Worldwide, electric lighting accounts for 2.9 billion metric tons of carbon dioxide emissions per year,¹ and the demand for electricity is only expected to increase. If solid-state lighting replaced all existing lights in the United States, it is estimated there would be a 10 percent reduction in greenhouse emission gases nationwide,² which is another good reason to make the switch to HB-LEDs.

On their own, LEDs are considered efficient, but frequently the components surrounding them negate this efficiency. To be truly efficient, you need a complete energy-efficient solution. Arrow offers a broad range of drivers and other components that preserve the efficiency of LEDs. And all of our lighting solutions are RoHS compliant. Arrow can solve even the most challenging lighting scenarios and protect the environment at the same time.

1. *IAEEL Newsletter*. http://www.iaeel.org/IAEEL/NEWSL/2000/ettva2000/NatGlob_a_1-2_00.html. May 25, 2007.

2. *Next Generation Lighting Industry Alliance Website*. <http://www.nglia.org/>. May 25, 2007.

Design Tools >>

Arrow's dedicated design tools page on our lighting website offers tools from a variety of lighting manufacturers to help you choose the right parts for your designs. Quickly access technical papers, training, and other information links to help you understand, compare, and evaluate the right parts for your lighting applications. Now you can solve your design challenges and speed time-to-market. Start now at <http://lighting.arrow.com/designtools>

Features and Benefits of HB-LEDs:

- Lower total cost of ownership compared to incandescent solutions
- Long life span (30,000 to 100,000 hours of continuous operation), means less-frequent lamp replacement
- Capable of flashing without reduced life span
- Low voltage DC operation
- Resistant to shock and vibration, for higher reliability
- Ability to operate within -40°C to +125°C temperature range and therefore ideal for outdoor, industrial, and automotive applications
- Dimmable/brightness control without color shift
- Dynamic color control and a full range of saturated colors
- Environmentally friendly RoHS compliance; lead- and mercury-free
- No heat (IR) in the light beams means it won't harm what it illuminates



Photo courtesy of Osram Sylvania®

arrowdevtools.com™ >>

Find the best reference designs and evaluation tool solutions with arrowdevtools.com—an online development tool selection and purchasing site that gives you access to a vast range of development tools. Our proprietary parametric search engine allows you to narrow your tool search quickly and intuitively to the unique tool you need to keep your development on track. You can browse and compare different solutions and then conveniently and confidently purchase your tool for immediate delivery online or through Arrow's sales team.

Arrowdevtools.com offers everything you need to move your project rapidly to completion—whether you're developing a product vision, connecting ideas, or simply evaluating a component.

TestdriveSM >>

Our Testdrive tool evaluation program helps you save time and money on your designs. The program allows you to try tools before you buy them, free of charge for 21 days. You can test a vast selection of tools from all the major semiconductor and third-party suppliers without impacting your budget.

Additionally, Arrow's Field Applications Engineers are familiar with the tools offered through Testdrive and can work through any issues that may arise, saving you precious resources and giving you access to some of the industry's leading expertise.

Arrow's LCD Offering >>

Arrow offers a broad range of thin-film transistor (TFT) modules that are available for enhancement. We provide key solutions ranging from 2.2" to 82" panels and everything in between. Arrow's world-class integration facility and technical resources allow us to fully service your backlight enhancements needs, whether you need components, sub-assemblies or complete displays. Contact your Arrow sales representative for further information on backlight enhancements and Arrow's LCD linecard including industry-leading suppliers such as Sharp, NEC, Toshiba, and Samsung.

Supply Chain Services >>

For decades, Arrow has successfully managed one of the most complex supply chains in the world, allowing us to offer unmatched insight and expertise. Our services, which include collaborative material planning tools, vendor managed inventory programs, performance analysis services, materials management programs, and electronic communication services, can support your needs throughout a product's entire lifecycle. Whether you manufacture your product internally or through outsourcing, and regardless of your organization's size or complexity, Arrow has an efficient solution that will drive you toward your goals.

Arrow Consulting Engineering Services >>

The Arrow Consulting Engineering Services (ACES) program puts you in touch with pre-screened, qualified, and certified third-party lighting solutions and design services companies to save time, effort, and resources. The superior core competencies of our partners allow them to provide complete outsourced designs—while allowing you to focus on your core competency.

ACES accelerates your time to market through a broad range of concept-to-full-turn-key solutions. Our partners can match you with lighting solutions companies that focus solely on HB-LED solutions, including power supply design, thermal management and heat dissipation, optics, packaging, and integrated LED module solutions. In addition, ACES can provide systems integration solutions and recommend reference designs and supporting kits specific to a particular input power supply or mains voltage, providing the best answer to your unique lighting challenge.

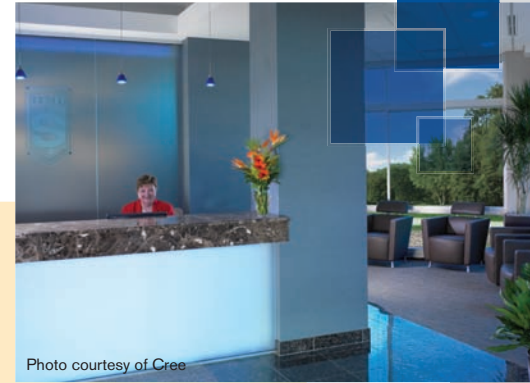


Photo courtesy of Cree

Access to the industry's premier LED lighting suppliers and integrators is complemented by Arrow services that go far beyond getting you the components you need. Our engineering services, online development tool selection site, complimentary development tool evaluation program, supply chain solutions, reference design, and sampling capabilities ensure the success of your design from concept to production.



Arrow Lighting

constantly discovers opportunities to expand your business by researching new markets and identifying compelling technologies with potential for growth and synergies. To cultivate these markets Arrow forges key partnerships with new and existing manufacturers and delivers a complete solution for your needs, expanding well beyond traditional component support.

Commercial Lighting ▶▶

Light adds two exciting elements to architectural and commercial applications materials: movement and change. Because of these, the possibilities for commercial lighting are tremendous. Because of their ability to dim and the extremely broad range of colors, HB-LEDs

can be used to create a mood or catch attention. Pendant lighting, cove lighting, under- and over-cabinet lighting, sconces and wall washing, street and roadway lighting, and retail accent lighting, to name a few, can all benefit from the flexibility of HB-LEDs.

Features and Benefits:

- Long life and low maintenance
- True saturated colors and a wide temperature range
- Dimming extends LED component life and won't change color temperature
- Easily integrated with control systems
- Detect failure modes
- Low energy consumption
- Low-voltage DC operation
- Operate with low- or high-voltage inputs
- White color temperatures available from cool to warm (6,500°K to 2,500°K)
- Available in fixed optical angles

Backlighting ▶▶

Backlighting applications provide an enormous opportunity for HB-LEDs to outperform existing CCFL solutions.

Features and Benefits:

- Bright, saturated colors
- Very bright source of white light
- Outperform CCFL in LCD TVs regarding RGB solutions
- Lower power consumption vs. incandescent light sources
- RoHS/WEEE compliant (no mercury)
- Long life (30,000 to 100,000 hrs.)

Transportation ▶▶

Lighting for transportation is a necessity that provides many opportunities to improve safety standards and express style. Numerous interior and exterior applications benefit from HB-LEDs, and the prospects are growing.

Features and Benefits:

- Resist failure from shock and vibration
- Low power consumption
- Cycle on and off in milliseconds
- Allow designs that can enhance appearance, style, and safety

Signage ▶▶

HB-LEDs are finding their way into a realm once dominated by neon and other light sources. Readability at distances, effective luminance, appropriate viewing angle and set back, and shading are all factors that can be controlled by using HB-LEDs. Their dimmable and programmable nature make them a natural fit for signage applications.

Features and Benefits:

- No filaments or glass components to break
- Low-voltage power supplies
- Real-time message updating/changing
- No moving parts
- Millions of colors available with RGB LED emitters
- Reduced installation and maintenance

Flashlights ▶▶

Generally used in less than ideal situations, flashlights have a history of not working when needed the most. The durability, long life, and low power consumption of HB-LEDs spell higher reliability for flashlight applications. The compact nature of HB-LEDs means flashlights can be small yet more effective.

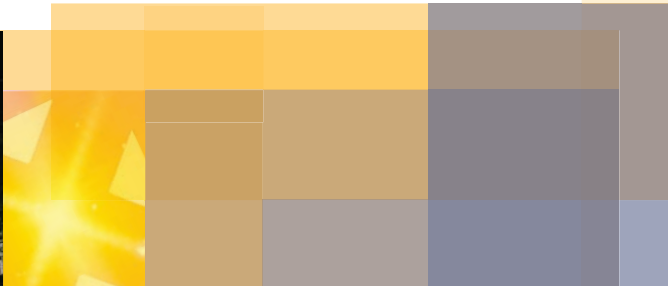
Features and Benefits:

- Durability and long life in extreme conditions
- Small size and light weight
- Low-power consumption allows smaller battery packs



Photo courtesy of Cree

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LIGHT SOURCES

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High-Power LEDs

Avago Technologies' InGaN-based 1W high-power LED is an easy-to-use high-flux output SMT package that is compatible with standard IR solder reflow process, has an extremely low package thermal resistance with a robust moisture sensitivity level, and is designed with silicone encapsulation to maintain long operation life of the LED. A slim profile and a smooth radiation pattern make the package ideal for many solid-state lighting applications.

Avago's 3W ASMT-MW20 high-power LED is capable of being driven at high currents to deliver up to 160 lm of illumination, which provides an energy efficient and robust high-output light source for designers of portable, architectural, decorative, and backlighting applications.



Features ▶

- High-flux output
- IR reflow solderable
- Low package thermal resistance of 10°C/W
- Silicone encapsulant
- Smooth radiation pattern
- Full range of colors available

Benefits ▶

- Easy-to-use and compatible to existing IR solder reflow process
- Low-thermal resistance ensures efficient heat dissipation
- Long operation life
- Smooth radiation pattern

Applications ▶

- Portable appliances such as torchlights and headlamps
- Reading light, spotlight, accent light, and cove light
- Decorative, garden, and architectural lighting

Product Specifications ▶

Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets
ASMT-MW60-NFH00	High power	Cool white	4,000-10,000	-	150	150	3.5	110	30	-	CL FL BL SI
ASMT-MY60-NEG00		Warm white	2,600-4,000	-	150	150	3.5	110	25	-	CL FL BL SI
ASMT-MW01-NFH00		Cool white	4,000-10,000	-	350	350	3.6	110	35	-	CL FL BL SI
ASMT-MY01-NFH00		Warm white	2,600-4,000	-	350	350	3.6	110	30	-	CL FL BL SI
ASMT-MW00-NJK00		Cool white	4,000-10,000	-	350	350	3.6	110	55	-	CL FL BL SI
ASMT-MW00-NKK00		Cool white	4,000-10,000	-	350	350	3.6	110	60	-	CL FL BL SI
ASMT-MY00-NJK00		Warm white	2,600-4,000	-	350	350	3.6	110	50	-	CL FL BL SI
ASMT-MW09-NLL00		Cool white	4,000-10,000	-	500	350	3.6	120	80	-	CL FL BL SI
ASMT-MY09-NKL00		Warm white	2,600-4,000	-	500	350	3.6	120	73	-	CL FL BL SI
ASMT-MB00-NAE00		Blue	-	460-480	350	350	3.6	110	10	-	CL FL BL SI
ASMT-MG00-NGJ00		Green	-	515-535	350	350	3.6	110	40	-	CL FL BL SI
ASMT-MR00-AHJ00		Red	-	620-635	350	350	2.4	110	40	-	CL FL BL SI
ASMT-MR00-AGH00		Red	-	620-635	350	350	2.4	110	35	-	CL FL BL SI
ASMT-MAD0-AGH00		Amber	-	582-595	350	350	2.4	110	35	-	CL FL BL SI
ASMT-MWA0-NKK00		Cool white	4,000-10,000	-	350	350	3.6	110	60	-	CL FL BL SI
ASMT-MYA0-NJK00		Warm white	2,600-4,000	-	350	350	3.6	110	50	-	CL FL BL SI
ASMT-MWV0-NKK00		Cool white	4,000-10,000	-	350	350	3.6	110	60	-	CL FL BL SI
ASMT-MYK0-NJK00		Warm white	2,600-4,000	-	350	350	3.6	110	50	-	CL FL BL SI
ASMT-MW20-NNN00		Cool white	4,000-10,000	-	700	700	4.0	110	145	-	CL FL BL SI
ASMT-MY20-NMN00		Warm white	2,600-4,000	-	700	700	4.0	110	135	-	CL FL BL SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

ChipLEDs

ChipLEDs from Avago Technologies utilize AlInGaP and InGaN material technology delivering high luminous efficiency capable of high-light output and low power over a wide range of colors. The ChipLEDs are offered in top-emitting and side-emitting packages. To facilitate pick-and-place assembly, they are provided in tape-and-reel.



Features ▶

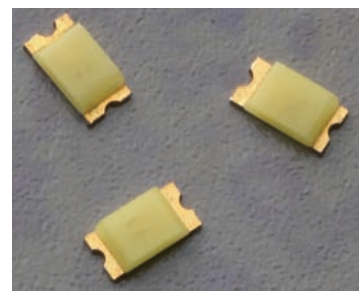
- SMD
- HB InGaP and AlInGaP

Benefits ▶

- Pb-free
- Miniature package

Applications ▶

- Keypad backlighting
- Status indicators



Product Specifications ▶											
Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets
ASMT-RA45	ChipLED	Amber	–	591	20	–	2	145	–	90	TR BL
ASMT-RF45		Yellow	–	573	20	–	2	145	–	60	TR BL
ASMT-RR45		Red	–	622	20	–	2	145	–	120	TR BL
HSMF-C114		RGB	–	626/525/470	20	–	1.9/3.4/3.4	140	–	85/180/70	BL
HSMF-C115		RGB	–	626/525/470	20	–	1.9/3.4/3.4	120	–	80/170/60	BL
HSMR-C120		Blue	–	473	20	–	3.4	155	–	55	BL
HSMR-C191-J00L5		Blue	–	473	5	–	2.85	140	–	18	BL
HSMR-CL25		Blue	–	473	5	–	2.85	120	–	18	BL
HSMW-CL25		White	–	–	5	–	2.85	120	–	70	BL
HSMW-C130		White	–	–	20	–	3.6	145	–	150	BL
HSMW-C191		White	–	–	20	–	3.6	140	–	200	BL

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



Power PLCC-4 SMT LEDs

Avago Technologies' PLCC-4 SMT LEDs have high-reliability performance and are packed in the industrial standard PLCC-4 package. The 3-chips-in-1 package is suitable for applications requiring tight-LED pitch and high-resolution signs.



Features ▶

- Industrial PLCC-4 platform—compatible with IR and TTW soldering process
- High-reliability package—operating at -40°C to +100°C
- Mid-power intensity brightness with optimum-flux performance
- Minimum Iv degradation features over product lifetime
- High-brightness w/optimum-flux performance
- Available in all colors—amber, green, red, red orange, and blue
- Industry-standard PLCC-4 package
- High-brightness using AlInGaP and InGaN dice technologies
- Wide viewing angle at 120°
- Black surface for enhanced contrast

Benefits ▶

- High LOP for standard industrial PLCC-4 platform
- Less than 50 percent Iv degradation over operating condition at +25°C for 50K hours
- MSL level 2A certified
- LLW is binned at 8-color binning (tight-color bin for uniformity)
- High-brightness and focused radiation in the beam direction
- Single-color and intensity binning
- Tight-intensity bin range for uniform brightness

Applications ▶

- Interior automotive—instrument cluster, central console backlighting, instrument panel backlighting, and dome lighting
- Exterior automotive—RCL, CHSML, side-turn repeaters, turn signal, license plate illumination, puddle light, and reverse lamp
- ESS—channel lettering, contour lighting, and variable messaging signs
- Interior full-color signs
- Channel lettering
- Decorative and architectural signs

Product Specifications ▶

Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets	
ASMT-QWB2-NEFOE	Super 0.5W power PLCC-4	White	8-color binning	—	150	—	3.6	120	17.0	—	TR BL SI	
ASMT-QAB2-FEFOE		Amber	—	594.5	150	—	2.7	120	11.4	—	TR BL SI	
ASMT-QHB2-FDEOE		Red orange	—	617.0	150	—	2.7	120	14.0	—	TR BL SI	
ASMT-QRB2-FCDOE		Red	—	624.0	150	—	3.1	120	9.8	—	TR BL SI	
ASMT-QWBE-NFHOE		White	x=0.33/y=0.33	—	150	150	3.6	120	19.5	—	TR BL SI	
ASMT-QYBE-NEG0E		White	x=0.437/y=0.413	—	150	150	3.6	120	18.0	—	TR BL SI	
ASMT-QTB2-0A002	PLCC-4-multi color	Red	—	628	20	—	2.06	120	—	505	TR BL SI	
QSMF-A367-FP9J1		Green	—	526	20	—	3.32	120	—	1,015	TR BL SI	
		Blue	—	472	20	—	3.32	120	—	325	TR BL SI	
		Red	—	635	30	—	1.9	120	—	250	SI	
QSMF-A368-F99J1		Green	—	523	20	—	3.4	120	—	800	SI	
		Blue	—	468	20	—	3.4	120	—	155	SI	
		Red	—	635	30	—	1.9	120	—	140	SI	
ASMT-SWBM-NU803		Power PLCC-4	Green	—	523	20	—	3.4	120	—	355	SI
			Blue	—	468	20	—	3.4	120	—	72	SI
	White		8-color binning	—	30	—	—	120	2.8	560-1,400	TR	
	Amber		—	592	50	—	2.2	30	—	2,850	TR	
	Red		—	626	50	—	2.2	30	—	1,125-3,550	TR	
	Green		—	518	30	—	3.9	30	—	1,400-4,500	TR	
	Red orange		—	617	50	—	2.8	30	—	3,500	TR	
	Blue		—	468	30	—	3.9	30	—	450-1,400	TR	
	Amber		—	590	70	50	2.2	50	—	2,100	TR SI	
	Amber		—	590	70	50	2.2	50	—	3,300	TR SI	
ASMT-A431-YO0M1	Envisium power PLCC-4	Red	—	626	70	50	2.2	50	—	580	TR SI	
ASMT-A430-W50M1		Red	—	626	70	50	2.2	50	—	1,750	TR SI	
ASMT-A430-Y90M2		Orange	—	605	70	50	2.2	50	—	1,850	TR SI	
ASMT-A430-Y90M1		Red	—	630	50	—	2.8	120	2.6-3.3	630-1,600	TR	
ASMT-A430-U50M2		Red orange	—	617	50	—	2.8	120	4.3-5.0	1,000-2,500	TR	
ASMT-A460-W50M1		Amber	—	592	50	—	2.8	120	3.0-3.8	630-1,600	TR	
ASMT-A461-X83M1		Amber	—	593.5	150	—	2.64	120	6.6	—	TR SI	
ASMT-A460-U30M1		Red	—	619.3	150	—	2.64	120	9.3	—	TR SI	
ASMT-A461-V00M1		Red orange	—	—	—	—	—	—	—	—	—	
ASMT-A461-W40M1		Red orange	—	—	—	—	—	—	—	—	—	
ASMT-A461-W40M1		Red orange	—	—	—	—	—	—	—	—	—	

MARKETS LEGEND

CL COMMERCIAL LIGHTING

FL FLASHLIGHTS

TR TRANSPORTATION

EL BACKLIGHTING

SI SIGNAGE

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Extra-Bright InGaN/High-Brightness Thru-Hole Lamps

These extra bright LEDs are specifically designed for full-color/video and passenger information signs. They have very smooth, matched radiation patterns ensuring consistent color mixing and uniformity.



Features ▶

- Available in red, green, blue, amber, and white
- Available in 4 mm and 5 mm ovals, 35° x 70° and 50° x 100° viewing angles
- High luminous output
- Superior resistance to moisture

Benefits ▶

- Single-color and intensity binning
- Tight-intensity bin range for uniform brightness
- Multiple viewing angle options

Applications ▶

- Outdoor full-color signs
- Commercial outdoor advertising signs
- Decorative and architectural signs
- Transportation signs



Product Specifications ▶											
Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets
HLMP-LG65-TX0ZZ	TH LED-4 mm oval	Red	-	630	50	20	2.2	50 x 100	-	800-1,990	CL FL TR SI
HLMP-HG63-TX0ZZ	TH LED-5 mm oval	Red	-	630	50	20	2.2	50 x 100	-	800-1,990	CL FL TR SI
HLMP-HL63-TX0DD		Amber	-	592	50	20	2.2	50 x 100	-	800-1,990	CL FL TR SI
HLMP-AG63-X10ZZ	TH LED-5 mm round	Red	-	630	50	20	3.2	30 x 70	-	1,600-3,500	CL FL SI
HLMP-AL63-WZ0DD		Amber	-	592	50	20	2.3	30 x 70	-	1,380-2,400	CL FL SI
HLMP-CB14-UX0DD		Blue	-	470	30	20	3.2	15	-	3,200-9,300	CL FL SI
HLMP-CB25-SV0DD		Blue	-	470	30	20	3.2	23	-	1,900-5,500	CL FL SI
HLMP-CB35-RU0DD		Blue	-	470	30	20	3.2	30	-	1,500-4,200	CL FL SI
HLMP-CM14-Z30DD		Green	-	525	30	20	3.2	15	-	12,000-35,000	CL FL SI
HLMP-CM25-X10DD		Green	-	525	30	20	3.2	23	-	7,200-21,000	CL FL SI
HLMP-CM35-X10DD		Green	-	525	30	20	3.2	30	-	7,200-21,000	CL FL SI
HLMP-EG13-UX0DD		Red	-	626	50	20	2.2	15	-	3,200-9,300	CL FL SI
HLMP-EG23-UX0DD		Red	-	626	50	20	2.2	23	-	3,200-9,300	CL FL SI
HLMP-EG37-TW0DD		Red	-	626	50	20	2.2	30	-	2,500-7,200	CL FL SI
HLMP-EL13-VY0DD		Amber	-	590	50	20	2.2	15	-	4,200-12,000	CL FL SI
HLMP-EL23-UX0DD		Amber	-	590	50	20	2.2	23	-	3,200-9,300	CL FL SI
HLMP-EL37-TW0DD		Amber	-	590	50	20	2.2	30	-	2,500-7,200	CL FL SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



XLamp® High-Power LEDs

Cree® is an industry leader in brightness and reliability for power LEDs with the XLamp LED family, which enables the lighting industry with efficient and environmentally friendly LED light. XLamp XR-E LEDs are "lighting class," delivering unprecedented levels of white LED brightness and efficacy, along with the white-point stability expected by the lighting industry. XLamp MC-E LEDs expand lighting class performance into a multi-chip package with four times the flux of XR-E LEDs in the same footprint.



Cree® four-chip XLamp MC-E LEDs: lighting class, high-lumen output

Features ▶

- Typical efficacy up to 90 lm/W in cool white
- Correlated color temperature (CCT) from 2,600°K to 10,000°K
- Available with currents up to 1,000 mA
- Electrically isolated thermal path
- Tested to the highest standards in the LED industry

Benefits ▶

- "Lighting class" brightness and efficacy
- Stable white point over time
- High reliability
- Lifetime up to 50,000 hours
- Directional light output

Applications ▶

- Outdoor lighting
- Portable and personal lighting
- Indoor directional lighting
- Emergency vehicle lighting
- Architectural lighting

Product Specifications ▶

Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets
XREWHT-L1-0000-XXXXX	XLamp XR-E	Cool white	5,000-10,000	-	1,000	350	3.9 max.	90	80.6-114	-	CL FL TR BL SI
XREWHT-L1-0000-XXXXX		Neutral white	3,700-5,000	-	700	350	3.9 max.	90	62-100	-	CL FL TR BL SI
XREWHT-L1-0000-XXXXX		Warm white	2,600-3,700	-	700	350	3.9 max.	90	56.8-93.9	-	CL FL TR BL SI
XREROY-L1-0000-XXXXX		Royal blue	-	450-465	1,000	350	3.9 max.	100	300-500 mW	-	TR BL
XREBLU-L1-0000-XXXXX		Blue	-	465-485	1,000	350	3.9 max.	100	23.5-39.8	-	TR BL
XREGRN-L1-0000-XXXXX		Green	-	520-535	700	350	3.9 max.	100	67.2-87.4	-	TR BL
XRCWHT-L1-0000-XXXXX	XLamp XR-C	Cool white	5,000-10,000	-	500	350	4.0 max.	90	56.8-87.4	-	CL FL TR BL SI
XRCWHT-L1-0000-XXXXX		Neutral white	3,700-5,000	-	500	350	4.0 max.	90	39.8-62.0	-	CL FL TR BL SI
XRCWHT-L1-0000-XXXXX		Warm white	2,600-3,700	-	500	350	4.0 max.	90	39.8-62.0	-	CL FL TR BL SI
XRCROY-L1-0000-XXXXX		Royal blue	-	450-465	500	350	4.0 max.	100	250-350 mW	-	TR BL
XRCBLU-L1-0000-XXXXX		Blue	-	465-475	500	350	4.0 max.	100	13.9-23.5	-	TR BL
XRCGRN-L1-0000-XXXXX		Green	-	520-535	500	350	4.0 max.	100	39.8-67.2	-	TR BL
XRCAMB-L1-0000-XXXXX		Amber	-	585-595	350	350	2.5 max.	90	23.5-51.7	-	TR SI
XRCROD-L1-0000-XXXXX		Red orange	-	610-620	700	350	2.5 max.	90	30.6-51.7	-	TR SI
XRCRED-L1-0000-XXXXX	Red	-	620-630	700	350	2.5 max.	90	23.5-51.7	-	TR BL SI	
MCE4WT-A2-0000-XXXXX	XLamp MC-E	Cool white	5,000-10,000	-	700 per LED	350 per LED	TBA	110	370-490	-	CL FL TR
MCE4WT-A2-0000-XXXXX		Neutral white	3,700-5,000	-	700 per LED	350 per LED	TBA	110	320-430	-	CL FL TR
MCE4WT-A2-0000-XXXXX		Warm white	2,600-3,700	-	700 per LED	350 per LED	TBA	110	240-320	-	CL FL TR

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

Round and Oval High-Brightness LEDs

Cree® offers a range of high-brightness LEDs in a variety of colors, including red, green, blue, and amber. They come in 4 mm and 5 mm oval packages with 70° or 110° viewing angles and 5 mm round packages with 15°, 30°, or 60° viewing angles. The oval LEDs are designed for full-color video screens and passenger information signs. They have very smooth, matched radiation patterns, ensuring consistent color mixing and uniformity.



Features ▶

- Single-color and intensity binning
- Tight intensity bin range for uniform brightness
- Multiple viewing-angle options
- Can be supplied in either tape-and-reel or ammo pack for automatic machine insertion
- RoHS compliant

Benefits ▶

- High reliability
- Long lifetime
- High performance

Applications ▶

- Gaming machines
- Full-color video screens
- Variable-message signs
- Traffic and gas signs
- Backlighting for mobile devices and channel letters



Cree® makes a wide selection of high-performance round and oval LEDs

Product Specifications ▶											
Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets
LC503UHR1-15P-A	5 mm round	Red	-	618-630	50	20	2.1	15	-	5,860-16,800	TR BL SI
LC503UHR1-15Q-A		Red	-	618-630	50	20	2.1	15	-	5,860-16,800	TR BL SI
LC503UHR1-30Q-A		Red	-	618-630	50	20	2.1	30	-	3,000-8,200	TR BL SI
LC503UYL1-15Q-A		Amber	-	584-596	50	20	2.1	15	-	5,860-23,500	TR BL SI
LC503UYL1-30Q-A		Amber	-	584-596	50	20	2.1	30	-	3,000-8,200	TR BL SI
LC503FPG1-15Q-A3		Green	-	520-535	25	20	3.2	15	-	16,800-64,600	TR BL SI
LC503FPG1-30Q-A3		Green	-	520-535	25	20	3.2	30	-	5,860-23,500	TR BL SI
LC503FBL1-15Q-A3		Blue	-	465-475	25	20	3.2	15	-	5,860-23,500	TR BL SI
LC503FBL1-30Q-A3		Blue	-	465-480	25	20	3.2	30	-	2,130-8,200	TR BL SI
LC503FWH1-15Q-A0		White	Cool	-	-	25	20	3.2	15	-	16,800-32,900
L0494UHR4-B0G-A3	4 mm oval	Red	-	618-630	50	20	2.1	105 x 50	-	770-2,130	TR BL SI
L0494UYL4-B0G-A3		Amber	-	584-596	50	20	2.1	105 x 50	-	770-2,130	TR BL SI
L0494EPG4-B0G-A3		Green	-	520-535	25	20	3.4	105 x 50	-	1,520-4,180	TR BL SI
L0494EBL4-B0G-A3		Blue	-	465-475	25	20	3.4	105 x 50	-	390-1,520	TR BL SI
L0566UHR3-70G-A3	5 mm oval	Red	-	618-630	50	20	2.1	70 x 30	-	1,520-4,180	TR BL SI
L0566UHR3-70H-A3		Red	-	618-630	50	20	2.1	70 x 30	-	1,520-4,180	TR BL SI
L0566UYL3-70G-A3		Amber	-	584-596	50	20	2.1	70 x 30	-	1,520-4,180	TR BL SI
L0566UYL3-70H-A3		Amber	-	584-596	50	20	2.1	70 x 30	-	1,520-4,180	TR BL SI
L0566EPG3-70G-A3		Green	-	520-535	25	20	3.4	70 x 35	-	3,000-8,200	TR BL SI
L0566EPG3-70H-A3		Green	-	520-535	25	20	3.4	70 x 35	-	3,000-8,200	TR BL SI
L0566EBL3-70G-A3		Blue	-	465-475	25	20	3.4	70 x 35	-	550-2,130	TR BL SI
L0566EBL3-70H-A3		Blue	-	465-475	25	20	3.4	70 x 35	-	550-2,130	TR BL SI
L05SMUHR4-B0G-A3		Red	-	618-630	50	20	2.1	110 x 40	-	770-3,000	TR BL SI
L05SMUYL4-B0G-A3		Amber	-	584-596	50	20	2.1	110 x 40	-	770-3,000	TR BL SI
L05SMEPG4-B0G-A3	Green	-	520-535	25	20	3.4	110 x 40	-	2,130-5,860	TR BL SI	
L05SMEBL4-B0G-A3	Blue	-	465-475	25	20	3.4	110 x 40	-	390-1,520	TR BL SI	

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



P4 and SMD High-Brightness LEDs

Cree's high-performance P4 and SMD LEDs demonstrate the company's commitment to providing industry-leading technology in standard, cost-effective packages. Cree's P4 LEDs feature high luminous flux with superior heat dissipation. These LEDs are perfect for use in exterior lighting, interior architectural illumination and accent lighting, and exterior automotive applications. Cree's SMD LEDs are comprised of several product families, each providing unique features and benefits for a wide range of lighting applications and are available with 2, 4, or 6 leads.



Cree® LEDs are available in a wide range of sizes, colors, and types, including SMD and P4

Features ▶

- Single-color and intensity binning
- Tight intensity bin range for uniform brightness
- High-brightness and focused radiation in the beam direction
- Low power consumption
- RoHS compliant

Benefits ▶

- High reliability
- Long lifetime
- High performance

Applications ▶

- Gaming machines
- Full-color video screens
- Variable-message signs
- Traffic signals
- Backlighting for mobile devices and channel letters

Product Specifications ▶

Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets	
LP377UHR1-40G-01	7.6 x 7.6 P4	Red	-	618-630	70	70	2.5	40	4.0-11.8	-	TR BL SI	
LP377UHR1-70G-01		Red	-	618-630	70	70	2.5	70	4.0-11.8	-	TR BL SI	
LP377UHR1-A0G-01		Red	-	618-630	70	70	2.5	100	4.0-11.8	-	TR BL SI	
LP377UYL1-40G-01		Amber	-	584-599	70	70	2.5	40	4.0-11.8	-	TR BL SI	
LP377UYL1-70G-01		Amber	-	584-599	70	70	2.5	70	5.0-11.8	-	TR BL SI	
LP377UYL1-A0G-01		Amber	-	584-599	70	70	2.5	100	5.0-11.8	-	TR BL SI	
LP377FPG1-70G-02		Green	-	515-535	30	30	3.6	70	4.4-11	-	TR BL SI	
LP377FBL1-70G-02		Blue	-	462-475	30	30	3.6	70	1.1-3.3	-	TR BL SI	
LP377FWH1-60G		White	-	-	30	30	3.6	60	3.85-11	4,180-12,000	TR BL SI	
LP377FWH1-90G		White	-	-	30	30	3.6	90	3.85-11	2,130-8,200	TR BL SI	
LM1-UHR1-01-N1		3.2 x 2.7 PLCC2	Red	-	618-630	50	20	2.1	120	-	450-1,120	TR BL SI
LM1-EPG1-01-N2			Green	-	520-540	25	20	3.4	120	-	560-1,400	TR BL SI
LM1-EBL1-01-N2	Blue		-	460-480	25	20	3.4	120	-	112-710	TR BL SI	
LM1-UYL1-01-N1	Amber		-	584-596	50	20	2.1	120	-	355-900	TR BL SI	
LM1-EWN1-01-N2	White		-	-	25	20	3.4	120	2,700	710-1,800	TR BL SI	
LM3-EWH1-01-N2	2.7 x 2.0 PLCC2	White	-	-	25	20	3.4	120	4,000	1,200-1,800	TR BL SI	
LM1-UHR1-11-N1	3.2 x 2.7 PLCC4	Red	-	618-630	70	50	2.4	120	-	1,120-2,800	TR BL SI	
LM1-EPG1-11-N2		Green	-	516-536	30	30	3.6	120	-	710-1,800	TR BL SI	
LM1-EBL1-11-N2		Blue	-	460-480	30	30	3.6	120	-	180-1,120	TR BL SI	
LM1-UYL1-11-N1		Amber	-	584-599	70	50	2.4	120	-	1,120-2,800	TR BL SI	
LM1-EWN1-11-N2		White	-	-	30	30	3.6	120	-	900-2,240	TR BL SI	
LM2-UHR1-F1-N1		Red	-	618-630	70	50	2.5	60	-	2,240-5,600	TR BL SI	
LM2-UYL1-F1-N1		Amber	-	584-596	70	50	2.5	60	-	2800-5600	TR BL SI	
LVB-UEE2-01-N2		3.2 x 2.8 3-in-1 full color	RGB	-	R=618 ~ 630/ G=518-538/B=460 ~ 480	R=200/G=100/ B=100	20	R=2.0/G=3.2/ B=3.2	120	-	R=224-560/ G=280-710/B=90-224	TR BL SI
LU6-UFF2-01-N2	3.3 x 3.5 3-in-1 full color	RGB	-	R=618 ~ 630/ G=520-540/B=460 ~ 480	R=200/G=100/ B=100	20	R=2.0/G=3.2/ B=3.2	120	-	R=450-1,400/ G=560-2,240/B=224-450	TR BL SI	
LP6-UEE2-01-T2	6.0 x 5.0 3-in-1 full color	RGB	-	R=618 ~ 630/ G=520-540/B=460 ~ 480	R=200/G=100/ B=100	20	R=2.0/G=3.2/ B=3.2	120	-	R=450-620/ G=560-1,100/B=224-355	TR BL SI	
LP6-FWH1-03-T2	5.0 x 6.0 3-in-1 PLCC6	White	-	-	150	3 x 50	5	120	-	7,100-14,000	CL BL	

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

XcelLED EHP-AX08 Series (1W and 3W)

The Everlight XcelLED AX08 series is a newly developed LED commodity capable of implementation in any application. The XcelLED has demonstrated formidable efficiency and lumens output, capable of up to 85 lm/W. It has also performed exceedingly well in equally important criteria such as color uniformity and narrow, precise binning. The combination of Everlight's engineering flexibility and XcelLED AX08 series' versatility allows highly customizable end products. These devices are in mass production and are readily available.



XcelLED EHP-AX08 with Lambertian lens

Features ▶

- Variety of industry standard colors
- Widely used industry standard size
- Variety of industry standard radiation patterns
- Multiple binning parameters: V_F , I_V , λ
- Silicon lens for long operational lifetime

Benefits ▶

- Highly competitive dollar/lumens and lumens/watt
- Versatility for many applications
- Narrow color binning
- Leading color uniformity
- Reflow solderable

Applications ▶

- General lighting
- Architectural lighting
- Backlighting
- Emergency vehicle lighting
- Flashlight

Product Specifications ▶												
Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets	
EHP-AX08LS/SUR01H-P01	1W SMD	Red	-	620-630	500	350	2.05-2.95	130	33-52	-	CL FL TR BL SI	
EHP-AX08LS/US001H-P01		Red-orange	-	610-620	500	350	2.05-2.95	130	33-52	-	CL FL TR BL SI	
EHP-AX08LS/UY01H-P01		Amber	-	585-595	500	350	2.05-2.95	130	33-52	-	CL FL TR BL SI	
EHP-AX08LS/SUG01H-P01		Green	-	520-530	500	350	3.25-3.85	150	45-70	-	CL FL TR BL SI	
EHP-AX08LS/UB01C-P01		Blue	-	455-470	500	350	2.95-4.15	150	8-17	-	CL FL TR BL SI	
EHP-AX08LS/UB01H-P01		Blue	-	455-470	500	350	2.95-4.15	150	10-13	-	CL FL TR BL SI	
EHP-AX08LS/UBG01H-P01		Cyan	-	500-515	500	350	2.95-4.15	150	39-60	-	CL FL TR BL SI	
EHP-AX08LS/CT01C-P01		White	4,500-10,000	-	500	350	2.95-4.15	120	45-100	-	CL FL TR BL SI	
EHP-AX08LS/CT01H-P01		White	4,500-10,000	-	500	350	2.95-4.15	120	39-85	-	CL FL TR BL SI	
EHP-AX08LS/LM01C-P01		Warm white	2,670-4,500	-	500	350	2.95-4.15	120	33-85	-	CL FL TR BL SI	
EHP-AX08LS/LM01H-P01		Warm white	2,670-4,500	-	500	350	2.95-4.15	120	33-70	-	CL FL TR BL SI	
EHP-AX08LS/SUR01A-P03		3W SMD	Red	-	615-630	1,000	700	2.35-3.25	130	60-85	-	CL FL TR BL SI
EHP-AX08LS/SUG01H-P03			Green	-	515-535	1,000	700	3.25-4.15	140	100-130	-	CL FL TR BL SI
EHP-AX08LS/UB01C-P03			Blue	-	455-470	1,000	700	3.25-4.45	150	20-33	-	CL FL TR BL SI
EHP-AX08LS/UB01H-P03	Blue		-	455-470	1,000	700	3.55-4.45	140	23-39	-	CL FL TR BL SI	
EHP-AX08LS/CT01C-P03	White		4,500-10,000	-	1,000	700	3.25-4.45	120	85-200	-	CL FL TR BL SI	
EHP-AX08LS/LM01C-P03	Warm white		2,670-4,500	-	1,000	700	3.25-4.45	120	70-130	-	CL FL TR BL SI	

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

Note: The EHP-AX08 series is available in Lambertian, batwing, focus, and side-emitting



Batwing



Focus



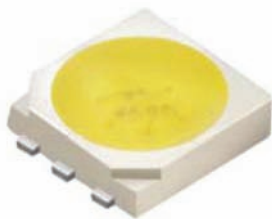
Side-emitting



White PLCC-6 for Signage and General Lighting Applications (0.2W) and EHP-B03 Series (5W)

The 67-235 PLCC-6 series was developed for low power, high lumens operation needed for many signage and general lighting applications. Everlight's expertise in package design and die management has produced a very effective package. It allows for cost and energy savings, precise binning for properly managed light output, and simple integration into designs. Everlight's 67-235 series contains three die, which are electrically isolated from each other and can be driven separately. Due to Everlight's ability to produce customized packages, other colors are also available.

The EHP-B03 series is Everlight's front runner in high-watt white LEDs, with 250 lm at 700 mA. Its convenient shape and size, paired with its capability of reflow solder make the EHP-B03 an easy-to-handle yet formidable LED.



67-235 series

Features ▶

White PLCC-6

- PLCC-6 low-profile package
- Three low-power die
- Silicon lens
- Reflow solderable

EHP-B03 Series

- 250 lm at 700 mA
- Convenient package size
- Multiple binning parameters: V_F , I_v , λ
- Thermal resistance is 9 K/W
- Reflow solderable

Benefits ▶

White PLCC-6

- High lumens/watt
- Competitive lumens/dollar and dollar/package
- Low power operation for energy savings
- Isolated die

- Uniform spatial radiation pattern

EHP-B03 Series

- Highly competitive dollar/lumens and lumens/watt
- High lumens output
- Leading color uniformity
- Narrow warm white and cool white binning
- Versatility for many applications

Applications ▶

White PLCC-6

- General lighting
- Backlighting
- Channel lettering
- Architectural lighting

EHP-B03 Series

- General lighting
- Architectural lighting
- Backlighting
- Emergency vehical lighting
- Flashlight

Product Specifications ▶

Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets
67-235/S6P-RY1Z01/2T	0.2W SMD	White	2,670-10,000	-	90	60	2.7-3.7	120	-	2,850-5,700	CL FL TR BL SI
EHP-B03LS/UT04-P05	5W SMD	White	4,500-10,000	-	1,000	700	6.5-7.5	130	200-300	-	CL FL TR BL SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



EHP-B03

EVERspark EHP-A09 Series (0.5W)

Everlight's EVERspark EHP-A09 series is the ultimate solution for SMD mid-watt applications. It bridges the gap between high bright, low power and high lumens, high power LEDs. The EVERspark EHP-A09 provides a significant millicandela output per amount of power consumed. Configured to an industry standard PLCC-6 package, and reflow solderable, implementation/ replacement into current applications will be an easy task.



EVERspark EHP-A09

Features ▶

- Variety of industry standard colors
- Widely used industry standard size
- Multiple binning parameters: V_F , I_v , λ
- High luminous intensity output
- PLCC-6 SMD

Benefits ▶

- Small package allows for smaller board and higher board density
- Highly competitive dollar/ lumens and lumens/watt
- Low power consumption for amount of luminous intensity

Applications ▶

- Automotive: interior and exterior
- Solar lighting
- Architectural
- Indication
- Portable light sources

Product Specifications ▶

Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets
EHP-A09/SUR01A-PU5	0.5W PLCC-6	Red	-	620-630	300	150	2.05-3.25	120	-	2,800-7,100	CL FL TR BL SI
EHP-A09/US001A-PU5		Red-orange	-	610-625	300	150	2.05-3.25	120	-	2,800-7,100	CL FL TR BL SI
EHP-A09/UY01A-PU5		Amber	-	585-595	300	150	2.05-3.25	120	-	2,240-7,100	CL FL TR BL SI
EHP-A09/SUG01H-PU5		Green	-	520-535	300	150	3.25-4.15	120	-	4,500-9,000	CL FL TR BL SI
EHP-A09/UB01H-PU5		Blue	-	460-470	300	150	2.95-3.85	120	-	1,120-2,240	CL FL TR BL SI
EHP-A09/CT01H-PU5		White	4,600-15,000	-	300	150	2.95-3.55	120	-	5,600-11,200	CL FL TR BL SI
EHP-A09/LM01H-PU5		Warm white	2,670-4,500	-	300	150	2.95-3.85	120	-	4,500-9,000	CL FL TR BL SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

OSRAM

Opto Semiconductors

OSTAR™ Lighting Compact Light Sources (10W-15W Typical)

The OSTAR™ family of products is comprised of compact light sources optimized for lighting applications. Utilizing OSRAM's proprietary ThinFilm/ThinGaN® chip technology, these arrays consist of multiple power LED chips on a low-thermal resistance carrier. Available in four- and six-chip versions, with or without a lens to give lighting designers optimum flexibility, it delivers light with exceptional lumen output. A variety of mechanical, color, and optical variations provide maximum flexibility.



1,000 lumen OSTAR™ Lighting

Features ▶

- High-illuminance surface-emitting chips with precise alignment of chips and optics
- Lighting: 4- or 6-chip arrays, with or without hemispherical lens, in white, warm white, and daylight white
- Low forward voltage (V_F) and thermal resistance (R_{th})
- Designed for high-lumen density applications—LE UW E3B over 1,000 lm at 1,000 mA
- White products available with ANSI-compliant binning

Benefits ▶

- Light couples efficiently into secondary optics
- Simplifies system optical and thermal design
- Provides extreme brightness from a compact area
- Maximum efficiency with less heat generation
- Reduces LED count, board size, and system complexity

Applications ▶

- High-brightness projection systems
- General lighting—downlights, spots, floods, and bulb replacement
- Outdoor area lighting—street, tunnel, bridge, and parking
- Architectural lighting

Product Specifications ▶

Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets
LE UW E3B	OSTAR™ Lighting	Daylight white	6,500	–	1,000	700	20.8	130	610-1,120	–	CL FL TR
LE W E3B		White	5,600	–	1,000	700	20.8	130	390-970	–	CL FL TR
LE CW E3B		Warm white	4,500/4,000/3,500/3,000/2,700	–	1,000	700	20.8	130	280-820	–	CL FL TR
LE W E2B		White	5,600	–	1,000	700	14	130	240-710	–	CL FL TR
LE CW E2B		Warm white	4,500/4,000/3,500/3,000/2,700	–	1,000	700	14	130	180-610	–	CL FL TR
LE W E3A		White	5,600	–	1,000	700	20.8	120	280-820	–	CL FL TR
LE CW E3A		Warm white	4,500/4,000/3,500/3,000/2,700	–	1,000	700	20.8	120	150-450	–	CL FL TR
LE W E2A		White	5,600	–	1,000	700	14	120	150-390	–	CL FL TR
LE CW E2A		Warm white	4,500/4,000/3,500/3,000/2,700	–	1,000	700	14	120	97-280	–	CL FL TR

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

Diamond DRAGON®, Golden DRAGON® Plus, Golden DRAGON®, and Platinum DRAGON® (1W-5W Typical)



OSRAM's newly expanded family of DRAGON® LEDs offer high-power LED performance from the smallest possible light sources. Featuring proprietary ThinFilm/ThinGaN® technology, OSRAM's Diamond DRAGON®, Golden DRAGON® Plus, Golden DRAGON®, and Platinum DRAGON® LEDs emit maximum light from a small, low-profile package. Reflow solderability, silicone encapsulation for long lifetime, and low thermal resistance provide optimum efficiency in assembly and performance.

Features ▶

- Maximum current ratings of 500 mA through 2,000 mA
- Available in 2,700°K to 6,500°K white, red, amber, yellow, true green, verde, blue, and deep blue
- Utilizes OSRAM's patented high-efficiency, low V_F, surface-emitting ThinFilm/ThinGaN® die
- Chip-level phosphor conversion for uniform white color across the radiation pattern
- White products available with ANSI-compliant binning

Benefits ▶

- Suitable for ultra high-brightness applications
- Meets a wide variety of application needs; great for multi-color uses
- Saves power and reduces heat while providing more available light
- Low manufacturing cost, reduces depth, survives high temperatures, and transfers heat well
- Ideal radiation pattern for coupling secondary optics

Applications ▶

- General lighting—architectural, decorative, and entertainment
- Transportation lighting—automotive exterior, trucking, and emergency vehicle
- Specialty lighting
- Traffic signals, street and tunnel lighting
- Backlighting large screen LCDs



Golden DRAGON® Plus

Product Specifications ▶												
Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets	
LR W5AP	Diamond DRAGON®	Red	—	625	2,000	1,400	2.5	140	97-210	—	CL BL SI	
LA W5AP		Amber	—	617	2,000	1,400	2.5	140	112-240	—	CL TR BL SI	
LY W5AP		Yellow	—	590	2,000	1,400	2.5	140	82-180	—	CL TR BL SI	
LT W5AP		True green	—	528	2,000	1,400	3.5	140	130-280	—	CL TR BL SI	
LB W5AP		Blue	—	470	2,000	1,400	3.5	140	39-97	—	CL TR BL SI	
LD W5AP		Deep blue	—	455	2,000	1,400	3.5	140	90 mW-1,800 mW	—	CL BL	
LUW W5AP		Daylight white	6,500/5,700	—	2,000	1,400	3.5	140	210-390	—	CL FL TR BL SI	
LW W5AP		White	5,600	—	2,000	1,400	3.5	140	150-280	—	CL FL TR BL SI	
LCW W5AP		Warm white	4,500/4,000/3,500/3,000/2,700	—	2,000	1,400	3.5	140	112-280	—	CL FL TR BL SI	
LUW W5AM		Golden DRAGON® Plus	Daylight white	6,500/5,700	—	1,000	350	3.2	170	71-130	—	CL FL TR BL SI
LW W5AM	White		5,600	—	1,000	350	3.2	170	52-97	—	CL FL TR BL SI	
LCW W5AM	Warm white		4,500/4,000/3,500/3,000/2,700	—	1,000	350	3.2	170	39-97	—	CL FL TR BL SI	
LR W5SN	Platinum DRAGON®	Red	—	625	1,000	700	2.5	120	52-97	—	CL BL SI	
LA W5SN		Amber	—	617	1,000	700	2.5	120	61-112	—	CL TR BL SI	
LY W5SN		Yellow	—	590	1,000	700	2.5	120	45-97	—	CL TR BL SI	
LT W5SN		True green	—	528	1,000	700	3.6	120	82-150	—	CL TR BL SI	
LB W5SN		Blue	—	470	1,000	700	3.6	120	24-62	—	CL TR BL SI	
LD W5SN		Deep blue	—	455	1,000	700	3.6	120	280 mW-710 mW	—	CL BL	
LW W5SN		White	5,600	—	1,000	700	3.6	120	71-130	—	CL FL TR BL SI	
LCW W5SN		Warm white	4,500/4,000/3,500/3,000/2,700	—	1,000	700	3.6	120	61-150	—	CL BL	
LR W5SM	Golden DRAGON®	Red	—	625	500	400	2.2	120	33-61	—	CL BL SI	
LA W5SM		Amber	—	617	500	400	2.2	120	39-71	—	CL TR BL SI	
LY W5SM		Yellow	—	590	500	400	2.2	120	28-52	—	CL TR BL SI	
LT W5SM		True green	—	528	500	350	3.2	120	52-82	—	CL TR BL SI	
LV W5SG		Verde	—	505	500	350	3.8	120	18-33	—	CL BL SI	
LB W5SM		Blue	—	470	500	350	3.2	120	15-28	—	CL TR BL SI	
LD W5SM		Deep blue	—	455	500	350	3.2	120	210 mW-355 mW	—	CL BL	
LUW W5SM		Daylight white	6,500/5,700	—	500	350	3.2	120	61-97	—	CL FL TR BL SI	
LW W5SM		White	5,600	—	500	350	3.2	120	45-82	—	CL FL TR BL SI	
LCW W5SM		Warm white	4,500/4,000/3,500/3,000/2,700	—	500	350	3.2	120	33-82	—	CL BL	

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

Arrow Electronics Lighting Group

1.888.9LIGHT1

<http://lighting.arrow.com>

OSRAM

Opto Semiconductors

Advanced Power TOPLED® LEDs (1/2W Typical) and 6-Lead MULTILED®

This versatile 6-lead package is the perfect choice for a wide range of applications. Single-color versions feature OSRAM's latest ThinFilm/ThinGaN® chips. The MULTILED® device features chips in red, green, and blue. Now 50 percent brighter than previous generations, this device offers brightness levels previously available only in higher power LED devices. Silicone encapsulation ensures long lifetimes, and the low thermal resistance maximizes brightness and reduces heat. White products available with ANSI-compliant binning.



6-lead MULTILED®

Features ▶

- Maximum current ratings of 200 mA to 250 mA for single-color devices, 50 mA or 60 mA for multi-color
- Available in white, five shades of warm white, red, amber, yellow, true green, and blue—plus RGB and AGB versions
- Utilizes OSRAM's patented high-efficiency, low V_F , surface-emitting ThinFilm/ThinGaN® die
- Reflow solderable; 1.9 mm package height; +125°C Tj to +150°C Tj
- 120° lambertian radiation pattern

Benefits ▶

- Suitable for high-brightness applications
- Meets a wide variety of application needs; great for multi-color and color-changing applications
- Saves power and reduces heat while providing more available light
- Low manufacturing cost, reduces depth, and survives high temperatures
- Ideal radiation pattern for coupling secondary optics

Applications ▶

- Video walls and displays
- Color-changing and RGB applications
- Automotive, trucking, and transportation applications
- Backlighting medium-sized LCD panels

Product Specifications ▶

Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets
LW G6SP	Advanced Power TOPLED®	White	5,600	–	250	140	3.6	120	18.8 typ.	3,550-9,000	CL FL TR BL SI
LCW G6SP		Warm white	4,500/4,000/3,500/ 3,000/2,700	–	250	140	3.6	120	20.0 typ.	2,800-11,200	CL TR BL
LR G6SP		Red	–	625	200	140	2.1	120	13.4 typ.	2,800-7,100	CL BL SI
LA G6SP		Amber	–	617	200	140	2.1	120	16.8 typ.	3,550-9,000	CL TR SI
LY G6SP		Yellow	–	590	200	140	2.2	120	12.6 typ.	2,240-7,100	CL TR SI
LT G6SP		True green	–	528	250	140	3.6	120	18.7 typ.	3,550-11,200	CL BL SI
LB G6SP		Blue	–	470	250	140	3.6	120	4.9 typ.	900-2,800	CL BL SI
LRTB G6TG	6-lead MULTILED®	Red/true green/blue	–	R=625/TG=528/ B=470	70/50/50	20	R=2.1/TG=3.2/ B=3.2	120	–	R=280-1,120/TG=710-1,400/ B=180-560	CL TR BL SI
LRTB G6SG		Red/true green/deep blue	–	R=625/TG=528/ B=458	70/50/50	20	R=2.1/TG=3.2/ B=3.2	120	–	R=280-900/TG=450-1,400/ B=112-560	CL TR BL SI
LATB G66B		Amber/true green/blue	–	A=617/TG=528/ B=470	70/30/30	20	A=2.0/TG=3.5/ B=3.6	120	–	A=180-450/TG=355-1,120/ B=71-280	CL TR BL SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



Advanced Power TOPLED®

Power TOPLED® and Power TOPLED® with Lens

OSRAM's versatile Power TOPLED® and Power TOPLED® with Lens are high-brightness surface-mount LEDs featuring OSRAM's ThinFilm/ThinGaN® chip technology, now 50 percent brighter than previous versions. With a full color palette and choice of three radiation patterns—plus automotive reliability, SMT manufacturing, high-temperature capability, low thermal resistance, and long lifetimes—Power TOPLED® is clearly the right choice. White products available with ANSI-compliant binning.

OSRAM
Opto Semiconductors



Power TOPLED®

Features ▶

- Maximum current ratings of 70 mA (50 mA for white, blue, and true green)
- Available in white, five shades of warm white, super red, red, amber, orange, yellow, true green, and blue
- Uses OSRAM's patented high-efficiency, low V_F, surface-emitting ThinFilm and ThinGaN® die
- Reflow solderable; 1.9 mm package height (flat top), 3.5 mm to 3.8 mm package height (with lens); +125°C T_j
- 120° lambertian, 30°, and 60° radiation patterns

Benefits ▶

- Suitable for high-brightness applications
- Meets a wide variety of application needs; great for multi-color and color-changing applications
- Saves power and reduces heat while providing more available light
- Low manufacturing cost, reduces depth, survives high temperatures
- Ideal for coupling into secondary optics or as stand alone point sources of light

Applications ▶

- Automotive, trucking, transportation exterior, and signal lighting
- Channel letters, video walls and displays, variable message signs
- Interior lighting for cars, trucks, airplanes, and buildings
- Backlighting (LCD, switches, keys, and displays)
- Color-changing and RGB applications

Product Specifications ▶

Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets
LW E6SG	Power TOPLED®	White	5,600	-	50	30	3.3	120	4.3	900-1,800	CL FL TR BL SI
LCW E6SG		Warm white	4,500/4,000/ 3,500/3,000/2,700	-	50	30	3.4	120	3.8	710-2,240	CL TR BL SI
LS E6SF		Super red	-	633	70	50	2.15	120	4.7	900-2,240	CL BL SI
LR E6SF		Red	-	625	70	50	2.15	120	4.9	900-2,800	CL BL SI
LA E6SF		Amber	-	617	70	50	2.15	120	6.4	1,120-3,550	CL TR SI
LO E6SF		Orange	-	606	70	50	2.15	120	8.8	1,400-4,500	CL TR SI
LY E6SF		Yellow	-	590	70	50	2.15	120	4.5	900-2,240	CL TR BL SI
LT E6SG		True green	-	525	50	30	3.4	120	4.0	900-1,800	CL BL SI
LB E6SG		Blue	-	469	50	30	3.4	120	1.2	224-560	CL TR BL SI
LS E63F		Power TOPLED® with lens	Super red	-	633	70	50	2.15	30	3.8	5,600-14,000 mlux
LS E65F	Super red		-	633	70	50	2.15	60	4.5	2,240-5,600 mlux	CL TR
LA E63F	Amber		-	617	70	50	2.15	30	5.1	7,100-22,400 mlux	CL TR
LA E65F	Amber		-	617	70	50	2.15	60	6.0	2,800-9,000 mlux	CL TR
LY E63F	Yellow		-	590	70	50	2.15	30	3.8	5,600-14,000 mlux	CL TR
LY E65F	Yellow		-	590	70	50	2.15	60	4.3	2,240-5,600 mlux	CL TR

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



Surface-Mount White LEDs for Backlighting

Stanley Electric is a manufacturer bringing high quality lighting components to the marketplace. Stanley's experience in automotive and consumer products can backlight or direct-light products with a diverse number of packaging and color combinations.

Features ▶

- TS16949/QS9000/QS14001 approvals
- All components RoHS compliant
- Many different brightness and packaging options
- Silicone encapsulation for better color control

Benefits ▶

- Tight color binning
- Tight intensity binning
- High quality packaging for robust applications

Applications ▶

- Automotive
- Consumer
- Display backlighting
- Keypad backlighting

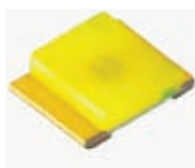
Product Specifications ▶											
Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets
VEW1147LS	SMT-PLCC 2	White	5,000	-	30	20	3.2	120	4	1,500 typ.	TR BL
VCLW1144LS		White	5,000	-	30	20	3	120	2.2	800 typ.	TR BL
VSW1146USE	SMT-2.5 x 1.5	White	5,500	-	40	30	3.5	115	5.7	2,000 typ.	CL TR BL
VCLW1107WX		White	5,000	-	30	20	3	25	TBD	1,000 typ.	TR BL
VCPW1109WX	SMT-3.2 x 2.0	White	5,000	-	20	20	3.1	25	TBD	470 typ.	TR BL
VCLW1107WX		White	5,000	-	30	20	3	60	TBD	330 typ.	TR BL
VCMW1109WX		White	5,000	-	20	20	3.1	60	TBD	120 typ.	TR BL
LW1141C	SMT-3.0 x 1.5	White	5,000	-	20	10	3	180	TBD	55 typ.	BL
LW1141W		White	5,000	-	20	10	3	170	TBD	80 typ.	BL
HKW1142LT	SMT-side view	White	-	0.299 x 0.296	30	20	3.2	110	4.2	1,440-2,000	BL
HKW1145LT		White	-	0.299 x 0.296	30	20	3.2	110	4	1,300-1,580	BL

MARKETS LEGEND

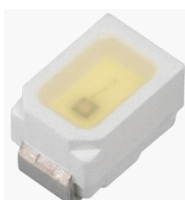
CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



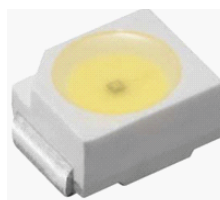
LW1141C



LW1141W



VSW1146USE



VEW1147LS



HSW1142KLT



HSW1145LT



Surface-Mount LEDs

OPTEK's expanded range of visible LED products and assemblies for specialty lighting applications provides design engineers with new options in solid-state lighting for the next generation of signage and displays. From discrete LEDs to complete assemblies, OPTEK provides the building blocks and offers total lighting solutions, including thermal management and secondary optics.



Features ▶

- Mono- and multi-color devices
- Uniform color and light output
- Clear lenses optimize intensity
- 60° to 120° viewing angles
- RoHS compliant

Benefits ▶

- Compatible with automated placement equipment
- Suitable for all SMT assembly methods and compatible with Pb-free solder
- Low power consumption

Applications ▶

- Illumination and indication
- Outdoor and indoor signage
- Backlighting of LCDs
- Automotive interior lighting
- Entertainment equipment



Product Specifications ▶											
Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets
OVSABWBCR4	SMT PLCC4	White	-	-	200	30	3.4	120	-	1,050	CL TR BL
OVSAAABC2R8		Amber	-	591	200	50	2.6	120	-	700	CL TR
OVSABBC2R8		Blue	-	470	100	30	3.9	120	-	200	CL TR
OVSACBC2R8		Blue green	-	505	100	30	3.9	120	-	560	CL TR
OVSAGBC2R8		Green	-	527	100	30	3.9	120	-	700	CL TR
OVSASBC2R8		Red	-	628	200	50	2.5	120	-	900	CL TR
OVSAABLCR8		Amber	-	594	200	50	2.6	60	-	1,650	CL TR
OVSAQBLCR8		Red orange	-	618	200	50	2.5	60	-	2,800	CL TR
OVSASBLCR8		Red	-	628	200	50	2.5	60	-	900	CL TR
OVSRWAC1R6		RA PLCC	White	-	-	50	20	3.2	x=120/y=110	-	2,000
OVSTRGBBCR8	SMT PLCC6	RGB	-	-	100/100/100	50/50/50	2.5/4.5/4.5	120	-	1,000/900/390	CL FL TR
OVSARGB3R8	PLCC4	RGB	-	-	100/100/100	20/20/20	2.3/3.6/3.6	120	-	300/450/110	CL FL TR
OVSRRGBCC3	1204	RGB	-	-	100/80/80	30/20/20	2.0/3.3/3.3	150	-	125/300/75	TR BL SI
OVS9WBCR4	PLCC2	White	-	-	200	20	3.2	120	-	750	CL TR BL
OVTLO1LGAAS	High-power 1W surface mount*	Amber	-	595	1,000	350	2.3	135	35	-	CL FL TR SI
OVTLO1LGABS		Blue	-	460	1,000	350	3.4	135	12	-	CL FL TR SI
OVTLO1GACS		Cyan	-	505	1,000	350	3.4	135	40	-	CL FL TR SI
OVTLO1LGAGS		Green	-	525	1,000	350	3.4	135	60	-	CL FL TR SI
OVTLO1LGARS		Red	-	625	1,000	350	2.3	135	45	-	CL FL TR SI
OVTLO1LGAWS		Cool white	7,000	-	1,000	350	3.4	135	65	-	CL FL TR SI
OVTLO1LGAWDS		Daylight white	5,800	-	1,000	350	3.4	135	60	-	CL FL TR SI
OVTLO1LGAWWS		Warm white	3,600	-	1,000	350	3.4	135	50	-	CL FL TR SI

MARKETS LEGEND CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*For flush-mount version, remove "S" suffix from the part number





High-Power Series

OPTEK's expanded range of visible LED products and assemblies for specialty lighting applications provides design engineers with new options in solid-state lighting for the next generation of signage and displays. From discrete LEDs to complete assemblies, OPTEK provides the building blocks and offers total lighting solutions, including thermal management and secondary optics.



Features ▶

- 1W to 10W devices
- High luminous flux
- Robust and energy efficient packages
- Low-thermal resistance
- Mono- and multi-color in single package
- White color temperatures from 3,200°K to 10,000°K
- RoHS compliant

Benefits ▶

- Exceptional spatial uniformity
- Versatile package designs for variable light output and power consumption
- Maximum output from smallest footprint
- Compatible with Pb-free solder and secondary optics

Applications ▶

- General illumination
- Outdoor and indoor signage
- Interior, exterior architectural, and accent lighting
- Automotive exterior and interior lighting
- Traffic, pedestrian signals, and emergency lighting
- Medical equipment
- Landscape and safety lighting

Product Specifications ▶

Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets	
OVFSAAC8	Power 4-pin flux	Amber	–	591	200	70	2.5	100	5	–	CL FL TR SI	
OVFSB6C8		Blue	–	470	100	30	4.0	60	.85	–	CL FL TR SI	
OVFSG6C8		Green	–	527	100	30	4.0	60	2.5	–	CL FL TR SI	
OVFSQ4C8		Red orange	–	618	200	70	2.6	40	4.5	–	CL FL TR SI	
OVFSRAC8		Red	–	624	200	70	2.5	100	4.5	–	CL FL TR SI	
OVFSW6C8		White	–	–	–	100	30	4.0	60	1.2	–	CL FL TR SI
OVTLO9LG3A	9-chip array 29 x 29 mm	Amber	–	595	1,050	1,050	6.9	120	305	–	CL FL TR SI	
OVTLO9LG3B		Blue	–	460	1,050	1,050	10.2	120	105	–	CL FL TR SI	
OVTLO9LG3C		Cyan	–	505	1,050	1,050	10.8	120	348	–	CL FL TR SI	
OVTLO9LG3G		Green	–	515	1,050	1,050	10.8	120	522	–	CL FL TR SI	
OVTLO9LG3M		RGB	–	–	–	1,050	1,050	10	120	300	–	CL FL TR SI
OVTLO9LG3R		Red	–	625	1,050	1,050	6.9	120	400	–	CL FL TR SI	
OVTLO9LG3W		White	6,400-7,600	–	–	1,050	1,050	10.2	120	565	–	CL FL TR SI
OVTLO9LG3WD		Daylight white	5,200-6,400	–	–	1,050	1,050	10.2	120	522	–	CL FL TR BL SI
OVTLO9LG3WW		Warm white	3,200-3,800	–	–	1,050	1,050	10.2	120	435	–	CL FL TR BL SI
OVSPYBCR4	1W 6 x 6 mm SMD	Yellow	–	587	500	400	2.5	120	35	–	CL FL TR SI	
OVSPBBCR4		Blue	–	470	1,000	350	3.6	120	9	–	CL FL TR SI	
OVSPGBCR4		Green	–	530	1,000	350	3.6	120	48	–	CL FL TR SI	
OVSPRBCR4		Red	–	625	500	400	2.5	120	26	–	CL FL TR SI	
OVSPWBCR4		White	4,500-10,000	–	–	1,000	350	3.6	120	75	–	CL FL TR SI
OVSPWWBCR4		Warm white	2,760-3,500	–	–	1,000	350	3.6	120	50	–	CL FL TR SI
OVSPYBCR44		Yellow	–	587	500	400	2.5	40	35	–	CL FL TR SI	
OVSPBBCR44		Blue	–	470	1,000	350	3.6	40	–	11,000	CL FL TR SI	
OVSPGBCR44		Green	–	530	1,000	350	3.6	40	–	46,000	CL FL TR SI	
OVSPRBCR44		Red	–	625	500	400	2.5	40	26	46,000	CL FL TR SI	
OVSPWBCR44		White	6,000	–	–	1,000	350	3.6	60	52	42,000	CL FL TR SI
OVSPWWBCR44		Warm white	3,000	–	–	1,000	350	3.6	60	40	13,000	CL FL TR SI
OVSPRGBCR4		RGB	–	–	–	500/500/500	250/250/250	2.3/3.5/3.5	130	21/32/8	–	CL FL TR SI
OV5WBCR4		.5W 6 x 6 mm SMD	White	6,000	–	180	150	3.2	120	25	–	CL FL TR SI
OV5R4CR44			Red	–	625	500	175	2.2	40	8	9,000	CL FL TR SI
OV5Y4CR44	Yellow		–	589	500	175	2.2	40	11	14,000	CL FL TR SI	

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

Thru-Hole LEDs

OPTEK's expanded range of visible LED products and assemblies for specialty lighting applications provides design engineers with new options in solid-state lighting for the next generation of signage and displays. From discrete LEDs to complete assemblies, OPTEK provides the building blocks and offers total lighting solutions, including thermal management and secondary optics.



Features ▶

- High luminous intensity
- Narrow and wide viewing angles
- Precision optical performance
- UV-resistant epoxy lenses
- RoHS compliant

Benefits ▶

- Uniform spatial radiation
- No thermal management required
- Low power consumption and long operating life

Applications ▶

- Illumination and indication
- Outdoor, indoor signage, and video screens
- Interior and exterior accent lighting
- Automotive lighting
- Traffic and pedestrian signals



Product Specifications ▶											
Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets
OVLHBKD8	PTH 5 mm oval	Blue	-	470	100	20	3.4	110/50	-	500	CL TR FL
OVLHGKD8		Green	-	525	100	20	3.6	110/50	-	1,100	CL
OVLHQKD8		Red orange	-	618	200	20	2.3	110/50	-	800	CL
OVLHRKD8		Red	-	624	200	20	2.1	110/50	-	900	CL
OVLJBGD8	4 mm oval	Blue	-	470	100	20	3.6	100/50	-	300	CL
OVLJGGD8		Green	-	525	100	20	3.6	100/50	-	1,200	CL
OVLJRGD8		Red	-	624	200	20	2.0	100/50	-	400	CL
OVLFB3C7	5 mm round	Blue	-	470	50	20	3.4	30	-	2,000	CL TR
OVLFG3C7		Green	-	525	50	20	3.4	30	-	7,000	CL TR
OVLFY3C7		Yellow	-	589	100	20	2.2	30	-	4,000	CL TR
OVLFR3C7		Red	-	623	100	20	2.2	30	-	5,000	CL TR
OVLB8C7		Blue	-	470	50	20	3.4	85	-	300	CL TR
OVLG8C7		Green	-	525	50	20	3.4	85	-	670	CL TR
OVLV8C7		Yellow	-	589	100	20	2.2	85	-	650	CL TR
OVLR8C7		Red	-	623	100	20	2.2	85	-	570	CL TR
OVLAB6CB8		3 mm round	Blue	-	470	100	20	3.6	65	-	600
OVLAG6CB8	Green		-	527	100	20	3.6	65	-	2,000	CL TR
OVLAS6CB8	Red		-	628	200	20	2.3	65	-	1,100	CL TR
OVLBB4C7	Blue		-	465	50	20	3.4	45	-	900	CL TR
OVLBG4C7	Green		-	525	50	20	3.4	45	-	4,500	CL TR
OVLBY4C7	Yellow		-	589	100	20	2.2	45	-	1,800	CL TR
OVLBR4C7	Red		-	628	100	20	2.2	45	-	1,900	CL TR
OVLAW4CB7	5 mm round	White	-	-	50	20	3.4	45	-	3,500	CL FL TR
OVLEW3CB6		White	-	-	50	20	3.4	30	-	2,100	CL FL TR
OVLEW5CB6		White	-	-	50	20	3.4	50	-	1,600	CL FL TR
OVLEW1CB9		White	-	-	100	20	3.4	15	-	18,000	CL TR FL
OVLGBOC6B9		Blue	-	465	50	20	3.4	6	-	3,800	CL TR FL
OVLGCOC6B9		Blue green	-	505	50	20	3.4	6	-	9,800	CL TR FL
OVLGSOC8B9		Red	-	623	100	20	2.0	6	-	8,550	CL TR FL
OVLGYOC9B9		Yellow	-	589	100	20	2.0	6	-	10,300	CL TR FL

MARKETS LEGEND CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



White PLCC4, PLCC2, and MiniLED Packages for High-Brightness Lighting Solutions

The new VLMW3200 PLCC4 and VLM2100 MiniLED SMD packages are available in luminous intensity categories that feature the same classification and designation scheme as OSRAM®. The VLMW3200 offers a 60° angle of half-intensity, luminous intensity of ≥ 560 mcd, and a luminous intensity ratio of ≤ 1.6 per packaging unit, while the VLM2100 offers the same angle of intensity and luminous intensity ratios in a compact package size. These products allow bright, even lighting for interior and exterior lighting applications. They are ideal for backlighting audio, video, symbols, and illuminated advertising. Low power consumption adds to efficiency, prolonging battery life and/or reducing operational costs.

Features ▶

- Designed to meet increasing demand for white SMD LEDs
- Utilizes highly-efficient InGaN/TAG technology
- Chromaticity coordinate categorized
- Leadframe profile optimized to reduce thermal resistance

Benefits ▶

- High-brightness white products in an industry standard PLCC4, PLCC2, and MiniLED packages
- Reduced operational costs
- Long life
- Low power consumption

Applications ▶

- Interior and exterior lighting
- Backlighting video, audio, and symbols
- Chromaticity coordinate categorized

Product Specifications ▶

Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets
VLMW41R1T1-5K8L-08	PLCC2	White	$x=0.296/y=0.259$ to $x=0.364/y=0.380$	–	20	10	3.3	120	–	112-355	CL TR BL SI
VLMW41R1T1-5K8L-18		White	$x=0.296/y=0.259$ to $x=0.364/y=0.380$	–	20	10	3.3	120	–	112-355	CL TR BL SI
VLMW41R2S2-5K8L-08		White	$x=0.296/y=0.259$ to $x=0.364/y=0.380$	–	20	10	3.3	120	–	140-280	CL TR BL SI
VLMW41R2S2-5K8L-18		White	$x=0.296/y=0.259$ to $x=0.364/y=0.380$	–	20	10	3.3	120	–	140-280	CL TR BL SI
VLMW41S1T1-5K8L-08		White	$x=0.296/y=0.259$ to $x=0.364/y=0.380$	–	20	10	3.3	120	–	180-355	CL TR BL SI
VLMW41S1T1-5K8L-18		White	$x=0.296/y=0.259$ to $x=0.364/y=0.380$	–	20	10	3.3	120	–	180-355	CL TR BL SI
VLMW3200-GS08		White	$x=0.266/y=0.232$ to $x=0.360/y=0.357$	–	30	30	3.7	120	–	560-1,800	CL TR BL SI
VLMW3200-GS18		White	$x=0.266/y=0.232$ to $x=0.360/y=0.357$	–	30	30	3.7	120	–	560-1,800	CL TR BL SI
VLMW3201-GS08		White	$x=0.266/y=0.232$ to $x=0.360/y=0.357$	–	30	30	3.7	120	–	710-1,800	CL TR BL SI
VLMW3201-GS18		White	$x=0.266/y=0.232$ to $x=0.360/y=0.357$	–	30	30	3.7	120	–	710-1,800	CL TR BL SI
VLMW2100-5K8L-08	White	$x=0.266/y=0.232$ to $x=0.360/y=0.357$	–	20	10	3.0	120	–	56-280	CL TR BL SI	

MARKETS LEGEND

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TELUX™ LEDs for High-Brightness Lighting Solutions



Vishay's high-performance TELUX™ LEDs feature high luminous flux with superior heat dissipation. These LEDs are perfect for use in exterior lighting, interior architectural illumination and accent lighting, automotive dashboard and compartment illumination, as well as exterior automotive applications. TELUX LEDs offer designers a choice of 30° or 45° of half intensity. With excellent luminous flux performance and extended -40°C to +100°C operating temperature, TELUX is binned for luminous flux and color to achieve the best homogenous light appearance for an application.

Features ▶

- Supreme heat dissipation allows applications at high ambient temperatures
- Luminous flux and color categorized for each tube
- High operating temperature: Tj + 100°C
- Excellent luminous flux performance

Benefits ▶

- Robust, vibration resistant 4-pin packaging
- Utilizes highly-efficient InGaN/TAG and AlInGaP technologies
- Chromaticity coordinate categorized
- Bin structures allow homogenous light appearance

Applications ▶

- Exterior lighting
- Interior architectural illumination and accent lighting
- Appliance and compartment lighting
- Automotive dashboard, display, and exterior lighting



Product Specifications ▶												
Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets	
TLWR7600	TELUX 4-pin	Red	-	611-634	70	70	2.2	60	2.1	-	CL FL TR SI	
TLWR7900		Red	-	611-634	70	70	2.2	90	2.1	-	CL TR BL SI	
TLWR8600		Red	-	611-634	70	70	2.2	60	3.0	-	CL TR BL SI	
TLWR8900		Red	-	611-634	70	70	2.2	90	3.0	-	CL TR BL SI	
TLWR9600		Red	-	611-634	70	70	2.2	60	3.2	-	CL TR BL SI	
TLWR9900		Red	-	611-634	70	70	2.2	90	3.2	-	CL TR BL SI	
TLWY7600		Yellow	-	585-597	70	70	2.1	60	1.4	-	-	CL TR BL SI
TLWY7900		Yellow	-	585-597	70	70	2.1	90	1.4	-	-	CL TR BL SI
TLWY8600		Yellow	-	585-597	70	70	2.1	60	3.0	-	-	CL TR BL SI
TLWY8900		Yellow	-	585-597	70	70	2.1	90	3.0	-	-	CL TR BL SI
VLWTG9600		Green	-	509-535	70	70	3.9	60	2.5	-	-	CL TR BL SI
VLWTG9900		Green	-	509-535	70	70	3.9	90	2.5	-	-	CL TR BL SI
VLWW9600		White	$x=0.266/y=0.232$ to $x=0.352/y=0.357$	-	-	50	50	4.3	60	1.5	-	CL TR BL SI
VLWW9601		White	$x=0.266/y=0.232$ to $x=0.352/y=0.357$	-	-	50	50	4.3	60	2.0	-	CL TR BL SI
VLWW9900		White	$x=0.266/y=0.232$ to $x=0.352/y=0.357$	-	-	50	50	4.3	90	1.5	-	CL TR BL SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



1W Little Star® and 1/2W CLCC-6 Power SMD LEDs

Vishay's power SMDs are among the most robust and light efficient LEDs in the market. With an extremely high level of brightness and an ultra-low profile, the 1W Little Star® is highly suitable for conventional and specialized lighting applications. The 1/2W CLCC-6 has a ceramic package that is ideal for light source applications with high thermal considerations. The reflector inside Vishay's Power SMDs are a mixture of silicone and TAG phosphor, enabling a high service life of up to 50,000 hours.



Little Star®

Features ▶

- High-flux output
- Very low-thermal resistance
- Luminous intensity and color grouping
- Lead-free device
- Automotive qualified AEC-Q101

Benefits ▶

- High-brightness white products in neutral and warm white color temperatures
- Slim package profiles, including ultra slim profile CLCC6
- Long life up to 50K hours
- Optical efficiency 52 lm/W
- Utilizes highly efficient InGaN/TAG technology

Applications ▶

- Lighting: general, architecture, garden
- White goods: refrigerator, oven, microwave
- Automotive interior and exterior
- Handheld flashlights, camera flash
- Luminaires

Product Specifications ▶

Part Number	Package Type	Color	Color Temp. (°K)	Dominant Wavelength (nm)	Max. Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (mcd)	Markets
VLMW711ADAF-GS08	Power SMD	White	x=0.278/y=0.243 to x=0.340/y=0.396	-	350	350	3.6	120	39-97	14,000-28,500	CL FL TR BL SI
VLMW711AD-GS08		White	x=0.278/y=0.243 to x=0.340/y=0.396	-	350	350	3.6	120	39-52	14,000-18,000	CL FL TR BL SI
VLMW711AE-GS08		White	x=0.278/y=0.243 to x=0.340/y=0.396	-	350	350	3.6	120	52-71	18,000-22,400	CL FL TR BL SI
VLMW71ACAE-GS08		Warm white	x=0.400/y=0.340 to x=0.440/y=0.430	-	350	350	3.6	120	33-71	11,250-22,400	CL FL TR BL SI
VLMW71AC-GS08		Warm white	x=0.400/y=0.340 to x=0.440/y=0.430	-	350	350	3.6	120	33-39	11,250-14,000	CL FL TR BL SI
VLMW71AD-GS08		Warm white	x=0.400/y=0.340 to x=0.440/y=0.430	-	350	350	3.6	120	39-52	14,000-18,000	CL FL TR BL SI
VLMW71AE-GS08		Warm white	x=0.400/y=0.340 to x=0.440/y=0.430	-	350	350	3.6	120	52-71	18,000-22,400	CL FL TR BL SI
VLMW61CADB-3K8L	CLCC6 SMD	White	x=0.266/y=0.252 to x=0.352/y=0.357	-	150	140	3.3	120	8.8-22.3	2,800-7,100	FL TR BL SI
VLMW61CBEA-3K8L		White	x=0.266/y=0.252 to x=0.352/y=0.357	-	150	140	3.3	120	11.1-28.3	3,550-9,000	FL TR BL SI
VLMW611BADAK3L5-08		Warm white	x=0.373/y=0.338 to x=0.399/y=0.412	-	150	140	3.3	120	5.4-16.8	1,800-5,600	FL TR BL SI
VLMW611CADBK3L5-08		Warm white	x=0.373/y=0.338 to x=0.399/y=0.412	-	150	140	3.3	120	8.7-22.3	2,800-7,100	FL TR BL SI
VLMW62CADB-3K8L		White	x=0.266/y=0.252 to x=0.352/y=0.357	-	150	140	3.3	120	8.8-22.3	2,800-7,100	FL TR BL SI
VLMW62CBEA-3K8L		White	x=0.266/y=0.252 to x=0.352/y=0.357	-	150	140	3.3	120	11.1-28.3	3,550-9,000	FL TR BL SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



CLCC-6

High-Power RGB and White LED Modules

Avago Technologies' high-power RGB and white LED modules are the industry's first plug-and-play LED light sources that can be operated at high drive currents. The built-in heat sink and the mechanical mounting features simplify the thermal management of a lighting solution. This enables effective heat transfer and maintains the LED junction below the maximum allowed temperature. The footprint of the top-emitting package is 100 mm x 18 mm x 3.6 mm with aperture of 96 mm x 6 mm. The footprint of side-emitting package is 100 mm x 18 mm x 8 mm with aperture of 96 mm x 4.6 mm. The reflector cavity design maximizes the light extraction as well as the color mixing to produce the required color.



Features ▶

- High flux output
- Choice of top emitting or side emitting
- Compact footprint
- Integrated heat sink
- RGB-color premix in the reflector cavity to produce required color
- Silicone encapsulation
- Plug-and-play mechanical mounting and electrical connection (connector interface)

Benefits ▶

- Ease of stacking horizontally and vertically
- Simplified thermal management
- Extra long product life
- Fully serviceable due to ease of mounting and demounting

Applications ▶

- Decorative lighting
- Architectural lighting
- Specialty lighting
- Backlighting
- Commercial lighting

Product Specifications ▶												
Part Number	Type	Color	Color Temp. (°K)	Wavelength (nm)	Voltage (V)	Power Consumption (W)	Lens Type	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (Lux @ 1m)	Markets	
ADJD-MJ50	Light engines	RGB/white (tunable)	2,000-20,000	617/530/457	R=29/G=35/B=35	24	-	135 x 80 elliptical	R=200/G=250/B=30	-	CL TR BL SI	
ADJD-MJ60		RGB/white (tunable)	2,000-20,000	617/530/457	R=29/G=35/B=35	24	-	135 x 75 elliptical	R=200/G=250/B=30	-	CL TR BL SI	
ADJD-WD00		Cool white	5,600	-	17.5	3.5	-	130 x 90 elliptical	170	-	CL TR BL SI	
ADJD-WD20		Cool white	5,600	-	17.5	10.5	-	130 x 90 elliptical	500	-	CL TR BL SI	
ADJD-YD00		Warm white	2,800	-	17.5	3.5	-	130 x 90 elliptical	150	-	CL TR BL SI	
ADJD-YD20		Warm white	2,800	-	17.5	10.5	-	130 x 90 elliptical	350	-	CL TR BL SI	
ADJD-WM00	Strip	Cool white	4,000-10,000	-	-	4	-	110	180	-	CL BL SI	
ADJD-YM00		Warm white	2,600-4,000	-	-	4	-	110	150	-	CL BL SI	
ADJD-WM01		Cool white	4,000-10,000	-	10.8	4	-	110	180	-	CL BL SI	
ADJD-YM01		Warm white	2,600-4,000	-	10.8	4	-	110	150	-	CL BL SI	
ADJD-WM10		Cool white	4,000-10,000	-	-	5	-	110	240	-	CL BL SI	
ADJD-YM10		Warm white	2,600-4,000	-	-	5	-	110	200	-	CL BL SI	
ADJD-WM21		Cool white	4,000-10,000	-	10.8	8	-	110	360	-	CL BL SI	
ADJD-YM21		Warm white	2,600-4,000	-	10.8	8	-	110	300	-	CL BL SI	
ADJD-WM30		Cool white	4,000-10,000	-	-	12	-	110	540	-	CL BL SI	
ADJD-YM30		Warm white	2,600-4,000	-	-	12	-	110	450	-	CL BL SI	
ADJD-WM40		Cool white	4,000-10,000	-	-	15	-	110	720	-	CL BL SI	
ADJD-YM40		Warm white	2,600-4,000	-	-	15	-	110	600	-	CL BL SI	
ADJD-WMRO		Round	Cool white	4,000-10,000	-	-	9	-	110	420	-	CL BL SI
ADJD-YMRO			Warm white	2,600-4,000	-	-	9	-	110	350	-	CL BL SI
ADJD-WMR3	Ring	Cool white	4,000-10,000	-	-	10	-	110	480	-	CL BL SI	
ADJD-YMR3		Warm white	2,600-4,000	-	-	10	-	110	400	-	CL BL SI	

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE





LED Power Light Engines

CML offers a range of LED-powered light engines/modules, with output ranging from 3W to 14W, in a wide range of styles and shapes. Designed to support customers with little or no knowledge of LED technology, these light engines include everything required to make LEDs easy to use. Applications range from reading lights, point-of-sale displays, and architectural and landscape lighting, to task lighting, and other applications where energy efficiency is important and long service life is available.



ILL3A0004 9W

Features ▶

- Wide range of power outputs
- Wide range of colors
- Easy to use

Benefits ▶

- Energy efficient
- Unit is ready to use
- Heat management available
- Power drivers available

Applications ▶

- Decorative edge lighting
- Cove lighting
- Architectural lighting
- Task lighting
- Point-of-purchase lighting
- Cabinet and display case lighting

Product Specifications ▶

Part Number	Type	Color	Color Temp. (°K)	Wavelength (nm)	Voltage (V)	Power Consumption (W)	Lens Type	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (Lux @ 1m)	Markets
ILL5A0001A	Dimmable light engines*	Warm white	6,400	-	10-30 VAC/VDC	5	-	40	60	-	CL FL TR BL SI
ILL5A0001B		Cool white	3,300	-	10-30 VAC/VDC	5	-	40	54	-	CL FL TR BL SI
ILL5A0002B or J	Light engines*	Cool white	6,400	-	10-30 VDC	4	-	5 or 25	58	-	CL FL TR BL SI
ILL5A0002C or K		Warm white	3,300	-	10-30 VDC	4	-	5 or 25	50	-	CL FL TR BL SI
2410F79		Cool white	6,400	-	24 VDC	15	-	120	450	-	CL FL TR BL SI
ILL3A0001A or H	1-LED light engines**	Cool white	6,400	-	-	2.8	-	5 or 25	64	-	CL FL TR BL SI
ILL3A0001 B or I		Warm white	3,300	-	-	2.8	-	5 or 25	40	-	CL FL TR BL SI
ILL30003A or H	3-LED light engines**	Cool white	6,400	-	-	3.8	-	11 or 24	96	-	CL FL TR BL SI
ILL30003B or I		Warm white	3,300	-	-	3.8	-	11 or 24	48	-	CL FL TR BL SI
ILL3A0004A or H		Cool white	6,400	-	-	8.4	-	6 or 25	192	-	CL FL TR BL SI
ILL3A0004B or I		Warm white	3,300	-	-	8.4	-	6 or 25	120	-	CL FL TR BL SI
ILL3A0002A or H	5-LED light engines**	Cool white	6,400	-	-	14	-	6 or 25	320	-	CL FL TR BL SI
ILL3A0002B or I		Warm white	3,300	-	-	14	-	6 or 25	200	-	CL FL TR BL SI
ILL2A0005A	6-LED light engines**	Cool white	6,400	-	-	7.5	-	120	240	-	CL FL TR BL SI
ILL2A0005B		Warm white	3,300	-	-	7.5	-	120	120	-	CL FL TR BL SI

MARKETS LEGEND

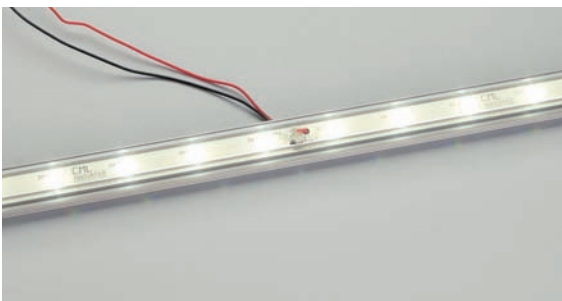
CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Contains internal driver circuitry and requires only correct voltage input for usage

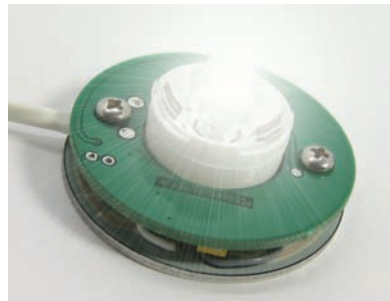
**Please refer to CML page 69 in the Driver section for appropriate power management selection

Featured Product ▶

Contact Arrow to ask about CML's power light engine prototyping kit, specially created for designers and engineers trying out LED technology for the first time. Available with a variety of the products described above.



2410F79 15W



ILL5A0002 3W



ILL5A0001 5W

LED Modules

Everlight has progressed not only in achieving quality LEDs but in expanding our expertise to value-added LED solutions. Everlight's LED module designs demonstrate high lumens output, high fixture efficiency, optical acuteness, and proper thermal management. As with our LEDs, Everlight module solutions are highly customizable in regard to size, shape, color, and brightness. Therefore, it can be implemented into various real world applications. Everlight's Phoenix light engine can be implemented in general lighting. The Cobra was intended for T5 replacement. Everlight's proprietary MR16 design is a viable replacement for current halogen bulbs. The Dolphin is Everlight's creative design for streetlight, walkway light, or parking light applications. In order to fully support module opportunities, Everlight has optical, thermal, and circuitry design capabilities. Everlight's standard module capabilities allow for any scheme of LED population on PCB boards. These services provide a one-stop shop for all our customers.



Everlight Phoenix light engine

Features ▶

- Value added module designs
- Variety of module selection
- Multiple binning parameters: V_F , I_V , λ
- Optical, thermal, and circuit design assistance

Benefits ▶

- Plug-and-play solutions
- High lumens output
- Leading color uniformity
- Strict color binning
- Versatility for many applications

Applications ▶

- General lighting
- Architectural lighting
- Street lighting
- Emergency lighting

Product Specifications ▶											
Part Number	Type	Color	Color Temp. (°K)	Wavelength (nm)	Voltage (V)	Power Consumption (W)	Lens Type	Viewing Angle (°)	Luminous Flux (lm)*	Luminous Intensity (Lux @ 1m)	Markets
SL-16B/012AC/A/P05/15/5670	MR16	Cool white	5,670-7,000	-	12	4	-	15	120	930	CL
SL-16B/012AC/A/P05/15/2832		Warm white	2,850-3,250	-	12	4	-	15	100	573	CL
SL-Phoenix/12S4C/A/P120	Street lamp light engine	Cool white	4,550-7,000	-	46	120	-	110 x 30	6,500	-	CL FL BL
SL-Cobra/045DC/B/P12	LED strip	Cool white	5,650-7,000	-	45	12	-	-	-	670	CL FL BL
SL-Dolphin/100240AC/Ph120	Street lamp	Neutral white	4,550-7,000	-	100/240	120	-	110 x 30	6,500	-	CL FL BL
MARKETS LEGEND					CL COMMERCIAL LIGHTING	FL FLASHLIGHTS	TR TRANSPORTATION	BL BACKLIGHTING	SI SIGNAGE		

*Tj=+25°C



Cobra



MR16



Dolphin



LED Linear Flex Modules

LINEARlight LED modules from OSRAM SYLVANIA feature white, fixed color, or RGB LEDs mounted on either rigid or flexible circuit boards for installation into almost any application. The LINEARlight Flex modules are able to conform to curved surfaces to fit unique fixture designs and unusual installations. The TopLED and SideLED products have a self adhesive backing and connectors and accessories are available to further ease the installation of the products. LINEARlight modules are ideal for accent, marker, display, shelf, and many other applications.



LED linear modules

Features ▶

- Flexible substrates
- Available in a variety of lengths
- Modules can be cut into shorter lengths
- Dynamic color mixing options

Benefits ▶

- Long life
- Ease of installation
- Allows complete system integration
- OPTOTRONIC® drivers are available for a complete system

Applications ▶

- Cove lighting, straight, and curved
- Accent lighting
- Architectural lighting
- Shelf lighting
- Edge lighting

Product Specifications ▶

Part Number	Type	Color	Color Temp. (°K)	Wavelength (nm)	Voltage (V)	Power Consumption (W)	Lens Type	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (Lux @ 1m)	Markets
70098	LINEARlight POWER FLEX-9' strip	White	5,400	-	24	72	Flat top	120	1,400	-	CL BL
70268		White	2,700	-	24	72	Flat top	120	1,300	-	CL BL
70266	LINEARlight FLEX TOPLED-27.5" strip	White	2,700	-	24	86.4	Flat top	120	1,400	-	CL BL SI
70356		White	3,300	-	24	86.4	Flat top	120	1,800	-	CL BL SI
70105		White	4,700	-	24	86.4	Flat top	120	1,290	-	CL BL SI
70089		White	5,400	-	24	86.4	Flat top	120	1,290	-	CL BL SI
70104		White	6,500	-	24	86.4	Flat top	120	1,290	-	CL BL SI
70135		Amber red	-	617	24	72	Flat top	120	1,620	-	CL BL SI
70061		Yellow	-	587	24	72	Flat top	120	1,290	-	CL BL SI
70063		True green	-	525	24	72	Flat top	120	675	-	CL BL SI
70064	Blue	-	469	24	72	Flat top	120	170	-	CL BL SI	
70104	White	6,500	-	24	86.4	Flat top	120	1,290	-	CL BL SI	
70127	LINEARlight FLEX Top Colormix-13.1' reel	RGB	-	617/525/467	24/24/24	12/24/19.2	Flat top	120/120/120	213/336/54	-	CL BL SI
70229		RGB	-	625/525/467	24/24/24	12.1/24/14.4	Flat top	120/120/120	385/770/130	-	CL BL SI
70090	LINEARlight FLEX SIDELED-13.8' strip	White	4,700	-	10.5	31.5	Flat top	120	1,000	-	CL BL SI
70088		White	5,400	-	10.5	31.5	Flat top	-	1,000	-	CL BL SI
70087		White	6,500	-	10.5	31.5	Flat top	-	1,000	-	CL BL SI
70066		Red	-	615	10.5	15.75	Flat top	120	117	-	CL BL SI
70067		Yellow	-	587	10.5	23.63	Flat top	120	405	-	CL BL SI
70068		True green	-	528	10.5	31.5	Flat top	120	147	-	CL BL SI
70069		Blue	-	470	10.5	31.5	Flat top	120	37	-	CL BL SI
70181	LINEARlight MULTIFLEX 3.2'-96 LEDs	White	8,800	-	24	6	Silicone flat top	45	88	-	CL BL SI
70182		White	6,500	-	24	6	Silicone flat top	45	180	-	CL BL SI
70205		White	2,700	-	24	6	Silicone round top	45	83	-	CL BL SI
Part Number	Type	Material Type	Size L x W x H (mm)	Thermal Expansion (10 ⁻⁶ m/m/°K)	Thermal Resistance (°C/W)	Distribution Type	Viewing Angle (°)	Optic Holder	Attachment Method	Connector Type	Markets
70228	HF ² LINEAR LD-MB	-	-	-	-	-	-	-	-	Surface clip	CL BL SI
70321	HF ² LINEARRGBLD4PINFEED	-	5"	-	-	-	-	-	-	Power feed	CL BL SI
70232	HF ² LINEARRGBLD4CONN	-	15"	-	-	-	-	-	-	Board-to-board	CL BL SI
70183	LM 4 PIN FLEX connector	-	12.25 x 16.5 wire length: 500	-	-	-	-	-	-	Board-to-board	CL BL SI
70263	LM 2 connector 5 FLEX connector	-	34.5 x 16.5 wire length: 10	-	-	-	-	-	-	-	CL BL SI
70269	LM 2 PIN FLEX connector	-	12.25 x 16.5 wire length: 500	-	-	-	-	-	-	Board-to-board	CL BL SI
70206	LINEARlight MULTI FLEX STR channel	Aluminum	1,000 x 20 x 18.5	-	-	-	-	-	-	-	CL BL
70187	LINEARlight MULTI FLEX FLX channel	Aluminum	1,000 x 9 x 9	-	-	-	-	-	-	-	CL BL
70188	LINEARlight MULTI FLEX STR thin channel	Aluminum	1,000 x 10 x 16.5	-	-	-	-	-	-	-	CL BL
71237	LINEARlight track 56" prismatic	Aluminum	56"	-	-	-	-	-	-	-	CL
71239	LINEARlight track 56" diffused	Aluminum	56"	-	-	-	-	-	-	-	CL

MARKETS LEGEND

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Arrow Electronics Lighting Group

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<http://lighting.arrow.com>

LED Linear Rigid Modules



An extensive line of optics, connectors, and heat sinks are available for these modules.

Features ▶

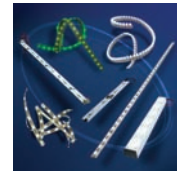
- Rigid boards for easy installation
- Low profile and high efficacy
- High-color rendering
- Dynamic color mixing options

Benefits ▶

- Long life and energy saving
- Connectors can link boards and power supplies
- Easy system integration
- OPTOTRONIC® drivers are available for a complete system

Applications ▶

- Cove lighting
- Refrigeration and freezer lighting
- Display case and shelf lighting
- General lighting



Product Specifications ▶											
Part Number	Type	Color	Color Temp. (°K)	Wavelength (nm)	Voltage (V)	Power Consumption (W)	Lens Type	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (Lux @ 1m)	Markets
70214	HF ² Linear-6 LEDs/12" long	White	5,400	-	24	12	Secondary-on board	30	270	-	CL BL
70284		White	2,700	-	24	12	Secondary-on board	30	270	-	CL BL
70352	HF ² Linear Colormix-18 LEDs/24" long	RGB	-	616/531/468	24	8.5/11.5/3.6	Secondary-on board	-	-	925/1,950/205	CL
70212	HF ² Stick XB-4 LEDs/12" long	White	2,700	-	24	5.6	Primary dome	100	130	-	CL TR BL SI
70225		White	4,100	-	24	5.6	Primary dome	100	150	-	CL TR BL SI
70226		White	6,500	-	24	5.1	Primary dome	100	240	-	CL TR BL SI
70353	HF ² Stick Colormix-18 LEDs/23" long	RGB	-	616/531/468	24/24/24	8.5/11.5/3.6	Flat top	-	-	925/1,950/205	CL
70297	HF ² Stick XB Sx Series S2-4 LEDs/12" long	White	2,700	-	24	5.1	Primary dome	90	197	-	CL TR BL SI
70298		White	3,500	-	24	5.1	Primary dome	90	197	-	CL TR BL SI
70299		White	4,100	-	24	5.1	Primary dome	90	197	-	CL TR BL SI
70300		White	5,700	-	24	5.1	Primary dome	90	197	-	CL TR BL SI
70308	HF ² Stick XB Sx Series S2L-4 LEDs/12" long	White	3,500	-	24	2.2	Primary dome	90	100	-	CL TR BL SI
70360		White	4,100	-	24	2.2	Primary dome	90	100	-	CL TR BL SI
70301	HF ² Stick XB Sx Series S3-4 LEDs/12" long	White	2,700	-	24	10.3	Primary dome	90	440	-	CL TR BL SI
70358		White	3,000	-	24	10.3	Primary dome	90	483	-	CL TR BL SI
70302		White	3,500	-	24	10.3	Primary dome	90	483	-	CL TR BL SI
70303		White	4,100	-	24	10.3	Primary dome	90	483	-	CL TR BL SI
70304		White	5,700	-	24	10.3	Primary dome	90	536	-	CL TR BL SI
70359	HF ² Stick XB Sx Series S4-4 LEDs/12" long	White	3,000	-	24	3.7	Primary dome	90	216	-	CL TR BL SI
70313		White	3,500	-	24	3.7	Primary dome	90	216	-	CL TR BL SI
70314		White	4,100	-	24	3.7	Primary dome	90	216	-	CL TR BL SI
70316		White	5,700	-	24	3.7	Primary dome	90	235	-	CL TR BL SI
70232	HF ² Stick-6 LEDs/12" long	White	5,400	-	24	12	Flat top	120	375	-	CL TR BL SI
70285		White	2,700	-	24	12	Flat top	120	300	-	CL TR BL SI
70227	HF ² DisplayStick-10 LEDs/12" long	White	4,200	-	24	16	Flat top	110	495	-	CL TR BL SI
71233		White	4,200	-	24	16	Flat top	110	596	-	CL TR BL SI
71232	HF ² DisplayStick-5 LEDs/6" long	White	4,200	-	24	7	Flat top	110	248	-	CL TR BL SI
71234		White	4,200	-	24	7	Flat top	110	298	-	CL TR BL SI
70128	DRAGONstick-12 LEDs/12" long	White	4,700	-	24	17	Flat top	120	300	-	CL TR BL SI
70180		White	3,300	-	24	17	Flat top	120	240	-	CL TR BL SI
70158	DRAGONstick-6 LEDs/12" long	White	3,300	-	24	8.5	Flat top	120	120	-	CL TR BL SI
70221		White	4,700	-	24	8.5	Flat top	120	290	-	CL TR BL SI
70080	LINEARlight Colormix Rigid-30 LEDs/1.48' long	RGB	-	617/525/467	24	1.8/3.6/2.9	Flat top	120	32/51/8	-	CL BL SI
70006	LINEARlight Rigid-1.47" long	Yellow	-	587	10.5	4.2	Flat top	120	69	-	CL
70007		Amber red	-	617	10.5	4.2	Flat top	120	86	-	CL
70008		True green	-	525	10.5	4.2	Flat top	120	57	-	CL
70009		Blue	-	469	10.5	4.2	Flat top	120	10	-	CL
70044		Super red	-	6,331	10.5	4.2	Flat top	120	54	-	CL
70083		Orange	-	606	10.5	4.2	Flat top	120	98	-	CL
70288		White	2,700	-	10.5	4.2	Flat top	-	68	-	CL
70289		White	5,400	-	10.5	4.2	Flat top	-	57	-	CL
70222	INSPIRELED	White	3,300-4,700	-	24	17	Flat top	120	270	-	-

MARKETS LEGEND

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LED Directional Modules

OSRAM SYLVANIA's directional LED modules are compact products providing an intense white light output that has a higher efficacy than incandescent or halogen light sources with similar luminous intensity. They are designed with mounting holes or threads for solid coupling to thermal management solutions and are pre-wired so they can be integrated into a luminaire with positive electrical connections. Their sleek, innovative form factors make them ideal for use in compact fixtures offering a bright and intense light that is not available from any other light source.



LED directional modules

Features ▶

- Available in several color temperatures
- Metal housings or metal core boards for solid thermal coupling
- Pre-wired with polarized cables
- Integrated optics

Benefits ▶

- Long lifetime
- Low total cost of ownership
- OPTOTRONIC® drivers are available for a complete system
- Energy saving and fully dimmable

Applications ▶

- Task, accent, and display lighting
- Portable and emergency lighting
- Downlighting
- Landscape lighting
- Street lighting

Product Specifications ▶

Part Number	Type	Color	Color Temp. (°K)	Wavelength (nm)	Voltage (V)	Power Consumption (W)	Lens Type	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (Lux @ 1m)	Markets
70192	HF ² X-23 mm hexagonal board	White	3,300	-	Constant current	1.2	Secondary-on board	12	-	450	CL FL TR BL
70193		White	3,300	-	Constant current	1.2	Secondary-on board	30	-	75	CL FL TR BL
70194		White	3,300	-	Constant current	1.2	Secondary-on board	60	-	22	CL FL TR BL
70164		White	3,300	-	Constant current	1.2	Flat top	120	-	10	CL FL TR BL
70201		White	5,400	-	Constant current	1.2	Secondary-on board	12	-	675	CL FL TR BL
70202		White	5,400	-	Constant current	1.2	Secondary-on board	30	-	110	CL FL TR BL
70191		White	5,400	-	Constant current	1.2	Secondary-on board	60	-	33	CL FL TR BL
70184		White	5,400	-	Constant current	1.2	Flat top	120	45	15	CL FL TR BL
70307	HF ² X HO-23 mm hexagonal board	White	3,000	-	Constant current	15	Flat top	120	330	-	CL FL TR BL
70306		White	5,400	-	Constant current	15	Flat top	120	390	-	CL FL TR BL
70305		White	6,500	-	Constant current	15	Flat top	120	390	-	CL FL TR BL
70318	HF ² Flood-2" diameter	White	3,000	-	24	12	Secondary-on board	38	-	330	CL FL TR
70319		White	4,700	-	24	12	Secondary-on board	38	-	450	CL FL TR
70350		White	5,400	-	24	12	Secondary-on board	38	-	450	CL FL TR
70200	HF ² Eye-1" diameter	White	5,400	-	Constant current	1.2	Secondary-on board	15	-	310	CL
70199		White	3,300	-	Constant current	1.2	Secondary-on board	15	-	230	CL
70281	DRAGONpuck-1.4" diameter	White	2,700	-	Constant current	3.6	Secondary-on board	16	-	630	CL FL TR
70169		White	5,400	-	Constant current	3.6	Secondary-on board	16	-	900	CL FL TR
70121		Red	-	617	Constant current	2.4	Secondary-on board	16	-	215	CL TR
70124		Yellow	-	587	Constant current	2.4	Secondary-on board	16	-	215	CL TR
70123		Verde	-	505	Constant current	3.6	Secondary-on board	16	-	285	CL TR
70122		Blue	-	470	Constant current	3.6	Secondary-on board	16	-	100	CL TR
70203	HFDisk-1.38" diameter	White	3,300	-	Constant current	3.6	Flat top	120	60	-	CL FL TR
70204		White	4,700	-	Constant current	3.6	Flat top	120	75	-	CL FL TR

MARKETS LEGEND

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LED Chain Modules



OSRAM SYLVANIA's chain LED products consist of a number of small LED modules connected together with bendable wiring. They are ideal for various applications where flexibility and versatility are needed in limited spaces. Designed to meet the rigorous requirements of signage applications, the HF² Chain and BACKlight systems are listed in the UL Sign Accessories Manual (SAM) and offer an adaptable alternative to neon for channel letters. They are available with white or colored LEDs and, due to their high flexibility, are also suitable for any application requiring LEDs oriented in a 3-dimensional setting.



LED chain modules

Features ▶

- Low profile boards
- Flexible chains
- Available in white and saturated colors
- Conformally coated
- UL SAM listed

Benefits ▶

- Mounting holes for easy installation
- Adjustable spacing for desired lumen output
- Chains can be subdivided
- OPTOTRONIC[®] drivers are available for a complete system

Applications ▶

- Signage lighting
- General lighting
- Cove lighting
- Architecture lighting
- Irregular spaces

Product Specifications ▶											
Part Number	Type	Color	Color Temp. (°K)	Wavelength (nm)	Voltage (V)	Power Consumption (W)	Lens Type	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (Lux @ 1m)	Markets
70273	BACKlight BL04-15.7' reel	White	5,400	-	10.5	44	Flat top	120	880	-	CL BL SI
70274		White	6,500	-	10.5	44	Flat top	120	880	-	CL BL SI
70171		Blue	-	470	10.5	32	Flat top	120	100	-	CL BL SI
70172		Green	-	525	10.5	32	Flat top	120	430	-	CL BL SI
70173		White	6,500	-	10.5	38	Flat top	120	520	-	CL BL SI
70279	BACKlight BL04-23.62' reel	White	6,500	-	10.5	44	Flat top	240	880	-	CL BL SI
70278	BACKlight BL02-47.24' reel	White	6,500	-	10.5	22	Flat top	120	440	-	CL BL SI
70235	BACKlight BL02-31.5' reel	Super red	-	633	10.5	19	Flat top	120	245	-	CL BL SI
70175		Amber red	-	617	10.5	19	Flat top	120	590	-	CL BL SI
70236		Orange	-	606	10.5	19	Flat top	120	490	-	CL BL SI
70237		Yellow	-	587	10.5	19	Flat top	120	490	-	CL BL SI
70238		Green	-	525	10.5	16	Flat top	-	215	-	CL BL SI
70239		Blue	-	470	10.5	16	Flat top	120	50	-	CL BL SI
70272		White	6,500	-	10.5	22	Flat top	120	440	-	CL BL SI
70165	HFChain-12' reel	White	6,500	-	24	52	Flat top	120	1,320	-	CL BL SI
70213	DRAGONchain-12' reel	White	6,500	-	24	52	Flat top	120	1,320	-	CL SI BL
70210	LINEARlight ColorPod-36'	RGB	-	-	7.5	25	Clear dome	-	-	-	CL SI
70211		RGB	-	-	7.5	25	Frosted dome	-	-	-	CL SI
70208	LINEARlight ColorPod XB-67'	RGB	-	-	12	50	Frosted dome	-	-	-	CL SI
70209		RGB	-	-	12	50	Clear dome	-	-	-	CL SI
Part Number	Type	Material Type	Size L x W x H (mm)	Thermal Expansion (10 ⁻⁶ m/m/°K)	Thermal Resistance (°C/W)	Distribution Type	Viewing Angle (°)	Optic Holder	Attachment Method	Connector Type	Markets
70125	BACKlight tape	Foam tape	25.4 x 10 x 2.54	-	-	-	-	-	Adhesive	-	CL BL SI
70126	BACKlight connector	-	-	-	-	-	-	-	-	-	CL BL SI
70216	LINEARlight ColorPod track	-	Length: 4'	-	-	-	-	-	-	-	CL SI
70217	LINEARlight ColorPod clip	-	-	-	-	-	-	-	-	-	CL SI
70218	LINEARlight ColorPod XB track	-	Length: 4'	-	-	-	-	-	-	-	CL SI
70219	LINEARlight ColorPod XB clip	-	-	-	-	-	-	-	-	-	CL SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

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Slim Stick LED Light Modules

Coming in four different configurations, the Slim Stick LED light module family offers a low-profile, high CRI LED lighting in many different applications. By using dedicated connectors, Slim Sticks can be connected allowing flexibility in lighting design. Whether it is architectural cove lighting, task lighting, or fluorescent replacement for food display, Stanley's Slim Stick offers a high quality, extended life LED light source.



294 mm long x 13 mm wide
x 3 mm high

Features ▶

- S type—comes in two different configurations of 15 LED at 20 mm pitch and 30 LED at 20 mm pitch
- S type—comes in two different colors with light output of 25 lm to 55 lm
- F type—promotes high CRI rating of 96 Ra and 300 lm
- Slim Block—features a sealed lens for waterproof and dustproof applications
- M type—low profile that comes in three different lengths (300 mm, 600 mm, and 900 mm)

Benefits ▶

- Long life up to 30,000 hours
- No heat dissipation around food storage
- Low power consumption
- S type and Slim Block can be connected for ease and flexibility of design

Applications ▶

- Architectural lighting applications such as stairways, handrails, counters, cove, and shelving lighting
- F type is perfect for refrigerated food display, such as vending machines, dairy, and pastry casing
- Slim Block designed for glass door reach in commercial refrigerators and vending machines
- Any high color rendering application that requires CRI of 90 plus Ra

Product Specifications ▶

Part Number	Type	Color	Color Temp. (°K)	Wavelength (nm)	Voltage (V)	Power Consumption (W)	Lens Type	Viewing Angle (°)	Luminous Flux (lm)	Luminous Intensity (Lux @ 1m)	Markets
STN0101N (S type)	30 LEDs	White	5,000	–	DC12	2.4	–	–	55	12.5	CL
STW0101N (S type)		Warm white	3,300	–	DC12	2.4	–	–	45	20	CL
STN0201N (S type)	15 LEDs	White	5,000	–	DC12	1.2	–	–	25	10	CL
STW0201N (S type)		Warm white	3,300	–	DC12	1.2	–	–	24	10	CL
SMW1801-S300 (M)	300 mm/8 LED	Warm white	3,300	–	DC18	8	–	–	290	–	CL
SMP1801-S300 (M)		Pure white	4,200	–	DC18	8	–	–	310	–	CL
SMC1801-S300 (M)		Cool white	6,500	–	DC18	8	–	–	480	–	CL
SMW1801-S600 (M)	600 mm/16 LED	Warm white	3,300	–	DC18	16	–	–	580	–	CL
SMP1801-S600 (M)		Pure white	4,200	–	DC18	16	–	–	620	–	CL
SMC1801-S600 (M)		Cool white	6,500	–	DC18	16	–	–	960	–	CL
SMW1801S-900(M)	900 mm/24 LED	Warm white	3,300	–	DC18	24	–	–	870	–	CL
SMP1801-S900 (M)		Pure white	4,200	–	DC18	24	–	–	930	–	CL
SMC1801-S900 (M)		Cool white	6,500	–	DC18	24	–	–	1,440	–	CL
SFN0061S (F type)	15 LEDs	White	5,000	–	24	8.8	–	70	140	300	CL
SBN12N1N-001	2 LEDs	Cool white	6,500	–	48	2.2	–	Narrow	130	150	CL
SBN12W1N-001		Cool white	6,500	–	48	2.2	–	Wide	67	150	CL

MARKETS LEGEND

CL COMMERCIAL LIGHTING

FL FLASHLIGHTS

TR TRANSPORTATION

BL BACKLIGHTING

SI SIGNAGE



Slim Stick F Type

TT electronics/OPTEK Technology

TT electronics/OPTEK Technology offers decades of experience in custom product development and manufacturing capability. Our expertise extends from die placement through finished product assembly and testing. OPTEK has the experience and the facilities to accommodate the most stringent assembly requirements.



Features ▶

Product Design

- From concept through characterization to design

Product Assembly

- Full manufacturing capability for a wide variety of circuit configurations

Thermal Management

- Optek OptoTherm™, a superior thermal management substrate

Benefits ▶

Product Design

- On-shore design, production engineering, and product support

Product Assembly

- Full integration of all board-level components

Thermal Management

- Multiple thermal management solutions available, including OptoTherm™

Applications ▶

- Architectural
- Transportation
- Flashlights
- Backlighting
- Signage



Product Specifications ▶												
Part Number	Type	Color	Color Temp. (°K)	Wavelength (nm)	Voltage (V)	Power Consumption (W)	Lens Type	Viewing Angle (°)	Luminous Flux (lm)*	Luminous Intensity (Lux @ 1m)	Markets	
OPA729W	Light engines*	White	4,500-10,000	–	18	12.6	Flat	120/lambertian	480	–	CL FL TR BL SI	
OPA729WD		White	4,500-10,000	–	18	12.6	Domed	40	480	–	CL FL TR BL SI	
OPA730W		White	4,500-10,000	–	21.6	12.6	Flat	120/lambertian	576	–	CL FL TR SI	
OPA730WD		White	4,500-10,000	–	21.6	12.6	Domed	40	576	–	CL FL TR SI	
OPA731W		White	4,500-10,000	–	18	25.2	Flat	120/lambertian	960	–	CL FL TR BL SI	
OPA731WD		White	4,500-10,000	–	18	25.2	Domed	40	960	–	CL FL TR BL SI	
OPA733W		White	4,500-10,000	–	3.6	1.26	Flat	120/lambertian	48	–	CL FL TR BL SI	
OPA733WD		White	4,500-10,000	–	3.6	1.26	Domed	40	48	–	CL FL TR BL SI	
OPA739W		White	4,500-10,000	–	10.8	3.78	Flat	120/lambertian	144	–	CL FL TR BL SI	
OPA739WD		White	4,500-10,000	–	10.8	3.78	Domed	40	144	–	CL FL TR BL SI	
OPA740W-23		White	4,500-10,000	–	18	12.6	Secondary	23/lambertian	408	–	CL FL TR BL SI	
OPA741W-23		White	4,500-10,000	–	21.6	12.6	Secondary	23/lambertian	490	–	CL FL TR BL SI	
OPA742W-23		White	4,500-10,000	–	3.6	1.26	Secondary	23/lambertian	41	–	CL FL TR BL SI	
OVTLZ1LGAB		1W star module	Blue	–	460	3.4	1	Flat	135	12	–	CL FL TR BL SI
OVTLZ1LGAC			Cyan	–	505	3.6	1	Flat	135	40	–	CL FL TR BL SI
OVTLZ1LGAG	Green		–	515	3.6	1	Flat	135	60	–	CL FL TR BL SI	
OVTLZ1LGAR	Red		–	625	2.3	1	Flat	135	45	–	CL FL TR BL SI	
OVTLZ1LGAA	Amber		–	595	2.3	1	Flat	135	35	–	CL FL TR BL SI	
OVTLZ1LGAW	Cool white		7,000	–	3.4	1	Flat	135	65	–	CL FL TR BL SI	
OVTLZ1LGAWD	Daylight white		5,800	–	3.4	1	Flat	135	60	–	CL FL TR BL SI	
OVTLZ1LGAWW	Warm white		3,500	–	3.4	1	Flat	135	50	–	CL FL TR BL SI	
OPAKIT100	Design kit	Various	Various	Various	3.6-21.6	1.26-25.2	Various	23/40/120/lambertian	41-960	–	CL FL TR BL SI	
OVPL5W3K	Power line design kit	White	4,500-10,000	–	15	1.9	Flat	120/lambertian	250	–	BL SI	
OPA773	Power line light strip	White	4,500-10,000	–	14-16	1.9	Flat	120/lambertian	50	–	BL SI	
OPA775		White	4,500-10,000	–	14-16	1.9	Flat	120/lambertian	50	–	BL SI	
OPA776		White	4,500-10,000	–	24-26	3.8	Flat	120/lambertian	100	–	BL SI	
Part Number	Type	Material Type	Size L x W x H (mm)	Thermal Expansion (10 ⁻⁶ m/m/°K)	Thermal Resistance (°C/W)	Distribution Type	Viewing Angle (°)	Optic Holder	Attachment Method	Connector Type	Markets	
OVLENS154**	Optics	Optical-grade PC	20 diam. x 12h	–	–	Narrow-beam optic	≈15	Included	Glue down	–	CL TR SI	
OVLENS234**		Optical-grade PC	20 diam. x 12h	–	–	Narrow-beam optic	≈23	Included	Glue down	–	CL TR SI	

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Light engines are also available in red, yellow, blue, and green

**For OVSPxBRC4 series



OVPL5W3K power line kit

OSRAM

Opto Semiconductors



IR Golden DRAGON®

High-Efficiency and Ultra High-Power Infrared LEDs

OSRAM offers one of the largest selections of 850 nm infrared LEDs. OSRAM's unique ThinFilm technology enables very high efficiency and output powers of up to 3.6W. Designed specifically for CCTV applications and for use in night vision equipment, they deliver a wavelength specially adapted to CMOS/CCD camera systems. These LEDs are offered in thru-hole packages and a variety of surface-mount packages such as TOPLED®, Power TOPLED®, MIDLED, Golden DRAGON®, and OSTAR™ Observation. OSTAR™ Observation is the optimum choice when long distances and extensive areas need to be covered and monitored with infrared light, especially in applications that require continuous operation and/or high ambient temperatures.

Features ▶

- Small dimensions, big performance
- 50 mW output power from 0.3 mm x 0.3 mm die and 500 mW from 1 mm x 1 mm die
- Low forward voltage of 1.8V @ 1A
- Maximum DC current of 1A
- High forward currents allowed at high temperatures

Benefits ▶

- High optical IR output, even in continuous operation
- Exceptionally low thermal resistance for optimum thermal management
- Certified for automotive applications at temperatures up to +125°C
- Easy design for external lenses
- Low forward voltage provides longer life in battery operated devices

Applications ▶

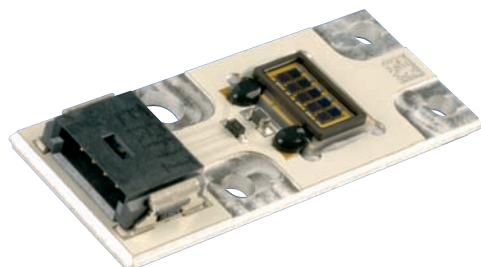
- Infrared illumination for CMOS cameras
- Surveillance systems
- Automotive–driver assistance systems
- Machine vision
- IR data transmission

Product Specifications ▶

Part Number	Package Type	Dominant Wavelength (nm)	Max Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Radiant Flux (mW)	Radiant Intensity (mW/sr)	Markets
SFH 4050	SmartLED®	850	100	100	1.5	160	50	7	TR
SFH 4230	Golden DRAGON®	850	1,000	1,000	1.8	120	440	170	FL TR
SFH 4250	Power TOPLED®	850	100	100	1.5	120	40	15	TR
SFH 4255	SIDELED®	850	100	100	1.5	120	40	15	TR
SFH 4257	TOPLED®	850	100	100	1.5	120	18	7	TR
SFH 4252		850	100	100	1.5	120	40	16	TR
SFH 4258	Power TOPLED® with lens	850	100	100	1.5	30	45	90	TR
SFH 4259		850	100	100	1.5	50	45	55	TR
SFH 4350	3 mm (T1)	850	100	100	1.5	26	50	70	TR
SFH 4550	5 mm (T1 3/4)	850	100	100	1.5	6	50	700	TR
SFH 4650	MIDLED	850	100	100	1.5	40	40	40	TR
SFH 4655		850	100	100	1.5	40	40	40	TR
SFH 4730	OSTAR™ Observation	850	1,000	1,000	18	120	3,000	1,000	FL TR
SFH 4740		850	1,000	1,000	18	120	3,600	1,200	FL TR

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION EL BACKLIGHTING SI SIGNAGE



OSTAR™ Observation

Near-Infrared LEDs for Vision and Security

OPTEK provides a variety of packages designed for the high-power near-infrared LED market. These products are used for illumination of small and medium areas, for vision and security, and have a life expectancy of greater than 100,000 hours with less than 20 percent light degradation.



Features ▶

- High optical power
- 3 mm, 5 mm, metal TO46/TO18, metal-lensed pill, and surface-mount package configurations
- Side-emitting LEDs, point source LEDs, and VCSELs
- Choice of pin patterns and plastic or hermetic packages
- Variety of sensitivity ranges and choice of narrow/wide irradiance pattern

Benefits ▶

- Typical center wavelength 850 nm, 890 nm, and 940 nm
- Expected life (20% optical power loss) greater than 100,000 hours (11.4 years) of continual operation
- Choice of a variety of beam angles to meet customer requirements
- Commercial and harsh environment packaging
- Excellent heat dissipation for all of the axial components

Applications ▶

- Security cameras
- Encoders
- Non-contact switching
- Product identification system appliances
- Measuring instruments, medical instruments, communications, system appliances, and currency validation (automatic vending machines)



Product Specifications ▶

Part Number	Package Type	Dominant Wavelength (nm)	Max Current (mA)	Tested Current (mA)	Forward Voltage (V)	Viewing Angle (°)	Radiant Flux (mW)	Radiant Intensity (mW/sr)	Markets	
OP133	Thru-hole	940	100	100	-	18	5 min.	-	CL FL TR	
OP165A		940	50	20	-	18	-	4.4 min.	CL FL TR	
OP205CL		875	100	50	-	6	10	-	CL FL TR	
OP233		890	100	100	-	18	10	-	CL FL TR	
OP235		850	100	100	-	18	-	79.5 min.	CL FL TR	
OP265A		890	50	20	-	18	-	6.1 min.	CL FL TR	
OP265AD		850	50	20	-	18	-	36.1 min.	CL FL TR	
OP297A		890	150	20	-	20	-	9.3 min.	CL FL TR	
OP297AB		850	100	20	-	20	-	10.8 min.	CL FL TR	
OP298A		890	100	100	-	25	-	39.8 min.	CL FL TR	
OP298AD		875	100	100	-	25	-	46.4 min.	CL FL TR	
OPV302		850	20	7	-	4	1.5	-	CL FL TR	
OPV332		850	20	7	-	4	1.5	-	CL FL TR	
OP270		SMT	890	50	20	-	25	-	2.4 min.	CL FL TR
OP271			890	50	20	-	25	-	2.4 min.	CL FL TR
OP272	890		50	20	-	25	-	2.4 min.	CL FL TR	
OP273	890		50	20	-	25	-	2.4 min.	CL FL TR	
OPV322	850		20	7	-	6	1.5	-	CL FL TR	
OP280	PLCC SMT	890	50	20	-	100	-	0.7 min.	CL FL TR	
OP280K		875	50	20	-	100	24	-	CL FL TR	
OP280KT		850	50	20	-	100	24	-	CL FL TR	
OP280PS		850	50	100	-	100	2.8 min.	-	CL FL TR	
OP280V		850	20	5	-	4	1.05 min.	-	CL FL TR	
OPR2800		880	50	20	-	100	-	0.3 min.	CL FL TR	

MARKETS LEGEND CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



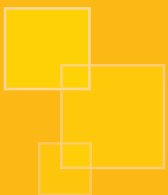
✕ | LED DRIVERS

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Backlight LED Drivers

Allegro MicroSystems offers a growing portfolio of devices used to drive LEDs for LCD panel backlighting and WLED Flash/torch. Both boost- and charge-pump architectures cover a wide variety of applications, with minimal external component requirements and high levels of integration. Allegro's backlight LED drivers are highly-integrated ICs with on-chip FETs, providing a small solution size. They also offer high performance and efficiency in small TDFN and TQFN packages ranging in size from 2 mm x 3 mm to 4 mm x 4 mm.



Features ▶

- Small packages
- Excellent matching
- Low quiescent current
- Charge pump and boost designs
- Multiple control methods

Benefits ▶

- Reduced solution size
- Uniform brightness
- Longer battery life
- More solution choices
- Flexible dimming control

Applications ▶

- Mobile phones
- Notebooks and desktop LCD panels
- Portable media players
- GPS/navigation systems
- Digital cameras

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
A8430	Boost	PWM/analog	2-6	1	Series	2.5-10	36	25	87	TSD	PWM/analog	BL
A8431		PWM/analog	2-6	1	Series	2.5-10	32	25	87	TSD/OVM	PWM/analog	BL
A8480		PWM/analog	2-10	1	Series	2.7-9	23 (higher with split inductor)	250	90	TSD	PWM/analog	BL
A8481		PWM/analog	2-10	2	Series	2.7-9	23 (higher with split inductor)	250	90	TSD	PWM/analog	BL
A8500		PWM/analog	8-12	8	Series	5-25	47	25 x 8	92	TSD/OVM/LOD	Serial/PWM/analog	BL
A8501		PWM	12	4	Series	8-21	38	100 x 4	92	TSD/OVM/LOD	Serial/PWM	BL
A8503		PWM	10	6	Series	5-25	44	20 x 6	92	TSD/OVM/LOD	Serial/PWM	BL
A8504		PWM/analog	8-11	6	Series	5-25	47	40 x 8	92	TSD/OVM/LOD	Serial/PWM/analog	BL
A8435		Charge pump	PWM/analog	1	4	Parallel	2.7-5.5	6	30 x 4	92	TSD/OVM/LOD	Serial
A8434	PWM/analog		1	6	Parallel	2.7-5.5	6	30 x 6	92	TSD/OVM/LOD	Serial	BL
A8530	PWM/analog		1	6	Parallel	2.7-5.5	6	30 x 4 and 100 x 2	92	TSD/OVM/LOD	Serial	BL

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Diagnostic capabilities: TSD: Thermal shutdown, OVM: Output voltage monitoring, LOD: LED open detection



Single- and Multi-Channel Constant-Current Drivers for LED Displays, Signs, Architectural, and Automotive Lighting



Allegro MicroSystems offers a broad portfolio of LED drivers for signs and displays, architectural and decorative lighting, entertainment lighting, and automotive lighting with a variety of features and channel counts and high-current outputs.

Features ▶

- Output currents up to 350 mA per channel
- 10-bit PWM per channel
- 7-bit current-control DACs for color calibration (dot correction)
- Open LED and shorted LED detection
- Thermal shutdown and undervoltage lockout
- Automotive voltage and temperature rating (A6260)

Benefits ▶

- Drive high-brightness LEDs
- Precise brightness control
- Accurate color balance and white point
- Remote diagnostics
- Full protection of driver IC

Applications ▶

- Full-color LED video displays
- Monochrome to full-color message and graphic displays
- Channel letter signs
- Architectural and decorative lighting
- Stage and entertainment lighting
- Automotive interior lighting
- Automotive exterior signal lighting



A6285 16-channel LED driver with dot correction and open LED detection in 5 mm x 5 mm QFN package

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
A6285	Linear	Internal DAC/external PWM/external resistor	3	16	Series/parallel	3-5	13	80	–	LOD/TSD/UVLO	Serial/PWM/analog	TR BL SI
A6279		External PWM/external resistor	4	16	Series/parallel	3-5	17	90	–	LOD/TSD/UVLO	Serial/PWM/analog	TR BL SI
A6282		External PWM/external resistor	3	16	Series/parallel	3-5	13	50	–	TSD/UVLO	Serial/PWM/analog	TR BL SI
A6278		External PWM/external resistor	4	8	Series/parallel	3-5	17	90	–	LOD/TSD/UVLO	Serial/PWM/analog	TR BL SI
A6277		Logic input dims to 50%/external PWM or resistor	6	8	Series/parallel	5	24	150	–	UVLO	Serial/PWM/analog	TR BL SI
A6280		Internal PWM/internal DAC/external resistor	4	3	Series/parallel	5-17	17	150	–	TSD/UVLO	Serial/PWM/analog	CL TR BL SI
A6281		Internal PWM/internal DAC/external resistor	4	3	Series/parallel	5-17	17	150	–	TSD/UVLO	Serial/PWM/analog	CL TR BL SI
A6260	Linear regulator	External PWM/analog	12	1	Series	6-40	Input–2.25V at 350 mA	350	–	TSD/OVM (current foldback)	PWM or analog	CL TR

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

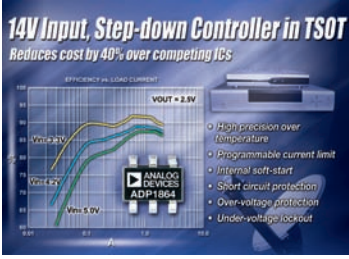
*Diagnostic capabilities: TSD: Thermal shutdown, UVLO: Under voltage lock out, OVM: Output voltage monitoring, LOD: LED open detection





Buck and Boost LED Driver DC-to-DC Switching Regulators

Analog Devices, Inc., has introduced several families of highly efficient and reliable switching regulators with optimized levels of functional integration that maximize the power conversion and consumption in performance-driven applications. These products range from three-phase controllers to fully-integrated controller, driver, and FET devices. Features such as margining and tracking have been integrated into several product variants to enhance the monitoring and control capabilities of the overall system.



Features ▶

- Wide input voltage range (1V-24V)
- Step-up and step-down through variety of topologies
- Online design tools provide fast and robust solutions
- Synchronous converters for high efficiency

Benefits ▶

- Higher efficiency over LDOs
- Fully-integrated regulators for quick design
- Reduced part count
- Reduced BOM cost
- Integrated advanced features

Applications ▶

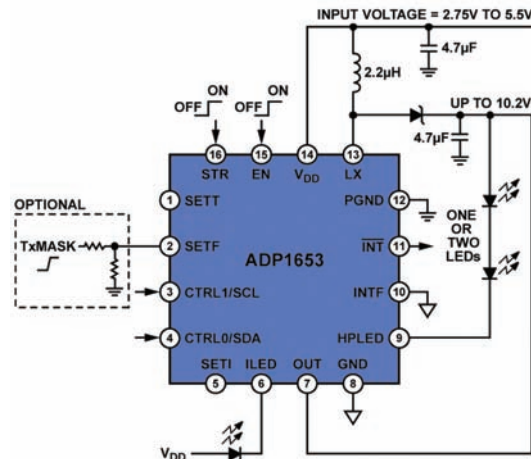
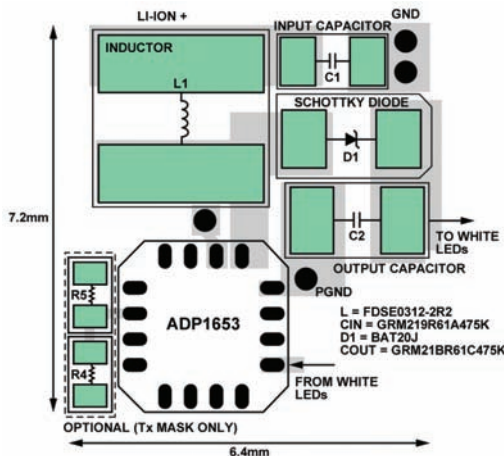
- Mobile handsets
- Set-top boxes
- Telecommunications and networking systems
- DDR terminations
- Hard disk drives

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities	Interface	Markets
ADP1610	Step-up, SEPIC	-	3	-	Series	2.5-5.5	Adj. 1.23-12/20	300-1,000	-	None	-	CL FL BL
ADP1612		-	5	1	Series	1.8-6	1.3-20	300-1,000	95	None	-	CL FL BL
ADP1621	Step-up, flyback, SEPIC	-	20	-	Series	3-5.5	Adj. 1.215-80	10,000	-	None	-	FL BL
ADP1821	Step-down w/margining and tracking, flyback	-	15	-	Series	1-24	Adj. 0.6-60	25,000	-	None	-	CL FL TR BL
ADP1822	Step-down, flyback	-	15	-	Series	1-24	Adj. 0.6-60	25,000	-	None	-	CL FL TR BL
ADP1829	Dual step-down, flyback	-	15/15	-	Series	1-24	Adj. 0.6-60	25,000	-	None	-	FL TR BL
ADP1864	Step-down, invert, flyback	-	15	-	Series	3.15-14	Adj. 0.6-60	10,000	-	None	-	FL TR BL
ADP2102	Step-down	-	1	-	Series	2.7-5.5	Adj. 0.8-3.3	600	-	None	-	FL BL
ADP2105/ADP2106/ADP2107		-	1	-	Series	2.7-5.5	Adj. 0.8-V _{IN}	2,000	-	None	-	CL FL BL
ADP1828	Step-down, flyback	-	15	-	Series	1-24	Adj. 0.6-60	25,000	-	None	-	FL BL
ADP1653	Step-up	Digital	2	-	Series	2.7-5.5	10.5	500	92	None	I ² C or 2-bit logic	FL

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SD SIGNAGE



Flash LED Driver, LED, and Backlighting LED Drivers

The ADP1653 is an ultra-compact, high efficiency, 12V boost converter from Analog Devices, specifically designed and optimized for use in cellular camera phones and digital still cameras. The ADP1653 solution consumes a mere 7.2 mm x 6.4 mm of board space while still offering high-efficiency Flash circuitry that can drive one string of high-brightness LEDs up to 500 mA, as well as a separate indicator LED at lower currents up to 17 mA.

Analog Devices offers LED drivers for automotive and LCD backlighting applications. Products like the AD8240, designed for automotive applications, both drive and monitor the LED assembly. End users are demanding bigger, brighter, and thinner displays. The ADM8845 and ADM8843 charge-pump-based backlight drivers are designed for driving up to six and four white LEDs in parallel, respectively, while ensuring uniform brightness of a backlit LCD display. By individually monitoring each LED current, excellent matching performance is achieved. The ADM8845 is also designed to maximize power efficiency by switching automatically between three charge pump modes based on the input voltage. For applications with severe height restrictions, the ADM8843 offers an ultra-thin package height of 0.5 mm.



Features ▶

- Small 45 mm² total solution size
- 92 percent efficiency
- 90 lumens of brightness
- Tx masking with 50 μs
- 2.2 μH power inductor
- 500 mA Flash current

Benefits ▶

- Reduces bill of materials
- Extends battery life
- Improves picture quality
- Enables smaller form factors

Applications ▶

- Digital still cameras
- Camera phones
- Portable video recorders

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
AD8240	-	PMW	Variable	-	Serial/parallel	9-27	12	Adjustable	-	Yes	Analog	CL TR BL
ADM8843	-	PMW	4 WLED	-	Parallel	2.6-5.5	2X mode	30	88	TSD/SCP	Pin controlled	FL BL
ADM8845	-	PMW	6 WLED	-	Parallel	2.6-5.5	X mode	30	88	TSD/SCP	Pin controlled	FL BL
ADP5520	Inductive boost	Current modulation	6	1	Serial	2.7-5.5	26	30	85	Yes	I ² C	BL

MARKETS LEGEND CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Diagnostic capabilities: TSD: Thermal shutdown, SCP: Short circuit protection

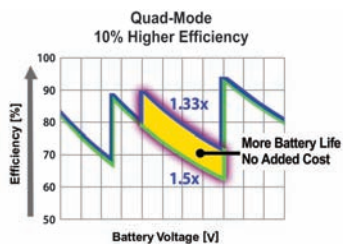




Quad-Mode® Ultra-Small, High-Efficiency Fractional Charge Pump LED Drivers

Catalyst's Quad-Mode® adaptive fractional charge pumps take LED driver performance to a new level by offering a 10 percent efficiency improvement and up to 65 percent smaller packaging, without the need for an additional capacitor and with no price premium*.

Catalyst Semiconductor's innovative, patented Quad-Mode charge pump architecture delivers the high efficiency levels normally associated with inductor-based LED drivers, while eliminating the associated high-profile inductors and unwanted EMI. Most charge pump LED drivers offer three modes of operation corresponding to the ratio of the output voltage to the input voltage: 1x, 1.5x, and 2x. The Quad-Mode architecture adds a fourth mode of operation, 1.33x, without the need for the additional capacitor required by all existing four-mode charge pumps. The 1.33x fractional operating mode also reduces the input switching currents seen at the battery, minimizing the overall supply noise.



Features ▶

- 10% higher efficiency*
- Very small package (up to 65% smaller)*
- No additional capacitors
- No added cost*
- No inductor

Benefits ▶

- Longer battery life
- Dramatic reduction in board space
- Reduced pin count

Applications ▶

- LCD display backlights
- Color RGB LEDs
- Handheld devices
- GPS systems
- Thermostat controllers

Product Specifications ▶												
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities**	Interface	Markets
CAT32	Boost	PWM	4	1	Series	2V-7V	20V	20	83	-	-	BL
CAT37		PWM	4	1	Series	2.5V-7V	20V	20	83	-	-	BL
CAT4134		PWM	3	2	Series	2.8V-4.2V	16V	500	85	TSD/OVM/LOD	-	CL FL BL
CAT4137		PWM	5	1	Series	2.2V-5.5V	24V	30	87	TSD/OVM/LOD	-	FL BL
CAT4139		PWM	5	1	Series	2V-5.5V	22V	200	87	TSD/OVM/LOD	-	BL
CAT4237		PWM	8	1	Series	2.8V-5.5V	30V	40	87	TSD/OVM/LOD	-	FL BL
CAT4238		PWM	10	1	Series	2V-5.5V	38V	40	87	TSD/OVM/LOD	-	FL BL
CAT4240		PWM	10+	1	Series/parallel	2V-5.5V	38V	200	87	TSD/OVM/LOD	-	CL FL BL SI
CAT3603	Charge pump	PWM	1	3	Parallel	3V-5.5V	7V	90	91	TSD/OVM	-	BL
CAT3604		PWM	1	4	Parallel	3V-5.5V	7V	120	93	TSD/OVM	Parallel/binary	BL
CAT3606		PWM	1	6	Parallel	3V-5.5V	7V	150	90	TSD/OVM	Parallel/individual control	BL
CAT3612		Programmable	1	2	Parallel	3V-5.5V	7V	300	90	TSD/OVM	Serial	FL BL
CAT3614		Programmable	1	4	Parallel	3V-5.5V	6V	124	91	TSD/OVM	Serial	BL
CAT3616		Programmable	1	6	Parallel	3V-5.5V	6V	150	91	TSD/OVM	Serial	BL
CAT3626		FC	1	6	Parallel	3V-5.5V	7V	192	91	TSD/OVM	Serial/FC	BL
CAT3604V Quad-Mode®		PWM	1	4	Parallel	2.5V-5.5V	6V	100	92	TSD/OVM	Serial	BL
CAT3636 Quad-Mode		Programmable	1	6	Parallel	2.5V-5.5V	7V	192	92	TSD/OVM	Serial	BL
CAT3637 Quad-Mode		Programmable	1	6	Parallel	2.5V-5.5V	7V	180	92	TSD/OVM	Serial	BL
CAT3643 Quad-Mode		Programmable	1	3	Parallel	2.5V-5.5V	7V	90	92	TSD/OVM	Serial	BL
CAT3644 Quad-Mode		Programmable	1	4	Parallel	2.5V-5.5V	7V	120	92	TSD/OVM	Serial	BL
CAT3647 Quad-Mode		Programmable	1	3	Parallel	2.5V-5.5V	7V	90	92	TSD/OVM	Serial	BL
CAT3648 Quad-Mode		Programmable	1	4	Parallel	2.5V-5.5V	7V	120	92	TSD/OVM	Serial	BL

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Compared to three-mode charge pumps

**Diagnostic capabilities: TSD: Thermal shutdown, OVM: Output voltage monitoring, LOD: LED open detection

Step-Down LED Drivers

Catalyst offers step-down, inductor-based LED drivers, as well as linear-based, constant-current Low Dropout (LDD™) LED drivers. Step-down LED drivers are available in both inductor-based, DC-to-DC converter, and inductor-less, linear architectures. Inductor-based LED drivers are inherently higher efficiency. Alternatively, linear LED drivers are inherently noise-free. Catalyst offers both architectures—including the CAT4201 inductor-based buck LED driver and the CAT4101 linear, LDD driver—giving designers the ability to select the optimal solution for their specific application.

The award-winning CAT4201 buck converter is optimized for driving high-brightness, 1W LEDs at up to 94 percent efficiency. Designed with Catalyst's patented switching control architecture, the CAT4201 reduces system complexity and improves efficiency by providing better inductor control and eliminating the need for a dedicated heat sink. For even higher-power LED lighting applications where low noise is a key issue, the CAT4101 constant-current sink LDD drives strings of up to 10 LEDs at 1A.

Features ▶

CAT4201

- 1W buck LED driver
- High efficiency
- Input voltage to 24V
- TSOT-23 package

CAT4101

- 3W linear LED driver
- TO-263 package

Benefits ▶

CAT4201

- Longer battery life
- Small and cost effective

CAT4101

- No noise
- No inductor

Applications ▶

- Architectural
- Landscape
- Automotive
- General lighting



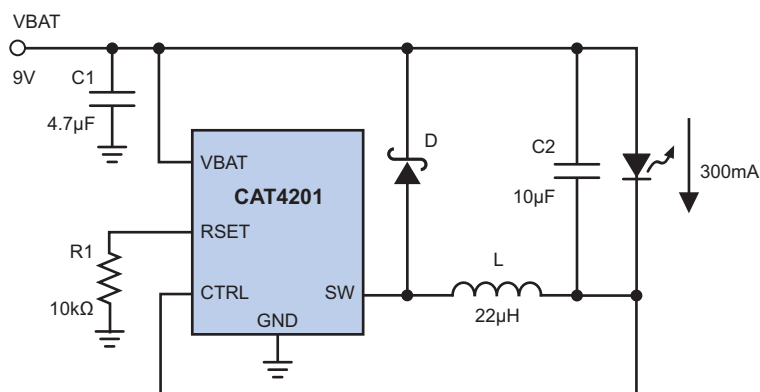
Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
CAT4201	Buck	PWM	1-5	1	Series	7.0V-36.0V	32V	350	86	TSD	-	CL TR SI
CAT4101	Linear	PWM	10	1	Series	3.0V-5.5V	25V	1,000	-	TSD	-	CL FL
CAT310		PWM	1	10	Parallel	2.0V-40.0V	17V	500	-	OVM	Serial	TR
CAT4004	Low Dropout Driver (LDD™)	Programmable	1	4	Parallel	2.4V-5.5V	6V	160	-	TSD	Serial	BL
CAT4008		Programmable	1	8	Parallel	3.0V-5.5V	7V	800	-	TSD	Serial	SI
CAT4016		Programmable	1	16	Parallel	3.0V-5.5V	7V	1,600	-	TSD	Serial	SI

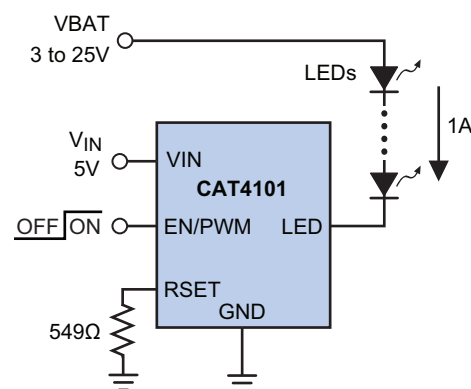
MARKETS LEGEND

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*Diagnostic capabilities: TSD: Thermal shutdown, OVM: Output voltage monitoring



1W step-down, inductor-based LED driver for multivolt (6V to 24V) systems



3W constant-current, Low Dropout Driver (LDD™) for noise-sensitive, high-power LED lighting applications



Low-Voltage Controller and Integrated Switch Products

The Zetex family of low-voltage controller and integrated switch products from Diodes Incorporated enable high accuracy, compact solutions across a wide range of applications. Housed in the tiny and thermally efficient DFN package, the ZXLD132x series supports highly optimized solutions for the latest 1.5A LEDs, whereas the ZXLD381/ZXLD383 provide the simplest, single 50 mA LED drivers, including direct connection to solar panels. The controllers offer a flexible and scalable alternative approach.



ZXLD1320EV1 evaluation board— a buck LED driver easily configured to drive up to four external LEDs at 1A or 1.5A, housed in the 3 mm x 4 mm TDFN1443 package.

Features ▶

- Tiny DFN14, SOT23, and SOT23-5 packages
- High- and low-sided current sensing
- Ultra-low operating voltage from 0.8V to 20V
- Single-pin on/off and brightness control using DC voltage or PWM
- High efficiency (up to 85%)

Benefits ▶

- Minimum solution size
- Enhanced accuracy and noise immunity
- Ideally matched with today's high-brightness LEDs
- Flexible dimming options
- Minimizes solution energy costs

Applications ▶

- High-power LED flashlights and other portable illumination
- Low-voltage halogen lamp replacement LEDs
- LED back-up and emergency lighting
- Illuminated signs
- Automotive lighting

Product Specifications ▶

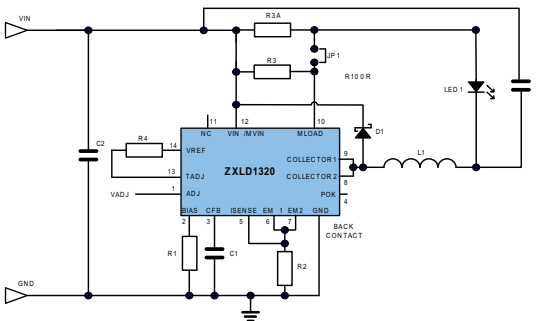
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities**	Interface	Markets
ZXLD1320	Buck	PWM/analog	4	1	Series	4.0-18.0	18	1,500	85	TSD/POK	Analog/PWM	CL FL TR SI
ZXLD1321	Boost	PWM/analog	5	1	Series	1.2-12.0	18	1,000	85	TSD/TM	Analog/PWM	CL FL BL SI
ZXLD381		Input voltage	4	1	Series	0.9-2.2	V _{IN} to 20	76	85	None	None	FL BL
ZXLD383*		Input voltage	2	1	Series	0.9-3.3	V _{IN} to 20	65	85	None	Solar panel	CL FL
ZXSC400		PWM/analog	Flexible	1	Series	1.8-8.0	V _{IN} to 30	100	80	None	Analog/PWM	FL BL SI
ZXLD1322	Buck/boost	PWM/analog	3	1	Series	2.5-15.0	18	700	80	TSD/TM	Analog/PWM	CL FL BL SI
ZXSC310		PWM/analog	Flexible	1	Series	0.8-8.0	V _{IN} to 20	100	85	None	PWM	FL BL SI

MARKETS LEGEND

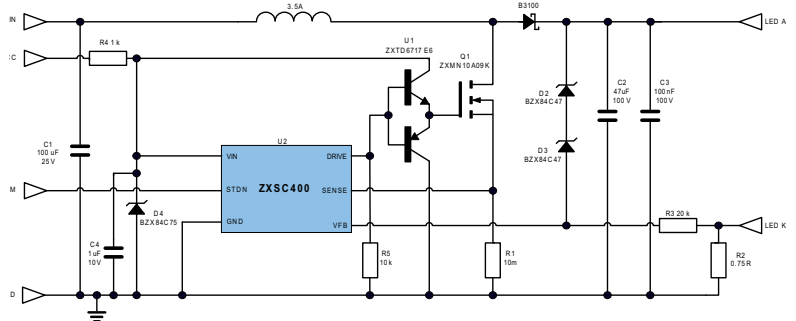
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*Preliminary information—expected Q3 2008

**TSD: Thermal shutdown, POK: Power OK pin, TM: Thermal management



The ZXLD1320 is a 4V to 20V, 1.5A LED current continuous mode LED driver. The thermally enhanced package and topology can be configured to optimize LED driving.



The ZXSC400 is flexible, low-voltage controller that can be used to drive single 50 mA type LEDs to large strings of latest generation power LEDs.

Evaluation Board Information

Board Order Code	LED Board Description
ZXLD1320EV1	ZXLD1320 with output for off-board LEDs
ZXLD1321EV1	ZXLD1321 with output for off-board LEDs
ZXLD1322EV1	ZXLD1322 with output for off-board LEDs
ZXLD381EV1	ZXLD381 with output for off-board LEDs
ZXLD383EV1	ZXLD383 with white 50 mA on-board LED
ZXSC310EV(1)	ZXSC310 LED driver for LCD backlight
ZXSC400EV2	ZXSC400 LED string driver; 25W at 350 mA LED current; terminal output for off-board LEDs

Design Support Tools

Item	Description
Lighting design handbook (DN81)	Contains design ideas and application notes with test results and bill of materials for a wide range of applications.
Calculators	Designed to quickly try out a range of LED configurations that simplify calculations when designing with Zetex LED drivers.
Circuit simulator	Enables you to draw a circuit that can be tested in simulation prior to prototyping, and to determine the best components for your application.

To access these design tools, visit lighting.arrow.com/designtools



Medium-Voltage Integrated Switches

The Zetex ZXLD135xx and ZXLD136x ranges of medium-voltage, integrated switch LED drivers from Diodes Incorporated support voltages from 6V to 60V and achieve up to 95 percent efficiency. With up to 1 MHz operating frequencies, they can drive 15 high power LEDs at up to 1A. Simple to use and requiring just four external components, output currents can be adjusted with dimming ratios of 1000:1. Available in the tiny TSOT23-5 and DFN6 packages, they are ideal for space starved applications.



ZXLD1362EV3 evaluation board— a hysteretic buck LED driver in TSOT23-5, configured to drive a single onboard LED with thermal control or up to 15 external 3W LEDs.

Features ▶

- Inherently stable hysteretic topology
- Internal switch (30V/60V)
- Up to 1A output current (high-sided current sense)
- Single-pin on/off and brightness control using DC voltage or PWM
- High efficiency (up to 95%)
- Simple, low parts count

Benefits ▶

- Operates over a wide range of voltage and LED combinations
- Lowest total solution cost
- Ideally matched with today's high-brightness LEDs
- Flexible dimming options
- Minimizes solution energy costs
- Reduces development time

Applications ▶

- Low-voltage halogen lamp replacement LEDs
- Automotive lighting
- Low-voltage industrial and retail lighting
- LCD TV back-lighting
- Illuminated signs

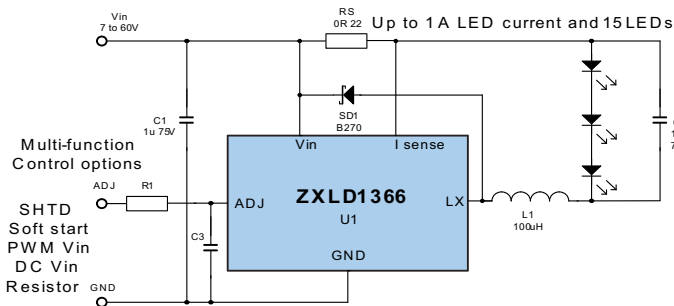
Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities	Interface	Markets
ZXLD1350	Buck/hysteretic	PWM/DC/resistive	8	1	Series	7-30	30	350	95	None	PWM/analog	CL TR BL SI
ZXLD1352*		PWM/DC/resistive	8	1	Series	7-30	30	350	95	None	PWM/analog	CL TR BL SI
ZXLD1356*		PWM/DC/resistive	15	1	Series	6-60	60	550	95	None	PWM/analog	CL TR BL SI
ZXLD1360		PWM/DC/resistive	7	1	Series	7-30	30	1,000	95	None	PWM/analog	CL TR BL SI
ZXLD1362		PWM/DC/resistive	15	1	Series	6-60	60	1,000	95	None	PWM/analog	CL TR BL SI
ZXLD1366*		PWM/DC/resistive	15	1	Series	6-60	60	1,000	95	None	PWM/analog	CL TR BL SI

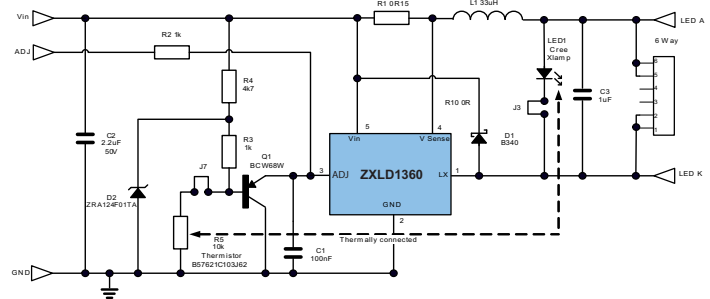
MARKETS LEGEND

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*Preliminary information—expected Q3 2008



The ZXLD1366 is a 1A, 60V hysteretic buck LED regulator with enhanced current control, thermal packaging, and fast PWM dimming capability.



The ZXLD1360 is a 1A, 30V hysteretic buck LED regulator that provides a simple, easy-to-use LED driver over a wide range of series 3W-LED combinations.

Evaluation Board Information

Board Order Code	LED Board Description
ZXLD1350EV3	ZXLD1350 with on-board LEDs
ZXLD1352EV1	ZXLD1352 with outputs for off-board LEDs
ZXLD1356EV1	ZXLD1356 with outputs for off-board LEDs
ZXLD1360EV8	ZXLD1360 with on-board LED and terminal outputs
ZXLD1362EV3	ZXLD1362 with aluminium PCB and outputs for off-board LEDs
ZXLD1366EV1	ZXLD1366 with outputs for off-board LEDs

Design Support Tools

Item	Description
Lighting design handbook (DN81)	Contains design ideas and application notes with test results and bill of materials for a wide range of applications.
Calculators	Designed to quickly try out a range of LED configurations that simplify calculations when designing with Zetex LED drivers.
Circuit simulator	Enables you to draw a circuit that can be tested in simulation prior to prototyping, and to determine the best components for your application.

To access these design tools, visit lighting.arrow.com/designtools



Linear-Mode LED Drivers

Infineon Technologies' linear-mode LED driver family, BCR401, BCR402, BCR405, and newly introduced BCR450, provides efficient, low-cost constant-current solutions for LED strings from 10 mA to 700 mA. Our constant-current drivers keep light emission consistent over power supply and temperature variations, eliminate the effect of V_F variation, and help prevent thermal runaway in applications. We also offer low forward voltage Schottky diodes, including single-package reverse polarity protection diode arrays (RPP).



Ultra small 2 mm x 2.1 mm SOT343 package

Features

- Constant current adjustable from 10 mA to 60 mA, up to 500 mW power dissipation
- Current range may be extended up to 700 mA with addition of external "boost" transistor (e.g., BCX68-25)
- Selection of 18V or 40V maximum rating across driver
- On/off feature enables PWM/FM modulation
- LED-circuit protection due to negative-temperature coefficient (NTC)

Benefits

- Efficient active current regulation, accuracy of I_{OUT} at $\pm 1\%/V$ voltage variation
- Maintains consistent light emission across LED strings independent of V_F , power supply, and temperature variation
- Enables using more LEDs in one branch due to low voltage drop compared to resistor biasing schemes
- Eliminates problem of stocking multiple-bias resistor values to match incoming LED V_F bins

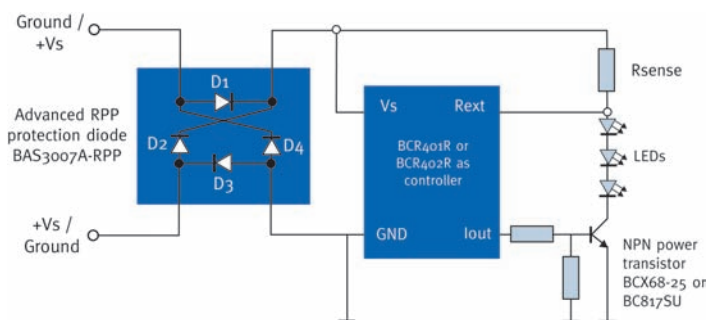
Applications

- Channel lighting
- Advertising signage
- Home/office lighting (recess lamps, pendant lamps, etc.)
- Rope lighting/neon replacement
- Automotive (e.g., center high-mounted stop light "CHMSL")

Product Specifications												
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities	Interface	Markets
BCR401R/BCR402R	Single-output channel	PWM/FM capable on/off input	At 12V supply voltage four red or two blue LEDs	1	Series	Max. 18 across device	Linear w/ low-voltage drop	Adjustable 10-60	-	-	Discrete interface	CL TR SI
BCR401W/BCR402W		PWM/FM capable on/off input	At 12V supply voltage four red or two blue LEDs	1	Series	Max. 18 across device	Linear w/ low-voltage drop	Adjustable 10-60	-	-	Discrete interface	CL TR SI
BCR401U/BCR402U/BCR405U		PWM/FM capable on/off input	At 12V supply voltage four red or two blue LEDs	1	Series	Max. 40 across device	Linear w/ low-voltage drop	Adjustable 10-65	-	-	Discrete interface	CL TR SI
BCR450		PWM/FM capable on/off input	At 12V supply voltage four red or two blue LEDs	1	Series	Max. 27 across device	Linear w/ low-voltage drop	Adjustable 0-85	-	-	Discrete interface	CL TR SI
BCR401R + BCX68-25		PWM/FM capable on/off input	At 12V supply voltage four red or two blue LEDs	1	Series	Max. 18 across device	Linear w/ low-voltage drop	Adjustable 65-700	-	-	Discrete interface	CL TR SI
BCR450 + BCX68-25		PWM/FM capable on/off input	At 12V supply voltage four red or two blue LEDs	1	Series	Max. 27 across device	Linear w/ low-voltage drop	Adjustable 65-1,000	-	-	Discrete interface	CL TR SI

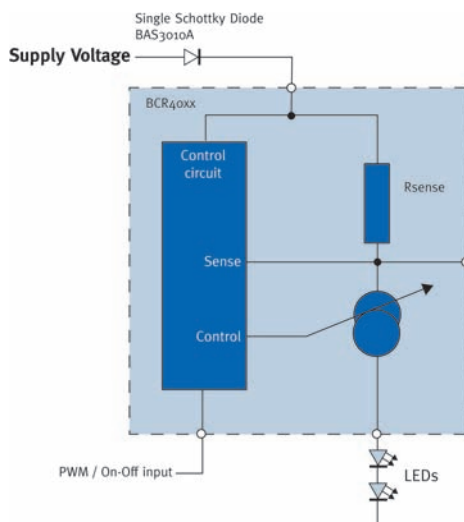
MARKETS LEGEND

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60 mA to 700 mA range LED driver with booster transistor and reverse polarity protection

*BAS3007A: If max.=700 mA, $V_F=0.38V$ (typ.) for each diode, V_{REV} max.=30V



10 mA to 65 mA range stand alone LED driver with reverse polarity protection

*BAS3010A: If max.=1A, $V_F=0.38V$ (typ.), V_{REV} max.=30V

Linear Constant-Current LED Drivers

To address the increasing growth of LED usage in the automotive market, Infineon offers power supplies specifically developed for these applications.

Infineon products are designed to supply constant current to white or color LEDs up to 500 mA, independently from supply voltage or LED forward voltage class. This provides appropriate operating conditions to the connected LEDs, enabling constant brightness and ensuring extended LED lifetime.

Products with adjustable output current and PWM input enable flexible use of LEDs in applications that require brightness regulation avoiding color shift. Diagnostic capability is also offered with the open load detection feature.

Infineon LED drivers are outstanding solutions that benefit from the advantages of LEDs providing full protection to lighting applications in automotive. Connected LEDs are fully protected from short circuit, overheating, reverse polarity transients, and input voltages up to 45V.

Features ▶

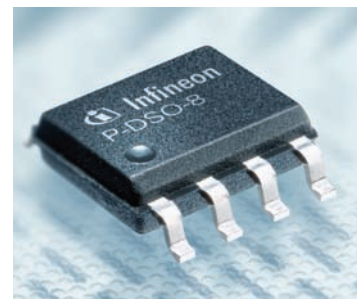
- Adjustable constant-output current
- Wide input voltage range
- Over-temperature protection
- Open load detection
- Wide temperature range: -40°C to +150°C

Benefits ▶

- Efficient active current regulation, accuracy of I_{OUT} at $\pm 1\%/V$ voltage variation
- Maintains consistent light emission across LED strings independent of V_F , power supply and temperature variation
- Enables use of more LEDs in one branch due to low-voltage drop compared to resistor biasing schemes
- Eliminates problem of stocking multiple-bias resistor values to match incoming LED V_F bins

Applications ▶

- Emergency lighting
- Traffic lighting
- Architectural or concert lighting
- Automotive (interior and exterior) lighting
- Display backlighting (e.g., LCD)



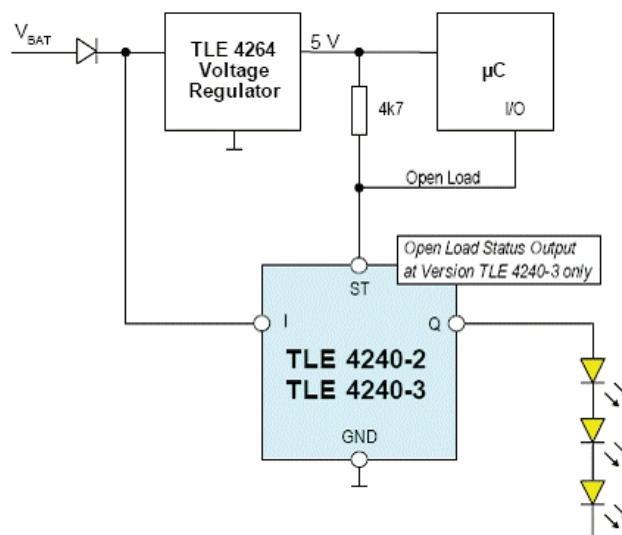
P-DSO-8, 5 mm x 6 mm

Product Specifications ▶												
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
TLE4241	Linear	PWM	10	1	Single	Up to 45	40	70	-	TSD/TEF/OVM/LOD	PWM	CL FL TR BL SI
TLE4242		PWM	10	1	Single	Up to 45	40	500	-	TSD/TEF/OVM/LOD	PWM	CL FL TR BL SI
TLE4309		PWM	10	1	Single	Up to 45	40	500	-	TSD/OVM	PWM	CL FL TR BL SI
TLE4240-2M/3M		PWM	10	1	Single	Up to 45	6	58	-	TSD/TEF/OVM/LOD	PWM	CL FL TR BL SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

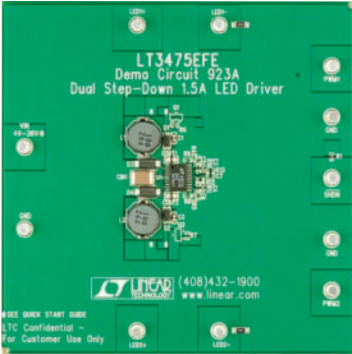
*Diagnostic capabilities: TSD: Thermal shutdown, TEF: Thermal error flag, OVM: Output voltage monitoring, LOD: LED open detection





High-Power (350 mA to 10A) LED Drivers—Buck

High current, inductor-based, step-down switching LED drivers provide tiny, efficient high power LED lighting solutions for automotive, architectural, and display backlighting. Key features include wide-ranging True Color PWM™ dimming, wide input voltage range, high-side sensing, and high-switching frequency.



Features ▶

- LT3475**
- True Color PWM™ delivers constant color with 3000:1 dimming range
 - Wide input range: 4V to 36V operating, 40V maximum
 - Accurate and adjustable control of LED current from 50 mA to 1.5A
 - High-side current sense allows grounded cathode LED operation
 - Accurate and adjustable 200 kHz to 2 MHz
 - Available in a compact 20-lead TSSOP thermally enhanced surface-mount package

Benefits ▶

- Enables wide dimming range
- Ideal for automotive and industrial applications
- Easy dimming
- Enables one-wire LED connector
- Keeps externals tiny
- Compact solution footprint

Applications ▶

- Automotive and avionic lighting
- Architectural detail lighting
- Display backlighting
- Constant-current sources

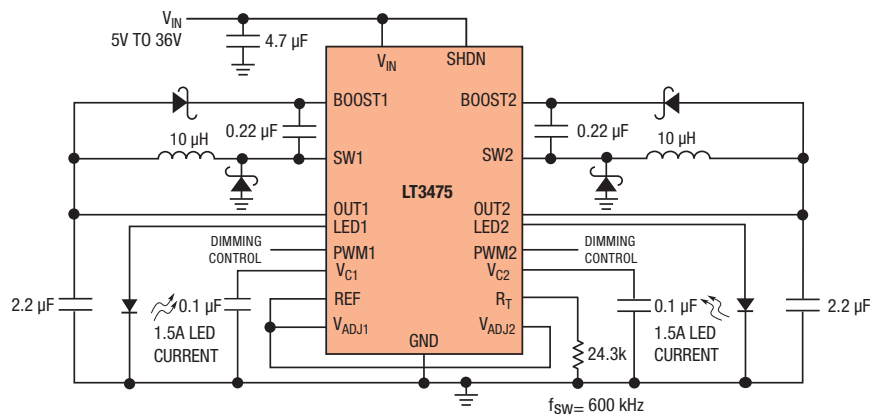
Product Specifications ▶												
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)**	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LT*3474	Buck LED driver	400:1 PWM	3 x 500 mA	1	Series (3 max.)	4-36	15	1	87	TSD/OVM	PWM	CL TR BL
LT3517	Buck/boost/buck-boost	5000:1 PWM	10 x 100 mA	1	Series	3-30 (40 max.)	45	1A	92	TSD/OVM	PWM	CL FL TR BL SI
LT1618	Buck/boost/buck-boost LED driver	DC/PWM	2 x 350 mA	1	Series (2 max.)	1.6-18	30	1.5	87	TSD/OVM	PWM	CL TR
LT3477	SEPIC/buck/boost/buck-boost/flyback/inverter	DC/PWM	5 x 1A	1	Parallel/series	2.5-5	Depends upon configuration	3	91	TSD/OVM	PWM	CL TR
LT3478/-1	Buck/boost/buck-boost	3000:1 PWM	8 x 1.5A	1	1 series string (8 max.)	2.7-36	40	4.5	92	TSD/OVM	PWM	CL TR
LT3518		5000:1 PWM	10 x 200 mA	1	Series	3-30 (40 max.)	45	1A	92	TSD/OVM	PWM	CL FL TR BL SI
LT3475	Dual-buck LED driver	3000:1 PWM	3 x 1.5A	2	2 x multiple series string (3 max.)	4-36	15	2 x 1.5	88	TSD/OVM	PWM	CL TR BL
LT3476	Quad buck/boost/buck-boost LED driver	1000:1 PWM	5 x 1A	4	4 x multiple series string (8 max.)	2.8-6	Depends upon configuration	4 x 1.5	96	TSD/OVM	PWM	CL TR BL
LTC*3783	SEPIC/buck/boost/buck-boost/flyback/inverter	3000:1 PWM, 10:1 analog	4 x 12 x 1A	1	Series/parallel	3-36+	Limited by ext. FET	<10	97	TSD/OVM	PWM	CL TR
LT3755	Buck/buck-boost/boost controller	3000:1 PWM	14 x 1A	1	Series	4.5-40	Ext. FET	Ext. FET	92	TSD/OVM	PWM	CL FL TR BL SI
LT3756	Buck/buck-boost/boost controller	3000:1 PWM	14 x 1A	1	Series	6-100	Ext. FET	Ext. FET	92	TSD/OVM	PWM	CL FL TR BL SI

MARKETS LEGEND CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Diagnostic capabilities: TSD: Thermal shutdown, OVM: Output voltage monitoring

**Switch current

LT3475 Dual Step-down 1.5A LED Driver



High-Power (350 mA to 10A) LED Drivers—Boost

High current, inductor-based, step-up switching LED drivers provide compact, efficient, LED lighting solutions for notebook computer displays, cell phone camera lighting, automotive dashboard lighting, and avionics displays. Key features include high current, high-voltage switches, wide-ranging True Color PWM™ dimming, wide input voltage range, and high switching frequency.



Features ▶

LT3478-1

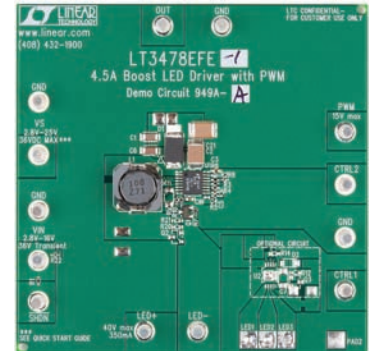
- True Color PWM™ delivers constant LED color with up to 3000:1 range
- Wide input range: 2.8V to 36V; ideal for industrial applications
- 4.5A, 42V internal switch
- Drives LEDs in boost, buck-boost, or buck modes
- Integrated resistors for inductor and LED current sensing
- Program LED current de-rating vs. temperature
- Fixed-frequency operation from 200 kHz to 2.25 MHz
- 16-pin thermally enhanced TSSOP package with compact solution footprint

Benefits ▶

- Can drive 6 x 700 mA LEDs in boost configuration
- No need for external sense resistor
- Enhances reliability
- Keeps externals tiny
- Compact solution footprint

Applications ▶

- High-power LED driver
- DSL modems
- Distributed power
- CVCC source
- Input/output current-limited boost, SEPIC, inverting, flyback converters
- Ideal for automotive and industrial applications



Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)**†	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LTC3490††	Sync boost LED driver	DC/PWM	1 x 350 mA	1	Single LED	1-3.2	4	$I_{LED}=350$ mA	90	TSD/OVM	PWM	FL
LT3517	Buck/boost/buck-boost	5000:1 PWM	10 x 100 mA	1	Series	3-30 (40 max.)	45	1A	92	TSD/OVM	PWM	CL FL TR BL SI
LT3486	Dual LED driver	1000:1 PWM	7 x 350 mA	2	Dual parallel strings	2.7-24	35	2 x 1.3	85	TSD/OVM	PWM	CL FL TR BL SI
LT1618	Buck/boost/buck-boost LED driver	DC/PWM	7 x 350 mA	1	Parallel or series strings	1.6-18	36	1.5	80	TSD/OVM	PWM	CL FL TR BL SI
LT3479	Buck LED driver	DC/PWM	6 x 1A	1	Series strings	2.5-24	40	3	89	TSD/OVM	PWM	CL FL TR BL SI
LT3477	SEPIC/buck/boost/buck-boost/flyback/inverter	DC/PWM	6 x 1A	1	Series	2.5-25	40	3	92	TSD/OVM	PWM	CL TR
LT3478/-1	Boost LED driver	3000:1 PWM	6 x 700 mA	1	Series strings	2.7-36	40	4.5	91	TSD/OVM	PWM	CL TR
LT3518	Buck/boost/buck-boost	5000:1 PWM	10 x 200 mA	1	Series	3-30 (40 max.)	45	1A	92	TSD/OVM	PWM	CL FL TR BL SI
LT3476	Quad buck/boost/buck-boost LED driver	1000:1 PWM	8 x 350 mA	4	4 x multiple series string	2.8-16	36	4 x 1.5	83	TSD/OVM	PWM	CL FL TR BL SI
LTC3783	SEPIC/buck/boost/buck-boost/flyback/inverter	3000:1 PWM 10:1 analog	12 x 3 x 1A	1	Series/parallel	3-36+	Limited by ext. FET	Ext. FET	95	TSD/OVM	PWM	CL TR
LT3755	Buck/buck-boost/boost controller	3000:1 PWM	14 x 1A	1	Series	4.5-40	Ext. FET	Ext. FET	92	TSD/OVM	PWM	CL FL TR BL SI
LT3756	Buck/buck-boost/boost controller	3000:1 PWM	14 x 1A	1	Series	6-100	Ext. FET	Ext. FET	92	TSD/OVM	PWM	CL FL TR BL SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

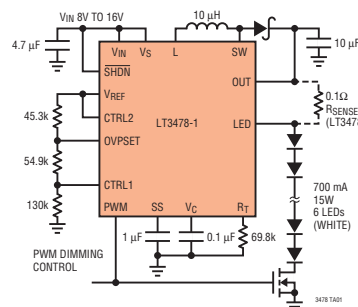
*Diagnostic capabilities: TSD: Thermal shutdown, OVM: Output voltage monitoring

** $I_{OUT} \sim 0.65 I_{SW} \times (V_{IN} / V_{OUT})$ —estimate may vary depending on external component selection

†Switch current

††Max. $V_{IN}=3.2$ V

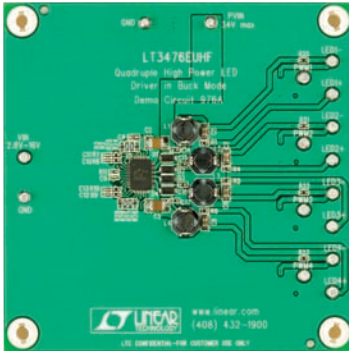
LT3478-1—Automotive TFT LCD Backlight





High-Power (350 mA to 10A) LED Drivers— Buck-Boost

High current inductor-based buck-boost switching LED drivers provide flexible, tiny, efficient solutions for DSL modem, CVCC, and distributed power applications. Key features include high current, high-voltage switches, adjustable LED currents, wide input voltage range, and high switching frequency.



Features ▶

LT3476

- True Color PWM™ delivers up to 1000:1 dimming ratio
- LED current regulation with high-side sense
- V_{ADJ} pin accurately sets LED current sense threshold over range 10 mV to 120 mV
- Four independent driver channels with 1.5A, 36V internal NPN switches
- Frequently adjust pin: 200 kHz to 2 MHz
- High efficiency conversion: up to 96%
- Wide V_{IN} range: 2.8V to 16V; ideal for industrial applications
- Thermally enhanced, 38-lead, 5 mm x 7 mm QFN package with compact solution footprint

Benefits ▶

- Enables one-wire connection of LEDs
- Easy dimming
- Compact solution for 4-channel applications
- Keeps solution footprint tiny
- Reduces heat

Applications ▶

- RGB lighting
- Automotive and avionic lighting
- TFT LCD backlighting
- Constant-current sources
- Ideal for automotive and industrial applications

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA) [†]	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LT1618	Buck/boost/buck-boost	DC/PWM	1 x 350 mA	1	Series	1.6-18	35	1.5	78	TSD/OVM	PWM	CL TR
LTC3453**	Synchronous buck-boost LED driver	DC/PWM	1 x 500 mA	1	1 LED	2.7-5.5	4.5	1.1	90	TSD/OVM	PWM	CL FL TR BL SI
LTC3454**		DC/PWM	1 x 1A	1	1 LED	2.7-5.5	5.15	2.5	93	TSD/OVM	PWM	CL FL TR BL SI
LT3517	Buck/boost/buck-boost	5000:1 PWM	3 x 100 mA	1	Series	3-30 (40 max.)	45	1A	92	TSD/OVM	PWM	CL FL TR BL SI
LT3477	SEPIC/buck/boost/buck-boost/flyback/inverter	DC/PWM	5 x 350 mA	1	Series	2.5-25	40	3	78	TSD/OVM	PWM	CL TR
LT3518	Buck/boost/buck-boost	5000:1 PWM	3 x 200 mA	1	Series	3-30 (40 max.)	45	1A	92	TSD/OVM	PWM	CL FL TR BL SI
LT3478/-1	Buck/boost/buck-boost	3000:1 PWM	4 x 1A	1	Series	2.7-36	40	4.5	92	TSD/OVM	PWM	CL TR
LT3476	Quad buck/boost/buck-boost LED driver	1000:1 PWM	4 x 350 mA	4	4 x multiple series string	2.8-16	36	4 x 1.5	78	TSD/OVM	PWM	CL TR BL
LTC3783	SEPIC/buck/boost/buck-boost/flyback/inverter	3000:1 PWM, 10:1 analog	12 x 3 x 1A	1	Series/parallel	3-36	Limited by ext. FET	Ext. FET	93	TSD/OVM	PWM	CL TR
LT3755	Buck, buck-boost/boost controller	3000:1 PWM	6 x 1A	1	Series	4.5-40	Ext. FET	Ext. FET	92	TSD/OVM	PWM	CL FL TR BL SI
LT3756		3000:1 PWM	6 x 1A	1	Series	6-100	Ext. FET	Ext. FET	92	TSD/OVM	PWM	CL FL TR BL SI

MARKETS LEGEND

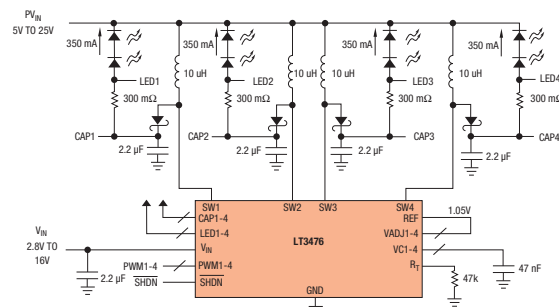
CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Diagnostic capabilities: TSD: Thermal shutdown, OVM: Output voltage monitoring

**Max. V_{IN} =6V

[†]Switch current

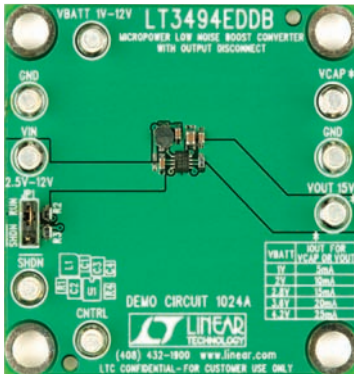
LT3476—High-Current Quad-Output LED Driver





High-Power Drivers for Organic LED (OLED) Bias

Linear Technology delivers highly integrated solutions for OLED bias applications. Key features include output disconnect, soft start, and integrated Schottky diodes. Their small circuit size and high efficiency make them ideal solutions for space-conscious, portable device applications such as cellular phones and media players.



Features ▶

- LT3494**
- Low-quiescent current
 - 65 μ A in active mode
 - 1 μ A in shutdown mode
 - Switching frequency is non-audible over entire load range; ideal for wireless and MP3 applications
 - Integrated power NPN:
 - 350 mA current limit (LT3494A)
 - 180 mA current limit (LT3494)
 - Integrated Schottky diode
 - Integrated output disconnect
 - Integrated output dimming
 - Wide input range: 2.3V to 16V; ideal for Li-Ion to 12V applications
 - Tiny 8-lead 2 mm x 3 mm solution footprint DFN package

Benefits ▶

- Maximizes battery-run time
- Ideal for OLED display
- Compact, highly-integrated OLED solution

Applications ▶

- Organic LED power supply
- Low-noise power
- MP3 players

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)**	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LTC3459	Synchronous boost	–	1	–	Single	1.5-5.5	10	60	89	TSD	–	CL FL TR BL SI
LT3464	Boost	–	1	–	Single	2.3-10	34	85	84	TSD	–	CL FL TR BL SI
LT3494/A		Pin adj.	1	–	Single	2.3-16	40	150/350	85	TSD	–	CL FL TR BL SI
LT3463	Boost and inverter	–	2	–	Dual	2.4-15	\pm 40	180/320	77	TSD	–	CL FL TR BL SI
LT3472		–	2	–	Dual	2.2-16	\pm 40	250/300	83	TSD	–	CL FL TR BL SI
LT1613	Boost	–	1	–	Single	0.9-10	34	550	89	TSD	–	CL FL TR BL SI
LT3495		Pin adj.	1	–	Single	2.3-16	40	650/350	85	TSD	–	CL FL TR BL SI
LT3487	Boost and inverter	–	2	–	Dual	2.3-16	\pm 28	750/900	77	TSD	–	CL FL TR BL SI
LT3473/A	Boost	–	1	–	Single	2.2-16	36	1.2A	77	TSD	–	CL FL TR BL SI
LT3467/A		–	1	–	Single	2.4-16	40	1.4A	90	TSD	–	CL FL TR BL SI
LT3471	Boost or inverter	–	2	–	Dual	2.4-16	\pm 40	2A/1.5A	86	TSD	–	CL FL TR BL SI
LTC3458/L	Synchronous boost	–	1	–	Single	1.5-6	7.5/6	1.4A/1.7A	96	TSD	–	CL FL TR BL SI

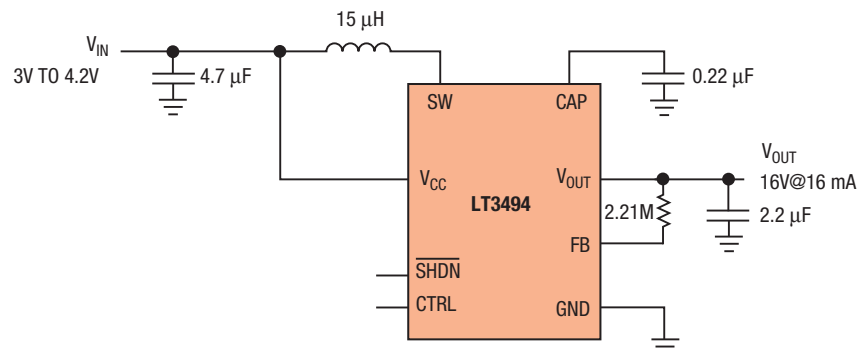
MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Diagnostic capabilities: TSD: Thermal shutdown

**Switch current

LT3494—Micropower Low-Noise Boost Converter with Output Disconnect



Low- to Medium-Power LED Drivers—Inductorless

The Linear Technology family of charge pump-based LED drivers includes a wide selection of simple and compact inductorless DC/DC converter designs. These step-up converters offer low ripple and can be used to boost an input voltage and drive LEDs. By eliminating the inductor, these switched-capacitor converters provide a small solution footprint and a simple design.



Features ▶

LTC3204-5/LTC3204B-5

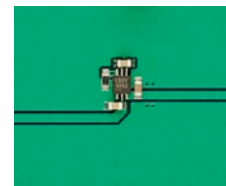
- 1.2 MHz constant frequency operation
- Constant frequency operation at all loads (LTC3204B only)
- Automatic Burst Mode™ operation (LTC3204 only)
- Built-in soft start
- Inductorless design
- Few external components (3)
- Tiny 6-lead (2 mm x 2 mm x 0.75 mm) DFN package

Benefits ▶

- Minimizes input and output ripple and switching noise
- Burst mode defeated—lower ripple at light loads; fixed-frequency operation at all loads (B version only)
- Low I_Q extends battery run time; higher efficiency with the tradeoff of higher ripple; variable frequency operation
- Reduces inrush current
- Minimizes footprint/externals
- Minimizes BOM and saves cost
- Compact, low-profile footprint

Applications ▶

- 2 AA cell to 3.3V conversion
- Li-Ion/Polymer cell to 5V conversion
- USB on-the-go devices
- White or blue LED drivers
- Handheld devices



Actual size complete solution

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LTC3200	Charge pump based LED driver	PWM	5+	1	Parallel	2.7-4.5	Adj. (1.268-5.4)	100	87	TSD	PWM	CL FL TR BL SI
LTC3200-5		PWM	5+	1	Parallel	2.7-4.5	5	100	87	TSD	PWM	CL FL TR BL SI
LTC3201		DAC	5+	1	Parallel	2.7-4.5	Adj. (3.19-4.6)	100	87	TSD	Parallel binary	CL FL TR BL SI
LTC3202		DAC	6+	1	Parallel	2.7-4.5	Adj. (3.3-4.0)	125	87	TSD	Parallel binary	CL FL TR BL SI
LTC3204-5**		PWM	6+	1	Parallel	2.7-5.5	5	150	93	TSD	PWM	CL FL TR BL SI
LTC3204B-5		PWM	6+	1	Parallel	2.7-5.5	5	150	93	TSD	PWM	CL FL TR BL SI
LTC3203B		PWM	6+	1	Parallel	2.7-5.5	Adj. (0.9-5.4)	500	90	TSD	PWM	CL FL TR BL SI
LTC3203-1**		PWM	6+	1	Parallel	2.7-5.5	4.5/5	500	90	TSD	PWM	CL FL TR BL SI
LTC3203B-1		PWM	6+	1	Parallel	2.7-5.5	4.5/5	500	90	TSD	PWM	CL FL TR BL SI

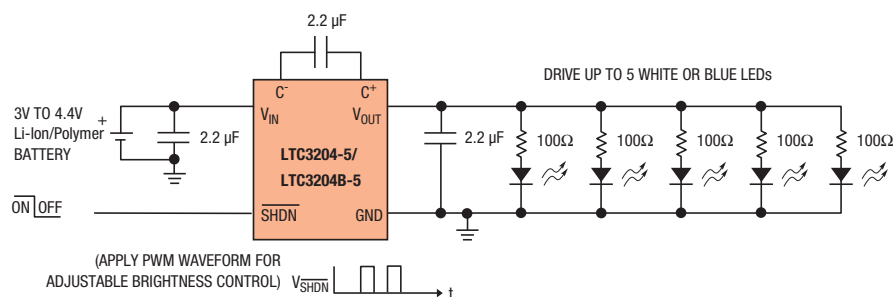
MARKETS LEGEND

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*Diagnostic capabilities: TSD: Thermal shutdown

**Burst mode operation

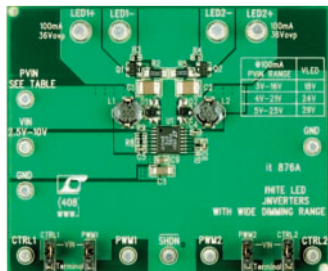
LTC3204-5/LTC3204B-5—Low Noise, Miniature Regulated Charge Pump Doubler in 2 mm x 2 mm DFN





Low-Power (20 mA to 100 mA) Multi-Display LED Drivers—Inductor Based

Multi-display inductor-based white LED drivers are capable of driving up to 20 white LEDs from a single-cell Li-Ion/Polymer input. Key features include high-voltage internal power switches, internal Schottky diodes, adjustable switching frequency, DC dimming control, open LED protection, and optimized internal compensation. They are ideal solutions for multipanel LCD backlight applications or space-constrained portable applications such as cellular phones, PDAs, and digital cameras.



Features ▶

LT3486

- Drives up to 16 white LEDs at 25 mA from a 3.6V supply
- Drives up to 16 white LEDs at 100 mA from a 12V supply
- True Color PWM™ dimming delivers constant color with 1000:1 dimming range
- Two independent step-up DC/DC converters with independent dimming and shutdown
- Wide input voltage range: 2.5V to 24V
- Programmable constant switching frequency: 200 kHz to 2 MHz
- Tiny 10-lead (5 mm x 3 mm x 0.75 mm) DFN-16 package or TSSOP-16E package

Benefits ▶

- Ideal for TFT-LCD screens up to 6" in handhelds
- Ideal for automotive displays with TFT-LCD screens up to 10"
- Eliminates the color shift normally associated with LED current dimming
- 1000:1 dimming ratio is required on many automotive and handheld displays
- Ideal for applications with multiple screens
- Can be used with single-/dual-cell Li-Ion/Polymer to automotive/industrial supply voltages
- Minimizes switching noise and size of external components
- Minimizes solution footprint/cost while enhancing system reliability

Applications ▶

- Notebook PC displays
- LED camera light for cell phones
- Car dashboard lighting
- Avionics displays

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)**	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LT3497	Dual LED driver	250:1 PWM	6 x 20 mA	2	Dual series strings	2.5-10	32	2 x 300	78	TSD	PWM	CL FL TR BL SI
LT3466-1	LED driver and boost converter	DC/PWM	10 x 25 mA	1	Series	2.7-24	39.4	2 x 320	84	TSD	PWM	CL FL TR BL SI
LT3466	Dual LED driver	DC/PWM	10 x 25 mA	2	Dual series strings	2.7-24	39.4	2 x 320	84	TSD	PWM	CL FL TR BL SI
LTC3452	Synchronous buck-boost LED driver	DC/PWM	5 x 20 mA + 1 x 200 mA	1	Parallel	2.7-5.5	4.5	1A	88	TSD	PWM	CL FL TR BL SI
LT3486	Dual LED driver	1000:1 PWM	10 x 100 mA	2	Dual series strings	2.7-24	35.4	2 x 1.3A	85	TSD	PWM	CL FL TR BL SI
LT3496	Triple LED driver	3000:1 PWM	7 x 0.5A	3	Three series string	3-30	45	21 x 500	95	TSD	PWM	CL FL TR BL SI
LT3498	LED driver plus OLED power	DC/PWM	10 x 25 mA + OLED	2	Single LED string OLED	2.5-12	32	10 x 25 + 30	75	TSD	PWM	CL FL TR BL SI

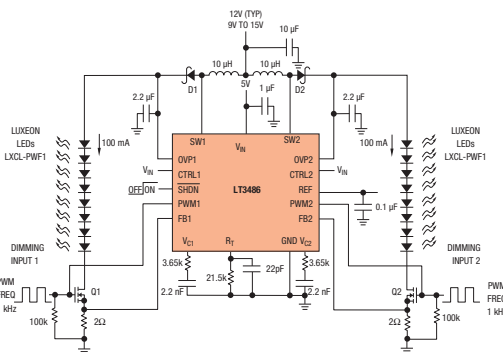
MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Diagnostic capabilities: TSD: Thermal shutdown

**Switch current

LT3486—Dual 1.3A White LED Step-Up Converter with 1000:1 Dimming Range



Low-Power LED Drivers (Up to 25 mA)— Inductor Based



Low current inductor-based switching LED drivers ensure light intensity matching across LEDs. Key features include the purest white LED color dimming control, low standby mode quiescent current, selectable current level, guaranteed LED brightness matching, and extremely small circuit size, making them well suited for cellular phone and other portable backlight applications.

Features ▶

LT3491

- Drives up to six white LEDs from a 3V supply
- Internal Schottky diode
- High-side current sense
- Input voltage range: 2.5V to 12V
- Constant 2.3 MHz switching frequency
- 300:1 True Color PWM™ dimming
- 27V open-LED protection
- Tiny 8-lead SC70 package

Benefits ▶

- Ideal for most cell phones/PDAs/MP3 and media players
- Enables one-wire current source
- Ideal for single-cell Li-Ion/Polymer applications
- Keeps noise out of critical RF bands, enables the use of tiny externals
- Enables precise dimming control for handheld application without color shifts of the LEDs
- Maximizes system reliability
- Compact, low-profile footprint

Applications ▶

- Cellular phones
- PDAs, handheld computers
- Digital cameras
- MP3 players
- GPS receivers



Actual size
complete solution

Product Specifications ▶												
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)**	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LT3590	Buck LED driver	200:1 PWM	10	1	Series	4.5-5.5	–	80	90	TSD/OVM	PWM	CL FL TR BL SI
LT3465/A	Boost LED driver	DC/PWM	6 x 25 mA	1	Series	2.7-16	30	225	81	TSD/OVM	PWM	CL FL TR BL SI
LT3591		90:1 PWM	10 x 20 mA	1	Series	2.5-12	42	450	77	TSD/OVM	PWM	CL FL TR BL SI
LT3491		300:1 PWM	6 x 25 mA	1	Series	2.5-12	27	260	76	TSD/OVM	PWM	CL FL TR BL SI
LTC3452	Synchronous buck-boost converter	DC/PWM	5 x 20 mA + 200 mA	1	Parallel	2.7-5.5	4.5	300	88	TSD/OVM	PWM	CL FL TR BL SI
LT1937	Boost LED driver	DC/PWM	4 x 25 mA	1	Series	2.5-10	34	320	84	TSD/OVM	PWM	CL FL TR BL SI
LT3497	Boost/dual LED driver	250:1 PWM	2 x 6 x 20 mA	2	2 parallel series strings of 6	2.5-10	32	2 x 300	77	TSD/OVM	PWM	CL FL TR BL SI
LT3466		DC/PWM	2 x 10 x 25 mA	2	2 parallel series strings of 10	2.7-24	40	2 x 320	84	TSD/OVM	PWM	CL FL TR BL SI
LT3466-1	LED driver/boost converter	DC/PWM	10 x 25 mA	1	Series	2.7-24	40	2 x 320	84	TSD/OVM	PWM	CL FL TR BL SI
LT1932	Boost LED driver	DC/PWM	10 x 25 mA	1	Series	1.0-10	34	400	80	TSD/OVM	PWM	CL FL TR BL SI
LT1942	Quad DC/DC converter and LED driver	DC/PWM	12 x 25 mA	1	2 parallel series strings of 6	2.6-16	44	550	77	TSD/OVM	PWM	CL FL TR BL SI
LT1618	LED driver	DC/PWM	8 x 25 mA	1	Series	1.6-18	36	1.5A	86	TSD/OVM	PWM	CL FL TR BL SI

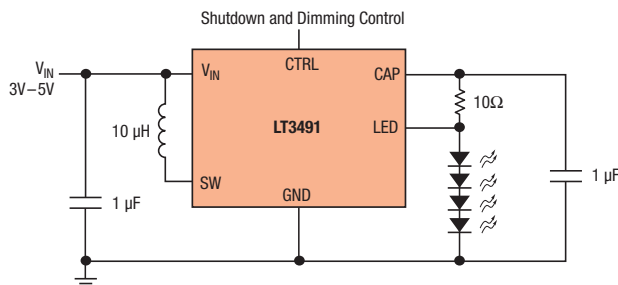
MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Diagnostic capabilities: TSD: Thermal shutdown, OVM: Output voltage monitoring

**Switch current

LT3491—White LED Driver in SC70 with Integrated Schottky





Low- to Medium-Power Multi-Display LED Drivers—Inductorless

Linear Technology's family of inductorless, multi-display, charge-pump-based LED drivers features the highest level of integration, smallest footprint, and highest efficiency. Universal configuration and individual display driver outputs eliminate the need for ballast resistors. These ICs optimize flexibility for product designers, ranging from fully-featured, multi-display cellular phones to high-current/high-resolution camera flash electronic devices to keypad illumination.



Actual size complete solution

Features ▶

LTC3220/-1

- Drives up to 18 universal independently configurable 20 mA current sources
- 64-step brightness control
- Slew-rate limited switching
- High efficiency operation up to 91%: 1x, 1.5x, or 2x boost modes with automatic mode switching
- Output current up to 360 mA
- LED on/off, brightness level, blinking and gradation control programmable using 2-wire I²C interface
- Wide input voltage range: 2.9V to 5.5V
- Low noise, 850 kHz constant frequency operation
- Inductorless charge pump design
- Internal soft-start
- Short-circuit/thermal protection
- 28-lead (4 mm x 4 mm x 0.55 mm) ultra-thin QFN package, <math><56\text{ mm}^2</math> solution area

Benefits ▶

- Design flexibility for highly featured, multi-display cell phones and system status LED lighting
- High resolution
- Reduces conducted and radiated noise
- Extends battery run time
- Powers wide array of applications
- Keeps designs simple, flexible, and easy to use
- Ideal for Li-Ion/Polymer applications
- Ideal for applications with noise sensitive circuitry onboard, minimizes size of externals
- Minimizes footprint/externals
- Limits inrush current
- Additional operating safety margin
- Compact, ultra-low profile footprint

Applications ▶

- Multi-display cellular phones
- Video/camera phones with QVGA+ displays
- Keypad lighting
- General purpose LED lighting
- Ideal for Li-Ion/Polymer applications
- Ideal for applications with noise sensitive circuitry onboard, minimizes size of externals

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LTC3212	Multi-display LED driver	1-wire	3	1	Parallel, RGB	2.7-5.5	–	75	92	TSD	1-wire	FL BL
LTC3219		I ² C	9	1	Parallel, Universal	2.9-5.5	–	250	93	TSD	I ² C	FL BL
LTC3220/-1		I ² C	18	1	Parallel, Universal	2.9-5.5	–	360	91	TSD	I ² C	FL BL
LTC3206		SPI**	9	1	Parallel, Main/SUB/RGB	2.8-4.5	–	400	90	TSD	SPI**	FL BL
LTC3210/-1		1-wire	5	1	Parallel, Main/CAM	2.9-4.5	–	500	93	TSD	1-wire	FL BL
LTC3209-1		I ² C	8	1	Parallel, Main/CAM/Aux.	2.9-4.5	–	600	94	TSD	I ² C	FL BL
LTC3209-2		I ² C	8	1	Parallel, Main/CAM/Aux.	2.9-4.5	–	600	94	TSD	I ² C	FL BL
LTC3207		I ² C	13	1	Parallel, Universal	2.9-5.5	–	600	90	TSD	I ² C	FL BL
LTC3208		I ² C	17	1	Parallel, Main/SUB/CAM/RGB/Aux.	2.9-4.5	–	1,000	90	TSD	I ² C	FL BL

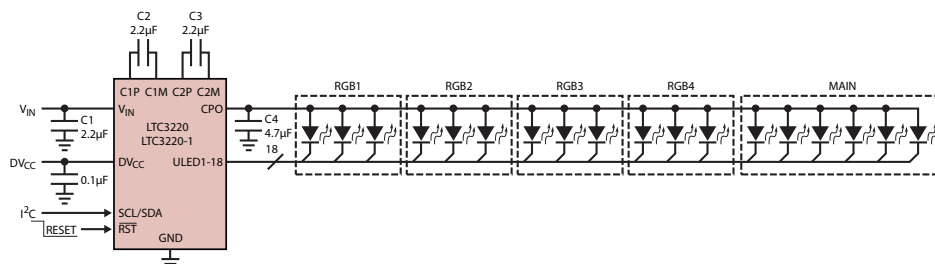
MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Diagnostic capabilities: TSD: Thermal shutdown

**Serial peripheral interface

LTC3220—Typical Application



Integrated Constant-Current Buck Regulators

National Semiconductor offers a broad portfolio of easy to design, energy-efficient buck regulators ideal for driving LEDs in a wide variety of applications. With integrated switching MOSFETs and online design tools as well as extensive protection features and dimming capability, National's buck LED drivers maximize ease of design without sacrificing functionality. National's LED drivers also feature low feedback voltages and very high efficiencies to enable energy-efficient lighting solutions.



Features ▶

- Online design tools ease IC selection, enable design simulation, and offer orderable evaluation kits with custom BOMs
- Low external component counts
- Fast PWM dimming inputs
- Low (≤ 200 mV) feedback voltages
- Thermal, open-circuit, and short-circuit protection

Benefits ▶

- Design tools and integrated switches increase ease of design and time to market
- Low external component counts minimize BOM cost and total solution size
- Low feedback voltages, high efficiencies, and excellent package technologies maximize heat dissipation
- Wide input voltage ranges and high current capabilities increase design flexibility
- Supports all ceramic output capacitors and capacitor-less outputs for smallest solution size

Applications ▶

- General illumination
- Automotive lighting
- Industrial lighting
- Architectural lighting
- Signage



LM3402/02HV evaluation board with female 6-pin SIP connector and two standard 94 mil turret connectors for easy connection to LED array

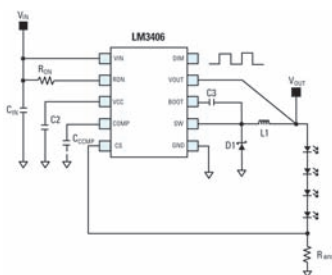
Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LM3402	Buck	PWM	1-10	1	Series	6-42	40	500	90	Over-current protection/TSD/LOD	PWM	CL FL TR BL SI
LM3402HV		PWM	1-20	1	Series	6-75	70	500	90	Over-current protection/TSD/LOD	PWM	CL FL TR BL SI
LM3404		PWM	1-10	1	Series	6-42	40	1,000	90	Over-current protection/TSD/LOD	PWM	CL FL TR BL SI
LM3404HV		PWM	1-20	1	Series	6-75	70	1,000	90	Over-current protection/TSD/LOD	PWM	CL FL TR BL SI
LM3405		PWM	1-4	1	Series	3-15	14	1,000	90	Over-current protection/TSD/LOD/OVM/UVLO	PWM	CL FL TR BL SI
LM3405A		PWM	1-5	1	Series	3-22	20	1,000	90	Over-current protection/TSD/LOD/OVM/UVLO	PWM	CL FL TR BL SI
LM3406		PWM	1-10	1	Series	6-42	40	1,500	90	TSD, UVLO, broken open check	-	CL SI
LM3406HV		PWM	1-20	1	Series	6-75	70	1,500	90	TSD, UVLO, broken open check	-	CL SI
LM3407		PWM	1-7	1	Series	4.5-30	27	350	96	Over-current protection/ TSD/LOD/UVLO	PWM	CL FL TR BL SI

MARKETS LEGEND

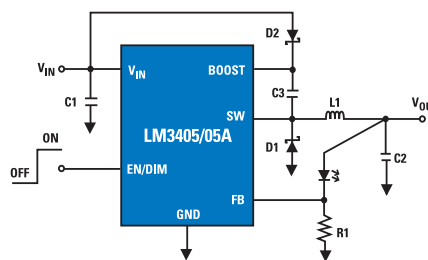
CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Diagnostic capabilities: TSD: Thermal shutdown, OVM: Output voltage monitoring, UVLO: Under voltage lock out, LOD: LED open detection



LM3406 schematic

The LM3406/06HV are monolithic switching regulators capable of delivering up to 1.5A constant currents to high-power LEDs. True average current control, broken and open LED protection, low-power shutdown, and thermal shutdown features allow for design robustness and flexibility



LM3405/05A schematic

The LM3405/05A are 1A constant-current buck regulators designed to provide simple, high-efficiency solutions for driving high-power LEDs. These devices feature a low 205 mV feedback voltage to reduce heat dissipation, and can support up to five 1W or 3W LEDs in series

LED Reference Designs



National's power reference design library provides a comprehensive library of practical reference designs to speed system design and time-to-market.

LED WEBENCH® Online Tool



Design a power supply for 1 to 60 LEDs instantly! Select, optimize, and simulate your LED driver in this FREE online design and prototyping environment.

Visit lighting.arrow.com/designtools to access free design tools, including National's LED reference designs and LED WEBENCH online tools.

Arrow Electronics Lighting Group

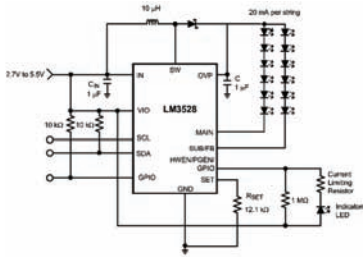
1.888.9LIGHT1

<http://lighting.arrow.com>



Constant-Current Boost Regulators

National's portfolio of constant-current boost regulators features inductive and switched-capacitor solutions for applications such as backlighting, flash, and portable lighting. For higher currents, National has a variety of high-efficiency inductive-boost LED drivers. National's switched-capacitor LED drivers offer small, inductor-less, low-noise solutions for both parallel and series LED configurations. Features such as multiple dimming interfaces and current matching can also be found in inductive and switched capacitor drivers.



The LM3528 is a high-efficiency boost converter for white LEDs and/or OLED displays with dual-current sinks and I²C-compatible brightness control. This LED driver is ideal for small- to medium-sized displays in battery-powered applications

Features ▶

- PWM, analog, and I²C dimming interfaces
- 128 logarithmic dimming steps
- Built-in current matching
- Adjustable and fixed switching frequency options
- Thermal shutdown, flash timeout, open-circuit, and short-circuit protection
- Supports OLED displays

Benefits ▶

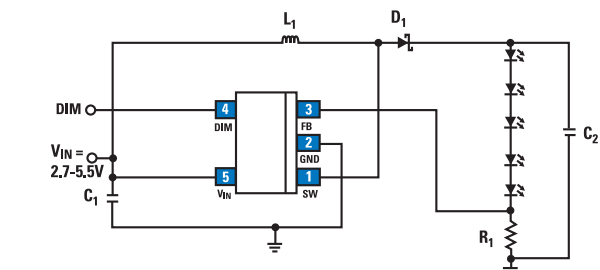
- Multiple dimming interfaces increases design flexibility
- Current matching ensures parallel LED arrays have even, balanced brightness
- Various switching frequency options allow for solution size, efficiency, and EMI optimization
- Micro SMD packages provide very small footprints and minimize solution size

Applications ▶

- Backlighting
- Flash LED
- Portable lighting (handheld devices, flashlights)
- Automotive lighting

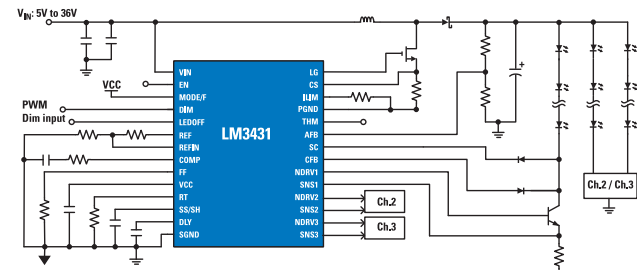
Product Specifications ▶													
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets	
LM3410	Boost/SEPIC	PWM	1-6	1	Series	2.7-5.5	24	1,000	88	Over-current protection/TSD/LOD	PWM	CL FL BL SI	
LM3430/32	Boost	PWM/analog	1-20	6	Series/parallel	6-40	80	40 per string	92	Over-current protection/TSD/LOD/UVLO	PWM/analog	CL TR BL SI	
LM3431		PWM/analog	1-10	3	Series/parallel	5-36	40	150 per string	88	Over-current protection/TSD/OVM/LOD	PWM/analog	CL TR BL SI	
LM3509		I ² C	1-5	2	Series/parallel/OLED	2.7-5.5	21	30 per string	92	TSD/soft start	I ² C	CL TR BL SI	
LM2756		I ² C	1	8	Parallel	2.7-5.5	4.6	180	91	TSD/OVP/soft start	I ² C	BL	
LM2757		-	-	1-10	-	-	2.7-5.5	4.1/4.5/5	180	92	Over-current protection/TSD/shutdown w/high impedance/soft start	Binary	BL
LM3553		-	-	1-2	1	Series	2.7-5.5	19	1,200	90	TSD/OVM/Flash pulse safety timer	I ² C	BL
LM4510		-	-	-	-	Series/parallel/OLED	2.7-5.5	18	280	85	TSD/output short-circuit protection/feedback fault protection/input UVLO/soft start/true shutdown isolation	Binary	FL
LM2755		I ² C	1	3	Parallel	3-5.5	5	90	90	TSD/soft start	I ² C	BL	
LM3528		Exponential	6	2	Series/parallel	2.7-5.5	20	30	1.27M	-	-	-	BL
LM5022		Boost/SEPIC/flyback	PWM	1-20	1	Series	6-60	80	1,000	95	Over-current protection/TSD/LOD/UVLO	PWM	BL

*Diagnostic capabilities: TSD: Thermal shutdown, UVLO: Under voltage lock out, LOD: LED open detection



LM3410 schematic

The LM3410 is a high-frequency, very small, constant-current boost LED driver. A low external component count makes this driver easy to design and minimizes the total solution size and cost. The LM3410 has an input voltage range down to 2.7V to support single Li-Ion cells



LM3431 schematic

The LM3431 is a 3-channel linear current controller combined with a boost-switching controller ideal for driving LED backlight panels in space-critical applications. It accepts both analog and digital control signals and can achieve contrast ratios greater than 1,000:1

High-Current LED Drivers

National offers buck and boost regulators that can drive up to and greater than 6A, ideal for applications such as backlighting and projection. For example, the LM3433 supports over 6A of current and allows the LED anodes to be tied directly to the chassis ground for optimal heat dissipation. Also, National's LM3401 buck regulator is capable of achieving 100 percent duty cycle in order to support a maximum number of LEDs.



Features ▶

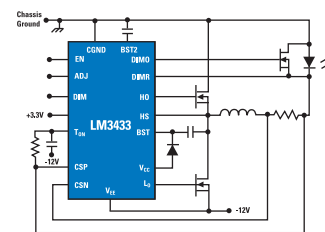
- PWM and analog dimming interfaces
- Capable of achieving up to 100% duty cycles
- Common-anode configuration allows LED anodes to be tied directly to chassis ground
- Adjustable switching frequencies up to 2 MHz
- Supports high-current applications with buck, boost, SEPIC, and flyback solutions

Benefits ▶

- Common-anode configuration maximizes heat dissipation and reduces heat sink requirements
- High duty cycles allow maximum number of LEDs to be powered by a single LED driver to shrink solution size and cost
- Multiple dimming interfaces provide design flexibility
- Adjustable switching frequency options allow for solution size, efficiency, and EMI optimization

Applications ▶

- Backlighting
- Projection
- Automotive lighting
- Industrial lighting
- General illumination



The LM3433 is an adaptive, constant, on-time buck controller designed to provide constant current for illuminating high-power LEDs. It can drive currents greater than 6A and supports a thermal, performance-enhancing common-anode LED configuration

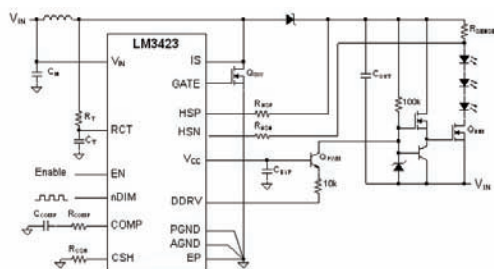
Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LM3433	Buck	PWM/analog	1	1	Series	-9 to -14	-6	>6,000	96	TSD/LOD	PWM/analog	CL TR BL SI
LM3401		PWM	1-9	1	Series	4.5 to 35	35	>3,000	95	TSD/LOD	PWM	CL FL TR SI
LM3421/3	Buck/boost/flyback/SEPIC	PWM	1-20	1	Series	4.5V to 75V	75V	>2,000	2.0 MHz	OVP, FLT, LED ready, broken open check	PWM	CL TR BL SI
LM5022	Boost/SEPIC/flyback	PWM	1-20	1	Series	6 to 60	80	>1,000	95	TSD/LOD	PWM	CL TR BL SI

MARKETS LEGEND

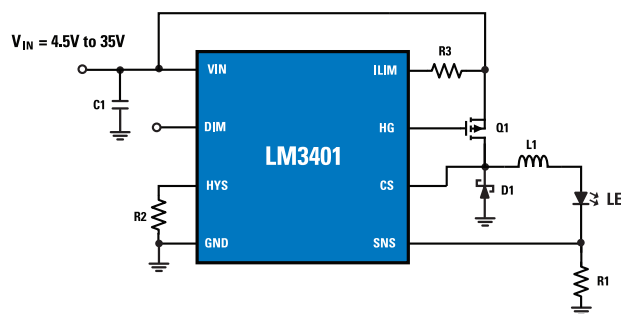
CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Diagnostic capabilities: TSD: Thermal shutdown, LOD: LED open detection



LM3421/23 schematic

LM3421/23 devices are versatile high voltage LED controllers with the capability to be configured in a buck, boost, buck-boost, or SEPIC topology. Zero current shutdown feature ensures current is not drawn during off time for longer battery life and increased efficiency



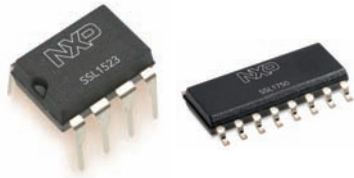
LM3401 schematic

The LM3401 is a buck-switching controller with an external P-MOSFET switch, which allows the device to run at 100% duty cycle and continue to drive a string of LEDs when the total forward voltage drop is equal to V_{IN} . Adjustable, dual-side hysteresis allows very flexible inductor selection, switching frequency customization, and reduced propagation delay error



High-Efficiency AC/DC LED Driver Solutions

The SSL152x, SSL16xx, and SSL1750 families of offline switched-mode power supply (SMPS) controllers are ideal for driving the latest high-brightness LEDs with high efficiency and a full suite of built-in protection features. For SSL indoor lighting solutions below 15W, the SSL152x family is the right choice. The ICs operate directly from the rectified universal mains. They are ideal for retrofitting LED lamps and for LED driver solutions used in cabinet, kitchen, and many other lighting applications in the home. With just a minimum of additional components it offers a driver solution that is fully compatible with transistor- and thyristor- (TRIAC-) based wall-mounted dimmers. Between 15W and 24W, the SSL1623PH is very suitable for SSL applications due to the special heat spreader underneath the IC package. For SSL applications higher than 25W, NXP offers the SSL1750, flyback control, and power-factor correction (PFC) integrated into one IC.



SSL1523 and SSL1750

Features ▶

- Universal mains 80 VAC to 270 VAC
- Support of power-factor correction when required
- Wide range of built-in protection circuits
- Meets safety/isolation regulations (UL 1598 Class 2 and IEC60950)

Benefits ▶

- High-energy efficiency—valley switching for minimum switch-on loss
- Wide input voltage range
- Wide current drive capability
- Supports next generation of HB-LEDs

Applications ▶

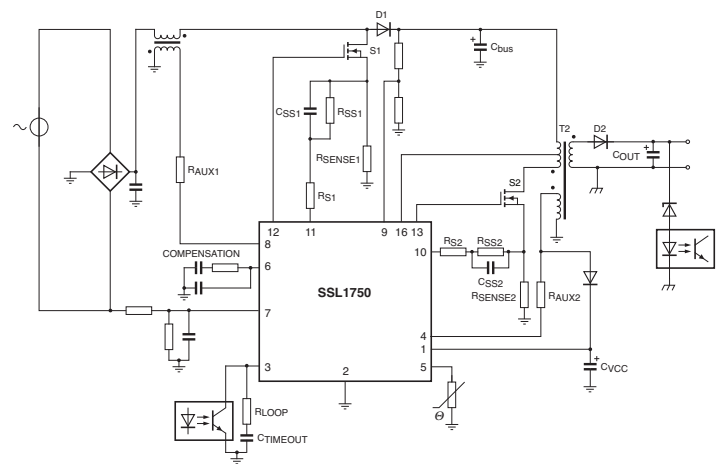
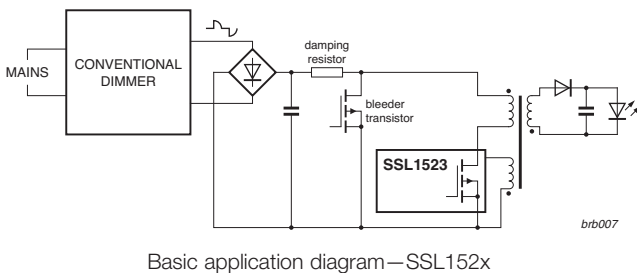
- General LED lighting indoor (residential, office, and building)
- General LED lighting outdoor (street lighting, parking lots, tunnel lighting)
- Industrial lighting
- Signage

Product Specifications ▶												
Part Number	Type	Dimming Type	Number of LEDs/ String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
SSL152x	Flyback SMPS	PWM and TRIAC-transistor	Pending on output wattage selected	–	String/series	80-276	User defined	User defined	Application defined	TSD/OVM	AC/DC	CL SI
SSL153x		PWM	Pending on output wattage selected	–	String/series	80-276	User defined	User defined	Application defined	TSD/OVM	AC/DC	CL SI
SSL1623PH		PWM and TRIAC-transistor	Pending on output wattage selected	–	String/series	80-276	User defined	User defined	Application defined	TSD/OVM	AC/DC	CL SI
SSL1750		PWM	Pending on output wattage selected	–	String/series	80-276	User defined	User defined	Application defined	TSD/OVM	AC/DC	CL SI
SSL1610	Resonant power supply	–	Pending on output wattage selected	–	String/series	80-276	User defined	User defined	Application defined	TSD/OVM	AC/DC	CL SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Diagnostic capabilities: TSD: Thermal shutdown, OVM: Output voltage monitoring



DC/DC LED Driver Solutions

The UBA3070 is a versatile high-voltage LED controller IC designed for applications where a high number of LEDs need to be driven in an accurate and highly energy efficient way. The flexible design allows the use of both low-power or high-power LEDs and can be used in combination with LED-strings containing hundreds of LEDs.



Features ▶

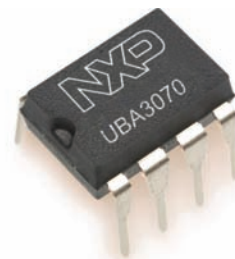
- Direct PWM dimming
- LED thermal and IC overheating protection
- Accurate DC/DC conversion with switch-mode buck converter

Benefits ▶

- Lower system costs
- Higher reliability and extended IC lifetime
- Supports next generation of HB-LEDs

Applications ▶

- General LED lighting (spotlights and downlights)
- General LED lighting (retail display)
- Channel letter and contour lighting
- Signage
- LCD backlighting

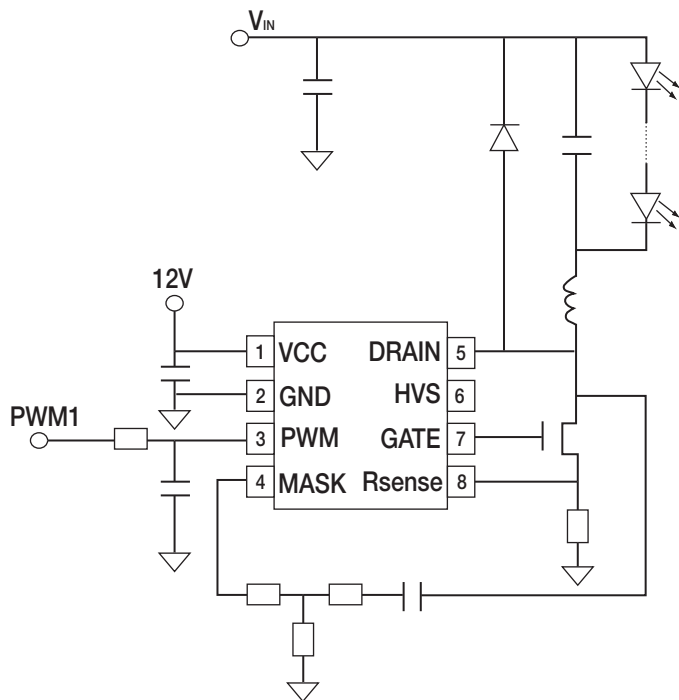


UBA3070

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
UBA3070	LED driver	PWM	Up to 200	-	String/series	600	-	User defined	Application defined	TSD/OVM	DC/DC	CL BL SI
MARKETS LEGEND						CL COMMERCIAL LIGHTING	FL FLASHLIGHTS	TR TRANSPORTATION	BL BACKLIGHTING	SI SIGNAGE		

*Diagnostic capabilities: TSD: Thermal shutdown, OVM: Output voltage monitoring



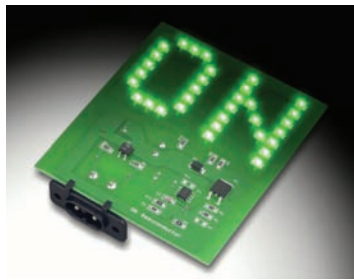
Basic application diagram—UBA3070

ON Semiconductor®



LED Driver Solutions

ON Semiconductor offers solutions for a wide range of LED applications whether run off an AC main or battery powered. With a broad portfolio of LED driver solutions, ON Semiconductor addresses everything from LCD backlighting, flashlights, wide DC-input range of applications, including automotive, solar powered, and commercial/landscape lighting powered from 12V DC/AC, to offline applications such as lighting ballasts and power factor correction solutions.



NCP1216 in non-isolated LED driver configuration

Features ▶

- Linear and switching topologies
- Wide-input DC-DC solutions to 40V
- Extended temperature range from -40°C to +125°C
- Optimized portable backlighting solutions
- Broad choice of packages

Benefits ▶

- Enhanced designer flexibility
- Suitable for automotive environment
- Robust and highly reliable
- Low passive parts count
- Demo boards and application notes available

Applications ▶

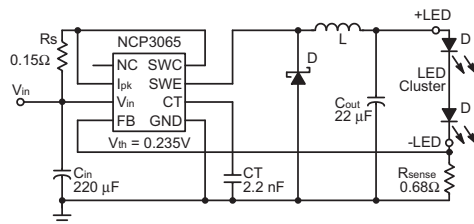
- Backlighting (small to medium LCD panels)
- Flashlights (torch and camera flash)
- Transportation (interior/exterior lighting, displays, and marine)
- General lighting (architectural, landscape, streetlighting, task lighting, and low-voltage AC/DC)
- Signage (LED ballasts)

Product Specifications ▶												
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
NCP3066	Boost/buck/SEPIC	PWM/analog	12	1	Series	3-40	40	1,200	89	TSD	Enable control	CL TR BL
NCP3065		PWM/analog	12	1	Series	3-40	40	1,200	89	TSD	-	CL TR BL
NCP/NCV3063		PWM/analog	12	1	Series	3-40	40	1,200	89	TSD	Enable control	CL TR BL
CS51411	Buck	PWM/analog	10	1	Series	4.5-40	37	-	93	TSD	Enable	CL TR BL
NCP1013	Fixed frequency flyback	PWM/analog	-	1	Series	85-265 VAC	Depends on V_{IN}	5W-up to 1,000	83	TSD/OVP/SS/UVLO	-	CL SI
NCP1014		PWM/analog	-	1	Series	85-265 VAC	Depends on V_{IN}	8W-up to 1,000	83	TSD/OVP/SS/UVLO	-	CL SI
NCP1028		PWM/analog	-	1	Series	85-265 VAC	Depends on V_{IN}	15W-up to 1,000	83	TSD/OVP/SS/UVLO	-	CL SI
NCP1216		PWM/analog	-	1	Series	85-265 VAC	Depends on V_{IN}	Flexible/controller	90	OCP/UVLO/TSD	-	CL BL
NCP1351	Variable OFF time flyback	PWM/analog	-	1	Series	85-265 VAC	Depends on V_{IN}	Flexible/controller	90	OCP/UVLO/TSD/OPP	-	CL BL
NUD4001	Linear	PWM/analog	8	1	Series	3.6-30 and 60V for load dump	27	500	-	-	Enable	CL TR BL SI
NUD4011		PWM/analog	50	1	Series	5-200	198	50	-	-	Enable	BL

MARKETS LEGEND

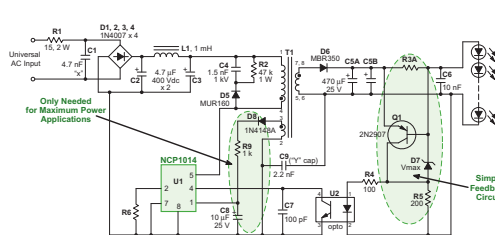
CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Diagnostic capabilities: TSD: Thermal shutdown, OVP: Overvoltage protection, SS: Soft start, UVLO: Under voltage lock out, OCP: Overcurrent protection, OPP: Overpower protection

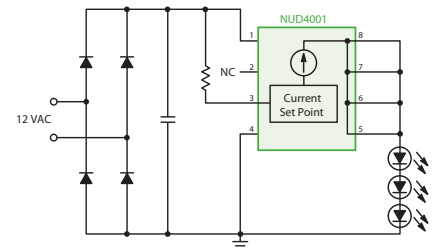


Typical Buck Application Circuit

NCP3065 LED driver—buck configuration



NCP1014 configured as a constant-current isolated offline LED driver



NUD4001 in 12 VAC-powered application

LED Driver Solutions for Handheld Applications



Portable applications require solutions that provide high efficiency, require minimal board space, and low height. ON Semiconductor offers LED driver solutions in linear, charge pump, and inductive DC-DC converter topologies for optimal space savings and inductive solutions for optimal power efficiency. In addition, ON Semiconductor offers a broad selection of high-current drivers to support flashlight and camera flash applications.

Features ▶

- Linear, inductive, and charge pump solutions
- High efficiency
- Highly integrated solutions
- Ultra-thin micro package 0.55 mm
- Simple to use

Benefits ▶

- Enhanced designer flexibility
- Extended battery life
- Low overall parts count
- Thinner and smaller end products
- Demo boards and application notes available

Applications ▶

- Small and medium size LCD backlighting
- Keyboard backlighting
- Flashlights, torch, and headlamps
- Camera flash
- Medical instruments

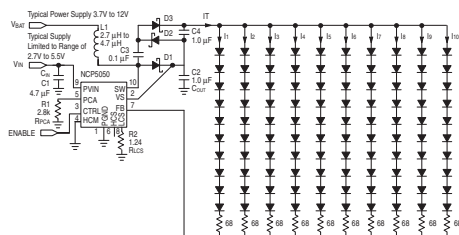


NCP1400A powered LED flashlight

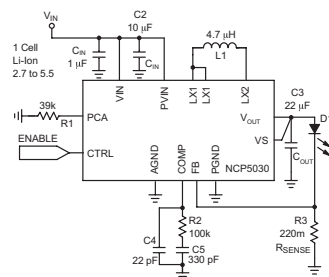
Product Specifications ▶												
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
NCP5050	Boost	PWM/analogue	6	1	Series	2.7-5.5	22	Up to 600	90	Timeout/OVP/TSD	Enable	BL FL
NCP5030	Buck-boost	PWM/analogue	1	1	Series	2.7-5.5	5.5	Up to 900	94	OVP/TSD/UVLO	Enable	FL
NCP1400A	Boost	PWM/analogue	1	1	Series	0.8-5.0	5	100	89	SS	Enable	FL
NCP1406		PWM/analogue	6	1	Series	1.8-5.5	25	500 mW (25 mA@25V)	85	TSD/UVLO/SS	Enable	BL FL
NCP1422		PWM/analogue	1	1	Series	1.0-5.0	5	600	92	TSD/UVLO/SS	Enable	FL
NCP5005	Boost w/enhanced RFI immunity	PWM/analogue	5	1	Series	2.7-5.5	21	1,000 mW (50 mA@20V)	90	OVP/TSD	Enable	BL
NCP5010	Boost w/integrated Schottky	PWM/analogue	5	1	Series	2.7-5.5	22	500 mW (25 mA@20V)	84	OVP/TSD	Enable	BL
NCP5602	Charge pump	IC	1	2	Parallel	2.7-5.5	5.5	60	88	OVP/TSD	IC	BL
NCP5603		PWM	1	1	Parallel	2.7-5.5	5.5	200	90	TSD/SCP	Enable	BL FL
NCP5608		PWM	1	8	Parallel	2.7-5.5	5.5	4@25/4@100	86	OVP/TSD	Enable	BL FL
NCP5612		S-wire link	1	2	Parallel	2.7-5.5	5.5	60	88	OVP/TSD	Enable/dim	BL
NCP5604A/B		PWM	1	4	Parallel	2.7-5.5	4.8	120	87	OVP/SCP	Enable	BL
NCP5623	RGB charge pump	IC	1	3	Parallel	2.7-5.5	5.5	90	93	OVP/SCP	IC	BL

MARKETS LEGEND CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

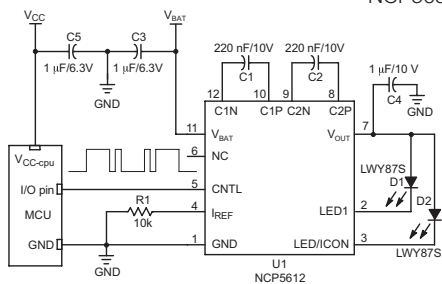
*Diagnostic capabilities: TSD: Thermal shutdown, UVLO: Under voltage lock out, SS: Soft start, OVP: Over voltage protection, SCP: Short circuit protection



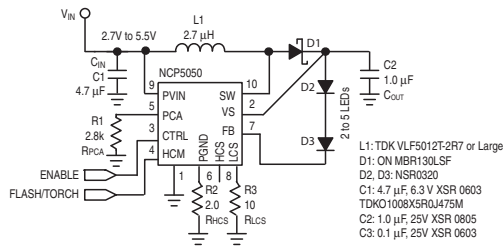
NCP5050 drives 10 x 10 LED for backlighting medium-size LCD panel



NCP5030 3-cell alkaline flashlight schematic



NCP5612 2 LED charge pump application schematic



NCP5050 driving 2 to 5 HB-LEDs in flashlight



LED7707 Monolithic DC/DC Converter for LED Driving



LED7707 demo board

The new LED7707 is a monolithic DC/DC converter for LED driving specifically designed for LCD backlighting and general lighting. It consists of a highly-efficient boost converter integrating a power MOSFET and six controlled-current generators (ROWS). The device can manage an output voltage up to 36V (example is 10 white LEDs x row). The boost section is based on a constant switching frequency, peak current-mode architecture. The boost output voltage is controlled so that the lowest voltage of the ROW, referred to SGND, is equal to an internal reference voltage (700 mV typical). The input voltage range is from 4.5V up to 36V. In addition, the LED7707 has an internal 5V LDO regulator that supplies the internal circuitry of the device and is capable of delivering up to 40 mA. The input of the LDO is the main input voltage (V_{BATT}). The boost section switching frequency can be externally adjusted from 200 kHz to 1 MHz. It also has an internal fixed value of 660 kHz (typical), which eliminates the need for a resistor, an important feature in minimum component-count applications. The frequency pin (FSW) can also be used as the synchronization input, allowing the LED7707 to operate both as the master or the slave. The generators can be externally programmed to sink from 16 mA up to 85 mA and can be dimmed via a PWM signal (1 percent dimming duty-cycle at 1 kHz can be managed). For high-current LEDs, it is possible to parallel the outputs to get the maximum output current value of 510 mA (6 ROWs x 85 mA). The device is able to detect and manage open and shorted LED faults. If some ROWs are not used, during the start up, the device is able to self-detect and automatically disconnect the ROWs without any fault detection. Output over-voltage, internal power MOSFET over-current, and thermal shutdown are provided as protection.

Features ▶

- Constant-frequency, peak, current control mode
- Internal power MOSFET
- External sync for multi-device applications
- Pulse-skip power saving mode at light load
- Programmable soft-start and over voltage protection
- Ceramic output capacitor
- Six ROWs with 85 mA maximum current capability (adjustable)
- Parallelable rows up to 510 mA (6 ROWs x 85 mA)
- Up to 36V output voltage (example 10 white LED per row)
- 2% current matching between ROWs
- LED failure (open- and short-circuit) detection
- Housed in VQFPN-24L space-saving package

Benefits ▶

- High efficiency thanks to adaptive-output voltage
- High-performance 36V rated current generators
- 1% dimming duty-cycle at 1 KHz can be managed
- Keeps externals tiny
- Demo board and application notes available

Applications ▶

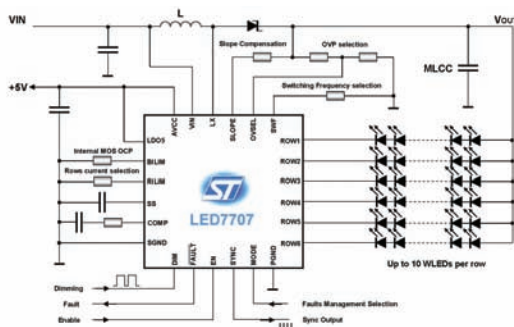
- Backlighting in LCD panels for battery/AC adapter supplied equipment such as:
 - GPS navigator backlighting
 - LCD monitor backlighting
- General lighting

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/ String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities	Interface	Markets
LED7707	Boost converter	PWM	36V (example 10 white LEDs)	6	Series/parallel	4.5-36	Adaptive to 36V	6 ROWs x 85	>90	Short/open	-	CL BL

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



LED7707 application schematic

24-Bit Constant-Current LED Sink Driver with Output Error Detection



The STP24DP05 is a monolithic, low-voltage, low current-power 24-bit shift register designed for LED panel displays. The 24-bit are grouped into three sets of 8-bit for RGB control to simplify PCB layout in parallel to achieve high resolution video display. In the output stage, 24 regulated current sources were designed to provide 5 mA to 80 mA constant current to drive the LEDs. The 8 x 3 shift registers data flow sequence order can be managed with two dedicated pins. The STP24DP05 has a dedicated pin to activate the outputs with a sequential delay that will prevent in-rush current during outputs turn-on. The device detection circuit checks three different conditions that can occur on the output line: short-to-GND, short-to-VO, or open line. The data detection results are loaded in the shift registers and shifted out via the serial line output. The detection functionality is activated with a dedicated pin, or as an alternative, through a logic sequence that allows the user to enter or exit from detection mode. Through three external resistors, users can adjust the output current for each 8-channel group, controlling the light intensity of LEDs.



STP24DP05 evaluation board

Features ▶

- 20V output driving capability
- 25 MHz clock frequency
- 3.3V and 5V supply voltage range
- Up to 80 mA drive capability per channel
- Thermal shutdown
- Thermal error flag
- Gradual outputs delay
- Short- and open-LED detection
- Controlled in-rush current
- TQFP-48 exposed pad, high thermal efficiency package

Benefits ▶

- Superior display quality
- Finer brightness control through three independent external resistors
- Accurate color balance and white points
- Remote diagnostics

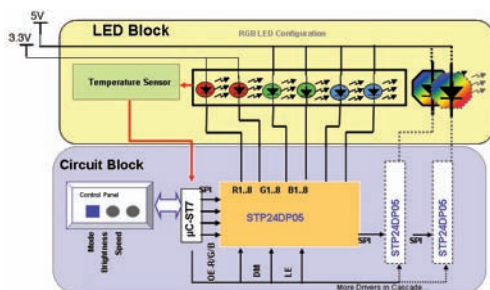
Applications ▶

- Full-motion RGB video wall display
- Monochrome LED signs
- Billboards and scoreboards
- Large-panel LCD backlighting units
- Traffic display
- Gaming machine
- Channel letter signs

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/ String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities	Interface	Markets
STP24DP05	Linear	SW/PWM signaling	20V (example 6 green LEDs)	24	Series/parallel	3.3-5	20	80	-	Yes, open/short LED detection	SPI	CL TR BL SI

MARKETS LEGEND CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



STP24DP05 typical application circuit



4-Bit Constant-Current Power-LED Sink Driver

STMicroelectronics has introduced the STP04CM05, a monolithic 4-bit shift register designed to supply high-power RRGB LEDs achieving high precision color control. Each channel provides a controlled current ranging from 80 mA to 400 mA. The device has 1 percent precision among the channels and 6 percent chip-to-chip. The STP04CM05 guarantee 20V output driving capability, allowing users to connect more LEDs in series. The high clock frequency, 30 MHz, makes the device suitable for high data transmission. The 3.3V voltage supply is useful in applications that interface with 3.3V microcontroller.



STP04CM05 evaluation board

Features ▶

- 20V output driving capability
- 30 MHz clock frequency
- 3.3V and 5V supply voltage range
- Controlled in-rush current
- Thermal shutdown
- Available in SO, TSSOP, and TSSOP exposed pad
- Adjustable output current through one external resistor

Benefits ▶

- Constant voltage and constant current
- Adjustable current limit
- Simple to implement
- Over-voltage protection
- High efficiency

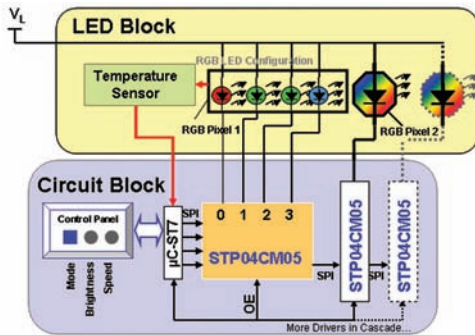
Applications ▶

- Architectural lighting
- Special illumination
- Ambient lights
- Automotive interior lighting
- Light indicator for white goods

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
STP04CM05	Linear	SW/PWM signaling	20V (example 5 green LEDs)	4	Series/parallel	3.3-5.5	20	400	-	TSD	SPI	CL TR
MARKETS LEGEND						CL COMMERCIAL LIGHTING	FL FLASHLIGHTS	TR TRANSPORTATION	BL BACKLIGHTING	SI SIGNAGE		

*Diagnostic capabilities: TSD: Thermal shutdown



STP04CM05 typical application diagram

15W TRIAC Dimmable LED Driver Based on L6562A



The L6562A is the latest proposal for power factor correction. The application note AN2711 presents a 15W driver for LEDs, based on single stage fly-back PFC, that is compatible with TRIAC phase-control dimmers. The design gives luminaire manufacturers a low-cost, commonly available dimming option for home fixtures. An additional benefit is that when not wired to a dimmer, the unit's power factor is over 0.9. This solution is scalable up to 60W.

Features ▶

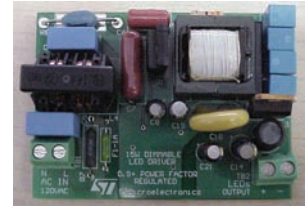
- High efficiency >87%
- No large electrolytic capacitor
- Able to meet FCC class B
- High power factor >0.9

Benefits ▶

- Solution compatible with common TRIAC dimmers
- Small form factor
- Scalable up to 60W

Applications ▶

- Downlight
- Dimmable ballast replacement
- Chandelier



STEVAL-ILL016V1 evaluation board

Product Specifications ▶

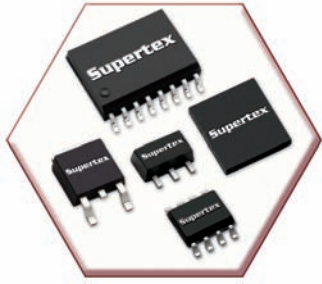
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
STEVAL-ILL016V1	Evaluation board	TRIAC dimmable	8 (1W)	2	Series/parallel	120 VAC	36V	350	87	-	-	CL
MARKETS LEGEND						CL COMMERCIAL LIGHTING	FL FLASHLIGHTS	TR TRANSPORTATION	BL BACKLIGHTING	SI SIGNAGE		



ST LED Evaluation Boards

ST Board Order Code	LED Board Description
STEVAL-ILL001V1	Dimmable driver for HB power LEDs with Viper22A (DALI connector)
STEVAL-ILL003V1	HB-LED without diagnostic (32 LED) based on STP16CP596
STEVAL-ILL005V1	Viper12A offline, constant-current driver for high-intensity LEDs
STEVAL-ILL006V1	Viper22A offline, constant-current driver for high-intensity LEDs
STEVAL-ILL007V1	High-intensity LED driver for MR-16 format based on L5973D
STEVAL-ILL009V3	OSTAR® Projection Module
STEVAL-ILL009V4	OSRAM DRAGON® LEDs module
STEVAL-ILL010V1	High-intensity LED dimming driver based on L6902
STEVAL-TLL002V1	Flash driver based on STCF01
STEVAL-TLL003V1	Power Flash driver based on STCF02
STEVAL-ILL002V3	HB-LED with diagnostic (40 LED) based on STP08DP05
STEVAL-ILL002V4	HB-LED with diagnostic (40 LED) based on STP08DP05
STEVAL-ILL003V2	HB-LED driver without diagnostics (32 LEDs) based on STP16CP05
STEVAL-ILL008V1	LED flashlight demo based on the L6920D
STEVAL-ILL011V1	RGB color control board based on ST7 and STP08C596MTR for LCD backlighting
STEVAL-ILL014V1	Constant-current controller for high brightness LEDs based on STCS1
STEVAL-TLL001V1	White LED controller based on STLD40D
STEVAL-TLL005V1	Power Flash evaluation board based on STCF03 and ST7 MCU (include the STEVAL-TLL004V1)

Supertex inc. LED Drivers



Supertex offers an extensive line of high-performance LED driver ICs for solid-state lighting applications, including general illumination, LCD screen backlighting, building, street, automotive, and decorative lighting. Our LED driver ICs range from simple, low-cost linear regulators to feature-rich switching regulators configured in buck, boost, buck-boost, and SEPIC topologies. These LED driver ICs offer high efficiency, excellent LED current matching, very low noise, and a wide dimming range. In addition, they have a very wide input voltage range and multiple output capabilities in the smallest footprints.

Features ▶

- DC to 450V input range
- PWM, linear, and phase dimming
- Low harmonic distortion
- Small size

Benefits ▶

- Supports universal AC
- Supports triac-based phase dimming
- Power-factor correction
- Integrated protection features
- Minimum number of external components

Applications ▶

- Traffic signals
- Automotive lighting
- Backlighting for LCD displays
- Offline lamps and fixtures
- Street lighting

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/ String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities	Interface	Markets
AT9933	Cuk	PWM	Configurable	1	Series	9-75	Configurable	Ext. FET	>80	-	-	TR
HV9930		PWM	Configurable	1	Series	8-200	Configurable	Ext. FET	>80	-	-	CL BL SI
CL2	Linear	-	1-30	1	Series/parallel	5-90	90	20	-	-	-	CL
CL25		-	1-30	1	Series/parallel	5-90	90	25	-	-	-	CL
CL320		-	Configurable	3	Series/parallel	5-90	90	20	-	-	-	CL BL
CL325		-	Configurable	3	Series/parallel	5-90	90	25	-	-	-	CL BL
CL330		-	Configurable	3	Series/parallel	5-90	90	30	-	-	-	CL BL
CL6		-	1-30	1	Series/parallel	6.5-90	90	100	-	-	-	CL
CL7		PWM	1-30	1	Series/parallel	6.5-90	90	100	-	-	-	CL
HV9903	Boost	PWM/linear	1-8	1	Series	1.8-12.5	<35	5-40	>90	-	-	BL
HV9910B	Buck	PWM/linear	Any	1	Series	8-450	<0.8* V _{IN}	Ext. FET	>90	-	-	CL BL SI
HV9921		-	4-20	1	Series	20-400	12-80	20	>80	-	-	CL
HV9922		-	4-20	1	Series	20-400	12-80	50	>80	-	-	CL
HV9923		-	4-20	1	Series	20-400	12-80	30	>80	-	-	CL
HV9925		PWM/linear	4-20	1	Series	20-400	12-80	20-50	>80	-	-	CL
HV9980		PWM/linear	Configurable	3	Series	100-160	Configurable	70	>85	-	-	CL BL SI
HV9911	Boost/SEPIC/ buck-boost	PWM/linear	Configurable	1	Series	9-250	Configurable	Ext. FET	>90	-	-	CL BL SI
HV9912		PWM/linear	Configurable	1	Series	9-100	Configurable	Ext. FET	>90	-	-	CL BL SI
HV9931	Buck/ buck-boost	PWM/phase	1-50	1	Series	8-450	2-200	Ext. FET	>80	-	-	CL
HV9982	Boost/buck/ SEPIC	PWM/linear	Configurable	3	Series	10-40	Configurable	Ext. FET	>90	-	-	CL BL SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

Linear and Switchmode LED Drivers

The TPS40211 is a wide-input voltage (4.5V to 52V), non-synchronous boost LED driver. It is suitable for boost, flyback, and SEPIC topologies. Current mode control provides improved transient response and simplified loop compensation. It is capable of driving 3A constant current for HB-LEDs.



Features ▶

- Input voltage: 4.5V to 52V
- Flexible output voltage
- 260 mV Isense voltage
- Switching upto 500 kHz
- 8V LDO for external μC

Benefits ▶

- Select appropriate topology based on system needs
- Select external components to fit application
- Drive long series of HB-LEDs from low input voltage

Applications ▶

- Automotive headlamp
- Industrial portable lighting
- Channel lighting
- Architectural lighting



TPS40211 wide-input voltage boost controller

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities	Interface	Markets
TPS40211	Boost/flyback/SEPIC	PWM	>20	4	Series	4.5-52	8->150	<3,000	90	Overcurrent, overtemp	PWM signal	FL TR
TPS75105	Linear	PWM	1	4	Parallel	2.7-5.5	$V_{in}-27\text{ mV}$	25	83	Overcurrent, overtemp	PWM signal	BL
TPS60250	Boost	PWM	1	7	Parallel	2.7- 6.5	6	125	85	Overcurrent, overvoltage, overtemp	I ² C	FL TR BL
TPS61042		PWM	7	1	Series	1.8-6.0	36	500	85	Overtemp, overvoltage	PWM signal	FL TR BL
TPS61059		On/off	1	1	Series	2.7-5.5	6	1,500	80	Overtemp, overvoltage	PWM signal	FL TR BL
TPS61062		PWM	6	1	Series	2.7-6.0	30	400	81	Overtemp, overvoltage	PWM signal	FL TR BL
TPS61081		PWM	6	1	Series	2.7-6.0	27	1,300	87	Overtemp, overvoltage	PWM signal	FL TR BL
TPS61200		PWM	1	1	Series	0.3-5.5	5.5	1,500	91	Overtemp, overvoltage	PWM signal	FL TR BL
TPS61140		On/off	6	2	2x series	3.0-6.0	24	700	85	Overtemp, overvoltage	PWM signal	FL TR BL
TPS61141		On/off	6	2	2x series	3.0-6.0	24	700	85	Overtemp, overvoltage	PWM signal	FL TR BL
TPS61150/51		On/off, analog	8	2	2x series	3.0-6.0	2x36	700	85	Overtemp, overvoltage	PWM signal, resistor	FL TR BL
TPS61160/61		Digital, analog	6	1	Series	2.7-18	26	700	87	Overtemp, overvoltage	Easy scale, PWM	FL TR BL
TPS61165		Digital, analog	7	1	Series	2.7-18	38	1,200	87	Overtemp, overvoltage	Easy scale, PWM	FL TR BL
TPS61180/81/82		Digital, analog	10	6	Parallel	5.0-24	40	1,500	90	Overcurrent, overvoltage, overtemp	Easy scale, PWM	FL TR BL
TPS63000		Buck-boost	PWM	1	1	Series	5.5-1.8	5.5-1.2	1,800	96	Load disconnect, overtemp	PWM signal

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



TLC59xxx Family of Linear LED Drivers

TLC59xxx devices offer up to 1 percent channel-to-channel and 3 percent chip-to-chip current regulation accuracy. The serial data input devices can run up to speeds of 30 MHz. The speed of the image display can be improved by these devices quick turn on and turn off time. Also, note the small amount of voltage headroom over the LEDs V_F to bias the internal linear element.



TLC5942 offers separate control lines for analog and digital dimming

Features ▶

- TLC59116–I²C interface with group dimming and blinking
- TLC5916/17–simple global dimming
- TLC5923–channel-to-channel dimming
- TLC5924–removes ghosting from multiplexed displays

Benefits ▶

- TLC5940–on-chip storage of analog dimming values
- TLC5941–lower cost TLC5941
- TLC5942–greater control over PWM and analog dimming
- TLC5943–high-resolution PWM dimming
- TLC5945–best for high-speed video

Applications ▶

- Full-motion RGB video wall displays
- Gaming
- Electronic billboard advertisement
- Large panel LCD backlighting units
- Professional lighting

Product Specifications ▶

Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
TLC59116	Linear	PWM/analog	4	16	Series/parallel	3.3-5	17	100	–	TSD/LOD	I ² C	CL TR BL SI
TLC5916		Analog	4	8	Series/parallel	3.3-5	17	120	–	TSD/TEF/LOD	Serial	CL TR BL SI
TLC5917		Analog	4	8	Series/parallel	3.3-5	17	120	–	TSD/TEF/LOD	Serial	CL TR BL SI
TLC5923		Analog	4	16	Series/parallel	3.0-5.5	17	80	–	OVM/TSD/LOD	Serial	CL TR BL SI
TLC5924		Analog	4	16	Series/parallel	3.0-5.5	17	80	–	OVM/TSD/LOD	Serial	CL TR BL SI
TLC5940		PWM/analog	4	16	Series/parallel	3.0-5.5	17	120	–	TSD/LOD	Serial	CL TR BL SI
TLC5941		PWM/analog	4	16	Series/parallel	3.0-5.5	17	80	–	TSD/LOD	Serial	CL TR BL SI
TLC5942		PWM/analog	4	16	Series/parallel	3.0-5.5	17	50	–	TSD/LOD	Serial	CL TR BL SI
TLC5943		PWM/analog	4	16	Series/parallel	3.0-5.5	17	50	–	TSD/LOD	Serial	CL TR BL SI
TLC5945		PWM/analog	4	16	Series/parallel	3.0-5.5	17	80	–	TSD/LOD	Serial	CL TR BL SI
TLC5946	PWM/analog	4	16	Series/parallel	3.0-5.5	17	40	–	TSD/LOD	Serial	CL TR BL SI	

MARKETS LEGEND

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*Diagnostic capabilities: TSD: Thermal shutdown, TEF: Thermal error flag, OVM: Output voltage monitoring, LOD: LED open detection

Innovative Technologies

CML offers a number of voltage-to-current drivers/ballasts that are ideal for CML's line of LED light engines. These LED drivers convert a voltage power supply and output a constant current to the LED modules over a specific voltage range.



Features ▶

- Constant-current outputs
- Drive from 1-16 LEDs
- Wide input voltage range
- Some models with PWM dimming
- Custom current outputs are available upon request

Benefits ▶

- Compact size
- High reliability
- Short circuit and overload protection
- Ideal for use with CML LED modules

Applications ▶

- Architectural and landscape lighting
- Task, track, and cabinet lighting
- Point-of-purchase and display case lighting
- Interior lighting



PS0006-PS0010

Product Specifications ▶

Part Number	Type	Dimming Type	Size (L x W x H) (Inches)	Max. # of LEDs	LED Configuration	Input Voltage (V)	Output Voltage (VDC)	Max. Output Current (mA)	Input Frequency (Hz)	Electrical Isolation	Product Compliance	Temperature Range (°C)	Markets
PS0001	DC/DC	-	1.74 diameter x 0.3	3	Series	10-30	-	350	50/60	-	-	-20 to +60	CL FL TR BL SI
PS0002		-	1.74 diameter x 0.3	1	-	10-30	-	700	50/60	-	-	-20 to +60	CL FL TR BL SI
PS0003		-	1.74 diameter x 0.3	3	Series	10-30	-	600	50/60	-	-	-20 to +60	CL FL TR BL SI
PS0004	DC/DC, AC/DC	PWM	1.88 diameter x 0.55	3	Series	10-30	-	350	50/60	-	-	-20 to +60	CL FL TR BL SI
PS0005		PWM	1.88 diameter x 0.55	1	-	10-30	-	700	50/60	-	-	-20 to +60	CL FL TR BL SI
PS0006	AC/DC	-	1.7 x 1.65 x 0.9	2	Series/parallel	100-240 VAC	-	350	50/60	-	C-UR/CE	-20 to +60	CL FL TR BL SI
PS0007		-	1.7 x 1.65 x 0.9	1	-	100-240 VAC	-	700	50/60	-	C-UR/CE	-20 to +60	CL FL TR BL SI
PS0008		-	4.05 x 1.5 x 1.06	8	Series/parallel	120 VAC	-	350	50/60	-	C-UR/CE	-20 to +60	CL FL TR BL SI
PS0009		-	4.05 x 1.5 x 1.06	4	Series/parallel	120 VAC	-	700	50/60	-	C-UR/CE	-20 to +60	CL FL TR BL SI
PS0010		-	5.39 x 1.65 x 1.14	16	Series/parallel	120 VAC	-	700	50/60	-	C-UR/CE	-20 to +60	CL FL TR BL SI
PS0011		-	5.39 x 1.65 x 1.14	8	Series/parallel	120 VAC	-	350	50/60	-	C-UR/CE	-20 to +60	CL FL TR BL SI
PS0012		-	2.6 x 1.38 x 1.06	5	Series/parallel	100-240 VAC	-	350	50/60	-	C-UR/CE	-20 to +60	CL FL TR BL SI
PS0013		-	2.6 x 1.38 x 1.06	2	Series/parallel	100-240 VAC	-	700	50/60	-	C-UR/CE	-20 to +60	CL FL TR BL SI

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Multiple LED Driver Module

1.88" diameter
0.48" highest component dimension including PCB



Single LED Driver Module

1.74" total diameter
0.88" inner diameter
0.24" highest component dimension including PCB



LED Power Supplies and Drivers

OSRAM OPTOTRONIC® power supplies and drivers are specifically designed for operating LED systems. OPTOTRONIC AC/DC and DC/DC power solutions come in a variety of configurations to meet the demands of LED applications. Configurations are available with either constant voltage or constant current outputs.



Features ▶

- UL Class 2 output
- Wide input voltage range with 277V types available
- Meet the highest industry standards for LED power converters
- Broad range of constant voltage or constant current products available with an output wattage of 3W to 240W
- Outdoor rated configurations available

Benefits ▶

- Optimum operation for LED systems
- Protection against short circuit and overload conditions
- Compliant for a variety of applications

Applications ▶

- Signage
- Architectural lighting
- Area/task illumination
- Retail/display lighting

Product Specifications ▶

Part Number	Type	Dimming Type	Size (L x W x H) (Inches)	Max. # of LEDs	LED Configuration	Input Voltage (V)	Output Voltage (VDC)	Max. Output Current (mA)	Input Frequency (Hz)	Electrical Isolation	Product Compliance	Temperature Range (°C)	Markets
51502	6W AC/DC	-	2.04 x 2.00 x 0.88	-	Parallel	100-120 VAC	10.5	570	50/60	Class 2	cUL/UL/CSA/IP65	-20 to +50	SI
51503		-	2.04 x 2.00 x 0.88	-	Parallel	100-120 VAC	24	250	50/60	Class 2	cUL/UL/CSA/IP65	-20 to +50	CL SI
51512	20W AC/DC	-	2.36 x 2.36 x 1.20	-	Parallel	120-240 VAC	24	830	50/60	Class 2	cUL/UL/CE	-20 to +50	CL SI
51599		-	3.74 x 1.57 x 0.98	-	Parallel	120-240 VAC	10.5	1,905	50/60	Class 2	cUL/UL/IP66	-30 to +60	SI
51505	25W AC/DC	-	3.03 x 3.27 x 1.33	-	Parallel	120 VAC	10.5	2,350	50/60	Class 2	cUL/UL/CSA	-20 to +50	SI
51506		-	5.63 x 2.75 x 1.75	-	Parallel	120 VAC	10.5	2,350	50/60	Class 2	UL	-20 to +50	SI
51527		-	3.07 x 3.15 x 1.02	-	Series	120-277 VAC	18-36	700	50/60	Class 2	cUL/UL/IP66	-30 to +70	CL SI
51509	50W AC/DC	-	9.50 x 1.70 x 1.18	-	Parallel	120-277 VAC	10.5	4,750	50/60	Class 2	cUL/UL/CSA/IP64	-25 to +60	SI
51598		-	9.50 x 1.50 x 0.65	-	Parallel	120 VAC	24	2,100	50/60	Class 2	cUL/UL	-20 to +50	CL SI
51514	75W AC/DC	-	9.50 x 1.63 x 1.18	-	Parallel	120-277 VAC	24	3,100	50/60	Class 2	cUL/UL/CSA/IP64	-25 to +60	CL SI
51510	96W AC/DC	-	7.60 x 2.44 x 1.54	-	Parallel	120-277 VAC	24	4,000	50/60	Class 2	cUL/UL/IP66	-30 to +70	CL SI
51511		-	12.32 x 2.54 x 1.67	-	Parallel	120-277 VAC	24	4,000	50/60	Class 2	cUL/UL/IP66	-30 to +70	CL SI
51515	240W AC/DC	-	11.95 x 5.98 x 2.95	-	Parallel	120-240 VAC	24	3,300/ch.	50/60	Class 2	cUL/UL/IP66	-30 to +70	CL SI
51524	3W AC/DC	-	1.71 x 1.63 x 0.90	-	Series	120-240 VAC	4-12	350	50/60	Class 2	cUL/UL	-20 to +60	CL
51525	9W AC/DC	-	3.15 x 1.58 x 0.87	-	Series	100-120 VAC	1.5-25	350	50/60	Class 2	cUL/UL/CSA	-20 to +50	CL
51526	9W DC/DC	PWM	3.15 x 1.58 x 0.87	-	Series	10-24 VDC	1.5-25	350	-	Class 3	cUL/UL/CSA	-20 to +50	CL SI
51529	40W AC/DC	-	3.74 x 2.76 x 1.26	-	Series	120-277 VAC	12-24	1,400	50/60	Class 2	cUL/UL/IP66	-30 to +70	CL SI
51530		-	3.74 x 2.76 x 1.26	-	Series	120-277 VAC	18-36	1,050	50/60	Class 2	cUL/UL/IP66	-30 to +70	CL SI

MARKETS LEGEND

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OT50/120/24LP part #51598



OT9/100-120/350E part #51525



✕ | **CONTROLS**

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Short-Range Transceivers for Wireless Connectivity

The ADF7000 series of transmitter and transceiver ICs provides high-performance, robust short-range wireless connections. Covering the 75 MHz to 1 GHz frequency range, the ADF7000 series is ideally suited for many applications requiring short-range wireless connectivity. The popular ADIsmLINK™ air-interface protocol allows users to transfer data between multiple end points and a base station (ADF702x) without having to develop their own protocol software. In addition to this, ADI SRD Design Studio™ allows real time simulation and optimization of many of the parameters in a typical wireless system.



Features ▶

- Frequency range from 75 MHz to 1 GHz operation
- Best in class Rx sensitivity
- Data rates up to 384 kbps
- Complete hardware and software tools: ADIsmLINK™, ADI SRD Design Studio™

Benefits ▶

- Wide frequency range
- Extended RF range
- Rapid system development
- Robust short-range wireless connections
- Real time simulation and optimization

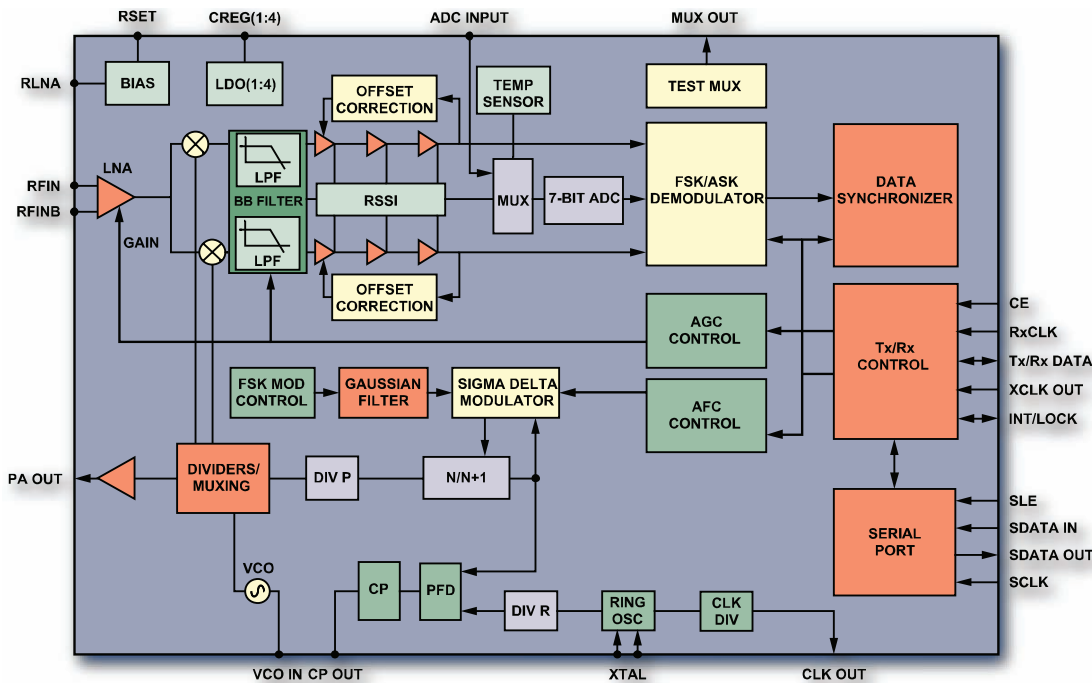
Applications ▶

- Home/building control and automation
- Lighting control
- Wireless metering
- Home security
- Industrial sensors
- Healthcare monitoring
- TV wireless remote control

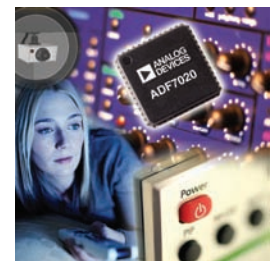
Product Specifications ▶

Part Number	Type	Input Voltage (V)	Over Air Data Rate (kbps)	Data Throughput (kbps)	Frequency (Hz)	Power Consumption (mA)	Range (Meters)	System Resources (KB)	Markets
ADF7012	RF transmitter	2.3-3.6 supply	179.2	179.2	75 MHz-1 GHz	55 mW typ.	>1,000	-	CL FL BL SI
ADF7020	RF transceiver	2.3-3.6 supply	200	200	431 MHz-478 MHz/862 MHz-956 MHz	60 mW typ.	>1,000	-	CL FL BL SI
ADF7020-1		2.3-3.6 supply	200	200	80 MHz-650 MHz	55 mW typ.	>1,000	-	CL FL BL SI
ADF7021		2.3-3.6 supply	24	32.5	80 MHz-650 MHz/868 MHz-940 MHz	58 mW typ.	>1,000	-	CL FL BL SI
ADF7021-N		2.3-3.6 supply	24	32.5	80 MHz-650 MHz/868 MHz-940 MHz	58 mW typ.	>1,000	-	CL FL BL SI

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ADF7020 block diagram



EZ-Color™ High-Brightness LED Control Solutions

Cypress' EZ-Color™ family of devices offers the ideal control solution for high-brightness LED applications requiring intelligent dimming control. EZ-Color devices combine the power and flexibility of Cypress' Programmable System-on-Chip™ (PSoC) with Cypress' precise illumination signal modulation™ (PrISM) technology providing lighting designers a fully-customizable and integrated-lighting solution platform.

EZ-Color devices support up to 16 independent LED channels with up to 16-bit resolution per channel, enabling lighting designers the flexibility to choose the LED array size as well as specific white light CCT or specific color quality. PSoC Designer 5.0 software, with lighting specific drivers, can significantly cut development time and simplify implementation of fixed color points through temperature and LED binning compensation. EZ-Color's virtually limitless analog and digital customization allow for simple integration of features in addition to intelligent lighting, such as battery charging, image stabilization, and motor control during the development process. EZ-Color is also compatible with DMX and DALI control gear.



Features ▶

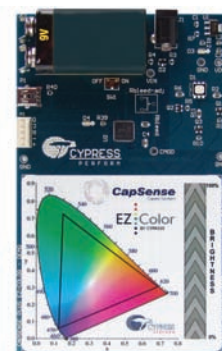
- Up to 16 LED channels
- Programmable 8-bit to 16-bit dimmer resolution
- PrISM modulation technology (patent pending)
- Dynamic reconfiguration
- Supported by PSoC Designer 5.0 design tool

Benefits ▶

- Allows integration of multiple controllers
- High-resolution dimmers enables greater color precision
- PrISM modulation reduces radiated EMI and flickering at low frequencies compared to PWM
- Manufacturer binning, temperature compensation, and optical compensation within embedded visual design tool
- Compatible with DMX and DALI

Applications ▶

- General lighting
- Architectural lighting
- Entertainment lighting
- LCD backlight
- White light



CY3269N lighting starter demonstration kit

Product Specifications ▶

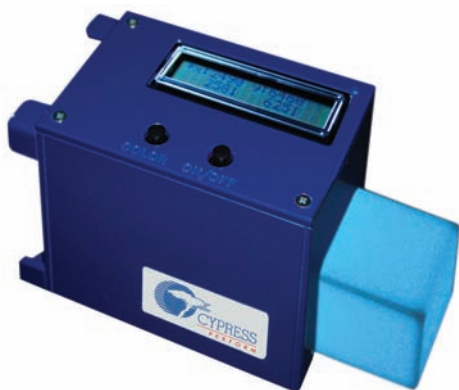
Part Number	Type	PWM Ch. (#)/ Res. (bits)	Flash (KB)	RAM (KB)	ZigBee® Enabled (Y/N)	Core Supply (V)	IO Supply (V)	I ² C/Ch. (#)	UART/Ch. (#)	SPI/Ch. (#)	Operating Temperature (°C)	Markets
CY8CLED02	QFN/SOIC	2*/16	4	0.256	N	3.0-5.25	-	1	1	1	-40 to +85	CL FL BL SI
CY8CLED04	QFN	4*/16	16	1	N	3.0-5.25	-	1	1	1	-40 to +85	CL FL BL SI
CY8CLED08	QFN/SSOP	8*/16	16	0.256	N	3.0-5.25	-	1	Up to 2	Up to 2	-40 to +85	CL FL BL SI
CY8CLED16		16*/16	32	2	N	3.0-5.25	-	1	Up to 4	Up to 4	-40 to +85	CL FL BL SI

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Development software required

*For 8-bit resolution

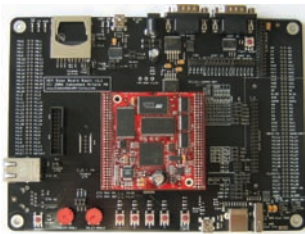


CY3265C-RGB evaluation kit with Cree XLamp LEDs



Fast and Connected ARM7® for Lighting Control Systems

NXP Semiconductors' newest entry in a growing line of ARM7® microcontrollers is a perfect fit for "Connected Lighting Controller" applications. NXP combines the high-performance connectivity of a dual-AHB architecture, enlightened combinations of peripherals (Ethernet, USB OTG, and CAN) with unique, fast, and deterministic I/O ports. With the embedded Ethernet MAC and the feature-rich serial ports, designers can use the LPC24xx as a bridge from IP to DMX512. The fast I/O ports are perfect for software-based PWM intensity control of light sources. Add an external LCD controller and gain the potential for a cost-effective touchscreen lighting scene controller.



LPC2468 demo board (OM10010)

Features ▶

- 72 MHz, 32-bit ARM7TDMI-S with dual-AHB buses and DMA
- Fast I/O suitable for bit-banging PWM outputs at up to 17.5 MHz
- 10/100 Ethernet MAC interface with DMA and MII/RMII interface
- Wide range of peripherals, including CAN, I²S, ADC, and PWM

Benefits ▶

- Dual buses with DMA allow concurrent transactions to get the most performance possible
- External interfaces provide flexibility regarding peripherals and memory
- Give customers the flexibility of lighting control with Ethernet

Applications ▶

- Architectural or landscape lighting
- Signage and gaming
- DMX512-to-Ethernet bridges

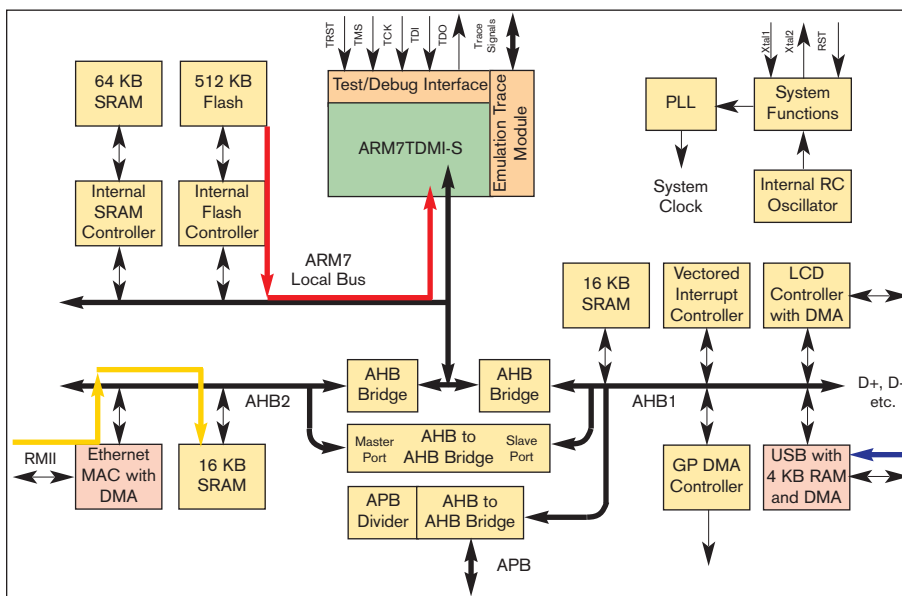
Product Specifications ▶

Part Number	Type	PWM Ch. (#)/ Res. (bits)	Flash (KB)	RAM (KB)	ZigBee® Enabled (Y/N)	Core Supply (V)	IO Supply (V)	I ² C/Ch. (#)	UART/Ch. (#)	SPI/Ch. (#)	Operating Temperature (°C)	Markets
LPC2460	General purpose ARM7® microcontroller with Ethernet, USB, and CAN	HW: 2 PWM/4 timers SW: Scalable	-	98	N	3.0-3.6	3.0-3.6	3	4	3	-40 to +85	CL TR BL SI
LPC2468		HW: 2 PWM/4 timers SW: Scalable	512	98	N	3.0-3.6	3.0-3.6	3	4	3	-40 to +85	CL TR BL SI

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Development software required



Two AHB buses with three DMA engines allow concurrent transactions for high performance



I²C LED Color Controllers

NXP Semiconductors offers a wide-variety of LED color controllers based on the I²C control bus. I²C provides easy connectivity while the integrated PWMs provide smooth color control. Drive quickly changing displays with the new PCA963x when using the fast-mode plus I²C protocol for I²C speeds up to 1 MHz and 10x the drive on the I²C bus for large networks. Set each LED to a specific brightness and dim or blink all of them with the same value. Special I²C command features optimize I²C bus commands in multi-LED control applications.

Features ▶

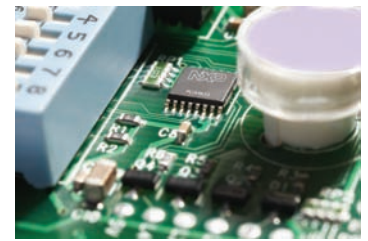
- I²C provides a software scalable architecture; many devices allow 126 nodes on a single bus
- Each output provides up to 25 mA of sink current and 5V tolerant outputs
- 8-bit PWMs on all devices with the PCA963x devices providing an 8-bit global PWM
- Small packages available including SO, TSSOP/MSOP, HVQFN, and HVSON
- New "sub call" command in the PCA963x devices

Benefits ▶

- Easily connects nodes in a multi-drop configuration
- High sink current, 5V tolerance is suitable for driving large transistors or constant-current sources
- 256 levels of brightness control on all devices with the PCA963x devices providing 256 levels of global brightness or blinking
- Small packages allow use in portable applications or space-constrained lighting modules
- Controls color of all devices (or four groups of devices) with a single I²C command sequence (PCA963x devices)

Applications ▶

- Architectural or landscape lighting
- Signage and gaming
- LCD backlights
- LCD or keypad backlights
- Hands-free device status indicators



Color-mixing RGB LED drivers for mobile, entertainment, and architectural lighting

Product Specifications ▶

Part Number	Type	PWM Ch. (#)/ Res. (bits)	Flash (KB)	RAM (KB)	ZigBee® Enabled (Y/N)	Core Supply (V)	IO Supply (V)	I ² C/Ch. (#)	UART/Ch. (#)	SPI/Ch. (#)	Operating Temperature (°C)	Markets
PCA9530	I ² C LED dimmer 2 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9531	I ² C LED dimmer 8 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9532	I ² C LED dimmer 16 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9533	I ² C LED dimmer 4 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9550	I ² C LED blinker 2 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9551	I ² C LED blinker 8 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9552	I ² C LED blinker 16 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9553	I ² C LED blinker 4 outputs	2/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9633	I ² C LED color controller-4 outputs 1 MHz fast-mode plus	4/8 + global/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9634	I ² C LED color controller-8 outputs 1 MHz fast-mode plus	8/8 + global/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI
PCA9635	I ² C LED color controller-16 outputs 1 MHz fast-mode plus	16/8 + global/8	-	-	N	2.3-5.5	5.5	1	-	-	-40 to +85	CL TR BL SI

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Development software required



The PCA9633 Demo Board drives and mixes four LED colors (RGBA) to easily demonstrate networked I²C for signage and architectural lighting applications; order number OM6276

Demo board schematic

Arrow Electronics Lighting Group

1.888.9LIGHT1

<http://lighting.arrow.com>



LED Control Solutions

OSRAM OPTOTRONIC® control solutions are compact, electronically stabilized control interface units with input line voltages ranging from 10 VDC to 24 VDC for use with the most popular LED power supplies. OPTOTRONIC control interfaces complete the system of innovative control gear and open up even more possibilities for dynamic control of LED based lighting solutions.



Features ▶

- Lightweight and low-profile
- Utilizes pulse width modulation (PWM) to control LED performance
- Dimming range from 0% to 100%
- UL-recognized component
- Options available to adapt an LED system to analog or DMX controllers

Benefits ▶

- Allows for integration of dynamic control into LED systems
- Fits into low profile luminaires
- Compatible with various controllers

Applications ▶

- Architectural lighting
- Area/task illumination
- Signage
- Accent lighting

Product Specifications ▶

Part Number	Type	Dimming System	Wireless Controller	Input Voltage (V)	# Addresses	Software Required (Y/N)	Programmable (Y/N)	Interactive Keypad (Y/N)	Mounting System	Power Supply Required (Y/N)	Markets
51516	2-channel dimming control interface	Analog	-	10-24	1	N	N	N	-	Y	CL SI
51517	3-channel dimming control interface	Analog	-	10-24	3	N	N	N	-	Y	CL SI
51600		DMX512	-	10-24	3	N	N	N	-	Y	CL SI
51518	3-channel color sequencing control interface	Analog	-	10-24	3	N	Y	N	-	Y	CL SI

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All photos courtesy of OSRAM SYLVANIA®

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ZigBee® Wireless Lighting Control

ZigBee® is a standard for low-power wireless mesh networks intended for monitoring and control. This makes ZigBee an ideal solution for lighting systems and enables users to fully control all lights and reduce energy costs. The ZigBee technology can be used in a number of application areas including home lighting, commercial lighting, industrial lighting, and street lighting.



Features ▶

- Low-power wireless mesh network
- Open global standard
- Based on well-known IEEE 802.15.4 specification
- Over air download

Benefits ▶

Low-Power Wireless Mesh Network

- Reliable and robust self-healing wireless network
- Ideal for battery-operated devices
- Easily extendable

Open Global Standard

- Multiple vendors with certified ZigBee® stacks available
- Standardized installation
- Suitable both for private networks and networks that require interoperability

Based on IEEE 802.15.4 Specification

- Excellent co-existence with Bluetooth® and Wi-Fi™
- Very small footprint for radios and system-on-chips
- A standardized radio ensures low-cost solutions
- Over air download: firmware can be upgraded in the field

Applications ▶

- General lighting control
- Home and building automation
- Industrial monitoring and control
- Sensor networks
- Meter reading



Product Specifications ▶

Part Number	Type	Input Voltage (V)	Over Air Data Rate (kbps)	Data Throughput (kbps)	Frequency (Hz)	Power Consumption	Range (Meters)	System Resources (KB)	Markets
CC2520	Transceiver	1.8-3.6	250	40-150	2,394 MHz-2,507 MHz	RX: 18.5 mA/sleep: <1 uA	10-400	2x 128 byte RX/TX FIFOs	CL
CC2430	System-on-chip	2.0-3.6	250	40-150	2,400 MHz-2,483 MHz	RX: 27 mA/sleep: <1 uA	10-100	4+4 kB SRAM/128 kB Flash	CL
CC2480	Network processor	2.0-3.6	250	40-150	2,400 MHz-2,483 MHz	RX: 27 mA, sleep: <1 uA	10-100	-	CL

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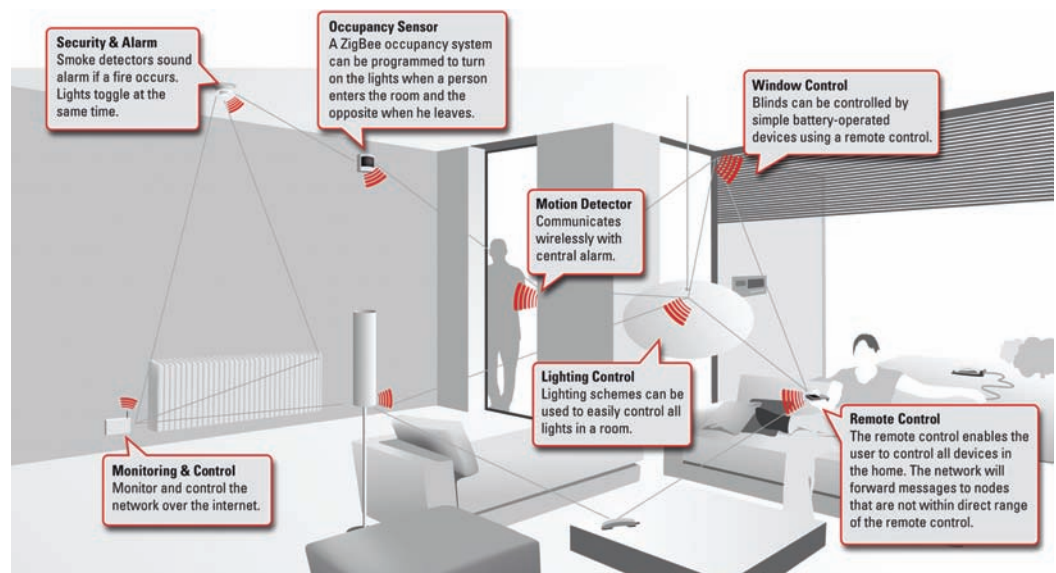
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Software ▶

In addition to hardware, TI offers a ZigBee® and ZigBee Pro compliant ZigBee protocol stack, the Z-Stack. We offer the full ZigBee stack free of charge: Z-Stack version 2.1.0, including Home Automation Profile

Development Tools

Part Number	Development Tool
CC2520	CC2520DK
CC2430	CC2430ZDK
CC2480	eZ430-RF2480





C28x 32-Bit High Performance Controller— 100 LQFP or BGA

The F28x 32-bit MCU can control the power stage and regulate LED driving currents, eliminating the need of multiple controllers in such applications. It also offers automatic operating stage (such as blown string) detection and protection, temperature monitoring for thermal runaway prevention, precise operating voltage and current control for precise light intensity, color mix/temperature control, and increased efficiency. F28x offers uniform platform for different LED types or configurations with easy system networking. One F28x MCU can control LED lighting and power line communication system, DALI and other lighting control standards easily added. On-chip peripherals (SPI, UART, etc.) simplify interfacing with other systems.

Features ▶

- 60 MHz to 100 MHz performance
- 10 PWMs to 16 PWMs (up to 16 high-resolution, 150 ps)
- ADC: 12-bit, 16-channel, 12.5 MSPS
- 32 KB to 128 KB Flash
- I²C (PMBus), CAN, SPI, UART
- 100-pin LQFP or BGA package

Benefits ▶

- One MCU controls the power stage and regulates LED driving currents
- Precise LED lighting control
- Easy system networking
- Backlight and power supply control
- Simple system integration

Applications ▶

- LED street lighting
- LED backlighting

Product Specifications ▶

Part Number	Type	Dimming System	Wireless Controller	Input Voltage (V)	# Addresses	Software Required (Y/N)	Programmable (Y/N)	Interactive Keypad (Y/N)	Mounting System	Power Supply Required (V/N)	Markets
TMS320F2808	System-on-chip	PWM	–	1.8	–	Y	Y	N	–	Y	CL TR BL SI
TMS320F28015		PWM	–	1.8	–	Y	Y	N	–	Y	CL TR BL SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING

FL FLASHLIGHTS

TR TRANSPORTATION

BL BACKLIGHTING

SI SIGNAGE

✕ | OPTICS

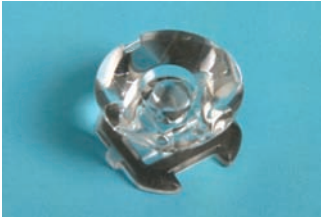
- ▶ Dialight Lumidrives 84
- ▶ Fraen Corporation 85-86



Dialight

Lumidrives Lenses

Dialight's standard lenses and lens kits, drivers, and light engines allow designers to develop, trouble-shoot, and produce the solid-state lighting solution applications require. Standard lenses, provided for all leading manufacturers of LEDs with multiple radiation patterns, are complemented by intelligent constant-current drivers, as well as light engines in circular or linear styles.



Features ▶

- Designed for HB-LEDs from all leading manufacturers
- Multiple radiation patterns—narrow, medium, wide spot, and oval distribution
- Available in kit or individual form

Benefits ▶

- Precise location over LED for maximum light transmission
- Easy-to-apply self-adhesive lens
- Snap-on secondary lenses provide medium, wide, and oval beam distribution

Applications ▶

- Machine and task lighting
- Architectural and theme lighting
- Portable lighting
- Equipment illumination

Product Specifications ▶

Part Number	Type	LED Type	Distribution Type	Material Type	Distribution Angle (θ)	Attachment Method	Optical Holder (Y/N)	Max. Operating Temp. (°C)	Markets
OPTX-1-006	Secondary	Cree XLamp	Spot	PMMA acrylic	12	Self-adhesive	N	105	CL FL TR SI
OPIO-1-011		Nichia Jupiter	Spot	PMMA acrylic	22	Self-adhesive	N	105	CL FL TR SI
OPGD-1-002		OSRAM® Golden DRAGON®	Spot	PMMA acrylic	4	Self-adhesive	N	105	CL FL TR SI
OPK2-1-003		Luxeon 1W, 3W, 5W/K2	Spot	PMMA acrylic	6	Self-adhesive	N	105	CL FL TR SI
OPAA-1-DF	Tertiary	Cree XLamp	Medium	PMMA acrylic	16	Clip onto self-adhesive	N	105	CL FL TR SI
OPAA-1-WSL		Cree XLamp	Wide	PMMA acrylic	32	Clip onto self-adhesive	N	105	CL FL TR SI
OPAA-1-OSL		Cree XLamp	Oval	PMMA acrylic	16 x 50	Clip onto self-adhesive	N	105	CL FL TR SI
OPAA-1-DF		Nichia Jupiter	Medium	PMMA acrylic	26	Clip onto self-adhesive	N	105	CL FL TR SI
OPAA-1-WSL		Nichia Jupiter	Wide	PMMA acrylic	36	Clip onto self-adhesive	N	105	CL FL TR SI
OPAA-1-OSL		Nichia Jupiter	Oval	PMMA acrylic	24 x 48	Clip onto self-adhesive	N	105	CL FL TR SI
OPAA-1-DF		OSRAM Golden DRAGON	Medium	PMMA acrylic	10	Clip onto self-adhesive	N	105	CL FL TR SI
OPAA-1-WSL		OSRAM Golden DRAGON	Wide	PMMA acrylic	30	Clip onto self-adhesive	N	105	CL FL TR SI
OPAA-1-OSL		OSRAM Golden DRAGON	Oval	PMMA acrylic	8 x 54	Clip onto self-adhesive	N	105	CL FL TR SI
OPAA-1-DF		Luxeon 1W, 3W, 5W/K2, Seoul Semiconductor	Medium	PMMA acrylic	12	Clip onto self-adhesive	N	105	CL FL TR SI
OPAA-1-WSL		Luxeon 1W, 3W, 5W/K2, Seoul Semiconductor	Wide	PMMA acrylic	24	Clip onto self-adhesive	N	105	CL FL TR SI
OPAA-1-OSL		Luxeon 1W, 3W, 5W/K2, Seoul Semiconductor	Oval	PMMA acrylic	8 x 54	Clip onto self-adhesive	N	105	CL FL TR SI
OH-ES1-WH	White optical holders and F-form lenses	Seoul Semiconductor, Luxeon 1W Star and direct mount	–	Polycarbonate	–	Glue-down snap type	Y	125	CL FL TR SI
OH-GD-WH		Fits OSRAM Golden DRAGON	–	Polycarbonate	–	Glue-down snap type	Y	125	CL FL TR SI
OH-K2-WH		Fits K2	–	Polycarbonate	–	Glue-down snap type	Y	125	CL FL TR SI
OP-005		Seoul Semiconductor, Luxeon 1W, 3W, 5W/K2, OSRAM, Cree, Nichia	Spot	PMMA acrylic	10	Snaps in glue-down	Y	105	CL FL TR SI
OP-015		Seoul Semiconductor, Luxeon 1W, 3W, 5W/K2, OSRAM, Cree, Nichia	Medium	PMMA acrylic	30	Snaps in glue-down	Y	105	CL FL TR SI
OP-025		Seoul Semiconductor, Luxeon 1W, 3W, 5W/K2, OSRAM, Cree, Nichia	Wide	PMMA acrylic	50	Snaps in glue-down	Y	105	CL FL TR SI
OP-520		Seoul Semiconductor, Luxeon 1W, 3W, 5W/K2, OSRAM, Cree, Nichia	Oval	PMMA acrylic	10 x 40	Snaps in glue-down	Y	105	CL FL TR SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



ADBACK optic base



ADBACK optic sub-lenses



F-form optic sub-lenses



F-form optic holders (shown with optics inserted)

Innovative Optical Solutions for Maximizing Light

As one of the world's premier optics providers for high-powered LEDs, Fraen continues to develop leading-edge standard optical components. These innovative solutions have all been specifically engineered, designed, and optimized for each individual LED.



Features ▶

- High-efficiency TIR and reflector solutions
- Adjustable beam solutions available
- Complete range of lenses
- Software-optimized aspheric profile
- Optimized lens holders and spacer rings available

Benefits ▶

- Custom solutions available
- Fully-automated lens injection molding in United States
- New flat-top geometry allows for a wider range of beam shaping options
- Provides the maximum performance possible utilizing the benefits of this new LED technology
- New reflectors use faceted structure technology providing excellent color mixing and uniformity

Applications ▶

- Architectural lighting
- Street lights
- Portable lighting
- Emergency lighting
- General illumination (MR11, MR16, and downlights)
- White goods and power tools



Product Specifications ▶

Part Number	Type	LED Type	Distribution Type	Material Type	Distribution Angle (θ)	Attachment Method	Optical Holder (Y/N)	Max. Operating Temp. (°C)	Markets	
FC-N2-XR79-ZZ	Secondary	Cree XR-E 7090 LED	Narrow beam	Optical grade PMMA	8	Holder can be glued to PCB	zz=OR or HRF	80	CL FL TR BL SI	
FC-M2-XR79-ZZ		Cree XR-E 7090 LED	Medium beam	Optical grade PMMA	21	Holder can be glued to PCB	zz=OR or HRF	80	CL FL TR BL SI	
FC-W2-XR79-ZZ		Cree XR-E 7090 LED	Wide beam	Optical grade PMMA	29	Holder can be glued to PCB	zz=OR or HRF	80	CL FL TR BL SI	
FC-E2-XR79-ZZ		Cree XR-E 7090 LED	Elliptical beam	Optical grade PMMA	8 x 44	Holder can be glued to PCB	zz=OR or HR	80	CL FL TR BL SI	
FCT3-N2-XR79-ZZZZ		Cree XR-E 7090 LED	Narrow beam	Optical grade PMMA	8	Holder can be glued to PCB	ZZZZ=HRLC or HRCN	80	CL FL TR BL SI	
FCT3-M2-XR79-ZZZZ		Cree XR-E 7090 LED	Medium beam	Optical grade PMMA	21	Holder can be glued to PCB	ZZZZ=HRLC or HRCN	80	CL FL TR BL SI	
FCT3-W2-XR79-ZZZZ		Cree XR-E 7090 LED	Wide beam	Optical grade PMMA	29	Holder can be glued to PCB	ZZZZ=HRLC or HRCN	80	CL FL TR BL SI	
FCG-N1-XR79-ZZ		Cree XR-E 7090 LED	Narrow beam	Optical grade PMMA	6	Holder can be heat staked to PCB	zz=OR or HR	80	CL FL TR BL SI	
FCG-M1-XR79-ZZ		Cree XR-E 7090 LED	Medium beam	Optical grade PMMA	28	Holder can be heat staked to PCB	zz=OR or HR	80	CL FL TR BL SI	
FCG-W1-XR79-ZZ		Cree XR-E 7090 LED	Wide beam	Optical grade PMMA	42	Holder can be heat staked to PCB	zz=OR or HR	80	CL FL TR BL SI	
FCG-E1-XR79-ZZ		Cree XR-E 7090 LED	Elliptical beam	Optical grade PMMA	7 x 45	Holder can be heat staked to PCB	zz=OR or HR	80	CL FL TR BL SI	
FC3-N1-XR79-H		Cree XR-E 7090 LED	Narrow beam	Optical grade PMMA	6	Holder can be heat staked to PCB	N	80	CL FL TR BL SI	
FC3-M1-XR79-H		Cree XR-E 7090 LED	Medium beam	Optical grade PMMA	28	Holder can be heat staked to PCB	N	80	CL FL TR BL SI	
FC3-W1-XR79-H		Cree XR-E 7090 LED	Wide beam	Optical grade PMMA	42	Holder can be heat staked to PCB	N	80	CL FL TR BL SI	
FNP-N1-N083-ZZ		Nichia 083 Rigel LED	Narrow beam	Optical grade PMMA	10	Holder can be glued to PCB	zz=OR or HRF	80	CL FL TR BL SI	
FNP-M1-N083-ZZ		Nichia 083 Rigel LED	Medium beam	Optical grade PMMA	27	Holder can be glued to PCB	zz=OR or HRF	80	CL FL TR BL SI	
FNP-W1-N083-ZZ		Nichia 083 Rigel LED	Wide beam	Optical grade PMMA	40	Holder can be glued to PCB	zz=OR or HRF	80	CL FL TR BL SI	
FNP-E1-N083-ZZ		Nichia 083 Rigel LED	Elliptical beam	Optical grade PMMA	13 x 42	Holder can be glued to PCB	zz=OR or HRF	80	CL FL TR BL SI	
FRC-N1-XR79-OR		Reflector	Cree XR-E 7090 LED	Narrow beam	PC	7	Holder can be glued to PCB	N	120	CL FL TR BL SI
FRC-N1-MCE-OR			Cree MC-E LED	Narrow beam	PC	11†	Holder can be glued to PCB	N	120	CL FL TR BL SI
FRC-M1-MCE-OR	Cree MC-E LED		Medium beam	PC	25†	Holder can be glued to PCB	N	120	CL FL TR BL SI	
FRC-W1-MCE-OR	Cree MC-E LED		Wide beam	PC	45†	Holder can be glued to PCB	N	120	CL FL TR BL SI	
FRC-W1-XR79-OR	Cree XR-E 7090 LED		Flood beam	PC	60	Holder can be glued to PCB	N	120	CL FL TR BL SI	

MARKETS LEGEND

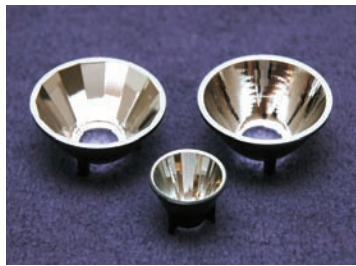
CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Distribution angle changes with LED color (see product datasheets); FWHM=full beamwidth measured at one-half of peak intensity; lenses can be ordered either alone, or with a spacer ring, or assembled with a holder; spacers must be ordered separately (when required); OS: lens only; OR: lens only; HS: square flange with holder; HR: round flange with holder; HST: square flange with transparent holder; HRF: round holder with flat bottom; If using FDG lens without holder, a spacer ring (p/n FDS-OS) is required and must be ordered separately. See Fraen datasheet for more details. †Beam angle is estimated from computer simulation



Innovative Optical Solutions for Maximizing Light

Staying consistent with its philosophy to introduce “revolutionary” products, Fraen is planning to release a new family of variable focus optical systems in Q4 2008. These systems have been specifically designed to set a new standard by exceeding the variable beam requirements within the portable lighting market.



Features ▶

- High-efficiency TIR and reflector solutions
- Adjustable beam solutions available
- Complete range of lenses
- Software-optimized aspheric profile
- Optimized lens holders and spacer rings available

Benefits ▶

- Custom solutions available
- Fully-automated lens injection molding in U.S.
- New flat-top geometry allows wider range of beam shaping options
- Provides the maximum performance possible utilizing the benefits of this new LED technology
- New reflectors use faceted structure technology providing excellent color mixing and uniformity

Applications ▶

- Architectural lighting
- Street lights
- Portable lighting
- Emergency lighting
- General illumination (MR11, MR16, and downlights)
- White goods and power tools

Product Specifications ▶									
Part Number	Type	LED Type	Distribution Type	Material Type	Distribution Angle (θ)	Attachment Method	Optical Holder (Y/N)	Max. Operating Temp. (°C)	Markets
FDP-N1-D01-ZZ	Secondary	OSRAM® Golden DRAGON®	Narrow beam	Optical grade PMMA	13	Holder can be heat-staked to PCB	zz=OS, HS, or HSA	80	CL FL TR BL SI
FDP-M1-D01-ZZ		OSRAM Golden/Platinum DRAGON	Medium beam	Optical grade PMMA	18	Holder can be heat-staked to PCB	zz=OS, HS, or HSA	80	CL FL TR BL SI
FDG-N1-D01-ZZ		OSRAM Golden/Platinum/Diamond DRAGON	Narrow beam	Optical grade PMMA	6.5	Holder can be heat-staked to PCB	zz=OS, HS	80	CL FL TR BL SI
FDG-M1-D01-ZZ		OSRAM Golden/Platinum/Diamond DRAGON	Medium beam	Optical grade PMMA	20.5	Holder can be heat-staked to PCB	zz=OS, HS	80	CL FL TR BL SI
FDG-W1-D01-ZZ		OSRAM Golden/Platinum/Diamond DRAGON	Wide beam	Optical grade PMMA	33.5	Holder can be heat-staked to PCB	zz=OS, HS	80	CL FL TR BL SI
FDG-E1-D01-ZZ		OSRAM Golden/Platinum/Diamond DRAGON	Elliptical beam	Optical grade PMMA	10 x 20	Holder can be heat-staked to PCB	zz=OS, HS	80	CL FL TR BL SI
FD3-N1-D01-H		OSRAM Golden/Platinum DRAGON	Narrow beam	Optical grade PMMA	10	Holder can be heat-staked to PCB	N	80	CL FL TR BL SI
FD3-M1-D01-H		OSRAM Golden/Platinum DRAGON	Medium beam	Optical grade PMMA	13	Holder can be heat-staked to PCB	N	80	CL FL TR BL SI
FD4-M1-D01-O		OSRAM Golden/Platinum DRAGON	Medium beam	Optical grade PMMA	21.5	Custom MR 16	N	80	CL FL TR BL SI
FSP-N1-SSP4-ZZ		Seoul Semiconductor z-power P4	Narrow beam	Optical grade PMMA	10	Holder can be heat-staked to PCB	zz=OR or HRF	80	CL FL TR BL SI
FSP-M1-SSP4-ZZ		Seoul Semiconductor z-power P4	Medium beam	Optical grade PMMA	24	Holder can be heat-staked to PCB	zz=OR or HRF	80	CL FL TR BL SI
FSP-W1-SSP4-ZZ		Seoul Semiconductor z-power P4	Wide beam	Optical grade PMMA	38	Holder can be heat-staked to PCB	zz=OR or HRF	80	CL FL TR BL SI
FSP-E1-SSP4-ZZ		Seoul Semiconductor z-power P4	Elliptical beam	Optical grade PMMA	10 x 50	Holder can be heat-staked to PCB	zz=OR or HRF	80	CL FL TR BL SI
FP3-N1-SSP4-H		Seoul Semiconductor z-power P4	Narrow beam	Optical grade PMMA	10	Holder can be heat-staked to PCB	N	80	CL FL TR BL SI
FP3-M1-SSP4-H		Seoul Semiconductor z-power P4	Medium beam	Optical grade PMMA	24	Holder can be heat-staked to PCB	N	80	CL FL TR BL SI
FP3-W1-SSP4-H		Seoul Semiconductor z-power P4	Wide beam	Optical grade PMMA	38	Holder can be heat-staked to PCB	N	80	CL FL TR BL SI
FSG-N1-SSP4-ZZ		Seoul Semiconductor z-power P4	Narrow beam	Optical grade PMMA	8†	Holder can be heat-staked to PCB	zz=OR or HR	80	CL FL TR BL SI
FSG-M1-SSP4-ZZ		Seoul Semiconductor z-power P4	Medium beam	Optical grade PMMA	25†	Holder can be heat-staked to PCB	zz=OR or HR	80	CL FL TR BL SI
FSG-W1-SSP4-ZZ		Seoul Semiconductor z-power P4	Wide beam	Optical grade PMMA	45†	Holder can be heat-staked to PCB	zz=OR or HR	80	CL FL TR BL SI
FSG-E1-SSP4-ZZ		Seoul Semiconductor z-power P4	Elliptical beam	Optical grade PMMA	10 x 50†	Holder can be heat-staked to PCB	zz=OR or HR	80	CL FL TR BL SI
FS3-N1-SSP4-H	Seoul Semiconductor z-power P4	Narrow beam	Optical grade PMMA	8†	Holder can be heat-staked to PCB	N	80	CL FL TR BL SI	
FS3-M1-SSP4-H	Seoul Semiconductor z-power P4	Medium beam	Optical grade PMMA	25†	Holder can be heat-staked to PCB	N	80	CL FL TR BL SI	
FS3-W1-SSP4-H	Seoul Semiconductor z-power P4	Wide beam	Optical grade PMMA	45†	Holder can be heat-staked to PCB	N	80	CL FL TR BL SI	
FCM-N1-SSP5-Z	Seoul Semiconductor z-power P5	Narrow beam	Optical grade PMMA	17	Holder can be heat-staked to PCB	z=O or H	80	CL FL TR BL SI	
FCM-M1-SSP5-Z	Seoul Semiconductor z-power P5	Medium beam	Optical grade PMMA	32	Holder can be heat-staked to PCB	z=O or H	80	CL FL TR BL SI	
FCM-W1-SSP5-Z	Seoul Semiconductor z-power P5	Wide beam	Optical grade PMMA	42	Holder can be heat-staked to PCB	z=O or H	80	CL FL TR BL SI	
FCM-E1-SSP5-Z	Seoul Semiconductor z-power P5	Elliptical beam	Optical grade PMMA	15 x 50	Holder can be heat-staked to PCB	z=O or H	80	CL FL TR BL SI	
FRC-N1-0E2B-O	Reflector	OSRAM 4/6-chip OSTAR LED	Narrow Beam	Ultem	11	Holder can be glued	N	150	CL FL TR BL SI
FRC-M1-0E2B-O		OSRAM 4/6-chip OSTAR LED	Medium beam	Ultem	25	Holder can be glued to PCB	N	150	CL FL TR BL SI
FRC-N1-A3P7-OR		Seoul Semiconductor P7 LED	Narrow beam	PC	11†	Holder can be glued to PCB	N	120	CL FL TR BL SI
FRC-M1-A3P7-OR		Seoul Semiconductor P7 LED	Medium beam	PC	25†	Holder can be glued to PCB	N	120	CL FL TR BL SI
FRC-W1-A3P7-OR		Seoul Semiconductor P7 LED	Wide beam	PC	45†	Holder can be glued to PCB	N	120	CL FL TR BL SI

MARKETS LEGEND CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Distribution angle changes with LED color (see product datasheets); FWHM=full beamwidth measured at one-half of peak intensity; lenses can be ordered either alone, or with a spacer ring, or assembled with a holder; spacers must be ordered separately (when required); OS: lens only; OR: lens only; HS: square flange with holder; HR: round flange with holder; HST: square flange with transparent holder; HRF: round holder with flat bottom; If using FDG lens without holder, a spacer ring (p/n FDS-OS) is required and must be ordered separately. See Fraen datasheet for more details. †Beam angle is estimated from computer simulation

Arrow Electronics Lighting Group

1.888.9LIGHT1

<http://lighting.arrow.com>



THERMAL MANAGEMENT

- ▶ Aavid Thermalloy 90
- ▶ AVC America 91





Cooling Solutions

Aavid Thermalloy is ready to guide customers through thermal design issues from concept to production with solutions that provide a competitive advantage. With a wide selection of standard products, Aavid Thermalloy provides fast access to cooling solutions for the new generation of LED light sources. Standard products are easily configured for rapid prototyping and our global footprint delivers the integrated solution cost effectively.



Extruded 637303B03000G

Features ▶

Stamping

- Lightweight
- Variety of fin configurations

Pin Fin

- Fin array allows airflow in any direction
- Compact size
- Available with pre-applied thermal tape

Extrusion

- Highly configurable
- Low thermal resistance

Benefits ▶

Stamping

- Requires minimal structural support
- Use with natural or forced convection airflow
- Can support high-volume production

Pin Fin

- Excellent forced convection cooling
- Reduced space requirement
- Simple assembly

Extrusion

- Can incorporate structural and aesthetic elements
- Cools multiple devices

Applications ▶

Stamping

- Commercial lighting
- Signals
- Transportation

Pin Fin

- Commercial lighting
- Signals
- Transportation

Extrusion

- Commercial lighting
- Signals
- Transportation

Product Specifications ▶

Part Number	Type	Shape	LED Wattage (W)	Material Type	Thermal Expansion ($10^{-6}\text{m/m}/^{\circ}\text{K}$)	Thermal Conductivity ($\text{W/m}\cdot^{\circ}\text{K}$)	Thermal Impedance ($^{\circ}\text{C}/\text{W}$)	Size L x W x H (mm)	LED Surface Area (mm^2)	Volume (mm^3)	Markets
500400B0000G	Stampings	Square	10	Al-1100	23.6	220	5.0	46 x 46 x 32	2,116	67,712	CL TR BL SI
569000B0000G		Square	9	Al-1100	23.6	220	5.5	46 x 46 x 33	2,116	69,828	CL TR BL SI
373024B00000G	Pin fin	Square	2	Al-6063	23.4	209	33.3	28 x 28 x 9	784	7,056	CL TR BL SI
371824B00000G		Square	2	Al-6063	23.4	209	31.9	35 x 35 x 7	1,225	8,575	CL TR BL SI
364424B00000G		Square	3	Al-6063	23.4	209	18.4	40 x 40 x 11	1,600	18,240	CL TR BL SI
374424B00035G	Pin fin/thermal tape	Square	2	Al-6063	23.4	209	20.3	27 x 27 x 18	729	13,122	CL TR BL SI
375024B00032G		Square	4	Al-6063	23.4	209	12.2	40 x 40 x 18	1,600	28,800	CL TR BL SI
374724B00032G		Square	3	Al-6063	23.4	209	15.3	35 x 35 x 18	1,225	22,050	CL TR BL SI
637303B03000G	Extruded sink	Square	27	Al-6063	23.4	209	1.8	76 x 76 x 57	5,776	329,232	CL TR BL SI
766203B04000G		Square	28	Al-6063	23.4	209	1.8	102 x 102 x 32	10,404	332,928	CL TR BL SI
601403B06000G		Square	51	Al-6063	23.4	209	1.0	154 x 154 x 44	23,716	1,043,504	CL TR BL SI
656053B07000G		Square	106	Al-6063	23.4	209	0.5	177 x 177 x 71	31,329	2,224,359	CL TR BL SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING

FL FLASHLIGHTS

TR TRANSPORTATION

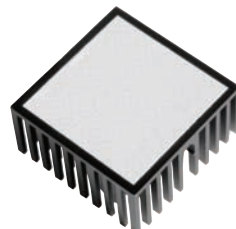
BL BACKLIGHTING

SI SIGNAGE

Contact Arrow for samples



Stamped 569000B00000G



Pin fin/thermal tape
374724B00032G



Extruded 766203B04000G

LED Heat Sinks

AVC has been offering systematic thermal management for over 15 years with experience in developing and manufacturing a superior product. The emerging of LEDs into the mainstream market and the demand for thermal management has naturally brought AVC into the realm of LED heat sinks. With over 200 research and development engineers, AVC offers a wide array of standard heat sinks from the smallest MR16 to larger commercial landscape heat sinks. Whether you're in the automotive industry, indoor or outdoor lighting, AVC has a heat sink to offer. Please contact your local Arrow office to learn more about these and many other new products being introduced every day.



ST40700001 Φ 50 x 36.3
MR16 heat sink

Features ▶

- Ability to offer customized heat sinks per customer's drawing
- Standard MR16, PAR20, PAR30, PAR38, T5, T8, and T9 LED heat sinks
- Heat sinks with extrusion or stacked fin technology with integrated heat pipes
- Aluminum or aluminum with copper insertion

Benefits ▶

- Energy efficient
- Increase life of LED
- Increase device performance
- Asia-based manufacturing allows AVC to offer CM services for a complete LED heat sink with optics, driver, and LED

Applications ▶

- Street lights
- Indoor lighting
- Aquarium lighting
- Architectural lighting
- Automotive head lights and fog lamp

Product Specifications ▶											
Part Number	Type	Shape	LED Wattage (W)	Material Type	Thermal Expansion (10 ⁻⁶ m/m/°K)	Thermal Conductivity (W/m-°K)	Thermal Impedance (°C/W)	Size L x W x H (mm)	LED Surface Area (mm ²)	Volume (mm ³)	Markets
ST40700001	Stacked fin	Round	7	AL-1100 Cu-1100	Cu-1100 μ m/m.K at 20~300°C	AL-1100 209.5 W/mK Cu-1100 391.1 W/mK	5.95	Φ 50 x 36.3	3.15 cm ² Φ :2 cm	Φ 50 x 36.3	CL TR BL SI
ST40200001		Round	7	AL-1100 Cu-1100	Cu-1100 μ m/m.K at 20~300°C	AL-1100 209.5 W/mK Cu-1100 391.1 W/mK	3.71	Φ 59.79 x 57	14.5 cm ² Φ :4.3 cm	Φ 59.79 x 57	CL TR BL SI
ST00L00001		Round	12	AL-1100 Al-6063	AL-1100 24 10-6/°C Al-6063 23.4 10-6/°C	AL-1100 209.5 W/mK Al 6063 201.12 W/mK	4.46	Φ 95 x 64.5	44.2 cm ² Φ :7.5 cm	Φ 95 x 64.5	CL TR BL SI
ST40500001	Stacked fin	Round	18	AL-1100 AL-6063	AL-1100 24 10-6/°C Al-6063 23.4 10-6/°C	AL-1100 209.5 W/mK Al 6063 201.12 W/mK	2.59	Φ 120 x 100.4	50.3 cm ² Φ :8 cm	Φ 120 x 100.4	CL TR BL SI
ST40600001	Stacked fin w/heat pipes	Round	15	AL-1100/Cu-1100 C-1020 (PIPE)/ADC-10	Cu-1100 μ m/m.K at 20~300°C	AL-1100 209.5 W/mK Al 6063 201.12 W/mK Cu-1100 391.1 W/mK	1.80	Φ 120.5*122.3	3.15 cm ² Φ :2 cm	Φ 120.5*122.3	CL TR BL SI
ST00X00001	Extruded heat sink	Round	14	AL-6063	23.4 10-6/°C	Al 6063 201 W/mK	1.78	Φ 16 x 550	54*1.2 cm=64.8 cm ²	Φ 16 x 550	CL TR BL SI
ST00R00001		Round	14	AL-6063	23.4 10-6/°C	Al 6063 201 W/mK	1.78	Φ 29 x 590	54*1.6 cm=86.4 cm ²	Φ 29 x 590	CL TR BL SI

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

Note: Φ signifies the object is circular



ST00I00001
PAR30 Heat sink



ST40500001
PAR38 Heat sink



ST40600001
Recessed lamp



ST00X00001
15 Light bar



INTEGRATION PARTNERS

- ▶ Integration Solutions..... 94
- ▶ TT electronics/OPTEK Technology..... 95



In addition to providing access to many of the world's top LED lighting suppliers, Arrow has relationships with knowledgeable and experienced integrators that offer complete solutions via integrated devices. Our world-class integrators deliver complete lighting solutions for even the most challenging requirements.



Photo Courtesy of Peter Paige

ACES Partners ▶▶

The Arrow Consulting Engineering Services (ACES) program puts you in touch with pre-screened, qualified, and certified third-party lighting solutions and design services companies to save time, effort, and resources. The superior core competencies of our partners allow them to provide complete outsourced designs—while allowing you to focus on your core competency.

Designspring: This well established industrial design and engineering consulting firm provides comprehensive product development services. Designspring's offerings include:

- Consumer and commercial product development from concept to manufacturing
- Software development and packaging

Illumination Devices: This engineering firm specializes in design configuration and electrical integration of solid-state lighting systems for general illumination applications. Illumination Devices offers:

- Light engine/system development for new and existing fixtures
- On-board driver circuit and microprocessor integration

LED Specialists: This engineering services firm specializes in design and integration of high-performance LED lighting solutions and offers:

- Requirement analysis and rapid prototyping
- Optical, electronic driver and mechanical design, including thermal management

Metaphase: This firm provides straightforward lighting solutions using LEDs in non-imaging applications. Metaphase offers expertise in the design of components such as secondary optics for LEDs and fully developed lighting systems including:

- Design team consultation and prototyping for design verification
- Full OEM component and system manufacturing

TXP Corporation: This PCB assembly firm provides pre-manufacturing services for the electronics industry that help OEMs bring products to market both faster and more cost-effectively. TXP Corporation offers:

- Preview PCB layout and design for manufacturability (DFM) analysis
- Get quick turn prototype PCB assembly—consigned or turn-key
- Advanced technology capabilities:
 - PoP (package-on-package)
 - 0.4 mm BGAs
 - High-density assemblies

Integration Partners ▶▶

CML Innovative Technologies

For 90 years, CML has added value to light sources. CML solves the most difficult issues in thermal management, optics, and drivers, and offers a complete range of solid-state products that range from power LEDs to LED light engines. CML offerings include:

- Advanced software simulation ensures custom products meet expectations
- Rapid prototypes and engineering support

Dialight Lumidrives

This industry leader applies LED technology to the spectrum of visual applications. Dialight specializes in status indication for the communications and industrial markets, as well as signaling for transportation and rapidly emerging illumination products. Dialight offers:

- Light engines, standard optics, and drivers
- Complete design and manufacturing for custom lighting applications

TT electronics/OPTeK Technology

OPTeK's strength is in providing application-specific optoelectronic solutions. As an integrator, OPTeK provides quality products that range from chips to fully functioning assemblies. OPTeK offers:

- Custom optoelectronic solutions
- Broad range of devices and industry expert support

Unity Microelectronics

Unity offers engineering and manufacturing capabilities for custom lighting assemblies and a wide selection of visible and IR optoelectronic products. Unity is dedicated to providing products that perform consistently over their lifecycle and offers:

- Tight binning with rigorous quality and testing procedures
- Low-cost/high-volume manufacturing

To learn more about our integration partners, please contact your local Arrow representative or call 888-9LIGHT1.





Total Solutions

TT electronics/OPTEK Technology offers decades of experience in custom product development and manufacturing capability. Our expertise extends from die placement through finished product assembly and testing. OPTEK has the experience and the facilities to accommodate the most stringent assembly requirements.



Features ▶

Product Design

- OPTEK has vast experience in many markets with a broad variety of applications

Product Assembly

- OPTEK is a vertically-integrated company with the ability to accommodate a wide range of circuit configurations

Thermal Management

- OPTEK has OptoTherm™ substrate material

Benefits ▶

Product Design

- Customers can draw on OPTEK's knowledge to find the perfect design to fit their needs

Product Assembly

- No aspect of product design and manufacture is beyond OPTEK's capability; this means custom manufacturing solutions from chip placement to integrated assemblies can be provided

Thermal Management

- OptoTherm™ accommodates the heat dissipation required by high-brightness LEDs

Applications ▶

- Product design
- Die placement
- Circuit assembly
- Thermal management

Product Specifications ▶										
Type	Fixture Design (Y/N)	PCB Design (Y/N)	Testing (Y/N)	Manufacturing (Y/N)	Component #1 HB-LEDs (Y/N)	Component #2 Drivers (Y/N)	Component #3 Optics-Standard (Y/N)	Component #4 Optics-Custom (Y/N)	Component #5 Thermal Management (Y/N)	Markets
Total solution	Y	Y	Y	Y	Y	Y	Y	Y	Y	CL FL TR BL SI
MARKETS LEGEND						CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE				

Featured Products ▶

OPTEK offers a variety of both standard and custom VLED products and assemblies





SUPPORTING COMPONENTS

▶ Tyco Electronics 98-99





Starboard Pixel Holder Simplifies Connectivity and Thermal Management of LEDs



The Starboard holder is a modular assembly that makes it fast and easy to integrate commonly available hexagonal “star” LED holders into fixtures. The holder simplifies application by addressing electrical, thermal, and mechanical needs in a single solution—without solder and without the complexity of engineering separate thermal, electrical, and mechanical subsystems. Consisting of a heat sink, locking ring, and contact carrier, the holder is available with a two-wire connection for single-color LEDs and four-wire connection for RGB LEDs. The wire interface is 110 FASTON quick-disconnect tabs. The cast aluminum heat sink, rated for 3W, is tooled to fit standard GU10/MR16 light fixtures. Options include a diffusion lens and an integrated constant-current LED driver.

For more information, please visit <http://lighting.arrow.com> or call 1-888-9LIGHT1.

Poke-In Connector Makes Fast Work of LED Strings

The SMT poke-in connector is a low-profile, one- or two-position connector ideally suited for use in PCB-based LED strings, lighting controls, and other applications that can benefit from an easy poke-in wire termination to the PCB. Optimized to terminate 18 AWG wire, the connectors offer quick and reliable wire termination as a low-labor alternative to hand-soldering wires, particularly when used with single-sided aluminum clad circuit boards. The connectors, available in surface-mount or thru-hole configurations, are available in tape-and-reel packages for high-speed processing equipment; the high-temperature plastic housing is reflow solder process compatible.

For more information, please visit <http://lighting.arrow.com> or call 1-888-9LIGHT1.



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Arrow Electronics Lighting Group

1.888.9LIGHT1

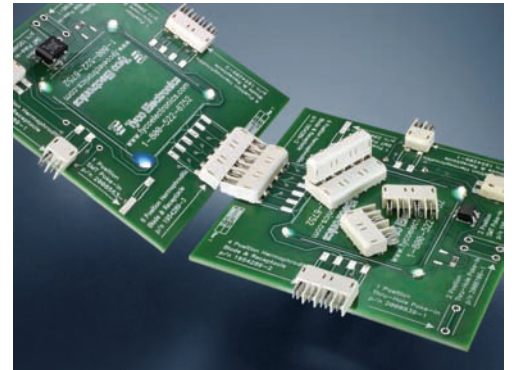
<http://lighting.arrow.com>

Surface-Mount Hermaphroditic Blade and Receptacle Design Promotes Fast Assembly

Tyco Electronics
Authorized Distributor

A new in-line hermaphroditic blade and receptacle connector from Tyco Electronics is designed to make connecting of conventional glass-epoxy as well aluminum-clad printed circuit boards for LED lighting controls and LED modules faster and easier. The low-profile surface-mount connector, available in two, four, and six positions, uses a hermaphroditic blade and receptacle design to allow LED printed circuit board strips to be joined with more flexibility than with traditional post-and-receptacle headers. Boards slide together horizontally, vertically, or at right angles. The unique capability to slide the two boards together vertically makes replacement of a board in mid-strip easier by lifting up the old strip and lowering in the new one. The new connector features a flexible mating engagement allowance of 2.5 mm horizontally and 1.1 mm vertically to accommodate variations in the mounting of the PC boards.

For more information, please visit <http://lighting.arrow.com> or call 1-888-9LIGHT1.



Tyco Electronics
Authorized Distributor

Low-Profile Micro MATE-N-LOK Connectors Shrink Height, Not Performance

Designed for space-constrained LED lighting applications, low-profile Micro MATE-N-LOK soft-shell connectors offer a slim vertical height of less than 4.7 mm—about 45 percent lower than existing members of the family. Available in 2, 3, and 4 positions on a 3 mm centerline, the connectors include right-angle surface-mount headers and mating cable connectors, with a space-saving side latch. The line uses standard Micro MATE-N-LOK contacts, with 24 AWG to 20 AWG and 30 AWG to 26 AWG wire ranges. The 94V-0-rated nylon housing is available in black or natural colors. Contacts are phosphor bronze with a choice of tin or gold plating. The connectors are rated up to 5A and 250V.

For more information, please visit <http://lighting.arrow.com> or call 1-888-9LIGHT1.



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Arrow Electronics Lighting Group
1.888.9LIGHT1

<http://lighting.arrow.com>



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Glossary

Accent Lighting

Directional lighting emphasizing a particular object or area

AlGaAs (Aluminum Gallium Arsenide)

Active material used to produce infrared emitting diodes (IREDs)

AllnGaP (Aluminum Indium Gallium Phosphide)

Active material used to produce red, amber, and yellow LEDs

Ambient Lighting

Lighting available in area absent of sources inside that area

Ambient Temperature

The temperature of the air around a fixture

Ballast

An enclosed device that regulates electrical power to a specific type of light source; also known as a driver module

Black Body Curve or Planckian Locus

The curve on the CIE chart representing the colors of a black body radiator at a specified temperature. Low temperature radiators begin at the red edge of human vision and move through white toward blue, though the curve ends well before reaching saturated blue

Candela (cd)

The measure of luminous intensity of a source in a given direction. The unit is equivalent to lumens per steradian (lm/sr)

Candlepower

An obsolete term for luminous intensity; current practice is to refer to this simply as candelas

CCT (Correlated Color Temperature)

A measurement of color that maps spectral output to the apparent color of a heated object (black body) at the specified temperature

Chromaticity

The color of light as mapped to the CIE 1931 color chart, expressed as x and y coordinates

Color Bin

The region of the CIE 1931 chart that an individual LED fits into; the bin boundaries may vary between suppliers

Color Temperature

See CCT (Correlated Color Temperature)

Cool White

A general term for higher CCT, bluer white light sources; typically indicates CCTs from 5,000°K up to 10,000°K

CRI (Color Rendering Index)

A scale from 0-100 that indicates the similarity of reflected light off select colors in comparison to a pure black body at the same CCT

Daylight White

5,000°K to 7,500°K; CIE defines daylight over a range, CCT: 5,000°K (CIE D50) is Equal Energy Daylight White, 5500°K (CIE D55) is Direct Sunlight, (Noon Sky sunlight), 6,500°K (CIE D65) is Average Daylight, 7,500°K (CIE D75) is Northern Sky Daylight

Dominant Wavelength

The apparent wavelength of an LED to the human eye

DMX (Digital MultipleXing)

A digital lighting control standard employed primarily by the theater industry, frequently used to color control LED fixtures

Efficacy

A measurement of a light source's effectiveness in converting electrical energy to lumens of visible light; expressed in lumens per watt (LPW)

Efficiency

The percent of electrical energy converted to light, i.e. watts of visible light produced for each watt of electrical power

Eye Sensitivity

The response of the human eye to light with respect to wavelength; peak response is at 555 nm

Fill Light

Lighting throughout an area that produces general illumination

Flood Light

A fixture designed to emit usable light over a wide beam angle

Footcandle (fc)

A unit of illuminance equivalent to the illumination produced by a source of one candle, at a distance of one foot; equal to one lumen incident per square foot; can be written as lm/ft^2 (see Lux)

Forward Current

Current through an LED in the direction that will produce light

Forward Voltage (V_F)

The voltage across an LED for a given forward current

GaAs (Gallium Arsenide)

Active material used to produce IREds

I²C

Two-wire, serial protocol developed by Philips in the early 1980s; used in today's mobile applications

Illuminance (E)

The amount of light arriving on a surface, measured in lux or footcandles

Infrared Light

Electromagnetic waves with a wavelength of 1 mm to 700 nm

InGaN (Indium Gallium Nitride)

Active material used to produce blue, green, and white LEDs

Intensity Bin

A group of LEDs defined by pre-established upper and lower brightness bounds

IREDD

Infrared emitting diode

Kelvin (K)

A temperature scale starting with 0°K (= -273.16°C) at the absolute zero temperature; a difference in temperature of one Kelvin (K) is equal to the difference in temperature in degrees Celsius

Key Light

Directional lighting used to highlight an object in order to draw attention

Leadframe

A metal frame used to mount and connect to LED chips; the lead-frame channels current and often heat to and from the LED

Light Trespass (Spill Light)

Light that escapes the optical system that contains the light source

Lumen Maintenance

A measure of how the light output of a light source degrades over time

Luminaire

A fixture with power requirements and light sources included

Luminaire Efficiency

Percentage of lumens emitted by the lamp that escapes the luminaire

Luminance (L)

The amount of visible light leaving a point in a given direction; the light can be reflected, transmitted, or emitted; luminance is measured in nits, equivalent to one candela per square meter (cd/m²)

Luminous Flux

A measure of total emitted light weighted by the human eye's sensitivity expressed in lumens (lm); peak lumens per watt of radiated light occurs at 555 nm and 683 lm for 1W radiated

Luminous Intensity

Luminous flux emitted per unit solid angle in a particular direction; standard unit of luminous intensity is a candela (cd)

Lux (lx)

A unit of illuminance or light incident on a surface, one lux is one lumen per square meter; ten lux approximately equals one footcandle (see footcandle)

MacAdam Ellipse

A region on the CIE chart where all colors are indistinguishable to human vision. Some regions are referred to as multiple "step" MacAdam Ellipses. These regions contain colors, which can be distinguished by a given amount to the human eye. A two-step MacAdam Ellipse contains colors that are only slightly different to human vision, a three step more so, etc.

PAR Lamp (Parabolic Aluminized Reflector)

A standard in directional, screw type lamps; the number following PAR indicates eighths of an inch in diameter

Phosphor

A chemical compound designed to absorb light and convert it into other wavelength(s); used in white LEDs to convert the single emitted wavelength into a broader spectrum

Photometry

The measurement of quantities associated with light; useful in selecting or comparing lighting products

Pixel

Term used in video applications to denote one-color controllable element in an image

Radiant Flux

Total radiant energy per unit time, unadjusted for eye sensitivity; standard unit for radiant flux is a watt (W)

Resolution

The number of pixels contained in a display, expressed in terms of the number of pixels on the horizontal axis and the number on the vertical axis; the sharpness of the image on a display depends on the display's resolution and size

Solid State

The electronic properties of crystalline (generally semiconductor) material

Spot Light

A lamp or fixture with a tight beam of light

Task Lighting

Usable light intended to illuminate a surface for specific work functions

Valance Lighting

Lighting from light sources on a wall typically above eye level, shielded by horizontal panels; the light may be directed upward or downward

Viewing Angle

The position left/right and up/down of vertical axis where the luminous intensity reduces to 50 percent of its peak value

Warm White

A lower CCT white, typically from 2,700°K to 3,800°K, which appears as a yellowish-white light

Wavelength

The distance between two consecutive peaks of a wave; the wavelength of visible light is between 400 nm to 700 nm

Binning for LEDs

Manufacturing

of light emitting diodes (LEDs) results in variations of characteristics from part to part. The human eye can detect differences in light output and color depending on the range of variation.



LEDs are therefore sorted by certain parameters in a range based on a fixed-forward test current. The parts are then assigned a code and combined together with LEDs of the same or similar characteristics.

Specific bin selection of LEDs may be necessary to optimize a lighting design in some applications. In other applications, tight binning may not be required and a system can be engineered with design methods to avoid or limit bin sorting. There may be cases where all bin ranges are

available on a particular LED; this is called full distribution.

The manufacturer or the customer can sort LEDs. Manufacturers bin LEDs to the yields they obtain from production. Low-yielding parts can limit the product availability.

For questions regarding LED binning and your lighting designs, contact your Arrow Lighting Group at 1.888.9LIGHT1 or lightingsolutions@arrow.com.

LED manufacturers each have sets of parameters that define their own unique bin selections and are sorted by some or all of the following:

Brightness ▶▶

Luminous Intensity

The power perceived by the human eye in a particular direction, measured in candelas.

Luminous Flux

The total amount of power perceived in all directions by the human eye, measured in lumens.

Voltage ▶▶

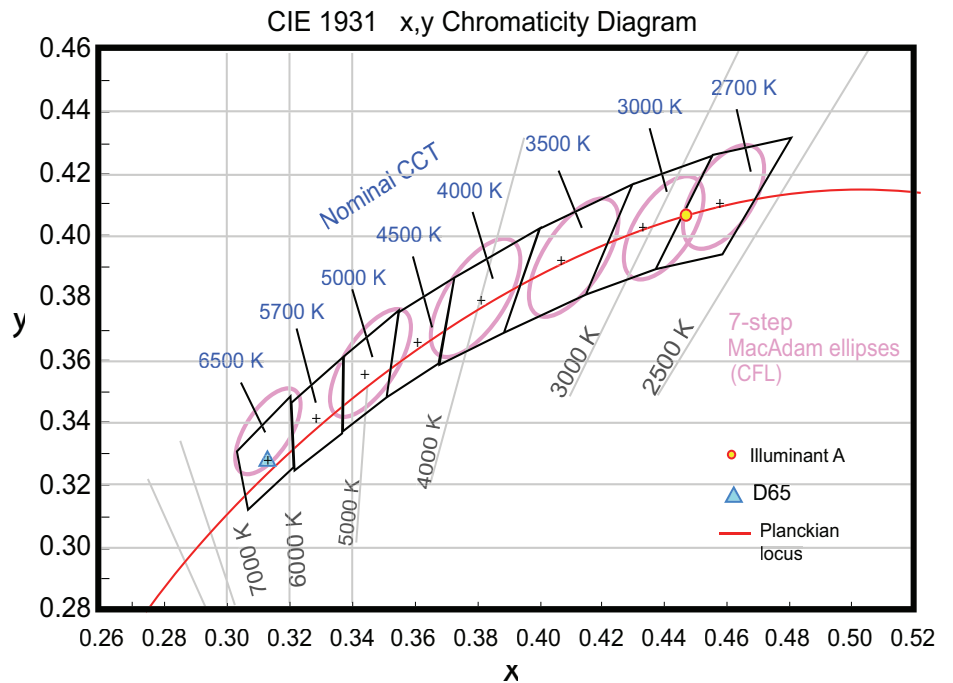
Forward voltage, measured in volts

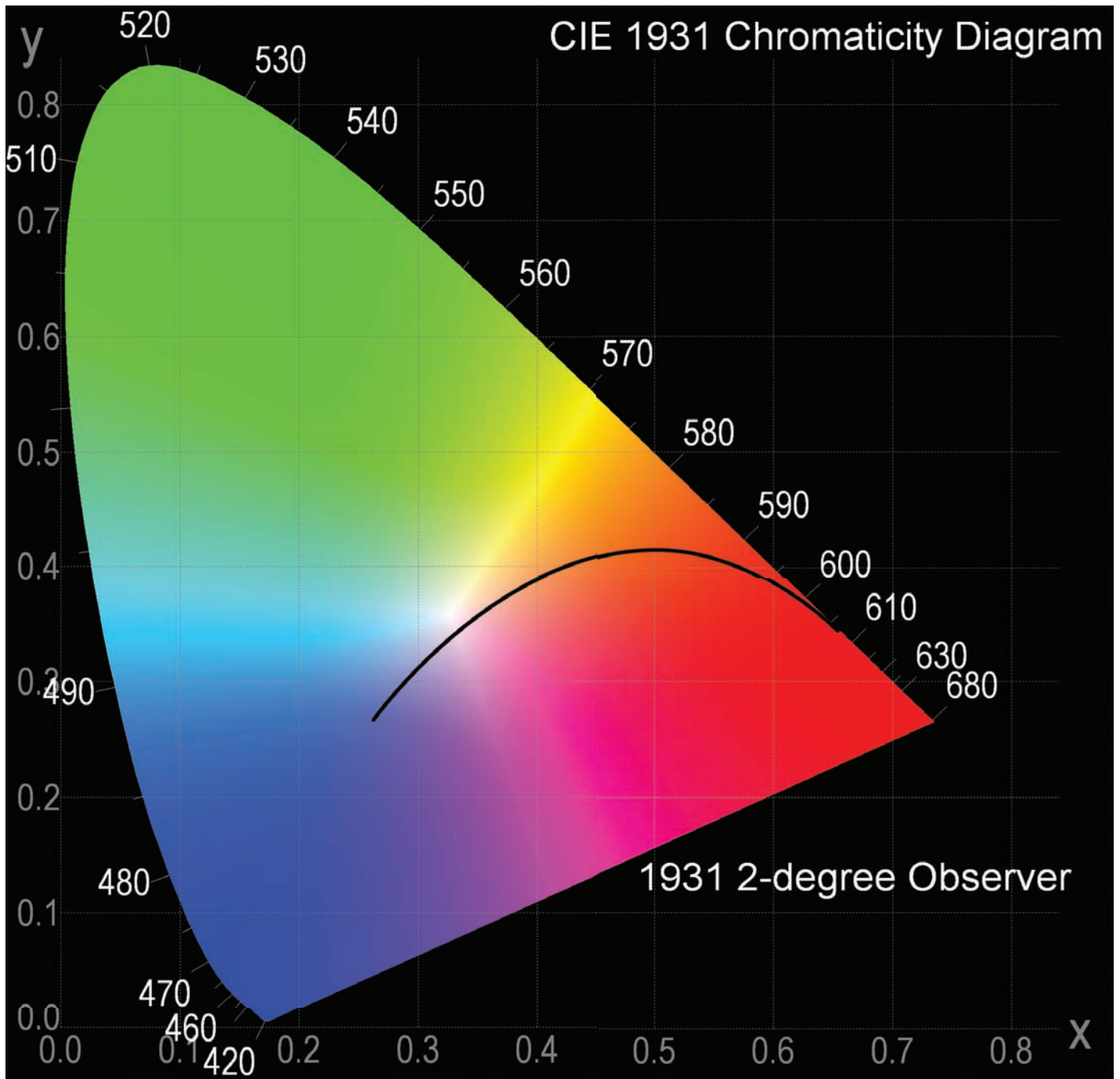
Color ▶▶

Chromaticity

- Plotting x and y coordinates within the CIE 1931 chromaticity chart
- Specified dominant wavelengths, measured in nanometers
- Color temperatures, measured in degrees Kelvin, pertains to white light only

**CIE 1931 Chromaticity Diagram
Showing the Eight Nominal CCT Quadrangles**



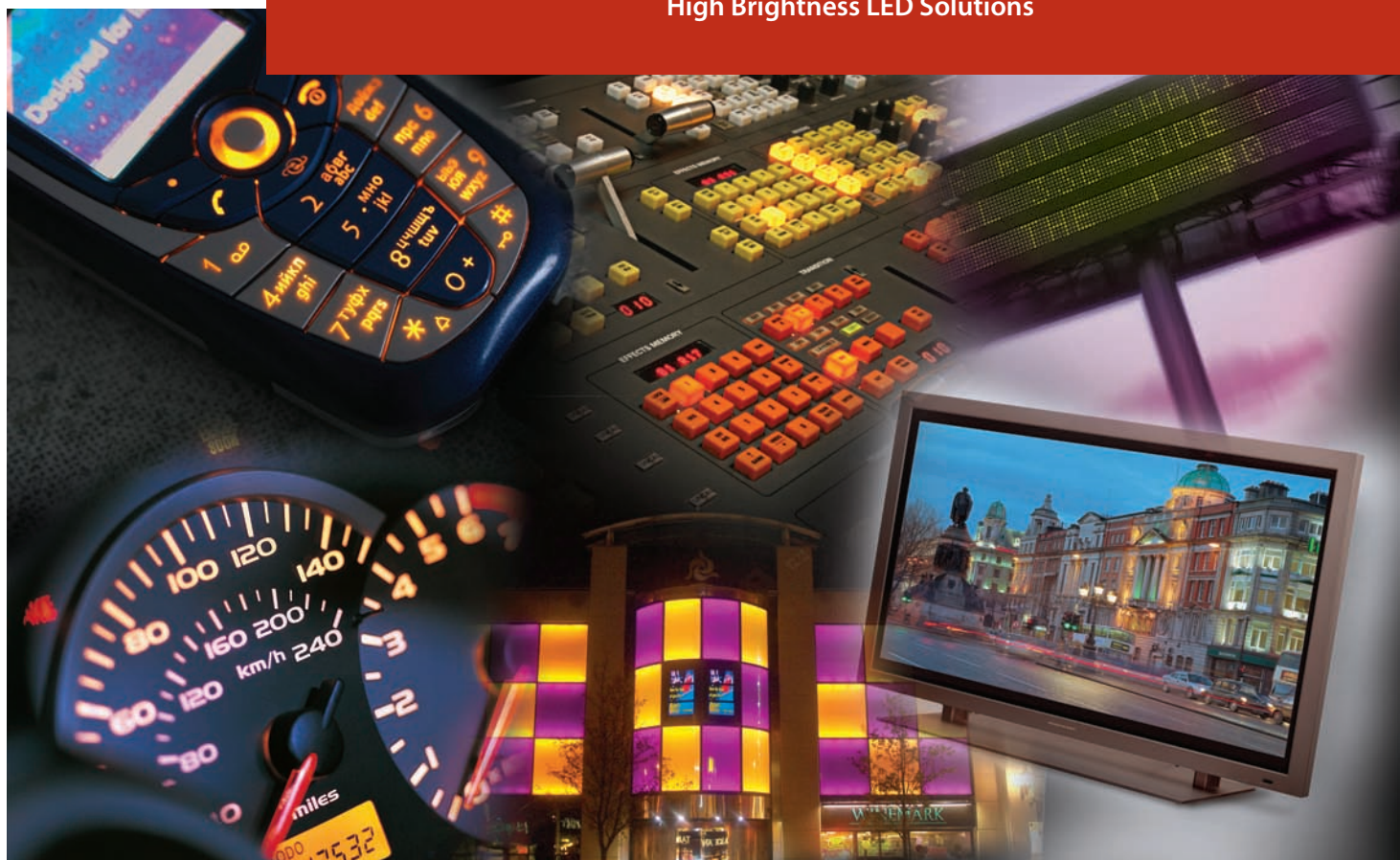


Applicable Agency Requirements

Applicable North American Agency Requirements ▶				
Agency Specification Number	Description	Comment #1	Comment #2	Comment #3
UL 486A	Wire connectors and soldering lugs for use with copper wire	Connectors for use with all alloys of copper conductors, for providing contacts between current-carrying parts	30 AWG to 8 AWG insulated conductors	Voltage levels above 600V (1,000V in a sign, lighting fixture, or luminaire)
UL 486C	Splicing wire connectors	Hand- or tool-applied splicing wire and cable connectors intended for use with all alloys of copper	30 AWG to 6 AWG insulated conductors	Voltage levels less than 600V (1,000V in a sign or luminaire)
UL 1573	Stage and studio luminaires, accessories, and connector strips	Stage and studio luminaires rated 600V or less for use in theatres, studios, and similar locations	-	-
UL 1598	Luminaires	Luminaires for use in non-hazardous locations and that are intended for installation on branch circuits of 600V nominal or less between conductors	-	-
UL 1977	Connectors for use in data, signal, control, and power applications—component	Single and multi-pole connectors	Factory installed to copper wiring, copper alloy conductors, or printed circuit boards	-
UL 2108	Low-voltage lighting systems	Class 2 low voltage lighting systems	Low voltage exposed conductor lighting systems and luminaires incorporating exposed conductors	-
UL 2459	Insulated multi-pole splicing wire connectors	Insulated multi-pole mating or non-mating wire connectors intended for field wiring and for use in accordance with the National Electrical Code, ANSI/NFPA-70	These wire connectors are intended to facilitate the connection of devices, such as prefabricated wiring assemblies, smoke detectors, and lighting products, to the branch circuit conductors of buildings. They are multi-polarity devices used to connect to two or more branch circuit conductors	-
CSA C22.2 182.3	Special use attachment plugs, receptacles, and connectors	Applies to plugs, receptacles, power inlets and outlets, connectors, and similar wiring devices intended for use in electronic and electrical applications	Voltage ratings less than 600V	-
CSA C22.2 NO. 250.0-04	Luminaires	Luminaires for use in non-hazardous locations and that are intended for installation on branch circuits of 600V nominal or less	Similar to UL1598	-

Applicable European Agency Requirements ▶				
Agency Specification Number	Description	Comment #1	Comment #2	Comment #3
IEC 61535	Installation couplers intended for permanent connection in fixed installations. It applies to two to five wire installation couplers with or without earthing contact with a rated voltage up to and including AC 500V	Installation couplers shall be provided with retaining means which engage automatically when the installation coupler is connected and which is capable of disengagement for disconnecting. The retaining means to be removable with the aid of a common tool only (not easily by hand) -> 80N min. retention force	Applicable for rewirable and non-rewirable connectors; rated connecting capacity up to and including 10 sqmm; total contact resistance wire-to-wire 1,0 mOhm max.	Protection against electric shock ensured by IP40 minimum -> use special plastic caps or equivalent device to be removable with the aid of a common tool only (not easily by hand); Instruction sheets must be provided by manufacturer
IEC 60320	Appliance couplers for household and similar purposes; this norm is applicable to appliance couplers for AC only, with or without earthing contact, with a rated voltage not exceeding 250V and a rated current not exceeding 16A	It is intended for the connection of a supply cord (lead) to electrical appliances or other electrical equipment for 50 Hz or 60 Hz supply	Connectors shall be so designed that the cord cannot be subjected to excessive bending where it enters the connector: verification by 10,000 flexings for rewirable connectors and 20,000 flexings for non-rewirable connectors -> requirement is no interruption of test current and no short circuit	Appliance couplers complying with this standard are suitable for use at ambient temperatures not exceeding +25°C, but occasionally reaching +35°C
IEC 61984	Connectors safety requirements and tests; this norm applies to connectors with rated voltage above 50V and up to 1,000V and rated currents up to 125A	Suitable for fixed and free connectors (e.g., free hanging versions)	Applicable for rewirable and non-rewirable connectors; connectors must have protective earth contact and (for free connectors) the cable clamp	For connectors according to this standard, voltage/current/breaking capacity values shall be specified in compliance with mechanical and environmental conditions given in the manufacturer specification

Charts courtesy of Tyco Electronics, Inc.



Changing the Way You Look At Light

High brightness LED solutions from Avago Technologies give you reliable, long life, high performance illumination, flexibility of design, easy to handle packaging

Visit Our New Lighting Technology Website

www.avagotechlighting.com

Avago offers "one-stop shopping" with its wide array of LED indicators and displays, high-brightness and high power LEDs.

Key products include from high brightness and high power LEDs, PLCC surface-mount LEDs, display backlighting module solutions, to standard through-hole lamps, surface-mount LEDs, flash LEDs, flexible light strip modules, and various LED displays. These LEDs address a wide range of markets, including electronic sign and signal, automotive, solid-state lighting, LCD display backlighting, consumer electronics, home appliances and mobile appliances.



For more information visit our website

www.avagotech.com

AVAGO
TECHNOLOGIES

Drive LEDs Your Way



High Efficiency LED Drivers

Part No.	Topology	Dimming Range	Input Voltage Range (V)	Max. Output Voltage (V)	I _{LED (MAX)} (A)*	Package
LT [®] 1618	Buck, Boost, Buck/Boost Mode	DC/PWM	1.6 to 18	36	1.00	3mm x 3mm DFN-10, MSOP-10
LT3466	Dual Boost	DC/PWM	2.7 to 24	39	0.02 x 2	3mm x 3mm DFN-10
LT3474/-1	Buck	400:1 PWM	4 to 36	9/25	1.00	TSSOP-16E
LT3475/-1	Dual Buck	3000:1 PWM	4 to 36 (40 Max.)	9/25	1.50 x 2	TSSOP-20E
LT3476	Quad Buck, Boost Buck/Boost Mode	1000:1 PWM	2.8 to 16	36	1.00 x 4	5mm x 7mm QFN-38
LT3477	Buck, Boost, Buck/Boost Mode	DC/PWM	2.5 to 25	40	2.00	4mm x 4mm QFN-20, TSSOP-20E
LT3478/-1	Buck, Boost, Buck/Boost Mode	3000:1 PWM	2.8 to 36 (40 Max.)	40	4.00	TSSOP-16E
LT3486	Dual Boost	1000:1 PWM	2.7 to 24	35	0.10 x 2	3mm x 5mm DFN-16
LT3496	Triple Buck, Boost, Buck/Boost Mode	3000:1 PWM	3 to 30 (40 Max.)	45	0.50 x 3	4mm x 5mm QFN-28
LT3517/18	Buck, Boost, Buck/Boost Mode	5000:1 PWM	3 to 30 (40 Max.)	45	1.0/2.0	4mm x 4mm QFN-16
LT3590	Buck Mode	200:1 PWM	4.5 to 55	n/a	0.05	2mm x 2mm DFN-6, SC-70
LT3595	Buck Mode	3000:1 PWM	4.5 to 45	n/a	0.05 x 16	5mm x 9mm QFN-56
LT3755/56	Buck, Boost, Buck/Boost Mode	3000:1 PWM	4.5 to 40/6 to 100	60/100	Ext. FET	3mm x 3mm QFN-16, MSOP-16E
LTC [®] 3783	Buck, Boost, Buck/Boost Mode	3000:1 PWM	3 to 36	40	Ext. FET	4mm x 5mm DFN-16, TSSOP-16E

*Actual output current will depend on V_{IN}, V_{OUT} and topology.

Info & Free Samples

www.linear.com/LEDdrivers

1-800-4-LINEAR



Free Power Management for LEDs Brochure

www.linear.com/ledsolutions

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New Interconnection Technology Helps Solid-State Lighting Shine Brighter

Lower Energy Costs, Higher Reliability, and Performance Drive LED Lighting

Solid-state lighting saves money through lower power consumption and higher reliability. Working closely with leaders in the industry, Tyco Electronics has been creating

innovative interconnection solutions to make building, installing, and maintaining solid-state lighting easier and more cost effective.

Starboard Pixel Holder Simplifies Connectivity and Thermal Management of LEDs



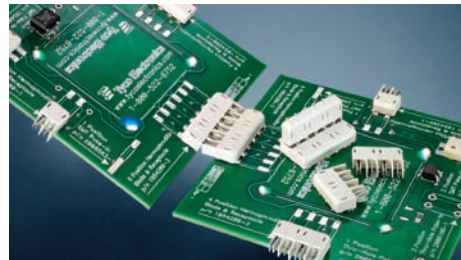
The Starboard holder is a modular assembly that makes it fast and easy to integrate commonly available hexagonal “star” LED holders into fixtures. The holder simplifies application by addressing electrical, thermal, and mechanical needs in a single solution—without solder and without the complexity of engineering separate thermal, electrical, and mechanical subsystems. Consisting of a heat sink, locking ring, and contact carrier, the holder is available with a two-wire connection for single-color LEDs and four-wire connection for RGB LEDs. The cast aluminum heat sink fits standard GU10/MR16 light fixtures. Options include a diffusion lens and an integrated constant current LED driver.

Poke-In Connector Makes Fast Work of LED Strings



The SMT Poke-in connector is a low-profile, one- or two-position connector ideally suited for use in PCB-based LED strings, lighting controls, and other applications that can benefit from an easy poke-in wire termination to the PCB. Optimized to terminate 18 AWG wire, the connectors offer quick and reliable wire termination as a low-labor alternative to hand-soldering wires, particularly when used with single-sided aluminum clad circuit boards. The connectors are available in surface-mount or through-hole configurations.

Surface-Mount Hermaphroditic Blade and Receptacle Design Promotes Fast Assembly



A new in-line Hermaphroditic Blade and Receptacle connector from Tyco Electronics makes connecting of conventional glass-epoxy as well aluminum-clad printed circuit boards for LED lighting applications faster and easier. The low-profile surface-mount connector, available in two, four, and six positions, uses a hermaphroditic blade and receptacle design to allow LED printed circuit board strips to be joined with more flexibility than with traditional post-and-receptacle headers. Connections can be made by sliding the two boards together horizontally, vertically, or at right angles. The unique capability to slide the two boards together vertically makes replacement of a board in mid-strip easier by lifting up the strip to be replaced and lowering in the new one.

Low-Profile Micro MATE-N-LOK Connectors Shrink Height, Not Performance



Designed for space-constrained LED lighting applications, low-profile Micro MATE-N-LOK soft-shell connectors offer a slim vertical height of less than 4.7 mm—about 45% lower than existing members of the family. Available in 2, 3, and 4 positions on a 3-mm centerline, the connectors include right-angle surface-mount headers and mating cable connectors, with a space-saving side latch. The line uses standard Micro MATE-N-LOK contacts, with 24-20 and 30-26 AWG wire ranges.

For more information, please visit <http://lighting.arrow.com> or call 1-888-9LIGHT1. MATE-N-LOK, TE logo, and Tyco Electronics are trademarks.

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