

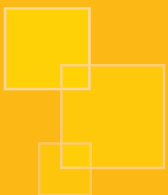
✕ | LED DRIVERS

ICs

▶ Allegro MicroSystems	36-37
▶ Analog Devices, Inc.	38-39
▶ Catalyst Semiconductor	40-41
▶ Diodes Incorporated	42-43
▶ Infineon Technologies	44-45
▶ Linear Technology	46-54
▶ National Semiconductor	55-57
▶ NXP Semiconductors	58-59
▶ ON Semiconductor	60-61
▶ STMicroelectronics	62-65
▶ Supertex	66
▶ Texas Instruments	67-68

Modules

▶ CML Innovative Technologies	69
▶ OSRAM SYLVANIA	70





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

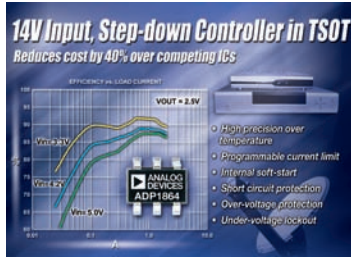
*Diagnostic capabilities: TSD: Thermal shutdown, UVLO: Under voltage lock out, OVM: Output voltage monitoring, LOD: LED open detection





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 ▶

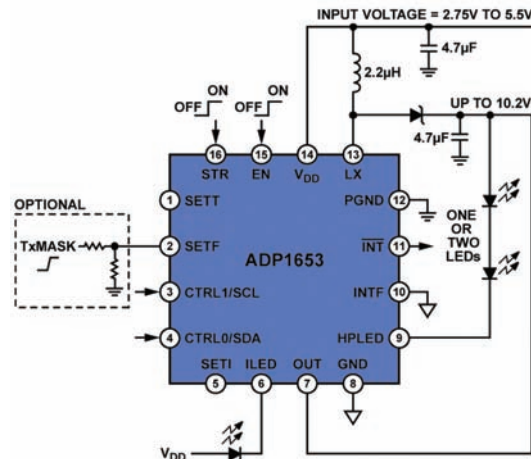
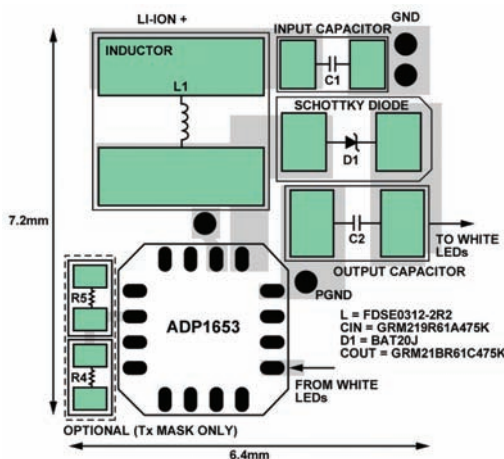
- Mobile handsets
- Set-top boxes
- Telecommunications and networking systems
- DDR terminations
- Hard disk drives

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

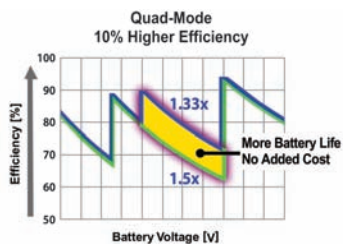




Quad-Mode® Ultra-Small, High-Efficiency Fractional Charge Pump LED Drivers

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

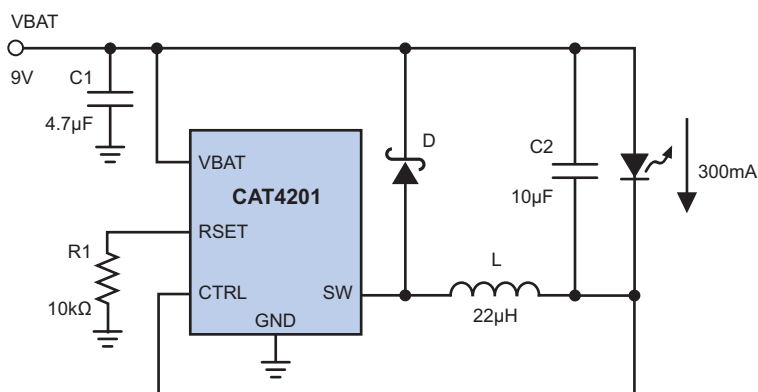
Product Specifications ▶

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

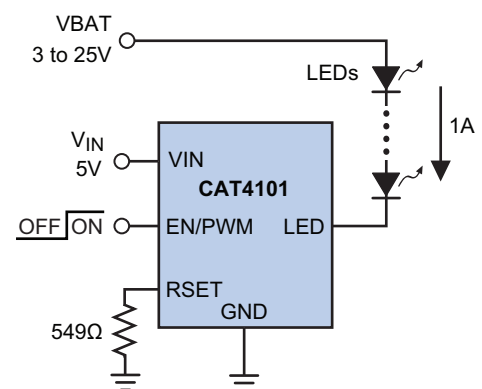
MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*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 ▶

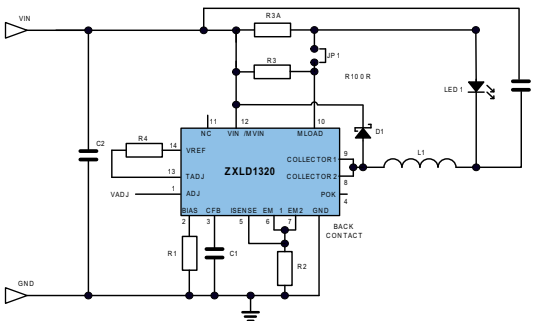
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities**	Interface	Markets
ZXLD1320	Buck	PWM/analog	4	1	Series	4.0-18.0	18	1,500	85	TSD/POK	Analog/PWM	CL FL TR SI
ZXLD1321	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

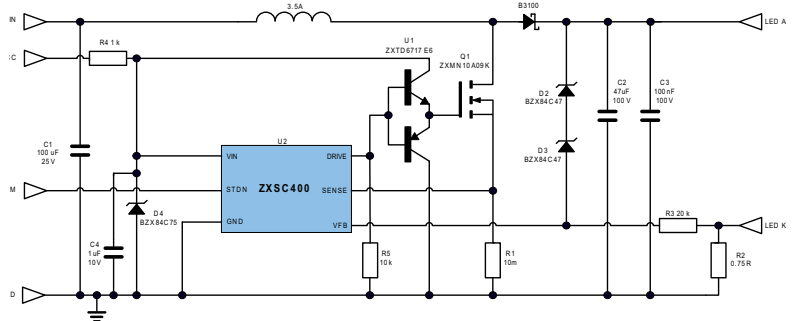
CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*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

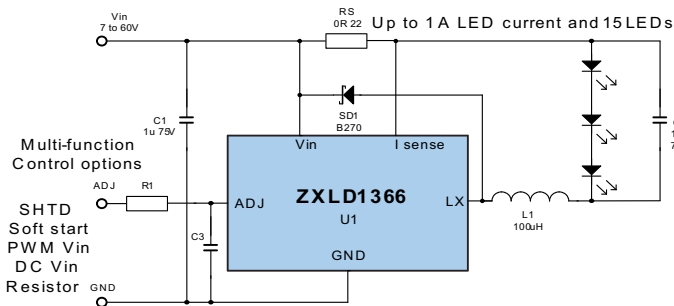
Product Specifications ▶

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

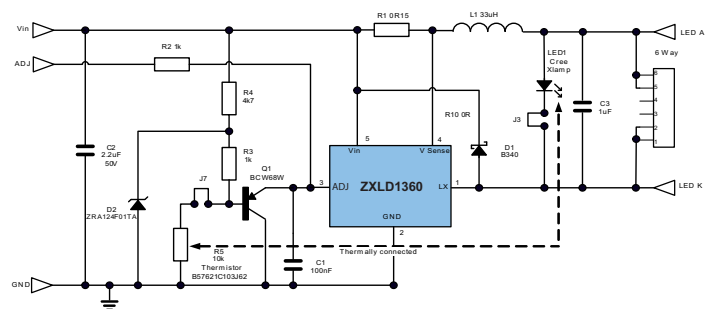
MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*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

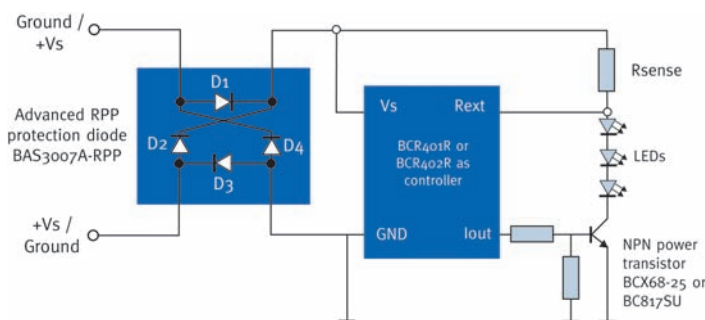
Applications

- 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

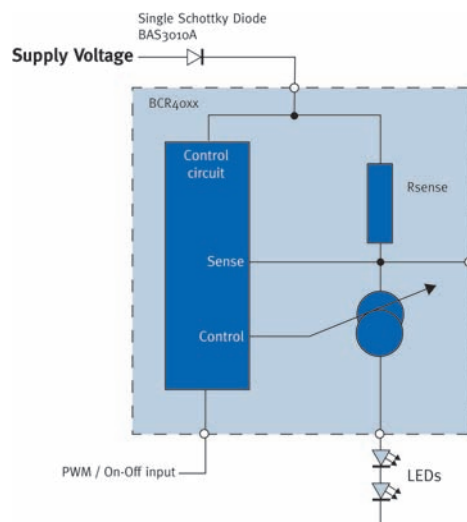
MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



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)

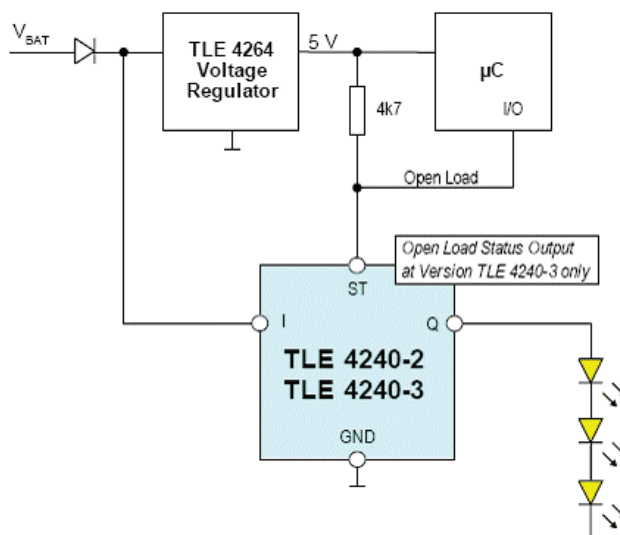


P-DSO-8, 5 mm x 6 mm

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

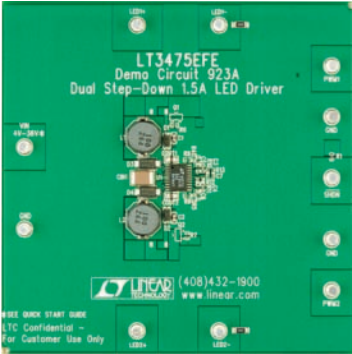
*Diagnostic capabilities: TSD: Thermal shutdown, TEF: Thermal error flag, OVM: Output voltage monitoring, LOD: LED open detection





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

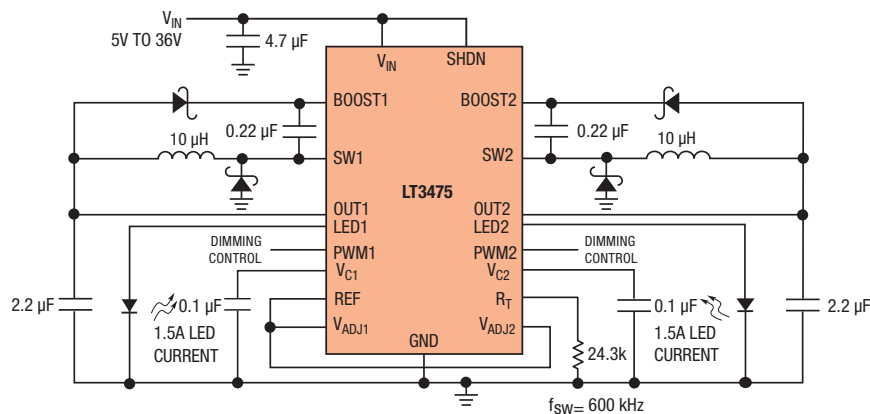
Product Specifications ▶												
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)**	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LT*3474	Buck LED driver	400:1 PWM	3 x 500 mA	1	Series (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

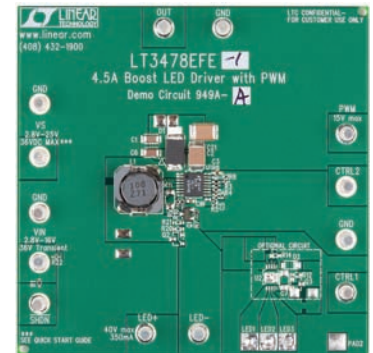
- True Color PWM™ delivers constant LED color with up to 3000:1 range
- Wide input range: 2.8V to 36V; ideal for industrial applications
- 4.5A, 42V internal switch
- Drives LEDs in boost, buck-boost, or buck modes
- Integrated resistors for inductor and LED current sensing
- Program LED current de-rating 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

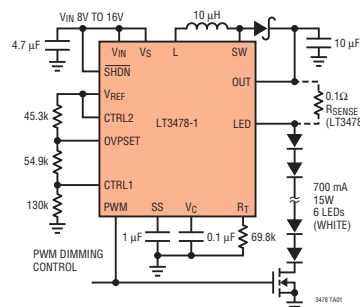
*Diagnostic capabilities: TSD: Thermal shutdown, OVM: Output voltage monitoring

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

†Switch current

††Max. $V_{IN}=3.2$ V

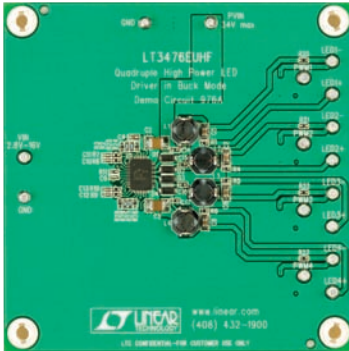
LT3478-1—Automotive TFT LCD Backlight





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

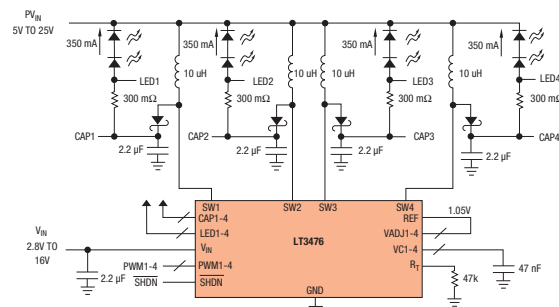
CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

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

**Max. V_{IN} =6V

[†]Switch current

LT3476—High-Current Quad-Output LED Driver



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



High current inductor-based multi-topology switching LED drivers provide flexible solutions for high-voltage LED arrays. Key features include high current, wide input voltage range, scalable output voltage, and wide-ranging True Color™ dimming.

Features ▶

LTC3783

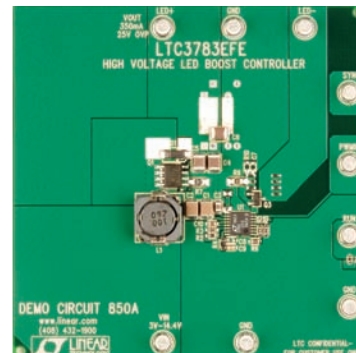
- High current
- High voltage
- Protection
- True Color PWM™ 3000:1 digital dimming
- Multi-topology

Benefits ▶

- Delivers high current ($\geq 1.5A$) and powers high brightness (HB) and super HB-LEDs
- Easily drives strings (series) or clusters (series + parallel) of LEDs
- Accurate current and output voltage protects HB-LEDs; additional protection includes overvoltage, overcurrent, and soft start
- Preserves LED's constant color over a wide dimming ratio; capable of additional analog 100:1 dimming
- Adjustable LED brightness
- Protects against overheating
- Can create multiple colors by separately dimming red, green, and blue LEDs
- Can be specified for many LED arrangements as buck, boost, buck-boost, or flyback

Applications ▶

- RGGB lighting
- Automotive and avionic lighting
- TFT LCD 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
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	SEPIC/buck/boost/ buck-boost/flyback/inverter	DC/PWM	2 x 350 mA (in buck-mode)	1	Series	1.5-18	Depends on configuration	1.5	85	TSD/OVM	PWM	CL TR
LT3477		DC/PWM	4 x 1A (in buck-mode)	1	Series	2.5-25	Depends on configuration	3	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
LT3478/-1	Buck/boost/buck-boost	3000:1 PWM	8 x 1.5A (in buck-mode)	1	Series	2.7-36	Depends on configuration	4.5	92	TSD/OVM	PWM	CL TR
LT3476	Quad buck/boost/ buck-boost LED driver	1000:1 PWM	4 x 8 x 1A (in buck-mode)	4	4 x multiple series string	2.8-16	Depends on configuration	4 x 1.5	96	TSD/OVM	PWM	CL TR BL
LTC3783	SEPIC/buck/boost/ buck-boost/flyback/inverter	3000:1 PWM, 10:1 analog	4 x 12 x 1A (in buck-mode)	1	Series/parallel	3-36	Limited by ext. FET	Ext. FET	90+	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		3000:1 PWM	14 x 1A	1	Series	6-100	Ext. FET	Ext. FET	92	TSD/OVM	PWM	CL FL TR BL SI

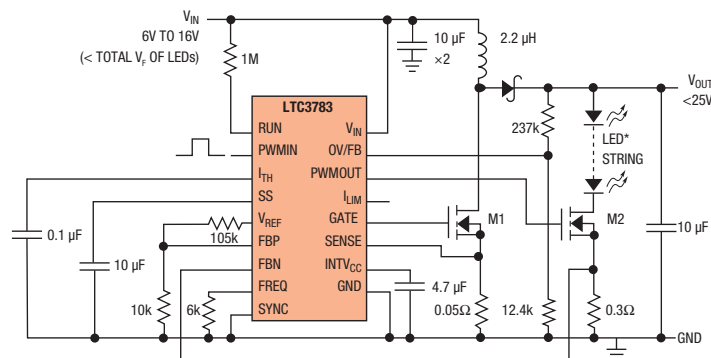
MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

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

**Switch current

LTC3783—PWM LED Driver in Boost Mode



*LUMILEDS LHXL-BW02

Arrow Electronics Lighting Group

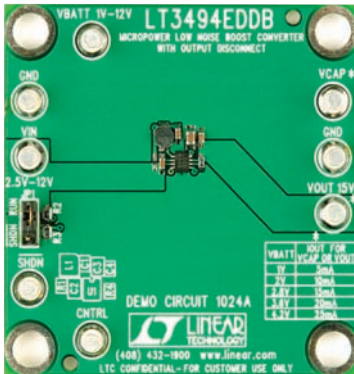
1.888.9LIGHT1

<http://lighting.arrow.com>



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

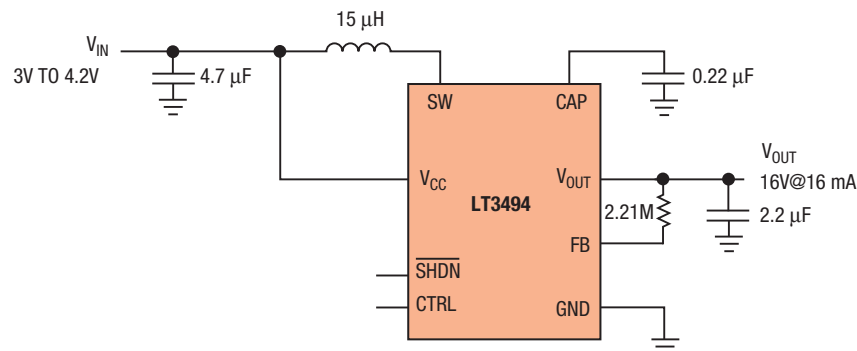
MARKETS LEGEND

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

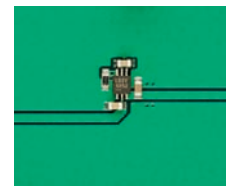
- 1.2 MHz constant frequency operation
- Constant frequency operation at all loads (LTC3204B only)
- Automatic Burst Mode™ operation (LTC3204 only)
- Built-in soft start
- Inductorless design
- Few external components (3)
- Tiny 6-lead (2 mm x 2 mm x 0.75 mm) DFN package

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

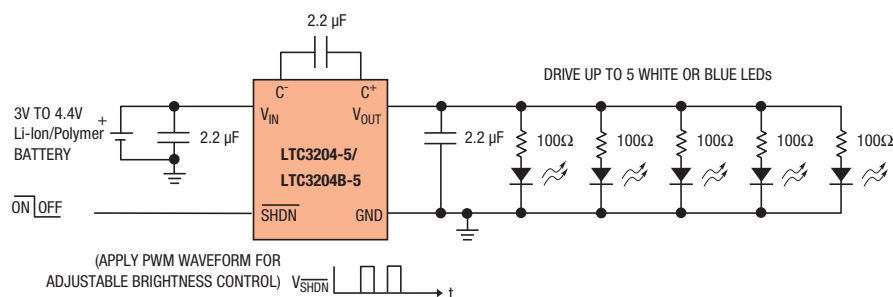
MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*Diagnostic capabilities: TSD: Thermal shutdown

**Burst mode operation

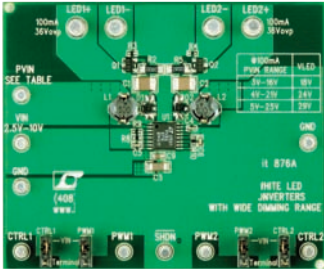
LTC3204-5/LTC3204B-5—Low Noise, Miniature Regulated Charge Pump Doubler in 2 mm x 2 mm DFN





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

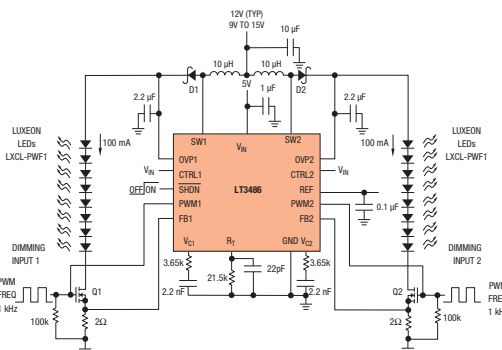
MARKETS LEGEND

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

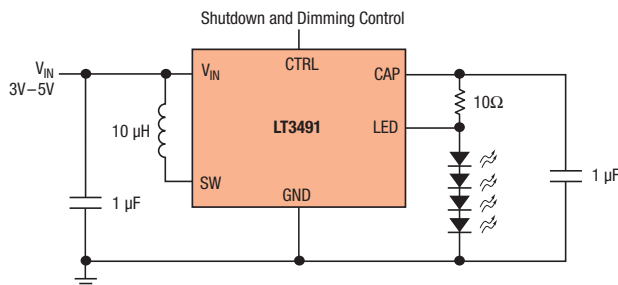
MARKETS LEGEND

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, <56 mm² 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

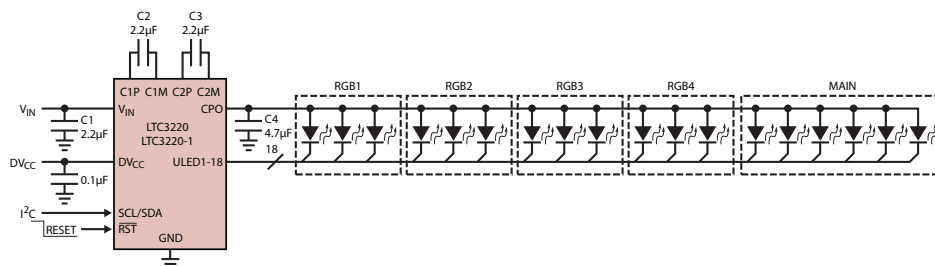
MARKETS LEGEND

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

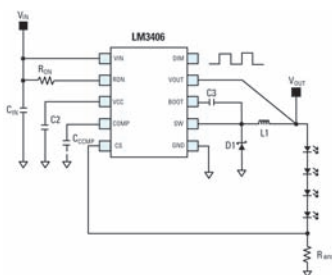
Product Specifications ▶

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

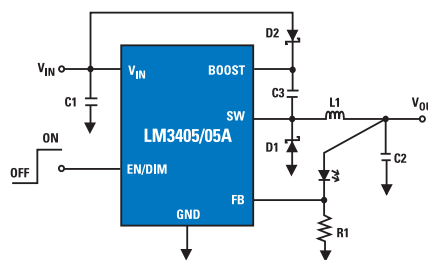
CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*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

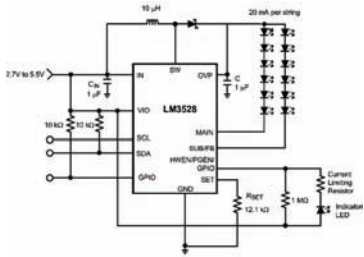
1.888.9LIGHT1

<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

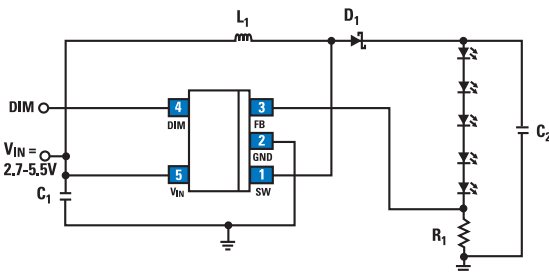
Applications ▶

- 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

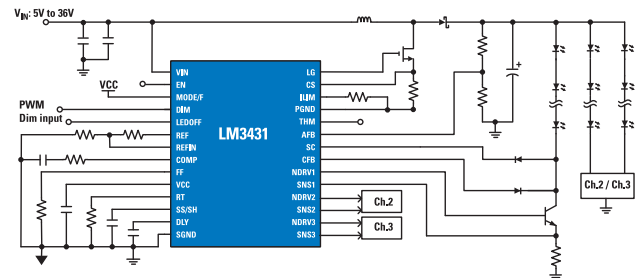
MARKETS LEGEND CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*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 ▶

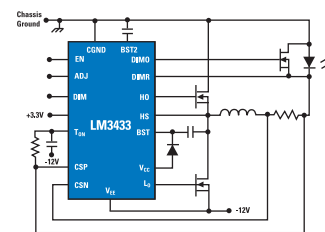
- PWM and analog dimming interfaces
- Capable of achieving up to 100% duty cycles
- Common-anode configuration allows LED anodes to be tied directly to chassis ground
- Adjustable switching frequencies up to 2 MHz
- Supports high-current applications with buck, boost, SEPIC, and flyback solutions

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

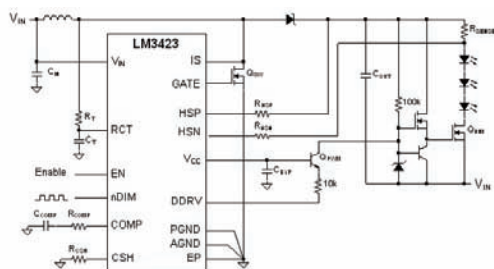
Product Specifications ▶

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

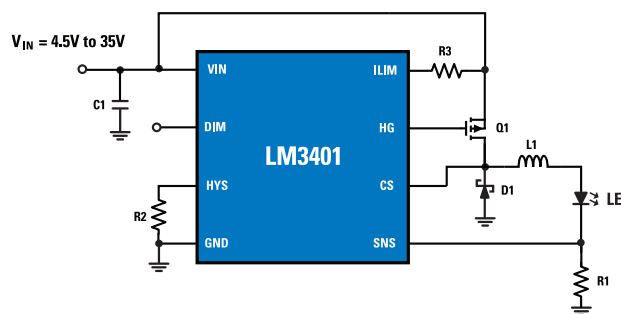
CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*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



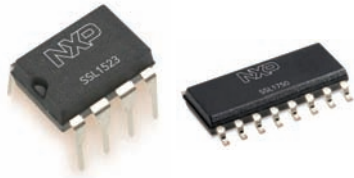
LM3401 schematic

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

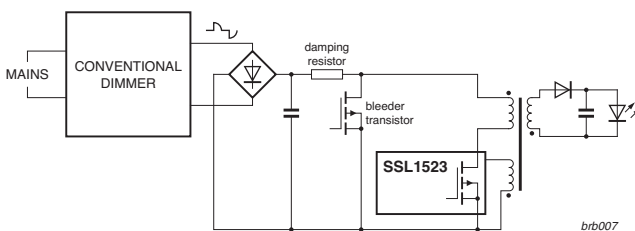
Product Specifications ▶

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

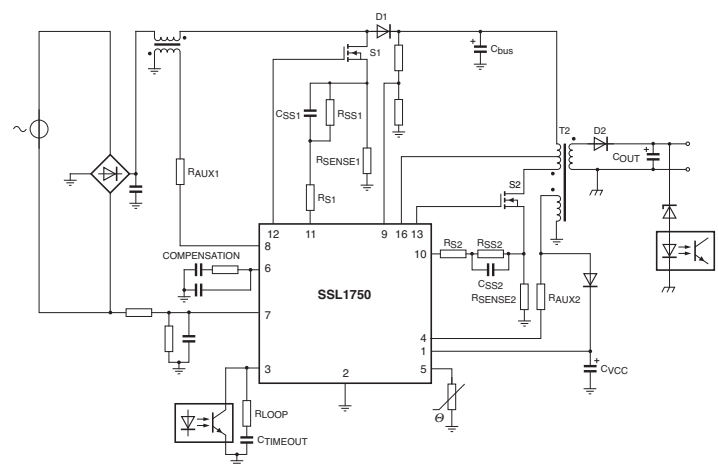
MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

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



Basic application diagram—SSL152x



Basic application diagram—SSL1750

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 ▶

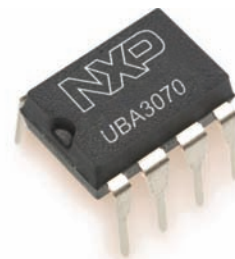
- Direct PWM dimming
- LED thermal and IC overheating protection
- Accurate DC/DC conversion with switch-mode buck converter

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



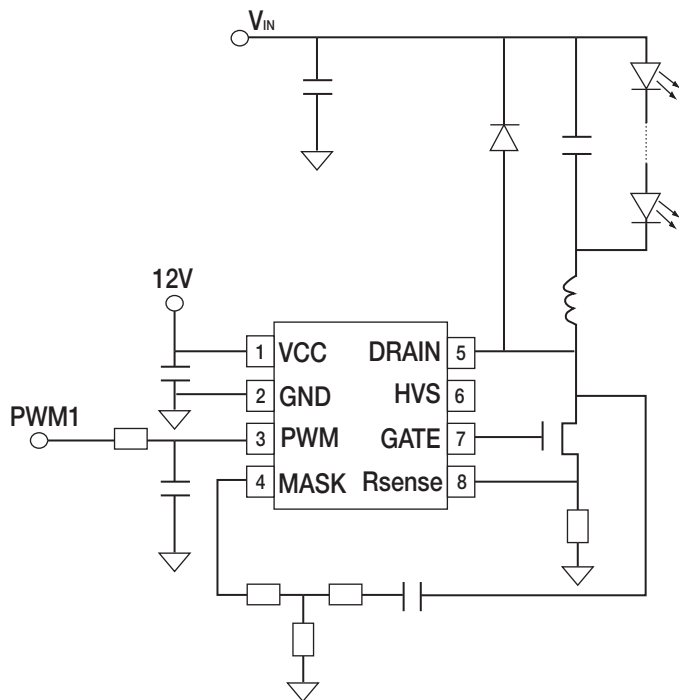
UBA3070

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



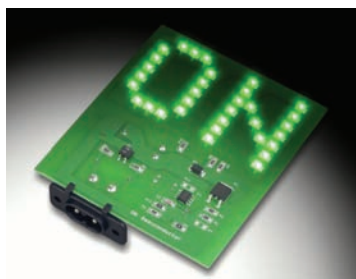
Basic application diagram—UBA3070

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

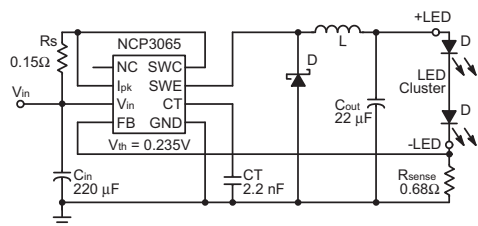
Applications ▶

- 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

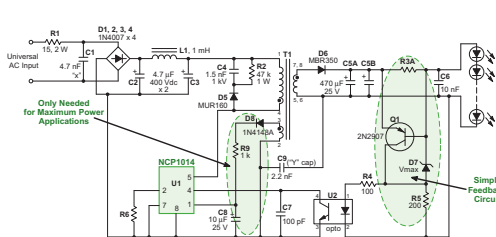
MARKETS LEGEND CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

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

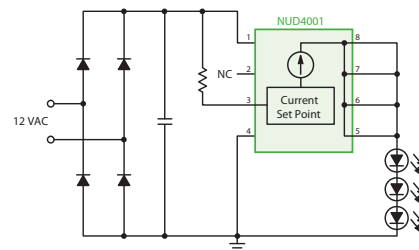


Typical Buck Application Circuit

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

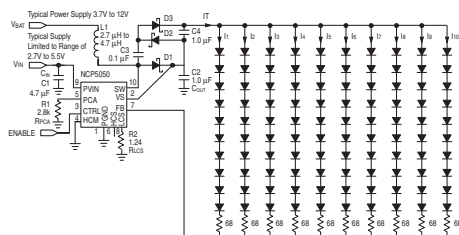


NCP1400A powered LED flashlight

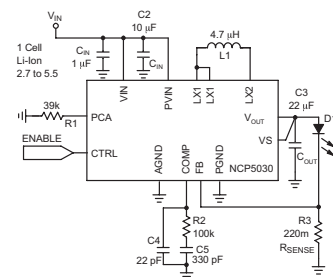
Product Specifications ▶												
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
NCP5050	Boost	PWM/analogue	6	1	Series	2.7-5.5	22	Up to 600	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

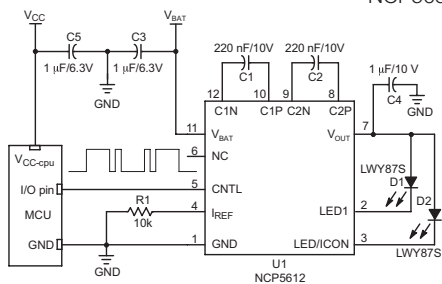
*Diagnostic capabilities: TSD: Thermal shutdown, UVLO: Under voltage lock out, SS: Soft start, OVP: Over voltage protection, SCP: Short circuit protection



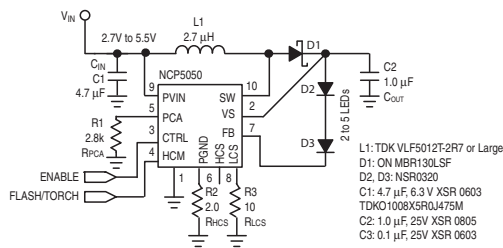
NCP5050 drives 10 x 10 LED for backlighting medium-size LCD panel



NCP5030 3-cell alkaline flashlight schematic



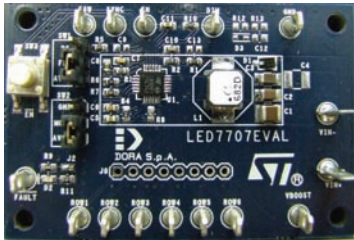
NCP5612 2 LED charge pump application schematic



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 ▶

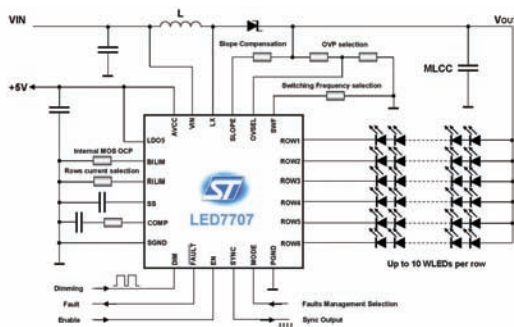
- Backlighting in LCD panels for battery/AC adapter supplied equipment such as:
 - GPS navigator backlighting
 - LCD monitor backlighting
- General lighting

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

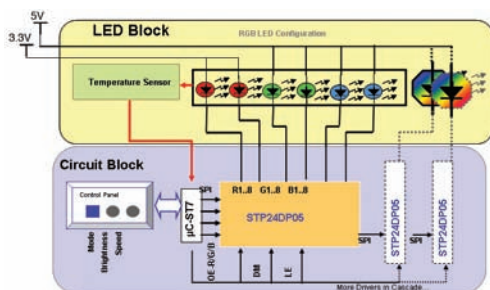
Applications ▶

- 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

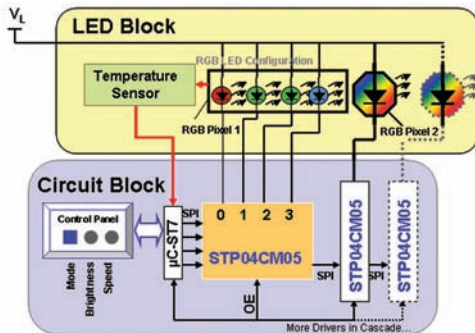
Applications ▶

- 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 ▶

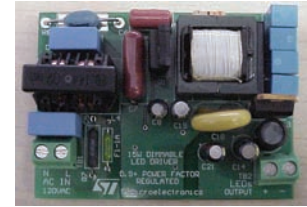
- High efficiency >87%
- No large electrolytic capacitor
- Able to meet FCC class B
- High power factor >0.9

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 ▶

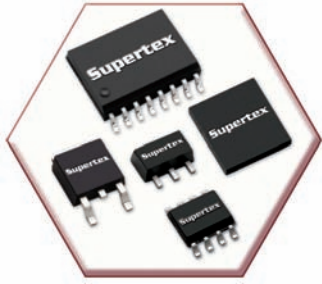
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
STEVAL-ILL016V1	Evaluation board	TRIAC dimmable	8 (1W)	2	Series/parallel	120 VAC	36V	350	87	-	-	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

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

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

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE



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

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

All photos courtesy of OSRAM SYLVANIA®
OPTOTRONIC is a registered trademark of OSRAM GmbH



OT50/120/24LP part #51598



OT9/100-120/350E part #51525

