

LED Drivers—Lighting and Display Solutions

Allegro MicroSystems offers a broad portfolio of LED drivers for lighting and display applications.



Features ▶

- Small packages
- Excellent matching
- Low quiescent current
- Charge pump and boost designs
- Multiple control methods
- Output currents up to 350 mA per channel
- 10-bit PWM per channel
- 7-bit current-control DACs for color calibration (dot correction)
- Open and shorted LED detection
- Thermal shutdown and under voltage lockout

Benefits ▶

- Reduced solution size
- Uniform brightness
- Longer battery life
- More solution choices
- Flexible dimming control
- Drive high-brightness LEDs
- Precise brightness control
- Accurate color balance and white point
- Remote diagnostics
- Full protection of driver IC

Applications ▶

- Mobile phones
- Notebooks/desktop LCD panels
- Portable media players
- GPS/navigation systems
- Digital cameras
- Full-color LED video displays
- Monochrome to full-color message and graphic displays
- Channel letter signs
- Architectural/decorative lighting
- Stage/entertainment lighting
- Automotive interior lighting
- Automotive exterior signal 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
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
A8500		PWM/analog	8-12	8	Series	5-25/ 4.3-5.5	47	25 x 8	92	TSD/OVM/LOD	Serial/PWM/analog	BL
A8501		PWM	8-12	4	Series	8-21	38	100 x 4	92	TSD/OVM/LOD	Serial/PWM	BL
A8503		PWM/analog	8-11	6	Series	5-25/ 4.3-5.5	50	20 x 6	92	TSD/OVM/LOD	Serial	BL
A8504		PWM/analog	8-11	8	Series	5-25/ 4.3-5.5	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
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
A6210	Constant-current buck switching regulator	PWM	–	–	QFN	9-46	3.5-31	3A	–	–	–	CL FL TR BL SI

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



Low-Voltage Controller and Integrated Switch Products

The Zetex family of low-voltage controller and integrated switch products from Diodes Incorporated enables 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 cells. 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
- Solar garden lights
- Automotive lighting

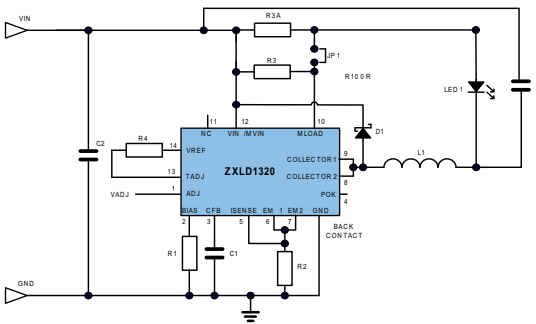
Product Specifications ▶

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 cells	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

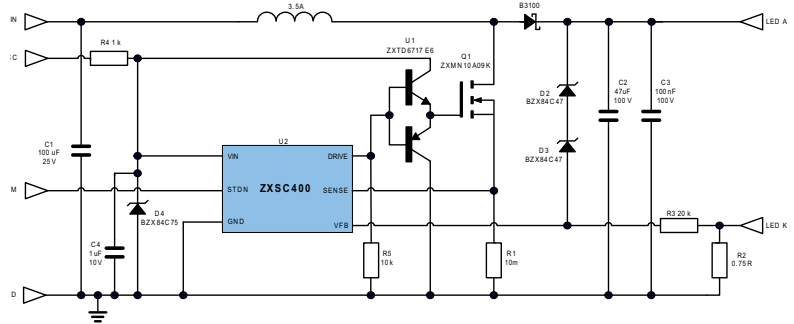
MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*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 ZXLD135x and ZXLD136x ranges of medium-voltage, integrated switch LED drivers from Diodes Incorporated support voltages from 6V to 60V and achieve up to 97 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.



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 97%)
- 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

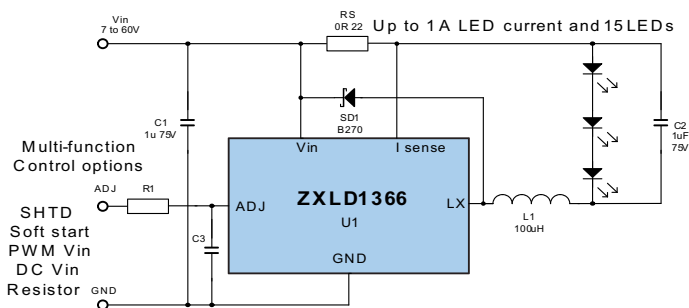


ZXLD1362EV3 evaluation board— a hysteretic buck LED driver in TSOT23-5, configured to drive a single onboard LED with thermal control or up to 15 external 3W LEDs

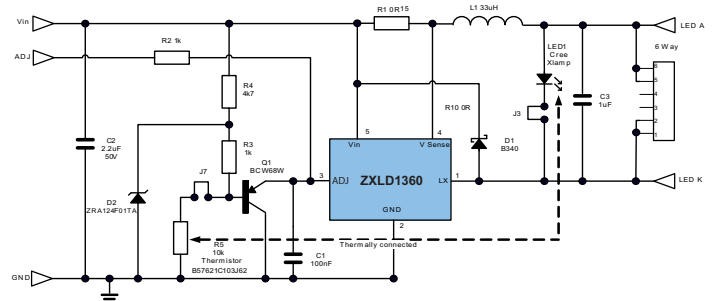
Product Specifications ▶

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	—	PWM/analog	CL TR BL SI
ZXLD1352		PWM/DC/resistive	8	1	Series	7-30	30	350	95	—	PWM/analog	CL TR BL SI
ZXLD1356		PWM/DC/resistive	15	1	Series	6-60	60	550	97	—	PWM/analog	CL TR BL SI
ZXLD1360		PWM/DC/resistive	7	1	Series	7-30	30	1,000	95	—	PWM/analog	CL TR BL SI
ZXLD1362		PWM/DC/resistive	15	1	Series	6-60	60	1,000	95	—	PWM/analog	CL TR BL SI
ZXLD1366		PWM/DC/resistive	15	1	Series	6-60	60	1,000	97	—	PWM/analog	CL TR BL SI

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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.

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Linear-Mode LED Drivers

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



Ultra small 2 mm x 2.1 mm SOT343 package

Features

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

Benefits

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

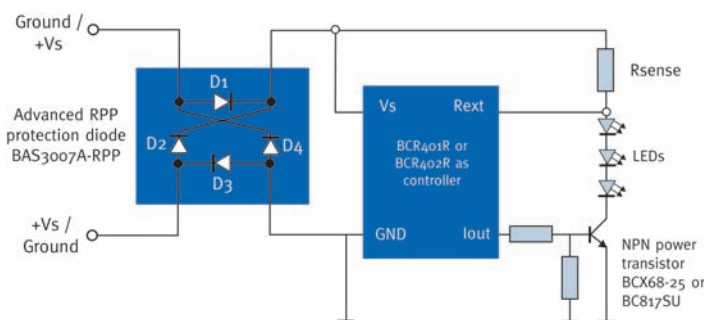
Applications

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

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

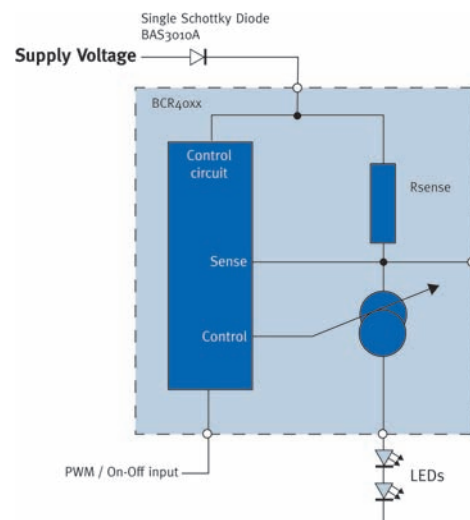
MARKETS LEGEND

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

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



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

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

Linear Constant-Current LED Drivers

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

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

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

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

Features ▶

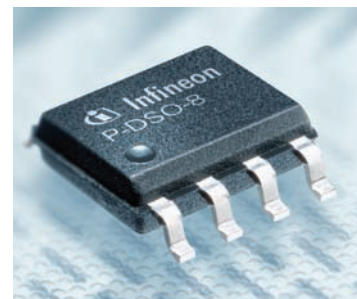
- Adjustable constant-output current
- Wide input voltage range
- Over-temperature protection
- Open load detection
- Wide temperature range: -40°C to +150°C

Benefits ▶

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

Applications ▶

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

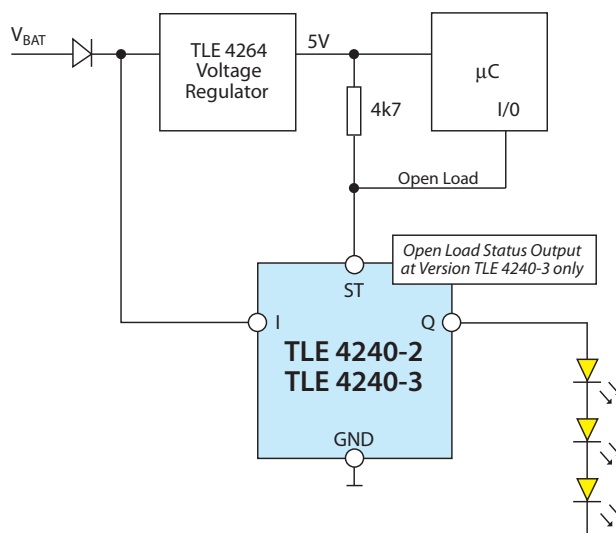


P-DSO-8, 5 mm x 6 mm

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

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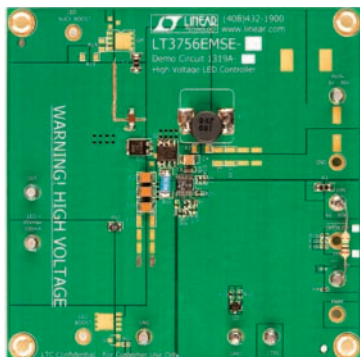
*Diagnostic capabilities: TSD: Thermal shutdown, TEF: Thermal error flag, OVM: Output voltage monitoring, LOD: LED open detection





High Current (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 ▶

- LT3756**
- 3000:1 True Color PWM dimming
- Wide input voltage range: 6V to 100V
- Output voltage up to 100V
- Constant-current and constant-voltage regulation
- 100 mV high side current sense

Benefits ▶

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

Applications ▶

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

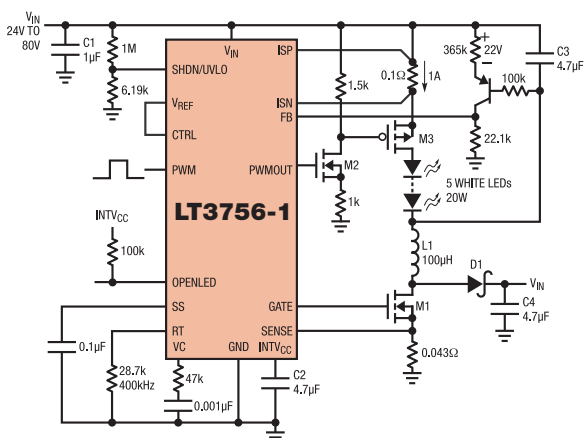
Product Specifications ▶												
Part Number	Type	Dimming Type	Number of LEDs/ String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)**	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LT3474/-1	Buck LED driver	400:1 PWM	3 x 500 mA	1	Series (3 max.)	4-36	15	1	87	TSD/OVM	PWM	CL TR BL
LT3592		10:1 Analog	4	1	Series	4-36	30	0.8	88	-	PWM	-
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 TR BL SI
LT3518		5000:1 PWM	10 x 200 mA	1	Series	3-30 (40 max.)	45	1A	92	TSD/OVM	PWM	CL TR BL SI
LT3496	Triple LED driver	3000:1 PWM	5	3	3 series strings	3-30	45	3 x 750	92	-	PWM	-
LT3475/-1	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
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
LT3476	Quad LED driver	1000:1 PWM	5	4	4 series strings	2.8-36	30	4 x 1.5	92	-	PWM	-
LTC3783	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/-1	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 TR BL SI
LT3756/-1		3000:1 PWM	14 x 1A	1	Series	6-100	Ext. FET	Ext. FET	92	TSD/OVM	PWM	CL TR BL SI

MARKETS LEGEND

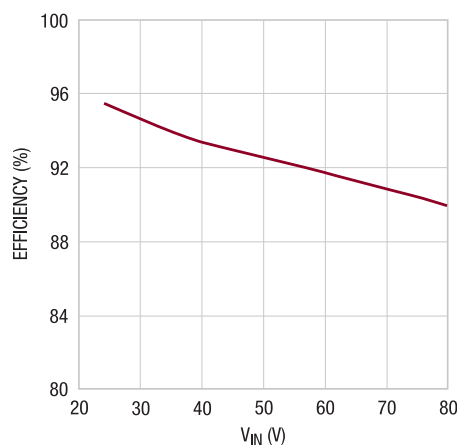
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*Diagnostic capabilities: TSD: Thermal shutdown, OVM: Output voltage monitoring

**Switch current



Efficiency vs. V_{IN}



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

High current, inductor-based, step-up switching LED drivers provide compact, 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 ▶

LT3755

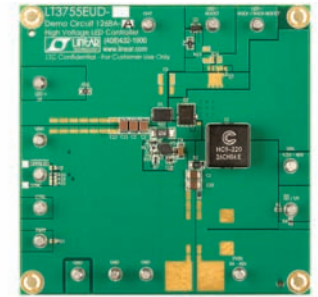
- 3000:1 True Color PWM dimming
- Wide input voltage range: 4.5V to 40V
- Output voltage up to 75V
- Constant-current and constant-voltage regulation
- 100 mV high side current sense

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 ▶

- 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
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 TR BL SI
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 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 TR BL SI
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 TR BL SI
LT3496	Triple LED driver	3000:1 PWM	4	3	3 series strings	3-30	45	3 x 750	87	–	PWM	–
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
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 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/-1	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 TR BL SI
LT3756/-1	Buck/buck-boost/boost controller	3000:1 PWM	14 x 1A	1	Series	6-100	Ext. FET	Ext. FET	92	TSD/OVM	PWM	CL TR BL SI

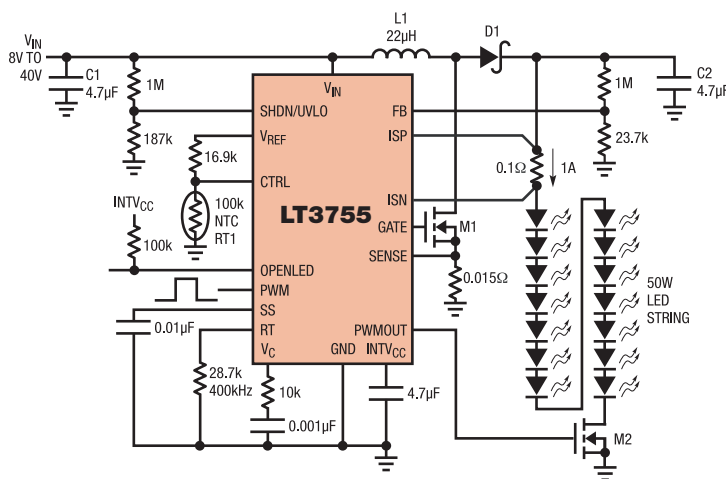
MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

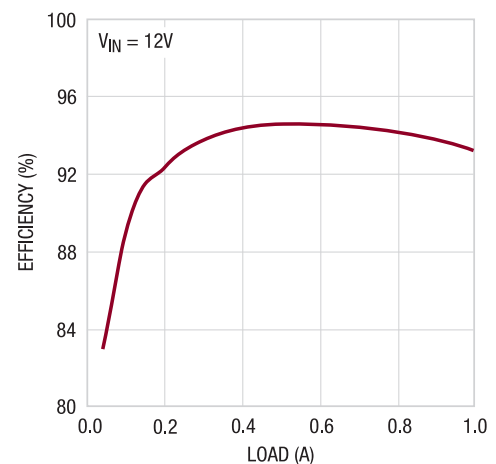
*Diagnostic capabilities: TSD: Thermal shutdown, OVM: Output voltage monitoring

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

†Switch current



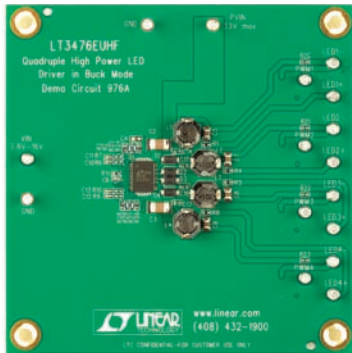
Efficiency vs. Load





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

High current, inductor-based, buck-boost switching LED drivers provide flexible, tiny, efficient solutions for TFT backlighting, automotive, and avionic lighting 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 5000:1 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

Benefits ▶

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

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	3 x 100 mA	1	Series	3-30 (40 max.)	45	1A	92	TSD/OVM	PWM	CL TR BL SI
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 TR BL SI
LT3496	Triple LED driver	3000:1 PWM	3	3	3 series strings	3-30	45	3 x 750	80	-	PWM	-
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/-1	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 TR BL SI
LT3756/-1		3000:1 PWM	6 x 1A	1	Series	6-100	Ext. FET	Ext. FET	92	TSD/OVM	PWM	CL TR BL SI

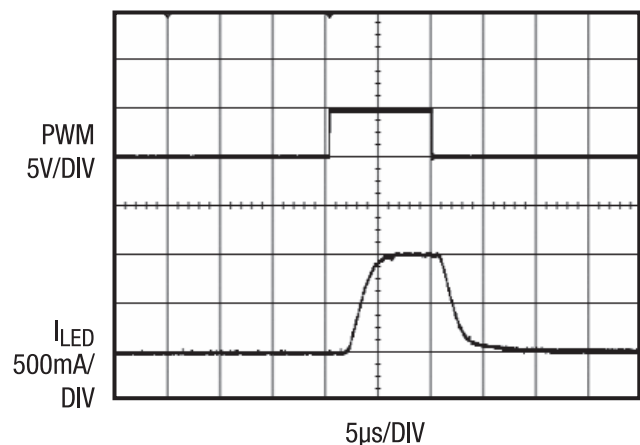
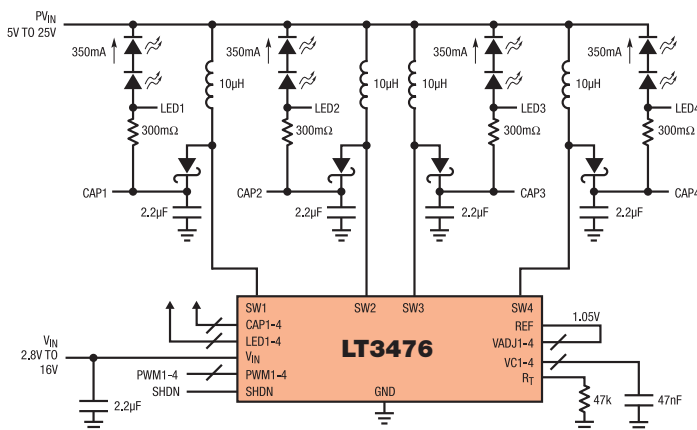
MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

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

**Switch current

1000:1 PWM Dimming at 100 Hz



High Current (350 mA to 10A) LED Drivers— SEPIC and Flyback



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 power, and wide-ranging True Color dimming.

Features ▶

LT3755

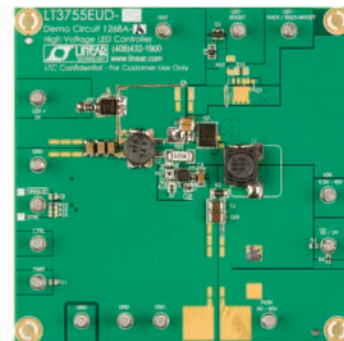
- High current
- High voltage
- Protection
- True Color PWM 3000:1 digital dimming
- Multi topology

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 LEDs constant color over a wide dimming ratio; capable of additional analog 100:1 dimming
- Adjustable LED brightness

Applications ▶

- High power LED applications
- Industrial
- Automotive



Product Specifications ▶

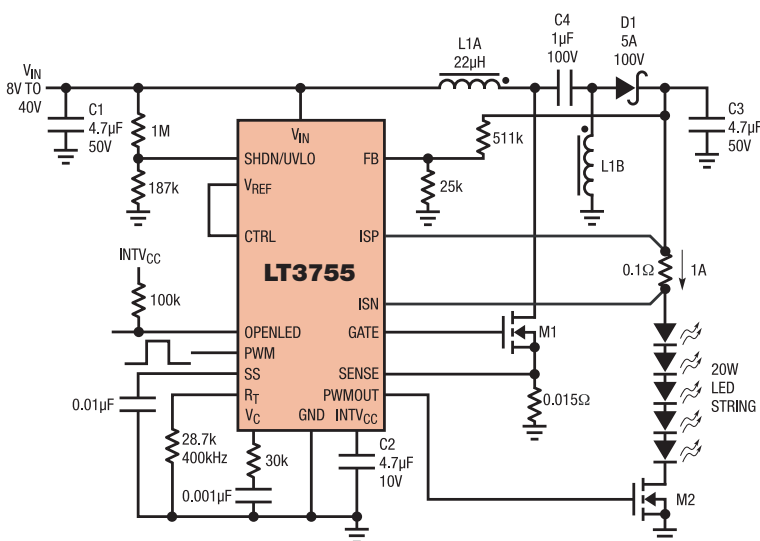
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)**	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LT3517	Buck/boost/buck-boost	5000:1 PWM	10 x 100 mA	1	Series	3-30 (40 max.)	45	1A	92	TSD/OVM	PWM	CL TR BL SI
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 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/-1	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 TR BL SI
LT3756		3000:1 PWM	14 x 1A	1	Series	6-100	Ext. FET	Ext. FET	92	TSD/OVM	PWM	CL TR BL SI

MARKETS LEGEND

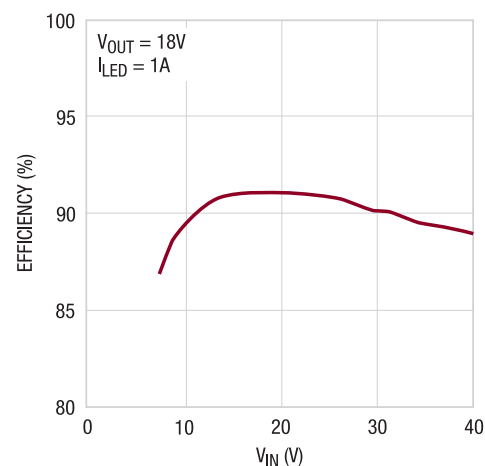
CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

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

**Switch current



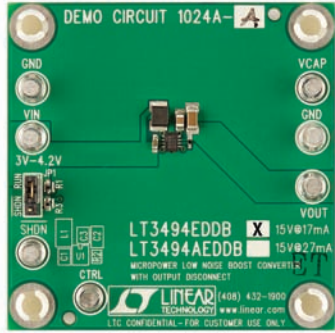
SEPIC Efficiency vs. V_{IN}





Organic LED (OLED) Bias—Low to High Current (50 mA to 2A) Drivers

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

Benefits ▶

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

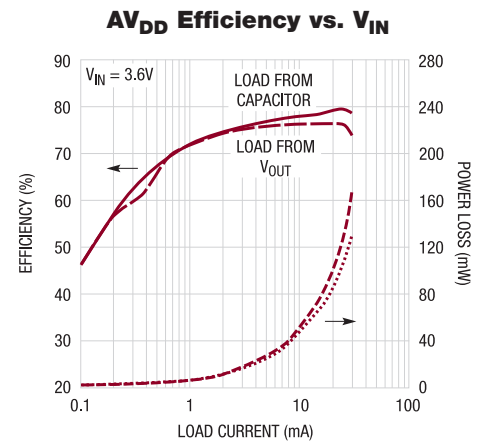
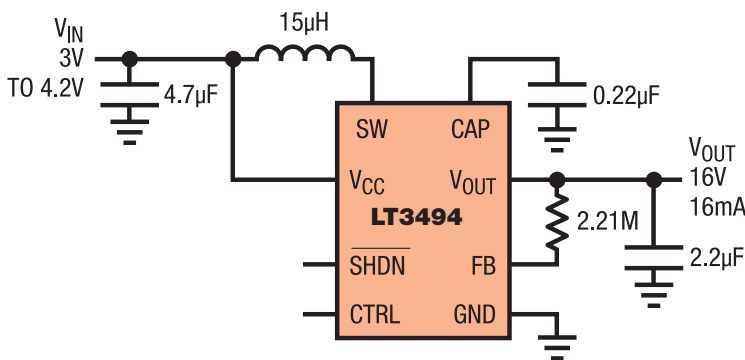
Applications ▶

- Organic LED power supply
- Digital cameras
- White LED power supply
- Cellular phones
- Medical diagnostic equipment

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 TR BL SI
LTC3464	Boost	-	1	-	Single	2.3-10	34	85	84	TSD	-	CL TR BL SI
LT3494/A		Pin adj.	1	-	Single	2.3-16	40	150/350	85	TSD	-	CL 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 TR BL SI
LT3463	Boost and inverter	-	2	-	Dual	2.4-15	\pm 40	180/320	77	TSD	-	CL TR BL SI
LT3472		-	2	-	Dual	2.2-16	\pm 40	250/300	83	TSD	-	CL TR BL SI
LT3582		-	2	-	Dual	2.58-5.5	\pm 14	290/500	83	TSD	-	CL TR BL SI
LT1613	Boost	-	1	-	Single	0.9-10	34	550	89	TSD	-	CL TR BL SI
LT3495(B)/-1		Pin adj.	1	-	Single	2.3-16	40	650/350	85	TSD	-	CL TR BL SI
LT3487	Boost and inverter	-	2	-	Dual	2.3-16	\pm 28	750/900	77	TSD	-	CL TR BL SI
LT3473/A	Boost	-	1	-	Single	2.2-16	36	1.2A	77	TSD	-	CL TR BL SI
LT3467/A		-	1	-	Single	2.4-16	40	1.4A	90	TSD	-	CL TR BL SI
LT3471	Boost or inverter	-	2	-	Dual	2.4-16	\pm 40	2A/1.5A	86	TSD	-	CL TR BL SI
LTC3458/L	Synchronous boost	-	1	-	Single	1.5-6	7.5/6	1.4A/1.7A	96	TSD	-	CL TR BL SI

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*Diagnostic capabilities: TSD: Thermal shutdown
 **Switch current



Medium Current (100 mA to 350 mA) LED Drivers—Buck



Medium 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 ▶

LT3592

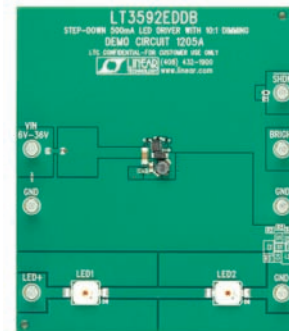
- Wide input voltage range operation from 3.6V to 36V
- Resistor adjustable 400 kHz to 2.2 MHz switching frequency
- Shorted and open-LED protection
- External resistor programs LED current, pin selects 10:1 ratio
- 50 mA/500 mA LED current settings

Benefits ▶

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

Applications ▶

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



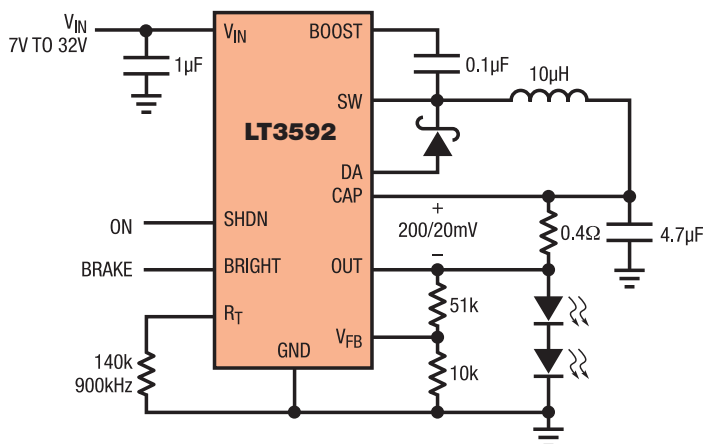
Product Specifications ▶

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
LT3591	Buck	80:1 PWM	5 x 200 mA	1	Series	2.5-12	30	0.5	92	TSD/OVM	PWM	CL TR BL SI
LT3517		5000:1 PWM	5 x 300 mA	1	Series	3-30	30	1.5	92	TSD/OVM	PWM	CL TR BL SI
LT3592		10:1 analog	6 x 350 mA	1	Series	3-36	32	0.8	92	-	-	-
LT3496		3000:1 PWM	3 x 5 x 300 mA	3	3x multiple series	3-30	30	3 x 0.75	92	TSD	PWM	CL TR BL SI

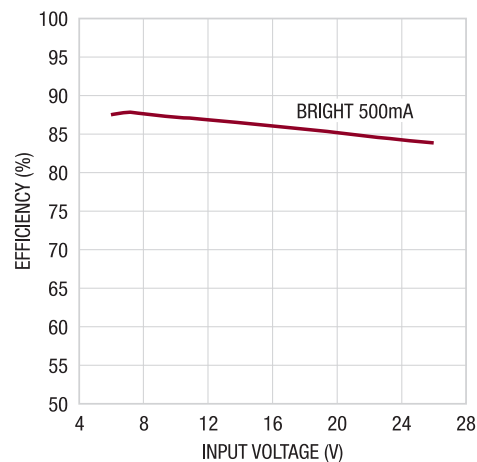
MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

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



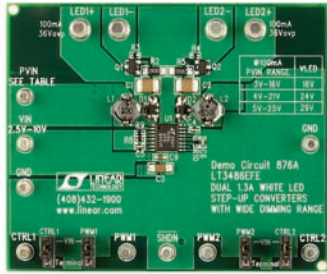
LED Power Efficiency vs I_{LED}





Low to Medium Current (20 mA to 100 mA/LED) Multi Channel 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 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 multi panel 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

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

Applications ▶

- Main/sub-displays
- Digital cameras and sub-notebook PCs
- PDAs/handheld computers
- Automotive

Product Specifications ▶

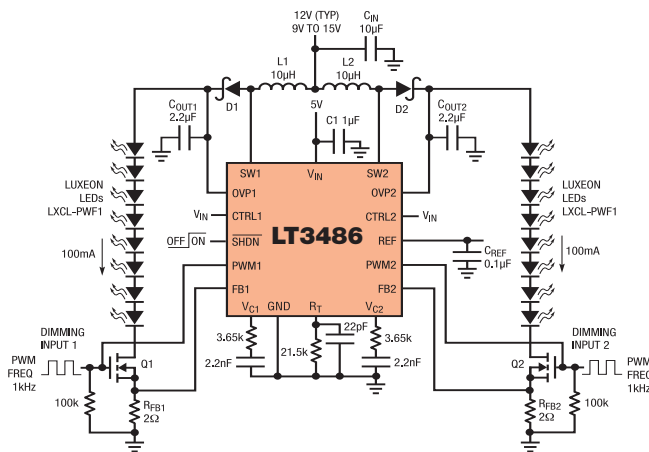
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)**	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LT3466-1	LED driver and boost converter	DC/PWM	10 x 25 mA	1	Series	2.7-24	39.4	2 x 320	84	TSD	PWM	CL 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 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 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 TR BL SI
LT3598	6-channel boost LED driver	3000:1 PWM	10	6	6 strings of series LEDs	3-30	44	30	90	-	PWM	TR BL SI
LT3599	4-channel boost LED driver	3000:1 PWM	10	4	4 strings of series LEDs	3-30	44	30	90	-	PWM	TR BL SI

MARKETS LEGEND

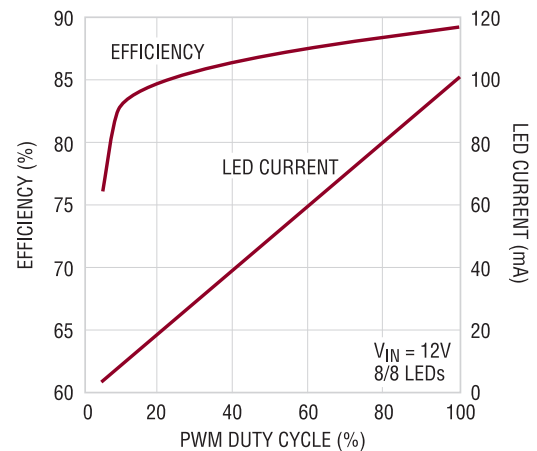
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*Diagnostic capabilities: TSD: Thermal shutdown

**Switch current



LED Efficiency and Current vs. PWM Duty Cycle



Low Current (20 mA to 50 mA) LED Drivers—Boost

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 ▶

LT3593

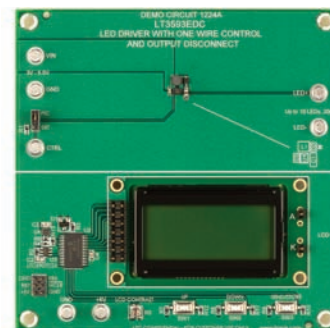
- Drives up to 10 white LEDs from a 3V supply
- One-pin shutdown and current programming
- LEDs disconnected in shutdown
- 32:1 linear brightness control range
- V_{IN} range: 2.7V to 5.5V

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

Applications ▶

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



Product Specifications ▶

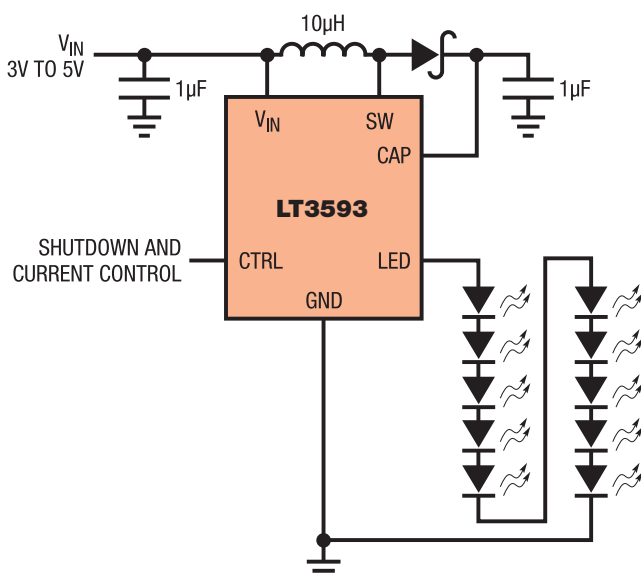
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)**	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LT3491	Boost LED driver	300:1 PWM	6 x 25 mA	1	Series	2.5-12	27	260	76	TSD/OVM	PWM	CL FL TR BL SI
LT3498	Boost LED driver and OLED	DC/PWM	6	1	Series	2.5-12	32	300 + 180	80	TSD/OVM	PWM	CL FL TR BL SI
LT3591	Boost LED driver	90:1 PWM	10 x 20 mA	1	Series	2.5-12	42	450	77	TSD/OVM	PWM	CL FL TR BL SI
LT3593		DC/PWM	10	1	Series	2.5-5.5	45	550	80	-	-	-
LT3497	Dual boost LED driver	DC/PWM	6	2	Dual series strings	2.5-10	32	2 x 300	80	-	-	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
LT3598	6-channel boost LED driver	DC/PWM	10	6	6 series strings	3-30 (40V _{MAX})	44	1.5A	88	-	-	-
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

MARKETS LEGEND

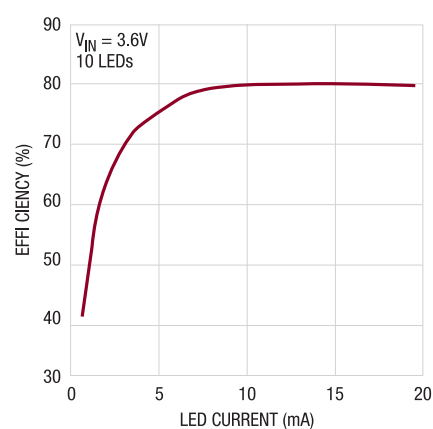
CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

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

**Switch current



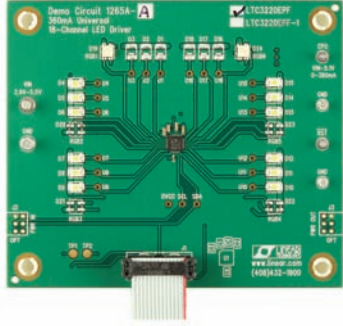
Conversion Efficiency





Low Current Multi Display LED Drivers—Inductorless

Linear Technology's family of inductorless, charge pump-based, multi display 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.



Features ▶

LTC3220/-1

- Drives up to 18 universal independently configurable 20 mA current sources
- 64-step brightness control
- Slow-rate limited switching
- High efficiency operation up to 91%:
1x, 1.5x, or 2x boost modes with automatic mode switching
- 28-lead (4 mm x 4 mm x 0.55 mm) ultra-thin QFN package, <math><56\text{ mm}^2</math> solution area

Benefits ▶

- Design flexibility for highly featured, multi-display cell phones and system status LED lighting
- High resolution
- Reduces conducted and radiated noise
- Extends battery run time
- Compact, ultra-low profile footprint

Applications ▶

- Ideal for applications with noise sensitive circuitry onboard, minimizes size of externals

Product Specifications ▶

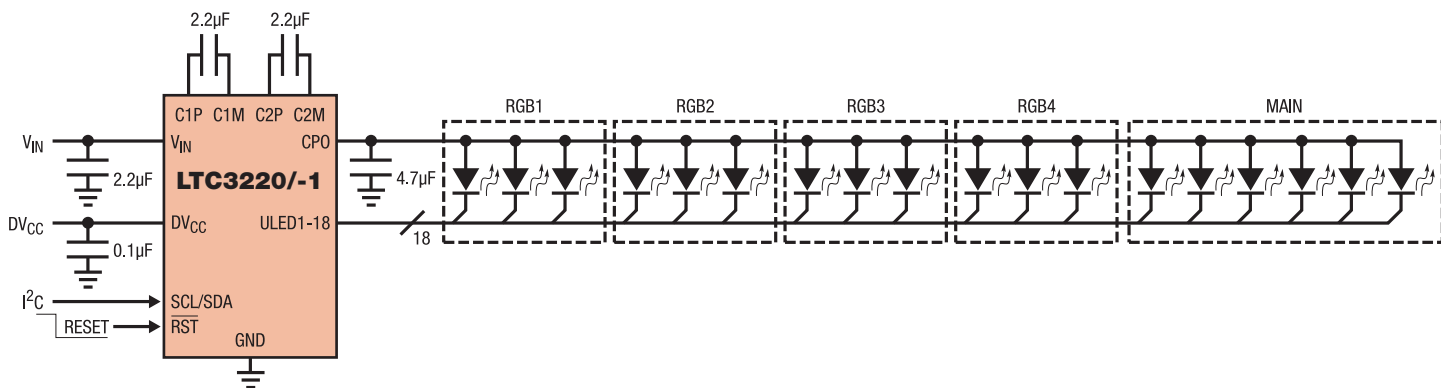
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
LTC3212	Multi display LED driver	1-wire	3	1	Parallel, RGB	2.7-5.5	-	75	92	TSD	1-wire	FL BL
LTC3230		1-wire	5	1	Parallel, Main/SUB + 2 LDOs	2.7-5.5	-	125	91	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



Integrated Constant-Current Buck-LED Drivers

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

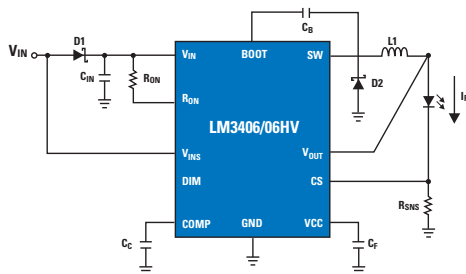
Product Specifications ▶

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
LM3401	Buck	PWM	1-9	1	Series	4.5-35	35	>3,000	95	TSD/LOD	PWM	CL FL TR SI
LM3402		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
LM3433	PWM/analog	1	1	Series	-9 to -14	-6	>6,000	96	TSD/LOD	PWM/analog	CL TR BL SI	

MARKETS LEGEND

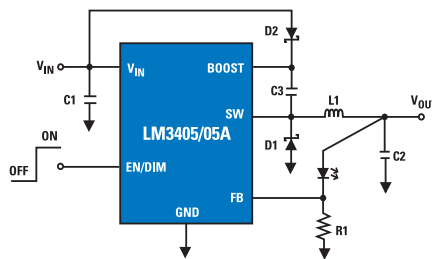
CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*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



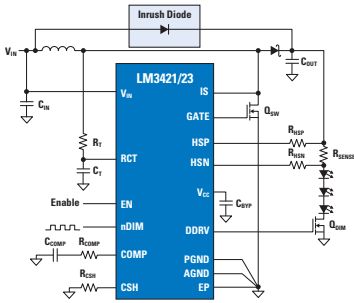
LM3405/05A schematic

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



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.



LM3421/3

Features ▶

LM3421/3

- Adjustable highside current sense threshold
- Peak current mode control with predictive off-time
- Zero current shutdown
- PWM dimming

Benefits ▶

- Allows for high efficiency design
- Eases design of loop compensation
- Great design flexibility

Applications ▶

- General illumination
- Automotive
- Architectural lighting

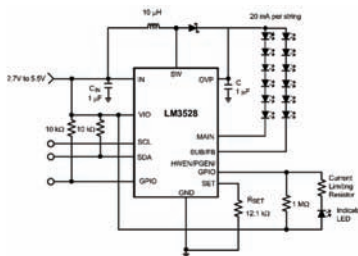
Product Specifications ▶

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	TSD/LOD	PWM	CL TR BL SI
LM3421/3	Buck/boost/buck-boost/SEPIC	PWM	1-20	1	Series	4.5V-75V	75V	>2,000	2.0 MHz	OVP/FLT/LED ready/broken open check	PWM	CL TR BL SI	

MARKETS LEGEND

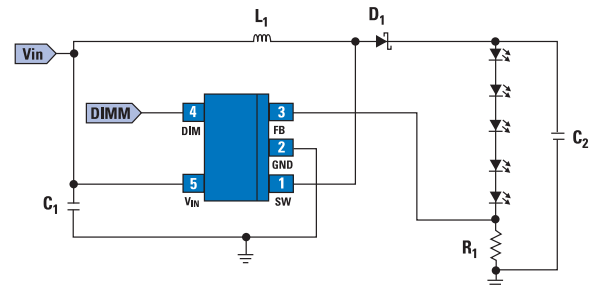
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*Diagnostic capabilities: TSD: Thermal shutdown, UVLO: Under voltage lock out, LOD: LED open detection



LM3528 schematic

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



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

TRIAC Dimmable LED Driver

National's TRIAC dimmable offline LED driver solution is perfect for any application where an LED driver must interface to a standard TRIAC wall dimmer. The LM3445 delivers a wide, uniform dimming range free of flicker, best-in-class dimming performance, and high efficiency—all while maintaining ENERGY STAR power factor requirements in typical application.



Features ▶

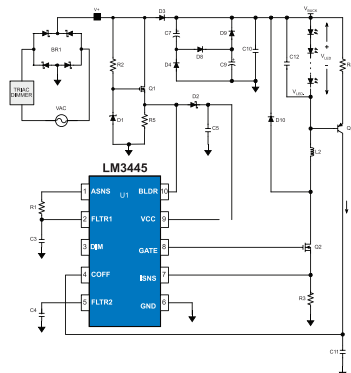
- Angle detector/decoder
- Simplified constant off-time
- Allows master-slave operation control in multi-chip solutions
- Fully WEBENCH® enabled

Benefits ▶

- Enables 150:1 full range DIM capability
- Ease of design
- Smaller BOM and solution size
- Control multiple strings of LEDs with consistent dimming, free of flicker

Applications ▶

- General illumination
- Architectural 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
LM3455	Buck	TRIAC dimmable	4-12	1	Series	80-277 AC	45V	1,000	85	–	PWM/analog	CL

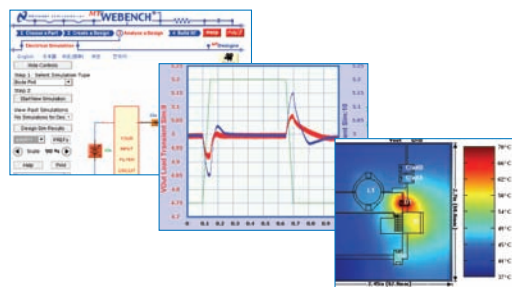
MARKETS LEGEND CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

Design Tools and Packaging ▶

WEBENCH® Online Design Environment

Use this online design and prototyping environment to accelerate your design process in just four simple steps:

1. Choose a part
2. Create a design
3. Analyze it using electrical and thermal simulation
4. Build it with your custom kit



WEBENCH® LED Designer

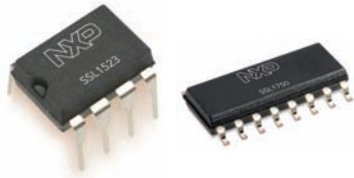
Find power solutions for High-Brightness LEDs

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



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 ▶

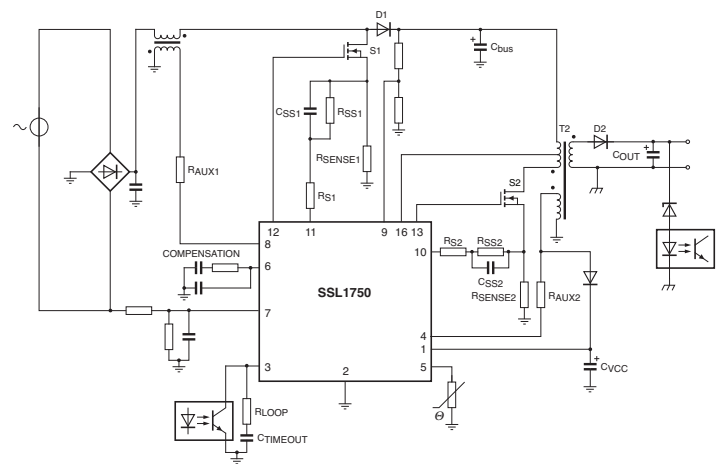
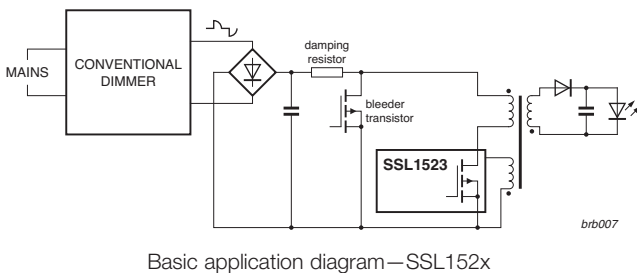
- General LED lighting indoor (residential, office, and building)
- General LED lighting outdoor (street lighting, parking lots, tunnel lighting)
- Industrial lighting
- Signage

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

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



DC/DC LED Driver Solutions

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



Features ▶

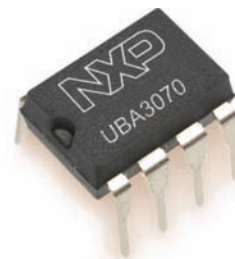
- Direct PWM dimming
- LED thermal and IC overheating protection
- Accurate DC/DC conversion with switch-mode buck converter

Benefits ▶

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

Applications ▶

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



UBA3070

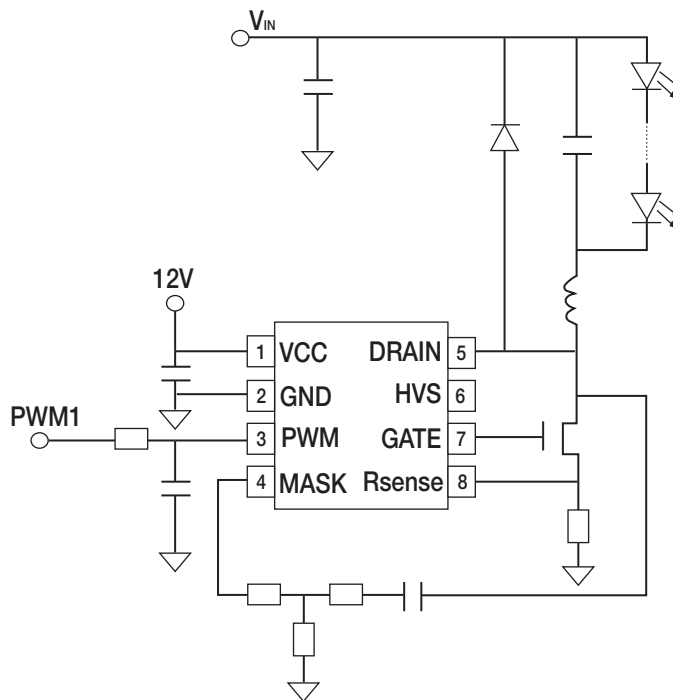
Product Specifications ▶

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

MARKETS LEGEND

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



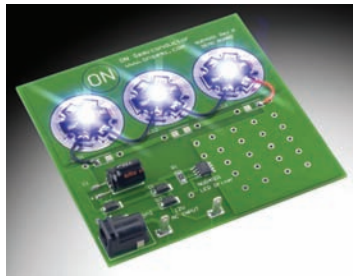
Basic application diagram—UBA3070

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.



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

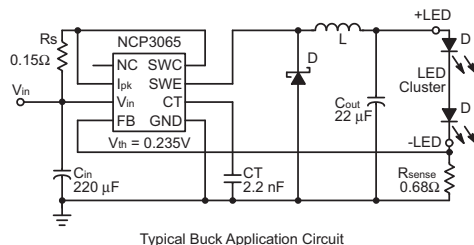
Applications ▶

- 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 (addressable and neon replacement)

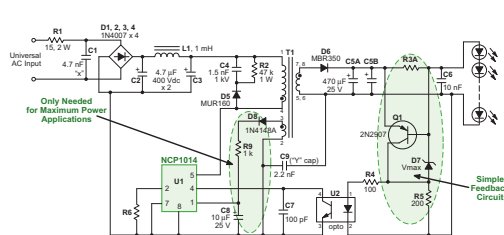
Product Specifications ▶												
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
NCP3066	Boost/buck/SEPIC	PWM/analog	12	1	Series	3-40	40	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
CAT4201	Buck	PWM/analog	8	1	Series	7-36	32	350	94	TSD	PWM/analog	CL TR SI
NCP1034		PWM/analog	20	1	Series	12-100	80V	Flexible/controller >1A	92	SS/OCP/UVLO	PWM	CL BL
NCP1013	Fixed frequency flyback	PWM/analog	-	1	Series	85-305 VAC	Depends on V _{IN}	5W-up to 1,000	83	TSD/OVP/SS/UVLO	-	CL SI
NCP1014		PWM/analog	-	1	Series	85-305 VAC	Depends on V _{IN}	8W-up to 1,000	83	TSD/OVP/SS/UVLO	-	CL SI
NCP1028		PWM/analog	-	1	Series	85-305 VAC	Depends on V _{IN}	15W-up to 1,000	83	TSD/OVP/SS/UVLO	-	CL SI
NCP1216		PWM/analog	-	1	Series	85-305 VAC	Depends on V _{IN}	Flexible/controller	90	OCP/UVLO/TSD	-	CL BL
NCP1351	Variable OFF time flyback	PWM/analog	-	1	Series	85-305 VAC	Depends on V _{IN}	Flexible/controller	90	OCP/UVLO/TSD/OPP	-	CL BL
NCP1607B	PFC boost or flyback	PWM/analog	-	1	Series	85-305 VAC	Depends on V _{IN}	Flexible/controller >1A	90	OVP/UVLO	PWM/analog	CL SI
CAT4016	Low drop out driver (LDO)	PWM	1	16	Parallel	3-5.5	7	100	-	TSD	Serial	SI
CAT4101	Linear	PWM	6	1	Series	3-5.5	25	1,000	-	TSD	PWM	CL FL
CAT4109		PWM	6	3	Parallel	3-5.5	25	175	-	TSD	PWM	CL BL SI
NUD4001		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

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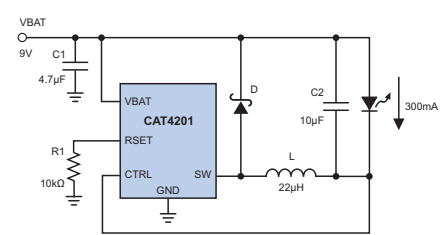
*Diagnostic capabilities: TSD: Thermal shutdown, OVP: Overvoltage protection, SS: Soft start, UVLO: Under voltage lock out, OCP: Overcurrent protection, OPP: Overpower protection



NCP3065 LED driver—buck configuration



NCP1014 configured as a constant-current isolated offline LED driver



1W step-down, inductor-based LED driver for multivolt (6V to 36V) systems

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, and highly integrated lighting management ICs that support backlight of the display, keyboard, and color indicators.

Features ▶

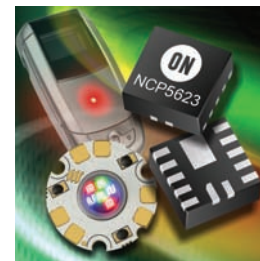
- Linear, inductive, and charge pump solutions
- High efficiency
- Highly integrated solutions
- Ultra-thin micro package 0.55 mm
- Simple to use

Benefits ▶

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

Applications ▶

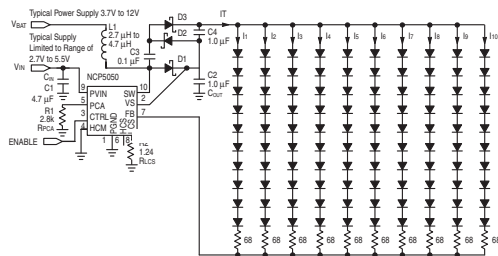
- Small and medium size LCD backlighting
- Keyboard backlighting
- Flashlights, torch, and headlamps
- Camera flash
- Medical instruments



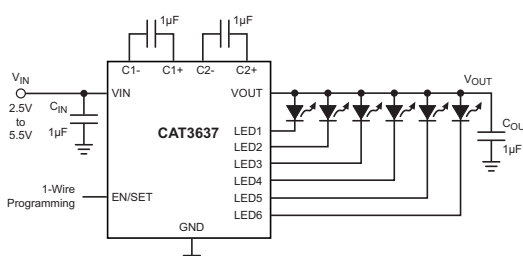
Product Specifications ▶												
Part Number	Type	Dimming Type	Number of LEDs/String	Number of Strings	Configuration	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Peak Efficiency (%)	Diagnostic Capabilities*	Interface	Markets
NCP1529A	Buck	PWM	1	1	Series	2.7-5.5	5.5	1,000	96	TSD/SCP/UVLO	PWM	FL
NCP5030	Buck-boost	PWM/analog	1	1	Series	2.7-5.5	5.5	Up to 900	94	OVP/TSD/UVLO	Enable	FL
CAT4106	Boost/linear	PWM	8	4	Parallel	3.0-5.5	36	175	-	TSD/OLP/SLP	PWM	BL
NCP1400A	Boost	PWM/analog	1	1	Series	0.8-5.0	5	100	89	SS	Enable	FL
NCP1406		PWM/analog	6	1	Series	1.8-5.5	25	500 mW (25 mA@25V)	85	TSD/UVLO/SS	Enable	BL FL
NCP1422		PWM/analog	1	1	Series	1.0-5.0	5	600	92	TSD/UVLO/SS	Enable	FL
NCP5050		PWM/analog	6	1	Series	2.7-5.5	22	Up to 600	90	Timeout/OVP/TSD	Enable	BL FL
NCP5890		PWM	8	1	Series	2.7-5.5	34	25	90	TSD/UVLO/OVP	I ² C	BL
NCP5005	Boost w/enhanced RFI immunity	PWM/analog	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/analog	5	1	Series	2.7-5.5	22	500 mW (25 mA@20V)	84	OVP/TSD	Enable	BL
CAT3224	Super cap charge pump	-	1	2	Parallel	2.5-5.5	5.5	2,000	-	Timeout/TSD/OC/OPV	PWM	FL
CAT3637	Charge pump	PWM	1	6	Parallel	2.5-5.5	7	30	92	TSD/OVM/SCP	1-wire	BL
NCP5602		I ² C	1	2	Parallel	2.7-5.5	5.5	30	88	OVP/TSD	I ² C	BL
NCP5603		PWM	1	1-10	Parallel	2.7-5.5	5.5	200	90	TSD/SCP	Enable	BL FL
CAT3200		PWM	1	1-6	Parallel	5	5.5	100	90	TSD	PWM	BL
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	30	88	OVP/TSD	Enable/dim	BL
NCP5604A/B		PWM	1	4	Parallel	2.7-5.5	4.8	30	87	OVP/SCP	Enable	BL
NCP5623A		RGB charge pump	I ² C	1	3	Parallel	2.7-5.5	5.5	30	93	OVP/SCP	I ² C
NCP5623DT	Linear RGB	I ² C	1	3	Parallel	2.7-5.5	5.2	30	-	TSD/SCP/UVLO	I ² C	CL BL

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

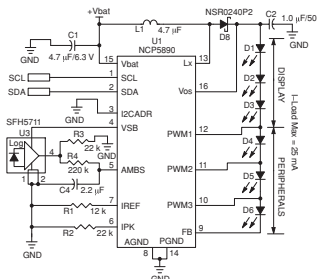
*Diagnostic capabilities: TSD: Thermal shutdown, UVLO: Under voltage lock out, SS: Soft start, OVP: Over voltage protection, SCP: Short circuit protection, SLP: Shorted LED protection, OLP: Open LED protection



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



CAT3637 schematic



NCP5890 typical schematic



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 ▶

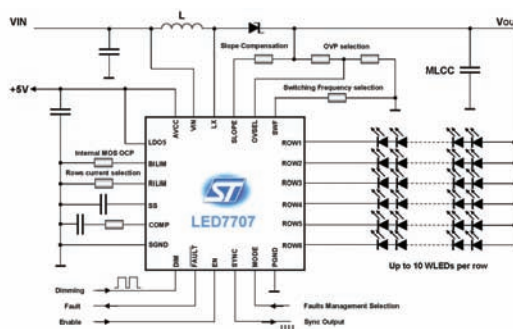
- Backlighting in LCD panels for battery/AC adapter supplied equipment such as:
 - GPS navigator backlighting
 - LCD monitor backlighting
- General lighting

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

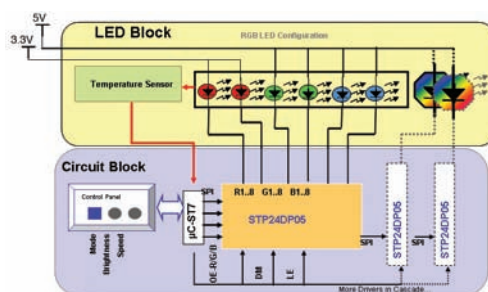
Applications ▶

- 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	-	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

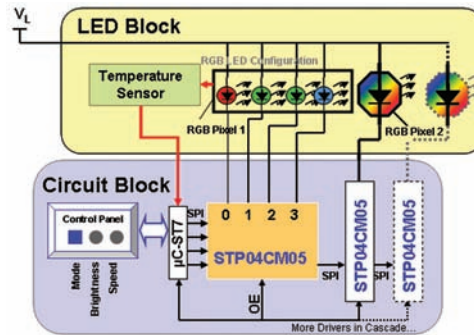
Applications ▶

- 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 ▶

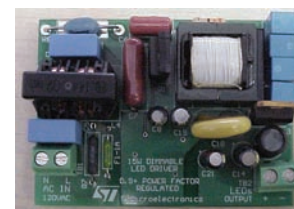
- High efficiency >87%
- No large electrolytic capacitor
- Able to meet FCC class B
- High power factor >0.9

Benefits ▶

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

Applications ▶

- Downlight
- Dimmable ballast replacement
- Chandelier

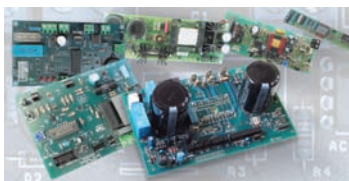


STEVAL-ILL016V1 evaluation board

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

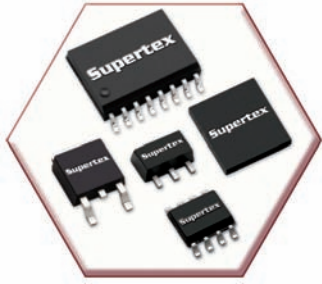
ST Board Order Code	LED Board Description
STEVAL-ILL001V1	Dimmable driver for HB power LEDs with Viper22A (DALI connector)
STEVAL-ILL002V3	HB-LED with diagnostic (40 LED) based on STP08DP05
STEVAL-ILL002V4	HB-LED with diagnostic (40 LED) based on STP08DP05
STEVAL-ILL003V1	HB-LED without diagnostic (32 LED) based on STP16CP596
STEVAL-ILL003V2	HB-LED without diagnostic (32 LED) based on STP16CP05
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-ILL008V1	LED flashlight demo
STEVAL-ILL009V3	OSTAR projection module
STEVAL-ILL009V4	OSRAM DRAGON LEDs module
STEVAL-ILL009V5	New RGB color control board based on STP04CM05 and ST1S10
STEVAL-ILL010V1	High-intensity LED dimming driver based on L6902
STEVAL-ILL014V1	Constant-current controller for high brightness LEDs based on STCS1
STEVAL-ILL015V1	HB-LED driver with diagnostic based on STP24DP05 and STM32
STEVAL-ILL016V1	15W offline TRIAC dimmable LED driver based on L6562AD and TSM1052 (USA Market-115V)
STEVAL-ILL018V1	OSRAM Golden DRAGON white LED module (LUW W5AM)
STEVAL-ILL018V2	OSRAM Golden DRAGON warm white LED module (LCW W5AM)
STEVAL-ILL018V3	OSRAM Golden DRAGON amber (red) LED module (LA W55M)
STEVAL-ILL018V4	OSRAM Golden DRAGON blue LED module (LB W55M)
STEVAL-TLL001V1	White LED controller based on STLD40D
STEVAL-TLL002V1	Flash driver based on STCF01
STEVAL-TLL003V1	Power Flash driver based on STCF02
STEVAL-TLL004V1	Power Flash driver based on STCF03
STEVAL-TLL005V1	Power Flash evaluation board based on STCF03 and ST7 MCU (include the STEVAL-TLL004V1)

Arrow Electronics Lighting Group

1.888.9LIGHT1

<http://lighting.arrow.com>

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	5-90	20	-	-	-	CL
CL25		-	1-30	1	Series/parallel	5-90	5-90	25	-	-	-	CL
CL320		Ext. PWM	1-30	3	Series/parallel	5-90	4-90	20	-	-	Independent enable	CL BL
CL325		Ext. PWM	1-30	3	Series/parallel	5-90	4-90	25	-	-	Independent enable	CL BL
CL330		Ext. PWM	1-30	3	Series/parallel	5-90	4-90	35	-	-	Independent enable	CL BL
CL520		-	1-30	1	Series/parallel	4.75-90	1-90	20	-	-	-	CL BL
CL525		-	1-30	1	Series/parallel	4.75-90	1-90	25	-	-	-	CL BL
CL6		-	1-30	1	Series/parallel	6.5-90	90	100	-	-	-	CL
CL7		Ext. PWM	1-30	1	Series/parallel	6.5-90	4-90	100	-	-	EN	CL
HV9903		Boost	PWM/linear	1-8	1	Series	1.8-12.5	<35	5-40	>90	-	-
HV9910B	Buck	PWM/linear	Any	1	Series	8-450	<0.8* V _{IN}	Ext. FET	>90	-	-	CL BL SI
HV9919		PWM/linear	Any	1	Series	4.5-40	<0.8* V _{IN}	Ext. FET	>90	-	-	CL 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	4-20	1	Series	20-400	12-80	20-50	>80	-	-	CL
HV9980		PWM/linear	Configurable	3	Series	20-200	Configurable	70	>85	-	-	CL BL SI
HV9911		Boost/buck/ SEPIC	PWM/linear	Configurable	1	Series	9-250	Configurable	Ext. FET	>90	-	-
HV9912	PWM/linear		Configurable	1	Series	9-100	Configurable	Ext. FET	>90	-	-	CL BL SI
HV9982	PWM/linear		Configurable	3	Series	10-40	Configurable	Ext. FET	>90	-	-	CL BL
HV9931	Buck-boost-buck	PWM/phase	1-50	1	Series	8-450	2-200	Ext. FET	>80	-	-	CL

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 μ C

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	$V_{in}-27$ 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
TPS61050		Digital	1	1	–	2.5-6.0	$V_{in}-5.5$ V	1,200	96	TSD/LOD	I ² C	FL
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
TPS61087		PWM	4	1	Series	2.5-6.0	$V_{in}+0.5$ V-18.5V	3,200	>90	TSD	PWM signal	CL FL
TPS61200		PWM	1	1	Series	0.3-5.5	5.5	1,500	91	Overtemp, overvoltage	PWM signal	FL TR BL
TPS61500		PWM, analog	10	1	Series	2.9-18	$V_{in}-38$ V	3,000	93	Overvoltage	PWM signal	BL
TPS61140		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 signal	FL TR BL
TPS61165		Digital, analog	7	1	Series	2.7-18	38	1,200	87	Overtemp, overvoltage	Easy scale/PWM signal	FL TR BL
TPS61180/81/82		Digital, analog	10	6	Parallel	5.0-24	40	1,500	90	Overcurrent, overvoltage, overtemp	Easy scale/PWM signal	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
TPS63030	–		1	1	–	1.8-5.0	1.2-5.5	800	96	TSD	PWM signal	FL

MARKETS LEGEND

CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

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



This Arrow sponsored Texas Instruments Analog eLab™ Videocast series partners with Cree, a leader in high-brightness and lighting-class LEDs, and focuses on solid-state lighting along with specific applications like solar powered lighting, cove lighting, and MR16 lamp replacement. Visit www.arrow.com/TIeLabsCree for the latest video; there will be a new videocast launched each week.



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



Texas Instruments

Analog eLAB™
Videocast

This Arrow sponsored Texas Instruments Analog eLab™ Videocast series partners with Cree, a leader in high-brightness and lighting-class LEDs, and focuses on solid-state lighting along with specific applications like solar powered lighting, cove lighting, and MR16 lamp replacement. Visit www.arrow.com/TIeLabsCree for the latest video; there will be a new videocast launched each week.