

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

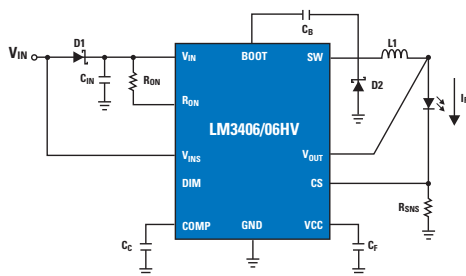
Product Specifications ▶

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

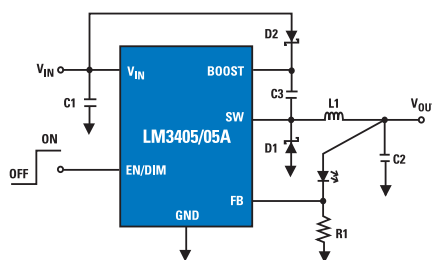
CL COMMERCIAL LIGHTING FL FLASHLIGHTS TR TRANSPORTATION BL BACKLIGHTING SI SIGNAGE

*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



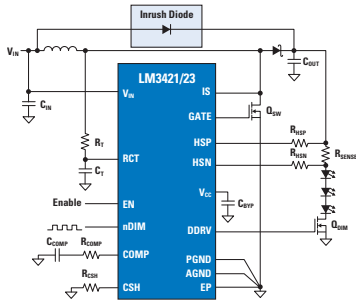
LM3405/05A schematic

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

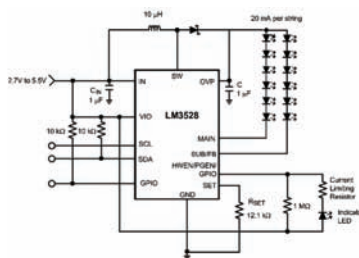
Applications ▶

- 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	

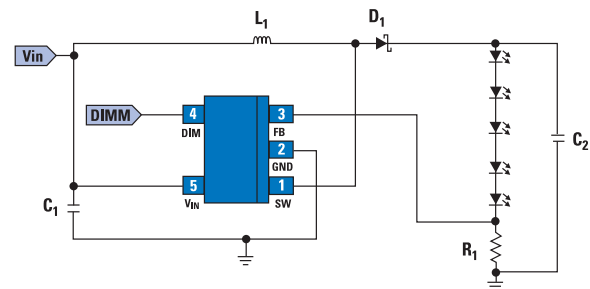
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*Diagnostic capabilities: TSD: Thermal shutdown, UVLO: Under voltage lock out, LOD: LED open detection



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 ▶

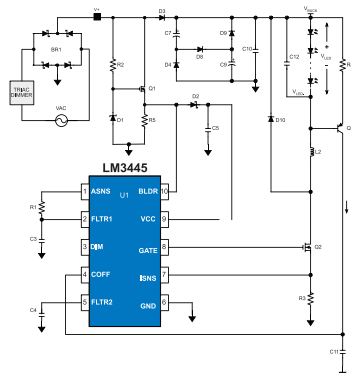
- Angle detector/decoder
- Simplified constant off-time
- Allows master-slave operation control in multi-chip solutions
- Fully WEBENCH® enabled

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

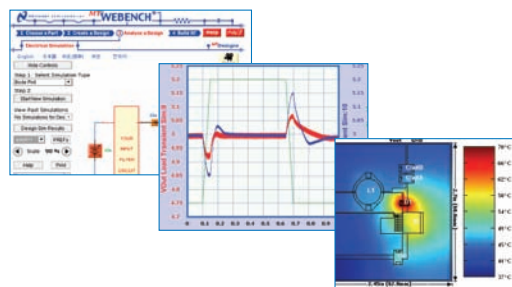
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Design Tools and Packaging ▶

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



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