LED Lighting

Bulb Replacement and Down Lighting Solutions

www.ti.com/lamps

LED Lighting

Helping You Solve Your Lighting Design Challenges

Today's global LED market is growing faster than ever before. With such rapid growth, it is becoming increasingly difficult to consistently design reliable, energy efficient, differentiated lighting products at viable cost.

Keeping these challenges in mind, TI has worked to expand its volume of LED lighting resources, in an effort to effectively meet and exceed the needs of today's LED lighting design engineers.

For the most complete and updated information from Texas Instruments (TI) regarding new lighting products, evaluation kits, design/selection tools, reference designs and support, please visit: **www.ti.com/lamps**

Getting Your LED Products to Market:

Leveraging TI's many LED lighting design tools and resources can help you build innovative, efficient and affordable solutions, getting you to market faster.

- Largest Portfolio of AC/DC LED Drivers
- LED Bulb Design Selection Tool
- Bulb Replacement Evaluation Boards
- Dozens of Tested Lighting Designs
- WEBENCH® LED Design Tool
- Lighting System Block Diagrams
- Technical Support Forums

Replacement Bulb and Downlight Solutions

To be successful in LED lighting, manufacturers must be innovative. TI's award winning LED drivers and solutions give lighting developers the flexibility to optimize their designs to satisfy the demanding challenges of this dynamic market.

From A to PAR lamps, MR16 bulbs to downlights, TI has proven solutions and resources to meet your needs. We understand the challenges and tradeoffs designers encounter when trying to develop lighting products which meet the demanding efficiency, performance, size and cost goals required to be competitive. By leveraging TI's many LED lighting design tools and resources we can help you build innovative solutions getting you to market faster.
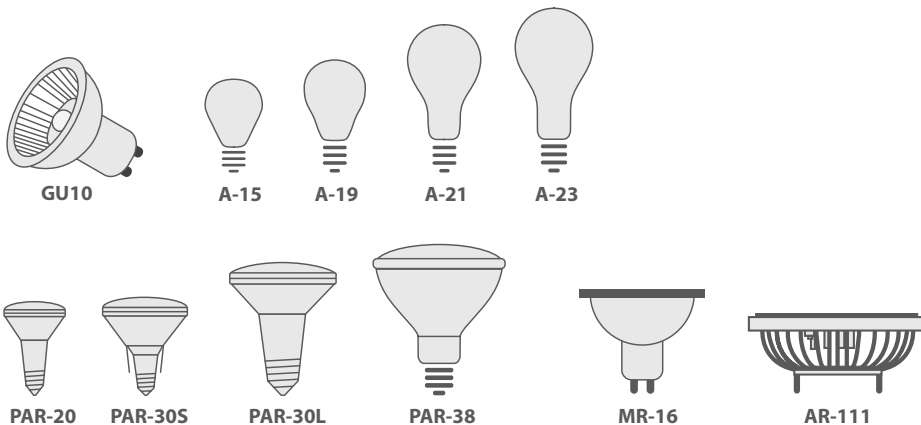
To access TI's LED Lighting resources visit: **www.ti.com/led**

LED Product Portfolio

Broadest Portfolio in the Industry

TI's broad product portfolio of AC/DC and DC/DC LED drivers enable customers to build differentiated products across all power levels and form factors that are energy efficient and reliable.

Part Number	Description	Application Voltage Range	Features				Lighting Applications						
			Isolation	Integrated Dimming	Integrated PFC	Integrated MOSFET	A-Lamp	R/PAR/BR	Down Light	GU10	T8	MR16	AR111
TPS92310	Off-Line Primary Side Sensing LED Driver with PFC	120VAC, 230VAC	✓		✓		✓	✓	✓	✓	✓		
TPS92314 TPS92314A	Off-Line Primary Side Sensing Controller with PFC in 8-SOIC	120VAC, 230VAC	✓		✓		✓	✓	✓	✓	✓		
TPS92315	Off-Line Primary Side Sensing Controller for LED Lighting	120VAC, 230VAC	✓				✓			✓			
TPS92311	Off-Line Primary Side Sensing LED Driver with PFC Integrated MOSFET	120VAC, 230VAC	✓		✓	✓	✓			✓			
LM3447	Phase-Dimmable, Primary Side Power Regulated, PFC Flyback Controller for LED Lighting	120VAC, 230VAC	✓	✓	✓		✓	✓	✓				
LM3445	Phase-Dimmable Off-Line LED Driver	120VAC, 230VAC	✓	✓			✓	✓	✓	✓			
LM3448	Phase-Dimmable Off-Line LED Driver with Integrated FET	120VAC, 230VAC	✓	✓		✓	✓						
LM3444	AC/DC Off-Line LED Driver	120VAC, 230VAC	✓	✓			✓	✓	✓	✓			
LM3450	LED Drivers with Active Power Factor Correction and Phase-Dimming Decoder	120VAC, 230VAC	✓	✓	✓			✓	✓				
TPS92075	Non-Isolated, Phase-Dimmable, Buck PFC LED Driver with Digital Reference Control	120VAC, 230VAC		✓	✓		✓	✓	✓	✓	✓		
LM3401	Hysteretic PFET Controller for High-Power LED Drive	12VAC, 12VDC		✓		✓						✓	✓
LM3444	AC/DC Offline LED Driver	12VAC, 12VDC		✓								✓	✓
TPS92560	Simple LED Driver for MR16 and AR111 Applications	12VAC, 12VDC		✓								✓	✓
LM3492	Two-Channel Individual Dimmable LED Driver with Boost Converter and Fast Current Regulator	12VAC, 12VDC		✓		✓						✓	✓

High-Voltage AC (rows TPS92310 through TPS92075)
Low-Voltage AC (rows LM3401 through LM3492)

GU10   A-15   A-19   A-21   A-23

PAR-20   PAR-30S   PAR-30L   PAR-38   MR-16   AR-111

LED Bulb and Downlight Selection Tool

TI's LED Bulb and Down Light Selection Tool enables customers to easily input their specifications to quickly find the appropriate solution.

Start by selecting lamp form factor.

Then narrow the search by answering a few simple questions.

ENTER LED LIGHTING SPECIFICATIONS

Reset Options

What FORM FACTOR is your lamp?
- MR-16
- A-Lamp
- R/PAR/BR Lamp
- ● Down Light Fixture
- AR-111
- GU10
- T8

What is your SUPPLY VOLTAGE ?
- 120 VAC
- 230 VAC

Are you looking for a solution that is ISOLATED ?
- Yes
- No

Do you want your solution to be DIMMABLE ?
- Yes
- No

How much LED POWER does your solution have
- Less than 15W
- More than 15W

DESIGN RECOMMENDATION

| Form Factor	Input Voltage	Isolation	Dimming	P OUT	Current Solution
Down Light Fixture	120 VAC	Yes	Yes	Less than 15W	LM3450EV120V15W
Down Light Fixture	120 VAC	Yes	Yes	Less than 15W	TPS92070-120VFLBK
Down Light Fixture	120 VAC	Yes	Yes	More than 15W	LM3450AEV120V30
Down Light Fixture	120 VAC	Yes	Yes	More than 15W	TPS92070-120VFLBK
Down Light Fixture	120 VAC	Yes	No	Less than 15W	TPS92310-120VFLBK
Down Light Fixture	120 VAC	Yes	No	More than 15W	TPS92310-120VFLBK
Down Light Fixture	120 VAC	No	Yes	Less than 15W	TPS92001-120VDIMBK
Down Light Fixture	120 VAC	No	No	Less than 15W	TPS92001-120VBK
Down Light Fixture	230 VAC	Yes	Yes	Less than 15W	LM3450EV230V15W
Down Light Fixture	230 VAC	Yes	Yes	Less than 15W	TPS92070-230VFLBK
Down Light Fixture	230 VAC	Yes	Yes	More than 15W	LM3450EV230V30
Down Light Fixture	230 VAC	Yes	Yes	More than 15W	TPS92070-230VFLBK
Down Light Fixture	230 VAC	Yes	No	Less than 15W	TPS92310-230VFLBK
Down Light Fixture	230 VAC	Yes	No	More than 15W	TPS92310-230VFLBK

LED Evaluation Modules

TI has a large variety of evaluation boards to get you started quickly on a lighting design. Options include dimming and non-dimming; isolated and non-isolated; multiple input voltage options; as well as form factor ready designs which mechanically fit common LED bulb enclosures.
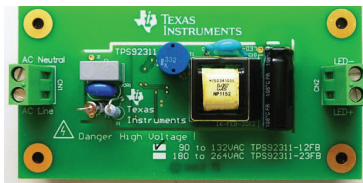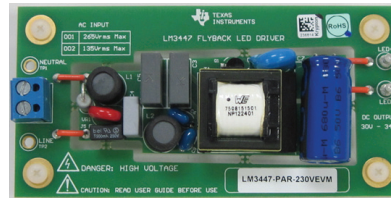
120 VAC
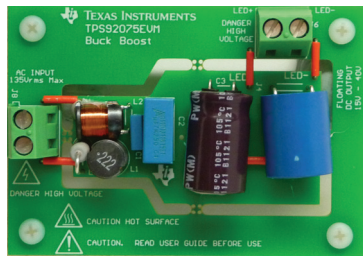LM3447-A19-120VEVM
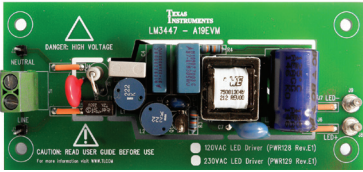
230 VAC
TPS92310-23FB

Input voltage?
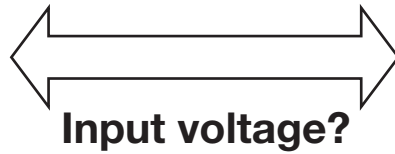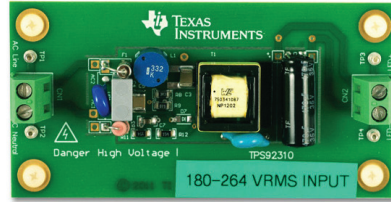
Non-Dimming
TPS92311A19120VEVM

Dimming
LM3447-PAR-230VEVM

Dimming?

Non-Isolated
TPS92075EVM

Isolated
LM3445-120VFLBK/NOPB

Isolated?
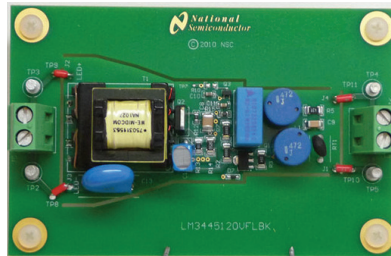
MR-16
TPS92560EVM
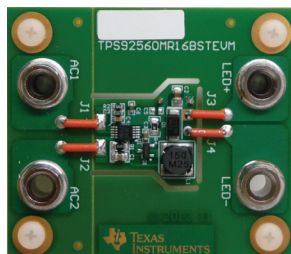
Downlight Fixture
LM3450A230V30

Form factor

LED Technical Documents, Videos and Support

Understanding which electronic components to use in a lighting system can be a difficult task. To streamline the selection process, TI has created lighting system block diagrams (SBD) for a number of common lighting applications. Each SBD features preselected LED drivers from our portfolio of power management, microcontrollers, low-power RF, and analog signal chain which are most optimal for the application, no matter if it is a basic bulb, or an advanced street lighting design. www.ti.com/**lighting-apps**

Product Demonstration Videos

Time constrained? Access TI's library of LED lighting videos to get a quick look at the latest in LED products and designs. www.**ti.com/ledvideos**

LED Lighting Technical Support Forums

Connect directly with fellow engineers to solve your LED lighting design challenges, by joining TI's E2E Community. www.**ti.com/ledsupport**

TI E2E™ Community
engineer.to.engineer,
solving problems

PowerLab™ Reference Design Library

TI's PowerLab™ Power Management Reference Design Library contains dozens of reference designs for LED Lighting applications. Each lighting design contains supporting technical documentation that includes a circuit schematic, printed circuit board (PCB) layout, bill-of-materials (BOM), test report and gerber files. Below are just a few of the LED bulb replacement designs that are available within TI's PowerLab Reference Design Library – www.**ti.com/powerlab**.

PowerLab™ Power Reference Designs Selection Tool

220VAC, 13W Isolated Flyback LED driver with PFC

The PMP8004 reference designed has been created to demonstrate a high-performance offline flyback LED driver with PFC based on the TPS92310.
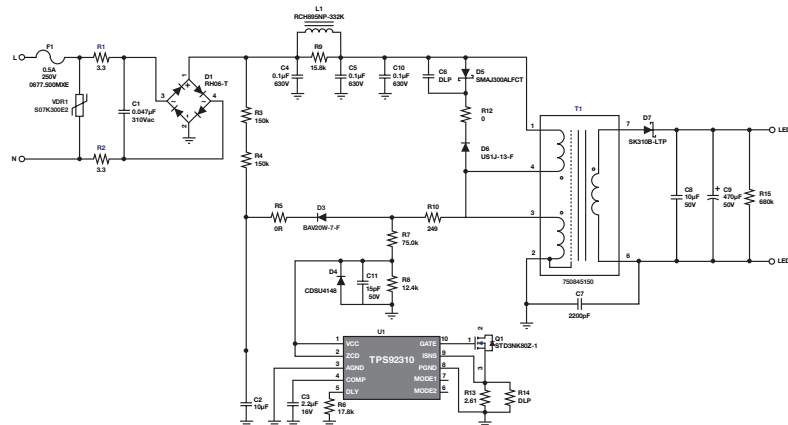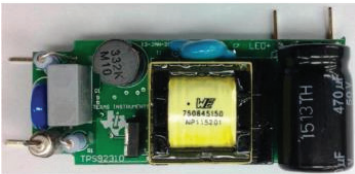
12VAC, 7W LED Driver for AR111 Application

The PMP8003 reference design highlights the performance of the LM3492 — 7watt LED driver that can be used to power a single/double LED string consisting of 6/7 series connected LEDs with 360mA from an electronic transformer or 50/60Hz transformer or DC supply source.
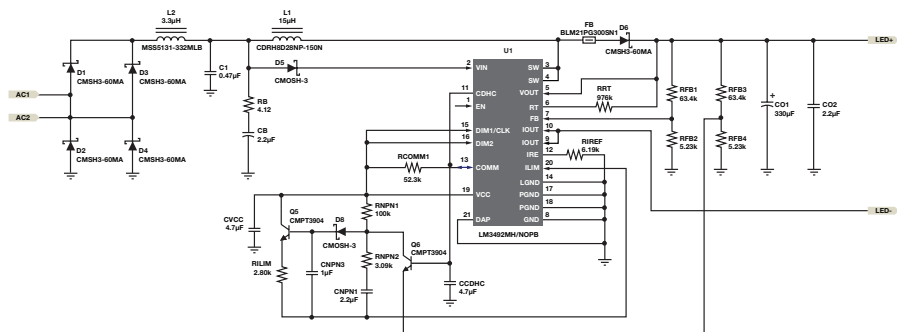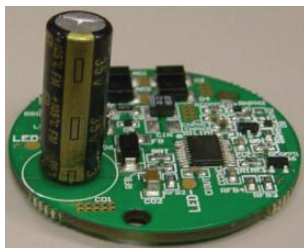
For more information on TI's LED Lighting reference designs visit: **www.ti.com/powerlab**

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LED Lamp Solutions
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General LED Driver Information
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LED Lighting System Block Diagrams
www.ti.com/led-sbd

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