

汽车外部照明应用的LED驱动器



尖端、可靠、性价比高汽车前照灯系统的开发

简介

德州仪器的发光二极管 (LED) 汽车外部照明产品致力帮您开发尖端、可靠、性价比高的车灯系统。我们高效的 LED 汽车外部照明方案延长照明系统的寿命, 提高驾驶员及行人安全, 并为驾驶员提升驾驶体验。

从前照灯到尾灯以及其他所有的汽车外部照明产品, 德州仪器能提供可靠, 可扩展和高功效的线性和开关解决方案, 适用于简单或者复杂的 LED 车灯系统

目录

用于汽车前照灯的照明产品

- 2 简介
- 2 资源与支持

前照灯

- 3 前照灯 - 单级LED前照灯架构
- 4 前照灯 - 全LED前照灯方案

后组合灯

- 5 后组合灯: 稳定可靠的低电磁干扰方案

其他

- 6 其他信号灯与便捷灯

设计资源

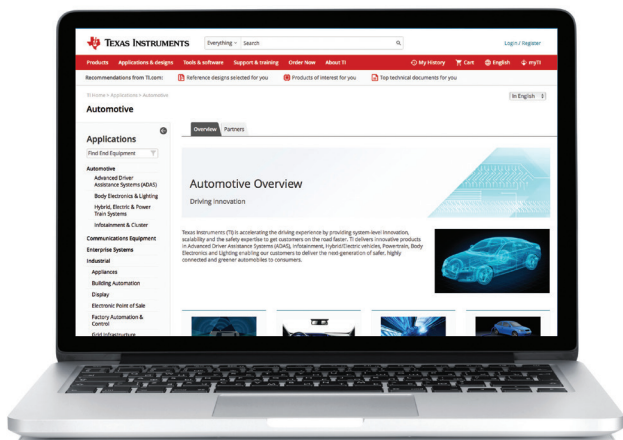
德州仪器为您的汽车外部照明应用提供许多资源, 如: 参考设计和易于使用的设计工具, 以帮助您更快的完成您的系统设计。我们还提供全球支持以确保迅速地解答您的提问。

在ti.com上了解更多有关德州仪器汽车照明LED产品的更多信息

- 汽车LED驱动解决方案: www.ti.com/autoled
- 德州仪器所有的汽车解决方案: www.ti.com/automotive

通过全面的参考设计以快速启动您的设计流程:

- 汽车LED驱动器参考设计: www.ti.com/autoled/reference
- 德州仪器所有的汽车参考设计: www.ti.com/tidesigns



在德州仪器的E2E™社区找到有关您技术问题的答案

访问e2e.ti.com与德州仪器 E2E™社区的同事一起提出问题, 分享知识并帮助解决问题。

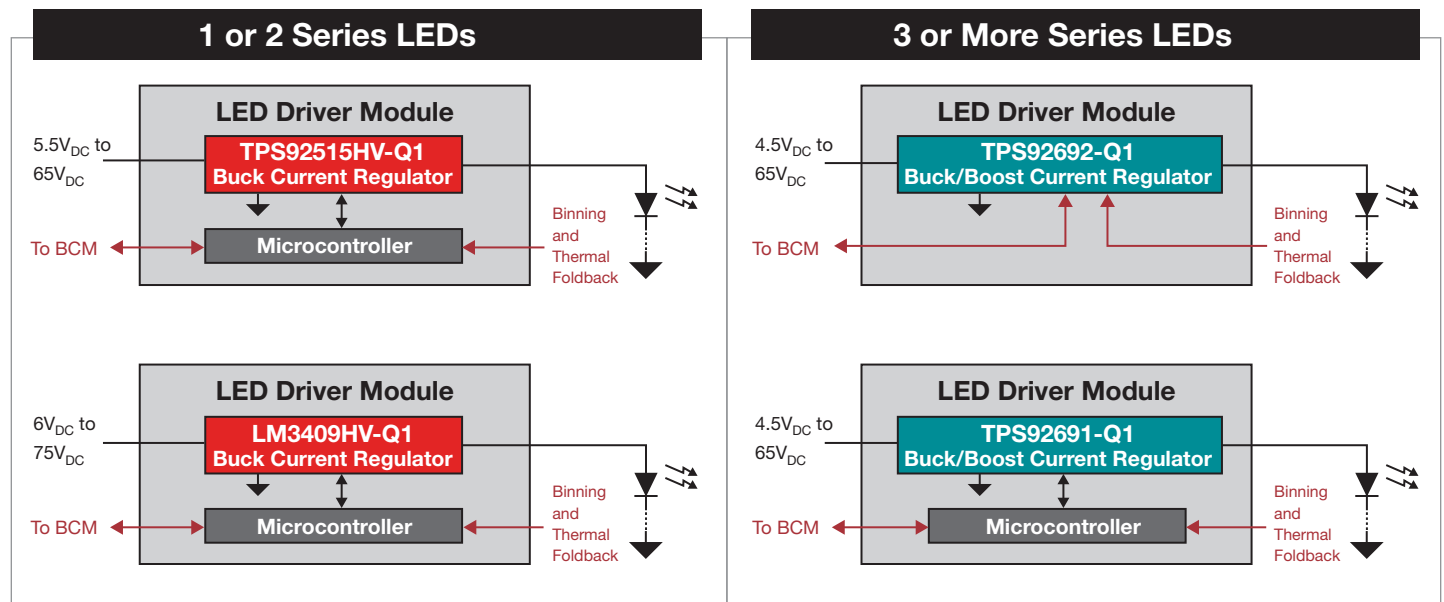


前照灯 - 单级 LED 前照灯架构

灵活的设计：单级电源转换架构

单级 LED 驱动器是简单、高性价比的方案，能用于日间行车灯，转向指示灯或远/近光等单一汽车前端照明功能。降压 LED 驱动器能非常有效的用于 LED 电压永远低于于电池电压的前照灯功能上。可是，由于冷启动或负载突降情况下电池电压变化很大，因此许多的前照灯功能需要可配置为升压，降 - 升压，SEPIC，反激或 Cuk 拓扑的 LED 驱动器。重点在于 LED 驱动器必须在所有可能的工作条件下为 LED 提供恒定的输出电流。

德州仪器灵活的单级 LED 驱动器产品具有先进的调光功能，拥有诊断、保护功能以及扩频等 EMI 缓解功能，是单一前照灯强大、高性能的电子解决方案平台。



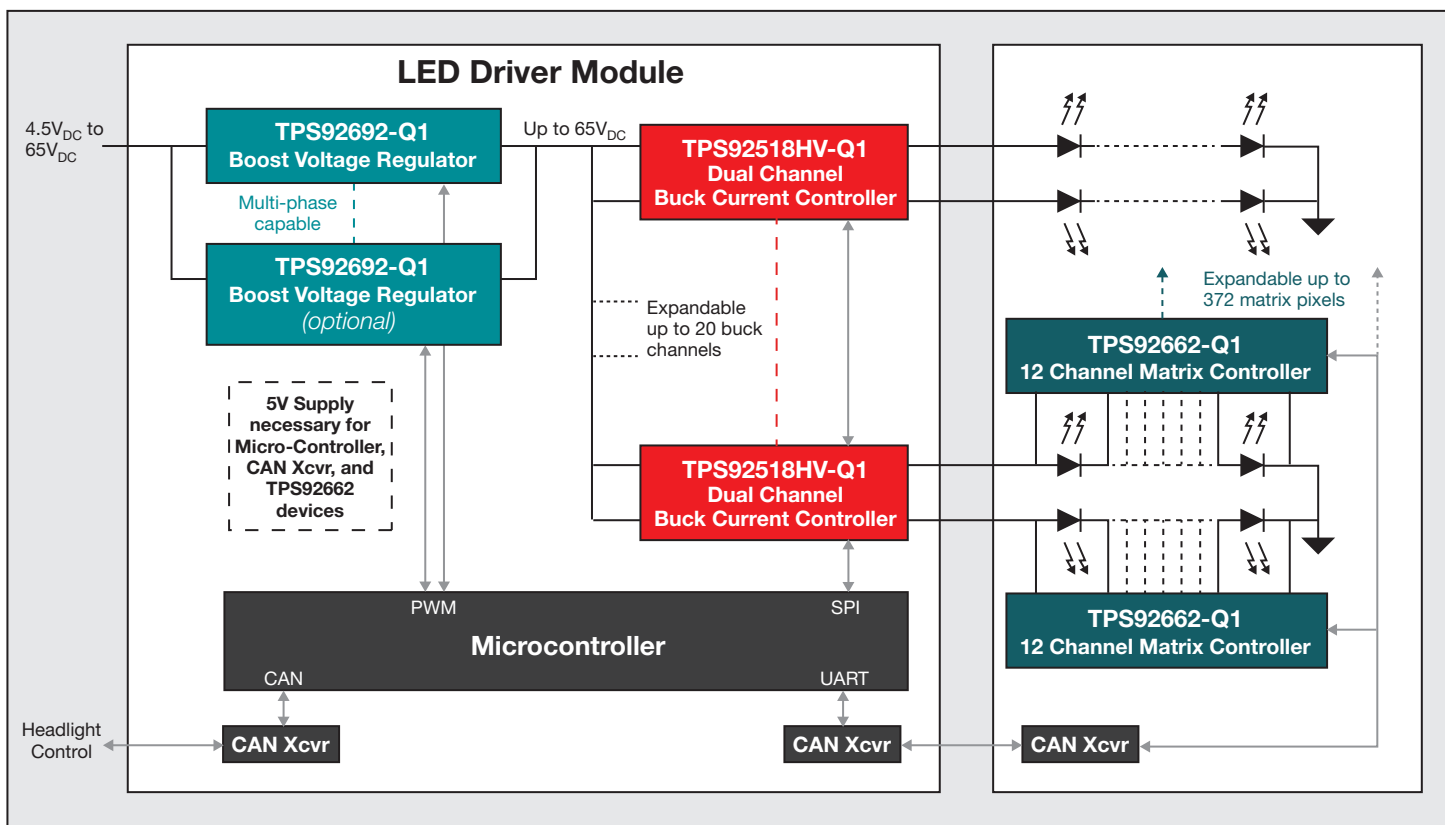
产品	通道数目	内置开关	输入电压		输出电压		最大电流	特别功能
			最小	最大	最小	最大		
多样拓扑恒流 LED 驱动器								
TPS92692-Q1	1	非	4.5V	65V	2.5V	65V	不适用	模拟及数字调光，扩频，报错及错误处理
多样拓扑恒流 LED 驱动器								
TPS92691-Q1	1	非	4.5V	65V	0	65V	不适用	模拟及数字调光，扩频，报错及轨到轨电流感测
降压恒流 LED 驱动器								
TPS92515HV-Q1	1	是	5.5V	65V	0	65V	2A	模拟及数字调光
降压恒流 LED 驱动器								
LM3409HV-Q1	1	非	6.0V	75V	0	75V	不适用	模拟及数字调光

前照灯 - 全 LED 前照灯方案

模组化方案：具有自适应功能的可扩展全 LED 前照灯架构

采用 LED 于许多外部照明功能的汽车能受益于双级功率转换架构的全 LED 电子控制平台方案。这种方案包括一个恒定电压输出的升压器作为前级以创建一个稳定的直流电压，后接高带宽降压恒定电流输出的 LED 驱动器以输出电流。德州仪器的产品组合包括具有报错、错误保护处理和扩频 EMI 缓解功能的升压器，以及采用准迟滞控制拓扑结构用以处理动态 LED 负载并实现先进调光功能的双路恒定电流降压控制器。

LED 矩阵管理器 [TPS92662-Q1](#) 提供了完美的动态前照灯功能（如顺序转向信号和自适应前照灯）的像素级控制解决方案。使用前置摄像头进行车辆和物体检测，LED 矩阵解决方案使汽车能够自动调节远/近灯的亮度，而无需实际移动前照灯以创建最佳的道路照明。

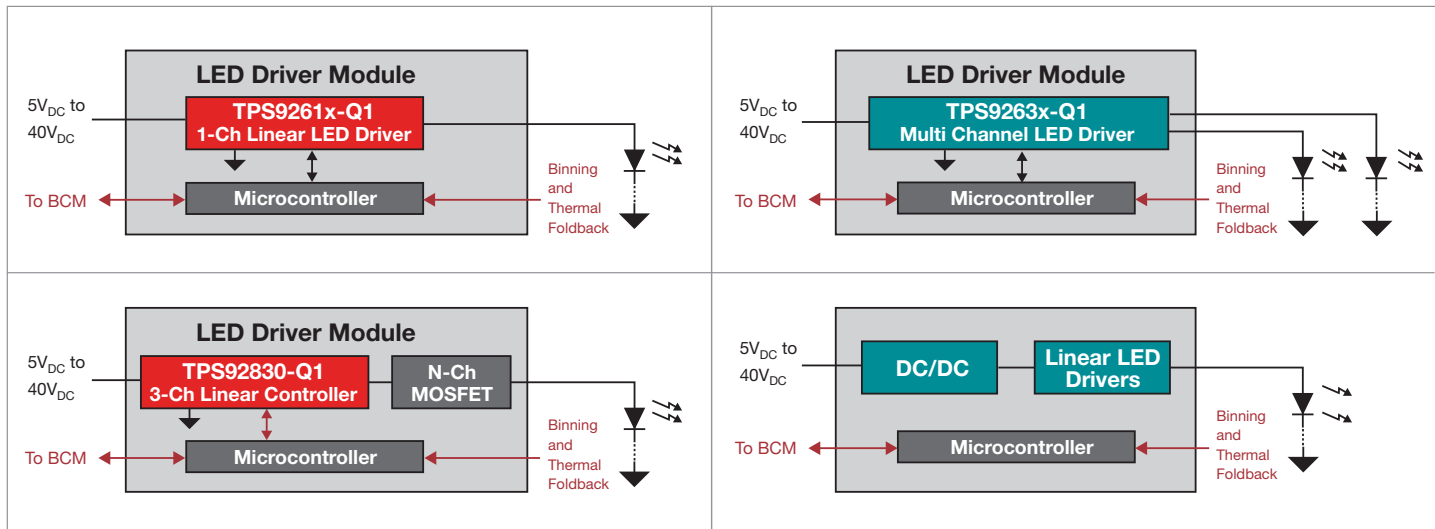


产品	通道数目	内置开关	输入电压		输出电压		最大电流	特别功能
			最小	最大	最小	最大		
恒定电压升压器								
TPS92692-Q1	1	非	4.5V	65V	N/A	65V	不适用	可调电压输出，扩频，错误处理
Buck Current Regulator								
TPS92518HV-Q1	2	非	6.5V	65V	0	65V	不适用	模拟及数字调光，SPI 接口，错误处理
Matrix Controller								
TPS92662-Q1	12	是	4.5V	60V	0	60V	2A	10 位数字调光，UART 接口，错误处理

汽车后组合灯：稳定可靠的低电磁干扰线性方案

为您的电路提供全面的LED诊断功能和创新的热量管理方案

德州仪器为工程师们提供了一套全系列的LED驱动芯片方案。这套方案中的产品具有高稳定性和低电磁干扰的特色，非常适用于汽车后组合灯，动态转向灯或者动态流水灯的设计。每个不同的产品都差异化的配备了领先的完全诊断（包括LED开路诊断，LED短路诊断及单颗LED短路诊断）和热量管理技术。与此同时，为了应对各种复杂的应用场景，输出通道数和电流输出能力也同样做了差异化配置。最新推出的 [TPS92830-Q1](#) 是一款极具创意的产品。他的独特设计在于创新地把MOS管外置，在增强了输出功率的同时，依然保证了低电磁干扰的特性，并且优化了整个系统的散热。与此同时，最新推出的单通道方案系列[TPS9261x-Q1](#)在方案灵活性上同其他几款产品形成了互补，为设计提供便利。



特色线性LED驱动产品（同时适用于汽车后组合灯以及其他信号灯与便捷灯）

产品型号	通道数	是否集成 MOSFET	输入电压 (V)	每通道输出电流 (mA)	输出电流精度 (%)	诊断与保护功能	封装
TPS92830-Q1	3	无	4.5-40	由外部MOSFET大小决定	2.5	开路诊断，短路诊断，降低输出电流	TSSOP-28
TPS92610-Q1	1	有	4.5-40	450	4.5	开路诊断，短路诊断，单颗LED短路诊断，过热关闭	HTSSOP-14
TPS92611-Q1	1	有	4.5-40	300	4.5	开路诊断，短路诊断，过热关闭	MSOP-8
TPS92612-Q1	1	有	4.5-40	150	4.5	短路保护，过热关闭	SOT23-5
TPS92613-Q1	1	有	4.5-40	450	4.5	开路诊断，短路诊断，过热关闭保护	T0263-7
TPS92630-Q1	3	有	4.5-40	150	1.5	开路诊断，短路诊断，单颗LED短路诊断，过热折回	HTSSOP-16
TPS92638-Q1	8	有	4.5-40	70	3.0	开路诊断，短路诊断，过热折回	HTSSOP-20

其他汽车信号灯与便捷灯：高度灵活方案

为这些车身“小灯”配备全新的灵活易用LED驱动方案

现如今，汽车中的LED数量成倍增加并且出现在各种各样照明，指示或者美观应用。TI的全新单通道线性LED驱动芯片系列不仅为尾灯提供了更多的设计思路，同时为其他大大小小的车灯应用提供了灵活的解决方案。

在以往的设计中工程师们更多地采用分立元器件来设计驱动电路。然而随着时间的推移，在新的设计中工程师们开始在意更高的电流精度，更少的外围器件，更完备的保护与诊断功能并且对价格的敏感度也在慢慢降低。应运而生的TPS92610-Q1, [TPS92611-Q](#), [TPS92612-Q1](#)和[TPS92613-Q1](#)差异化的配备了不同的输出电流能力，不同的封装尺寸，不同的诊断功能以及具有竞争力的价格。它们与[TPS92630-Q1](#), [TPS92638-Q1](#)和TPS92830-Q1共同为工程师们提供了完整的LED驱动产品序列，以帮助选择最合适的方案设计各种各样的汽车外部照明应用。



Important Notice: The products and services of Texas Instruments Incorporated and its subsidiaries described herein are sold subject to TI's standard terms and conditions of sale. Customers are advised to obtain the most current and complete information about TI products and services before placing orders. TI assumes no liability for applications assistance, customer's applications or product designs, software performance, or infringement of patents. The publication of information regarding any other company's products or services does not constitute TI's approval, warranty or endorsement thereof.

B011617

The platform bar and E2E are trademarks and WEBENCH is a registered mark of Texas Instruments. All other trademarks are the property of their respective owners.

IMPORTANT NOTICE FOR TI DESIGN INFORMATION AND RESOURCES

Texas Instruments Incorporated ("TI") technical, application or other design advice, services or information, including, but not limited to, reference designs and materials relating to evaluation modules, (collectively, "TI Resources") are intended to assist designers who are developing applications that incorporate TI products; by downloading, accessing or using any particular TI Resource in any way, you (individually or, if you are acting on behalf of a company, your company) agree to use it solely for this purpose and subject to the terms of this Notice.

TI's provision of TI Resources does not expand or otherwise alter TI's applicable published warranties or warranty disclaimers for TI products, and no additional obligations or liabilities arise from TI providing such TI Resources. TI reserves the right to make corrections, enhancements, improvements and other changes to its TI Resources.

You understand and agree that you remain responsible for using your independent analysis, evaluation and judgment in designing your applications and that you have full and exclusive responsibility to assure the safety of your applications and compliance of your applications (and of all TI products used in or for your applications) with all applicable regulations, laws and other applicable requirements. You represent that, with respect to your applications, you have all the necessary expertise to create and implement safeguards that (1) anticipate dangerous consequences of failures, (2) monitor failures and their consequences, and (3) lessen the likelihood of failures that might cause harm and take appropriate actions. You agree that prior to using or distributing any applications that include TI products, you will thoroughly test such applications and the functionality of such TI products as used in such applications. TI has not conducted any testing other than that specifically described in the published documentation for a particular TI Resource.

You are authorized to use, copy and modify any individual TI Resource only in connection with the development of applications that include the TI product(s) identified in such TI Resource. NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE TO ANY OTHER TI INTELLECTUAL PROPERTY RIGHT, AND NO LICENSE TO ANY TECHNOLOGY OR INTELLECTUAL PROPERTY RIGHT OF TI OR ANY THIRD PARTY IS GRANTED HEREIN, including but not limited to any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information regarding or referencing third-party products or services does not constitute a license to use such products or services, or a warranty or endorsement thereof. Use of TI Resources may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

TI RESOURCES ARE PROVIDED "AS IS" AND WITH ALL FAULTS. TI DISCLAIMS ALL OTHER WARRANTIES OR REPRESENTATIONS, EXPRESS OR IMPLIED, REGARDING TI RESOURCES OR USE THEREOF, INCLUDING BUT NOT LIMITED TO ACCURACY OR COMPLETENESS, TITLE, ANY EPIDEMIC FAILURE WARRANTY AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

TI SHALL NOT BE LIABLE FOR AND SHALL NOT DEFEND OR INDEMNIFY YOU AGAINST ANY CLAIM, INCLUDING BUT NOT LIMITED TO ANY INFRINGEMENT CLAIM THAT RELATES TO OR IS BASED ON ANY COMBINATION OF PRODUCTS EVEN IF DESCRIBED IN TI RESOURCES OR OTHERWISE. IN NO EVENT SHALL TI BE LIABLE FOR ANY ACTUAL, DIRECT, SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF TI RESOURCES OR USE THEREOF, AND REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

You agree to fully indemnify TI and its representatives against any damages, costs, losses, and/or liabilities arising out of your non-compliance with the terms and provisions of this Notice.

This Notice applies to TI Resources. Additional terms apply to the use and purchase of certain types of materials, TI products and services. These include; without limitation, TI's standard terms for semiconductor products (<http://www.ti.com/sc/docs/stdterms.htm>), [evaluation modules](#), and [samples](http://www.ti.com/sc/docs/sampterm.htm) (<http://www.ti.com/sc/docs/sampterm.htm>).

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2018, Texas Instruments Incorporated