Texas Instruments

Technology for Innovators™

电源管理选择指南

2007年第二季度

目录

德州仪器(TI)拥有完备的供电解决方案群及全系列的高性能产品。其产品涵盖了从标准线性IC到嵌入式及集成的电源解决方案的范围，都是为响应您设计上的挑战而量身定做的。并且，TI通过提供前沿的支持工具，诸如培训、多种可选的评估板(EVM)、应用手册、全面的技术文档等，使得设计工作更为简单。TI还提供了样片并接受小量订单（通过TI授权的分销商可实现24小时到货），以加速您的产品面市进程。

通过此册选择指南，您可以找到相应的设计要素、特色产品、产品组合的图示以及参数表。同时，此册指南的每一章节还包含了相关应用手册以及评估板的目录。

TI电源解决方案为您的设计提供强大的后援

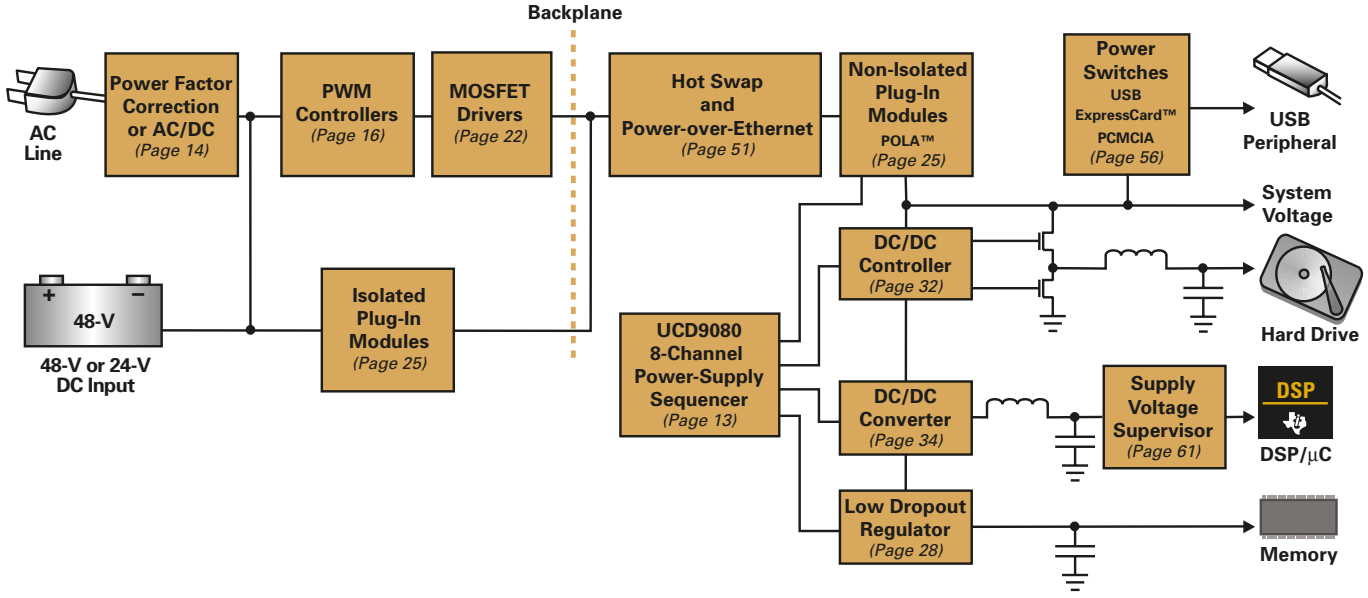
TI提供了电源管理集成、相关技术及评估，可帮助您开发创新产品并扩展市场商机。同时还结合了相关的协作、工具、服务及产品配送，使您更快的迈向成功。如需更多信息或技术协助，敬请参阅本选择指南第75页的TI全球技术支持，或者访问TI的电源管理网站：

power.ti.com。

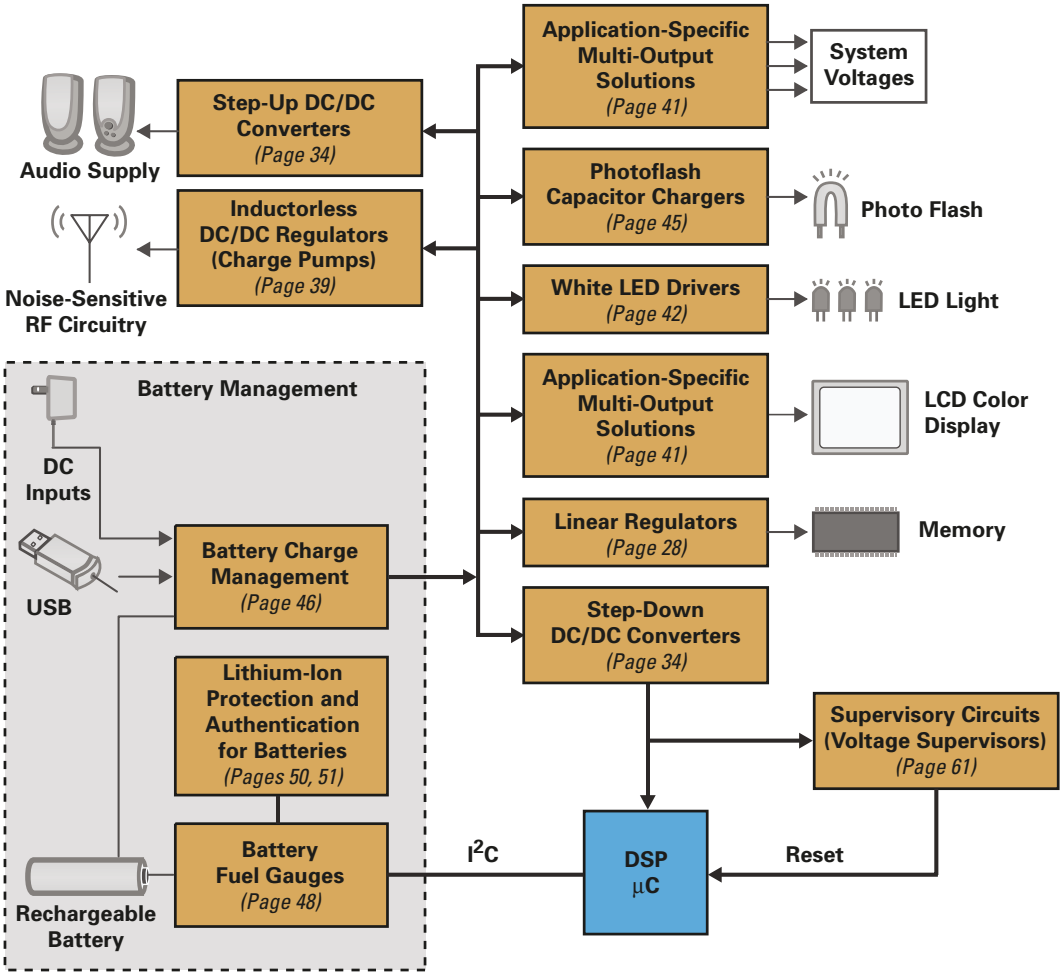
注释：部分电源管理产品的军用版本业已上市，敬请访问：

www.ti.com.cn/power

线路供电解决方案

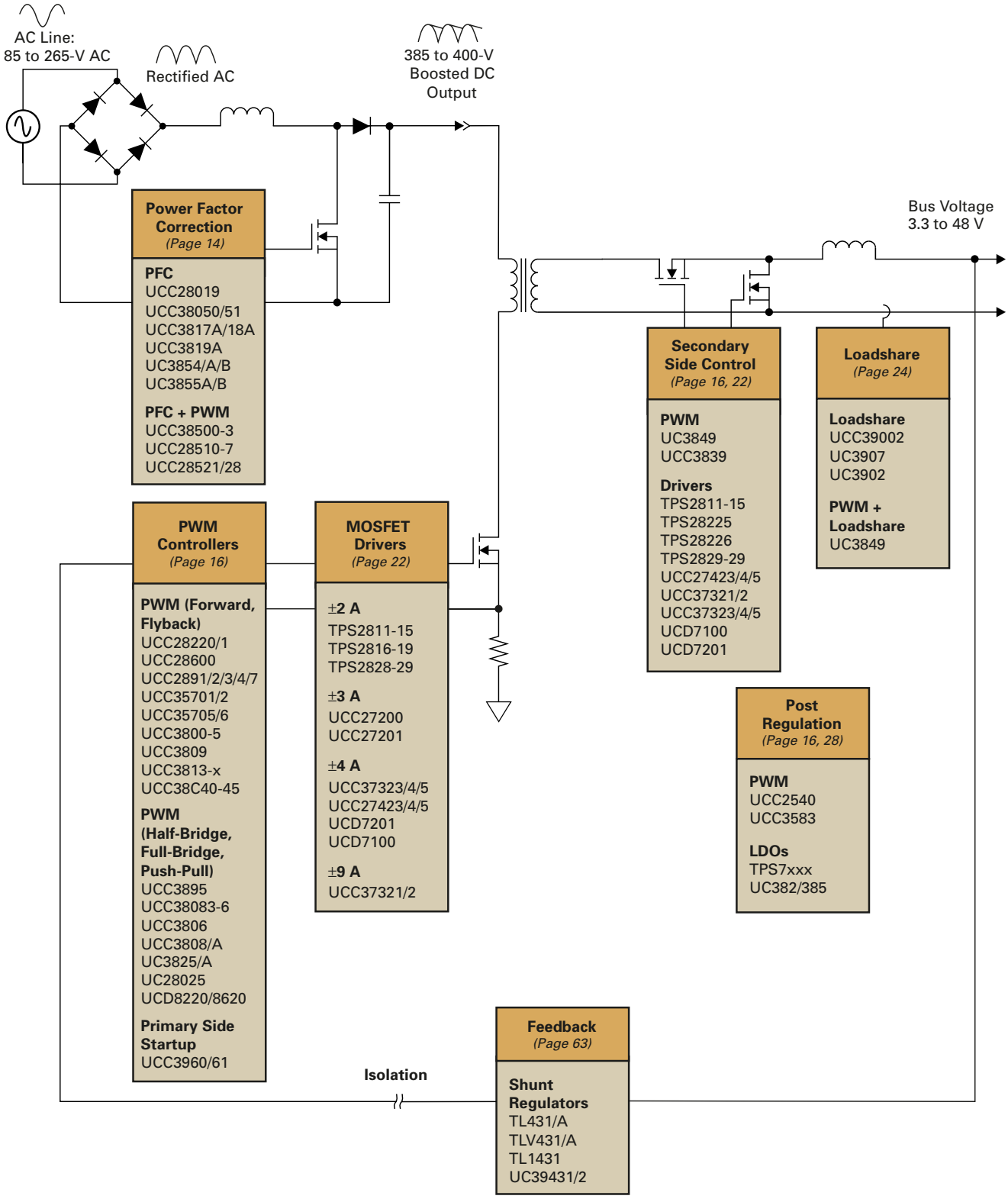


便携式电源解决方案



AC/DC解决方案

隔离DC/DC解决方案

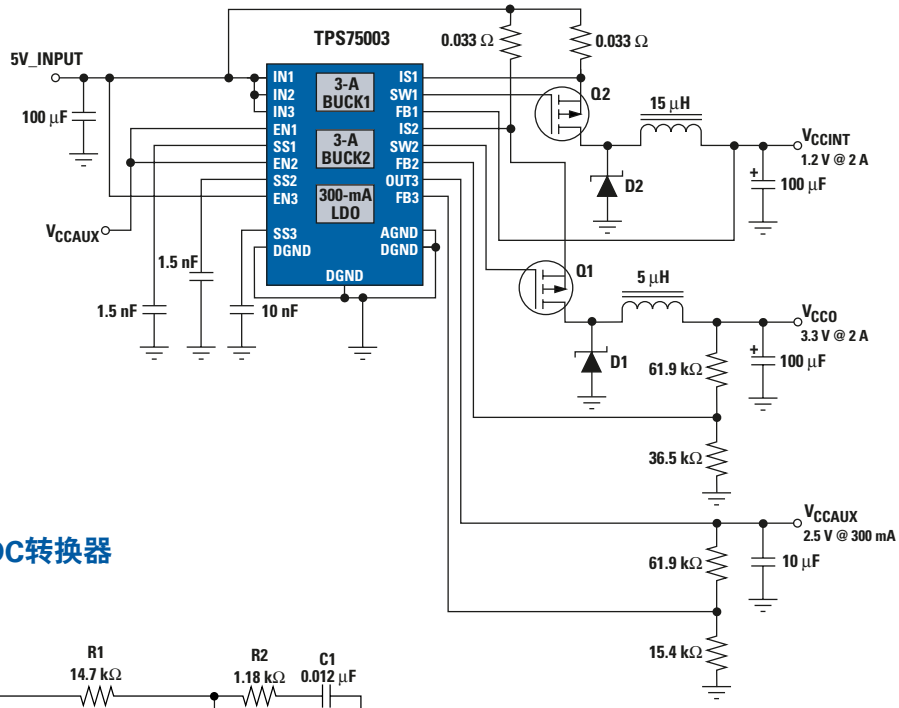


FPGA及CPLD电源解决方案

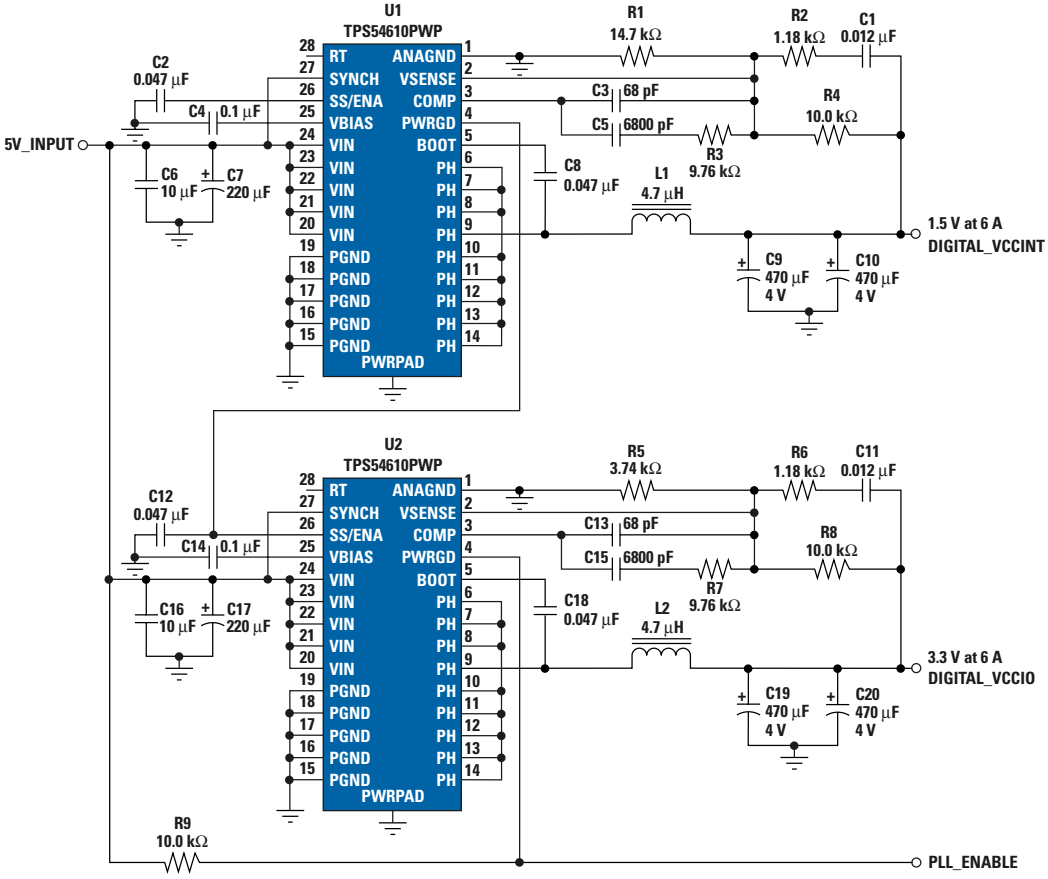
www.ti.com/xilinxfpga 或 www.ti.com/alterafpga

敬请访问以上站点，以获得有关Xilinx® 及 Altera®的FPGA及CPLD器件电源管理的一站式支持。(包括了可免费下载的电源参考设计 — 具有完整的图表、物料清单以及辅助执行手册)

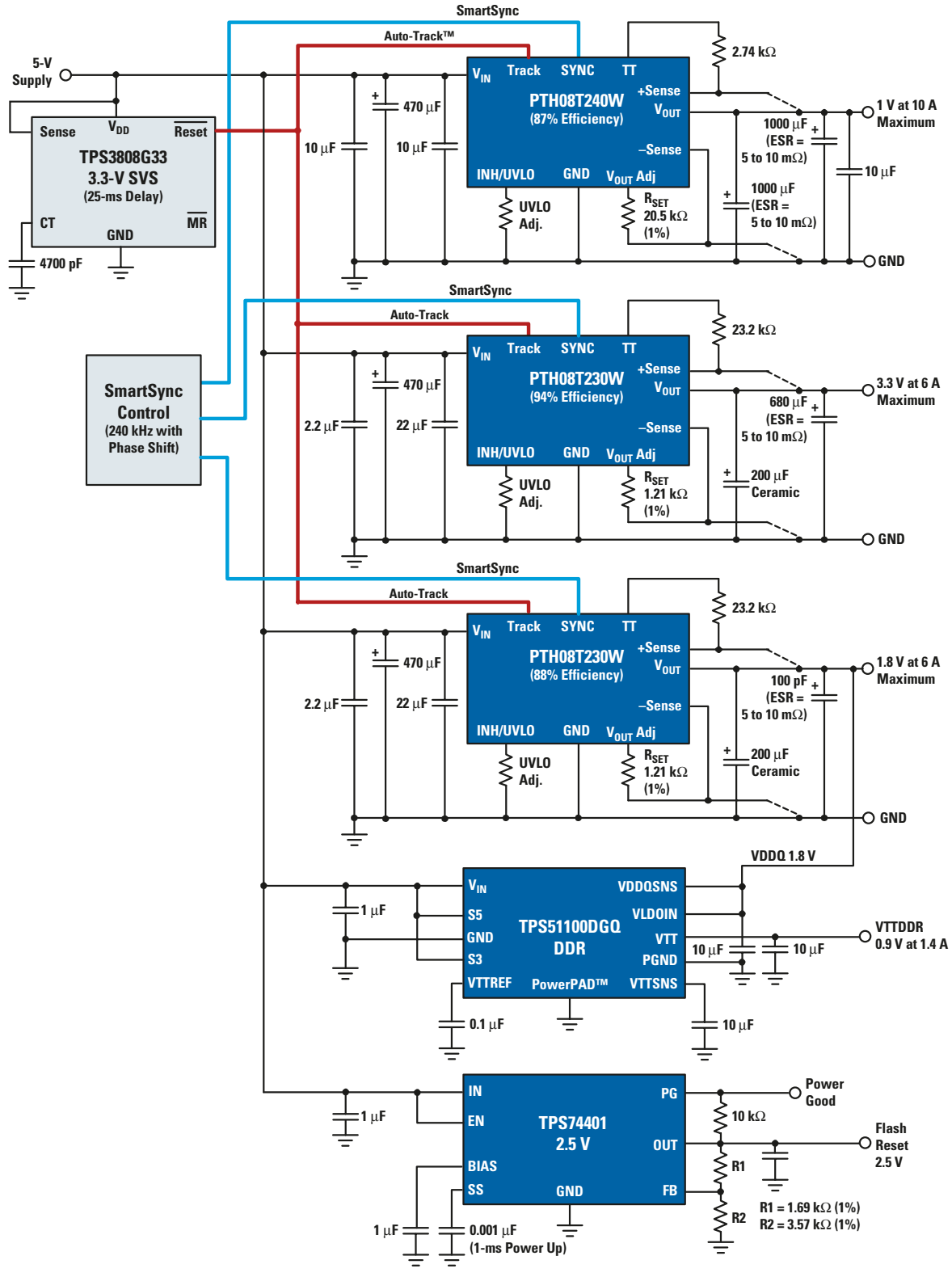
高度集成的TPS75003实现对Spartan™-3系列器件的三路供电



两片高功效TPS54610 6-A SWIFT™ DC/DC转换器实现对Stratix® II系列器件的供电



频率同步的多个T2模块，通过采用自动追踪(Auto-Track™)供电 Xilinx® Virtex® 5 FPGA实现智能同步(SmartSync)及调序(sequenced)

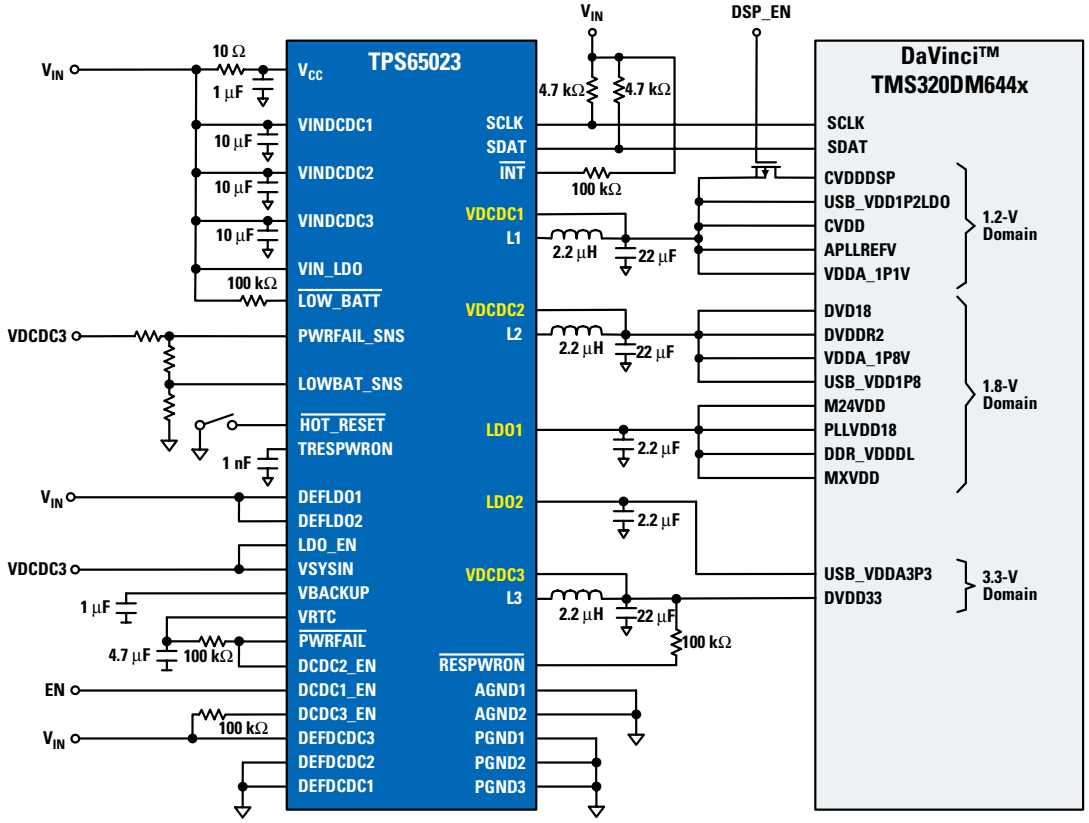


DSP电源解决方案

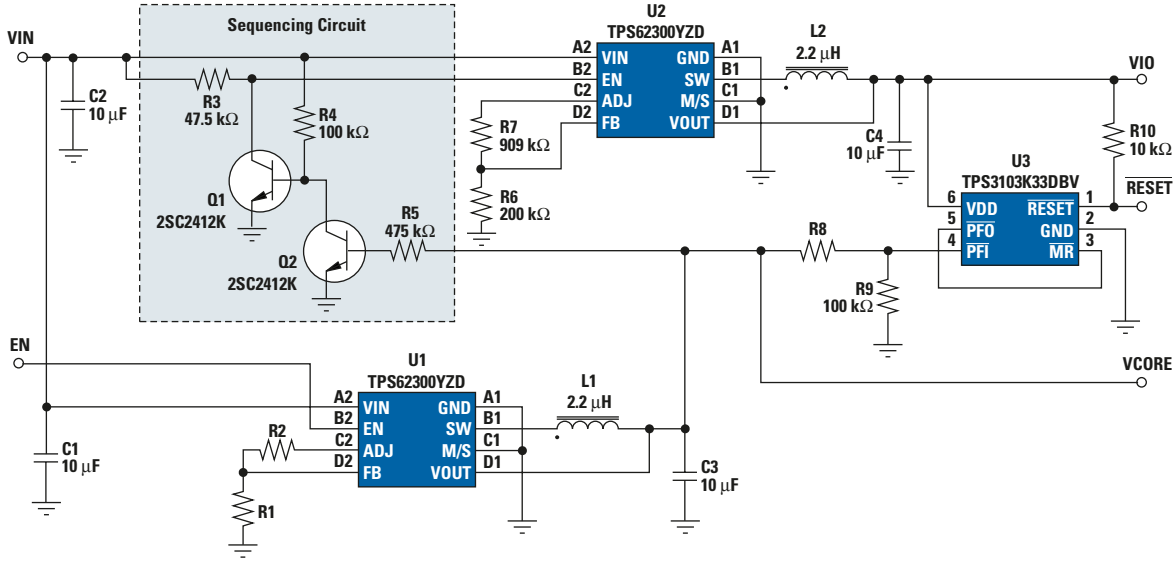
www.ti.com/dsppower

敬请访问以上站点，以获得有关DSP器件电源管理的支持。（包括了可免费下载的DSP电源参考设计 — 具有完整的图表、物料清单以及辅助执行手册）.

6通道电源管理IC，具有3个DC/DC转换端、3个低压将稳压器、I²C 接口以及动态电压调节(DVS)，针对DaVinci™ DSP进行了最优化



两片高功效、高空间效率型TPS62300 500-mA DC/DC转换器实现对TMS320VC5503/07/09A系列DSP的供电

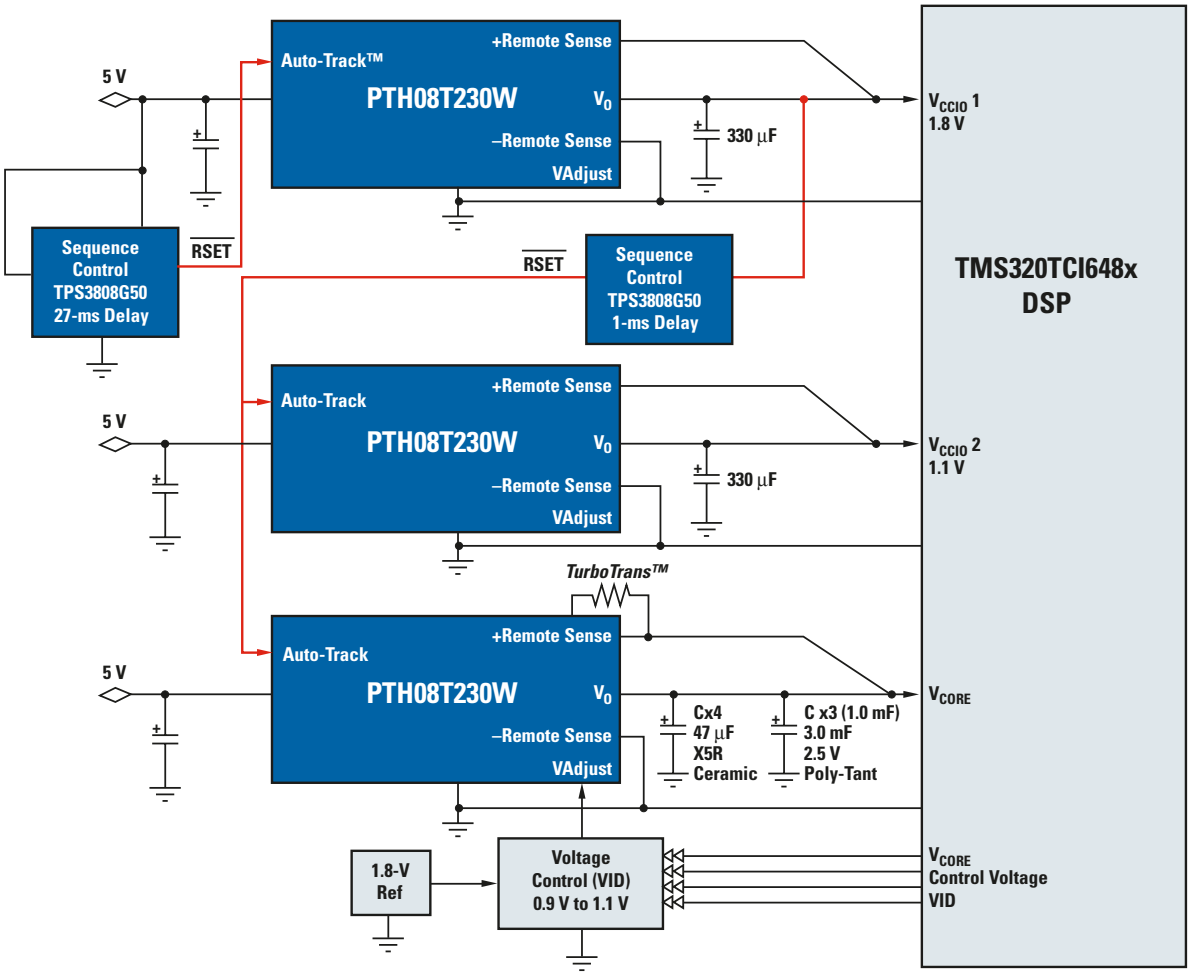


DSP电源解决方案

www.ti.com/dsppower

TI的TMS320TCI648x系列DSP对供电的要求很高 — 特别是处理器核心电压(V_{CORE})以及输入输出电压(V_{CCIO})。此类最新的3GHz DSP核心电压需求的典型范围介于0.9V至1.1V之间，但需求的电平容限仅在±3%之间。并且，大电流瞬变使得处理器功耗可靠输出的任务更加难于实现。为了克服此类难题，TI通过T2嵌入式电源产品提供了非常快速的瞬态响应性能。此类器件紧凑、经济高效，设计用于为处理器核心可靠的输出功率，从而节省了大量的电容。

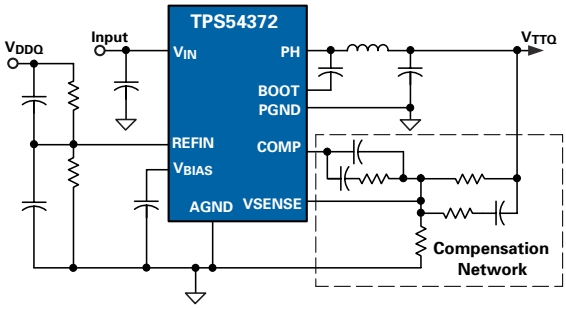
TMS320TCI648x DSP参考设计



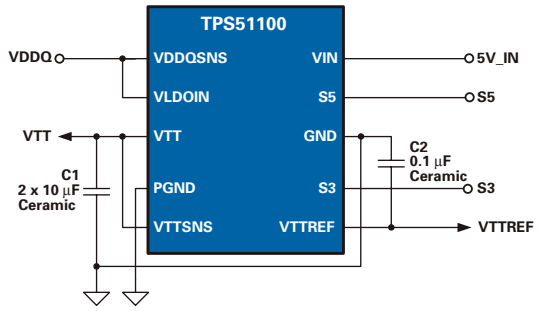
主动总线(Active-Bus)终端解决方案(DDR/QDR/GTL/SSTL/HSTL)

TI提供了可用于主动总线终端解决方案的多种选择，其范围从低压降稳压器(LDO)及开关控制器直至嵌入式电源，并提供了典型应用图表及产品参数以帮助进行产品选择。

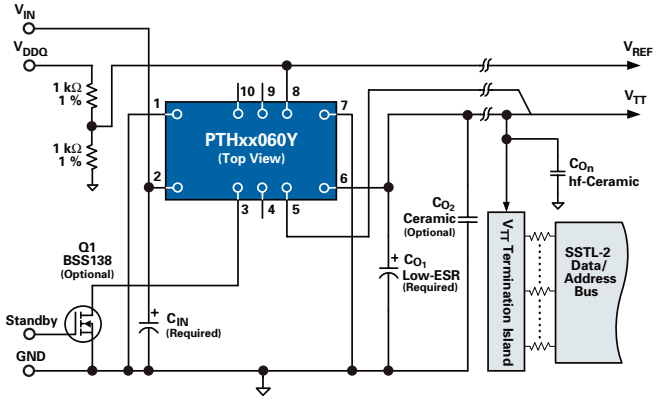
TPS54372：SWIFT™



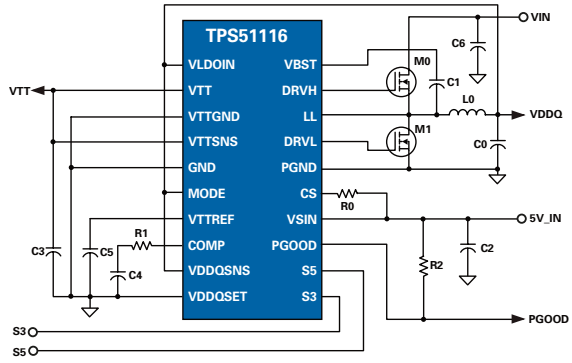
TPS51100：低压降稳压器



PTHxx060Y：嵌入式电源



TPS51116：控制器+低压降稳压器



主动总线最终端解决方案

Device	Input Bus Voltage (V)	I_{OUT} (A)	Isolated Outputs	V_O Range (V)	V_O Adjustable	Price*
Plug-In Power Modules						
PTH03010/50/60Y	3.3	6, 10, 15	No	0.55 to 1.8	Yes	13.95, 9.95, 11.50
PTH05010/50/60Y	5	6, 10, 15	No	0.55 to 1.8	Yes	13.95, 9.95, 11.50
PTH12010/50/60Y	12	6, 8, 12	No	0.55 to 1.8	Yes	13.95, 9.95, 11.50

Device	I_{OUT} (mA)	V_{IN} (V)	Adj. Out (V)	V_{OUT} Efficiency (%)	Switching Frequency (max) (kHz)	Package Pin Count HTSSOP	EVM	Price*
Converters (with Integrated FETs)								
TPS54372	3000	3.0 to 6.0	0.2 to 4.5	90	700	20	Yes	2.35
TPS54672	6000	3.0 to 6.0	0.2 to 4.5	90	700	28	Yes	3.35
TPS54872	8000	4.0 to 6.0	0.2 to 4.5	85	700	28	Yes	3.95
TPS54972	9000	3.0 to 4.0	0.2 to 4.5	90	700	28	Yes	4.20

Device	I_{OUT1} (V_{DDQ}) (A)	I_{OUT2} (V_{TT}) (A)	I_{OUT3} (Buf. V_{REF}) (mA)	V_{IN} (V)	V_{OUT1} (V_{DDQ}) Adj. (V)	V_{OUT2} (V_{TT}) Fixed (V)	V_{OUT3} (Buf. V_{REF}) Fixed (V)	Switching Frequency Selectable (kHz)	Light Load Eff. Mode	Control Scheme	Selectable Output Discharge	Package(s)	Price*
Controllers (with External FETs)													
TPS51020	>10 Switcher	>3 Switcher	3	4.5 to 28	2.5,1.8, Adj.	$V_{DDQ}/2$	$V_{DDQ}/2$	270, 360, 450	Yes	Voltage Mode	Yes	30 TSSOP	3.15
TPS51116	>10 Switcher	+3/–3 LDO	10	3 to 28	2.5,1.8, Adj.	$V_{DDQ}/2$	$V_{DDQ}/2$	400	Yes	D-CAP/ Current Mode	Yes	20 HTSSOP[1] 24 QFN[1]	1.20
Controller LDOs													
TPS51100	—	+3/–3 LDO	10	1.2 to 3.6[2]	—	$V_{DDQ}/2$	$V_{DDQ}/2$	—	—	—	Yes	10 MSOP[1]	0.80

[1] PowerPAD™。 [2] 需要独立的5-V电源。 * 建议零售价为每1000片时的美元价格。

数字电源驱动器简介

简介

TI的Fusion Digital Power™（整合数字电源）产品系列着眼于两大方面：数字电源驱动器(UCD7K)以及数字脉宽调制控制器(UCD9K)。此类产品是特定的电源管理器件，极为适用于对可配置性、通信、诊断及自适应的解决方案存在需求的应用。此类产品还提供了从交流线路(AC line)到负载点(point-of-load)的隔离及非隔离解决方案，涵盖了不间断电源(UPS)、服务器、电信以及数据通信领域的应用。与当前的纯模拟设计相比，这些Fusion Digital Power集成芯片所提供的经济高效的解决方案拥有更高层次的性能、可靠性及灵活性。如需有关数字电源技术及相关可选产品的最新信息，敬请访问：

www.ti.com/digitalpower

Fusion Digital Power技术的主要利益

- 更大的灵活性以及更快的产品上市
- 更强的电源性能
- 支持诸如远程诊断等系统通信功能
- 通过降低总元件数量降低系统成本

源自TI的Fusion Digital Power解决方案的其他利益

- 可编程
- 易于使用
- 高精度
- 更高的集成度
- 通用开发平台
- 支持当前及未来的拓扑布局

支持

UCD9K系列Fusion Digital Power控制器包括了直观的GUI（图形界面）可配置开发环境，允许电源设计人员更灵活的定制其产品，而无须编写任何代码。此类工具具有针对负载建模的能力，从而直接配置回路响应以满足设计要求。建模的结果通过易于读取的增益及相位预示图显示。我们还提供评估模板，可作为设计指导并用于产品评估。

数字电源驱动器

UCD7K驱动器不仅作为数字控制器与电源极(power stage)间的接口，还提供电源保护以及用于数字控制器的偏压。

Key Features	Benefits
• High current gate drivers	• Interfaces to the power stage
• Programmable analog over-current limit with flag	• Fail-proof and flexible overload protection
• Onboard 3.3-V, 10-mA linear regulator	• Provides power to the digital controller

选择指南

Device	No. of Outputs	Output Configuration	Output Type[1]	Peak I_{OUT} Source/Sink (A)	Rise/Fall Time (ns)	V_{CC} Range (V)	Propagation Delay (ns)	Input Threshold	Dead Time Control	Protection Features	Price*
UCD7100	1	Uncommitted/Non-inverting	TrueDrive™	4/4	10/10	4.5 to 16	20	CMOS/TTL	Adaptive	Adjustable	0.99
UCD7230	2	Non-inverting	CMOS	4/4	10/10	4.5 to 15.5	25	CMOS/TTL	Adaptive	Adjustable	0.80
UCD7201	2	Uncommitted/Non-inverting	TrueDrive	4/4	10/10	4.5 to 16	20	CMOS/TTL	Adaptive	Adjustable	1.20

[1] *输出类型：TrueDrive是混合了双极型/CMOS的输出架构，用于改善低电压情况下的电流驱动能力（于米勒前端）。*
** 建议零售价为每1000片时的美元价格。*

数字控制同步压降、±4A驱动器

UCD7230

敬请访问**www.ti.com/sc/device/UCD7230**，以获取样片及数据表。

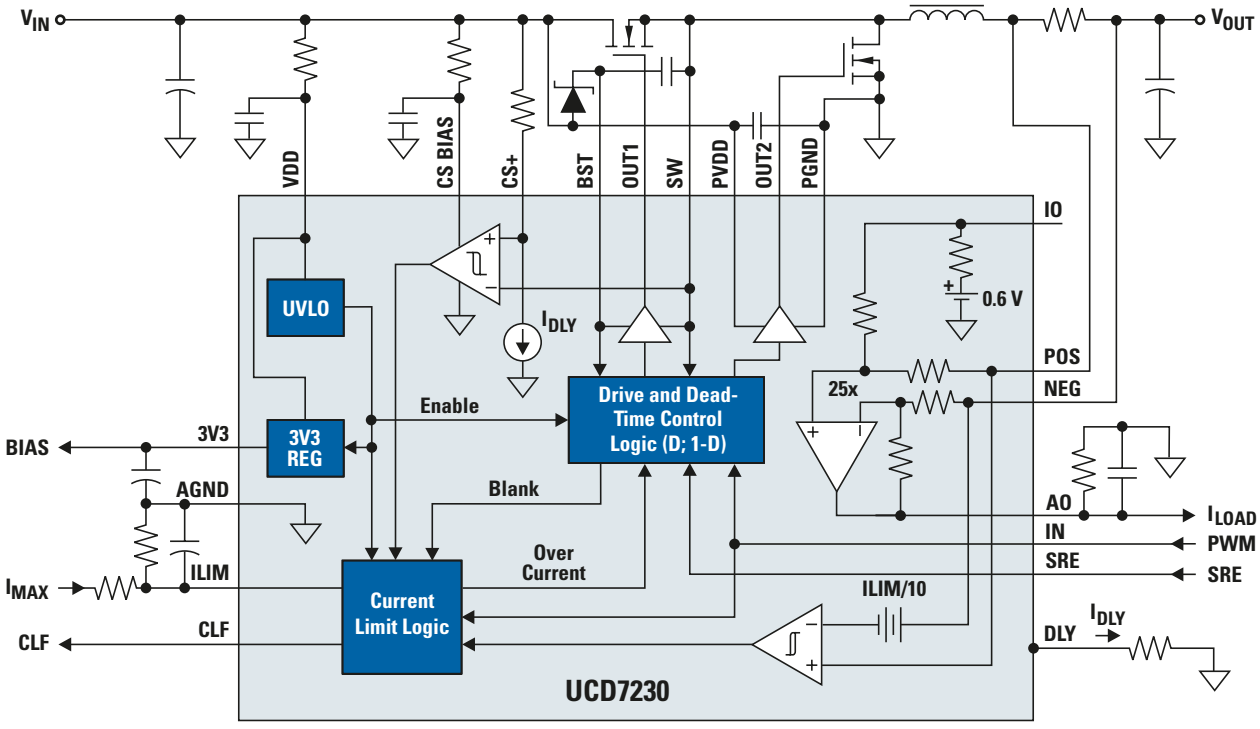
UCD7230隶属于UCD7K系列数字控制兼容驱动器，可用于采用了数字控制技术的应用或是需求快速局部峰值电流限制保护的应用。

UCD7230是同步压降、4A MOSFET门驱动器。该器件极为适用于提供数字控制器间的桥接，例如UCD9K同步压降控制器。UCD7230器件具有快速的25ns逐周期(cycle-by-cycle)电流限制保护，可保护电源极免受不恰当输入或过载电流的损害。

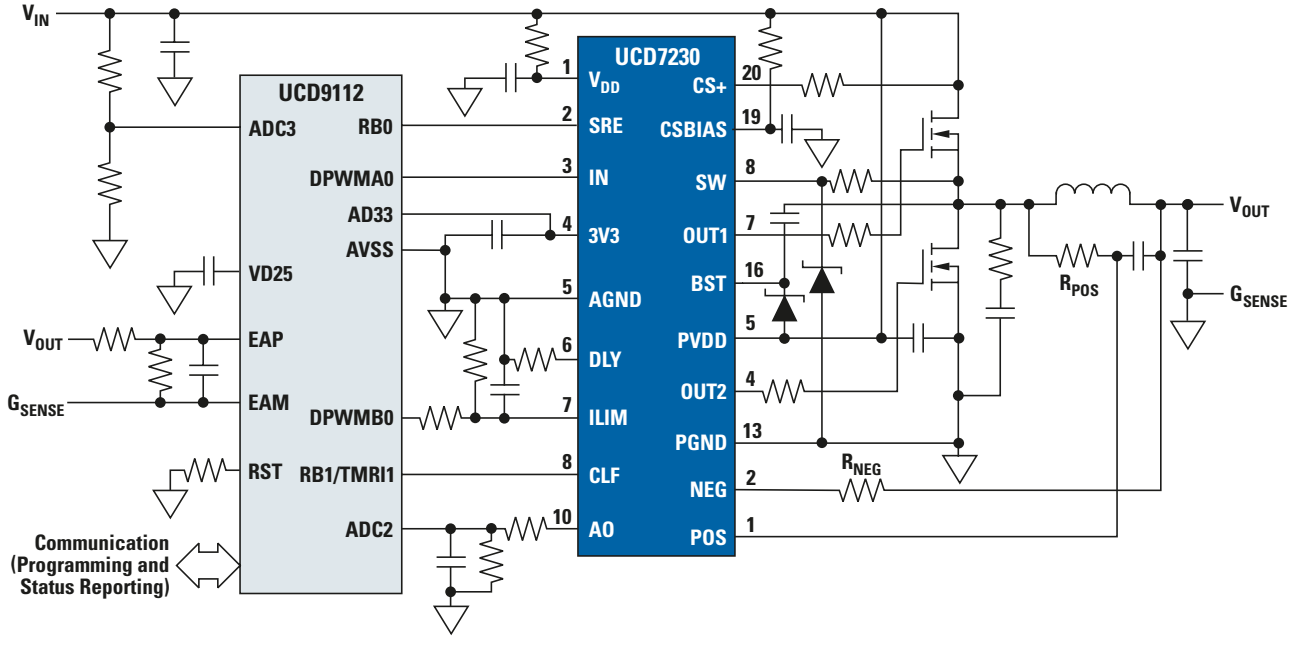
UCD7230是具有大电流、高侧(high-side)及低侧(low-side) 的4A门驱动器，采用了TI的TrueDrive™输出架构。该架构在开关转换的米勒上升区间向MOSFET的门电容输出额定的电流，从而获得了更快的转换速率。

主要特点

- 2MHz 转换频率
- 双限流保护
- 快速的电流感应电路，传播延迟仅为25ns
- 低失调、高增益差分电流感应放大器
- 3.3V、10mA 内部稳压器
- 双±4A TrueDrive大电流驱动器
- 2.2nF负载时，上升/下降时间为10ns (典型值)
- 数字输出电流限制标志位
- 4.5V至15.5V电源电压范围



UCD7230原理框图



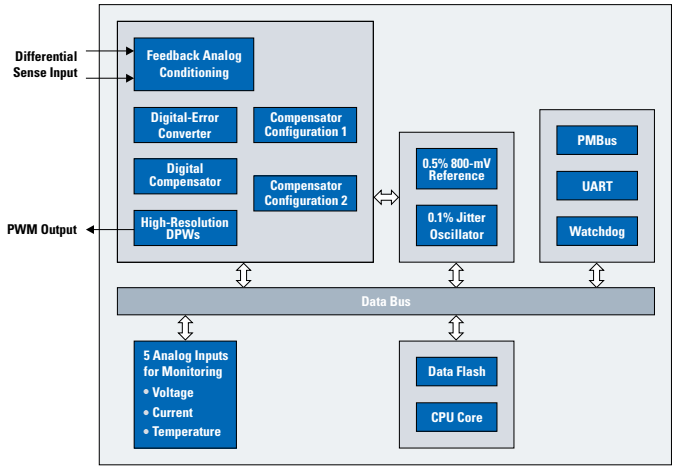
UCD7230数字转换器应用

数字脉宽调制控制器

数字脉宽调制控制器
UCD9111、UCD9112

敬请访问**www.ti.com/sc/device/UCD9111**或**www.ti.com/sc/device/UCD9112**，以获取样片及数据表。

UCD9K器件提供了完备的数字电源管理功能，可在数字域封闭多个反馈回路，其集成资源还可用于监督、通信、配置及控制。

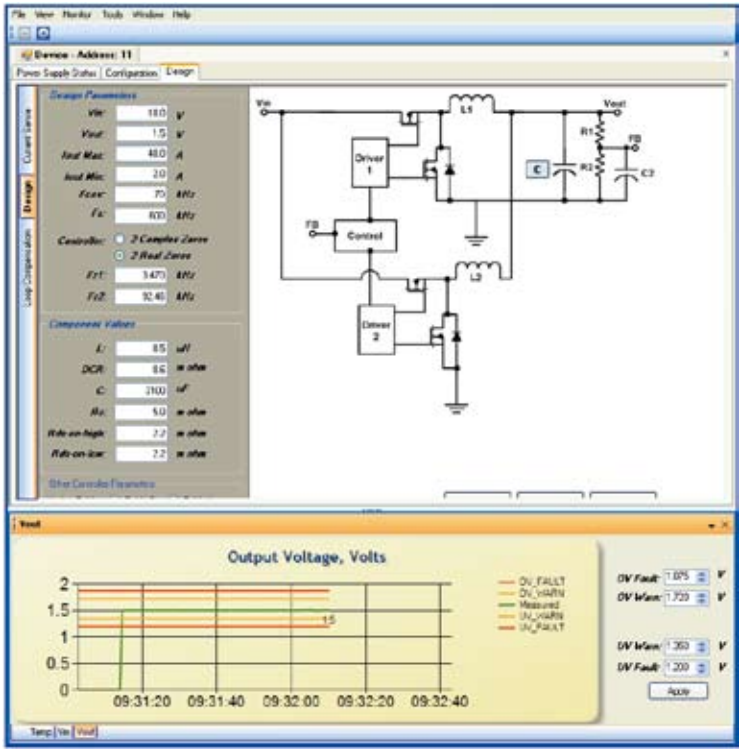


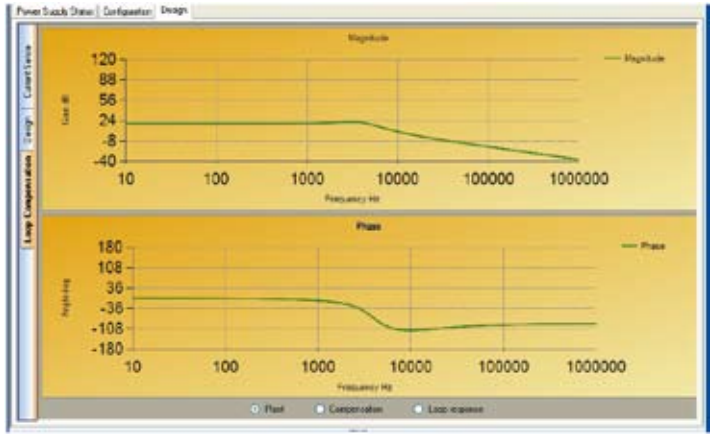
主要特点

- 数字同步压降PWM控制器，PWM分辨率为175ps
- 数字控制，带可编程PID补偿
- V_{OUT}可调，从V_{IN}的1%至99%
- 可编程设定转换频率，最高可达2MHz/相位
- 可编程软件启动及软件停止
- 支持预先偏置输出
- 0.5% 内置微调800mV基准
- V_{IN}可调，从4.5至15.5V (UCD7230)
- 遥感差分放大器
- 通过PMBus™总线实现电源监控
- 单偏压供电(3.3V V_{DD})
- 直观的图形用户界面
- 内置热传感器
- PMBus支持

图形用户界面(GUI)

UCD9111/2提供了一个直观的图形用户界面，简化了设计，可显示转换器的电流状态。该器件还支持PMBus指令。





图形用户界面的主要功能

- PID系数编程
- POL开启/关闭ON/OFF
- V_{OUT}设定值
- 转换器转换频率设定
- 输出电压软件启动及软件停止
- 故障门限配置
- 制造信息存储

选择指南

Device	Description
UCD9111	Single phase
UCD9112	Dual phase

电源供电定序器
UCD9080

敬请访问**www.ti.com/sc/device/UCD9080**，以获取样片及数据表。

单个UCD9080电源供电定序器控可控制多达8组电压轨及3个独立数字I/O口的电源次序。该器件无需外置存储器，采用单个3.3V电源支持运作。

UCD9080采用20kHz的采样率及3.5mV分辨率对所有的电压轨进行监控，拥有强大的可配置能力，可实现对电源轨通电(power up)及断电(power down) 的定序。

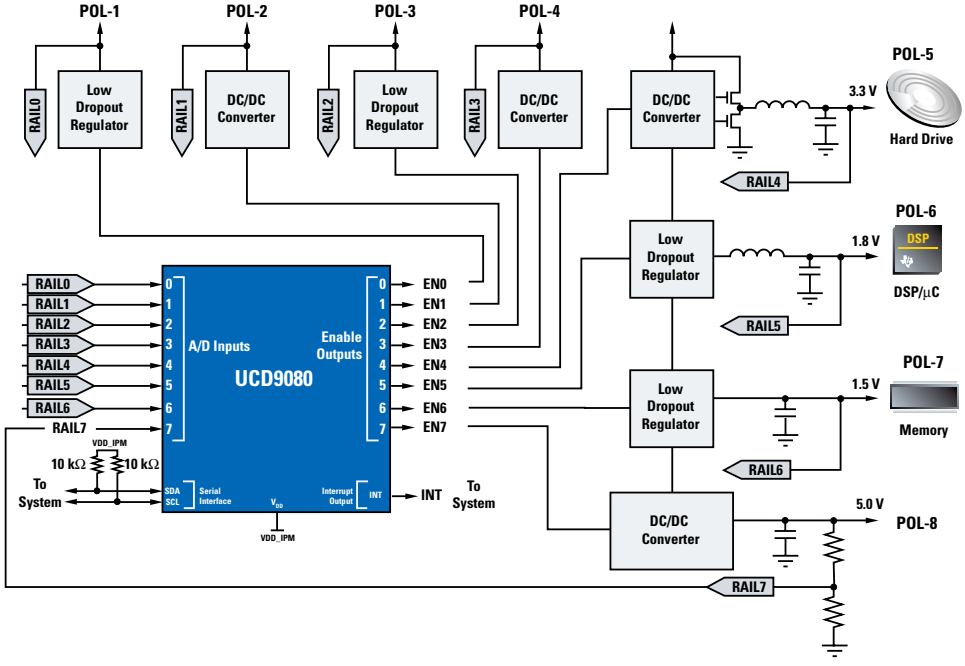
UCD9080还包括了其他选项，例如错误状态下（如电源轨失效）的再定序(resequence)。电源轨再定序可基于定时事件(timed event)或基于与定时事件相关联的其他电源轨，以实现调节。并且，每条电源轨都可实现对毛刺脉冲(glitch)、低压及过压限侵害的监测。所监测的每条电源轨还可通过配置窗口设定以实现对其他电源轨的关断。

主要特点

- 单片设计，3.3V供电运行
- 额外的GPIOs，带有设备复位控制、发光二极管控制等
- 低压及超压监控
- 通过运用Interdependency，实现快速灵活的关闭功能
- 通过I^2C接口提供错误记录和状态监控
- 闪存中的非挥发性错误记录存储功能，可以用于关键供电失败时的现场调试
- 可以配置的排序功能，过压/低压阈值、关闭回应
- 操作简单的Windows®操作系统图形用户界面

UCD9080定序配置

- 灵活的定序选项包括：
  - 基于时间
  - 其它电源轨实现稳压后定序（附加时间）
  - 其它电源轨达到确定电压值后定序
- 通电及断电定序
- 可配置电压轨从属性(dependency)



功率因数修正(PFC)

设计因素

控制方法

平均电流模式(ACM) — 最佳的控制方法，实现了功率因数修正及低谐波失真。

转换模式(TM) — 带峰值电流及滤波需求的简单廉价控制。

交叉模式(Interleaved) — TM-及ACM-兼容、多相位、高功率、高密度拓扑。拥有更佳的电磁干扰(EMI) 特性、更小的磁场及弱化的电流纹波。

零电压转换(ZVT)模式 — 一类软切换技术，降低了电磁干扰并允许工作于更高的频率。

保护

- 软启动（可编程）提供了可控制的启动方式。
- 过电流保护(OCP)提供了过载状态下的保护。
- 过电压保护(OVP)可防止输出电容、开关及负载出现超负荷状态。

性能

- 电压前馈(feed-forward)实现了宽线路电压范围内的性能线性化及更短的瞬态响应时间。
- 多路复用器线性化及零功率检测功能改善了小负载运作。
- 板载具有高电流驱动输出能力，无须外置MOSFET驱动器。

灵活性

- 可实现在宽泛的电压范围条件下工作。
- 不同电平的低压锁定限，可用于自偏压及辅助偏压应用。
- 可作为同步控制器，以消除噪声源。

功率极别

- IEC（国际电工委员会）标准，应用于所有大于150W的供电。
- 高功率转换器，可通过ZCS/ZVT（零电流转换/零电压转换）转换技术实现高效率。
- 部分简易控制技术无法用于高功率级别

特点

TI的PFC控制驱动器覆盖了50W到5kW的功率范围，且都与EN61000-3-2标准兼容。

- 工业标准架构。
- 输出功率因数 > 0.993。
- 最新的BiCMOS系列产品降低了复杂性。
- 最优化的PFC/PWM “结合” 控制器。
- 良好的应用支持。

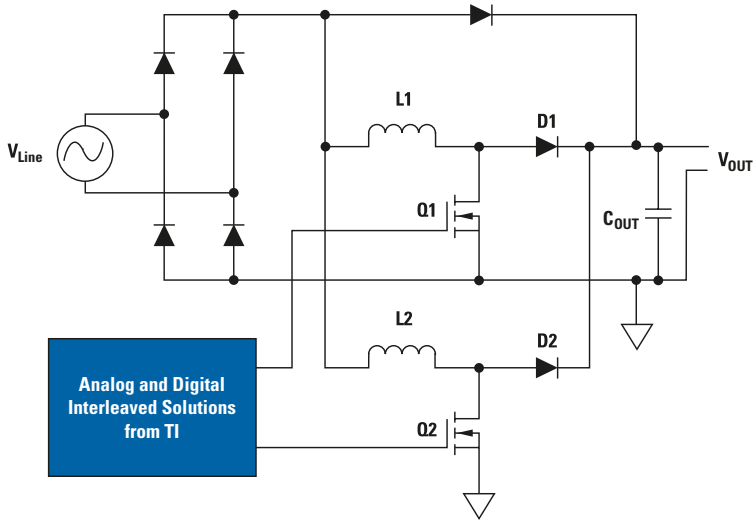
交叉功率因数修正

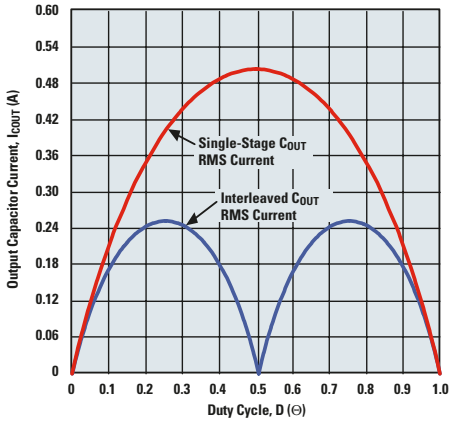
交叉(Interleaving)是一项PFC方法，在外置及嵌入式电源供电架构中越来越受欢迎。该方法异常灵活，提供了诸多选项，诸如无源组件尺寸缩减、更小的EMI滤波电路以及更高的效率。

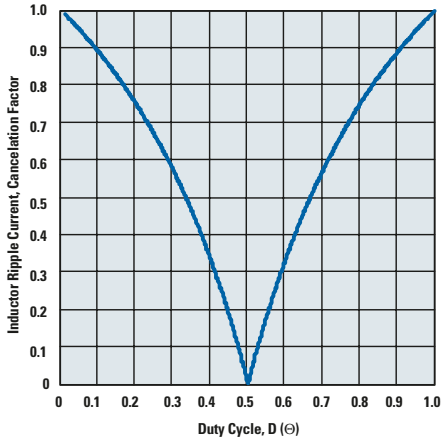
多相位交叉的另一受益是其可扩展特性，可支持的多个不同的功率级别及应用。

为什么选择交叉模式?

- 消除输入及输出的纹波电流
- 减少增压电阻的体积
- 降低输出电容的RMS（均方值）电流
- 降低EMI滤波器的尺寸







功率因数修正(PFC)

选择指南

Device	Description	Control Method[1]	Typical Power Level	Soft Switching[2]	Max Frequency (kHz)	Start-Up Current (mA)	UVLO Thresholds (V)	PWM Prog. Max Duty Cycle	PWM Freq. Option	OVP	Price*
UCC28019	8-Pin PFC Controller	ACM	75 W to 600 W	—	65	0.01	10.5/9.5	—	—	—	0.80
UC3852	Transition Mode PFC Controller	TM	<150 W	—	Variable	1	16.3/11.5	—	—	—	1.70
UC3853/A	8-Pin PFC Controller	ACM	75 W to 300 W	—	125	0.25	11.5/9.5	—	—	✔	0.99
UC3854	PFC Controller	ACM	200 W to 2 kW+	—	200	1.5	16/10	—	—	—	1.15
UC3854A/B	Improved PFC Controller	ACM	200 W to 2 kW+	—	200	0.3	16/10 ('3854A) 10.5/10 ('3854B)	—	—	—	1.35
UC3855A/B	High Performance Soft Switching PFC Controller	ACM	400 W to 2 kW+	ZVT	500	0.15	16/10 ('3855A) 10.5/10 ('3855B)	—	—	✔	5.70
UCC38050/1	Transition Mode PFC Controller	TM	50 W to 400 W	—	Variable	0.75	15.8/9.7 ('38050) 12.5/9.7 ('38051)	—	—	✔	0.70
UCC3817A/8A	BiCMOS PFC Controller	ACM	75 W to 2 kW+	—	400	0.1	16/10 ('3817A) 10.5/10 ('3818A)	—	—	✔	1.15
UCC3819A	Tracking Boost PFC Controller	ACM	75 W to 2 kW+	—	400	0.1	10.2/9.7	—	—	✔	1.15
UCC38500/1/2/3	PFC+PWM Combo Controller	ACM	75 W to 1 kW+	—	400	0.1	16/10 ('38500/2) 10.5/10 ('38501/3)	—	1x	✔	2.35
UCC28510/1/2/3	Advanced PFC+PWM Combo Controller	ACM	75 W to 1 kW+	—	600	0.1	16.6/9.3 ('28510/2) 10.2/9.7 ('28511/3)	✔[3]	1x	✔	1.80
UCC28514/5/6/7	Advanced PFC+PWM Combo Controller	ACM	75 W to 1 kW+	—	600	0.1	16.6/9.3 ('28514/6) 10.2/9.7 ('28515/7)	✔[3]	2x	✔	1.80
UCC28521/8	Advanced PWM/PFC Combo Controller with TEM/TEM Modulation	ACM	75 W to 1 kW+	—	600	0.1	10.2/9.7	✔[3] —	2x —	✔ —	1.80

[1] ACM =平均电流模式；TM =转换模式。 [2] ZVT =零电压转换。[3] 最高可达90%.

新器件以**粗体红色**标明。

* 建议零售价为每1000片时的美元价格

资源 如需完备的资源列表，敬请访问power.ti.com

Part Number	Description	Price*
Evaluation Modules (EVMs)		
UCC28051EVM	100-W Offline AC/DC Voltage Converter with PFC	49
UCC28514EVM	100-W AC/DC Power Converter with PFC Regulating a 12-V DC Output	49
UCC28521EVM	350-W Two-phase Interleaved Power Factor Corrected Pre-regulator	99
UCC28528EVM	350-W Two-phase Interleaved Power Factor Corrected Pre-regulator	99
UCC38050EVM	110-W Universal Line Input PFC Boost Converter	49
UCC38500	UCC38500 Evaluation Module: 100-W, Universal Line to 12-V Regulated Output	49
UCC3817	UCC3817 Evaluation Module: 385-V, 250-W PFC Boost Converter	49

* 建议零售价为每1000片时的美元价格

Literature Number	Part Number	Description
Application Notes		
SLUA144	UC3854	UC3854 Controlled Power Factor Correction Circuit Design
SLVC018.ZIP	UCC38050	MathCAD Application Design Tool for Use with the UCC38050
SLUU138	UCC38050	100-W Critical Conduction Power Factor Corrected Preregulator
SLUA308	UCC3817	UCC3817 Current Sense Transformer Evaluation
SLUA296	UCCX8510-17	A New Synchronization Circuit for Power Converters
SLUA294	UCC3817A/18A/19A	Differences between UCC3817A/18A/19A and UCC3817/18/19
SLUA269	UCC3819	UCC3819 250-W PFC Boost Follower Preregulator Design
SLUA245	UCC3817	Synchronizing a PFC Controller from a Downstream Controller Gate Drive
SLUA196	UC3854A/B, UC3855A/B	UC3854A/B and UC3855A/B Provide Power Limiting with Sinusoidal Input Current for PFC Front Ends
SLUA177	UC3854A/B	UC3854A and UC3854B Advanced Power Factor Correction Control ICs
SEM1500	UCC28510	Designing High Power Factor Off-Line Power Supplies
SEM700	UC3854	Optimizing the Design of High Power Factor Switching Preregulator
SLYT097	UCC28517	100-W PFC Power Converter with 12-V, 8-W Bias Supply (Part 1)
SLYT092	UCC28517	100-W PFC Power Converter with 12-V, 8-W Bias Supply (Part 2)

PWM电源控制器

单端拓扑

控制方法

电压模式 — 简易、低噪音控制方法，可满足大输入及输出的需求。

电流模式 — 带内置电流限制的快速瞬态响应。

集成度

- 集成的软启动（可编程）提供了可预测启动的性能。
- 内置前沿消隐电路(leading edge blanking)，用以抑制MOSFET管开启时所产生的切换毛刺。

性能

- 多种电压模式控制器都具有输入电压前馈能力，可对输入线电压的改变做出快速的响应。
- 绝大部分的控制其都具有内置高电流驱动能力，无须外置MOSFET驱动器。
- 更低的启动电流，可用于离线应用（主要是带UCC前缀的BiCMOS产品）。
- 低工作电流（主要是带UCC前缀的BiCMOS产品）实现了低负载下的高效率。
- 可编程最小化了责任周期钳制，实现了低负载下的高效率(UCC3581)。

特点

- 10W至350W离线及DC/DC电源供电。
- 单端拓扑的电源供电、压降、升压、反激及前向。

双端拓扑

电流模式— 控制技术的特点是带内置逐周期电源限制(cycle-by-cycle current limiting)的快速瞬态响应。

电压模式— 多用途、低噪音控制方法，可用于宽责任周期范围。

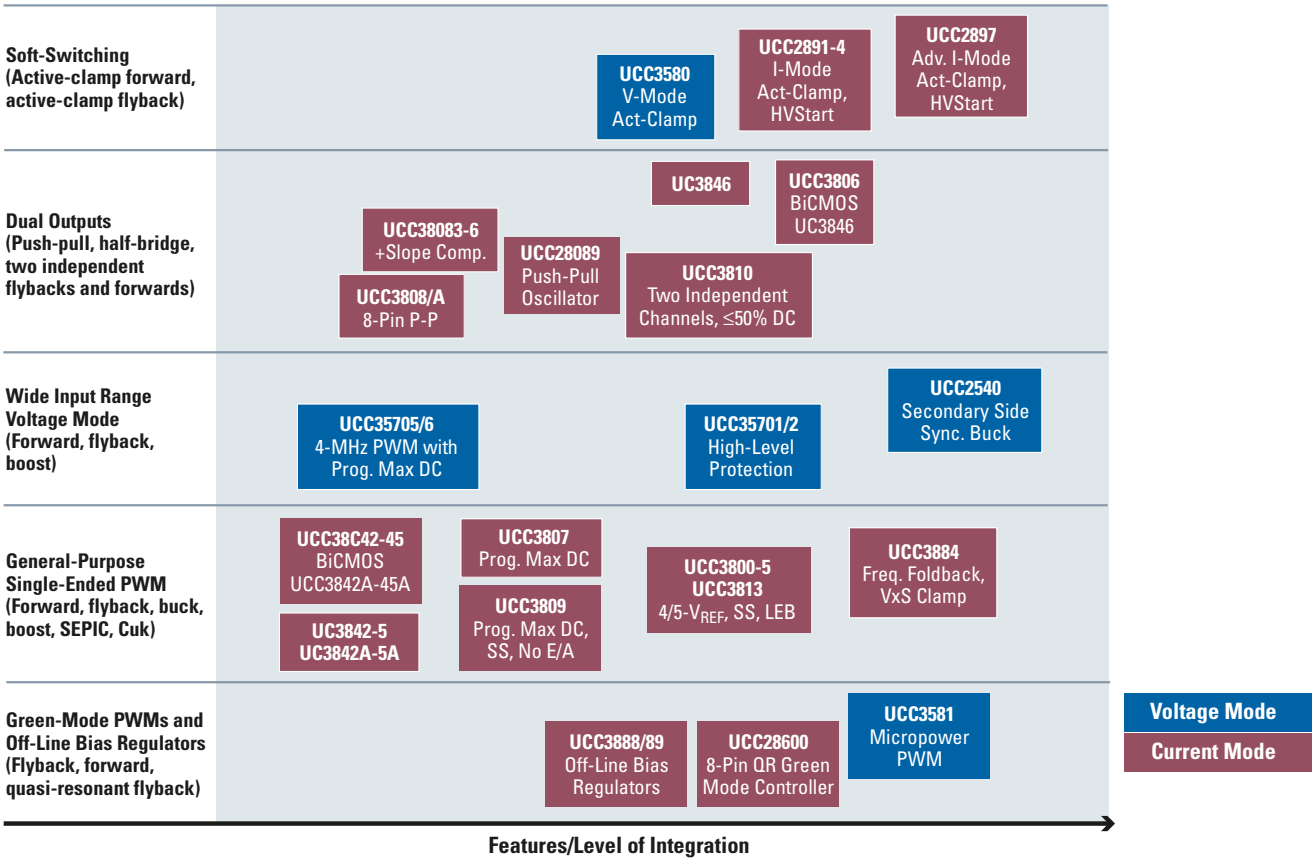
软开关

- 零电压转换(ZVT)软开关技术最小化了开启时的功率损失。
- 相位切换、零电压转换控制器最大化了全桥转换器的效率。

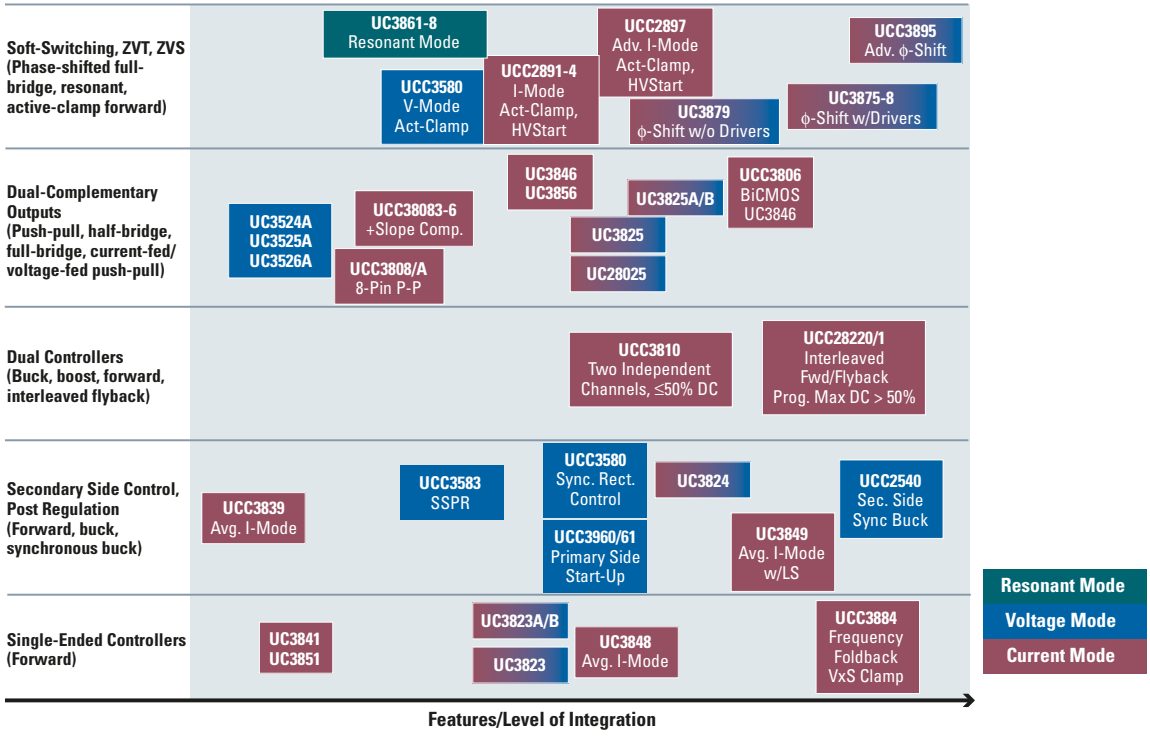
保护

- 灵活的过电流限制回路提供了可编的程错误保护模式。
- 可编程软启动实现了初始化时以及错误之后的可预测启动。
- 高速，逐周期电流限制。
- 最大化责任周期钳制防止变压器饱和。
- 可编程时滞(deadtime)控制，防止了电源开关的交叉干扰。

低功率至中等功率PWM控制器(25 W – 350 W)



中等功率至高功率PWM控制器(>300 W)



资源 *如需完备的资源列表，敬请访问power.ti.com*

Part Number	Description	Price*
Evaluation Modules (EVMs)		
UCC28600EVM 120 W	Green Mode PS with PFC	49
UCC28600EVM 65 W	Green Mode Adapter	49
UCC2891EVM	48-V to 3.3-V Forward Converter with Active Clamp Reset Using the UCC2891	49
UCC35705EVM	48-V to 3.3-V RCD Forward with the UCC35705	49
UCC3895EVM-001	UCC3895EVM Configuring for Direct Control Driven Synchronous Rectifier Applications	99
UCC3809EVM	10-W Flyback Converter Utilizing the UCC3809	49
UCC3889EVM	A Dual-Output, Non-Isolated Off-Line Power Supply Highlighting the UCC3889 and TPS77401	49

** 建议零售价为美元价格。*

Literature Number	Description
Application Notes	
SLUA149	UCC3800/1/2/3/4/5 BiCMOS Current Mode Control ICs
SLUA303	Designing for High Efficiency with the Active Clamp UCC2891 PWM Controller
SLUA276	25-W Forward Converter Design Review
SLUA213	Comparing the UC3842, UCC3802, and UCC3809 Primary Side PWM Controllers
SLUA246	A Comparison Between the BiCMOS UCC3895 Phase Shift Controller and the UC3875
SLUA257	The UCC38C42 Family of High-Speed, BiCMOS Current-Mode PWM Controllers
SLUA286	Low Voltage Feedback in PWM Applications
SLUA287	Control Driven Synchronous Rectifiers in Phase Shifted Full Bridge Converters
SLUA322	Active Clamp Transformer Reset: High Side or Low Side?
Reference Designs	
SLUU135A	UCC38083 50-W Push-Pull Converter
SLUA276	UCC38C42 25-W Forward Converter
SLUA274	UCC38C44 12-V Isolated Bias Supply
SLUA275	UCC3895 OUTC/OUTD Asymmetric Duty Cycle Operation
SLUU192A	48-V to 3.3-V Forward Converter with Active Clamp Reset Using the UCC2897 PWM Controller
SLUA303	Designing with the UCC2891 Active Clamp Controller
SLUU178	Using the UCC2891 Active Clamp and Reset PWM

PWM电源控制器

选择指南

(器件参数续下页)

Device	Typical Power Level (W)	Control Method: Voltage Mode	Control Method: Current Mode	Control Method: Avg. Current Mode	Topologies: Buck	Topologies: Boost	Topologies: Flyback (SEPIC, Cuk)	Topologies: Fwd (Including 2-Switch Fwd)	Topologies: Forward (D > 50%)	Topologies: Interleaved Fwd/Flyback/Boost	Topologies: Act-Clamp Fwd/Flyback	Topologies: Push-Pull	Topologies: I-Fed/V-Fed Push-Pull	Topologies: Half-Bridge	Topologies: Full-Bridge	Topologies: Φ-Shifted FB	Maximum Practical Frequency	Start-Up Current	Operating Current	Supply Voltage (V)	110-V Start-Up Circuit	UVLO: On/Off (V)
Green Mode Controllers and Offline Bias Regulators																						
UCC3581	10 to 200	✔			✔	✔	✔		✔								100 kHz	85 µA	300 µA	6.8 to 15	—	7.3/6.8
UCC28600	50 to 150		✔				✔										130 kHz	25 µA	50 mA	30	—	13/8
UCC3888/89	<10	✔					✔										250 kHz	150 µA	1.2 mA	9	—	8.4/6.3
General-Purpose Single-Ended Controllers																						
TL3842	30 to 350	✔	✔		✔	✔	✔		✔								500 kHz	0.5 mA	11 mA	10 to 30	—	16/10
TL3842B	30 to 350	✔	✔		✔	✔	✔		✔								500 kHz	0.3 mA	11 mA	10 to 30	—	16/10
TL3843	30 to 350	✔	✔		✔	✔	✔		✔								500 kHz	0.5 mA	11 mA	7.6 to 30	—	8.4/7.6
TL3843B	30 to 350	✔	✔		✔	✔	✔		✔								500 kHz	0.3 mA	11 mA	7.6 to 30	—	8.4/7.6
TL3844	30 to 350	✔	✔		✔	✔	✔	✔									500 kHz	0.5 mA	11 mA	10 to 30	—	16/10
TL3844B	30 to 350	✔	✔		✔	✔	✔	✔									500 kHz	0.3 mA	11 mA	10 to 30	—	16/10
TL3845	30 to 350	✔	✔		✔	✔	✔	✔									500 kHz	0.5 mA	11 mA	7.6 to 30	—	8.4/7.6
TL3845B	30 to 350	✔	✔		✔	✔	✔	✔									500 kHz	0.3 mA	11 mA	7.6 to 30	—	8.4/7.6
UC28023	50 to 750	✔	✔		✔	✔	✔		✔								1 MHz	1.1 mA	22 mA	9 to 30	—	9.2/8.4
UC3823	50 to 750	✔	✔		✔	✔	✔		✔								1 MHz	1.1 mA	22 mA	9 to 30	—	9.2/8.4
UC3823A/B	50 to 750	✔	✔		✔	✔	✔		✔								1 MHz	100 µA	28 mA	9 to 22	—	9.2/8.4/16/10
UC3842/A	30 to 350	✔	✔		✔	✔	✔		✔								500 kHz	0.5/0.3 mA	11 mA	10 to 30	—	16.0/10.0
UC3843	30 to 350	✔	✔		✔	✔	✔		✔								500 kHz	0.5 mA	11 mA	7.6 to 30	—	8.4/7.6
UC3843A	30 to 350	✔	✔		✔	✔	✔		✔								500 kHz	0.3 mA	11 mA	7.9 to 30	—	8.5/7.9
UC3844/A	30 to 350	✔	✔		✔	✔	✔	✔									500 kHz	0.5/0.3 mA	11 mA	10 to 30	—	16.0/10.0
UC3845	30 to 350	✔	✔		✔	✔	✔	✔									500 kHz	0.5 mA	11 mA	7.6 to 30	—	8.4/7.6
UC3845A	30 to 350	✔	✔		✔	✔	✔	✔									500 kHz	0.3 mA	11 mA	7.9 to 30	—	8.5/7.9
UC3849	50 to 250			✔				✔	✔								1 MHz	—	21 mA	8.4 to 20	—	8.4/8
UCC35705	25 to 250	✔				✔	✔		✔								4 MHz	50 µA	2.5 mA	8.2 to 15	—	8.8/8.2
UCC35706	25 to 250	✔				✔	✔	✔									4 MHz	50 µA	2.5 mA	8.0 to 15	—	12/8
UCC3800	10 to 200	✔	✔		✔	✔	✔		✔								1 MHz	100 µA	500 µA	7.2 to 15	—	7.2/6.9
UCC3801	10 to 200	✔	✔		✔	✔	✔	✔									1 MHz	100 µA	500 µA	9.4 to 15	—	9.4/7.4
UCC3802	10 to 200	✔	✔		✔	✔	✔		✔								1 MHz	100 µA	500 µA	12.5 to 15	—	12.5/8.3
UCC3803	10 to 200	✔	✔		✔	✔	✔		✔								1 MHz	100 µA	500 µA	4.1 to 15	—	4.1/3.6
UCC3804	10 to 200	✔	✔		✔	✔	✔	✔									1 MHz	100 µA	500 µA	12.5 to 15	—	12.5/8.3
UCC3805	10 to 200	✔	✔		✔	✔	✔	✔									1 MHz	100 µA	500 µA	4.1 to 15	—	4.1/3.6
UCC3807-1	10 to 200	✔	✔		✔	✔	✔		✔								1 MHz	100 µA	1.3 mA	6.9 to 15	—	7.2/6.9
UCC3807-2	10 to 200	✔	✔		✔	✔	✔		✔								1 MHz	100 µA	1.3 mA	8.3 to 15	—	12.5/8.3
UCC3807-3	10 to 200	✔	✔		✔	✔	✔		✔								1 MHz	100 µA	1.3 mA	4.1 to 15	—	4.3/4.1
UCC3809-1	10 to 200	✔	✔		✔	✔	✔		✔								1 MHz	50 µA	500 µA	8 to 19	—	10.0/8.0
UCC3809-2	10 to 200	✔	✔		✔	✔	✔		✔								1 MHz	50 µA	500 µA	8 to 19	—	15.0/8.0
UCC3813-0	10 to 200	✔	✔		✔	✔	✔		✔								1 MHz	100 µA	500 µA	7.2 to 15	—	7.2/6.9
UCC3813-1	10 to 200	✔	✔		✔	✔	✔	✔									1 MHz	100 µA	500 µA	9.4 to 15	—	9.4/7.4
UCC3813-2	10 to 200	✔	✔		✔	✔	✔		✔								1 MHz	100 µA	500 µA	12.5 to 15	—	12.5/8.3
UCC3813-3	10 to 200	✔	✔		✔	✔	✔		✔								1 MHz	100 µA	500 µA	4.1 to 15	—	4.1/3.6
UCC3813-4	10 to 200	✔	✔		✔	✔	✔	✔									1 MHz	100 µA	500 µA	12.5 to 15	—	12.5/8.3
UCC3813-5	10 to 200	✔	✔		✔	✔	✔	✔									1 MHz	100 µA	500 µA	4.1 to 15	—	4.1/3.6
UCC3884	50 to 250	✔	✔		✔	✔	✔		✔								1 MHz	200 µA	5 mA	8.9 to 15	—	8.9/8.3
UCC38C40	10 to 250	✔	✔		✔	✔	✔		✔								1 MHz	50 µA	2.3 mA	6.6 to 20	—	7.0/6.6
UCC38C41	10 to 250	✔	✔		✔	✔	✔	✔									1 MHz	50 µA	2.3 mA	6.6 to 20	—	7.0/6.6
UCC38C42	10 to 250	✔	✔		✔	✔	✔		✔								1 MHz	50 µA	2.3 mA	9 to 20	—	14.5/9

PWM电源控制器

(器件参数续上页)

Device	V_{REF} (V)	V_{REF} Tol. (%)	Max Duty Cycle (%)	Soft Start	E/A	Shut-down Pin	Voltage Feed-forward	Output Drive (Sink/Source) (A)	Slope Comp	Sync Pin	Leading Edge Blanking	Available Packages: MSOP	SSOP	TSSOP	HTSSOP-PowerPAD™	SOIC	SOIC-W (300 mil)	SOIC-W Power	PLCC	DIL (PDIP)	Price*
Green Mode Controllers and Offline Bias Regulators																					
UCC3581	4	1.5	Prog.	✔	—	✔	—	1/1	—	✔	—					14				14	1.00
UCC28600	—	—	99	✔	—	—	—	1/0.75	—	—	—					8					0.49
UCC3888/89	2.5	3	5.5	✔	—	—	✔	0.2/0.15	—	—	—						8			8	0.59
General-Purpose Single-Ended Controllers																					
TL3842	5	2	100	—	✔	—	—	1/1	—	—	—					8/14				8	0.40
TL3842B	5	2	100	—	✔	—	—	1/1	—	—	—					8/14				8	0.54
TL3843	5	2	100	—	✔	—	—	1/1	—	—	—					8/14				8	0.40
TL3843B	5	2	100	—	✔	—	—	1/1	—	—	—					8/14				8	0.54
TL3844	5	2	50	—	✔	—	—	1/1	—	—	—					8/14				8	0.40
TL3844B	5	2	50	—	✔	—	—	1/1	—	—	—					8/14				8	0.54
TL3845	5	2	50	—	✔	—	—	1/1	—	—	—					8/14				8	0.40
TL3845B	5	2	50	—	✔	—	—	1/1	—	—	—					8/14				8	0.54
UC28023	5.1	1	Prog.	✔	✔	—	—	1.5/1.5	—	✔	—						16			16	1.35
UC3823	5.1	1	Prog.	✔	✔	—	✔	1.5/1.5	—	✔	—						16		20	16	1.60
UC3823A/B	5.1	1	Prog.	✔	✔	—	✔	2/2	—	✔	—						16		20	16	4.90
UC3842/A	5	1.5	100	—	✔	—	—	1/1	—	—	—					8/14				8	0.80
UC3843	5	1.5	100	—	✔	—	—	1/1	—	—	—					8/14				8	0.80
UC3843A	5	1.5	100	—	✔	—	—	1/1	—	—	—					8/14				8	0.80
UC3844/A	5	1.5	50	—	✔	—	—	1/1	—	—	—					8/14				8	0.80
UC3845	5	1.5	50	—	✔	—	—	1/1	—	—	—					8/14				8	0.80
UC3845A	5	1.5	50	—	✔	—	—	1/1	—	—	—					8/14				8	0.80
UC3849	5	2	Prog	✔	✔	—	—	0.3/0.3	—	—	✔						24		28	24	3.05
UCC35705	—	—	93	—	—	—	✔	0.1/0.1	N/A	—	—	8				8				8	0.75
UCC35706	—	—	93	—	—	—	✔	0.1/0.1	N/A	—	—	8				8				8	0.75
UCC3800	5	1.5	100	✔	✔	—	—	1/1	—	—	100 ns			8		8				8	1.35
UCC3801	5	1.5	50	✔	✔	—	—	1/1	—	—	100 ns			8		8				8	1.35
UCC3802	5	1.5	100	✔	✔	—	—	1/1	—	—	100 ns			8		8				8	1.35
UCC3803	4	1.5	100	✔	✔	—	—	1/1	—	—	100 ns			8		8				8	1.35
UCC3804	5	1.5	50	✔	✔	—	—	1/1	—	—	100 ns			8		8				8	1.35
UCC3805	4	1.5	50	✔	✔	—	—	1/1	—	—	100 ns			8		8				8	1.35
UCC3807-1	2 (Int)	—	Prog.	✔	✔	—	—	1/1	—	—	100 ns					8				8	1.50
UCC3807-2	2 (Int)	—	Prog.	✔	✔	—	—	1/1	—	—	100 ns					8				8	1.50
UCC3807-3	2 (Int)	—	Prog.	✔	✔	—	—	1/1	—	—	100 ns					8				8	1.50
UCC3809-1	5	5	90	✔	—	✔	—	0.8/0.4	—	—	—	8		8		8				8	0.85
UCC3809-2	5	5	90	✔	—	✔	—	0.8/0.4	—	—	—	8		8		8				8	0.85
UCC3813-0	5	2	100	✔	✔	—	—	1/1	—	—	100 ns			8		8				8	0.80
UCC3813-1	5	2	50	✔	✔	—	—	1/1	—	—	100 ns			8		8				8	0.80
UCC3813-2	5	2	100	✔	✔	—	—	1/1	—	—	100 ns			8		8				8	0.80
UCC3813-3	4	2	100	✔	✔	—	—	1/1	—	—	100 ns			8		8				8	0.80
UCC3813-4	5	2	50	✔	✔	—	—	1/1	—	—	100 ns			8		8				8	0.80
UCC3813-5	4	2	50	✔	✔	—	—	1/1	—	—	100 ns			8		8				8	0.80
UCC3884	5	2.5	100	✔	✔	—	✔	1/0.5	—	—	—					16				16	1.60
UCC38C40	5	2	100	—	✔	—	—	1/1	—	—	—	8				8				8	0.95
UCC38C41	5	2	50	—	✔	—	—	1/1	—	—	—	8				8				8	0.95
UCC38C42	5	2	100	—	✔	—	—	1/1	—	—	—	8				8				8	0.95

* 建议零售价为每1000片时的美元价格。

新器件以**粗体红色**标明。

PWM电源控制器

选择指南 (续)

(器件参数续下页)

Device	Typical Power Level (W)	Control Method: Voltage Mode	Control Method: Current Mode	Control Method: Avg. Current Mode	Topologies: Buck	Boost	Flyback (SEPIC, Cuk)	Fwd (Including 2-Switch Fwd)	Forward (D > 50%)	Interleaved Fwd/Flyback/Boost	Act-Clamp Fwd/Flyback	Push-Pull	I-Fed/V-Fed Push-Pull	Half-Bridge	Full-Bridge	Φ-Shifted FB	Maximum Practical Frequency	Start-Up Current	Operating Current	Supply Voltage (V)	110-V Start-Up Circuit	UVLO: On/Off (V)
General-Purpose Single-Ended Controllers (Continued)																						
UCC38C43	10 to 250	✔	✔		✔	✔	✔		✔								1 MHz	50 µA	2.3 mA	7.6 to 20	—	8.4/7.6
UCC38C44	10 to 250	✔	✔		✔	✔	✔	✔									1 MHz	50 µA	2.3 mA	9 to 20	—	14.5/9
UCC38C45	10 to 250	✔	✔		✔	✔	✔	✔									1 MHz	50 µA	2.3 mA	7.6 to 20	—	8.4/7.6
Wide-Input Range Voltage Mode Controllers																						
UCC3570	25 to 250	✔					✔	✔	✔								500 kHz	85 µA	1 mA	9.0 to 15	—	13.0/9
UCC35701	25 to 250	✔					✔	✔	✔								700 kHz	130 µA	750 µA	9.0 to 15	—	13.0/9
UCC35702	25 to 250	✔					✔	✔	✔								700 kHz	130 µA	750 µA	8.8 to 15	—	9.6/8.8
UCC35705	25 to 250	✔				✔	✔	✔	✔								4 MHz	50 µA	2.5 mA	8.2 to 15	—	8.8/8.2
UCC35706	25 to 250	✔				✔	✔	✔	✔								4 MHz	50 µA	2.5 mA	8.0 to 15	—	12/8
Dual Output Controllers																						
TL494	50 to 500	✔			✔	✔	✔	✔	✔	✔		✔		✔	✔		300 kHz	—	7.5 mA	7 to 40	—	—
TL594	50 to 500	✔			✔	✔	✔	✔	✔	✔		✔		✔	✔		300 kHz	—	12.4 mA	7 to 40	—	6.1/6
TL598	50 to 500	✔			✔	✔	✔	✔	✔	✔		✔		✔	✔		300 kHz	—	15 mA	7 to 40	—	6.1/6
SG3524	50 to 500	✔										✔		✔	✔		450 kHz	—	—	8 to 40	—	—
UC28025	50 to 750	✔	✔									✔		✔	✔		1 MHz	1.1 mA	22 mA	9 to 30	—	9.2/8.4
UC3524	50 to 500	✔										✔		✔	✔		250 kHz	—	—	8 to 40	—	—
UC3524A	50 to 500	✔										✔		✔	✔		250 kHz	4 mA	5 mA	8 to 40	—	7.5/7
UC3525A/B	50 to 500	✔										✔		✔	✔		250 kHz	—	14 mA	8 to 40	—	7.0/7.0
UC3526A	50 to 500	✔										✔		✔	✔		250 kHz	—	14 mA	8 to 35	—	—
UC3825	50 to 750	✔	✔									✔		✔	✔		1 MHz	1.1 mA	22 mA	9 to 30	—	9.2/8.4
UC3825A/B	50 to 750	✔	✔									✔		✔	✔		1 MHz	100 µA	28 mA	9 to 22	—	16/10/9.2/8.4
UC3827-1/-2	50 to 500		✔										✔				450 kHz	1000 µA	32 mA	8.4 to 20	—	9/8.4
UC3846	50 to 750	✔	✔									✔		✔	✔		500 kHz	1.5 mA	17 mA	8 to 40	—	7.7/7
UC3856	50 to 750	✔	✔									✔		✔	✔		1 MHz	1.5 mA	17 mA	8 to 40	—	7.7/7
UCC28089	25 to 250									✔		✔		✔	✔		500 kHz	130 µA	1.4 mA	8 to 15	—	10.5/8.0
UCC28220	50 to 800		✔							✔							1 MHz/ch.	200 µA	3 mA	8 to 14.5	—	10/8
UCC28221	50 to 800		✔							✔							1 MHz/ch.	500 µA	3 mA	8 to 14.5	✔	13/8
UCC3806	50 to 750	✔	✔									✔		✔	✔		350 kHz	100 µA	1.4 mA	7 to 15	—	7.5/6.7
UCC3808-1/-2/A-1/A-2	50 to 500		✔									✔		✔	✔		1 MHz	130 µA	1 mA	4.3 to 15	—	12.5/8.3/4.3/4.1
UCC38083/4/5/6	50 to 500		✔									✔		✔	✔		1 MHz	130 µA	20 mA	8.3 to 15	—	12.5/8.3
UCC3810	50 to 500	✔	✔		✔	✔	✔	✔		✔							1 MHz	150 µA	2 mA	8.3 to 11	—	11.3/8.3
Soft-Switching, ZVT and ZVS Controllers																						
UC3875-8	200 W to 2 kW	✔	✔	✔							✔					✔	1+ MHz	150 µA	45 mA	10.7 to 20	—	10.7/9.3/15/9
UC3879	200 W to 2 kW	✔	✔													✔	500 kHz	150 µA	27 mA	11 to 20	—	15.2/9/10.7/9
UCC2891/2/3/4	75 to 600		✔						✔		✔						1 MHz	300 µA	2 mA	8.5 to 14.5	✔[1]	13/8.0
UCC2897	75 to 600		✔						✔		✔						1 MHz	300 µA	2 mA	8.5 to 14.5	✔	13/8.0
UCC3580-1/-2/-3/-4	50 to 500	✔							✔		✔						500 kHz	100 µA	1.5 mA	7 to 15	—	15/8.5/9.8/5
UCC3895	200 W to 2 kW	✔	✔	✔												✔	1 MHz	150 µA	5 mA	11 to 17	—	11/9
Secondary-Side, Post Regulation																						
UC3824	50 to 250	✔	✔														1 MHz	1.1 mA	22 mA	9 to 30	—	9.2/8.4
UCC2540	50 to 500	✔			✔												1000 kHz	—	12 mA	2.8 to 36	—	—
UCC3580-1/-2/-3/-4	50 to 500	✔									✔						500 kHz	100 µA	1.5 mA	7 to 15	—	15/8.5/9.8/5
UCC3583	50 to 500																500 kHz	100 µA	3 mA	8.5 to 15	—	9/8.4
UCC3960	25 to 250	✔			✔	✔	✔	✔									400 kHz	150 µA	2.3 mA	8.0 to 19	—	9.5/10.5
UCC3961	25 to 250	✔			✔	✔	✔	✔									400 kHz	150 µA	2.3 mA	8.0 to 19	—	9.5/10.5

[1] *UCC2891 and UCC2893.*

PWM电源控制器

(器件参数续上页)

Device	V_{REF} (V)	V_{REF} Tol. (%)	Max Duty Cycle (%)	Soft Start	E/A	Shut-down Pin	Voltage Feed-forward	Output Drive (Sink/Source) (A)	Slope Comp	Sync Pin	Leading Edge Blanking	Available Packages: MSOP	SSOP	TSSOP	HTSSOP-PowerPAD™	SOIC	SOIC-W (300 mil)	SOIC-W Power	PLCC	DIL (PDIP)	Price*
General-Purpose Single-Ended Controllers (Continued)																					
UCC38C43	5	2	100	—	✔	—	—	1/1	—	—	—	8				8				8	0.95
UCC38C44	5	2	50	—	✔	—	—	1/1	—	—	—	8				8				8	0.95
UCC38C45	5	2	50	—	✔	—	—	1/1	—	—	—	8				8				8	0.95
Wide-Input Range Voltage Mode Controllers																					
UCC3570	5	2	Prog.	✔	—	✔	✔	1.2/1.2	N/A	—	N/A					14				14	3.45
UCC35701	5	1.5	VS Clamp	✔	—	✔	✔	1.2/1.2	N/A	✔	N/A			14		14				14	2.95
UCC35702	5	1.5	VS Clamp	✔	—	✔	✔	1.2/1.2	N/A	✔	N/A			14		14				14	2.95
UCC35705	—	—	93	—	—	—	✔	0.1/0.1	N/A	—	N/A	8				8				8	0.75
UCC35706	—	—	93	—	—	—	✔	0.1/0.1	N/A	—	N/A	8				8				8	0.75
Dual Output Controllers																					
TL494	5	5	45	—	✔	—	—	0.2/0.2	N/A	✔	—			16		16				16	0.23
TL594	5	1	45	—	✔	—	—	0.2/0.2	N/A	✔	—			16		16				16	0.38
TL598	5	1	45	—	✔	—	—	0.2/0.2	N/A	✔	—					16				16	0.81
SG3524	5	4	45	—	✔	✔	—	0.1/0.1	N/A	✔	—					16				16	0.50
UC28025	5.1	1	Prog.	✔	✔	—	—	1.5/1.5	—	✔	—						16			16	1.35
UC3524	5	4	45	—	✔	✔	—	0.1/0.1	N/A	✔	—					16				16	0.85
UC3524A	5	2	Prog.	✔	✔	✔	—	0.2/0.2	—	✔	—					16				16	1.70
UC3525A/B	5	2	Prog.	✔	✔	✔	—	0.2/0.2	—	✔	—					16			20	16	1.05
UC3526A	5.1	1.3	Prog.	✔	✔	✔	—	0.2/0.2	—	✔	—					16			20	16	1.05
UC3825	5.1	1	Prog.	✔	✔	—	—	1.5/1.5	—	✔	—						16		20	16	1.60
UC3825A/B	5.1	1.5	Prog.	✔	✔	—	—	2/2	—	✔	—						16		20	16	2.65
UC3827-1/-2	5	4	—	✔	✔	—	—	1/0.8	—	✔	—						24		28	24	3.50
UC3846	5	2	Prog.	✔	✔	—	—	0.5/0.5	—	✔	—						16		20	16	1.60
UC3856	5	2	Prog.	✔	✔	—	—	0.5/0.5	—	✔	—						16		20	16	1.70
UCC28089	—	—	50	✔	—	—	—	0.5/1.0	—	✔	—					8					0.65
UCC28220	3.3	4.5	Prog.	✔	—	—	—	0.01/0.01	Prog.	—	—			16		16					1.60
UCC28221	3.3	4.5	Prog.	✔	—	—	—	0.01/0.01	Prog.	—	—			20		16					1.65
UCC3806	5.1	3	Prog.	✔	✔	✔	—	0.5/0.5	—	✔	—		16	16		16	16		20	16	4.10
UCC3808-1/-2/A-1/A-2	—	—	Prog.	✔	✔	—	—	1.0/0.5	—	✔	—			8		8				8	1.30
UCC38083/4/5/6	5	2	50	✔	—	—	—	1.0/0.5	Prog.	—	—			8		8				8	1.10
UCC3810	5	2	50	—	✔	✔	—	1/1	—	✔	—					16				16	1.85
Soft-Switching, ZVT and ZVS Controllers																					
UC3875-8	5	2	Prog.	✔	✔	—	—	Four @ 2/2	—	✔	—							20	28	20	4.85
UC3879	5	2.5	Prog.	✔	✔	—	—	Four @ 0.1/0.1	—	✔	—						20		28	20	3.70
UCC2891/2/3/4	5	1	Prog.	✔	—	✔	—	2/2, 2/2	Prog.	✔	—			16		16					1.50
UCC2897	5	1	Prog.	✔	—	✔	—	2/2, 2/2	Prog.	✔	—			20		16					1.50
UCC3580-1/-2/-3/-4	5	1	Prog.	✔	✔	✔	✔	0.5/1, 0.3/0.3	—	—	—					16				16	2.40
UCC3895	5	3	Prog.	✔	✔	✔	—	Four @ 0.1/0.1	—	✔	—						20		20	20	4.35
Secondary-Side, Post Regulation																					
UC3824	5.1	1	Prog.	✔	✔	—	—	1.5/1.5	—	✔	—						16			16	4.55
UCC2540	3.3	0.6	100	✔	✔	—	—	3/3	—	✔	—				20						1.85
UCC3580-1/-2/-3/-4	5	1	Prog.	✔	✔	✔	✔	0.5/1, 0.3/0.3	—	—	—					16				16	1.90
UCC3583	5	1.5	9.5	✔	✔	—	—	0.5/1.5	—	✔	—					14			20	14	1.75
UCC3960	—	—	72	✔	—	—	—	0.75/1.5	—	—	—					8				8	0.95
UCC3961	—	—	72	✔	—	—	—	0.75/1.5	—	—	—					14				14	1.05

**Suggested resale price in U.S. dollars in quantities of 1,000.*

** 建议零售价为每1000片时的美元价格。*

MOSFET驱动器

设计因素

电源电压范围 — 内置了电压稳压器后，MOSFET驱动器能工作于更宽泛的输入电压范围，使其更灵活的适用于各类应用。

输出口数量 — 可选用单路或双路的输出驱动器，以补足DC/DC开关及马达控制应用的需要。

输出配置 — 可选择反向(Inverting)、同向(noninverting)、与(AND)以及与非(NAND)配置方式。

TrueDrive™输出级 — TrueDrive输出架构被用于TI的大电流门驱动器及控制器上，其输出架构采用了双极型晶体管及CMOS晶体管并联的形式构建。TrueDrive技术在最需要的区域（在MSOFET管的米勒平坦Miller plateau区前端）给出了大电流输出并提供了转换效率增益。

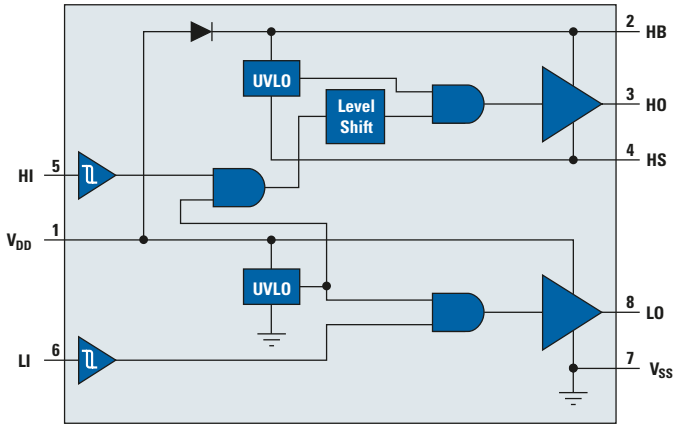
预测门驱动(Predictive Gate Drive™)技术 — TI的此项专利技术是一种数字控制技巧，用以控制高效率、低输出电压同步压降转换器的延迟时间。如需完备的相关描述资料，敬请参见我们所提供的有关预测门驱动技术的应用手册SLUA281及SLUA285。

120V 双MOSFET高侧、低侧驱动器
UCC27200, UCC27201

敬请访问**www.ti.com/sc/device/UCC27200**或**www.ti.com/sc/device/UCC27201**，以获取样片及数据表。

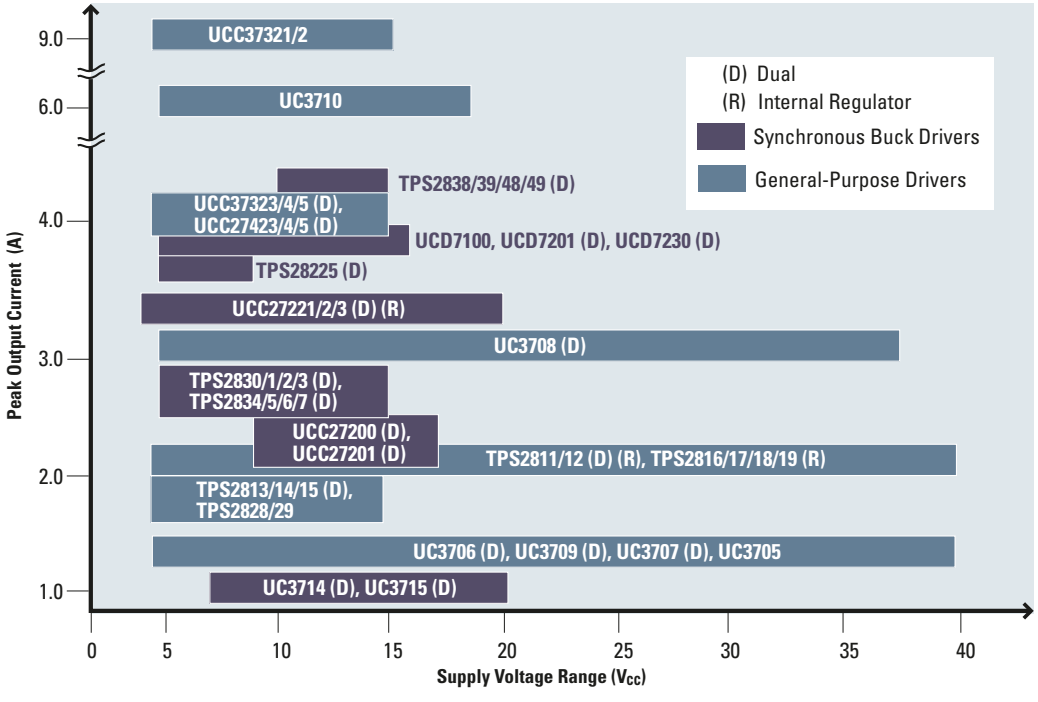
主要特点

- 于高侧、低侧配置时驱动两个N道沟MOSFET
- 引导电压绝对峰值：120V
- 片置0.65V VF、0.6Ω RD 阴极负载二极管(bootstrap diode)
- 最高工作于1MHz
- 20ns典型传播延迟
- 2.5A吸收(sink)、2A馈送(source)输出电流
- 1000pF负载时，10ns上升及8ns下降时间
- 2ns典型延迟匹配
- 封装模式：SOIC-8、PowerPAD™ SOIC-8以及空间节省型DFN封装（均为无铅封装）



UCC27200/01方框图

MOSFET驱动器产品系列



选择指南

Device	No. of Outputs	Output Configuration	Output Type[1]	Peak I_{OUT} Source/Sink (A)	Rise/Fall Time (ns)	V_{CC} Range (V)	Prop Delay (ns)	Input Threshold	Enable	Dead Time Control	Protection Features[2]	Internal Regulator	Price*
General-Purpose Low-Side Drivers													
TPS2811	2	Inverting	TrueDrive™	2.0/2.0	25/25	4 to 40	40	CMOS	—	—	—	✔	0.90
TPS2812	2	Non-inverting	TrueDrive	2.0/2.0	25/25	4 to 40	40	CMOS	—	—	—	✔	0.90
TPS2813	2	See Note 3	TrueDrive	2.0/2.0	25/25	4 to 14	40	CMOS	—	—	—	✔	0.90
TPS2814	2	Dual 2-input AND; one inverting	TrueDrive	2.0/2.0	25/25	4 to 14	40	CMOS	—	—	—	—	0.90
TPS2815	2	2-input NAND	TrueDrive	2.0/2.0	25/25	4 to 14	40	CMOS	✔	N/A	—	—	0.90
TPS2816	1	Inverting	TrueDrive	2.0/2.0	25/25	4 to 40	40	CMOS	—	N/A	—	✔	0.65
TPS2817	1	Non-inverting	TrueDrive	2.0/2.0	25/25	4 to 40	40	CMOS	—	N/A	—	✔	0.65
TPS2818	1	Inverting	TrueDrive	2.0/2.0	25/25	4 to 40	40	CMOS	—	N/A	—	✔	0.65
TPS2819	1	Non-inverting	TrueDrive	2.0/2.0	25/25	4 to 40	40	CMOS	—	N/A	—	✔	0.65
TPS2828	1	Inverting	TrueDrive	2.0/2.0	25/25	4 to 14	40	CMOS	—	N/A	—	—	0.60
TPS2829	1	Non-inverting	TrueDrive	2.0/2.0	25/25	4 to 14	40	CMOS	—	N/A	—	—	0.60
UC3714	2	Non-inverting	Bipolar	0.5/1.0	30/25	7 to 20	50	TTL/PWM	✔	Adj.	—	—	0.95
UC3715	2	See Note 3	Bipolar	1.0/2.0	30/25	7 to 20	50	TTL/PWM	✔	Adj.	—	—	0.90
UCC27323	2	Inverting	TrueDrive	4.0/4.0	25/25	4 to 15	35	TTL/CMOS	—	—	—	—	0.80
UCC27324	2	Non-inverting	TrueDrive	4.0/4.0	25/25	4 to 15	35	TTL/CMOS	—	—	—	—	0.80
UCC27325	2	See Note 3	TrueDrive	4.0/4.0	25/25	4 to 15	35	TTL/CMOS	—	—	—	—	0.80
UCC27423	2	Inverting	TrueDrive	4.0/4.0	25/25	4 to 15	35	TTL/CMOS	✔	—	—	—	0.85
UCC27424	2	Non-inverting	TrueDrive	4.0/4.0	25/25	4 to 15	35	TTL/CMOS	✔	—	—	—	0.85
UCC27425	2	See Note 3	TrueDrive	4.0/4.0	25/25	4 to 15	35	TTL/CMOS	✔	—	—	—	0.85
UCC37321	1	Inverting	TrueDrive	9/9	20/20	4 to 15	30	TTL/CMOS	✔	—	—	—	0.99
UCC37322	1	Non-inverting	TrueDrive	9/9	20/20	4 to 15	30	TTL/CMOS	✔	—	—	—	0.99
UCD7100PWP	1	Uncommitted/ Non-inverting	TrueDrive	4/4	10/10	4.5 to 16	20	CMOS/TTL	—	Adaptive	—	—	0.99
UCD7201PWP	2	Uncommitted/ Non-inverting	TrueDrive	4/4	10/10	4.5 to 16	20	CMOS/TTL	—	Adaptive	—	—	1.20
Synchronous Buck Drivers													
TPS28225	2	Non-inverting	CMOS	2.0/4.0	10/10	4.5 to 8.8	14	TTL/CMOS	✔	Adaptive	UVLO	—	0.60
TPS28226	2	Non-inverting	CMOS	2.0/4.0	10/10	4.5 to 8.8	14	TTL/CMOS	✔	Adaptive	UVLO	—	0.60
TPS2830	2	Non-inverting	TrueDrive	2.4/2.4	50/50	4.5 to 15	75	CMOS	✔	Adaptive	OVPC	—	1.05
TPS2831	2	Inverting	TrueDrive	2.4/2.4	50/50	4.5 to 15	75	CMOS	✔	Adaptive	OVPC	—	1.05
TPS2832	2	Non-inverting	TrueDrive	2.4/2.4	50/50	4.5 to 15	75	CMOS	—	Adaptive	—	—	1.00
TPS2833	2	Inverting	TrueDrive	2.4/2.4	50/50	4.5 to 15	75	CMOS	—	Adaptive	—	—	1.00
TPS2834	2	Non-inverting	TrueDrive	2.4/2.4	30/30	4.5 to 15	70	TTL	✔	Adaptive	OVPC	—	1.05
TPS2835	2	Inverting	TrueDrive	2.4/2.4	30/30	4.5 to 15	70	TTL	✔	Adaptive	OVPC	—	1.05
TPS2836	2	Non-inverting	TrueDrive	2.4/2.4	30/30	4.5 to 15	70	TTL	—	Adaptive	—	—	1.25
TPS2837	2	Inverting	TrueDrive	2.4/2.4	30/30	4.5 to 15	70	TTL	—	Adaptive	—	—	1.25
TPS2838	2	Non-inverting	TrueDrive	4/4	120	10 to 15	40	TTL	✔	Adaptive	—	✔	1.30
TPS2839	2	Inverting	TrueDrive	4/4	120	10 to 15	40	TTL	✔	Adaptive	—	✔	1.30
TPS2848	2	Non-inverting	TrueDrive	4/4	120	10 to 15	20	TTL	✔	Adaptive	—	✔	1.25
TPS2849	2	Inverting	TrueDrive	4/4	120	10 to 15	20	TTL	✔	Adaptive	—	✔	1.25
UCC27221	2	Inverting	TrueDrive	3.3/3.3	20/20	3.7 to 20	82/103	TTL	—	PGD[4]	—	✔	1.35
UCC27222	2	Non-inverting	TrueDrive	3.3/3.3	20/20	3.7 to 20	82/103	TTL	—	PGD[4]	—	✔	1.35
UCC27223	2	Non-inverting	TrueDrive	3.3/3.3	25/35	4.15 to 20	82/103	TTL	✔	PGD[4]	—	✔	1.35
High-Side Low-Side Drivers—Sync Buck, Half Bridge, Full Bridge						**Boot (V)**							
UCD7230	2	Non-inverting	CMOS	4/4	10/10	to 36	25	CMOS/TTL	—	Adaptive	Adjustable	—	0.80
UCC27200	2	Non-inverting	TrueDrive	3/3	10/8	to 110	20	CMOS	—	N/A	UVLO	—	1.30
UCC27201	2	Non-inverting	TrueDrive	3/3	10/8	to 110	20	TTL	—	N/A	UVLO	—	1.30

[1] 输出类型：TrueDrive采用了双极型及CMOS混合的输出架构。可用于改善低电压时的电流驱动能力（于米勒前端）。
[2] UVLO = 低电压锁定；OVPC = 过电压保护跨接器(crowbar)。
[3] 一路反向(inverting)，一路同向(non-inverting)。
[4] Predictive Gate Drive™。
* 推荐零售价为每1000片时的美元价格。

新器件以**粗体红色**标明。
前瞻性器件以**粗体蓝色**标明。

负载共享驱动器

设计因素

电流读出 — 电源输出电流值可通过负载共享输出端的高侧(high side)或低侧(low side)任意读出。UC3907及UCC39002可采用任意一种读取方式；但是UC3902仅可用低侧（接地参考）实现电流读出。

单端或差分电流读出 — 通过在同时在高侧和低侧应用端采用差分电流读出，可实现最优化的结果。单端配置为专用的，接地参考的应用减少了引脚数量。

单端或差分共享总线 — 取决于各类特定应用的噪声大小，设计者可选择单端或差分类型的通用共享总线实现对所有共享模块的操控。虽然真正的差分模式实现了对绝大多数噪声很好的消除，但是，当设计涉及到大幅度负载共享信号时，采用单端同样能得到很好的结果。

主/从状态 — UC3907负载共享控制器拥有特色的主/从输出信号，可用于连接其他电源或终端系统的诊断电路。

热交换/热嵌入 — 新型的UCC39002具有特色的热交换或热嵌入电源模块性能，无须分配负载总线来实现“共享”操控。

电流环路补偿 — 此列的负载共享控制器均为设计者提供了电流共享环路的补偿能力，可满足系统或独立供电的需求。

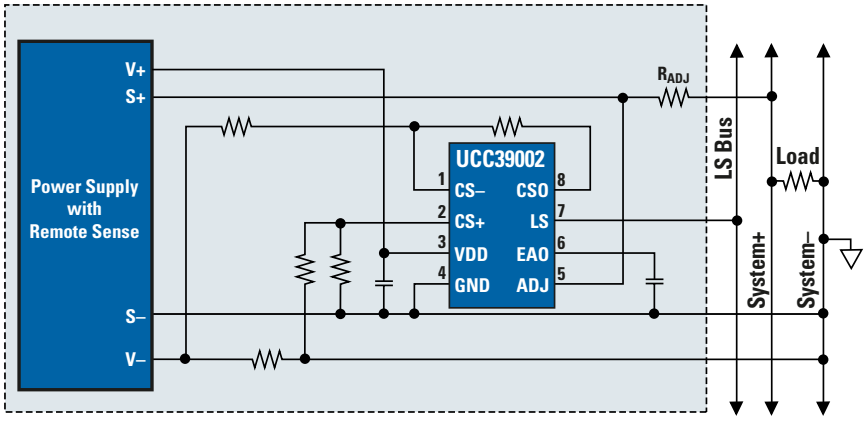
兼容英特尔(Intel)的SSI（服务器系统下层构建）技术规范 — UCC39002支持的Intel的SSI规格要求如下：(1)并行模块间单连接；(2)可调节负载共享电压独立于CS电阻。

高级8引脚负载共享控制器
UCC39002

敬请访问**www.ti.com/sc/device/UCC39002**，以获取样片、数据表、评估板及相关应用报告。

主要特点

- 高精度，全负载状态下电流共享误差低于1%
- 高侧或低侧（GND 参考地）电流读出能力
- 超低偏置的电流传感放大器采用后封装焊接(post package trimming)



选择指南

Device	V_{IN} (min)	V_{IN} (max)	Reference Accuracy (%)	Share Bus	Pin Count	Supply Current (mA)	Price*
UC3902	2.7	20	—	Differential	8	6	1.85
UC3907	4.5	35	1.25	Single Ended	16	6	2.10
UCC39002	4	15	—	Single Ended	8	2.5	0.95

** 推荐零售价为每1000片时的美元价格。*

*新器件以**粗体红色**标明。*

资源 *如需完备的资源列表，敬请访问power.ti.com*

Part Number	Description	Price*
Evaluation Module (EVM)		
UCC39002EVM	Advanced Loadshare Controller User's Guide, HPA027A	49

** 建议零售价为美元价格。*

Literature Number	Description
Application Notes	
SLUA270A	48-V_{IN}, 12-V_{OUT} Loadshare System Using the UCC39002 with 3 DC/DC Modules
SLUA128	The UC3902 Loadshare Controller and its Performance in Distributed Power
SLUA147	UC3907 Loadshare IC Simplifies Parallel Power Supply Design

设计因素

该嵌入式电源解决方案为板上安装型、完全集成的DC/DC转换器，仅需要一或两个外接组件。

输入电压(V_{IN}) — 嵌入式电源解决方案设计工作于工业标准的直流总线电压。

输出电流(I_{OUT}) — 转换器的输出电流I_{OUT}应匹配应用所需的最大电流。

输出电压(V_{OUT}) — 选择满足您需求的可调节或固定的输出电压V_{OUT}

隔离 — 带电子输入至输出端隔离的转换器通常更为复杂且更加昂贵。

特点—*TurboTrans*™(增压转换)、SmartSync(智能同步)、可调节输出电压V_{OUT}、远程感应、过热、过电流及输出抑制(output inhibit)是其众多特点的一部分。

气流需求 — 转换器的最大电流通常取决于气流。安全工作区域(SOA)曲线决定了转换器在特定电流下的气流需求。

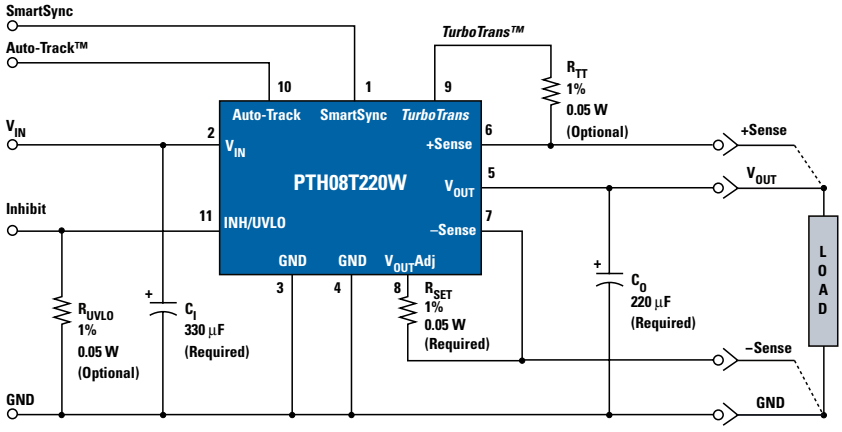
保护 — 错误保护包括了短路、过热、过电流及过电压保护。

封装 — 立式封装(Vertical mounting)实现了最小的占位面积。表面贴装及水平穿孔可用于大多数产品系列。

16-A、4.5-V至14-V输入、并采用*TurboTrans*™ 技术的负载点(POL)模块 PTH08T220W

敬请访问**www.ti.com/sc/device/PTH08T220W**，以获取样片及数据表。

PTH08T220W是高性能、16A额定、T2负载点功率模块。其工作电压从4.5V至14V，PTH08T220W需要一个单独的电阻以设定输出电压（输出值为任意值，覆盖范围从0.7 V至5.5V）。PTH08T220W采用了*TurboTrans*技术、智能同步以及自动跟随电源顺序(Auto-Track™ sequencing)技术。



嵌入式电源模块（POLA™ 及其它）产品系列

V_{IN}	1 A	2 A	3 A	5 A	8 A	15 A	20 A	30 A	60 A
48 V	PT4210 PT4310 #	PTMA PTB48540	PTMA PTB48540	PT4120 PTB48500 # PTEA	PTB48560	PTB48501 # PTB48502 #	PTB48520	PTQA PTQB	
24 V	DCP01/02 # DCR01/02 DCV01 # PTN78000	PT4240 PTN78060	PT4240 PTN78060	PT4140 PTN78020	PTB78560	PTB78520	PTB78520		
12 V	DCP02 # DCR01/02 DCV01 # PTN78000	PTN78060 PTH08000 PTH08080	PTH08T260 PTN78060	PTH08T230 PTN78020	PTH08T230 PTH12000 PTH12050 PTV12010	PTH08T240 PTH12060 PTH12010	PTH08T220 PTH12020 PTV12020	PTH08T210 PTH12030	PTV08T250 PTV08040 PTH12040
5 V	DCH0105 DCP01/02 # DCR01 DCV01 # PTN04050	PTH04000 PTH04070	PTH04T260 PTH04000 PTH04070	PTH04T230 PTH05000	PTH04T230 PTH05050 PTV05010 PT6910 ♣	PTH04T240 PTH05060 PTH05010	PTH04T220 PTH05020 PTV05020	PTH05T210 PTH05030	PTH04040
3.3 V		PTH04000 PTH04070	PTH04T260 PTH04000 PTH04070	PTH04T230 PTH03000 PT6910 ♣	PTH04T230 PTH03050 PTV03010 PT6910 ♣	PTH04T240 PTH03060 PTH03010	PTH04T220 PTH03020 PTV03020	PTH03030	PTH04040

I_{OU}

多输出电压　　♣ 特定功能：负相输出

隔离　　非隔离

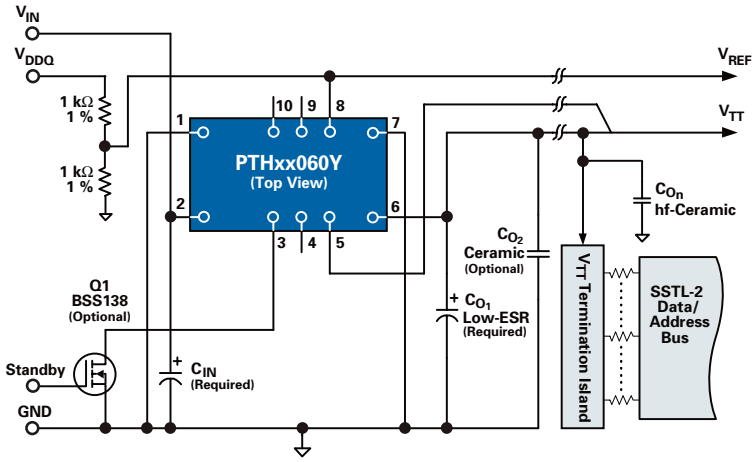
PTH QDR/DDR系列电源模块

PTHxx060Y

敬请访问**www.ti.com/sc/device/PARTnumber**，以获取样片及数据表。
（**PARTnumber**可用**PTH03060Y**、**PTH05060Y**或**PTH12060Y**代替）

主要特点

- 非隔离DC/DC模块，用于两倍数据率(DDR)及四倍速据率(QDR)的一或两个内存总线终端
- 所产生的终端电压(V_{TT})通过馈送或吸收电流实现对外部参考电压(V_{REF})的追踪
- V_{TT}对V_{DDQ}电压的追踪具有±40 mV的瞬变状态容忍度
- 支持V_{TT}范围：0.55V至1.8 V
- 3.3V、5V及12V输入模式
- 输出电流可达15 A
- POLA™兼容



标准应用

选择指南

Device[1]	Input Bus Voltage	Description	P_{OUT} or I_{OUT}	V_O Range (V)	V_O Adjustable	Auto-Track™ Sequencing	POLA™	DDR-QDR	Price*
Non-Isolated Single Positive Output									
PTH03000W	3.3 V	3.3-V Input 6-A POL	6 A	0.8 to 2.5	✔				6.90
PTH03010W	3.3 V	3.3-V Input 15-A POL with Auto-Track™ Sequencing	15 A	0.8 to 2.5	✔	✔	✔		11.60
PTH03020W	3.3 V	3.3-V Input 22-A POL with Auto-Track Sequencing	22 A	0.8 to 2.5	✔	✔	✔		18.15
PTH03030W	3.3 V	3.3-V Input 30-A POL with Auto-Track Sequencing	30 A	0.8 to 2.5	✔	✔	✔		25.00
PTH03050W	3.3 V	3.3-V Input 6-A POL with Auto-Track Sequencing	6 A	0.8 to 2.5	✔	✔	✔		6.90
PTH03060W	3.3 V	3.3-V Input 10-A POL with Auto-Track Sequencing	10 A	0.7 to 2.5	✔	✔	✔		9.80
PTH04000W	3.3 V/5 V	3-V to 5.5-V Input 3-A POL with Auto-Track Sequencing	3 A	0.9 to 3.6	✔	✔	✔		4.50
PTH04070W	3.3 V/5 V	3-V to 5.5-V Input 3-A POL	3 A	0.9 to 3.6	✔				4.28
PTH04040W	3.3 V/5 V	3-V to 5.5-V Input 60-A POL with Auto-Track Sequencing	60 A	0.8 to 3.6	✔	✔	✔		35.00
PTH04T220/221W	3.3 V/5 V	2.2- to 5.5-V Input, 16-A T2 2nd Gen PTH POL with *TurboTrans*™	16 A	0.7 to 3.6	✔	✔	✔		12.60
PTH04T230/231W	3.3 V/5 V	2.2- to 5.5-V Input, 6-A T2 2nd Gen PTH POL with *TurboTrans*	6 A	0.7 to 3.6	✔	✔	✔		7.90
PTH04T240/241W	3.3 V/5 V	2.2- to 5.5-V Input, 10-A T2 2nd Gen PTH POL with *TurboTrans*	10 A	0.7 to 3.6	✔	✔	✔		10.80
PTH04T260/261W	3.3 V/5 V	2.2- to 5.5-V Input, 6-A T2 2nd Gen PTH POL with *TurboTrans*	3 A	0.7 to 3.6	✔	✔			6.25
PTH05000W	5 V	5-V Input 6-A POL	6 A	0.8 to 3.6	✔				6.90
PTH05010W	5 V	5-V Input 15-A POL with Auto-Track Sequencing	15 A	0.8 to 3.6	✔	✔	✔		11.60
PTH05020W	5 V	5-V Input 22-A POL with Auto-Track Sequencing	22 A	0.8 to 3.6	✔	✔	✔		18.15
PTH05030W	5 V	5-V Input 30-A POL with Auto-Track Sequencing	30 A	0.8 to 3.6	✔	✔	✔		25.00
PTH05050W	5 V	5-V Input 6-A POL with Auto-Track Sequencing	6 A	0.8 to 3.6	✔	✔	✔		6.90
PTH05060W	5 V	5-V Input 10-A POL with Auto-Track Sequencing	10 A	0.8 to 3.6	✔	✔	✔		9.80
PTH05T210W	5 V	5-V Input, 30-A T2 2nd Gen PTH POL with *TurboTrans*	30 A	0.7 to 3.6	✔	✔	✔		18.00
PTH08000W	12 V	8-V to 14-V Input, 3-A POL	3 A	0.9 to 5.5	✔	✔	✔		4.50
PTH08080W	5 V/12 V	5-V to 18-V Input, 2.25-A POL	2.25 A	0.9 to 5.5	✔				4.28
PTH08T210W	12 V	5.5- to 14-V Input, 30-A T2 2nd Gen PTH POL with *TurboTrans*	30 A	0.7 to 3.6	✔	✔	✔		18.00
PTH08T220/221W	5 V/12 V	4.5- to 14-V Input, 16-A T2 2nd Gen PTH POL with *TurboTrans*	16 A	0.7 to 5.5	✔	✔	✔		12.60
PTH08T230/231W	5 V/12 V	4.5- to 14-V Input, 6-A T2 2nd Gen PTH POL with *TurboTrans*	6 A	0.7 to 5.5	✔	✔	✔		7.90
PTH08T240/241W	5 V/12 V	4.5- to 14-V Input, 10-A T2 2nd Gen PTH POL with *TurboTrans*	10 A	0.7 to 5.5	✔	✔	✔		10.80
PTH08T260/261W	5 V/12 V	4.5- to 14-V Input, 3-A T2 2nd Gen PTH POL with *TurboTrans*	3 A	0.7 to 5.5	✔	✔			6.25
PTH12000L/W	12 V	12-V Input 6-A POL	6 A	0.8 to 1.8/1.2 to 5.5	✔				6.90
PTH12010L/W	12 V	12-V Input 12-A POL with Auto-Track Sequencing	12 A	0.8 to 1.8/1.2 to 5.5	✔	✔	✔		11.60
PTH12020L/W	12 V	12-V Input 18-A POL with Auto-Track Sequencing	18 A	0.8 to 1.8/1.2 to 5.5	✔	✔	✔		18.15
PTH12030L/W	12 V	12-V Input 26-A POL with Auto-Track Sequencing	26 A	0.8 to 1.8/1.2 to 5.5	✔	✔	✔		25.00

[1] *敬请访问**power.ti.com**，以获取完全的供货信息。*
* *推荐零售价为每1000片时的美元价格。*

*新器件以**粗体红色**标明。*

选择指南（续）

Device[1]	Input Bus Voltage	Description	P_{OUT} or I_{OUT}	V_O Range (V)	V_O Adjustable	Auto-Track™ Sequencing	POLA™	DDR-QDR	Price*
Non-Isolated Single Positive Output (Continued)									
PTH12040W	12 V	12-V Input 50-A POL with Auto-Track™ Sequencing	50 A	0.8 to 5.5	✔	✔	✔		35.00
PTH12050L/W	12 V	12-V Input 6-A POL with Auto-Track Sequencing	6 A	0.8 to 1.8/1.2 to 5.5	✔	✔	✔		6.90
PTH12060L/W	12 V	12-V Input 10-A POL with Auto-Track Sequencing	10 A	0.8 to 1.8/1.2 to 5.5	✔	✔	✔		9.80
PTH03010Y	3.3 V	3.3-V Input 15-A DDR Terminating Module	15 A	Follows V_{REF}	✔		✔	✔	11.60
PTH03050Y	3.3 V	3.3-V Input 6-A DDR Terminating Module	6 A	Follows V_{REF}	✔		✔	✔	6.90
PTH03060Y	3.3 V	3.3-V Input 10-A DDR Terminating Module	10 A	Follows V_{REF}	✔		✔	✔	9.80
PTH05010Y	5 V	5-V Input 15-A DDR Terminating Module	15 A	Follows V_{REF}	✔		✔	✔	11.60
PTH05050Y	5 V	5-V Input 6-A DDR Terminating Module	6 A	Follows V_{REF}	✔		✔	✔	6.90
PTH05060Y	5 V	5-V Input 10-A DDR Terminating Module	10 A	Follows V_{REF}	✔		✔	✔	9.80
PTH12010Y	12 V	12-V Input 12-A DDR Terminating Module	12 A	Follows V_{REF}	✔		✔	✔	11.60
PTH12050Y	12 V	12-V Input 6-A DDR Terminating Module	6 A	Follows V_{REF}	✔		✔	✔	6.90
PTH12060Y	12 V	12-V Input 8-A DDR Terminating Module	8 A	Follows V_{REF}	✔		✔	✔	9.80
PTN04050C	3.3 V/5 V	3-V/5-V Input, 12-W Output Step-Up (Boost) ISR	12 W	5 to 15	✔				8.00
PTN78000W/H	V_O + 2 to 36 V	Wide-Input, Wide-Output 1.5-A Positive Step-Down ISR	1.5 A	2.5 to 12/12 to 22	✔				8.00
PTN78060W/H	V_O + 2 to 36 V	Wide-Input, Wide-Output 3-A Positive Step-Down ISR	3 A	2.5 to 12/12 to 22	✔				11.00
PTN78020W/H	V_O + 2 to 36 V	Wide-Input, Wide-Output 6-A Positive Step-Down ISR	6 A	2.5 to 12/12 to 22	✔				15.00
PTV03010W	3.3 V	5-V Input 8-A Vertical SIP with Auto-Track Sequencing	8 A	0.8 to 2.5	✔	✔	✔		6.90
PTV03020W	3.3 V	5-V Input 18-A Vertical SIP with Auto-Track Sequencing	18 A	0.8 to 2.5	✔	✔	✔		11.60
PTV05010W	5 V	5-V Input 8-A Vertical SIP with Auto-Track Sequencing	8 A	0.8 to 3.6	✔	✔	✔		6.90
PTV05020W	5 V	5-V Input 18-A Vertical SIP with Auto-Track Sequencing	18 A	0.8 to 3.6	✔	✔	✔		11.60
PTV08040W	12 V	8-V to 14-V Input, 50-A Vertical SIP with Auto-Track Sequencing	50 A	0.8 to 3.6	✔	✔			35.00
PTV08T250W	12 V	8-V to 14-V Input, 50-A T2 2nd Gen PTH POL with TurboTrans™	50 A	0.8 to 3.6	✔	✔	✔		36.00
PTV12010L/W	12 V	12-V Input 8-A Vertical SIP with Auto-Track Sequencing	8 A	0.8 to 1.8/1.2 to 5.5	✔	✔	✔		6.90
PTV12020L/W	12 V	12-V Input 18-A Vertical SIP with Auto-Track Sequencing	16 A	0.8 to 1.8/1.2 to 5.5	✔	✔	✔		11.60
Non-Isolated Single Negative Output									
PT6910	3.3 V/5 V	3.3-V/5-V Input 12-W Adjustable Plus to Minus Voltage Converter	12 W	–1.2 to –6.5	✔				26.25
PTN04050A	3.3 V/5 V	3-V to 5-V Input, 6-W Positive to Negative (Buck-Boost) ISR	6 W	–3.3 to –15	✔				8.00
PTN78000A	7 to 29 V	Wide-Input, Wide-Output 1.5-A Positive to Negative (Buck-Boost) ISR	1.5 A	–3 to –15	✔				8.00
PTN78060A	9 to 29 V	Wide-Input, Wide-Output 15-W Positive to Negative (Buck-Boost) ISR	15 W	–3 to –15	✔				11.00
PTN78020A	9 to 29 V	Wide-Input, Wide-Output 25-W Positive to Negative (Buck-Boost) ISR	25 W	–3 to –15	✔				15.00
Isolated Single Output									
DCH01_S	5	1-W Unregulated Isolated DC/DC Converter	1 W	5, 12, 15					4.25
DCP01_B	5, 24	1-W Unregulated Isolated DC/DC Converter with Synchronization	1 W	5, 12, 15					5.35
DCP02	5, 12, 24	2-W Unregulated Isolated DC/DC Converter with Synchronization	2 W	3.3, 5, 7, 9, 12, 15					6.95
DCR01	5, 12, 24	1-W Regulated Isolated DC/DC Converter with Synchronization	1 W	3.3, 5					5.95
PT4210	48 V	3- to 7-W 48-V Input Isolated DC/DC Converter	3 to 7 W	3.3 to 12					18.75
PTB48520W	48 V	25-A 48-V Input Isolated POL Converter with Auto-Track I/O	75 W	1.8 to 3.6	✔	✔			62.00
PTB48540A/B/C	48 V	10-W 48-V Input Isolated PoE Module	10 W	3.3, 5, 12	✔				26.00
PTB48560A/B/C	48 V	30-W 48-V Input Isolated POL Converter with Auto-Track I/O	30 W	3.3, 5, 12	✔	✔			25.00
PTB78520W	18 V to 60 V	20-A 18-V to 60-V Input Isolated POL Converter with Track I/O	65 W	1.8 to 3.6	✔	✔			62.00
PTB78560A/B/C	18 V to 60 V	30-W 18-V to 60-V Input Isolated POL Converter with Track I/O	30 W	3.3, 5, 12	✔	✔			25.00
PTEA4	48 V	50-W 48-V Input Isolated DC/DC Converter — Industry Std Footprint		12	✔				26.50
PTMA4	48 V	10-W 48-V Input Isolated DC/DC Converter — Industry Std Footprint	10 W	3.3, 5, 12	✔				20.00
PTQA4	48 V	100-W 48-V Input Isolated DC/DC Converter — Industry Std Footprint	100 W	2.5, 3.3, 5	✔				44.00
PTQB4	48 V	200-W 36- to 75-V Input Isolated Bus Converter with Auto-Track Control	200 W	8		✔			45.00
Isolated Multiple Output									
DCH01_D	5	1-W Unregulated Isolated DC/DC Converter	1 W	±5, ±12, ±15					4.25
DCP01_DB	5, 15, 24	1-W Unregulated Dual Isolated DC/DC Converter with Synchronization	1 W	±5, ±12, ±15					5.90
DCP02_D	5, 12, 24	2-W Unregulated Dual Isolated DC/DC Converter with Synchronization	2 W	±5, ±12, ±15					6.95
PTB48500A	48 V	30-W 48-V Input Isolated Dual DC/DC Converter	30 W	3.3/1.2	✔				43.00
PTB48501A/B	48 V	35-W 48-V Input Isolated Dual DC/DC Converter	35 W	3.3/1.2 or 1.5	✔				45.00
PTB48502A/B	48 V	40-W 48-V Input Isolated Dual DC/DC Converter	40 W	3.3/1.2 or 1.5	✔				49.00

[1] 敬请访问**power.ti.com**，以获取完全的供货信息。

* 推荐零售价为每1000片时的美元价格。

新器件以**粗体红色**标明。

线性及低压降(LDO)稳压器

TI提供了极其宽泛的LDO产品组合，其范围覆盖的应用从微安培保持电路直至7.5-A电信负载。主要产品在此页及29页的表格中高亮标明。如需作更为全面的选择，请参看30-31页或访问**power.ti.com**以获取完备的产品组合信息。

设计因素

输入电压 — 最小输入电压V_{IN}必须大于输出电压V_{OUT}与压降V_{DO}之和，且不受列表中所给出的最小值的约束。

效率 — 如忽略LDO的静态工作点电流(I_q)损耗，功效可用V_{OUT}/V_{IN}计算。

功率损耗 — $P_D=(V_{IN}-V_{OUT})x\ I_{OUT}$；$P_D$受封装模式、$T_A$及$T_{JMAX}$所限。敬请参照应用文档SLVA118 —《Digital Designer's Guide to Linear Voltage Regulators and Thermal Management》以获得相关支持。如需更高的功耗或需求更高的功效，TI推荐步降式（降压）DC/DC转换器/控制器（敬请参见32-38页产品）。

电容要求 — 输出电容，特别是其等效串联阻抗(ESR)是实现稳定性的关键。因此，部分LDO需采用具有高ESR的钽输出电容。而如果LDO能稳定于无输出电容或使用低ESR陶瓷输出电容的状态，那它也通常稳定于使用所有类型的电容的状态。

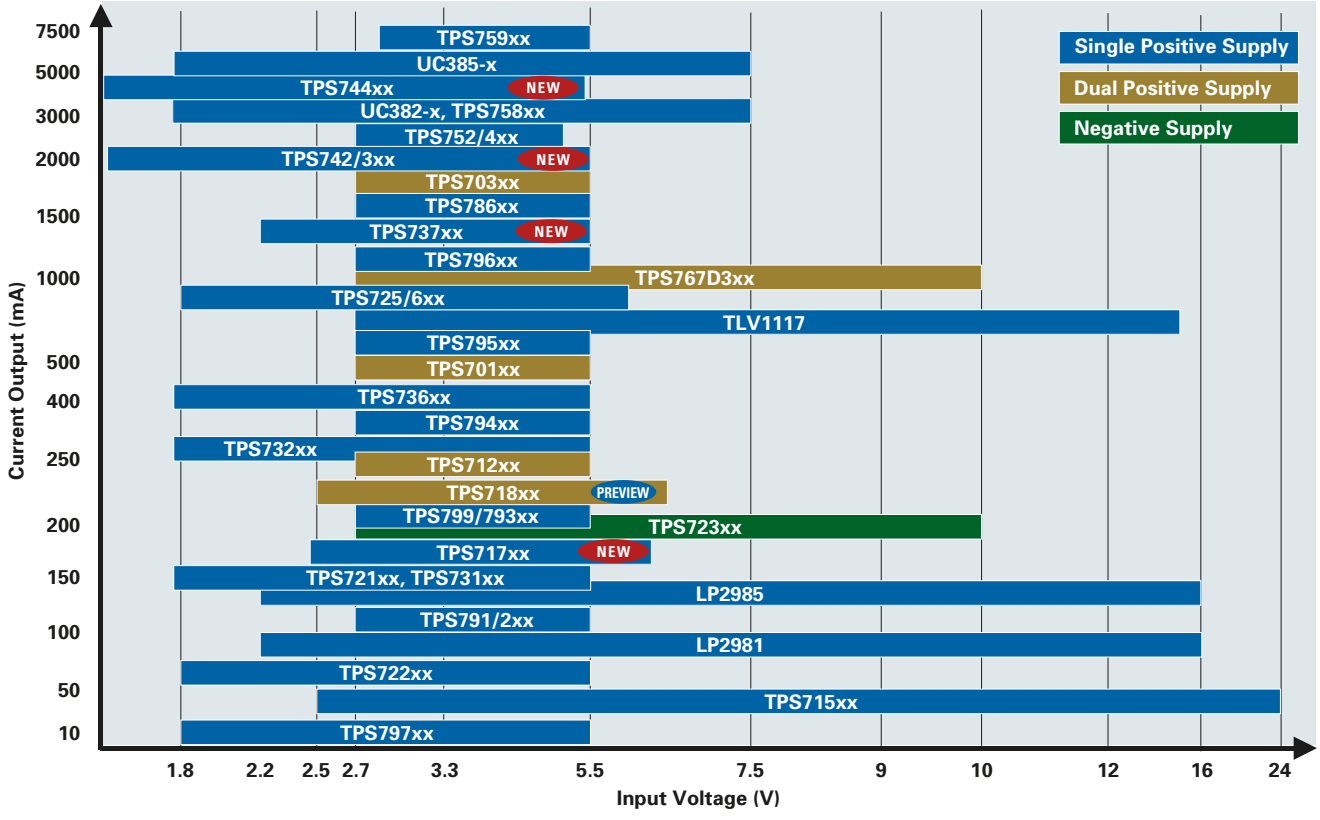
射频、音频及其它对噪声敏感的应用 — 选择具有高功率纹波抑制(PSRR)的LDO可实现输入电源的噪声消除，并给出较低噪声(< 50 μVrms)的输出。部分LDO还具有旁通(BP)引脚，用于添加电容以实现更低的输出噪声。

供电良好/电源电压监控(PG/SVS) — 诸如微控制器、DSP及FPGA的器件都要求高于某个下限电压值以确保正常工作。电源电压监控(SVS)功能监测系统电压，在压降降至某一确定值的时候给出输出信号，使系统复位并防止出现故障。SVS所给出的复位信号具有特定的延迟，而供电良好(PG)功能则不具有这样的延迟。

反向泄露保护 — 在某些特定应用中，LDO输出电压高于输入电压，而反向电流保护的特色就在于防止LDO中的电流从输出端逆流至输入端，从而避免了对输入电源的损坏，特别是对于电池电源。

特定应用的多输出解决方案 — 敬请参看第41页。

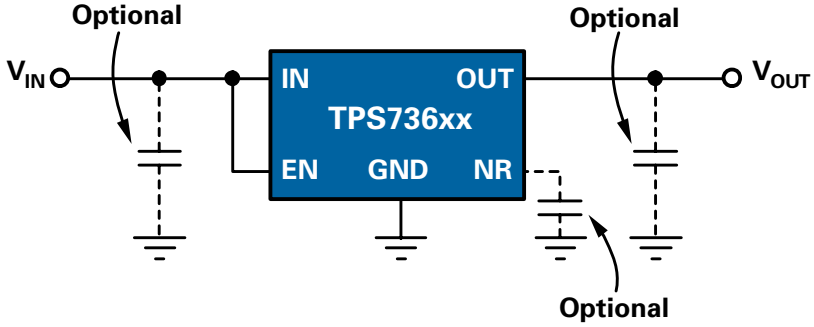
线性及低压降(LDO)稳压器产品系列（依照所选择的模块显示）



产品应用

Device	I_{OUT} (mA)	Highlights	Target Applications: Handset	WLAN	RF (High PSRR + Low Noise)	Portables/PDA/DSC	Reverse Leakage Protection	MSP430 Processor	OMAP™ Processor	DSP and FPGA	DDR Termination	High Voltage	Low Profile (≤1.2 mm)	Low Cost	Price*
TPS797xx	10	1.2-µA I_q, Power Good for brown-out protection, ceramic cap, SC70	✔			✔		✔					✔		0.34
REF30xx	25	0.2% accuracy, 50-µA max I_Q, SOT-23				✔		✔							0.59
REF29xx	25	2% accuracy, 50-µA max I_Q, SOT-23				✔		✔							0.49
TPS715xx	50	3.4-µA I_q, 24-V_{IN} max, ceramic cap, SC70	✔			✔		✔				✔	✔		0.34
TPS715Axx	80	Higher power version of TPS715xx, in thermally enhanced QFN	✔			✔		✔				✔	✔		0.44
TPS769xx	100	17-µA I_q, low-cost option for <100-mA apps, SOT23				✔								✔	0.29
LP2981	100	16-V_{IN} max, fast transient response, SOT23										✔		✔	0.36
TPS731xx	150	Cap-free, 1% acc, 1.7- to 5.5-V V_{IN}, custom V_{OUT} available, SOT23				✔	✔			✔					0.45
LP2985	150	Low-cost option for 150-mA apps, SOT23												✔	0.36
TPS730xx	200	Low-cost alternative to TPS793xx, SOT23/WCSP												✔	0.20
TPS793xx	200	LP2985 cross, RF, ceramic cap, SOT23/WCSP	✔	✔	✔	✔			✔	✔			✔		0.23
TPS799xx	200	LP3985 cross with 40-µA I_q in TSOT23/WCSP/SON	✔	✔	✔	✔			✔	✔			✔		0.30
TPS794xx	250	RF, ceramic cap, thermally enhanced PowerPAD™ MSOP8			✔	✔			✔	✔			✔		0.65
TPS732xx	250	Cap-free, 1% acc, 1.7- to 5.5-V V_{IN}, custom V_{OUT} available, SOT23/QFN				✔			✔	✔			✔		0.65
TPS766xx	250	35-µA I_q, Power Good, low-cost option for 250-mA apps, SOIC8				✔			✔	✔				✔	0.40
TPS712xx	250/250	Dual RF LDO in QFN package, ceramic cap	✔	✔	✔	✔			✔	✔			✔		0.80
TPS736xx	400	Cap-free, 1% acc, 1.7- to 5.5-V V_{IN}, custom V_{OUT} avail., SOT23/QFN/SOT223				✔	✔			✔			✔		0.95
TPS776xx	500	Low-cost option for 500-mA apps, SOIC and PowerPAD TSSOP (PWP) package								✔			✔	✔	0.70
TPS795xx	500	RF performance, ceramic cap, SOT223			✔					✔					1.05
TPS726126	1000	1.26-V core and integrated reset for C5501/02 and C6711/12/13								✔					1.10
TPS725xx	1000	Low input voltage (down to 1.8 V), any cap LDO, SOT223/TO263/SOIC								✔					1.10
TPS796xx	1000	RF performance, ceramic cap, SOT223/TO263/QFN			✔					✔					1.10
TPS768xx	1000	Low-cost option for 1-A apps, SOIC and PowerPAD TSSOP (PWP)								✔				✔	0.90
TPS786xx	1500	RF performance, ceramic cap, SOT223/TO263			✔					✔					1.35
UC382-x	3000	Separate V_{bias} allows regulation from as low as 1.7 V_{IN}, TO220/TO263								✔					2.70
TPS51100	3000	Source/sink LDO; see page 9 for details									✔				0.80
UC385-x	5000	Separate V_{bias} allows regulation from as low as 1.7 V_{IN}, TO220/TO263								✔					3.15

* 推荐零售价为每1000片时的美元价格。



TPS736xx系列400-mA无电容(cap-free) LDO典型应用电路

线性及低压降(LDO)稳压器

低压降(LDO)稳压器选择指南

Device[1]	I_O (mA)	V_{DO} @ I_O (mV)	I_q (µA)	Output Options: Fixed Voltage (V)	Output Options: Adj. (V)	Min V_{IN}	Max V_{IN}	Accuracy (%)	Packages: WCSP	SC70	SOT23	MSOP	QFN	SO8	SOT223	PWP	TO220	PW	TO263	Features[2]	C_O[3]	Comments	Price*
Positive Voltage, Single Output Devices																							
TPS797xx	10	105	1.2	1.8, 3.0, 3.3	—	1.8	5.5	4		✔										PG	0.47 µF C	MSP430; Lowest I_q	0.34
TPS715xx	50	415	3.2	2.5, 3.0, 3.3, 5.0	1.2 to 15	2.5	24	4		✔										—	0.47 µF C	Ultra-Low I_q	0.34
TPS770xx	50	35	17	1.2, 1.5, 1.8, 2.5, 2.7, 2.8, 3.0, 3.3, 5.0	1.2 to 5.5	2.7	10	3			✔									/EN	4.7 µF T	Low I_q	0.34
TPS789xx	100	115	18	1.5, 1.8, 2.5, 2.8, 3.0	—	2.7	13.5	3			✔									/EN	4.7 µF T	Low I_q and High V_{IN}	0.30
TPS792xx	100	38	185	2.5, 2.8, 3	1.2 to 5.5	2.7	5.5	2			✔									EN, BP	1 µF C	RF Low Noise; High PSRR	0.40
TPS769xx	100	70	18	1.2, 1.5, 1.8, 2.5, 2.7, 2.8, 3.0, 3.3, 5.0	1.2 to 5.5	2.7	10	3			✔									/EN	4.7 µF T	Low Cost	0.29
LP2950	100	380	75	3.0, 3.3	—	2.3	30	1												—	1 µF C	Available in TO92 and TO252	0.27
LP2951	100	380	75	3.0, 3.3, 5.0	1.23 to 30	2.3	30	1				✔	✔	✔						/EN	1 µF C	Low cost	0.27
LP2981	100	200	600	1.8, 2.5, 2.8, 3.0, 3.3, 5	1.3 to 9	2.2	16	1			✔									EN	3.3 µF C	Fast Transient Response	0.36
TPS76201	100	100	22	—	0.7 to 5.5	2.7	10	3			✔									/EN	4.7 µF T	Lowest V_{OUT} LDO	0.37
TPS717xx	150	170	50	1.8, 2.6, 2.8, 2.85, 3.0, 3.3, EEPROM[4]	0.9 to 6.2	2.5	6.5	1.5		✔										EN, BP	1 µF C	Ultra-High PSRR	0.45
TPS731xx	150	30	400	1.5, 1.8, 2.5, 3.0, 3.3, 5.0, EEPROM[4]	1.20 to 5.5	1.7	5.5	1			✔									EN, BP	No Cap	Reverse Leakage Protection	0.45
LP2985	150	280	850	1.8, 2.5, 2.8, 3.3, 5.0	—	2.2	16	1	✔		✔									EN	3.3 µF C	Fast Transient Response	0.36
TPS763xx	150	180	85	1.6, 1.8, 2.5, 2.7, 2.8, 3.0, 3.3, 3.8, 5.0	1.5 to 6.5	2.7	10	3			✔									EN	4.7 µF T	Low Cost	0.25
TPS721xx	150	150	90	1.5, 1.6, 1.8	1.2 to 2.5	1.8	5.5	3			✔									EN	0.1 µF C	Low Noise and Low V_{IN}	0.41
TPS730xx	200	120	180	1.8, 2.5, 2.8, 2.85, 3.0, 3.3	1.2 to 5.5	2.7	5.5	2			✔									EN, BP	2.2 µF C	Low Cost vs. TPS793xx	0.23
TPS793xx	200	77	180	1.8, 2.5, 2.8, 2.85, 3.0, 3.3, 4.75	1.2 to 5.5	2.7	5.5	2	✔		✔									EN, BP	2.2 µF C	RF Low Noise, High PSRR	0.28
TPS799xx	200	100	40	1.2, 1.5, 1.8, 1.9, 2.5, 2.6, 2.7, 2.8, 2.85, 3.0, 3.2, 3.3, EEPROM[4]	1.2 to 5.5	2.7	6.5	2	✔		✔		✔							EN, BP	2.2 µF C	Low Power vs. TPS793xx	0.35
TPS794xx	250	145	172	1.8, 2.5, 2.8, 3.0, 3.3	1.2 to 5.5	2.7	5.5	3				✔			✔					EN, BP	2.2 µF C	RF Low Noise, High PSRR	0.65
TPS732xx	250	40	400	1.5, 1.8, 2.5, 3.0, 3.3, 5.0, EEPROM[4]	1.20 to 5.5	1.7	5.5	1			✔		✔		✔					EN, BP	No Cap	Reverse Leakage Protection	0.65
TPS766xx	250	140	35	1.5, 1.8, 2.5, 2.7, 2.8, 3.0, 3.3, 5.0	1.25 to 5.5	2.7	10	3						✔						/EN, PG	4.7 µF T	Low Cost	0.40
TPS773xx	250	125	90	1.5, 1.6, 1.8, 2.7, 2.8, 3.3, 5.0	1.5 to 5.5	2.7	10	2				✔								/EN, SVS	10 µF T	Low Noise	0.70
TPS736xx	400	75	300	1.25, 1.5, 1.8, 2.5, 3.0, 3.3, EEPROM[4]	1.20 to 5.5	1.7	5.5	1			✔		✔		✔					EN, BP	No Cap	Reverse Leakage Protection	0.95
TPS795xx	500	105	265	1.6, 1.8, 2.5, 3.0, 3.3	1.2 to 5.5	2.7	5.5	2							✔					EN, BP	1 µF C	RF Low Noise, High PSRR	1.05
TPS775xx	500	169	87	1.5, 1.6, 1.8, 2.5, 3.3	1.5 to 5.5	2.7	10	2						✔		✔				/EN, SVS	10 µF T	Fast Transient Response	0.95
TPS776xx	500	169	87	1.5, 1.8, 2.5, 2.8, 3.3	1.20 to 5.5	2.7	10	2						✔		✔				/EN, PG	10 µF T	Fast Transient Response	0.70
TL5209	500	500	100	1.8, 2.5, 3.0, 3.3, 5.0	1.25 to 16	2.5	16	1						✔	✔				✔	EN	1 µF T	Low Noise	0.85
TPS78405	700	250	150	5.0	—	5.5	42	2											✔	—	22 µF C	Short Circuit; Rev. Polarity	0.99
TPS777xx	750	260	85	1.5, 1.8, 2.5, 3.3	1.5 to 5.5	2.7	10	2						✔		✔				/EN,SVS	10 µF T	Fast Transient Response	1.05
TLV1117	800	1200	5 mA	1.2, 1.5, 1.8, 2.5, 3.3, 5.0	1.4 to 13	2.7	15	3					✔		✔				✔	—	10 µF T	Low Cost	0.41
TPS737xx	1000	200	300	EEPROM[4]	1.2 to 5.5	2.0	5.5	2							✔					EN	1 µF C	Low Cost	0.60
TPS725xx	1000	170	75	1.5, 1.6, 1.8, 2.5	1.2 to 5.5	1.8	6	2						✔	✔				✔	EN, SVS	No Cap	Low Noise; SVS Delay 50 ms	1.10
TPS796xx	1000	200	310	1.8, 2.5, 2.8, 3.0, 3.3	1.2 to 5.5	2.7	5.5	2					✔		✔				✔	EN, BP	1 µF C	RF Low Noise, High PSRR	1.10
TPS767xx	1000	230	85	1.5, 1.8, 2.5, 2.7, 2.8, 3.0, 3.3, 5.0	1.5 to 5.5	2.7	10	2						✔		✔				/EN, SVS	10 µF T	Fast Transient Response	1.10
TPS768xx	1000	230	80	1.5, 1.8, 2.5, 2.7, 2.8, 3.0, 3.3, 5.0	1.2 to 5.5	2.7	10	2						✔		✔				/EN, PG	10 µF T	Fast Transient Response	0.90
TPS742xx	1500	60	2 mA	EEPROM[4]	0.8 to 3.3	0.9	5.25	1					✔			✔				EN, SS, PG	No Cap	Low V_{OUT}, High Accuracy	2.25
TPS743xx	1500	125	2 mA	EEPROM[4]	0.8 to 3.3	0.9	5.25	1					✔			✔				EN, TR, PG	No Cap	Low V_{OUT}, High Accuracy	2.25
TPS748xx	1500	130	1 mA	—	0.8 to 3.3	0.8	3.3	2					✔							EN, SS, PG	2.2 µF C	Low V_{OUT}	1.25
TPS786xx	1500	390	310	1.8, 2.5, 2.8, 3.0, 3.3	1.2 to 5.5	2.7	5.5	2							✔				✔	EN, BP	1 µF C	RF Low Noise, High PSRR	1.35
TPS751xx	1500	160	75	1.5, 1.8, 2.5, 3.3	1.5 to 5.0	2.7	5	2								✔				/EN, PG	47 µF T	Fast Transient Response	1.60
TPS753xx	1500	160	75	1.5, 1.8, 2.5, 3.3	1.5 to 5.0	2.7	5	2								✔				/EN, SVS	47 µF T	Fast Transient Response	1.70
TL1963A	1500	341	1 mA	1.5, 1.8, 2.5, 3.3	1.21 to 21	2.22	20	1							✔	✔			✔	/EN	10 µF C	Fast Transient Response	2.05
TPS752xx	2000	210	75	1.5, 1.8, 2.5, 3.3	1.5 to 5.0	2.7	5	2								✔				/EN, SVS	47 µF T	Fast Transient Response	1.80
TPS744xx	3000	125	2 mA	EEPROM[4]	0.8 to 3.3	0.9	5.25	1					✔			✔				EN, SS, PG	No Cap	Low V_{OUT}, High Accuracy	2.95
TPS749xx	3000	250	1 mA	—	0.8 to 3.3	0.8	3.3	2					✔							EN, SS, PG	2.2 µF C	Low V_{OUT}	2.50
UC382-x	3000	350	6 mA	1.5, 2.1, 2.5	1.20 to 6.0	1.7	7.5	1										✔	✔	—	100 µF T	Fast LDO with Reverse Leak.	2.70
UCC383-x	3000	400	400	3.3, 5.0	1.2 to 8.5	1.8	9	2.5										✔	✔	/EN	22 µF T	Reverse Leakage Protection	2.70
TPS51100	3000	1250	3	½ VDDQSNS	—	4.75	5.25	1.6				✔								EN	20 µF C	DDR/DDR2 V_H Power	0.80
TPS758xx	3000	150	110	1.5, 1.8, 2.5, 3.3	1.2 to 5.0	2.8	5.5	3										✔	✔	EN	47 µF T	Fast Transient Response	2.70
UC385-x	5000	350	8 mA	1.5, 2.1, 2.5	1.20 to 6.0	1.7	7.5	1										✔	✔	—	100 µF T	Fast LDO with Reverse Leak.	3.15
TPS756xx	5000	250	110	1.5, 1.8, 2.5, 3.3	1.2 to 5.0	2.8	5.5	3										✔	✔	EN	47 µF T	Fast Transient Response	3.00
TPS759xx	7500	400	110	1.5, 1.8, 2.5, 3.3	1.2 to 5.0	2.8	5.5	3										✔	✔	/EN, PG	47 µF T	Fast Transient Response	3.20
Negative Voltage, Single Output Devices																							
TPS723xx	200	280	130	–2.5	–1.2 to –9	–10	–2.7	2			✔									EN, BP	2.2 µF C	Low Noise, High PSRR	1.05
UCC384-x	500	150	200	–12.0, –5.0	–1.25 to –15	–15	–3.5	3						✔						/EN	4.7 µF T	Duty Cycled Short	1.86

[1] *xx 代表电压选项。例如，33代表3.3-V选项。 可调节输出电压选项以01表示。*
[2] *BP = 旁通(bypass)引脚以使用噪声消除电容；EN = 主动高使能；/EN = 主动低使能；PG = 供电良好；SS = 软启动引脚；SVS = 电源电压监控；TR = 追踪。*
[3] *C = 陶瓷， T = 钽， No Cap = 无电容LDO。*
[4] *EEPROM可在出厂前编程设定，允许客户的产品自定义电压。接受小量订单。敬请与TI联系。*
* *推荐零售价为每1000片时的美元价格。*

*新器件以**粗体红色**标明。*
*前瞻性器件以**粗体蓝色**标明。*

线性及低压降(LDO)稳压器

双输出LDO选择指南

Device	I_{O1} (mA)	I_{O2} (mA)	V_{DO1} @ I_{O1} (mV)	V_{DO2} @ I_{O2} (mV)	I_q (µA)	Output Options: Fixed Voltage (V)	Output Options: Adj.	Accuracy (%)	Package	V_O (min) (V)	V_O (max) (V)	Features: Enable	PG	SVS	Seq	Low Noise	V_{IN} (min) (V)	V_{IN} (max) (V)	C_O[1]	Comments	Price*
TPS718xx	200	200	230	230	100	—		3	QFN	0.9	3.6	EN					2.5	6.5	1.0 µF	High PSRR, Low V_{OUT}	0.70
TPS712xx	250	250	145	145	400	See Note 2	✔	2	QFN	1.2	5.5	EN				✔	2.7	5.5	2.2 µF C		0.80
TPS713xx	250	250	145	145	400	3.3/1.8	✔	2	QFN	1.2	5.5	EN		✔		✔	2.7	5.5	2.2 µF C	Integrated SVS	0.90
TPS707xx	250	150	83	125	187	See Note 3	✔	2	PWP	1.2	5	$\overline{EN}$	✔	✔	✔	✔	2.7	5.5	10 µF T	See TPS708xx[4]	1.20
TPS701xx	500	250	170	220	187	See Note 3	✔	2	PWP	1.2	5	$\overline{EN}$	✔	✔	✔	✔	2.7	5.5	10 µF T	See TPS702xx[4]	1.50
TPS767D3xx	1000	1000	350	350	85	3.3/2.5, 3.3/1.8	✔	2	PWP	1.5	5.5	$\overline{EN}$		✔			2.7	10	10 µF T	Dual Output Fast LDO with Integrated SVS	2.00
TPS703xx	1000	2000	160	190	185	See Note 3	✔	2	PWP	1.2	5.5	$\overline{EN}$	✔	✔	✔	✔	2.7	5.5	22 µF T	See TPS704xx[4]	2.35
TPPM0110	1500	300	1000	2500	1000	3.3/1.8		2	—	1.8	3.3	—					4.7	5.3	100 µF T	See TPPM0111 for 3.3-V/1.5-V Output	1.60

[1] *C = 陶瓷；T = 钽。*
[2] *1.8/2.85, 1.8/Adj., 2.8/2.8, 2.8/Adj., 2.85/2.85.*
[3] *3.3/2.5, 3.3/1.8, 3.3/1.5, 3.3/1.2.*
[4] *以独立的使能端替代集成电源顺序。*

*前瞻性器件以**粗体蓝色**标明。*
* *推荐零售价为每1000片时的美元价格。*

标准线性稳压器选择指南

Device	V_{OUT} (nom) (V)	V_{OUT}/V_{REF} Tol. Over Temp. (%)	I_{OUT} (max) (mA)	Min I_{OUT} for Regulation (mA)	I_q (max) (mA)	V_{DO} (typ) (V)	V_{DO} (max) (V)	V_{IN} (max) (V)	$V_{IN} - V_{OUT}$ (max) (V)	Price*
LM237, LM337	Adj. (–1.2 to –37)	4	1500	1.2, 1.5	—	—	3	—	–40	0.29
LM317, LM317M	Adj. (1.2 to 37)	4	1500, 500	3.5	—	—	3	—	40	0.27
MC79Lxx/A	–5, –12, –15	5, 10	100	—	6 to 6.5	1.7	2 to 2.5	–20, –27, –30	—	0.13
TL317	Adj. (1.2 to 35)	4	100	1.5	—	—	2.5	—	35	0.13
TL780-xx	5, 12, 15	2	1500	—	8	2	2 to 2.5	25, 30, 30	—	0.32
TL783	Adj. (1.25 to 125)	6	700	15	—	—	20	—	125	1.15
UA723	Adj. (2 to 37)	5 (25°C)	150	—	4	—	3	—	38	0.29
UA78Lxx/A	2.6, 5, 6.2, 8, 9, 10, 12, 15	5, 10	100	—	6 to 6.5	1.7	2 to 2.5	20 to 30	—	0.11
UA78Mxx	3.3, 5, 6, 8, 9, 12	5	500	—	6	2	2 to 2.5	25 to 30	—	0.25
UA78xx	5, 8, 10, 12, 15, 24	5	1500	—	8	2	2 to 3	25 to 38	—	0.23
UA79xx	–5, –8, –12, –15	5	1500	—	2	1.1	2 to 2.5	–25 to 30	—	0.25
UA79Mxx	–5, –8	5	500	—	2	1.1	2 to 2.5	–25	—	0.25

* *推荐零售价为每1000片时的美元价格。*

LDO控制器选择指南

Device	I_q (mA)	I_{drive} (max) (mA)	V_{IN} (max) (V)	V_{OUT} (min) (V)	Tolerance (%)	Shutdown	Short Circuit Limit Type	Comments	Price*
UC3832/3	3.3	100	40	2	2	Yes	Duty Cycle	Precise	2.50
UC3834	5.5	200	40	1.5	4	Yes	Foldback	High Efficiency	5.33
UC3835/6	3.75	250	40	5.0/2.5	2	Yes	Foldback	High Efficiency	3.05
UCC3837	1.2	500	12	1.5	1	No	Duty Cycle	8-Pin	1.95
LFC789D25	2	10	18	2.5	2	No	—	Dual	0.36

* *推荐零售价为每1000片时的美元价格。*

车载级LDO

Device	I_O (typ) (mA)
TPS769xx-Q1	100
TPS791xx-Q1	100
TPS792xx-Q1	100
TPS793xx-Q1	200
TPS766xx-Q1	250
TPS775xx-Q1	500
TPS776xx-Q1	500
TPS725xx-Q1	1000

Device	I_O (typ) (mA)
TPS767xx-Q1	1000
TPS768xx-Q1	1000
TPS751xx-Q1	1500
TPS753xx-Q1	1500
TPS752xx-Q1	2000
TPPM0110-Q1	1500/300
TPPM0111-Q1	1500/300

上表所框选器件符合AEC-Q100标准，适用于车载应用。其它附加器件可通过与TI联系购得。敬请参看先前页有关电子产品的详细描述。

资源 如需完备的资源列表，敬请访问power.ti.com

Literature Number	Description
Free Development Boards	
DEM-SOT23LDO	Compatible with most positive-output LDOs in the SOT23 (DBV) package
DEM-SOT223LDO	Compatible with most positive-output LDOs in the SOT223 (DCQ) package
Application Notes	
SLVA118	Digital Designer's Guide to Linear Regs and Thermal Management
SLVA072	Technical Review of LDO Operation and Performance
SLVA115	ESR, Stability and the LDO Regulator
SLVA119	Extending the Input Voltage Range of an LDO Regulator
SLUA256	Adjusting High Current LDOs down to 0.5-V Output Voltage
SLMA002	PowerPAD Thermally Enhanced Package Application Report
SLVA076	Supply Voltage Drop on Fast Current Demand
SLVA207	Understanding LDO Dropout

DC/DC控制器（外置开关）

设计因素

输入电压 — 电路板上或许需要多个电源电压值。驱动控制器IC需要一个电压值，同时电源转换部分需要另一个电压值。因此，需要针对系统的电流需求来选择最合适的电源电压值。

输出电压 — 通过使用电压分配器，输出电压可调节低至参考电压。

输出电流 — 输出电流通常由外置供电的MOSFET来设定。只要MOSFET驱动器能充分的驱动外置的FET，并行多个供电的MOSFET即可控制更高的电流。

效率 — 无效功率被转化成热能，因此更高的效率有助于改善散热问题。更大的电流会快速的生成更多的热耗，因此气流及板载空间是不得不考虑的问题。

精度 — 当今的高级处理器需要更好的精度以支持更低的核心电压。而对更精确的控制器的需求则是成本上的折衷。

保护特性 —因确保实现了控制器的保护特性，从而使单电路板上采用多个昂贵处理器及外设IC的应用在长期稳定性方面得到了改善。

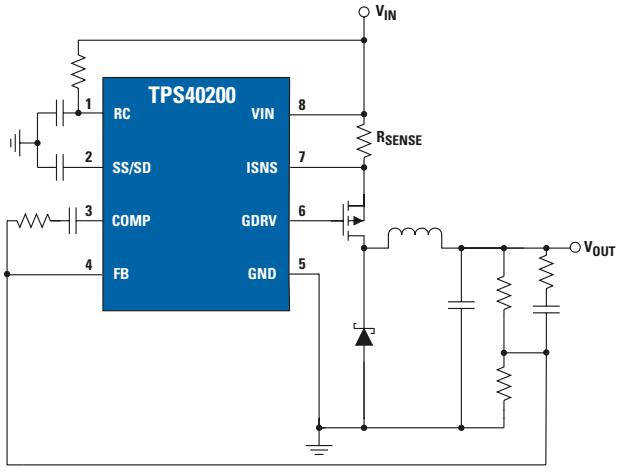
TPS40K™系列—设计软件可通过以下网址获取：
power.ti.com/40kswifttool

可提供设计软件

宽输入范围(4.5V至52V)的灵活、非同步降压控制器
TPS40200

敬请访问**www.ti.com/sc/device/TPS40200**，以获取样片、数据表及评估板。

TPS40200是灵活的非同步控制器，内置了200mA驱动器以用于P道沟FET。其电路工作电压可高达52V，并带有特色的功耗节省功能，可在外部FET完全开启状态下关闭驱动电流。此电路工作是带有电压模式的反馈，并前馈至输入电压补偿以实现对输入电压变化的即时响应。控制器的0.7V参考电压可1%微调(trimmed)，提供以控制低电压的高精度方法。TPS40200采用8引脚SOIC封装，支持更为复杂控制器的诸多特点



典型应用

资源 *如需完备的资源列表，敬请访问power.ti.com*

Part Number	Description	Price*
Evaluation Modules (EVMs)		
TPS40009EVM-001	TPS40009-Based 5-A Converter in Less Than One Square Inch	49
TPS40021EVM-001	Input Range 2.5 to 5.0 V, at 3.3 V_{IN} Steps Down to 1.5 V at 20 A	49
TPS40041EVM-001	A 5-V Input, 1.8-V Output, 6-A Synchronous Buck Converter	49
TPS40055EVM-001	TPS40055-Based Design Converts Bus from 12 to 1.8 V at 15 A	49
TPS40060EVM	10 to 55 V_{IN}, 4-A, 3.3-V Output Synchronous Buck Converter	49
TPS40075EVM-001	8-V to 14-V Input , 1.5 V @ 15-A Synchronous Buck Converter	49
TPS40090EVM-001	Multiphase Buck Converter: 12 to 1.5 V at 100 A w/UCC27222 Drivers	49
TPS40100EVM-001	A 12-V Input, 3.3-V Output, 10-A Synchronous Buck Converter	49
TPS40130EVM-001	12-V_{IN}, 1.5-V_{OUT}, 40-A Two-Phase Synchronous Buck Converter	49
TPS40140EVM-002	3.3 V @ 20 A and 1.8 V @ 20 A 2-Phase Stackable Converter	49
TPS40190EVM-001	A 12-V Input, 1.5-V Output, 10-A Synchronous Buck Converter	49
TPS40200EVM-001	8-V to 16-V, 3.3-V Output, 2.5-A Non-synchronous Buck Converter	49
TPS40200EVM-002	18-V to 36-V, 3.3-V Output, 2.5-A Non-synchronous Buck Converter	49
TPS51020EVM-001	Highly Efficient Dual DDR Selectable EVM	49
TPS5124EVM-001	V_{IN} (6.5- to 15-V) 12-V Step-Down to Dual 2.0-V Outputs @ 6 A	49
TPS51116EVM-001	4.5-V to 28-V Input Switcher and 3-A LDO for DDR Memory	49
TPS51117EVM	10-A Synchronous Buck Controller with D-CAP Mode	49
TPS51124EVM-001	High Efficiency Dual Synchronous Buck Converter	49
TPS51120EVM-001	8-V to 25-V Input, 5/3.3-V Output, 6 A Each Channel	99

* *建议零售价为美元价格。*

*新评估板以**粗体红色**标明。*

Literature Number	Description
Application Notes	
SLUA285	Predictive Gate Drive™—Frequently Asked Questions
SLUA310	TPS4005x & TPS4006x Effect of Programmable UVLO
SLUA311	TPS40050 Module Using the UCC39002 Load-Share Controller
SLUA343	Improved Voltage Feed Forward with TPS4005x/6x/7x Controllers

DC/DC控制器（外置开关）

选择指南

Device	V_{IN} (V)	V_O (max) (V)	V_O (min) (V)	V_{REF} Tol (%)	Driver Current (A)	Output Current (A)[1]	Multiple Outputs	Frequency (kHz)	Protection[2] SCP	OVP	UVLO	Application[3] PG	Non-Sync	Source/Sink	Prebias Operation	Sync	PGD	DDR	Remote Sense	Price*
General-Purpose DC/DC Controllers																				
TPS40007/9	2.25 to 5.5	4	0.7	1.5	1	15	No	300/600	✔		✔			✔	✔		✔			0.99
TPS40021	2.25 to 5.5	4	0.7	1	2	25	No	Adj. to 1 MHz	✔		✔	✔		✔		✔	✔			1.15
TPS40040/41	2.25 to 5.5	4.95	0.60	1	1	15	No	300/600	✔		✔			✔	✔					0.65
TPS40056	8 to 40	35	0.7	1	1	20	No	Adj. to 1 MHz	✔		✔			✔		✔		✔		1.35
TPS40057	8 to 40	35	0.7	1	1	20	No	Adj. to 1 MHz	✔		✔				✔	✔				1.35
TPS40061	10 to 55	40	0.7	1	1	10	No	Adj. to 1 MHz	✔		✔			✔						1.40
TPS40075	4.5 to 28	23	0.7	1	1	20	No	Adj. to 1 MHz	✔		✔	✔		✔	✔	✔	✔		✔	1.35
TPS40077	4.5 to 28	23	0.7	1	1	20	No	Adj. to 1 MHz	✔		✔	✔		✔	✔	✔	✔			1.35
TPS40100/101 (Sequencing)	4.5 to 18	6	0.7	0.6	1.3	20	No	Adj. to 600/1000	✔		✔	✔		✔	✔	✔				1.45
TPS40190/91	4.5 to 15	12.75	0.59	1	1.2	20	No	300/600	✔		✔			✔	✔					0.99
TPS40200	4.5 to 52	46	0.7	2	0.2	3	No	Adj. to 500	✔		✔		✔			✔				0.55
TPS5124	4.5 to 15	12	0.85	1	2	20	2	500	✔	✔	✔			✔						2.15
Multiphase DC/DC Controllers																				
TPS40090	4.5 to 15	3.3	0.7	1	—	30 per phase	No	Adj. to 1 MHz	✔		✔	✔		✔	✔	✔				1.90
TPS40091 (w/Tristate) (Up to 4 phase)	4.5 to 15	3.3	0.7	1	—	30 per phase	No	Adj. to 1 MHz	✔		✔	✔		✔	✔	✔				1.90
TPS40120 (VID DAC)	4.5 to 5.5	1.6	0.8375	0.3	—	—	—	Adj. to 1 MHz												0.49
TPS40130 (2 phase)	3.0 to 40	4	0.7	1	1.2	30 per phase	No	Adj. to 1 MHz	✔	✔	✔	✔		✔		✔		✔	✔	2.15
TPS40140	2.0 to 40	5.8	0.7	1	1.2	Note 4	2	Adj. to 1 MHz	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	3.05
TPS40180	2.0 to 40	5.8	0.7	0.5	1.2	Note 5	1	Adj. to 1 MHz	✔	✔	✔	✔		✔	✔	✔	✔		✔	1.75
DC/DC Controllers with Light Load Efficiency																				
TPS51020	4.5 to 28	5.5	0.85	1	2	20	2 + 1	270, 360, 450	✔	✔	✔	✔	Dual, DDR selectable w/skip mode					✔		2.40
TPS5110	4.5 to 28	3.5	0.9	1	1.5	15	1 + 1	Up to 500	✔	✔	✔	✔	Single buck w/NMOS LDO controller							2.35
TPS51116	3 to 28	3.0	1.5	1	0.8	10	1 + 1	Up to 400	✔	✔	✔	✔	Sync switcher w/3-A tracking LDO, needs 5-V bias					✔		1.20
TPS51117	1.8	5.5	0.75	1	3	10	1	Up to 550	✔	✔	✔	✔	Single buck, needs 5-V bias							0.80
TPS51120	4.5 to 28	5.5	2	1	3	20	2 + 1 + 1	270, 330, 430, 580	✔	✔	✔	✔	Dual buck with 5-V/3.3-V LDOs							2.50
TPS51124	3 to 28	5.5	0.76	1	3	10	2	300, 360, 420	✔	✔	✔	✔	Dual buck, needs 5-V bias							2.25
TPS5130	4.5 to 28	5.5	0.9	1.5	1.5	15	3 + 1	Up to 500	✔	✔	✔	✔	Triple buck w/NMOS LDO controller							3.65
TPS51511	3.0 to 28	3.3	0.75	1	0.8	10	1 + 1	Up to 550	✔	✔	✔	✔	Single buck with 2-A LDO, needs 5-V bias							1.75
DC/DC Controllers (Without Drivers)																				
TL1451A	3.6 to 50	50	2.5	4	0.02	—	2	500			✔		Dual PWM buck/boost							0.95
TL5001A	3.6 to 40	50	1	3	0.02	—	No	400			✔		PWM buck boost, typ. ref. voltage tolerance ±3%							0.55
Other Topology DC/DC Controllers																				
TPS43000	1.8 to 9	8	0.8	2	1.25	7	No	2 MHz	✔	✔	✔	✔	High-frequency, buck, boost, or sepic controller							2.10
TPS64200	1.8 to 6.5	6.5	1.2	—	—	3	No	—	✔		✔		Simple, hysteretic high-efficiency controller in SOT-23							0.55
UC3572	4.75 to 30	0	–48	2	0.5	5	No	300	✔		✔		Simple inverting PWM controller							1.05

*新器件以**粗体红色**标明。*
*前瞻性器件以**粗体蓝色**标明。*

[1] *可支持此量级电流电平。*
[2] *SCP = 短路保护，OVP = 过压保护，UVLO = 低压锁定。*
[3] *为绝大多数应用所选择的控制器均为馈送/接受(source/sink)版本，可实现2象限(two-quadrant)运转并馈送或接收输出电流。PG = 供电良好；PGD = 包含了预测门驱动(Predictive Gate Drive™)技术；DDR = 支持DDR内存。*
[4] *可堆叠(Stackable)至16相位。*
[5] *可堆叠至8相位。*
[*] *推荐零售价为每1000片时的美元价格。*

DC/DC转换器（集成开关）

设计软件可访问 power.ti.com 获取

设计因素

效率及解决方案尺寸 — 如需同时实现最高转换效率及最小化的解决方案尺寸，那么推荐你使用带内置开关的感应开关转换器。

TI的低功耗DC/DC转换器系列(TPS6xxxx)以及SWIFT™ (TPS54xxx)负载点步降DC/DC转换器可实现97%的峰值效率。同步整流不仅取代了所需的外部肖特基整流二极管，同时还使转换器效率的提升高达10%。更高的效率意味着电池驱动应用中延长的运转时间，并降低了大电流应用中的功率损耗，也放宽了对散热设计的要求。因外部仅需电阻、电容及单个电感支持工作，集成的高侧及低侧开关FET就有效的降低了板载空间。取决于不同的输出电流，DC/DC转换器可采用如下封装模式：CSP(800mA)、SOT-23 (400mA)、QFN-10(1.2A) 以及TSSOP-28(13A)，从而更减小了解决方案的尺寸。

输出电流 — TPS6xxxx系列的输出电流典型受限于集成FET的尺寸，并且对于最小输入电压（电池系统的放电结束电压）来说是额定的。TPS54xxx系列输出电流指示为连续可用的输出电流；可实现更高的峰值电流以确保高性能DSP、FPGA及ASIC系统启动时能有适合的供电。对于增压转换器来说，数据表详细说明了内置开关的电流限制。可通过以下方程实现对输出电流的粗略估计：

$$I_{OUT} = 0.65 \times I_{Switch(min)} \times (V_{IN}/V_{OUT})$$

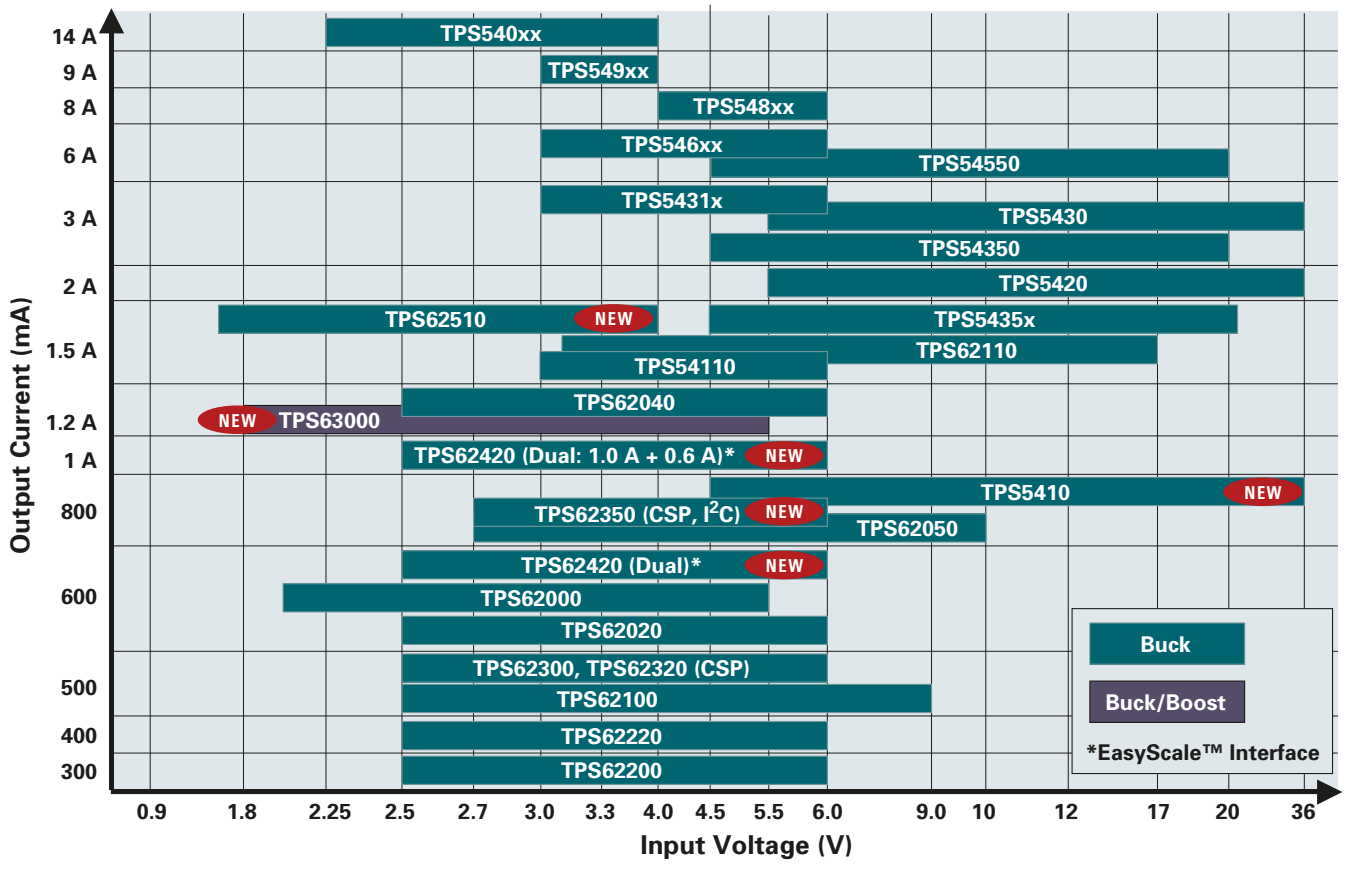
对于输出电流低于300mA及效率低于90%的情况，无电感充电泵DC/DC稳压器会是一个成本及空间效益的选择。（参见39-40页）

输入电压 — DC/DC转换器能工作于宽范围的输入源，包括供电模块、插头式电源（wall supply，或称墙式电源）以及电池。TPS6xxxx系列及其小外形封装、低静态工作电流都已经为低功耗电池驱动应用做了最优化。对于电池驱动系统来说，输入电压随着电池放电过程而大范围的变动。因此，转换器的选择就必须取决于所给定的电池工艺水平及数量。

TPS54xxx SWIFT™系列可工作于预调节24V、12V、5V或3.3V的总线电压。

输出电压 — 当前的高级DSP、FPGA及ASIC芯片对电源电压值的需求有所降低。为实现最大的灵活性，固定的或是低至0.7V的可调节输出电压都必须支持。TPS61xxx允许输入电压步升(step-up)至最高28V。

DC/DC 步降式转换器（集成开关）产品系列



96%高效降压--升压转换器

TPS63000

NEW

敬请访问**www.ti.com/TPS63000**，以获取样片、数据表、评估板及相关应用报告。

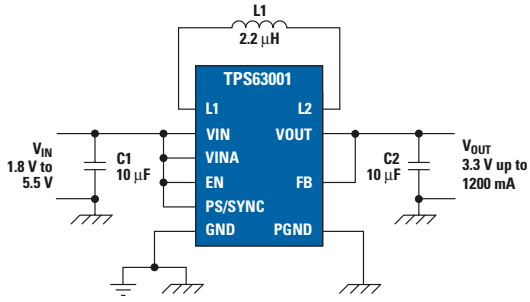
TPS63000降压-增压DC/DC转换器可提供跨越1.8V至5.5V宽电压范围内高达96%的峰值效率。是单锂电池或2/3个碱性电池供电应用的理想选择。

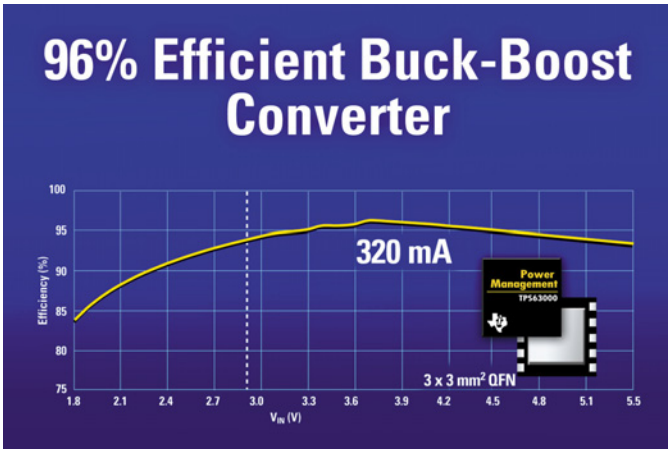
主要特点

- 输入电压：1.8至5.5 V
- 输出电压：1.2至5.5 V
- 输出电流开关：1.7 A
  - 3.3V降压配置时，输出电流最高可达1200mA
  - 3.3V升压配置时，输出电流最高可达800mA
- 效率：96%（最大值），跨越宽输入电压(V_{IN})范围
- 步降(step-down)及升压(boost)模式间可自动转换
- 器件静态电流小于25 µA
- 最小化解决方案尺寸，仅需一个2.2 µH电感
- 封装模式： 3mm x 3mm QFN

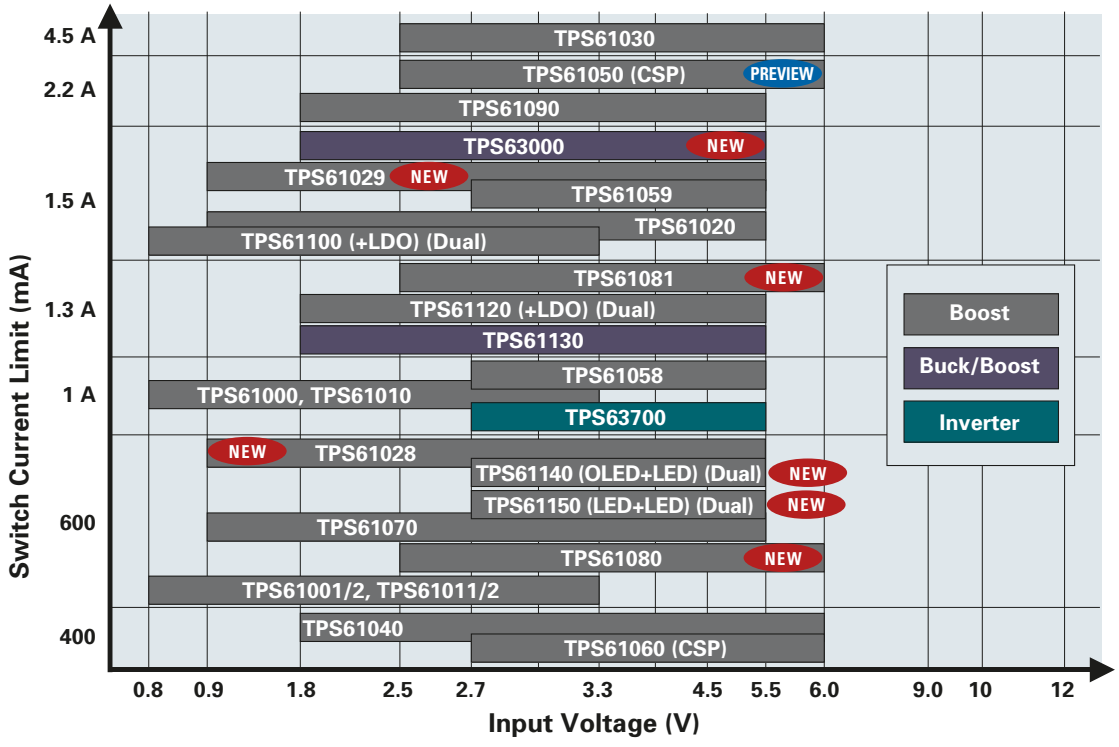
应用

- 硬盘驱动器
- 移动电话的动态PA控制
- 数字媒体播放器
- PDA
- 移动电话/智能电话
- 数码相机, 便携式摄像机
- 人体医学产品
- 工业计量设备





DC/DC步升转换器（集成开关）产品系列



DC/DC转换器（集成开关）

资源 如需完备的资源列表，敬请访问power.ti.com

Literature Number	Description
Application Notes	
SLEA004	Extending Battery Life with the TPS61040 White Light LED Driver
SLUA271	QFN/SON PCB Attachment Application Note
SLUA272	High Voltage Power Supply Using the TPS61040
SLUP100	Snubber Circuits Theory, Design and Application
SLVA006	Maximum Output Current of TPS62050
SLVA007	Sequencing with TPS54x80 and TPS54x73 SWIFT DC/DC Converters
SLVA107	Designing for Small-Size, High-Frequency Applications with SWIFT™ Regulators
SLVA113A	Optimizing the Layout of the TPS5461x for Thermal Performance
SLVA117	Dual Output Power Supply Sequencing for High Performance Processors
SLVA122	White Light LED Driver With Gradual Dimming
SLVA123	DVS For OMAP1510 Using TPS62200
SLVA125	TPS61042 White Light LED Driver Boost Converter
SLVA126	SWIFT Regulators w/Ceramic Output Caps Worst Case Analysis and Measurement
SLVA131	TPS61042 Dual Li-Ion and Higher Input Voltages
SLVA134	Adjusting the Output Voltage of Fixed-Voltage SWIFT Devices
SLVA159A	Using 3.3-V Signals for Spartan™-3 Configuration and JTAG Ports
SLVA201	Thermal Performance of SWIFT DC/DC Converters in 28-Pin HTSSOP Package
SLVA202	Low Voltage SWIFT DC/DC Converters Pin Compatibility
SLVA203	Using TPS54x80 Tracking SWIFT DC/DC Converters for Simultaneous Tracking of Input Supply
SLVA212	Limitations of Slew Rate on the REFIN Pin of the TPS54x72 Family
SLVA215	Optimizing the Layout of TPS546xx for Thermal Performance (Chinese)
SLVA237A	Using TPS5410/20/30/31 with Aluminum/Ceramic Output Capacitors
SLVA257	Using the TPS5430 as an Inverting Buck Boost Converter

*新应用手册以**粗体红色**标明。*

选择指南

Device	I_{OUT} (mA)	V_{IN} (V)	V_{OUT} (V)	Max Frequency (kHz)	Power Good	Enable	Current Limit	Thermal Shutdown	Sync Pin	Adj. Soft Start	EVM	Package	Comments	Price*
SWIFT™ Synchronous Step-Down (Buck) Regulators — Up to 14 A														
TPS54110	1500	3.0 to 6.0	Adj. to 0.9	700	✔	✔	✔	✔	✔	✔	✔	20 HTSSOP	Adjustable Output Only	2.00
TPS5410	1000	5.5 to 36	Adj. to 1.23	500		✔	✔	✔			✔	8 SOIC	Non-synchronous Buck	1.60
TPS40222	1600	4.5 to 8.0	Adj. to 0.8	1250			✔	✔			✔	6 SON	Non-synchronous Buck	0.70
TPS5420	2000	5.5 to 36	Adj. to 1.23	500		✔	✔	✔			✔	8 SOIC	Non-synchronous Buck	1.70
TPS5430	3000	5.5 to 36	Adj. to 1.23	500		✔	✔	✔			✔	8 HSOIC	Non-synchronous Buck	1.85
TPS54350/2/3/4/5/6/7	3000	4.5 to 20	Adj. and fixed	700	✔	✔	✔	✔	✔		✔	16 HTSSOP	Sync. or Non-sync. Buck	2.05
TPS54310/1/2/3/4/5/6	3000	3.0 to 6.0	Adj. and fixed	700	✔	✔	✔	✔	✔	✔	✔	20 HTSSOP	Adj., 0.9, 1.2, 1.5, 1.8, 2.5, 3.3 V	2.35
TPS54317	3000	3.0 to 6.0	Adj. to 0.9	1600	✔	✔	✔	✔	✔	✔	✔	24 QFN	Output Voltage (0.9 to 0.9 x V_{IN})	2.50
TPS54372	3000	3.0 to 6.0	Adj. to 0.2	700	✔	✔	✔	✔			✔	20 HTSSOP	Active Bus Termination/DDR	2.35
TPS54380	3000	3.0 to 6.0	Adj. to 0.9	700	✔	✔	✔	✔			✔	20 HTSSOP	Sequencing (TRACKIN pin)	2.35
TPS54550	6000	4.5 to 20	Adj. to 0.9	700	✔	✔	✔	✔	✔	✔	✔	16 HTSSOP	Sync. or Non-sync. Buck	2.95
TPS54610/1/2/3/4/5/6	6000	3.0 to 6.0	Adj. and fixed	700	✔	✔	✔	✔	✔	✔	✔	28 HTSSOP	Adj., 0.9, 1.2, 1.5, 1.8, 2.5, 3.3 V	3.35
TPS54672	6000	3.0 to 6.0	Adj. to 0.2	700	✔	✔	✔	✔			✔	28 HTSSOP	Active Bus Termination/DDR	3.35
TPS54680	6000	3.0 to 6.0	Adj. to 0.9	700	✔	✔	✔	✔			✔	28 HTSSOP	Sequencing (TRACKIN pin)	3.35
TPS54810	8000	4.0 to 6.0	Adj. to 0.9	700	✔	✔	✔	✔	✔	✔	✔	28 HTSSOP	Adjustable Output Only	3.95
TPS54872	8000	4.0 to 6.0	Adj. to 0.2	700	✔	✔	✔	✔			✔	28 HTSSOP	Active Bus Termination/DDR	3.95
TPS54880	8000	4.0 to 6.0	Adj. to 0.9	700	✔	✔	✔	✔			✔	28 HTSSOP	Sequencing (TRACKIN pin)	3.95
TPS54910	9000	3.0 to 4.0	Adj. to 0.9	700	✔	✔	✔	✔	✔	✔	✔	28 HTSSOP	Adjustable Output Only	4.20
TPS54972	9000	3.0 to 4.0	Adj. to 0.2	700	✔	✔	✔	✔			✔	28 HTSSOP	Active Bus Termination/DDR	4.20
TPS54980	9000	3.0 to 4.0	Adj. to 0.9	700	✔	✔	✔	✔			✔	28 HTSSOP	Sequencing (TRACKIN pin)	4.20
TPS54010	14000	2.25 to 4.0	Adj. to 0.9	700	✔	✔	✔	✔	✔	✔	✔	28 HTSSOP	Dual Input Bus (2.5, 3.3 V)	5.30

* *推荐零售价为每1000片时的美元价格。*

*新器件以**粗体红色**标明。*

选择指南（续）

Device	I_{OUT} (mA)	Switch Current Limit (typ) (mA)	V_{IN} (V)	V_{OUT} Adj. (V)	V_{OUT} Fixed (V)	Peak Efficiency (%)	Switching Frequency (typ) (kHz)	Recommended Inductor Size (µH)	Quiescent Current (typ) (mA)	Shutdown Current (typ) (µA)	Low Battery	Power Good	Undervoltage Lockout	Thermal and/or Short-Circuit Protection	Package: Chipscale (WCSP)	Package: SOT-23	Package: MSOP	Package: QFN	Package: SOIC	EVM	Price*
Low-Power Step-Down (Buck) Regulators — Small, Efficient, Low I_q																					
TPS62200	300	670	2.5 to 6.0	0.7 to 6.0	—	97	1000	10	0.015	0.1			✔	✔		6				✔	1.20
TPS62201/2/3/4	300	670	2.5 to 6.0	—	1.5/1.8/3.3/1.6	97	1000	10	0.015	0.1			✔	✔		6				✔	1.35
TPS62205/7/8	300	670	2.5 to 6.0	—	2.5/1.2/1.875	97	1000	10	0.015	0.1			✔	✔		6					1.35
TPS62220	400	880	2.5 to 6.0	0.7 to 6.0	—	95	1250	4.7	0.015	0.1			✔	✔		6				✔	1.40
TPS62221/2/3/4	400	880	2.5 to 6.0	—	1.5/1.8/2.3/1.6	95	1250	4.7	0.015	0.1				✔		6				✔	1.50
TPS62228/9	400	880	2.5 to 6.0	—	1.875/1.7	95	1250	4.7	0.015	0.1				✔		6				✔	1.50
TPS62400	400/600	800/1000	2.6 to 6.0	0.6 to 6.0	1.1/1.6	95	2250	2 x 3.3	0.030	0.1								10			2.70
TPS62100/1/2/3	500	—	2.5 to 9.0	0.8 to 8.0	—	92	2000	10	0.625	1				✔					8	✔	1.90
TPS62300	500	740	2.5 to 6.0	0.6 to 5.4	—	90	3000	1	0.086	0.1			✔	✔	8			10		✔	1.85
TPS62301/2/3/5	500	740	2.5 to 6.0	—	1.5/1.6/1.8/1.875	93	3000	1	0.086	0.1			✔	✔	8			10		✔	1.95
TPS62320	500	740	2.5 to 6.0	0.6 to 5.4	—	90	3000	1	0.086	0.1			✔	✔	8			10		✔	1.95
TPS62321	500	740	2.5 to 6.0	—	1.5	93	3000	1	0.086	0.1			✔	✔	8			10		✔	1.95
TPS62000	600	1600	2.0 to 5.5	0.8 to 5.0	—	95	750	10	0.05	0.1	✔	✔	✔	✔	8		10			✔	1.30
TPS62001/2/3/4	600	1600	2.0 to 5.5	—	0.9/1/1.2/1.5	95	750	10	0.05	0.1	✔	✔	✔	✔			10				1.40
TPS62005/6/7/8	600	1600	2.0 to 5.5	—	1.8/2.5/3.3/1.9	95	750	10	0.05	0.1	✔	✔	✔	✔			10			✔	1.40
TPS62020/1	600	1100	2.5 to 6.0	0.7 to 6.0	—	95	1250	6.2	0.018	0.1			✔	✔			10	10		✔	1.60
TPS62026	600	1100	2.5 to 6.0	—	3.3	95	1250	6.2	0.018	0.1			✔	✔			10	10		✔	1.60
TPS62420	600/1000	1000/1400	2.6 to 6.0	0.6 to 6.0	1.1/1.6	95	2250	2 x 3.3	0.030	0.1								10		✔	2.95
MC34063A	750	1500	3 to 40	1.25 to 33	—	—	100	—	2.7	—								8	8	✔	0.39
TPS62050	800	1400	2.7 to 10.0	0.7 to 6.0	—	95	850	10	0.012	1.5	✔	✔	✔	✔			10			✔	1.85
TPS62051	800	1400	2.7 to 10.0	0.7 to 6.0	—	95	850	10	0.012	1.5	✔	✔	✔	✔			10				1.85
TPS62052/4/6	800	1400	2.7 to 10.0	—	1.5/1.8/3.3	95	850	10	0.012	1.5	✔	✔	✔	✔			10			✔	1.85
TPS62350	800	1300	2.7 to 6.0	0.75 to 1.5375	—	95	3000	1.0	0.030	0.1			✔	✔	12			10		✔	2.15
TL2575/HV	1000	3200	4.75 to 40/60	1.25 to 38/58	3.3, 5, 12, 15	88	52	330	5	50										✔	0.96/2.45
TPS62040	1200	2000	2.5 to 6.0	0.7 to 6.0	—	95	1250	6.2	0.018	0.1			✔	✔			10	10		✔	1.90
TPS62042/3/4/6	1200	2000	2.5 to 6.0	—	1.5/1.6/1.8/3.3	95	1250	6.2	0.018	0.1			✔	✔			10	10		✔	1.90
TPS62110	1500	2400	3.1 to 17	1.2 to 16	—	95	1000	6.8	0.018	1.5	✔	✔	✔	✔				16		✔	2.50
TPS62111/2	1500	2400	3.1 to 17	—	3.3/5	95	1000	6.8	0.018	1.5	✔	✔	✔	✔				16		✔	2.50
TPS62510	1500	2000	1.6 to 3.8	0.6 to 3.8	—	97	1500	2.2	0.018	0.1								10		✔	2.50
TPS63000	1200	1700	1.8 to 5.5	1.2 to 5.5	—	96	1500	2.2	0.030	0.1			✔	✔				10		✔	2.75
TPS63001/2	1200	1700	1.8 to 5.5	—	3.3/5	96	1500	2.2	0.030	0.1			✔	✔				10		✔	2.75

* 推荐零售价为每1000片时的美元价格。

新器件以**粗体红色**标明。

DC/DC转换器（集成开关）

选择指南（续）

Device	I_{OUT} (mA)[1]	Switch Current Limit (typ) (mA)	V_{IN} (V)	V_{OUT} Adj. (V)	V_{OUT} Fixed (V)	Peak Efficiency (%)	Switching Frequency (typ) (kHz)	Recommended Inductor Size (µH)	Quiescent Current (typ) (mA)	Shutdown Current (typ) (µA)	Integrated LDO I_{OUT} (mA)/ V_{OUT} (V)	Low Battery	Power Good	Undervoltage Lockout	Thermal and/or Short-Circuit Protection	Package: SOT-23	Package: MSOP	Package: QFN	Package: TSSOP	Package: SOIC	EVM	Price*
Step-Up Regulators — Up to 4.5-A Switch Limit																						
TPS6734	120	—	2.7 to 12	—	12	86	170	18	1.2	3	—				✔					8	✔	1.25
TPS61041	50	250	1.8 to 6.0	V_{IN} to 28	—	87	1000	10	0.028	0.1	—			✔	✔	6					✔	0.75
TPS61040	90	400	1.8 to 6.0	V_{IN} to 28	—	87	1000	10	0.028	0.1	—			✔	✔	6					✔	0.95
TPS61045	100	450	1.8 to 6.0	V_{IN} to 28	—	85	1000	4.7	0.035	1	—			✔	✔			8			✔	1.35
TPS61011/2/3	100	480/560/930	0.8 to 3.3	—	1.5/1.8/2.5	95	500	10	0.036	1	—	✔		✔	✔		10					1.10
TL497A	—	500	4.5 to 12	(V_{IN} + 2) to 30	—	85	—	—	11	6000	—								14	14		0.86
TPS61001/2/3	100	500/650/900	0.8 to 3.3	—	1.5/1.8/2.5	85	500	33	0.05	0.2	—	✔		✔			10					0.95
TPS61080/1	—	500/1200	2.5 to 6.0	V_{IN} to 27	—	85	1200	4.7	—	—	—				✔			10			✔	1.65
TPS61070/71	150	600	0.9 to 5.5	1.8 to 5.5	—	90	1200[2]	4.7	0.019	0.1	—			✔	✔	6						0.95
TPS65130	700	800	2.7 to 5.5	15/–15	—	89	1380	4.7	0.5	0.2	—			✔	✔			24			✔	2.95
TPS61004/5/6	200	950/1000/1100	0.8 to 3.3	—	2.8/3/3.3	85	500	33	0.05	0.2	—	✔		✔			10					0.95
TPS61014/5/6	200	1010/1060/1130	0.8 to 3.3	—	2.8/3/3.3	95	500	10	0.036	1	—	✔		✔	✔		10					1.10
TPS61000	200	1100	0.8 to 3.3	1.5 to 3.3	—	85	500	33	0.05	0.2	—	✔		✔			10				✔	0.95
TPS61007	200	1100	0.8 to 3.3	1.5 to 3.3	—	85	500	33	0.05	0.2	—	✔		✔			10					0.95
TPS61010	200	1130	0.8 to 3.3	1.5 to 3.3	—	95	500	10	0.036	1	—	✔		✔	✔		10				✔	1.10
MC34063A	750	1500	3 to 40	3 to 39.5	—	—	100	—	2.7	—	—				✔			8		8	✔	0.39
TPS61020	500	1500	0.9 to 5.5	1.8 to 5.5	—	96	720	6.8	0.025	0.1	—	✔		✔	✔			10			✔	1.40
TPS61024/5/7	500	1500	0.9 to 5.5	1.8 to 5.5	3/3.3/5	96	720	6.8	0.025	0.1	—	✔		✔	✔			10				1.40
TPS65131	700	2000	2.7 to 5.5	15/–15	—	88	1380	4.7	0.5	0.2	—			✔	✔			24			✔	2.95
TPS61090	700	2200	1.8 to 5.5	1.8 to 5.5	—	96	600	6.8	0.02	0.1	—	✔		✔	✔			16			✔	1.70
TPS61091/2	700	2200	1.8 to 5.5	—	3.3/5	96	600	6.8	0.02	0.1	—	✔		✔	✔			16				1.70
TPS61030	1000	4500	1.8 to 5.5	1.8 to 5.5	—	96	600	6.8	0.02	0.1	—	✔		✔	✔			16	16		✔	2.10
TPS61031/2	1000	4500	1.8 to 5.5	—	3.3/5	96	600	6.8	0.02	0.1	—	✔		✔	✔			16	16		✔	2.10
TL3577	3000	6000	3 to 40	V_{IN} to 60	—	80	100	100	9	—	—									✔		3.15
Step-Up (Boost) Regulators with Integrated LDO																						
TL499A	100	—	1.1 to 10	2.9 to 30	—	85	—	—	—	15	100/Adj.											0.90
TPS61120	500	1300	1.8 to 5.5	2.5 to 5.5	—	95	500	10	0.04	0.2	200/Adj.	✔	✔	✔	✔			16	16		✔	1.95
TPS61121/2	500	1300	1.8 to 5.5	—	3.3/3.6	95	500	10	0.04	0.2	200/1.5, 3.3	✔	✔	✔	✔			16	16		✔	1.95
TPS61100	200	1500	0.8 to 3.3	1.5 to 5.5	—	95	500	10	0.065	0.5	120/Adj.	✔	✔	✔	✔			24	20		✔	1.85
TPS61103/6/7	200	1500	0.8 to 3.3	—	3.3/3.3/3.3	95	500	10	0.065	0.5	120/Adj., 1.5, 1.8	✔	✔	✔	✔			24	20		✔	1.85
Buck-Boost Regulators																						
TL497A	—	500	4.5 to 12	1.2 to (V_{IN}–1)	—	85	—	—	11	6000	—								14	14		0.86
TPS61130	300	1300	1.8 to 5.5	2.5 to 5.5	—	90	500	10	0.04	0.2	200/Adj.	✔	✔		✔			16	16		✔	2.05
TPS61131/2	300	1300	1.8 to 5.5	—	3.3/3.3	90	500	10	0.04	0.2	200/1.5, 3.3	✔	✔		✔			16	16			2.05
MC34063A	750	1500	3 to 40	3 to 39.5	—	—	100	—	2.7	—	—				✔			8		8	✔	0.39
TPS63000	1200	1700	1.8 to 5.5	1.2 to 5.5	3.3/5.0	90	1800	2.2	0.030	0.1	—				✔			10			✔	2.75
Inverting Regulators																						
TPS6735	200	—	4 to 6.2	—	–5.0	78	160	10	1.9	1	—			✔						8		1.25
TPS6755	200	—	2.7 to 9	Yes	—	78	160	10	1.9	1	—				✔					8		1.25
TL497A	—	500	4.5 to 12	–1.2 to –25	—	85	—	—	11	6000	—								14	14		0.86
TPS65130	700	800/2000	2.7 to 5.5	15/–15	—	89	1380	4.7	0.5	0.2	—			✔	✔			24			✔	2.95
TPS65131	700	800/2000	2.7 to 5.5	15/–15	—	81	1380	4.7	0.5	0.2	—			✔	✔			24			✔	2.95
TPS63700	360	1000	2.7 to 5.5	–2 to –15	—	84	1400	4.7	—	0.014	—							10			✔	2.35
MC34063A	750	1500	3 to 38	–1.25 to –36.3	—	—	100	—	2.7	—	—				✔			8		8	✔	0.39
TL2575/HV	350	3200	4.75 to 25/45	–1.25 to –35/55	–5/–12/–15	88	52	330	5	50	—				✔							0.96/2.45

[1] 对于增压转换器来说， I_{OUT}可如下估算：0.65 x 开关限制电流 x (V_{IN}/V_{OUT})。
[2] PWM/PFM (TPS61070)；仅PWM(TPS61071)。
* 推荐零售价为每1000片时的美元价格。

新器件以**粗体红色**标明。

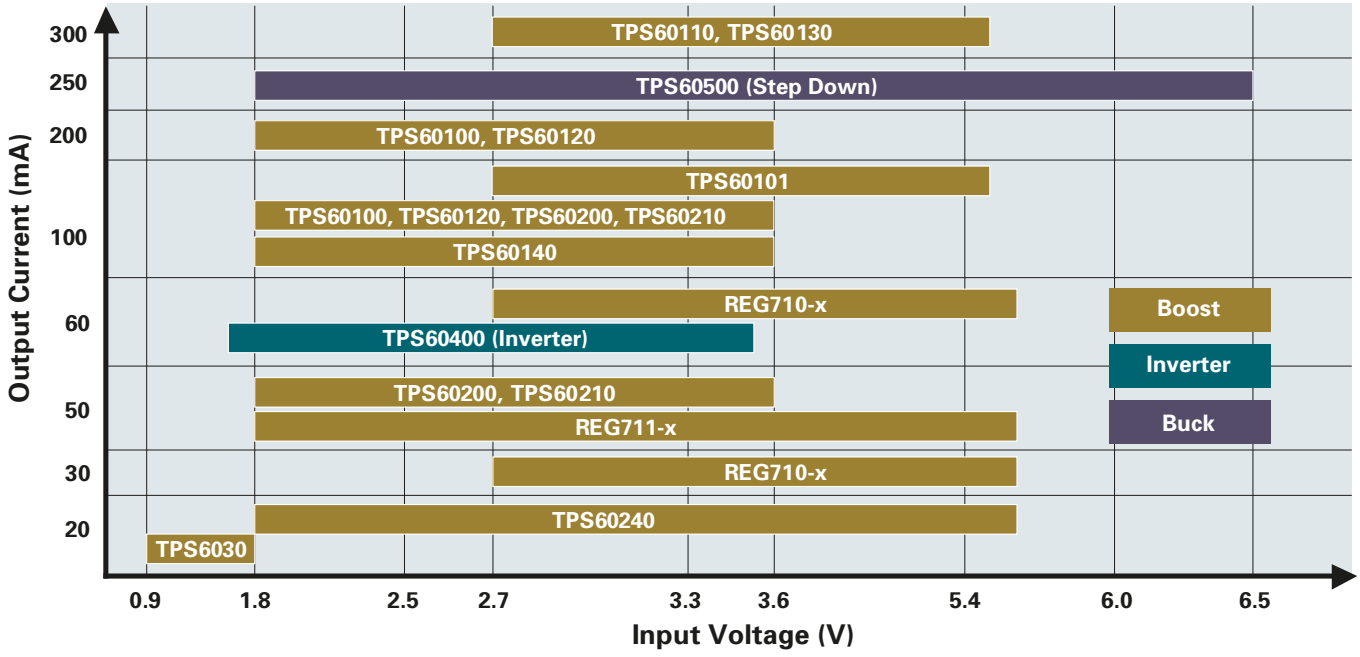
设计因素

效率及解决方案尺寸 — 当需要对效率及解决方案尺寸做折衷的时候，使用充电泵是推荐的选择。更高的效率意味着电池驱动应用中更长的运转时间。充电泵可达到90%的峰值效率，且典型的仅需少量电容支持运转，而无需电感、二极管或FET。充电泵采用诸如SOT-23及MSOP-8的小外形封装，更大程度上降低了解决方案尺寸。

输出电流 — 充电泵转换器可用于支持小尺寸、能源效益及成本效益型DC/DC解决方案（输出电流小于300mA、输出电压大于6V）。如需更大输出电流、更高输出电压或更高的效率，推荐使用感应开关转换器以获得更优的成本效益及空间效益。（参见32-38页）

输出纹波及噪声 — TI的充电泵产品通过使用一对带180度相位切换的集成充电泵环路，使得其输出电压纹波降至最低，从而无需在输出端添加滤波器的。与同等额定输出电流感应开关转换器相比，充电泵还趋向于更小的噪声。这对于射频敏感型或低噪声的应用是很重要的。

无电感DC/DC稳压器（充电泵）产品系列



资源 *如需完备的资源列表，敬请访问power.ti.com*

Literature Number	Description
Application Notes	
SLVA082	Powering the TMS320VC5402 DSP Using the TPS60100, TPS76918, and the TPS3305-18
SLVA070A	TPS6010x/TPS6011x Charge Pump
SLVA098	Additional Negative Output with TPS601xx
SLVA099	Improved Start-up Performance for Charge Pumps TPS6030x
SLVA128	Optimizing Output Voltage Ripple for the REG710
SLVA133	TPS6031x Evaluation Using the TPS6030xEVM

无电感DC/DC稳压器（充电泵）

选择指南

Device	I_{OUT} (mA)	V_{IN} (V)	V_{OUT} Adj. (V)	V_{OUT} Fixed (V)	Efficiency (%)	Switching Frequency (max) (kHz)	Quiescent Current (typ) (µA)	Shutdown Current (typ) (µA)	Features						Packaging				EVM	Price*
									Shutdown	Low Battery	Power Good	Undervoltage Lockout	Current Limit	Thermal Limit	SOT-23	QFN	MSOP	TSSOP		
Step-Down (Buck) Regulators																				
TPS60500	250	1.8 to 6.5	0.8 to 3.3	—	90	1200	40	0.05	✔		✔	✔	✔	✔			10		✔	0.80
TPS60501	250	1.8 to 6.5	—	3.3	90	1200	40	0.05	✔		✔	✔	✔	✔			10			0.80
TPS60502	250	1.8 to 6.5	—	1.8	90	1200	40	0.05	✔		✔	✔	✔	✔			10			0.80
TPS60503	250	1.8 to 6.5	—	1.5	90	1200	40	0.05	✔		✔	✔	✔	✔			10			0.80
Boost Regulators																				
TPS60100	200	1.8 to 3.6	—	3.3	90	300	50	0.05	✔			✔	✔					20	✔	1.25
TPS60101	100	1.8 to 3.6	—	3.3	90	300	50	0.05	✔			✔	✔					20		1.05
TPS60110	300	2.7 to 5.4	—	5.0	90	300	60	0.05	✔			✔	✔					20	✔	1.30
TPS60111	150	2.7 to 5.4	—	5.0	90	300	60	0.05	✔			✔	✔					20		1.15
TPS60120/1	200	1.8 to 3.6	—	3.3	85	450	55	0.05	✔	✔[1]	✔[1]	✔	✔					20	✔	1.25
TPS60122/3	100	1.8 to 3.6	—	3.3	85	450	55	0.05	✔	✔[1]	✔[1]	✔	✔					20		1.05
TPS60124/5	200	1.8 to 3.6	—	3.0	85	450	55	0.05	✔	✔[1]	✔[1]	✔	✔					20		1.25
TPS60130/1	300	2.7 to 5.4	—	5.0	90	450	60	0.05	✔	✔[1]	✔[1]	✔						20	✔	1.30
TPS60132/3	150	2.7 to 5.4	—	5.0	90	450	60	0.05	✔	✔[1]	✔[1]	✔						20		1.15
TPS60140/1	100	1.8 to 3.6	—	5.0	70	450	65	0.05	✔	✔[1]	✔[1]	✔	✔					20	✔	1.05
TPS60200/1	100	1.8 to 3.6	—	3.3	90	400	40	0.05	✔	✔[1]	✔[1]	✔					10		✔	1.05
TPS60202/3	50	1.8 to 3.6	—	3.3	90	400	40	0.05	✔	✔[1]	✔[1]	✔					10			0.95
TPS60204/5	100	1.8 to 3.6	—	3.3	90	400	35	0.05	✔	✔[1]	✔[1]	✔					10			1.05
TPS60210/1	100	1.8 to 3.6	—	3.3	90	400	35	2	Snooze	✔[1]	✔[1]	✔					10		✔	1.05
TPS60212/3	50	1.8 to 3.6	—	3.3	90	400	35	2	Snooze	✔[1]	✔[1]	✔					10			0.95
TPS60230/1	125	2.7 to 6.5	—	5.5[2]	85	1250	160	0.1	✔			✔	✔	✔		16			✔	1.55
TPS60240	12	1.8 to 5.5	—	3.3	90	160	250	0.1					✔	✔			8			1.15
TPS60241	12	2.7 to 5.5	—	5.0	90	160	250	0.1					✔	✔			8		✔	1.15
TPS60242	12	1.8 to 5.5	—	3.0	90	160	250	0.1					✔	✔			8			1.15
TPS60243	12	1.8 to 5.5	—	2.7	90	160	250	0.1					✔	✔			8			1.15
TPS60300/2	20	0.9 to 1.8	—	3.3	90	900	35	1	✔		✔[3]	✔					10		✔	0.95
TPS60301/3	20	0.9 to 1.8	—	3.0	90	900	35	1	✔		✔[3]	✔					10			0.95
TPS60310/2	20	0.9 to 1.8	—	3.3	90	900	35	2	Snooze		✔[3]	✔					10			1.05
TPS60311/3	20	0.9 to 1.8	—	3.0	90	900	35	2	Snooze		✔[3]	✔					10			1.05
TL7660	20	1.5 to 10	—	< 2 V_{IN}	99	10.35	80	—							8		8			0.72
Buck-Boost Regulators																				
REG710-2.5	30	1.8 to 5.5	—	2.5	90	1000	65	0.01	✔				✔	✔	6					0.65
REG710-2.7	30	1.8 to 5.5	—	2.7	90	1000	65	0.01	✔				✔	✔	6					0.65
REG710-3	30	1.8 to 5.5	—	3.0	90	1000	65	0.01	✔				✔	✔	6					0.65
REG710-3.3	30	1.8 to 5.5	—	3.3	90	1000	65	0.01	✔				✔	✔	6				✔	0.65
REG71050	60	2.7 to 5.5	—	5.0[2]	90	1000	65	0.01	✔				✔	✔	6				✔	0.65
REG710-5	60	2.7 to 5.5	—	5.0[2]	90	1000	65	0.01	✔				✔	✔	6				✔	0.65
REG71055	60	3.0 to 5.5	—	5.5[2]	90	1000	65	0.01	✔				✔	✔	6					0.65
REG711-2.5	50	1.8 to 5.5	—	2.5	90	1000	60	0.01	✔				✔	✔			8			0.90
REG711-2.7	50	1.8 to 5.5	—	2.7	90	1000	60	0.01	✔				✔	✔			8			0.90
REG711-3	50	1.8 to 5.5	—	3.0	90	1000	60	0.01	✔				✔	✔			8			0.90
REG711-3.3	50	1.8 to 5.5	—	3.3	90	1000	60	0.01	✔				✔	✔			8			0.90
REG711-5	50	2.7 to 5.5	—	5.0	90	1000	60	0.01	✔				✔	✔			8			0.90
Inverting Regulators																				
LT1054	100	3.5 to 15	—	–5.0	—	25	2500	100	✔											1.44
TPS60400	60	1.6 to 5.5	–(1.6 to 5.5)	—	99	50 to 250	125	—							5				✔	0.33
TPS60401	60	1.6 to 5.5	–(1.6 to 5.5)	—	99	28	65	—							5					0.33
TPS60402	60	1.6 to 5.5	–(1.6 to 5.5)	—	99	70	120	—							5					0.33
TPS60403	60	1.6 to 5.5	–(1.6 to 5.5)	—	99	300	425	—							5					0.33

[1] *特点应用分别如产品器件号顺序所示。例如，仅TPS60120拥有Low Battery的特点，仅TPS60121拥有Power Good的特点。*

[2] *单白光LED驱动器。*

[3] *特点仅应用于所示的后一器件。例如，仅TPS60302拥有Power Good的特点。*

* *推荐零售价为每1000片时的美元价格。*

*新器件以**粗体红色**标明。*

设计因素

集成度 — 特定应用的电源管理器件拥有不同层次的集成度并注重于特定终端器件的供电需求。此类器件拥有特色的构建模块，诸如充电器、线性稳压器、DC/DC控制器或DC/DC转换器。部分器件还集成了特定的通信接口，诸如I²C总线，以控制电压及其他功能。

封装模式 — 由于集成度不同，功率消耗性能需要纳入考虑范围。绝大多数高集成度器件的封装底部均有导热垫(thermal pad)，用以优化散热性能。

效率及外部组件数量 — 集成的电源转换器件的典型特色是组合了不同的电源转换器，其范围从LDO至充电泵及感应型DC/DC稳压器。多LDO器件在每一给定的封装尺寸内拥有最多的通道及最少的外部元件数量，但牺牲一定的效率。带多个感应型DC/DC转换器的器件需要更大的封装尺寸及外置电感，但典型的提供了最优的转换效率及针对便携式应用的最大电池使用时间。

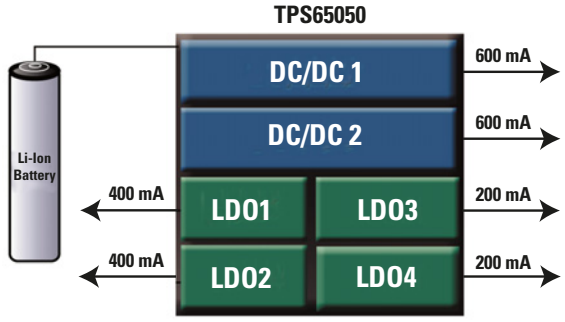
采用4x4 QFN封装的多用途6通道电源管理IC

TPS65050

NEW

敬请访问**www.ti.com/sc/device/TPS65050**，以获取样片。

TPS65050系列是电源管理集成电路(PMIC)，用于单锂电池多电源轨供电的应用。该器件包括了两个400mA及两个200mA LDO，还拥有两个高效、2.25MHz步降转换器，用于为处理器核心及I/O口提供输出电压。该器件还允许使用小电感及电容，以实现小型化解决方案尺寸。



Smallest Solution Size
4 x 4 mm
32-Pin QFN Package

选择指南

Device	V_{IN} (V)	Charger	A/D Converter	No. of Regulator Outputs	DC/DC Converter	DC/DC Controller	Charge Pump	LDO	LDO Controller	Communication Interface	Quiescent Current (mA)	Shutdown Current (µA)	Description	Package	Price*
Integrated Power Management for Smartphone, PDA, Media Players															
TPS65010/1/2/3/4	2.5 to 6.0	Li-Ion	—	4	2	—	—	2	—	I²C	0.07	0.015	Power management for Texas Instruments OMAP™ processors	QFN-48	3.95
TPS65020/1	2.5 to 6.0	—	—	6	3	—	—	3	—	I²C	0.07	—	Power management for Intel XScale,® OMAP™ and other processors with dynamic voltage scaling	QFN-40	3.75
TPS65050/1/2/4	2.5 to 6.0	—	—	6	2	—	—	4	—	I²C	0.03	0.007	General purpose PMIC for portable application processors and 1-cell Li-Ion apps.	QFN-32	2.75
TPS65800/10/20	3.0 to 4.7	Li-Ion	Yes	10	3	—	—	7	—	—	—	—	Complete 1-cell Li-Ion battery, lighting and power management for portable apps.	QFN-56	6.50
Integrated Power Management for DSP, FPGA, ASIC															
TPS62400/20	2.5 to 6.0	—	—	2	2	—	—	—	—	Serial	0.03	2	Dual, synchronous DC/DC converter in 3x3 QFN with EasyScale™ interface	QFN-10	2.70
TPS65023	2.5 to 6.0	—	—	6	3	—	—	3	—	I²C	0.07	—	PMIC for TI DaVinci™ DSP, optimized for 1-cell Li-Ion applications	QFN-40	3.95
TPS71202	2.7 to 5.5	—	—	2	—	—	—	2	—	—	—	—	Dual 250-mA, high PSRR, low noise LDO in 3x3 QFN	QFN-10	0.80
TPS75003	2.2 to 6.5	—	—	3	—	2	—	1	—	—	0.075	0.05	Power management for Xilinx® Spartan™-3 and other FPGA, DSP and ASIC	QFN-20	1.90
Integrated Power Management for Digital Still Cameras															
TPS65520	1.5 to 5	—	—	13	7	1	—	5	—	—	—	—	Complete 13-channel (7 DC/DC + 5 LDO) power management for DSC	BGA-121	3.95
Integrated Power Management for TFT/TFD LCD and OLED Displays															
TPS61045	1.8 to 6.0	—	—	1	1	—	—	—	—	—	0.035	1	Digitally adjustable, small form factor LCD and passive-matrix OLED bias supply	QFN-8	1.35
TPS61080/1	2.5 to 6.0	—	—	1	1	—	—	—	—	—	1	1	Adjustable, 27-V output, 0.7/1.6-A switch, OLED bias supply	QFN-10	1.90
TPS63700	2.7 to 5.5	—	—	1	1	—	—	—	—	—	1	0.2	Adjustable, –15-V output, 1-A switch, inverting DC/DC converter for bias applications	QFN-10	2.35
TPS65110/1	2.4 to 5.5	—	—	3	—	—	3	—	—	—	0.05	1	High-accuracy, small form factor, inductorless LTPS LCD bias supply with low ripple	QFN-24	1.70
TPS65120/1/3/4	2.5 to 5.5	—	—	4	1	—	2	1	—	—	—	0.1	High-accuracy, small form factor, LTPS and a-Si LCD bias supply, sequencing	QFN-16	1.75
TPS65130/1	2.7 to 5.5	—	—	2	2	—	—	—	—	—	0.5	0.2	Positive/negative small form factor OLED, TFT and CCD bias supply, dual rail	QFN-24	2.95
TPS65100/5	2.7 to 5.8	—	—	4	1	—	1	—	1	—	3.5	1	High-accuracy, large form factor TFT LCD bias supply w/vcom buffer, sequencing	QFN/TSSOP-24	2.30
TPS65140/5	2.7 to 5.8	—	—	4	1	—	1	—	1	—	3.5	1	High-accuracy, large form factor TFT LCD bias supply w/Power Good, sequencing	QFN/TSSOP-24	2.00
TPS65150	1.8 to 6	—	—	3	1	—	2	—	—	—	—	—	High-accuracy, large form factor TFT LCD bias supply w/flicker comp, sequencing	QFN/TSSOP-24	2.40
TPS65160/60A/65	8 to 14	—	—	4	2	—	2	—	—	—	—	—	LCD TV/monitor TFT display bias supply w/protection, softstart, sequencing	TSSOP-28	2.60

** 推荐零售价为每1000片时的美元价格。*

*新器件以**粗体红色**标明。* *前瞻性产品以**粗体蓝色**标明。*

单白光LED驱动器

设计因素

串行或并行LED配置 — 驱动不同的驱动器拓扑结构。感应型增压转换器提供了必须的高电压以驱动串行LED串。在此仅需一个电流稳压回路及两个用于LED串的连接点。

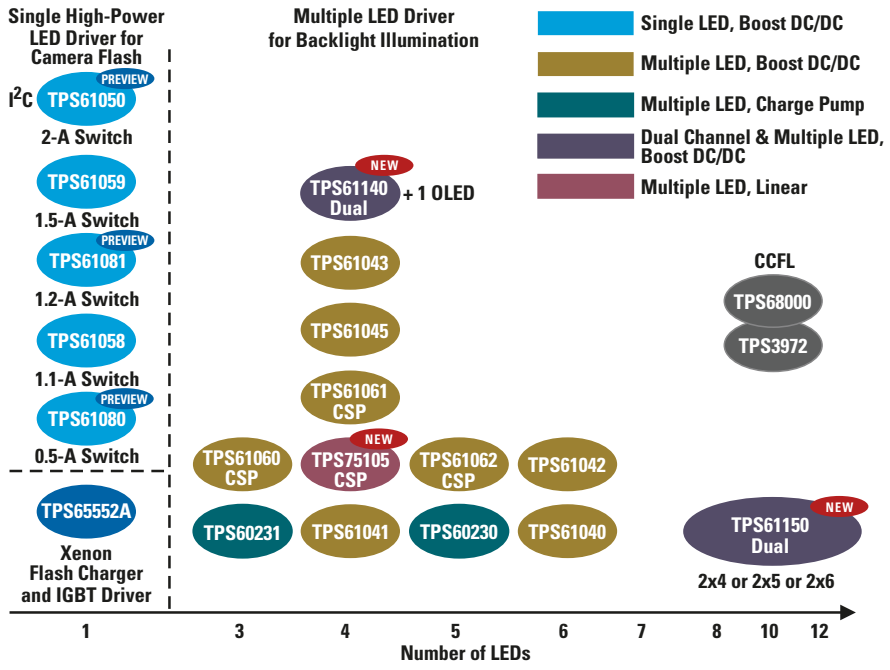
充电泵典型的用于驱动并行LED；但在每个LED引脚都需要电流设定电阻（稳流型LED除外）。通常情况下的选择取决于业已存在的预先安置彩色LCD显示模块中的LED配置方式。

稳流 — 避免LED串的亮度变化，或避免LED组成引脚产生不同前向电压(V_f)

过电压保护(OVP) — 当LED故障导致断开LED串时，防止感应驱动器损坏。

亮度调节 (dimming) — LED驱动器的典型特色是拥有模拟及/或数字装置以调节LED的亮度。

关断模式情况下实现负载分离(Load-Disconnect) — 当驱动器失效时，消除从电池流经LED串，再接入地的漏电流(leakage)，从而减少了电池电能损耗。



选择指南

Device	V_{IN} (V)	Type	Number of LEDs[1]	LED Configuration	Switch Current Limit (typ) (mA)	Current Regulation	Over-Voltage Protection (min) (V)	Synchronous	Output Capacitor	Load-Disconnect During Shutdown	Dimming[2]	Peak Efficiency[3] (%)	Quiescent Current (typ) (mA)	Shutdown Current (typ) (µA)	Package	Price*
TPS61041	1.8 to 6.0	Inductive	4	Series	250	No	No	No	1 µF	No	Yes	85	0.028	0.1	SOT-23	0.75
TPS61040	1.8 to 6.0	Inductive	6	Series	400	No	No	No	1 µF	No	Yes	86	0.028	0.1	SOT-23	0.95
TPS61043	1.8 to 6.0	Inductive	4	Series	400	Yes	17	No	100 nF	Yes	Yes	85	0.038	0.1	QFN-8	0.99
TPS61042	1.8 to 6.0	Inductive	6	Series	500	Yes	28	No	100 nF	Yes	Yes	85	0.038	0.1	QFN-8	1.20
TPS61140	2.5 to 6.0	Inductive	See Note 4	2 Series	700	—	—	Yes	—	—	—	85	—	—	QFN-10	1.85
TPS61145	2.5 to 6.0	Inductive	See Note 4	2 Series	700	—	—	Yes	—	—	Wire	85	—	—	QFN-10	1.65
TPS61150A	2.5 to 6.0	Inductive	See Note 5	2 Series	700	—	—	Yes	—	—	—	85	—	—	QFN-10	1.65
TPS61058	2.7 to 5.5	Inductive	1	Series	1100	No	No	Yes	3 x 22 µF	Yes	—	5.5	—	0.1	QFN-10	0.85
TPS61059	2.7 to 5.5	Inductive	1	Series	1500	No	No	Yes	3 x 22 µF	Yes	—	5.5	—	0.1	QFN-10	0.55
TPS61050/2	2.5 to 6.0	Inductive	1	Series	2000	No	No	Yes	10 µF	Yes	I2C	90	8.50	1	QFN-10/WCSP-12	1.35
TPS61060	2.7 to 6.0	Inductive	3	Series	400	Yes	14	Yes	220 pF	Yes	Yes	83	—	1	QFN-8/WCSP-8	1.35
TPS61061	2.7 to 6.0	Inductive	4	Series	400	Yes	18	Yes	220 pF	Yes	Yes	82	—	1	QFN-8/WCSP-8	1.35
TPS61062	2.7 to 6.0	Inductive	5	Series	400	Yes	22	Yes	220 pF	Yes	Yes	81	—	1	QFN-8/WCSP-8	1.35
TPS61020	0.9 to 5.5	Inductive	1	Series	1500	Yes	Optional	Yes	2.2 µF	Yes	Flash	90	0.025	0.1	QFN-10	1.40
REG71050	3.2 to 5.5	Charge pump	3	Parallel	—	No	—	—	2.2 µF	—	Yes	70	0.065	0.01	SOT-23	0.65
TPS60231	2.7 to 6.5	Charge pump	3	Parallel	—	Yes	—	—	1 µF	—	Yes	85	0.200	0.1	QFN-16	0.95
TPS60230	2.7 to 6.5	Charge pump	5	Parallel	—	Yes	—	—	1 µF	—	Yes	85	0.200	0.1	QFN-16	1.30
TPS75103/5	2.7 to 5.5	LDO	2/4	Parallel	—	Yes	—	—	—	—	Yes	—	0.18	0.1	WCSP-9	0.65
TPS61080/1	2.5 to 6.0	Inductive	7	Series	1.3 A/0.7 A	No	27	No	4.7 µF	Yes	No	94	1	1	QFN-10	1.35

[1] *于并行串配置时可驱动更多的LEDs。*
[2] *可通过使能(ENABLE)引脚，控制(CONTROL)引脚或模拟反馈网络实现调节。*
[3] *取决于LED电流、输入电压、LED数量、ILED引脚。*
[4] *1 OLED + 4 LED。*
[5] *双输出，每路最多可支持6个LED。*
* *推荐零售价为每1000片时的美元价格。*

*新器件以**粗体红色**标明。*
*前瞻性器件以**粗体蓝色**标明。*

设计因素

点校正 — 产生一致性的LED亮度，从而有能力动态控制输出电流。

灰度缩放 — 为每个LED提供了一个增强型的色谱，使其等效为数个可用的灰度阶。

输出电压监测 — 在恒定电流输出终端监测电压，以检测LED失效及短路。

LED开路检测 — 在输出终端指示损坏或断开连接的LED。

过热错误标志位 — 指示温度过高状态。

看门狗计时器 — 当扫描信号停止时关闭输出。

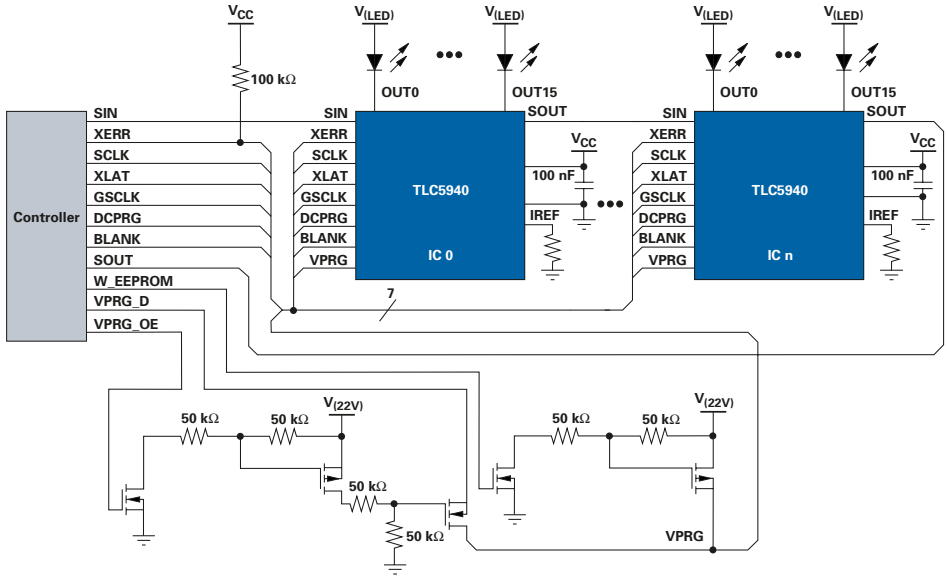
热关断 — 当连接点温度超过其限度时关闭输出。

带点校正及PMW灰度缩放的16通道LED驱动器

TLC5940

敬请访问**www.ti.com/sc/device/TLC5940**，以获取样片及数据表。

TLC5940是用于高端视频显示器的LED驱动器。该器件拥有特色的64级点修正及4096级PMW灰度缩放，每通道峰值电流可达120mA。该IC集成了EEPROM，并可选用HTSSOP、PDIP及QFN封装模式。



选择指南

Device	Data Input (Bits)	Output Count (Bits)	Input Voltage Range (V)	Output Current Drive (mA)	Channel-to-Channel Accuracy (typ) (%)	Data Transfer Rate (MHz)	Brightness Adjustment (Steps)	Dot Correction (Steps)	PWM Grayscale (Steps)	EEPROM	OVM[1]	LOD[2]	TEF[3]	WDT[4]	TSD[5]	Price*
TLC5924	1	16	3.0 to 5.5	80	±1	30	—	128	—	—	No	Yes	Yes	No	No	1.50
TL4242	1	1	4.5 to 42	500	—	—	—	—	—	—	Yes	No	No	No	Yes	0.99
TLC5904	8-bit parallel	8, 16	4.5 to 5.5	120	±4	15	32	—	256	—	Yes	Yes	No	Yes	Yes	3.70
TLC5905	1	8, 16	4.5 to 5.5	120	±4	15	32	—	256	—	Yes	Yes	No	Yes	Yes	2.85
TLC5911	7, 10	16	4.5 to 5.5	80	±4	20	64	128	1024	—	No	Yes	No	Yes	Yes	4.50
TLC5917	1	8	3.3 to 5.5	120	±3	25	256	—	—	—	Yes	Yes	Yes	No	Yes	1.35
TLC5920	1	16	4.5 to 5.5	30	±6	10	—	—	—	—	No	No	No	No	No	1.10
TLC5921	1	16	4.5 to 5.5	80	±1	20	—	—	—	—	No	Yes	No	No	Yes	1.25
TLC5922	1	16	3.0 to 5.5	80	±1	30	—	128	—	—	No	No	Yes	No	No	1.85
TLC5923	1	16	3.0 to 5.5	80	±1	30	—	128	—	—	No	Yes	Yes	No	No	1.90
TLC5930	1	12	3.0 to 3.6	40	±1	20	64	256	1024	—	Yes	Yes	Yes	No	No	2.50
TLC5940	1	16	3.0 to 5.5	120	±1	30	—	64	4096	Yes	No	Yes	Yes	No	No	1.90
TLC5941	1	16	3.0 to 5.5	80	±1	30	—	64	4096	—	No	Yes	Yes	No	No	1.65

*前瞻性器件以**粗体蓝色**标明。*

[1] *输出电压监测。*
[2] *LED开路检测。*
[3] *具有过热错误标志位。*
[4] *看门狗计时器。*
[5] *热关断。*
* *推荐零售价为每1000片时的美元价格。*

CCFL背光控制器

设计因素

输入电压 — 背光电源通常由电池或稳压器提供。对于背光电源来说，为了选择最佳的IC及电源转换拓扑电路以产生照明灯所需的输出电源，先对可选用的输入电压有所了解是十分重要的。

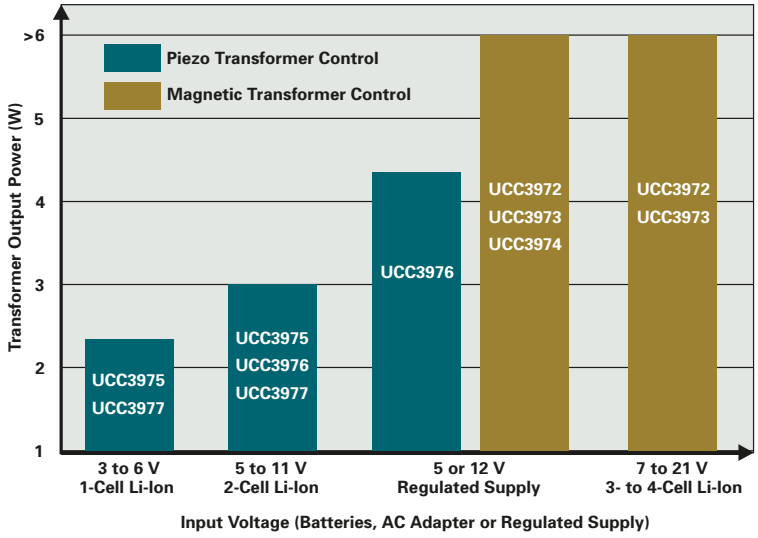
照明灯特性（输出功率） — 一般的CCFL灯需要250至1000VAC（2至10mA）以支持运转。而输入电压与输出电压间的关系指明了最佳的IC及电源拓扑结构。

电源拓扑 — 该部分以不同的方式控制变压器。有时输入/输出关系指示了某一确定的拓扑结构。而不同的拓扑机构还对应了不同的电源转换效率。

变压器类型 — 压电式(Piezo)在某些应用中可实现更小的尺寸及更高的效率。

控制选项 — 单或双灯控制、亮度控制。

CCFL背光控制器产品系列



特点

- 针对CCFL的完全电源控制。
- 磁感或压电变压器控制。
- 开灯(Open lamp)保护及变压器保护。
- 脉冲亮度调节控制以获得高效及更宽的亮度调节范围。
- 四种不同的电源拓扑：
  - 半桥(Half-bridge)
  - 反激式(Flyback)
  - 自振荡(Royer)
  - 推挽式(Push-pull)

选择指南

Device	Input Voltage (V)	Power Control Topology	Transformer Type	Dimming and Protection Control	Industrial Temp Version	Packages	Price*
Input Voltage = 5 to 11 V (2-Cell Li-Ion Application)							
UCC3975	3 to 13.5	Flyback	Piezo	Yes	UCC2975	8-pin TSSOP	1.70
UCC3976	3 to 13.5	Half-bridge	Piezo	Yes	UCC2976	8-pin TSSOP	1.00
TPS68000	8 to 30	Full Bridge	Magnetic	Yes	TPS68000	30-pin TSSOP	2.50
Input Voltage = 5 or 12 V (Regulated Supply)							
UCC3973	4.5 to 25	Royer	Magnetic	Yes	UCC2973	8-pin TSSOP or SOIC	3.00
UCC3976	3 to 13.5	Half-bridge	Piezo	Yes	UCC2976	8-pin TSSOP	1.00
TPS68000	8 to 30	Full Bridge	Magnetic	Yes	TPS68000	30-pin TSSOP	2.50
Input Voltage = 7 to 21 V (3- or 4-Cell Li-Ion Application)							
UCC3973	4.5 to 25	Royer	Magnetic	Yes	UCC2973	8-pin TSSOP or SOIC	3.00
TPS68000	8 to 30	Full Bridge	Magnetic	Yes	TPS68000	30-pin TSSOP	2.50

* *推荐零售价为每1000片时的美元价格。*
此选择指南为一般性参考工具。外部元件指示了电路中大多数的的电路参数，因此，可依照选择指南中的输入电压/器件边界实现外部设计。

资源 *如需完备的资源列表，敬请访问power.ti.com*

Part Number	Description	Price*
Evaluation Modules (EVMs)		
UCC3973EVM	UCC3973 Evaluation Module	50
UCC3976EVM	UCC3976 Evaluation Module	50
TPS68000EVM-161	TPS68000 Single-Lamp Evaluation Module	49
TPS68000EVM-166	TPS68000 Multi-Lamp Evaluation Module	49

* *推荐零售价为美元价格。*

设计因素

变压器 — 转换器的输出电压是通过调节反激式变压器的比率而设定。而转换频率则取决于反激式变压器的主要感应系数。这两个参数，以及其次的必要额定电压，构成了选择变压器的主要条件。

闪光灯电容 — 闪光灯电容值对于闪光器的应用来说必须是额定的。闪光灯电容通常具有低自感系数，以承受在闪光期间的浪涌电流。将非额定电容用于闪光器应用只会缩短此类应用的寿命周期。

IGBT（绝缘栅双极型晶体管） — 选择用于触发闪光管的IGBT管时需要参看相机闪光灯的功率级别。多种IGBT都能经受与闪光相关的电压及浪涌电流；但是，若是针对连续工作的功率级别，其封装尺寸须大型化。而对于相机闪光灯专用的IGBT来说，因其负载处于完全的浪涌(all surge)模式，而非连续工作模式，使其在实现同样功率级别时可做到小型化的封装尺寸。

闪光管 — 选择一个闪光管需要基于多个系统层次的参考因素，诸如所需的光谱、物理尺寸、安装方式、触发方式、所需灯光功率、闪光频率、闪光电压、包装材料及闪光管外包。客户应根据其特定应用来决定灯的选择。

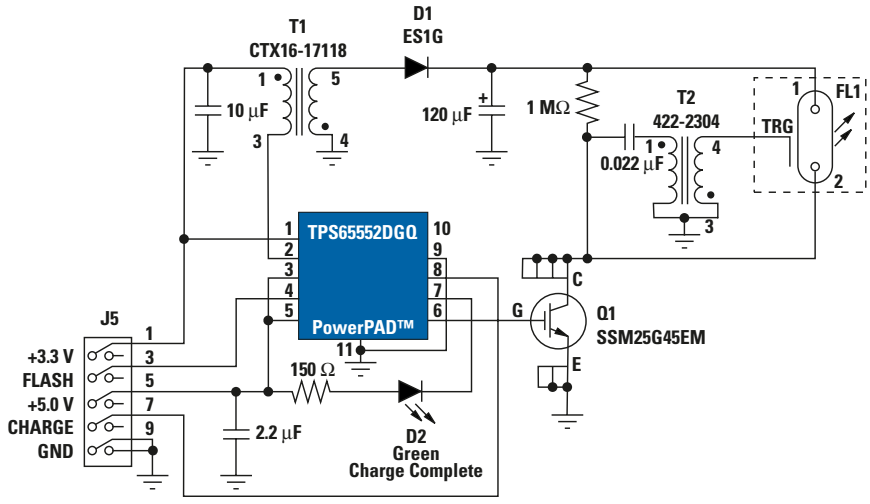
触发变压器 — 一旦灯管被选定之后，就应对触发变压器进行选择。每一闪光灯管都要求有特定的触发能量以触发一次闪光。

效率 — 转换器的效率很大程度上受限于高压二极管的回复时间。二极管电压回复得越快，其效率就越高。

集成相机闪光灯充电器及IGBT驱动器
TPS65552A

敬请访问**www.ti.com/sc/device/TPS65552A**，以获取数据表。

TPS65552A提供了一个完备的解决方案，以用于电池输入对相机闪光灯的电容充电以及后续的电容对氙闪光管放电。此器件包括了集成电源开关、IGBT驱动器以及针对充电应用的控制逻辑模块。



TPS65552A 应用电路

选择指南

Device	Input Voltage (V)	V_{CC} (V)	Programmable Peak Current (A)	Power Switch (V)	IGBT Driver	Protection: Max On Time	Protection: Over-Voltage Shutdown	Protection: Thermal Monitor	Packaging	Price*
TPS65552A	1.8 to 12	5	0.95 to 1.8	50	Yes	Yes	Yes	Yes	10-pin MSOP, 16-pin QFN	1.00
TPS65560	1.6 to 12	2 to 4	0.9 to 1.8	50	Yes	Yes	Yes	Yes	16-pin QFN	0.85

* *推荐零售价为每1000片时的美元价格。*

*新器件以**粗体红色**标明。*

电池充电管理

设计因素

电池的化学机理 — 每种电池的化学机理都对其充电算法有独特的要求，这对于最大化电池容量、周期寿命及安全性都是至关重要的。

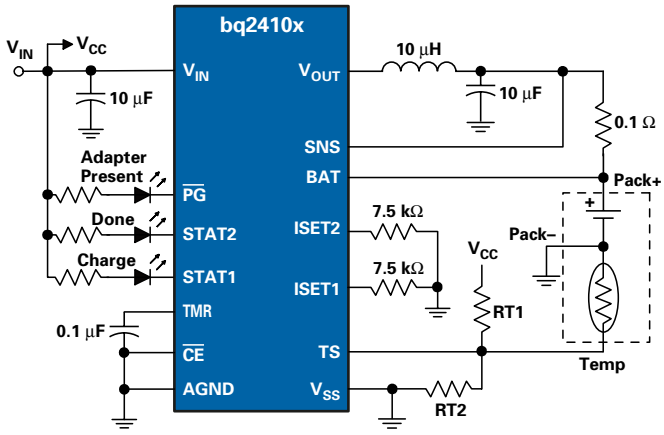
控制拓扑结构 — 对于充电电流小于1 A电池包（例如：单个或两个单元锂离子电池）的低功耗应用来说，采用简单的线性拓扑结构即可实现良好的运作。

对于充电额定需求大于1 A的大电池包（例如：3或4个串接锂离子电池或多个NiCd/NiMH离子电池）来说，采用开关模式(switchmode)拓扑结构则更为理想、适用。开关模式下的转换可使充电时的热效应实现最小化。对于采用电流限定(current-limited)拓扑结构的充电器来说，则需要对电源稳压或限压，并对充电电流施加简单的门限。

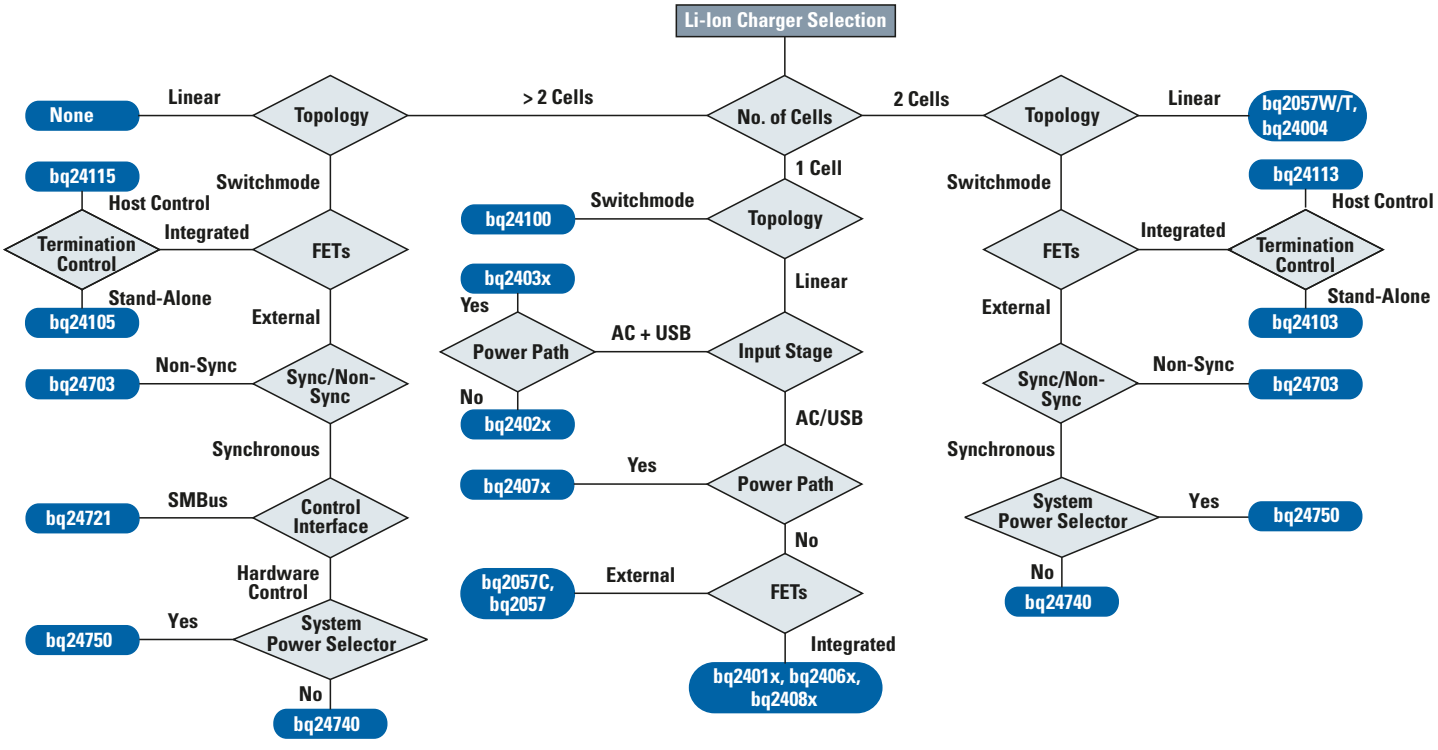
2A同步开关模式充电器
bq2410x

敬请访问**www.ti.com/sc/device/bq24100**，以获取样片、数据表及评估板。

bq2410x系列为2-A 同步开关模式充电器电源管理器件，用于1、2及3个串接锂离子或锂聚合(Li-polymer)电池包。



锂离子充电器选择流程图



电池充电管理

选择指南

Device	Number of Cells	Control Topology[1]	Integrated Power FET	Charge Current Internal FET	V_{IN} Max	Primary Charge Termination Method[2]	Safety Timer	Temp Monitor	Packaging: QFN/MLP	MSOP	TSSOP	SOIC	DIP	EVM	Price*	Comments
Multi-Chemistry (Li-Ion and NiCd/NiMH)																
bq2000	Multiple	Switching	No	—	—	PVD, min current	Yes	Yes			8	8	8	✔	1.50	Charges NiCd, NiMH, and Li-Ion
bq2000T	Multiple	Switching	No	—	—	ΔT/Δt, min current	Yes	Yes			8	8	8	✔	1.50	Charges NiCd, NiMH, and Li-Ion
bq24702/3	Multiple	Switching	No	—	30 V	Host controlled	No	No	28[3]		24			✔	3.10	Dynamic Power Management
Li-Ion Chemistry																
bq24200	1	Current-limited	Yes	500 mA	16.5 V	Min current	Yes	Yes		8				✔	0.85	Uses current-limited wall supplies, lowers power dissipation
	Parameter: bq24200 / bq24201 / bq24202 / bq24203 / bq24204 / bq24205															
	Optional Functions[4]: STAT, TS, 4.2 V / STAT, TS, 4.1 V / STAT, 4.2 V / STAT, 4.1 V / 4.2 V / 4.1 V															
bq2057/C	1	Linear	No	—	18 V	Min current	No	Yes		8	8	8		✔	0.90	Low dropout, 4.1/4.2 V regulation, AutoComp™
bq2057T/W	2	Linear	No	—	18 V	Min current	No	Yes			8	8		✔	1.20	Low dropout, 8.2/8.4 V regulation, AutoComp
bq24004	2	Linear	Yes	1.2 A	13.5 V	Min current	Yes	Yes	20		20				1.60	8.2-V or 8.4-V regulation
	Parameter: bq24004 / bq24005 / bq24006															
	Charge Status Configuration: Single LED / 2 LEDs / Single Bicolor LED															
bq24010	1	Linear	Yes	1.0 A	18 V	Min current	Yes	No	10					✔	1.05	Allows use of unregulated wall supplies with high max V_{IN}
	Parameter: bq24010 / bq24012 / bq24013 / bq24014 / **bq24018**															
	Optional Functions[4]: PG, TS, 4.2 V / PG, CE, 4.2 V / CE, TTE, 4.2 V / CE, TS, 4.2 V / PG, TS, 4.36 V															
bq24020	1	Linear	Yes	1.0 A	7 V	Min current	Yes	Yes	10					✔	1.50	Autonomous USB and AC-adapter supply management
	Parameter: bq24020 / bq24022 / bq24023 / bq24024 / bq24025 / bq24026 / bq24027															
	Optional Functions[4]: CE and TS / PG and CE / CE and TTE / TTE and TS / CE and TS / TE and TS / PG and CE															
	Fast Charge Timer/Taper Timer: 5/Yes / 5/Yes / 5/Yes / 5/Yes / 5/Yes / 7/No / 7/No															
bq24030	1	Linear	Yes	1.5 A	18 V	Min current	Yes	Yes	20					✔	2.00	Dynamic Power-Path Management powers the system and charges battery
	Parameter: bq24030 / **bq24031** / bq24032A / bq24035 / **bq24038**															
	Output for AC Input Condition: Regulated to 6 V / Regulated to 6 V / Regulated to 4.4 V / Cutoff at 6 V / Regulated to 4.4 V															
	Charge Regulation Voltage (V): 4.2 / 4.1 / 4.2 / 4.2 / 4.36															
bq24060	1	Linear	Yes	1 A	18 V	Min current	Yes	Yes	10					✔	1.20	Thermal regulation, over-voltage protection, LDO mode
	Parameter: **bq24060** / **bq24061** / **bq24064**															
	Optional Functions[4]: TS / CE / TS															
	Input Over-Voltage (V): 6.5 / 6.5 / 10.5															
bq24070/1	1	Linear	Yes	1.5 A	18 V	Min current	Yes	Yes	20					✔	1.90	Dynamic Power-Path Management, 4.4-V or 6-V ouput voltage
bq24080	1	Linear	Yes	1.0 A	7 V	Min current	Yes	Yes	10					✔	0.95	Low-cost integrated charger
	Parameter: **bq24080** / **bq24081**															
	Optional Functions[4]: PG and CE / TE and TS															
bq24100/8	1	Switching	Yes	2.0 A	20 V	Min current	Yes	Yes	20						2.00	Synchronous PWM, different status outputs
bq24103/113	1 or 2	Switching	Yes	2.0 A	20 V	Min current/ Host controlled	Yes	Yes	20						2.20	Synchronous PWM
bq24105/115	1 to 3	Switching	Yes	2.0 A	20 V	Min current/ Host controlled	Yes	Yes	20						3.50	Synchronous PWM, prog. output voltage
bq25010/2	1	Linear	Yes	500 mA	7 V	Min current	Yes	No	20					✔	2.00	USB, integrated 150-mA DC/DC converter
bq25015	1	Linear	Yes	500 mA	7 V	Min current	Yes	No	20					✔	2.20	USB, integrated 300-mA DC/DC converter
bq24721	3 or 4	Switching	No	—	30 V	SMBus	No	Yes	32					✔	4.90	Advanced synchronous battery charger with SMBus and system power selector
bq24740/50	2, 3 or 4	Switching	No	—	30 V	Host controlled	No	Yes	28					✔	4.90	bq24750 integrates system power selector
bq2954	Multiple	Switching	No	—	—	Min current	Yes	Yes				16	16	✔	2.50	PWM control, low/high-side current sense
TPS65010	1	Linear	Yes	1.0 A	6 V	Min current	Yes	Yes	48					✔	3.95	Integrated battery and power management[5]
TPS65800/10	1	Linear	Yes	1.5 A	18 V	Min current	Yes	Yes	56					✔	6.50	Integrated battery and power management[5]
TPS65820	1	Linear	Yes	1.5 A	18 V	Min current	Yes	Yes	56					✔	6.50	Integrated battery and power management[5]
NiCd/NiMH Chemistry																
bq2002/C/E/F	Multiple	Current-limited	No	—	—	−ΔV, PVD	Yes	Yes				8	8	✔	1.00	Low-cost nickel charge ICs
bq2002D/T	Multiple	Current-limited	No	—	—	ΔT/Δt	Yes	Yes				8	8	✔	1.00	Different charge timers and status display
bq24400/1	Multiple	Switching	No	—	—	PVD, ΔT/Δt	Yes	Yes			8	8			1.50	Simple switching controller
bq2004/E/H	Multiple	Switching	No	—	—	−ΔV, PVD, ΔT/Δt	Yes	Yes				16	16	✔	2.20	Selectable timers and pulse-trickle rates
bq2005	Multiple	Switching	No	—	—	−ΔV, ΔT/Δt	Yes	Yes				20		✔	2.20	Sequential fast charge of two battery packs
Lead-Acid Chemistry																
UC3906	Multiple	Linear	No	—	40 V	Max V, min I	No	No				16	16		2.75	Temp-compensated internal reference
UC3909	Multiple	Switching	No	—	40 V	Max V, min I	No	Yes				20	20		3.05	Differential current sense input
bq2031	Multiple	Switching	No	—	—	Max V, $-\Delta^2$V, min I	Yes	Yes				16	16	✔	2.80	Three user-selectable charge algorithms to accommodate cyclic and standby applications

[1] Current-limited = 外部门控，稳流/限流源。[2] PVD = 峰值电压检测；ΔT/Δt = 温度上升速率；host controlled = 系统处理器必须终止充电；−ΔV = 负相电压改变；max V = 最大电压； min I = 最小电流； Δ^2V = 电池电压的二阶差分。[3] 仅bq24703可选QFN封装模式。[4] STAT = 状态显示；TS = 温度感应； PG = 供电良好；CE = 变化使能(change enable)；TTE = 计时器及终止使能。[5] 敬请参见第41页。 推荐零售价为每1000片时的美元价格。*

*新器件以**粗体红色**标明。*
*前瞻性器件以**粗体蓝色**标明。*

电量计

设计因素

电池化学机理 — 每类电池的化学机理都有不一样的运作特征，例如放电波形及自放电速率。TI的计量IC基于化学机理而开发，专门用于计量此类差异，以精确的显示电池的剩余电量。

充/放电关系 — 充电及放电速率标示了感应的电阻值。

特点

TI的电量计及电池监测器可精确追踪电池动态，并依此计算出电池剩余电量及系统续航时间。其特点为：

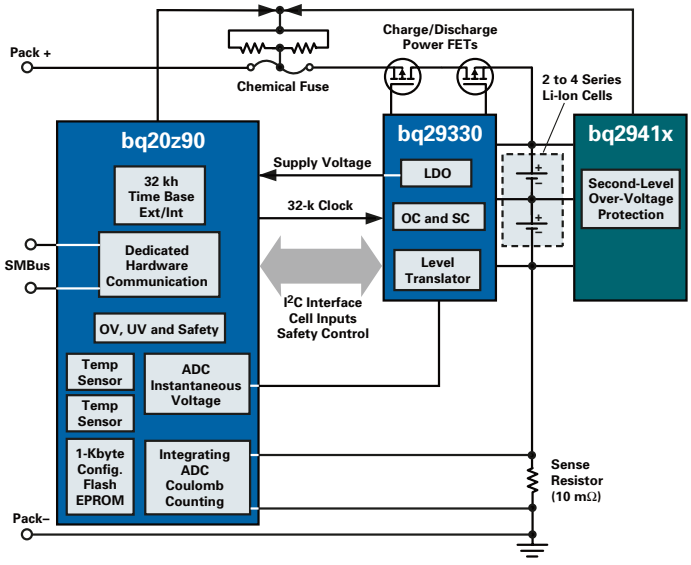
- 简化的通信协议。
- 高精度模数转换器以实现精确的充电/放电测量。
- 电量计集成了CPU，以实现对电池剩余电量及续航时间的计算。

99%精确电量计使续航时间得到最大化

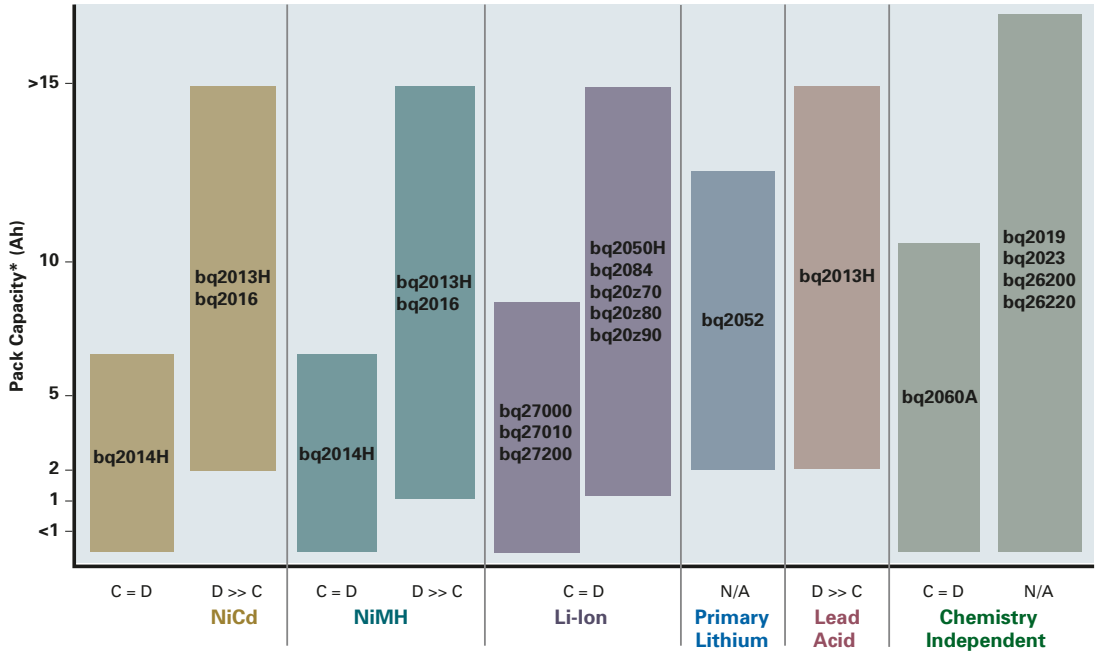
bq20z70、bq20z80、bq20z90

敬请访问**www.ti.com/sc/device/bq20z80**，以获取样片、数据表、评估板及相关应用报告。

bq20z80的动态阻抗追踪(dynamic Impedance Track™)电量计算法扩展了电池的可用性，可深掘出电池包的全部可用化学容能。其附带特性包括了即时充电状态和实时阻抗读出。阻抗追踪还降低了开发及生产时间。在整个电池包生命周期内，剩余电量报告的精度可优于99%。bq20z80可理想的适用于医药及工业设备、备用电池组及膝上型电脑的电池包。



电池电量计产品系列



C = D: 充电速率与放电速率近似。
D>>C: 放电速率远大于充电速率。
N/A: 不可用
* 电池包的额定容量为每个电量计提供了一个估算的范围。

电量计

选择指南

Device	Approx. Battery Capacity (mAh)	Min Max Series Cell	Number of LEDs	Communication Protocol	Other Features	Safety Enhancement	Packages	Price*
NiCd, NiMH Chemistry								
bq2013H	2000 to 15000	—	5	Single wire (HDQ)	Programmable offset error compensation	No	16-pin SOIC	3.70
bq2014H	500 to 6000	—	5	Single wire (HDQ)	Register compatible with bq2050H	No	16-pin SOIC	3.70
bq2016	1000 to 4500	—	5	Single wire (HDQ)	Automatic offset calibration	No	28-pin SSOP	3.00
Lithium-Ion, Lithium-Polymer Chemistry								
bq2050H	500 to 6000	—	5	Single wire (HDQ)	Register compatible with bq2014H	Yes	16-pin SOIC	3.70
bq2084	800 to 10000	2 to 4	3, 4 or 5	2 wire (SMBus)	SBS 1.1 works with bq29312 based on bq2083; includes bq2050 dataset via single wire interface	Yes	38-pin TSSOP	4.00
bq20z70	800 to 10000	2 to 4	No LED	HDQ and SMBus	Self learning, dynamic fuel gauge algorithm with bq29330	Yes	20-pin TSSOP	2.90
bq20z80	800 to 10000	2 to 4	3, 4 or 5	2 wire (SMBus)	SBS 1.1 with Impedance Track™ technology	Yes	38-pin TSSOP	4.60
bq20z90	800 to 10000	2 to 4	3, 4 or 5	2 wire (SMBus)	Self learning, dynamic fuel gauge algorithm with bq29330	Yes	30-pin TSSOP	3.30
bq27000	300 to 6000	1	—	HDQ	Single-cell fuel gauge with fixed-voltage EOD	No	10-pin DRK	1.95
bq27200	300 to 6000	1	—	I^2C	Single-cell fuel gauge with fixed-voltage EOD	No	10-pin DRK	1.95
bq27010	300 to 6000	1	—	HDQ	Single-cell fuel gauge with fixed-voltage EOD	No	10-pin DRK	1.95
Primary Lithium Chemistry								
bq2052	1000 to 12000	1	2, 4 or 5	Single wire (HDQ)	Automatic discharge compensation	No	16-pin SOIC	4.00
Lead Acid Chemistry								
bq2013H	2000 to 15000	10	5	Single wire (HDQ)	Programmable offset error compensation	No	16-pin SOIC	3.70
Multi-Chemistry								
bq2060A	800 to 10000	0.1	4 or 5	SMBus or HDQ16	SBS 1.1 extended cold temp cell modeling and high temp safety enhancement, improved bq2060	Yes	28-pin SSOP	3.90
Battery Monitors								
bq2019	>20000	1	—	Single wire (HDQ)	64-bit ID ROM and 1 program output non-volatile memory	—	8-pin TSSOP	1.95
bq2023	>20000	0.25	—	Single wire (SDQ)	64-bit ID ROM and 1 program output automatic offset error calibration	—	8-pin TSSOP	2.00
bq26200	>20000	0.25	—	Single wire (HDQ)	High-performance battery, coulomb counter	—	8-pin TSSOP	2.00
bq26220	>20000	0.25	—	Single wire (HDQ)	64-bit ID ROM and 1 program output on-chip voltage measurement	—	8-pin TSSOP	2.05

* *推荐零售价为每1000片时的美元价格。*

*新器件以**粗体红色**标明。*

资源 *如需完备的资源列表，敬请访问power.ti.com*

Part Number	Description	Price*
Evaluation Modules (EVMs)		
bq2013HEVM-001	bq2013H Evaluation Kit for NiCd, 16.8 V	99
bq2014HEVM-001	bq2014H Evaluation Kit for NiMH, 10.8 V	99
bq2050HEVM-002	bq2050H Evaluation Kit for Li-Ion, 10.8 V	99
bq2060AEVM-001	bq2060A Evaluation Kit for Li-Ion	99
bq2060AEVM-002	bq2060A Evaluation Kit for NiMH	99
bq2084EVM-001	bq2084 Evaluation Kit also features the bq29312 and bq29400	99
bq20z70EVM-001	bq20z70 Evaluation kit also features the bq29330 and bq29412	99
bq20z80EVM-001	bq20z80 Evaluation kit also features the bq29312 and bq29400	99
bq20z90EVM-001	bq20z90 Evaluation kit also features the bq29330 and bq29412	99
bq26220EVM-001	bq26220 Evaluation Kit for Multi-Chemistry, 2.6 to 4.5 V	99
bq27000EVM	bq27000 Evaluation Module	99
bq27200EVM	bq27200 Evaluation Module	99

* *推荐零售价为美元价格。*

Literature Number	Description
Application Notes	
SLUA324	Getting Started with the bq20z80 and EVM
SLUA325	Feature Set Comparison Between bq2084 and bq20z80
SLVA100	Advanced Gas Gauge Host Firmware Guide for the TI Battery Monitor ICs
SLVA101	HDQ Communication Basics for TI's Battery Monitor ICs
SLVA102	Gas Gauging Basics Using TI's Battery Monitor ICs
SLVA114	Advanced Gas Gauge Host Firmware Flow Chart for the TI Battery Monitor ICs
SLVA 148	bq2083, bq2084, and bq2085 Calibration Procedure
SLVA149	Configuring the bq2060 and bq2060A EEPROMs
SLVA150	Avoiding Clock Jitter with the bq2085 Advanced Gas Gauge
SLVA151	Using Advance Features of the bq2060A Gas-Gauge IC
SLUA338	Configuring the bq27000/200 for Gas Gauge Applications
SLUA359	Using SHA-1 in bq20zxx Family of Gas Gauges
SLUA364	Theory and Implementation of Impedance Track Battery Fuel-Gauging Algorithm

锂离子电池保护

设计因素

串接电池数量 — 一块电池通常由多个电池单元串联或并联构成。每一个串接的单元，或并行电池组单元都需要进行保护，以防止过充(overcharge)、过放电(overdischarge)以及短路的状态。

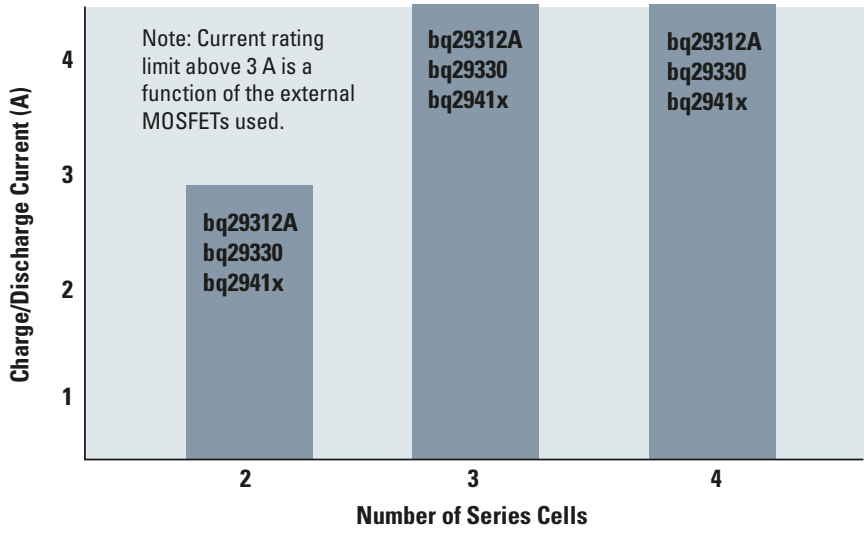
极限电压 — 锂离子(Li-Ion)及锂聚合物(Li-polymer)电池单元有众多的生产厂商。不同的厂商以各自其工艺生产出具有不同最大承受电压(maximum stress voltage)的电池单元，或称为“过压限”(“over voltage threshold”)。这些数据可从电池单元供应商处获得。

极限容忍度 — 过压限具有一定的容忍度，出于安全考虑，在设计时须对此参数进行估算。

关断电流 — 在电池包应用中，出须做到很低的恒定电流输出以保证电池寿命。

充/放电电流 — 不管是采用内部的或外部的FET，最大电流都已经由其通行因素及其每个保护IC确定。

锂离子保护产品系列



特点

- BiCMOS处理，仅消耗很小的电流。
- 不同的电压保护限，允许在单个设计中采用多个电池供电。
- 睡眠状态下电流消耗低于3.5 µA，有效的延长了电池寿命。
- 中心电压摆幅限度可实现50 mV的精度，最大化的保证了安全性。
- 短路保护，无需外置保险丝。

选择指南

Device	Number of Series Cells	Charge/Discharge Current (A)	Threshold Voltage (V_{OV})	Shutdown Current (µA)	Other Features	Available Packages	Price*
bq29312A	2, 3 or 4	External FET	bq2084[1], bq20z80[1]	1	Integrated LDO, works directly with bq2084 and bq20z80 gas gauge	24-pin TSSOP	1.30
bq29330	2, 3 or 4	External FET	bq20z90[1]	1	Integrated LDO, works directly with bq20z90 gas gauge	20-pin TSSOP	1.45
bq2941x	2, 3 or 4	—	x = voltage level	1	Second overvoltage safety for chemical fuse activation	8-pin TSSOP	0.42

[1] *由bq208x、bq20z8x或bq20z9x电量计控制。敬请参见各器件的数据表已获得完备的详细资料。*
* *推荐零售价为每1000片时的美元价格。*

资源 *如需完备的资源列表，敬请访问power.ti.com*

Part Number	Description	Price*
Evaluation Modules (EVMs)		
bq2084EVM-001	bq2084 Evaluation Kit also features the bq29312 and bq29400	99
bq20z70EVM-001	bq20z70 Evaluation Kit also features the bq29330 and bq29412	99
bq20z80EVM-001	bq20z80 Evaluation Kit also features the bq29312 and bq29400	99
bq20z90EVM-001	bq20z90 Evaluation Kit also features the bq29330 and bq29412	99

* *推荐零售价为美元价格。*

电池及外设认证

设计因素

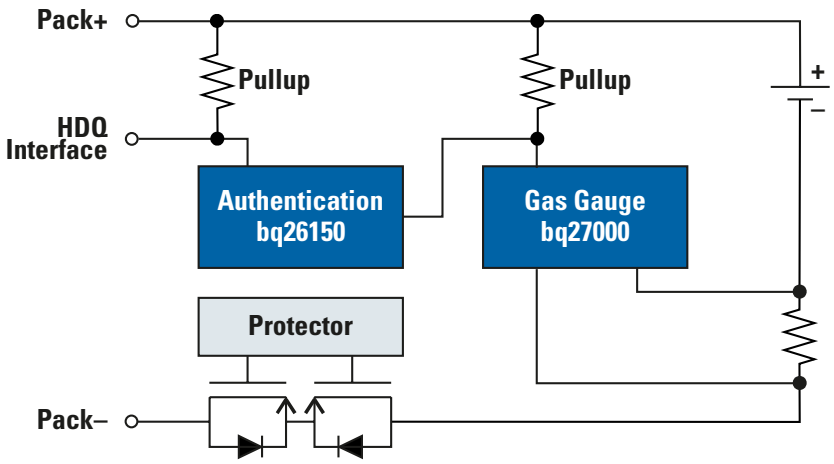
初始设备厂商详细规划其产品，以实现所需的性能和安全指标。认证则确保了所连接的器件满足确定的需求，且对于消费者来说是安全的。

特点

TI认证的器件采用了三层安全机制：

- **认证号** — 主控制器可查询认证号，并从产品中得到固定的响应回答。
- **循环冗余码校验(CRC)算法** — 主处理器发送随机序列，序列及共享的密钥通过一个带共享保密多项式的循环冗余码校验进行编码，而后主处理器读取响应编码。
- **SHA-1加密** — 主处理器发送随机序列，序列及共享密钥通过SHA-1加密原语进行编码，而后主处理器读取响应编码。

带电量计及认证的单一单元电池包



选择指南

Device	Interface	Pins	Security	Temp (°C)	Price*
bq2022	SDQ	3	ID number	–40 to 85	1.25
bq26150	HDQ	5	CRC algorithm	–20 to 70	1.25
bq26100	SDQ	5	SHA-1 encryption	–20 to 70	1.30

* *推荐零售价为每1000片时的美元价格。*

热交换及电源分配

以太网供电

设计因素

IEEE 802.3af 以太网供电 — 通过经认可的IEEE802.3af以太网供电(PoE)标准，现行的数据终端(DTE)都可选择使用业已存在的CAT-5及CAT-3数据传输布线来接收供电。IEEE802.3af标准详细定义了对以太网供电相关的发送和接收缆线的要求。电源供电设备(PSE)通过缆线提供电源，受电设备(PD)实现接受。作为IEEE 802.3af标准的一部分，PSE及PD间的接口通过与检测及分级相关的协议实现定义。

电源供电设备(PSE) — TPS2384四相PSE管理器独立的对最多四个以太网端口供电进行管理，并通过标准的I^2C串行接口报告系统状态。TPS2384是当今市面上最高集成度的PSE解决方案，集成了供电FET及感应电阻。

受电设备(PD) — 作为PSE及PD间的接口，TPS23750实现了与IEEE 802.3af兼容所必需的全部检测、分级、涌入电流限制及开关FET控制功能。

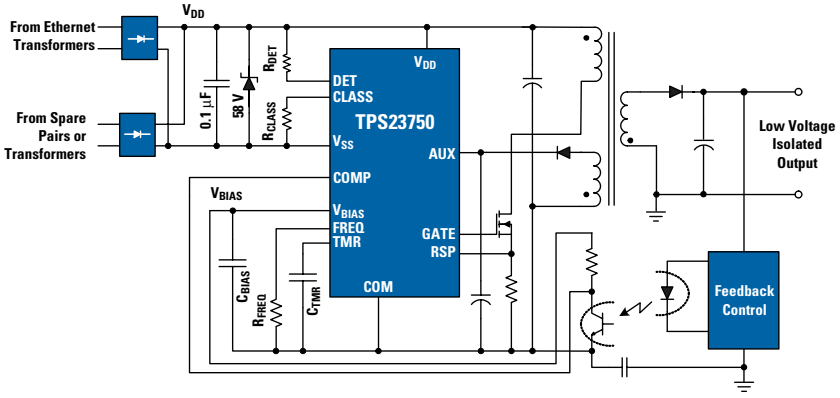
以太网供电

IEEE 802.3af集成初级端(Primary-Side)受电设备控制器

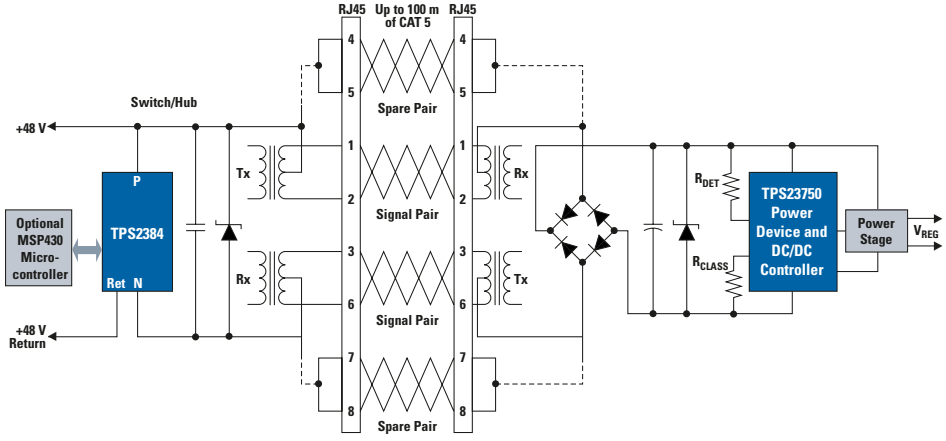
TPS23750

敬请访问**www.ti.com/sc/device/TPS23750**，以获取样片、数据表、评估板及相关应用报告。

TPS23750作为高集成度器件，兼具了TPS2375及一个初级端DC/DC脉宽调制控制器的功能。设计者可设计出完全的前端解决方案以用于最小化外部组件的PoE供电器件。



以太网供电(PoE)应用框图



*新型的TPS2384及TPS23750是兼容IEEE 802.3af标准的电源管理IC，设计用于电源供电设备(PSE)与受电设备(PD)之间以太网电缆供电连接的管理。***www.ti.com/poe**

选择指南

Device	Description	Detection	Classification	Abs Max V_{IN} (V)	Operating Temp (°C)	Full Inrush Current Limiting	Current Limit (mA)	Auto Retry or Latch Off in Fault	UVLO	DC/DC Interface	Package	Price*
Power-over-Ethernet (PoE) Powered Device (PD) Interface Switches												
TPS2375	Powered Device Controller	4	Yes, Class 0-4	100	–40 to 85	Programmable	450	Latch Off	802.3af (30.6/39.4 V)	PG	SOIC-8, TSSOP-8	1.25
TPS2375-1	Powered Device Controller	4	Yes, Class 0-4	100	–40 to 85	Programmable	450	Auto Retry	802.3af (30.6/39.4 V)	PG	TSSOP-8	1.00
TPS2376	Powered Device Controller	4	Yes, Class 0-4	100	–40 to 85	Programmable	450	Latch Off	Adjustable	PG	SOIC-8, TSSOP-8	1.25
TPS2376-H	High-Power Powered Device Cont.	4	Yes, Class 0-4	100	–40 to 85	Programmable	600	Auto Retry	Adjustable	PG	SOIC-8	1.25
TPS2377	Powered Device Controller	4	Yes, Class 0-4	100	–40 to 85	Programmable	450	Latch Off	Legacy (30.5/35.0 V)	PG	SOIC-8, TSSOP-8	1.25
TPS2377-1	Powered Device Controller	4	Yes, Class 0-4	100	–40 to 85	Programmable	450	Auto Retry	Legacy (30.5/35.0 V)	PG	SOIC-8	1.00
TPS23750	Integrated PD with PWM Controller	4	Yes, Class 0-4	100	–40 to 85	Fixed	450	Auto Retry	802.3af (30.6/39.4 V)	N/A	TSSOP-20	1.75
TPS23770	Integrated PD with PWM Controller	4	Yes, Class 0-4	100	–40 to 85	Fixed	450	Auto Retry	Legacy (30.5/35.0 V)	N/A	TSSOP-20	1.75
PTB48540	5-V, 10-W PoE Power Module	4	Yes, Class 0-4	100	–40 to 85	Fixed	450	Latch Off	802.3af (30.6/39.4 V)	N/A	13-DIP Module	26.00

Device	Applications	Channels	Abs Max V_{IN} (V)	Operating Temp (°C)	IEEE Compliant	Interface	Disconnect	Measurements	Power FET	Package	Price*
PoE Power Sourcing Equipment (PSE) Controllers											
TPS2383B	Routers, switches, hubs, mid-spans	8	80	–40 to 85	Yes	I^2C	Both AC and DC	Current, voltage and capacitance	External	64-pin LQFP	7.35
TPS2384	Routers, switches, SOHO hubs, mid-spans	4	80	–40 to 125	Yes	I^2C	Both AC and DC	Current, voltage, capacitance and temperature	Internal	64-pin LQFP	4.73
TPS23841	High-power (25 W) routers, switches, SOHO hubs, mid-spans	4	80	–40 to 125	Yes	I^2C	Both AC and DC	Current, voltage, capacitance and temperature	Internal	64-pin LQFP	7.50

* *推荐零售价为每1000片时的美元价格。*

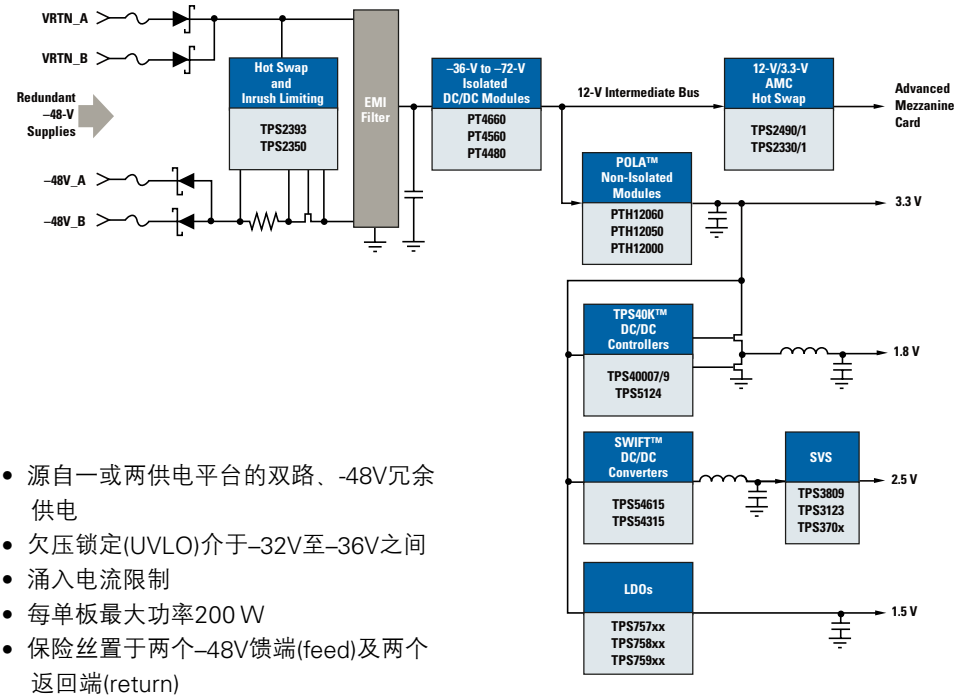
*如需关于PoE的更多资源，包括参考设计及评估板，敬请访问***power.ti.com/poe**

什么是ATCA?

高级电信计算架构（简称ATCA）是新开发的标准，以用于载波分级(carrier grade)通信设备。ATCA的要求在PICMG 3.0规范中得到定义，包括了机制、框架管理、电源分配、数据传输、散热、指导方针调整以及数据/电源连接器。

ATCA PICMG 3.0开放标准所特别定义的需求，可用于为单个功耗高达200W的单板(Individual boards)提供双路-48V馈送供电。

ATCA供电解决方案



ATCA供电需求

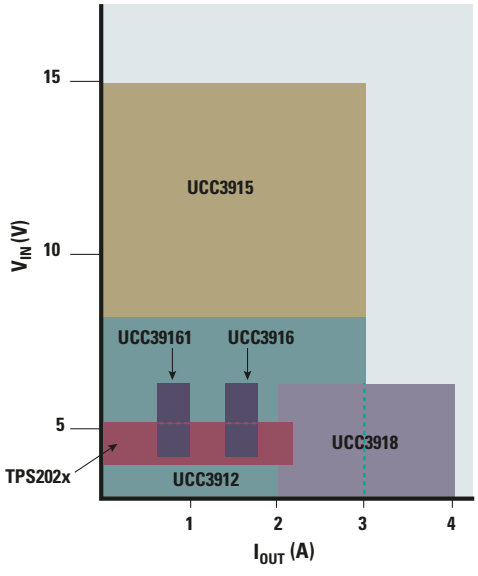
ATCA包括了现代热交换供电系统的许多典型要求。同时也包括了部分ATCA所特有的要求。而其中最具挑战性的可说是瞬态传导(transient ride-through)规范,它要求电路板须通过一个两侧输入5ms的短时脉冲实现连续工作。电路板还要求必须能通过10 µ s、100V的输入瞬变实现连续工作。

- 源自一或两供电平台的双路、-48V冗余供电
- 欠压锁定(UVLO)介于–32V至–36V之间
- 涌入电流限制
- 每单板最大功率200 W
- 保险丝置于两个–48V馈端(feed)及两个返回端(return)
- A及B的馈端/返回端(feed/return)实现隔离
- 输入端接至地时，具有5ms保持能力
- 60W最大夹层卡(mezzanine cards)功率
- 100V的瞬变容忍能力

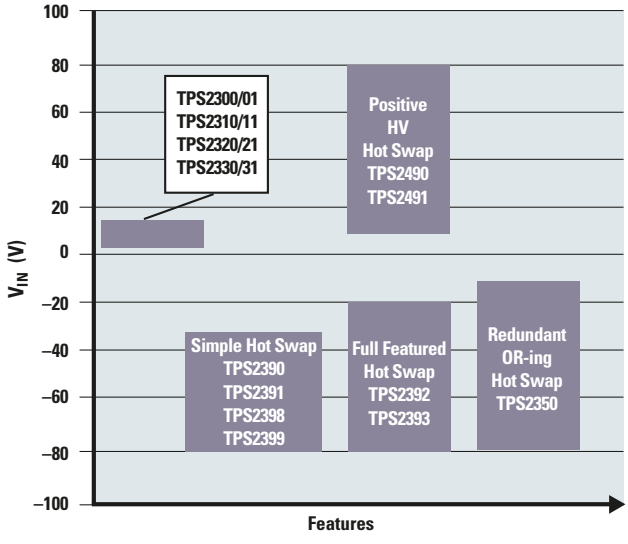
热交换电源管理产品系列

www.ti.com/atcapower

热交换电源开关IC（集成供电FET）



热交换电源控制IC（外置供电FET）



热交换电源管理

热交换开关（集成FET）选择指南

Device	Target Applications	Channels	V_{IN} (V)	Current Limit (A)	$r_{DS(on)}$ per FET (typ) (mΩ)	Enable/ Shutdown	Ramp	Package Options	Price*
UCC3915	Enclosure Management, General	1	7 to 15	0 to 3	150	1L	Current	SOIC-16, TSSOP-24	2.55
UCC3912	RAID, SCSI, General	1	3 to 8	0 to 3	150	1L	Current	SOIC-16, TSSOP-24	2.30
UCC3918	RAID, SCSI, General	1	3 to 6	0 to 4	75	1L	Current	SOIC-16, TSSOP-24	2.35
UCC3916	SCSI, General	1	4 to 6	1.65	220	1L	Current	SOIC-8	1.70

* 推荐零售价为每1000片时的美元价格。

热交换控制器（外置FET）选择指南

Device	Target Applications	Channels	V_{IN} Range (V)	Enable/ Shutdown	UV	OV	Fault	PG	Latch	Auto Retry	Ramp	Power Limiting	Package	Price*
TPS2300/01	CompactPCI, General	2	3 to 13/3 to 5.5	1L/1H	✔		✔	✔	✔		Voltage	No	20-pin TSSOP	1.60
TPS2310/11	CompactPCI, General	2	3 to 13/3 to 5.5	1L/1H	✔		✔	✔	✔		Voltage	No	20-pin TSSOP	1.60
TPS2320/21	CompactPCI, General	2	3 to 13/3 to 5.5	1L/1H	✔		✔	✔	✔		Voltage	No	16-pin SOIC/TSSOP	1.35
TPS2330/31	CompactPCI, General	1	3 to 13	1L/1H	✔		✔	✔	✔		Voltage	No	14-pin SOIC/TSSOP	1.25
TPS2342	CompactPCI, PCI-X, PC-X2.0	12	3.3, V_{aux}, V_{IO}, 5, +12, –12	1L	✔			✔	✔		Voltage	No	80-pin HTQFP	7.00
TPS2343	CompactPCI, PCI-X, PC-X2.0	12	3.3, V_{aux}, V_{IO}, 5, +12, –12	1L	✔			✔	✔		Voltage	No	80-pin SSOP	7.50
TPS2350	Replace –48-V OR-ing Diodes	2	–12 to –80	1H	✔	✔	✔	✔		✔	Current	No	14-pin SOIC/TSSOP	1.90
TPS2363	PCI Express	6	3.3 V_{aux}, 3.3, +12	1L	✔		✔	✔	✔		Voltage	No	48-pin QFP	2.50
TPS2390	Simple –48-V Telecom	1	–36 to –80	1H			✔		✔		Current	No	8-pin MSOP	1.00
TPS2391	Simple –48-V Telecom	1	–36 to –80	1H			✔			✔	Current	No	8-pin MSOP	1.00
TPS2392	Full Featured –48-V Telecom	1	–20 to –80	1H	✔	✔	✔	✔	✔		Current	No	14-pin TSSOP	1.80
TPS2393	Full Featured –48-V Telecom	1	–20 to –80	1H	✔	✔	✔	✔		✔	Current	No	14/44-pin TSSOP	1.80
TPS2393A	Full Featured –48-V Telecom	1	–20 to –80	1H	✔	✔	✔	✔		✔	Current	No	14-pin TSSOP	1.80
TPS2398	Simple –48-V Telecom with PG	1	–36 to –80	1H				✔	✔		Current	No	8-pin MSOP	1.25
TPS2399	Simple –48-V Telecom with PG	1	–36 to –80	1H				✔		✔	Current	No	8-pin MSOP	1.25
TPS2400	Overvoltage/Undervoltage Protection IC	1	2 to 100	1H	✔	✔			✔		—	No	SOT-23-5	0.80
TPS2410/1	N+1 and OR-ing Power Rail Controller	1	0.8 to 18	1H	✔	✔	✔	✔	✔		Voltage	No	14-pin TSSOP	1.70
TPS2412/3	N+1 and OR-ing Power Rail Controller	1	0.8 to 18	1H					✔		Voltage	No	14-pin TSSOP	1.20
TPS2490	Servers, Basestations, +48 V	1	9 to 80	1H	✔			✔	✔		Current	Yes	10-pin MSOP	1.70
TPS2491	Servers, Basestations, +48 V	1	9 to 80	1H	✔			✔		✔	Current	Yes	10-pin MSOP	1.70

* 推荐零售价为每1000片时的美元价格。

热交换电源管理

资源 如需完备的资源列表，敬请访问power.ti.com

Part Number	Description	Price*
Evaluation Modules (EVMs) and Tools		
TPS2375EVM	Power-over-Ethernet Powered Device Controller Evaluation Module	49
SLVC065	TPS2375/TPS2377 Design-in Calculation Tool	Free
TPS23750EVM-107	Power-over-Ethernet TPS23750 Powered Device Controller Evaluation Module Buck	49
TPS23750EVM-108	Power-over-Ethernet TPS23750 Powered Device Controller Evaluation Module Flyback	49
TPS2384EVM	Power-over-Ethernet Power Sourcing Equipment Controller Evaluation Module Auto Mode	149
TPS2384EVM-152	Power-over-Ethernet Power TPS2384 Sourcing Equipment Controller Evaluation Module Manual Mode	149
TPS2490EVM-001	TPS2490/1 Evaluation Module	49
TPS2490OR91CALC	TPS2490/1 Design-in Calculation Tool	Free

** 推荐零售价为美元价格。*

*新评估板以**粗体红色**标明。*

Literature Number	Part Number	Description
Application Notes		
SLUU221	TPS2363	PCIExpress Server Dual Slot Hot Plug User's Guide
SLUA331	UC2572	ATCA High Voltage Energy Storage Technique to Reduce Size and Cost of Transient Holdup Circuitry
SLVR248	TPS2490/TPS2231	ATCA AMC Hot Swap Reference Design
SLVR246a	TPS2393	–48-V ATCA Hot Swap Reference Design Using the TPS2393 (Rev. A)
SLUU212a	TPS2350	–48-V ATCA Hot Swap Reference Design Using the TPS2350 (Rev. A)
SLVA158	TPS2490/1	Hot Swap Design Using TPS2490/91 and MOSFET Transient Thermal Response
SLVA337	TPS2490/1	Undervoltage and Overvoltage Control for the TPS2490/91
SLVA362	TPS2490/1	Hot Plug Express Card
SLVA233a	TPS2384	Electrical Transient Immunity for Power-over-Ethernet
SLVA230	TPS2384	Implementation of a Port ON LED in PSE Systems
SLVA231	TPS2384	Proper Termination of Unused Port Connections
SLVA377	TPS2384	Using Standard Power-over-Ethernet Controllers for High-Powered Devices
SLVA223	TPS2384	Simple PSE Solution Delivers High Power-over-Ethernet to 31-35W PD Over Four Pairs
SLVA224	TPS2384	Simple PSE Solution Delivers High Power-over-Ethernet to 16-18W PD Over Two Pairs
SLVA229	TPS2384	Opto-Isolator Selection Guidelines: TPS2384 I^2C Interface
SLVA221	TPS2384	PSE Solution Delivers High Power-over-Ethernet to 25-W PD Over Two Pairs
SLVA328a	TPS2384	PSE Controller Interface Control (Rev. A)
SLUU206	TPS2375/TPS2376/TPS2377	Estimating Available Application Power for Power-over-Ethernet Applications
SLVA225	TPS2375/TPS2376/TPS2377	High Power PoE PD Using the TPS2375/77-1
SLVA220	TPS2375/TPS2376/TPS2377	Wall Adapter Powers IEEE 802.3af Powered Device
SLUA318	TPS2393	–48-V ATCA Module Hot Swap Using the TPS2393
SLVA158	TPS2490/TPS2491	Hot Swap Design Using the TPS2490/91 and MOSFET Transient Thermal Response
SLUA313	TPS2392/TPS2393	Protecting the TPS2392/TPS2393 Insertion Detection Inputs in Fused Applications
SLVA163	TPS2400	Overvoltage Protector for High Voltage Loads
SLVS368	—	Comparing Performance of Current Ramp and Voltage Ramp Hot Swap Controller ICs
SLUA187	UCC3912/15	Programmable Hot Swap Power Manager
SLUA198	UCC3912	Electronic Circuit Breaker ICs
SLUA131	UCC3912	Integrated Electronic Circuit Breaker IC for Hot Swap
SLUA211	UCC3918	Hot Swap Power Manager Evaluation Board and Schematic
SLUA283	TPS239x	A Universal Telecommunications Hot Swap Device Family
SLUA302	TPS2398/99, TPS2390/91	A Comparison of Telecom Hot Swap Managers TPS2398/99 vs TPS2390/91
SLUA291	TPS239x	–48-V Hot Swap Performance Competitive Comparison
SLUA306	TPS2398/99	Using the TPS2398/99 Hot Swap Controller with Power Trends PT4485
SLUA297	TPS2350	Boosting Supply Select Hysteresis on the TPS2350

PCMCIA及USB设备

设计因素

PCMCIA/卡总线电源开关

标准的PC卡要求V_{CC}相对地可在3.3V及5V间切换，同时V_{PP}相对地可在3.3V、5V及12V间切换。卡槽插口(CardBay sockets)对V_{CC}具有标准的需求，但对V_{PP}来说，则具有接地、3.3V及5V电平的需求，对于V_{CORE}具有接地、1.8V及3.3V的需求。其余的PC卡应用也许不只是简单的要求12V或V_{PP}电平，但同时还对V_{CC}有标准的需求。因此，在选择PCMCIA电源开关时必须考虑应用的电源电压需求。

带双路电流限制+LDO的USB高功率外设开关

TPS2140/41/50/51 — TPS2140/41/50/51针对于高功率的USB外设应用，例如ADSL调制解调器。此器件包括了一个电源开关及一个LDO。其双路电流限制开关允许使用大容量电容以稳定USB总线电压。

用于USB总线供电外设及集线器的双路电源开关+LDO

TPS2148/49 — TPS2148是完全的电源管理解决方案，用于USB总线供电外设，例如Zip驱动器；而TPS2149则可用于USB总线供电的集线器应用，例如带集成集线器的键盘。TPS2148/9都在其单片MSOP封装内整合了3.3V LDO及双路电源开关。TPS2148开关的配置允许电源与板载电容分隔，以满足USB系统对电流的需求。TPS2149开关可管理两个独立的或四个集群(ganged)的USB端口。

4端口USB集线器电源控制器

TPS207x — TPS207x系列提供了完全的电源解决方案，可用于4端口自供电、总线供电或混合型USB供电的集线器。此方案整合了用于四个端口的限流开关；3.3V 100-mA LDO；用于自供电(TPS2070, TPS2071)的一个5V LDO控制器；用以向主机发出一个附加连接信号的一个DP0线控制输入。

PCMCIA设备产品系列

PCMCIA/卡总线电源开关IC矩阵表

	Current Limit (min) (A)			
	0.3	0.7	1.0	2.5
3.3 V, 5 V, 12 V, V_{PP}				
Dual	—	—	TPS2224A, TPS2226A, TPS2204A, TPS2206A, TPS2205,	—
Single	TPS2212	—	TPS2204A, TPS2210A, TPS2211A, TPS2220A, TPS2220B	TPS2231
No 12 V				
Dual	—	—	TPS2223A	TPS2236
Single	—	TPS2044B/54B[1]	—	—
No V_{PP}				
Dual	—	TPS2044B/54B[1]	—	—

[1] *UL认证产品*

USB设备产品系列

USB电源分配开关

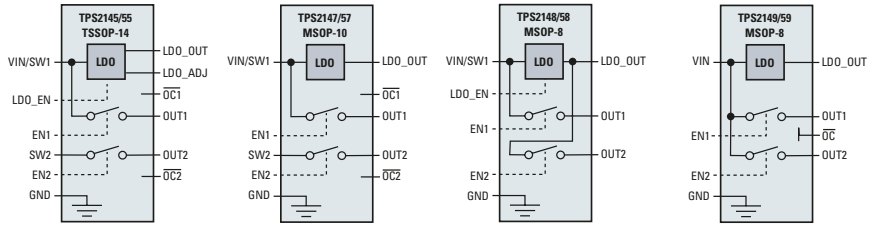
	Current Limit (min) (A)							
	0.22	0.3	0.66	0.7	1.1	1.5	1.65	2.2
Quad	—	TPS2048A/58A[1]	—	TPS2044B/54B[1]	—	—	—	—
Triple	—	TPS2047B/57A[1]	—	TPS2043B/53B[1]	TPS2063/67[1]	—	—	—
Dual	—	TPS2046B/56A	—	TPS2042B/52B[1]	TPS2062/66	TPS2060/64[1]	—	—
Single	TPS2020/30	TPS2045A/55A[1]	TPS2021/31	TPS2041B/51B[1]	TPS2022/32 TPS2061/65[1]	—	TPS2023/33	TPS2024/34

[1] *UL认证产品*

4端口USB集线器电源控制器

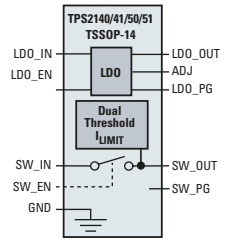
Device	5-V LDO Controller	Bus Power Mode Indicator	Pins	Package
TPS2070	Yes	Active Low	32	HTSSOP
TPS2071	Yes	Active High	32	HTSSOP
TPS2074	No	Active Low	24	SSOP
TPS2075	No	Active High	24	SSOP

用于USB总线供电外设及集线器的双路电源开关+LDO



USB高功率外设总线开关+LDO

Device	Switch Voltage	Description
TPS2140	3.3 V	3.3-V, 500-mA switch with active-low enable, 250-mA LDO
TPS2141	5.0 V	5.0-V, 500-mA switch with active-low enable, 250-mA LDO
TPS2150	3.3 V	3.3-V, 500-mA switch with active-high enable, 250-mA LDO
TPS2151	5.0 V	5.0-V, 500-mA switch with active-high enable, 250-mA LDO



设计因素（续）

易于使用 — USB的应用无需反复为外设的安装新驱动及设立独立的设定，从而简化了安装，改善了性能。USB可将多种业已存在的接口结合到一个单个易用的连接器中，极大地降低了系统的复杂性，并为厂商提供了开发高度集成产品的可能。

电源分配开关

TPS204xB/5xB — TPS204xB/5xB系列80mΩ限流电源开关满足所有USB电源管理的要求，可用于控制下行(downstream)端口，并拥有多个附加特色可用于改善设计的可靠性。例如，当过电流状态出现时，器件可智能的仅关断检测出错的端口。

TPS202x/3x/6x — TPS202x/3x/6x系列低导通电阻限流电源开关允许在单个开关芯片上集群连接多个端口，详细描述敬请参见应用手册SLVA049。尽管集群连接可实现成本效益，但所有的端口都会受到单个端口出错的影响。

选择指南

Device	Interface	Number of Ports	3.3-V $r_{DS(on)}$ (typ) (mΩ)	5.0-V $r_{DS(on)}$ (typ) (mΩ)	I_{OS} (min) (A)	Predecessor	Price*
PCMCIA/CardBus Switch Matrix ICs							
TPS2210A	3-line Serial	1	85	95	1	—	0.85
TPS2204A	3-line Serial	2	85	95	1	TPS2214/14A	1.95
TPS2220B	3-line Serial	1	85	95	1	TPS2220A	0.85
TPS2223A	3-line Serial	2	85	95	1	—	1.80
TPS2224A	3-line Serial	2	85	95	1	TPS2214/14A	1.95
TPS2226A	3-line Serial	2	85	95	1	TPS2206, TPS2216/16A	2.10
TPS2206A	3-line Serial	2	85	95	1	TPS2206, TPS2216/16A	2.10
TPS2205	8-line Parallel	2	70	100	1	TPS2201	2.90
TPS2211A	4-line Parallel	1	70	57	1	TPS2211	0.75
TPS2212	4-line Parallel	1	160	160	0.3	—	1.45
TPS2231	4-line Parallel	1	68	—	2.5	—	1.00
TPS2044B or 54B	Parallel	1 or 2	80	80	0.7	TPS2044/44A, TPS2054/54A	1.00
TPS2221	Interface Parallel	1	72	97	1	—	1.85
TPS2228	Interface Serial	2	72	97	1	—	3.10

* *推荐零售价为每1000片时的美元价格。*

PCMCIA及USB设备

选择指南（续）

Device	Number of FETs	I_{OS} (min) (A)	$r_{DS(on)}$ (mΩ)	V_{IN} Range (V)	Supply Current (µA)	OC Logic Output	OT Logic Output	Enable	Predecessor	Price*
USB Power Distribution Switches										
TPS2020/30	1	0.22	33	2.7 to 5.5	73	Yes	Yes	L/H	—	1.05
TPS2021/31	1	0.66	33	2.7 to 5.5	73	Yes	Yes	L/H	TPS2014	1.05
TPS2022/32	1	1.1	33	2.7 to 5.5	73	Yes	Yes	L/H	TPS2015	1.05
TPS2023/33	1	1.65	33	2.7 to 5.5	73	Yes	Yes	L/H	—	1.05
TPS2024/34	1	2.2	33	2.7 to 5.5	73	Yes	Yes	L/H	—	1.05
TPS2041B/51B	1	0.7	70	2.7 to 5.5	40	Each	Yes	L/H	TPS2041/51/41A/51A	0.50
TPS2042B/52B	2	0.7	70	2.7 to 5.5	53	Each	Yes	L/H	TPS2042/52/42A/52A	0.70
TPS2043B/53B	3	0.7	70	2.7 to 5.5	65	Each	Yes	L/H	TPS2043/53/43A/53A	0.90
TPS2044B/54B	4	0.7	70	2.7 to 5.5	75	Each	Yes	L/H	TPS2044/54/44A/54A	1.00
TPS2045A/55A	1	0.3	80	2.7 to 5.5	80	Each	Yes	L/H	TPS2045/55	0.60
TPS2046B/56A	2	0.3	80	2.7 to 5.5	80	Each	Yes	L/H	TPS2046/46A/56	0.65
TPS2047B/57A	3	0.3	80	2.7 to 5.5	160	Each	Yes	L/H	TPS2047/47A/57	0.90
TPS2048A/58A	4	0.3	80	2.7 to 5.5	160	Each	Yes	L/H	TPS2048/58	1.20
TPS2049	1	0.1	70	2.7 to 5.5	40	Each	Yes	L/H	—	0.50
TPS2060/4	2	1.5	70	2.7 to 5.5	50	Each	Yes	L/H	—	1.20
TPS2061/5	1	1.1	70	2.7 to 5.5	43	Each	Yes	L/H	—	0.60
TPS2062/6	2	1.1	70	2.7 to 5.5	50	Each	Yes	L/H	—	0.75
TPS2063/7	3	1.1	70	2.7 to 5.5	65	Each	Yes	L/H	—	0.90

Device	Application	Number of FETs	Switch Enable	Bus Power Indicator (BPMODE)	V_{IN} (min) (V)	V_{IN} (max) (V)	Bus Powered $r_{DS(on)}$ per FET (typ) (mΩ)	Bus Powered Current Limit (min) (A)	Self Powered $r_{DS(on)}$ per FET (typ) (mΩ)	Self Powered Current Limit (min) (A)	LDO Controller (A)	LDO	Price*
USB Power Controllers													
TPS2070	USB 4-port hub	8	L	1L	4.5	5.5	560	0.12	107	0.6	5 V, 3 A	3.3 V, 100 mA	2.55
TPS2071	USB 4-port hub	8	L	1H	4.5	5.5	560	0.12	107	0.6	5 V, 3 A	3.3 V, 100 mA	2.55
TPS2074	USB 4-port hub	8	L	1L	4.5	5.5	500	0.12	100	0.6	—	3.3 V, 100 mA	2.55
TPS2075	USB 4-port hub	8	L	1H	4.5	5.5	500	0.12	100	0.6	—	3.3 V, 100 mA	2.55
TPS2140	USB peripheral	1	L	—	2.7	5.5	70	0.1 and 1.2	—	—	—	Adj. 0.9 to 3.3 V, 250 mA	1.10
TPS2141	USB peripheral	1	L	—	4	5.5	70	0.1 and 1.2	—	—	—	Adj. 0.9 to 3.3 V, 250 mA	1.10
TPS2150	USB peripheral	1	H	—	2.7	5.5	70	0.1 and 1.2	—	—	—	Adj. 0.9 to 3.3 V, 250 mA	1.10
TPS2151	USB peripheral	1	H	—	4	5.5	70	0.1 and 1.2	—	—	—	Adj. 0.9 to 3.3 V, 250 mA	1.10
TPS2145	DSP, PDA	2	L	—	2.9	5.5	340	0.2	—	—	—	3.3 V, 200 mA	1.15
TPS2147	DSP, PDA	2	L	—	2.9	5.5	340	0.2	—	—	—	3.3 V, 200 mA	1.10
TPS2148	USB peripheral	2	L	—	2.9	5.5	340	0.2	—	—	—	3.3 V, 200 mA	0.99
TPS2149	USB 2-port hub	2	L	—	2.9	5.5	340	0.2	—	—	—	3.3 V, 200 mA	0.95
TPS2155	DSP, PDA	2	H	—	2.9	5.5	340	0.2	—	—	—	3.3 V, 200 mA	1.15
TPS2157	DSP, PDA	2	H	—	2.9	5.5	340	0.2	—	—	—	3.3 V, 200 mA	1.10
TPS2158	USB peripheral	2	H	—	2.9	5.5	340	0.2	—	—	—	3.3 V, 200 mA	0.99
TPS2159	USB 2-port hub	2	H	—	2.9	5.5	340	0.2	—	—	—	3.3 V, 200 mA	0.95

* 推荐零售价为每1000片时的美元价格。

设计因素

电源多路复用IC

电源多路复用IC设计用于在主电源失效时，将主电源切换至备用电源。（例如，从电池供电转向插头式适配器）

限流电源开关

电源开关用于智能的开启及关断电源，同时提供错误状态保护。电源开关用在任何需要对电源控制分配的场合，包括电路分区、模块、插入式卡(add-in cards)以及连接缆线。这些都可以理想的用于供电的先后次序或分隔。

为最小化压降，应选择具有最低$r_{DS(on)}$或最低漏极至源极导通阻抗的器件。

通用串行总线(USB)电源开关及LDO+电源开关组合式IC的资料请参看第56-58页。

ExpressCard™ 电源开关

TPS2231及TPS2236 ExpressCard电源接口开关提供了满足ExpressCard卡规范要求的总体电源管理解决方案。TPS2231及TPS2236 ExpressCard电源接口开关分配3.3V、AUX和1.5V至ExpressCard插槽。每条电压导轨通过集成的限流电路进行保护。TPS2231支持单槽(single-slot)ExpressCard/34或ExpressCard/54插口的系统。TPS2236支持双槽(dual-slot)ExpressCard插口的系统.

电源多路复用器产品系列

电源多路复用器IC

Configuration	Device	I_{OUT} (mA)	Transition	Comments
	TPS2100/1	IN1: 500, IN2: 10	Manual	SOT-23, 0 to 70°C
	TPS2102/3	IN1: 500, IN2: 100	Manual	SOT-23, 0 to 70°C
	TPS2104/5	IN1: 500, IN2: 100	Manual	SOT-23, –40 to 85°C
IN1 IN2	TPS2110A	Adj. 310 to 750	Auto/Manual	TSSOP
	TPS2111A	Adj. 630 to 1250	Auto/Manual	TSSOP
	TPS2112A	Adj. 310 to 750	Auto	TSSOP, Status pin
	TPS2113A	Adj. 630 to 1250	Auto	TSSOP, Status pin
	TPS2114A	Adj. 310 to 750	Auto/Manual	TSSOP, Status pin
	TPS2115A	Adj. 630 to 1250	Auto/Manual	TSSOP, Status pin

请于本册选择指南第60页查阅TPPM0301/2/3相关资料（用于NIC网络接口卡）

限流开关产品系列

限流电源开关IC

	Current Limit (min) (A)						
	0.22	0.3	0.66	0.7	1.1	1.65	2.2
Fault Reporting							
Quad	—	TPS2048A/58A[2] TPS2095/6/7	—	TPS2044/54[2] TPS2044A/54A[2] TPS2044B/54B[2] TPS2085/6/7	—	—	—
Triple	—	TPS2047B/57A	—	TPS2043/53[2] TPS2043A/53A[2] TPS2043B/53B[2]	TPS2063/7	—	—
Dual	—	TPS2046B/56A TPS2090/1/2	—	TPS2042/52[2] TPS2042A/52A[2] TPS2042B/52B[2] TPS2080/1/2	TPS2062/6	—	—
Single	TPS2020/30[1]	TPS2045A/55A[2]	TPS2021/31[1]	TPS2041/51[2] TPS2041A/51A[2] TPS2041B/51B[2]	TPS2022/32 TPS2061/5	TPS2023/33	TPS2024/34
No Fault Reporting							
Single	TPS2010A	—	TPS2011A	—	TPS2012A	TPS2013A	—

[1] *Nemko认证。* [2] *UL及Nemko认证。*

ExpressCard电源开关IC

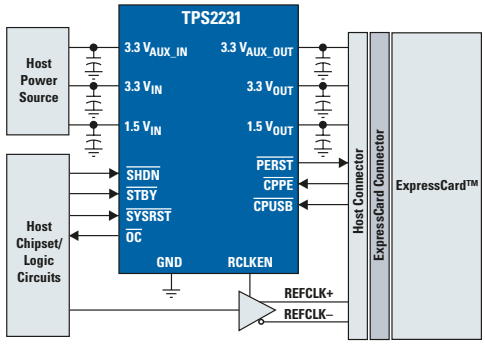
Device	Ports	3-V $r_{DS(on)}$ (typ) (mΩ)	Interface	Current Limit (min) (A)
TPS2231	1	45	Parallel	2.5
TPS2236	2	45	Parallel	2.5

集成ExpressCard™电源接口开关
TPS2231

敬请访问**www.ti.com/sc/device/TPS2231**，以获取样片、数据表、评估板及相关应用报告。

主要特点

- 满足ExpressCard™ 技术的PC卡标准
- 输入端兼容TTL逻辑电平
- 短路保护及过热保护
- 3.3V辅助输入（单端）时静态工作电流为50 μA（典型值）



典型ExpressCard™电源分配应用

电源多路复用器及限流开关

选择指南

Device	Number of Inputs	IN1 $r_{DS(on)}$ (mΩ)	IN2 $r_{DS(on)}$ (mΩ)	IN1 Output Current (mA)	IN2 Output Current (mA)	IN1 Supply Current (µA)	IN2 Supply Current (µA)	Input Voltage Range (V)	Transition Time IN1 to IN2 (µs)	Transition Time IN2 to IN1 (µs)	Transition	Price*
Power MUX ICs												
TPPM0301/2	3	—	—	400	400	2500	250	3 to 5.5	—	—	Autoswitch	1.60
TPPM0303	3	—	—	250	250	2500	250	3 to 5.5	—	—	Autoswitch	1.07
TPS2100/1	2	250	1300	500	10	10	0.75	2.7 to 4.0	4	900	L/H enable	0.59
TPS2102/3	2	250	1300	500	100	14	0.75	2.7 to 4.0	3	700	L/H enable	0.69
TPS2104/5	2	250	1300	500	100	18	0.75	2.7 to 5.5	3	700	L/H enable	0.85
TPS2110A/2A/4A	2	120	120	312 to 750	312 to 750	85	85	2.8 to 5.5	40	40	Autoswitch	0.70
TPS2111A/3A/5A	2	84	84	625 to 1250	625 to 1250	85	85	2.8 to 5.5	40	40	Autoswitch	0.70

Device	Number of FETs	I_{OS} (min) (A)	$r_{DS(on)}$ (mΩ)	V_{IN} Range (V)	Supply Current (µA)	OC Logic Output	OT Logic Output	Enable	Predecessor	Price*
Current-Limiting Power Switch ICs										
TPS2010A	1	0.22	30	2.7 to 5.5	73	No	No	L	TPS2010	0.75
TPS2011A	1	0.66	30	2.7 to 5.5	73	No	No	L	TPS2011	0.75
TPS2012A	1	1.1	30	2.7 to 5.5	73	No	No	L	TPS2012	0.75
TPS2013A	1	1.65	30	2.7 to 5.5	73	No	No	L	TPS2013	0.75
TPS2020/30	1	0.22	33	2.7 to 5.5	73	Yes	Yes	L/H	—	1.05
TPS2021/31	1	0.66	33	2.7 to 5.5	73	Yes	Yes	L/H	TPS2014	1.05
TPS2022/32	1	1.1	33	2.7 to 5.5	73	Yes	Yes	L/H	TPS2015	1.05
TPS2023/33	1	1.65	33	2.7 to 5.5	73	Yes	Yes	L/H	—	1.05
TPS2024/34	1	2.2	33	2.7 to 5.5	73	Yes	Yes	L/H	—	1.05
TPS2041B/51B	1	0.7	70	2.7 to 5.5	43	Each	Yes	L/H	TPS2041/51/41A/51A	0.50
TPS2042B/52B	2	0.7 ea	70	2.7 to 5.5	50	Each	Yes	L/H	TPS2042/52/42A/52A	0.70
TPS2043B/53B	3	0.7 ea	70	2.7 to 5.5	65	Each	Yes	L/H	TPS2043/53/43A/53A	0.90
TPS2044B/54B	4	0.7 ea	70	2.7 to 5.5	75	Each	Yes	L/H	TPS2044/54/44A/54A	1.00
TPS2045A/55A	1	0.3	80	2.7 to 5.5	80	Each	Yes	L/H	TPS2045/55	0.60
TPS2046B/56A	2	0.3 ea	80	2.7 to 5.5	80	Each	Yes	L/H	TPS2046/46A/56	0.65
TPS2047B/57A	3	0.3 ea	80	2.7 to 5.5	160	Each	Yes	L/H	TPS2047/47A/57	0.90
TPS2048A/58A	4	0.3 ea	80	2.7 to 5.5	160	Each	Yes	L/H	TPS2048/58	1.20
TPS2049	1	0.1	70	2.7 to 5.5	43	Each	Yes	L	TPS2041/51/41A/51A	0.50
TPS2060/4	2	1.5 ea	70	2.7 to 5.5	50	Each	Yes	L/H	—	1.20
TPS2061/5	1	1.1	70	2.7 to 5.5	43	Each	Yes	L/H	—	0.60
TPS2062/6	2	1.1 ea	70	2.7 to 5.5	50	Each	Yes	L/H	—	0.75
TPS2063/7	3	1.1 ea	70	2.7 to 5.5	65	Each	Yes	L/H	—	0.90
TPS2080/1/2[1]	2	0.7 ea	80	2.7 to 5.5	85	Yes	Yes	2H, 1L/1H, 2L	—	0.65
TPS2085/6/7[1]	4	0.7 ea	80	2.7 to 5.5	85	Yes	Yes	4H, 2L/2H, 4L	—	1.05
TPS2090/1/2[1]	2	0.3 ea	80	2.7 to 5.5	85	Yes	Yes	2H, 1L/1H, 2L	—	0.65
TPS2095/6/7[1]	4	0.3 ea	80	2.7 to 5.5	85	Yes	Yes	4H, 2L/2H, 4L	—	1.05

[1] *可配置为电源多路复用IC。*
* *推荐零售价为每1000片时的美元价格*

设计因素

系统电压 — 你所需要的监控器类型取决于该系统所采用的电压导轨类型。例如，设计用于支持处理器的监控器需要根据驱动处理器的电压进行选择。

通道数 — 在单个系统中，典型的所需监控功能数量取决于处理器及外设的电压数量。例如，分离电压式(split voltage)处理器或许同时需要监控两条电源轨，并且，系统内存还可能需要监控并工作于第三个（与前两个电压不同）电压轨。

手动复位(MR) — 此特点允许用户手动复位电路，或通过另一个应用设备来控制监控电路。

看门狗输入(WDI) — 在某些情况下，系统处理器或许并不处于合适的功能状态，使得其板载的看门狗特性无法实现复位。而带集成看门狗功能的监控器可用于触发复位，从而增强了系统的可靠性。

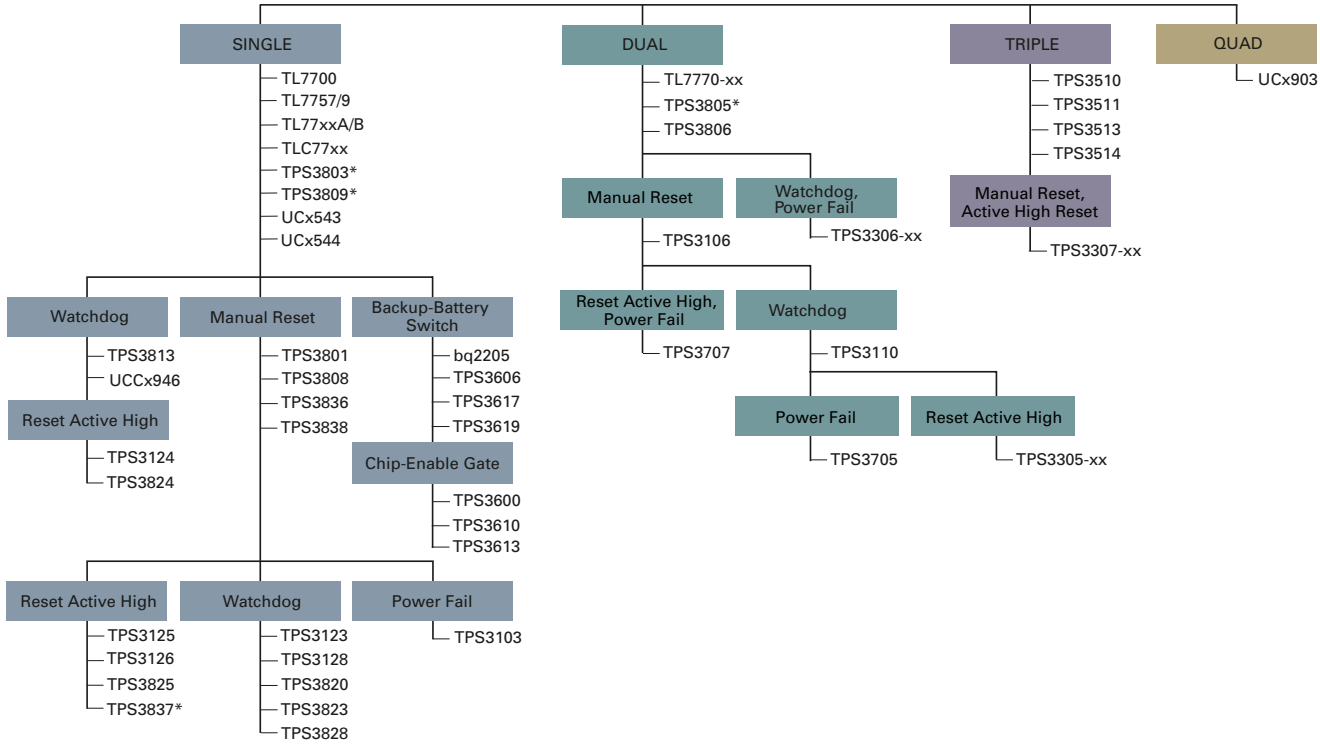
高位有效输出 — 允许用户使用带高位有效复位(active high reset)输入的处理器，无须附加组件。

电源失效输入/输出(PFI/PFO) — 通过使用此比较器，实现了更高的灵活性。例如，长时间的电池监测及预警。

延迟时间 — 在正常工作状态恢复之前，使电压及其它电路中的组件首先达到稳定(stabilize)。

芯片使能门选(Chip-Enable Gating) — 芯片使能门选防止低电压状态下错误数据对CMOS RAM的破坏。

监控电路（电压监控）产品系列



如需低成本的解决方案，敬请从*标记开始选择。

选择指南

Device	Number of Supervisors	Supervised Voltages	Packages	V_{DD} Range (V)	I_{DD} (typ) (µA)	Time Delay (ms)	Watchdog Timer WDI (sec)	Reset Threshold Accuracy (%)	Manual Reset Input/MR	Active-Low Reset Output	Active-High Reset Output	Reset Output Topology[1]	Power-Fail PFI/PFO	Over-Voltage Detection	Over-Current Detection	Backup-Battery Switchover	Chip-Enabled Gating	Price*	Comments
General Purpose Supply Supervisors																			
TPS3808	1	Adj./0.9/1.2/1.5/1.8/2.5/3.0/3.3/5.0/EEPROM	SOT-23	1.8 to 6.5	2.4	Prog	—	0.5	✔	✔		OD						0.70	
TPS3103	1	1.2/1.5/2.0/3.3	SOT-23	0.4 to 3.3	1.2	130	—	0.75	✔	✔		OD	✔					0.90	
TPS3123	1	1.2/1.5/1.8	SOT-23	0.75 to 3.3	14	180	1.4	3.6	✔	✔		PP						0.85	
TPS3124	1	1.2/1.5/1.8	SOT-23	0.75 to 3.3	14	180	1.4	3.6		✔	✔	PP						0.85	
TPS3125	1	1.2/1.5/1.8/3.0	SOT-23	0.75 to 3.3	14	180	—	3.6	✔	✔	✔	PP						0.80	
TPS3126	1	1.2/1.5/1.8	SOT-23	0.75 to 3.3	14	180	—	3.5	✔	✔	✔	OD						0.80	
TPS3128	1	1.2/1.5/1.8	SOT-23	0.75 to 3.3	14	180	1.4	3.5	✔	✔		OD						0.85	
TPS3800	1	2.7	SC-70	1.6 to 6.0	9	100	—	2	✔	✔		PP						0.49	
TPS3801	1	Adj./1.8/2.5/3.0/3.3/5.0	SC-70	1.6 to 6.0	9	200	—	2	✔	✔		PP						0.49	
TPS3802	1	3.0/3.3	SC-70	1.6 to 6.0	9	400	—	2	✔	✔		PP						0.49	
TPS3803	1	Adj./1.5	SC-70	1.3 to 6.0	3	5 µs	—	1.5		✔		OD						0.29	
TPS3809	1	2.5/3.0/3.3/5.0	SOT-23	2.0 to 6.0	9	200	—	2.2		✔		PP						0.29	
TPS3813	1	2.5/3.0/3.3/5.0	SOT-23	2.0 to 6.0	9	25	Window	2.2		✔		OD						0.90	Window Watchdog
TPS3820/8-xx	1	3.3/5.0	SOT-23	1.1 to 5.5	15	25/200	0.2/1.6	2.4	✔	✔		PP/OD						0.65	
TPS3823	1	2.5/3.0/3.3/5.0	SOT-23	1.1 to 5.5	15	200	1.6	2.4	✔	✔		PP						0.65	
TPS3824-xx	1	2.5/3.0/3.3/5.0	SOT-23	1.1 to 5.5	15	200	1.6	2.2		✔	✔	PP						0.65	
TPS3825-xx	1	3.3/5.0	SOT-23	1.1 to 5.5	15	200	—	2.2	✔	✔	✔	PP						0.55	
TPS3836/8	1	1.8/2.5/3.0/3.3	SOT-23	1.6 to 6.0	0.22	10/200	—	2.5	✔	✔		PP/OD						0.85	
TPS3837	1	1.8/2.5/3.0/3.3	SOT-23	1.6 to 6.0	0.22	10/200	—	2.4	✔		✔	PP						0.85	
TL7700	1	Adjustable	DIP-8, SOP-8	1.8 to 40	0.6 mA	Prog	—	1		✔		OC						2.25	
TL7757	1	5	SO-8, SOT-89, TO-92	1.0 to 7.0	1.4 mA	5 µs	—	2.6		✔		OC						0.32	
TL7759	1	5	SO-8	1.0 to 7.0	1.4 mA	5 µs	—	2.6		✔	✔	OC						0.88	
TL77xxA	1	2.7/5/9/12/15	SO-8, DIP-8, SOP-8	3.5 to 18	1.8 mA	Prog	—	2	✔	✔	✔	OC						0.25	
TL77xxB	1	2.7/3.3/5	SO-8, DIP-8	3.6 to 18	1.8 mA	Prog	—	2	✔	✔	✔	OC						0.27	
TLC77xx	1	Adj./2.5/3.3/3.0/5.0	SO-8, DIP-8, TSSOP-8	2.0 to 6.0	9	Prog	—	5.5		✔	✔	PP						0.65	
UCCx946	1	Adjustable	SO-8, DIL-8, TSSOP-8	2.0 to 5.5	10	Prog	Prog	2		✔		PP						1.40	
TPS3807	2	3/3.5	SC-70	1.8 to 6.5	3.5	20	—	1		✔		OD						0.95	
TPS3106	2	Adj./0.9/1.6/3.3	SOT-23	0.4 to 3.3	1.2	130	—	0.75	✔	✔		OD						0.90	
TPS3110	2	Adj./0.9/1.2/1.5/3.3	SOT-23	0.4 to 3.3	1.2	130	1.1	0.75	✔	✔		PP						0.99	
TPS3305-xx	2	1.8/2.5/3.3/5.0	SO-8, MSOP-8	2.7 to 6.0	15	200	1.6	2.7	✔	✔	✔	PP						1.00	
TPS3306-xx	2	1.5/1.8/2.0/2.5/3.3/5.0	SO-8, MSOP-8	2.7 to 6.0	15	100	0.8	2.7		✔		OD	✔	✔				1.05	
TPS3705-xx	2	3.0/3.3/5.0	SO-8, MSOP-8	2.0 to 6.0	30	200	1.6	2.1	✔	✔		PP	✔					0.80	
TPS3707-xx	2	2.5/3.0/3.3/5.0	SO-8, MSOP-8	2.0 to 6.0	20	200	—	2.2	✔	✔	✔	PP	✔					0.75	
TPS3805	2	Adj./3.3	SC-70	1.3 to 6.0	3	5 µs	—	1.5		✔		PP						0.34	
TPS3806	2	Adj./2.0/3.3	SOT-23	1.3 to 6.0	3	5 µs	—	2		✔		OD						0.60	
TL7770-xx	2	5.0/12.0 & Adj.	SO-16, DIP-16	3.5 to 18	5 mA	Prog	—	2	✔	✔	✔	OC		✔				1.55	
TPS3307-xx	3	Adj./1.8/2.5/3.3/5.0	SO-8, MSOP-8	2.0 to 6.0	15	200	—	2.7	✔	✔	✔	PP						1.05	
UCx903	4	Adjustable	DIP-18, PLCC-20	—	7 mA	Prog	—	5		✔	✔	OC	✔	✔				2.45	
Battery Backup Switchover Supply Supervisors																			
TPS3600	1	2.0/2.5/3.3/5.0	TSSOP-14	—	20	100	0.8	2.3	✔	✔		PP	✔			✔	✔	2.30	
TPS3606-33	1	3.3	MSOP-10	—	20	100	0.8	2	✔	✔		PP	✔			✔		1.80	
TPS3610	1	1.8/5.0	TSSOP-14	—	20	100	0.8	2		✔		PP	✔			✔	✔	2.10	
TPS3613-01	1	Adjustable	MSOP-10	—	20	100	—	1.7	✔	✔	✔	PP				✔	✔	1.60	
TPS3617-50	1	5	MSOP-8	—	20	100	0.8	2		✔		PP	✔			✔		1.35	
TPS3619	1	3.3/5.0	MSOP-8	—	15	100	—	2	✔	✔		PP	✔			✔		1.10	
bq2205LY	1	3.3	TSSOP-16	—	0.2 mA	55	—	1.7		✔		OD				✔	Two	1.75	See Note 2
Special Function Supply Supervisors																			
bq2205LY	1	3.3	TSSOP-16	—	0.2 mA	55	—	1.7		✔		OD				✔	Two	1.75	See Note 2
TPS3510	3	3.3/5.0/12.0	SO-8, DIP-8	—	1 mA	300	—	9.1		✔		OD	✔	✔				0.55	PC Power Supplies
TPS3511	3	3.3/5.0/12.0	SO-8, DIP-8	—	1 mA	150	—	5.7		✔		OD	✔	✔				0.55	PC Power Supplies
TPS3513	3	3.3/5.0/12.0	SO-14, DIP-14	—	1 mA	300	—	9.1		✔		OD	✔	✔	✔			0.85	PC Power Supplies
TPS3514	3	3.3/5.0/12.0	SO-14, DIP-14	—	1 mA	300	—	5.2		✔		OD	✔	✔	✔			0.85	PC Power Supplies

[1] *PP = 推挽(push-pull)，OD =漏极开路(open drain)，OC =集极开路(open collector).*
[2] *带电池备份的3.3V SRAM控制器*

* *推荐零售价为每1000片时的美元价格。*
注：可为用户提供订制电压电平。接受小订单。敬请与TI联系以获取详细资料及可用信息。

*新器件以**粗体红色**标明。*

设计因素

拓扑—并行(shunt,两终端）vs.串行(series，三终端)。并行基准与齐纳二极管(Zener diodes)的工作方式非常相似，都需要外置电阻设定偏置。外置电阻决定了可供给负载的最大电流，并提供了最小化的偏置电流以保持稳压。当负载近乎常量或电源供电变化量极小的情况下，可以考虑采用并行基准。串行基准无须任何外部组件，当负载变动及注重更低的电压开销(voltage overhead)时，可以考虑串行基准。与并行基准相比较，串行基准相对于电源电压变化具有更强的免疫适应性。

初始精度 — 当校准不可用或不便于使用时，该参数即成为了系统的主要关注点。通常情况下，精度确定是通过对系统全面校准完成的。而初始精度则是由固定的输入电压及无负载电流（串行类型）或固定偏置电流（并行类型）来精确确定的。

温度漂移 — 温度漂移是由于温度的变化而引起的输出电压改变，其单位为ppm/°C。掩埋齐纳(Buried Zener)类型基准（例如，REF02及REF102）典型的比能带隙(bandgap)类型基准具有更低的温度漂移。温度漂移可有多种方法精确确定，有斜率式(slope)、交叉式(butterfly)及箱式(box)，但最常用的箱式方法可估算如下：

$$TC\left(\frac{ppm}{°C}\right) = \frac{(V_{max} - V_{min}) \times 10^6}{(T_{max} - T_{min}) \times V_{nom}}$$

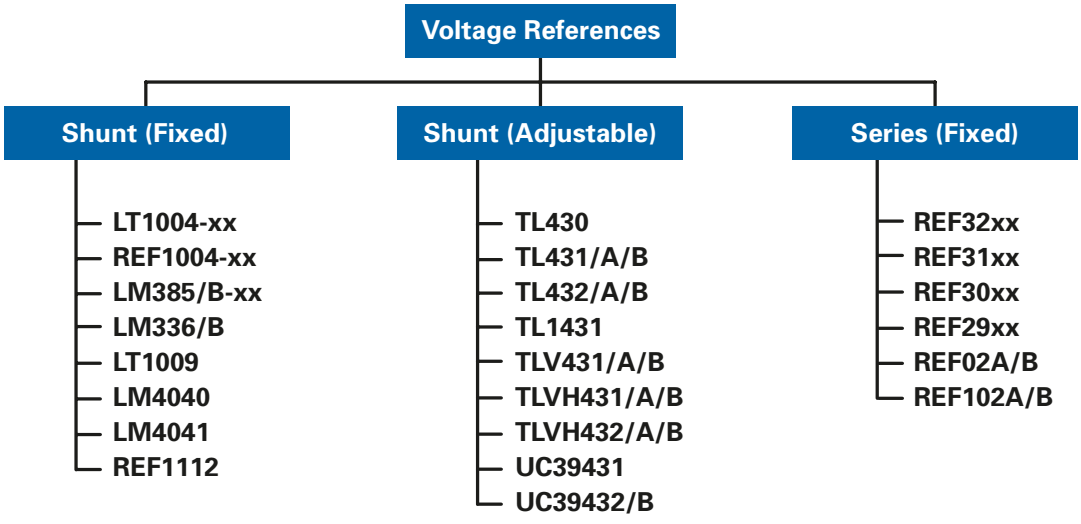
长期稳定性 — 输出的电压基准会随时间做缓慢的变化。最大变化出现在最初的500小时内。这个参数极为重要，特别是对于高性能应用或周期性校准不可行的应用。TI基于超过1000小时的室温观测，给出了详细的长期稳定性数据资料。

输出噪声 — 输出噪声通常在两个频率范围内具体规定：0.1 Hz至10 Hz（峰峰值噪声）以及10 Hz至1 kHz（RMS均方值噪声）。噪声会产生重大的影响，因其有可能降低采集系统的动态范围。高精度数据采集系统有可能因基准噪声的影响，而单独的在下边带(LSB)产生“抖动”(“dither”)。噪声可通过外置滤波器滤除。（REF102拥有噪声降低引脚）

可调节输出 — 可选择固定值及可调节的输出。可调节输出可通过设定一个电阻分配器(resistor divider)并连接到基准引脚来实现。

封装模式 — 可选如下封装模式
穿孔式封装(Through-holes)：PDIP及TO-92；平面贴膜封装(surface-mount)：SOIC、TSSOP、SOT-89及SOT23。

电压基准产品系列



选择指南

Device	V_{OUT} (V)	Initial Tolerance @ 25°C (%)	Temp. Coefficient (typ) (ppm/°C)	Temp. Coefficient (max) (ppm/°C)	I_{OUT} (max) (mA)	I_q (max) (mA)	V_{IN} (min) (V)	V_{IN} (max) (V)	Package	Price*
Series Voltage References										
REF32xx	1.25, 2.048, 2.5, 3.0, 3.3, 4.096	0.2	4	7	±10	0.12	1.8	3.5	SOT23	1.70
REF31xx	1.25, 2.048, 2.5, 3.0, 3.3, 4.096	0.2	5	15	±10	0.115	1.8	5.5	SOT23	1.10
REF30xx	1.25, 2.048, 2.5, 3.0, 3.3, 4.096	0.2	20	50	25	0.05	1.8	5.5	SOT23	0.59
REF29xx	1.25, 2.048, 2.5, 3.0, 3.3, 4.096	2	35	100	25	0.05	1.8	5.5	SOT23	0.49
REF02A/B	5	0.2, 0.3	4	10, 15	21	1.4	8	40	SOIC, PDIP	1.75
REF102A/B	10	0.05, 0.1	—	5, 10	10	1.4	11.4	36	SOIC, PDIP	1.75
REF102C	10	0.025	—	2.5	10	1.4	11.4	36	SOIC, PDIP	4.85

Device	V_{OUT} (V)	Initial Tolerance @ 25°C (%)	Adj. V_{OUT} (min) (V)	Adj. V_{OUT} (max) (V)	Min I_Z for Reg. (µA)	I_q (max) (mA)	I_{OUT}/I_Z (max) (mA)	V_{IN} (min) (V)	V_{IN} (max) (V)	Temp. Coefficient (typ) (ppm/°C)	Temp. Coefficient (max) (ppm/°C)	Package	Price*
Shunt Voltage References													
LM236-2.5, LM336/B-2.5	2.5	2, 4	—	—	400	—	10	—	—	10, 13	33	SOIC, TSSOP, TO92	0.40
LM285-xx, LM385/B-xx	1.235, 2.5	1, 1.5, 2, 3	—	—	10, 20	—	20	—	—	20	—	SOIC, TSSOP, TO92	0.18
LM4040	2.048, 2.5, 3, 4.096, 5, 10	0.1, 0.2, 0.5, 1	—	—	75	—	20	—	—	15	100, 150	SOT23, SC70, TO92	0.27
LM4041	Adj., 1.225	0.1, 0.2, 0.5, 1	1.225	10	75	—	12	—	—	15	100, 150	SOT23, SC70, TO92	0.27
LT1004-xx	1.235, 2.5	0.3, 0.8	—	—	10, 20	—	20	—	—	20	—	SOIC, TSSOP, TO92	0.40
LT1009	2.5	0.2	—	—	400	—	10	—	—	—	25	SOIC, TSSOP, TO92	0.41
REF1004-xx	1.235, 2.5	0.3, 0.4	—	—	10, 20	—	20	—	—	20	—	SOIC, PDIP	1.23
REF1112	1.25	0.2	—	—	1	0.005	5	—	—	10	30	SOT23	0.79
TL1431	Adj.	0.4	2.5	36	1000	—	100	—	—	23	114	SOIC, TSSOP, TO92	0.32
TL430	Adj.	5	2.75	30	2000	—	100	—	—	120	—	TO92	0.58
TL431/A/B, TL432/A/B	Adj.	0.5, 1, 2	2.495	36	600, 1000	—	100	—	—	34	83	SOIC, PDIP, TSSOP, SOT89, SOT23	0.14
TLV431/A/B	Adj.	0.5, 1, 1.5	1.24	6	80	—	15	—	—	39	129	SOIC, SOT23, SC70, TO92	0.23
TLVH431/A/B, TLVH432/A/B	Adj.	0.5, 1, 1.5	1.24	18	100	—	80	—	—	39	129	SOT23, SC70, SOT89, TO92	0.27
UC39431	Adj., 2.82, 3.12, 5.1, 7.8, 10.42, 12.24	0.4	2.3	36	800	0.5	100	2.2	36	—	—	SOIC, PDIP	2.33
UC39432/B	Adj., 1.3	0.4, 0.8	2.2	36	800	0.5	100	2.2	36	—	—	SOIC, PDIP	2.09

Device	No. of Outputs	I_{OUT} (µA)	Current Tolerance (max) (%)	Current Match Tolerance (max) (%)	Temp Drift (typ) (ppm/°C)	Voltage Compliance, 1% (V)	Current Mirror Tolerance (max) (%)	Price*
Current References								
REF200	2	100	1	1	25	2.5 to 40	0.5	2.60

Device	Number of Channels	V_S (min) (V)	V_S (max) (V)	I_q per Channel (max) (mA)	V_{IO} (25°C) (max) (mV)	GBW (typ) (MHz)	Single Supply	V_{ref} Fixed (V)	V_{ref} Adj. (min) (V)	V_{ref} Adj. (max) (V)	V_{ref} 25°C Tolerance (%)	I_{ref} (max) (mA)	Package	Price*
Op Amp with Voltage Reference														
TL103W/A	2	3	36	0.6	4, 3	0.9	Yes	2.5	—	—	0.7, 0.4	100	SOIC8	0.32
TSM104W/A	4	3	36	0.6	5, 3	0.9	Yes	—	2.5	36	0.7, 0.4	100	SOIC, TSSOP	0.32

Device	Number of Channels	V_S (min) (V)	V_S (max) (V)	I_q per Channel (max) (mA)	t_{RESP} Low-to-High (µs)	Output Type	V_{IO} (25°C) (max) (mV)	Rail-to-Rail	V_{ref} Fixed (V)	V_{ref} 25°C Tolerance (%)	V_{ref} Temp Co. (typ) (ppm/°C)	Package	Price*
Comparator with Voltage Reference													
TLV3011	1	1.8	5.5	0.005	6	Open-Drain	12	In, Out	1.242	1	40	SOT23, SC70	0.75
TLV3012	1	1.8	5.5	0.005	6	Push-Pull	12	In, Out	1.242	1	40	SOT23, SC70	0.75

* 推荐零售价为每1000片时的美元价格。

设计因素

数据总线类型 — 通常采用两种总线类型：(1)地址/数据复用；(2)并行。对于(1)来说，内存地址线与数据线共享同一套引脚。对于(2)来说，地址线与数据线分离，其接口与静态RAM相同。地址/数据复用设备引脚数目较少，但可能需要更多控制逻辑来实现接口。

3V或5V运转 — 实时时钟器件可运转于5V或3V电源轨。

CPU监控 — 部分器件包括了完全的CPU监控功能，可提供：

- CPU复位(上电触发或按键触发）。
- 电源轨中断。
- 看门狗计时器。
- 非易失性控制，用于附加的NVSRAM (非易失性静态存储器)。

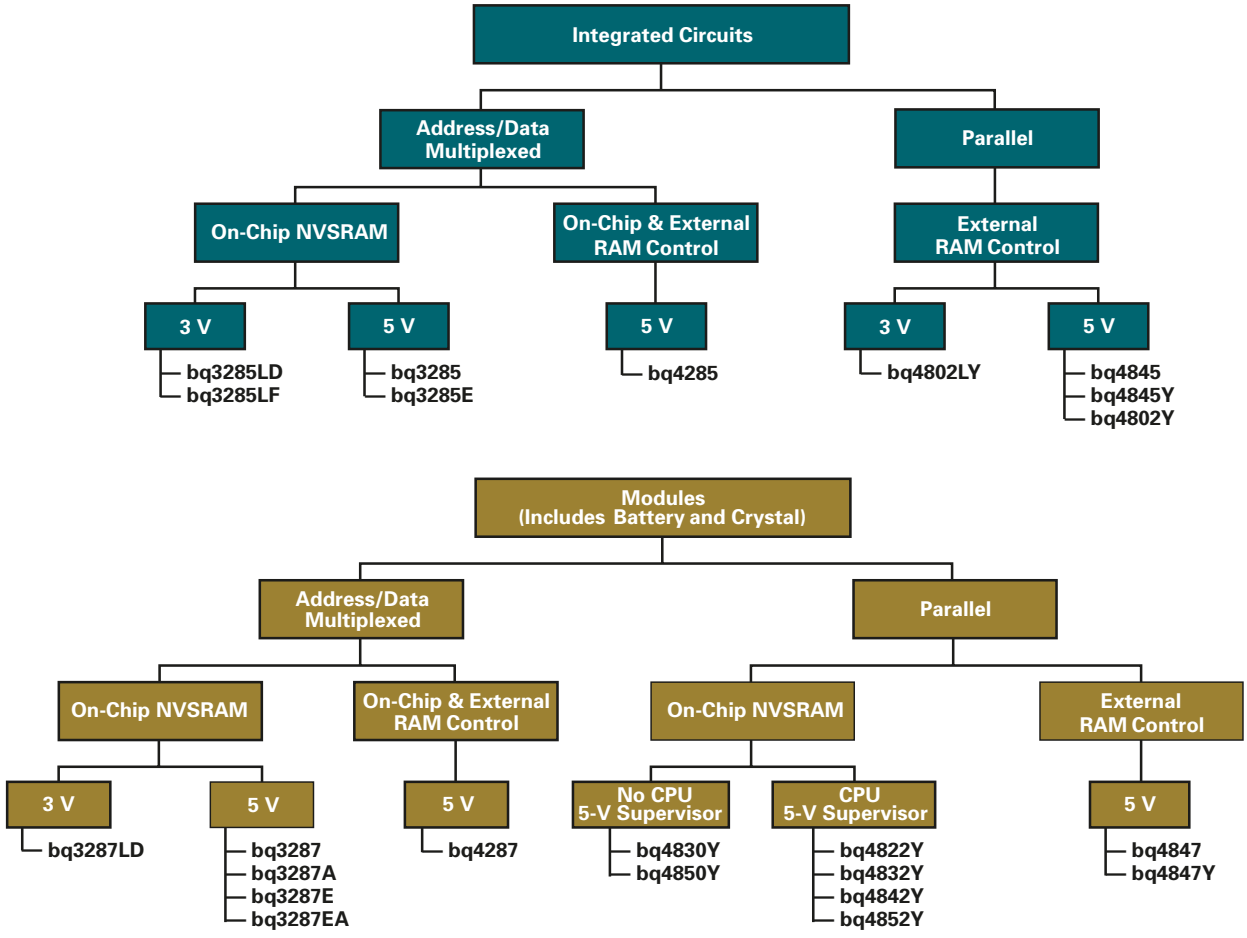
通过在实时时钟上集成监控功能可有效地减少设计中元件的数量。

- 板载非易失性静态存储器。
- V_{CC}容忍度。
- 封装类型。

特点

- 实时时钟通过数百个BCD格式编码实现计时。
- 电池后备供电模式下的电流消耗小于500nA。
- 时钟精度（模块）误差低于1分钟/月。
- 最大可支持8片512K板载NVSRAM。
- 3V或5V运转。
- 完全集成CPU监控器。

实时时钟产品系列



实时时钟

选择指南

Device	V_{CC} Level (V)	V_{CC} Tolerance (%)	CPU Supervisor	Onboard NVSRAM	External NVSRAM Control	Packages	Price*
Parallel Interface							
bq4802Y	5	10	Yes	No	Yes	28-pin SOIC or TSSOP	2.50
bq4802LY	3	10	Yes	No	Yes	28-pin SOIC or TSSOP	2.50
bq4845	5	5	Yes	No	Yes	28-pin SOIC	2.50
bq4845Y	5	10	Yes	No	Yes	28-pin SOIC	2.50
bq4830Y	5	10	No	32K x 8	No	28-pin DIP Module	10.50
bq4822Y	5	10	Yes	8K x 8	No	28-pin DIP Module	9.50
bq4832Y	5	10	Yes	32K x 8	No	32-pin DIP Module	12.50
bq4842Y	5	10	Yes	128K x 8	No	32-pin DIP Module	14.50
bq4852Y	5	10	Yes	512K x 8	No	36-pin DIP Module	29.00
bq4847	5	5	Yes	No	Yes	28-pin DIP Module	4.95
bq4847Y	5	10	Yes	No	Yes	28-pin DIP Module	4.95
bq4850Y	5	10	No	512K x 8	No	32-pin DIP Module	25.00
Address/Data Multiplexed							
bq3285	5	10	No	114 bytes	No	24-pin SOIC	2.10
bq3285E	5	10	No	242 bytes	No	24-pin SOIC or SSOP	2.10
bq3285LD	3	10	No	242 bytes	No	24-pin SSOP	2.10
bq3285LF	3	10	No	240 bytes	No	24-pin SSOP	2.10
bq3287/A[1]	5	10	No	114 bytes	No	24-pin DIP Module	3.80
bq3287E/EA[1]	5	10	No	242 bytes	No	24-pin DIP Module	3.80
bq4285/E	5	10	No	114 bytes	Yes	24-pin SOIC	2.35
bq4287	5	10	No	114 bytes	Yes	24-pin DIP Module	4.30

[1] *"A" 标示版本具有RAM擦除输入引脚。*
* *推荐零售价为每1000片时的美元价格。*

非易失性SRAM(NVSRAM)

设计因素

存储器密度

存储密度范围可容纳64Kbit至16Mbit（8bit/byte组成）不等的NVSRAM。

V_{CC} 容忍度

为实现在上电/掉电次序中保护数据，NVSRAM在其电源电压低于标称值5V的5%或10%时，自动取消对SRAM的选定。此容忍度与5V电源特性相匹配。3.3V电源版本将于2007年底三季度开始发售。

特点

- 无电源状态下，数据具有长达10年的保持能力。
- 标准SRAM的引脚输出及接口。
- 无约束写入周期。
- 读写时间：70 ns。
- 供电周期(power cycle)内实现自动写保护。

非易失性静态存储器(NVSRAM)产品系列

Device	Description	Price*
5% V_{CC} Tolerance		
bq4010	8K x 8 (64 Kbit)	6.50
bq4011	32K x 8 (256 Kbit)	7.50
bq4013	128K x 8 (1 Mbit)	9.50
bq4014	256K x 8 (2 Mbit)	20.00
bq4015	512K x 8 (4 Mbit)	22.00
bq4016	1024K x 8 (8 Mbit)	26.00
bq4017	2048K x 8 (16 Mbit)	50.00
10% V_{CC} Tolerance		
bq4010Y	8K x 8 (64 Kbit)	6.50
bq4011Y	32K x 8 (256 Kbit)	7.50
bq4013Y	128K x 8 (1 Mbit)	9.50
bq4014Y	256K x 8 (2 Mbit)	20.00
bq4015Y	512K x 8 (4 Mbit)	22.00
bq4016Y	1024K x 8 (8 Mbit)	26.00
bq4017Y	2048K x 8 (16 Mbit)	50.00

* *推荐零售价为每1000片时的美元价格。*

- 未初始化上电前采用内置电池隔离。
- 28至36引脚DIP封装模式

研讨会及在线培训

TI备受欢迎的电源供电设计系列研讨会及便携式电源系列研讨会提供了大量从技术到实践的介绍讲座，这些讲座结合了一系列先进的新型电源管理理念、基本设计准则以及现实的应用示例。研讨会讲座在电源业界备受重视，邀请具有数十年经验的资深人员通过革新技术、拓扑结构、工具及实例讨论当前最为棘手的设计难题。

敬请收录并访问**www.ti.com/training**，以核对电源系列研讨会相关的日期、时间及会场信息。

在线培训

敬请访问**power.ti.com/seminars**，以了解过去的研讨会主体以及在线培训模块，从而帮助您应对设计难题。

- 模拟
- DSP
- 微控制器
- 应用
- 工具及软件

- 在线培训
- 网络广播(Webcast)
- 研讨会
- 年会
- 单日讨论会
- 多日讨论会

- 美国及加拿大
- 欧洲、非洲及中东
- 拉丁美洲
- 亚洲

设计支持

通过TI高度集成的模拟器件资源及工具加速并简化工程过程。

欢迎访问模拟eLab设计中心，以获取完备的资源及工具列表。

www.ti.com.cn/analogelab

如需更多产品信息，敬请访问：

www.ti.com.cn/power获取电源管理相关信息

www.ti.com.cn/amplifier获取放大器及线性器件相关信息

www.ti.com.cn/dataconverter获取数据转换器相关信息

www.ti.com.cn/interface获取接口相关信息

www.ti.com.cn/logic 获取逻辑器件相关信息

www.ti.com.cn/lprf 获取低功耗射频产品相关信息

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e-mail：elabdesigncenter@ti.com

或通过以下网址联系我们，以获取个人产品支持。

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学习

- 在线培训
- 模拟eLab™ 网络广播
- 全范围的网络广播
- 研讨会
- 年会
- TI开发商大会
- 1日制讨论会
- 多日制讨论会
- 应用手册/技术文档
- 公司发表的论著

选择

- 电源管理速查
  - 电源速查 (Power Quick Search)
  - 讨论T2模块将如何降低输出电容
- 数据转换器速查
  - 模数转换器
  - 数模转换器
- 音频速查
- RF(射频)/IF(中频)组件速查
- 转换器件选择工具
- 选择及解决方案指南
- 终端器件解决方案
- 参数查询
- 同类产品交叉参考查询

设计

- TI的Pro系列
  - FilterPro™ 设计软件
  - OpAmpPro™ 设计软件
- 电源设计工具
  - 最新的SwitcherPro™ Beta设计软件
  - SWIFT™-SW设计软件
  - TPS40K™-SW设计软件
  - TPS62K-SW设计软件
- 参考设计
- 计算及其他用途
- 硬件设计工具及软件
- 快速、可靠 & 无铅(Pb-Free)
- RoHS(有害物质禁用)条款 & 交付计划表
- 封装信息

仿真

- TINA-TI™强大、易于使用的电路仿真程序，基于SPICE引擎
- 完备的SPICE模块库
- IBIS及BSDL模块库

样片

- 定价及供货
- 索取样片
- TI eStore
  - 浏览评估板
- TI全球销售及支持机构
- 分销商
- 销售代表

学习

通过在线培训、模拟eLab网络广播、研讨会、年会及讨论会，TI专家可帮助您解决实际的模拟器件难题。

选择

完善的查询工具，通过数字参数查询缩小选择范围，从而为产品选择提供了指导方法。

设计

参考设计、计算应用及电源设计工具，并包括TI的Pro系列基于web的软件工具。

仿真

快速、基于web的电源仿真具有大量的TI经验认证模块选项，通过强大、友好的TINA-TI原理图编辑器及SPICE仿真实现复合信号电路分析。（DC、AC、噪声瞬变及傅立叶分析）

样片

预定样片及评估板.

FilterPro™

FilterPro *可快捷的设计低通、高通、带通、notch窄带滤波器、宽带滤波器以及带阻滤波器；计算无源元件取值并选取可用的器件。*

OpAmpPro™

OpAmpPro *依据设计人员指定的输入/输出参数，提供了模拟接口设计及分析。*

TINA-TI™

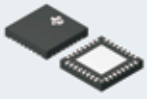
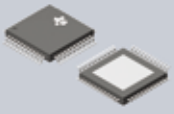
TINA-TI*是友好的原理图及SPICE仿真器，可用于复合信号电路的分析。*

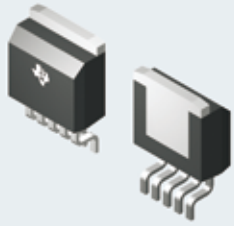
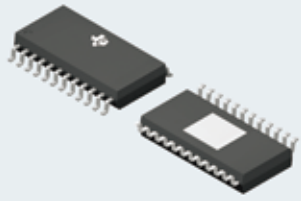
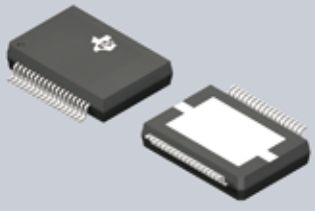
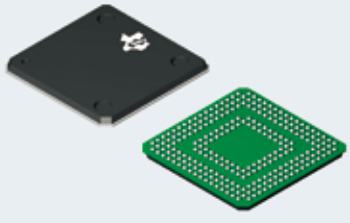
SwitcherPro™

SwitcherPro *可在线使用，或下载至您的计算机。SwitcherPro可生成测试用例(test-case)的原理图表及回路响应、评估效率，并分析电路性能。使用者可采用共享的诸多设计配合工作。*

封装模式

高性能模拟器件封装

	Package Type	Package Designator
	Wafer Scale Package (WSP)	YEG, YEK, YEJ, YEA, YZA, YED, YNA
	Small Outline Transistor Package (SOT23)	DBY, DCN, Thin SOT, DDC
	Transistor Outline (TO236)	DBZ
	Mini Small Outline Package (MSOP)	DGK, DGS
	Small Outline No Leads (SON)	DRD, DRB, DRC
	Shrink Small Outline Package (SSOP)	DBQ, DB, DL
	Quad Flatpack No Leads (QFN)	RGS, RGY, RGT, RGV, RGY, RHC, RGA, RGP, RGW, RGY, RGE, RGU, RHD, RGL, RGD, RHB, RGF, RHA, RTA, RGN, RGZ, RGQ, RGC, RHE, RHF
	Thin Quad Flatpack (TQFP)	PBS, PJT, PFB, PAG
	Small Outline Transistor (SOT223)	DCY, DCQ
	Heat Sink Thin Quad Flatpack (HTQFP)	PHP, PAP
	Small Outline Integrated Circuit (SOIC)	D, DTH, DTC, DW, DWU

	Package Type	Package Designator
	Thin Shrink Small Outline Package (TSSOP)	PW
	Plastic Dual-In-Line Package (PDIP)	P, N, NT, NTD
	Surface Mount Header (DDPak)	KTT, KTW
	Transistor Outline (TO220)	KC
	Heat Sink Small Outline Package (HSOP)	DWP, DWD
	Power Small Outline Package (PSOP3)	DKP (slug down), DKD (slug up)
	Ball Grid Array (BGA)	

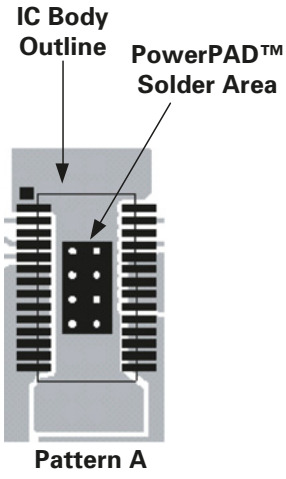
如何实现与PowerPAD™的连接

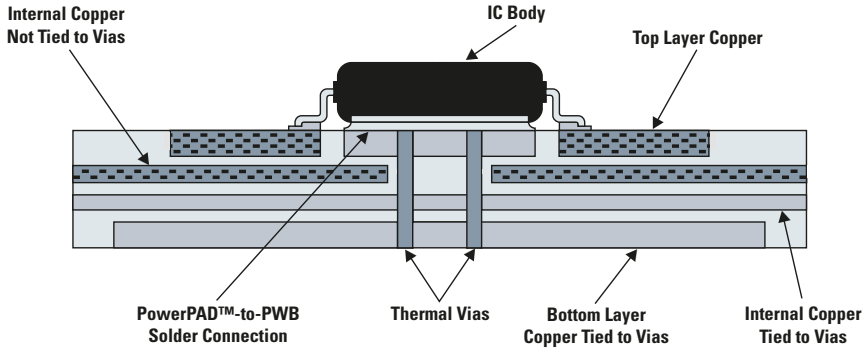
PowerPAD™ 应当依据产品数据表中详细规定连接至适当的内部信号层(internal signal plane)。取决于实现了集成电路(IC)与铅框架的连接所采用的热传导环氧体的导电性，PowerPAD可实现如产品数据表中所述的低阻抗，以连接到至芯片的内部信号层。即使PowerPAD不作为IC的主要信号连接（而是采用数据表中所规定的指定信号引脚实现连接），其衬垫下方的铜接触区也可对应连接到每个产品数据表中所规定的信号层，而不对器件产生影响。由于PowerPAD着眼于部件的散热，其板区内散热衬垫黏结到信号层的尺寸必须足够的大，以满足散热的需求。下列文档中所推荐的通路阵列(via array)，因其基于的布板约束及产品数据表中的推荐样式存在差异，会有所不同。当应用特定的通路及连接样式需求涉及到产品数据表时，下列文档可作为布板设计的一般性指导。

通过以下资源，您还可以获取附加信息。

技术文档可通过在线访问**www-s.ti.com/sc/techlit/litnumber**获取。网址中的***litnumber***请使用下列圆括号中所列的某个文献编号替代。

- 务必核查“Symbols/Footprints”下方的CAD格式，以用于您的产品封装模式，检验其对于所有的TI产品文件夹的可用性。
- 下载“PowerPAD Made Easy” 应用摘要(SLMA004)以及“PowerPAD Thermally Enhanced Package”技术摘要(SLMA002)
- 如需有关QFN/SON封装的详细规格信息，可查阅应用报告SLUA271及SCBA017。
- 访问TI的模拟及复合信号知识库网站(Analog & Mixed-Signal KnowledgeBase)**support.ti.com/sc/knowledgebase**
- 通过连接至技术支持体系的主页**support.ti.com**，并选用模拟及混合信号的电子邮件支持，您可以通过email向我们的专家咨询有关特定设计的问题。





用于SWIFT™ 产品系列的PowerPAD™ 封装模式

器件目录

器件目录（续）

器件目录（续）

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接口	http://www.ti.com.cn/interface
逻辑	http://www.ti.com.cn/logic
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