英飞凌高效LED照明解决方案

IFCN PMM SMD AP APC POWER
July, 2014

目录

- 英飞凌照明总体介绍
- 英飞凌AC/DC LED驱动方案
- 英飞凌DC/DC LED驱动方案
- 英飞凌MOSFET

英飞凌照明重点：通用照明和汽车照明

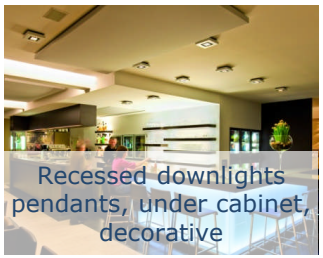
住宅照明



A19 lamps



MR16 & PAR lamps



Recessed downlights pendants, under cabinet, decorative

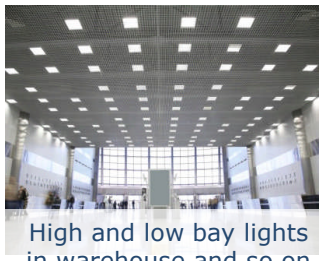
室内照明



Office luminaires



Downlights, spotlights in shopping malls



High and low bay lights in warehouse and so on

室外照明



Street, tunnel, parking



Wall washer



Stripe lights, accent lights

其他



Automotive interior lighting and indicator



Home appliances vending machines



Channel letters signs, signals

从传统照明到LED照明

由于LED技术众多的优势，照明产业正处于传统光源到LED照明的转换阶段。这也给整个照明行业带来了机遇和挑战。

挑战

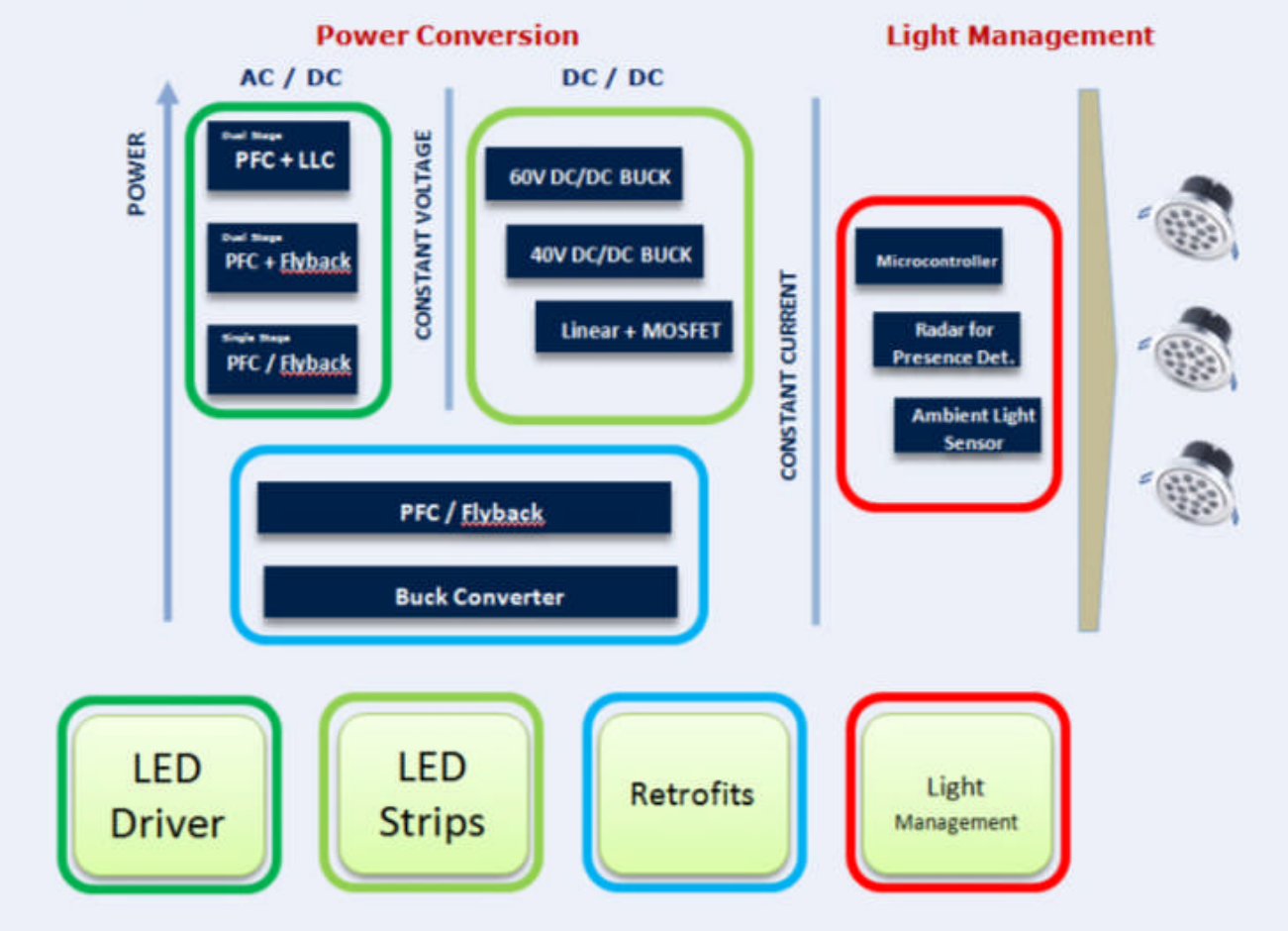
- 现有基础设施的兼容性
- 产品周期更快
- 产品延伸更多
- 研发成本增长

机遇

- 更节能
- 更智能，更人性化
  - 更低的维护成本
  - 人体昼夜节律
  - 人的年龄和健康状况

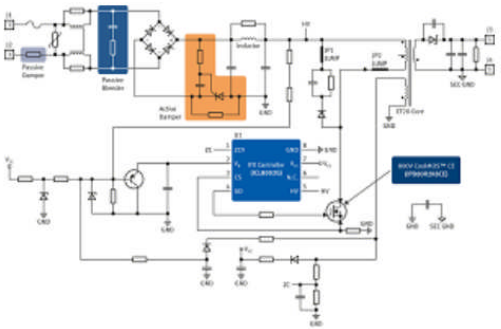
基于对客户照明应用需求的深刻理解，英飞凌提供一系列完整的解决方案和半导体产品。

英飞凌照明应用解决方案

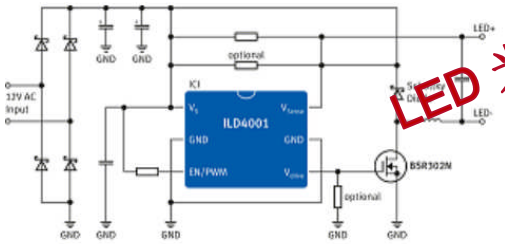


LED 照明

Dimmable Offline Retrofit Lamps



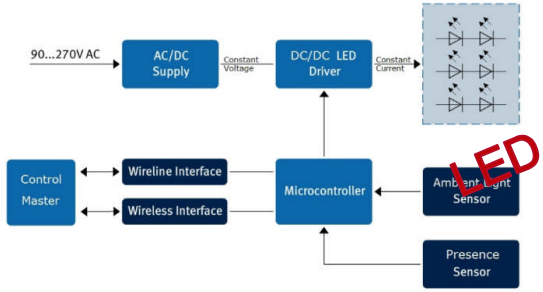
MR16 Retrofit Lamps



LED 光源驱动方案



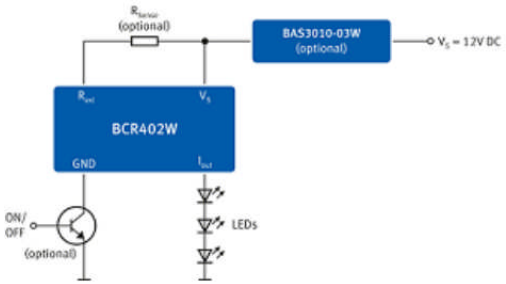
Professional Lighting



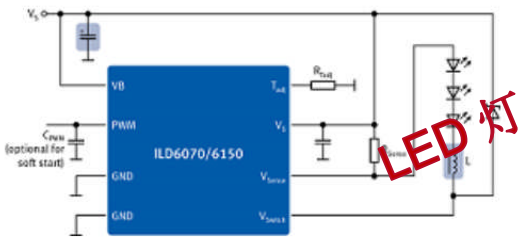
LED 灯具驱动方案



Linear LED Driver ICs



DC/DC LED Driver ICs

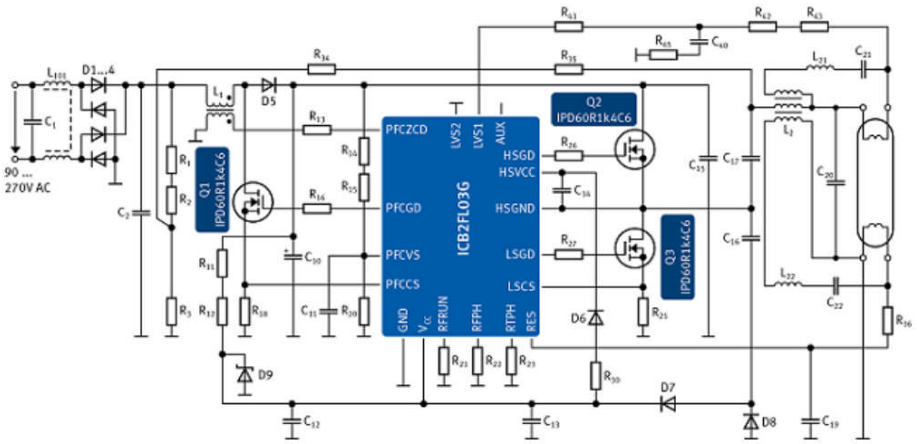


LED 灯串灯带类驱动方案



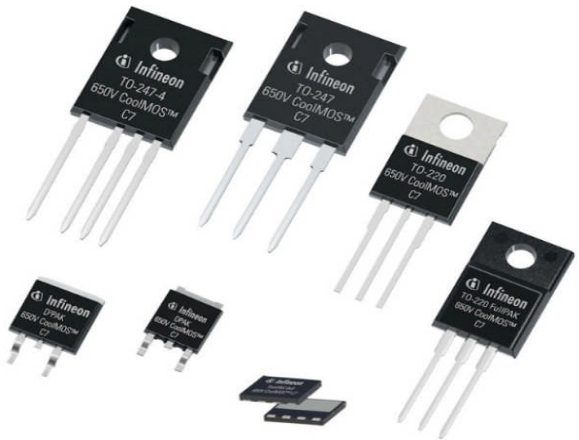
荧光灯镇流器和HID灯镇流器

Application Example - Demoboard for 54W T5 Single Lamp Design with Voltage Mode Preheating

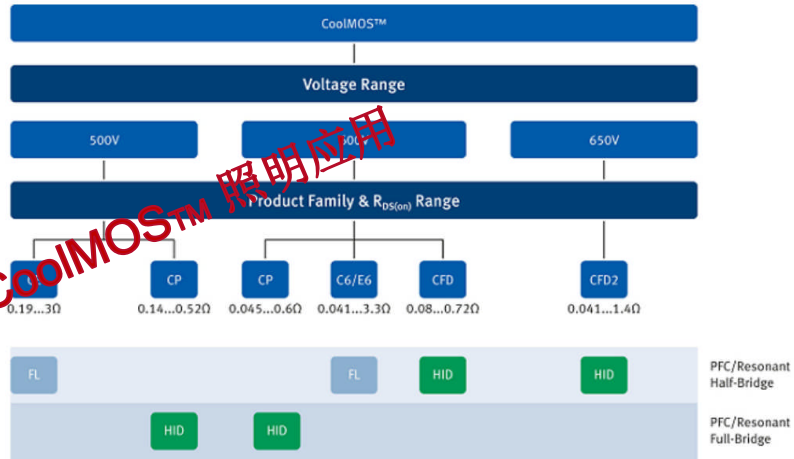




电子镇流器方案



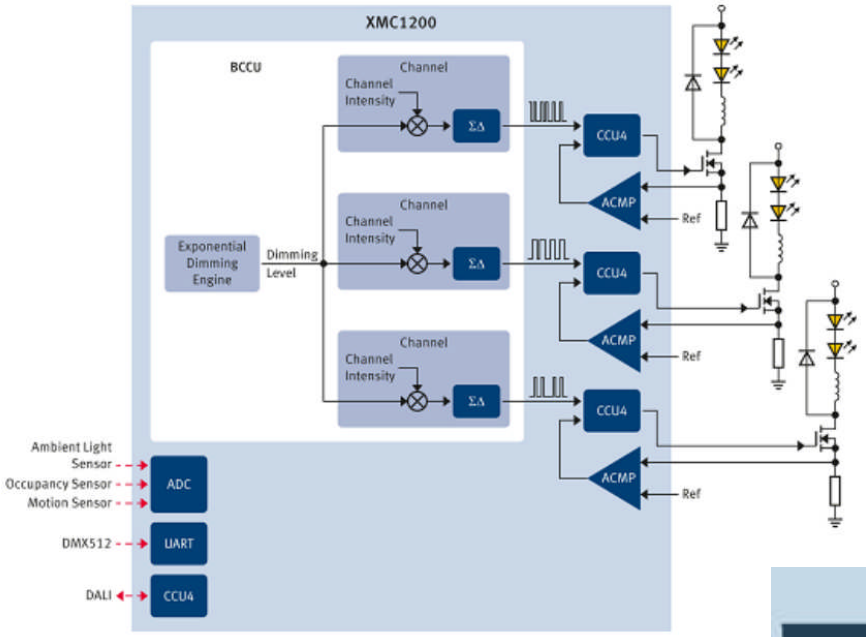
CoolMOS™ Selection Table for Lighting Applications



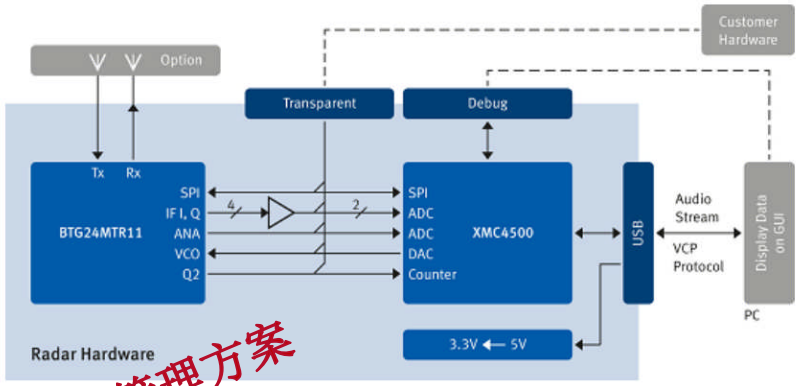
CoolMOS™ 照明应用

照明管理

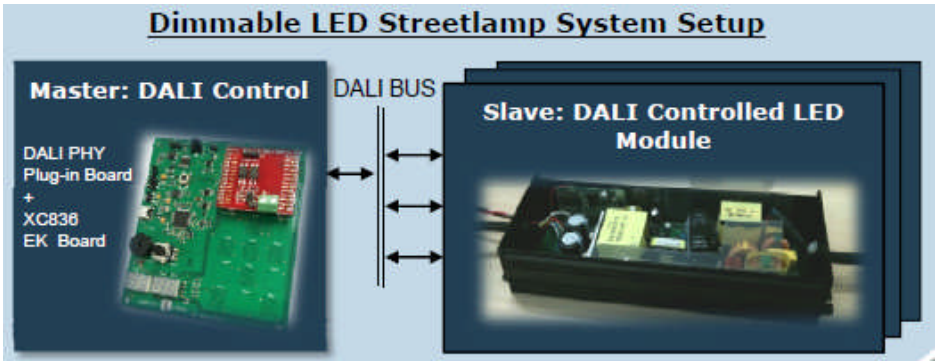
Application Example - XMC1200



Application Example - 24GHz Radar Demonstrator Kit for Presence Detection



照明管理方案



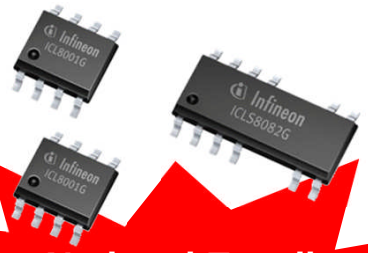
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- 英飞凌MOSFET

LED 驱动电源 AC/DC 类产品控制器

专用LED驱动控制器

Sales Type	Topology	V_{DS} (V)	R_{DSON} (Ohm)	Nominal Power @ $230V_{ACIN}$	Package
ICL8001G	DCM PFC + QR-flyback or buck	Ext. MOSFET	-	Ext. MOSFET	DSO-8
ICLS8082G	DCM PFC + QR-FB or buck	800V CoolMOS	2,26	26W	DSO-12
ICL8002G	DCM PFC + QR-flyback or buck	Ext. MOSFET	-	Ext. MOSFET	DSO-8



Won National Excellent IC and Electronic Product Solutions Awards!

高效率准谐振 QR PWM LED电源控制器

- ICE2QS02G
- ICE2QS03G

■ ICL8105G

专用功率因数校正PFC控制器

- TDA4862, TDA4863, TDA4863-2G

■ ICE3PCS01G, ICE2PCS01/2G

高效率半桥谐振LLC LED 电源控制器

- ICE1HS01G-1; ICE2HS01G

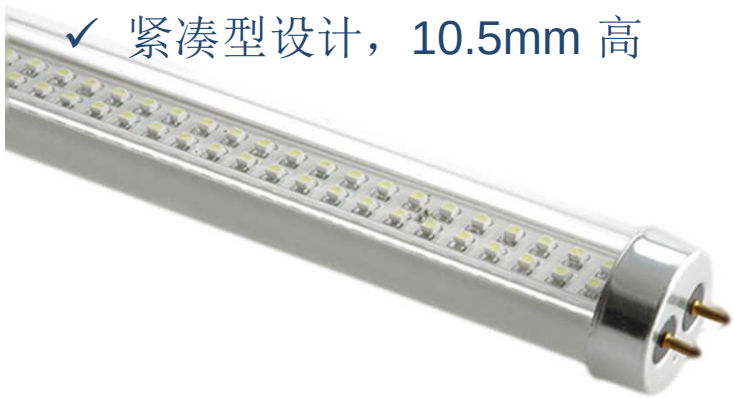
■ ICL5101

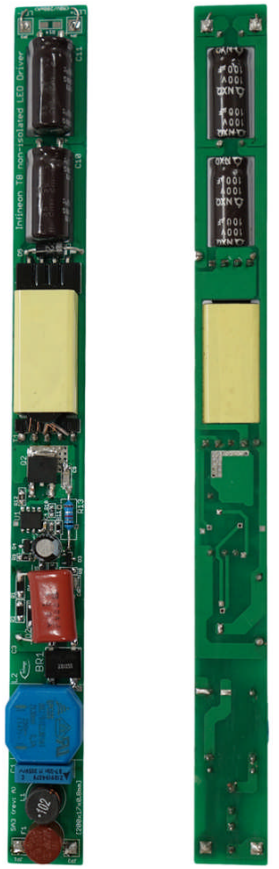
辅助电源和中低功率LED电源用功率集成控制器

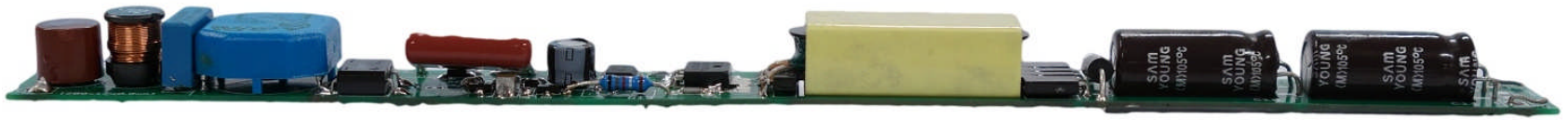
- 固定频率 CoolSET™
- 准谐振 CoolSET™

基于ICL8001G 的T8 非隔离LED 驱动电源方案

- ✓ 适用于20W 及以下T8管LED电源驱动
- ✓ 高压输出
- ✓ 非隔离
- ✓ 性价比高
- ✓ 高功率因数
- ✓ 低谐波
- ✓ 紧凑型设计，10.5mm 高

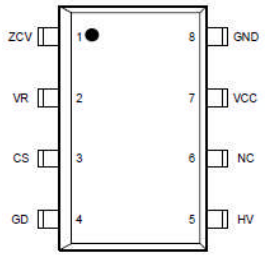


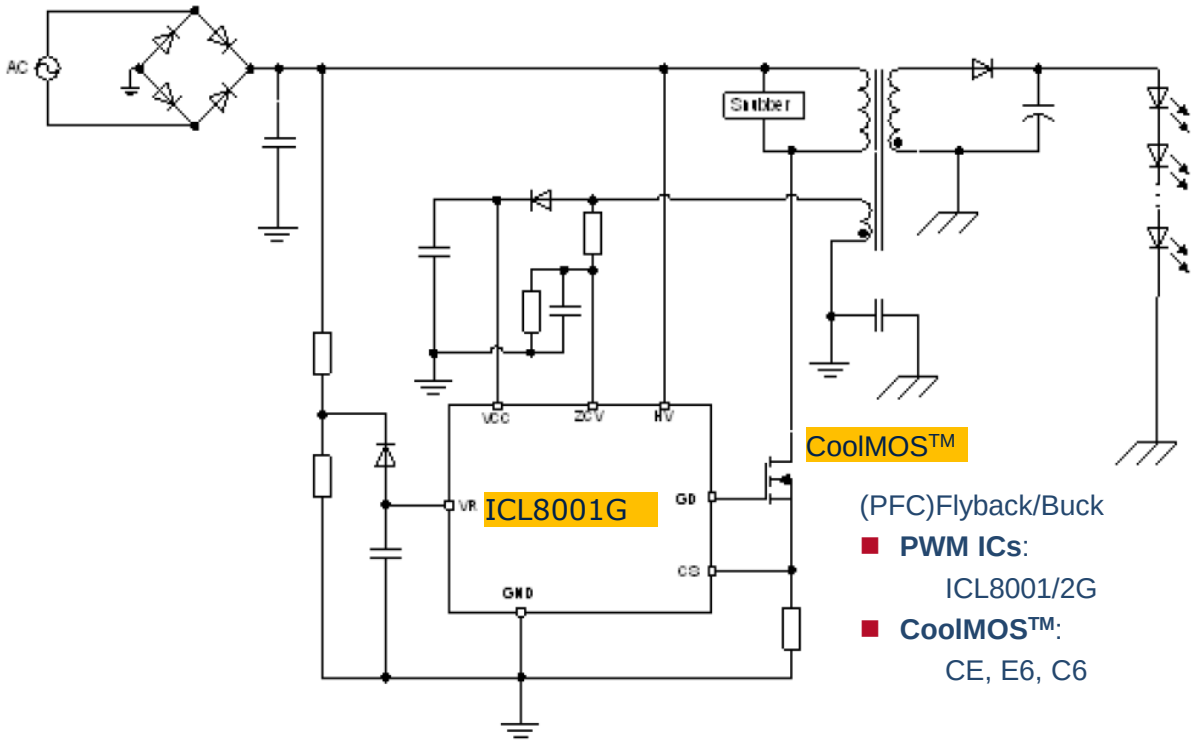




ICL8001G – 集成功率因数校正的LED驱动控制器

- 准谐振，高效率
- 内置功率因数校正，
- 适合反激，降压，升降压拓扑结构
- 内置微电流高压启动单元
- 内置保护功能
  - Vcc 过压保护
  - Vcc 欠压保护
  - 过温保护
  - 负载开路保护
  - 负载短路保护
  - 线圈短路保护

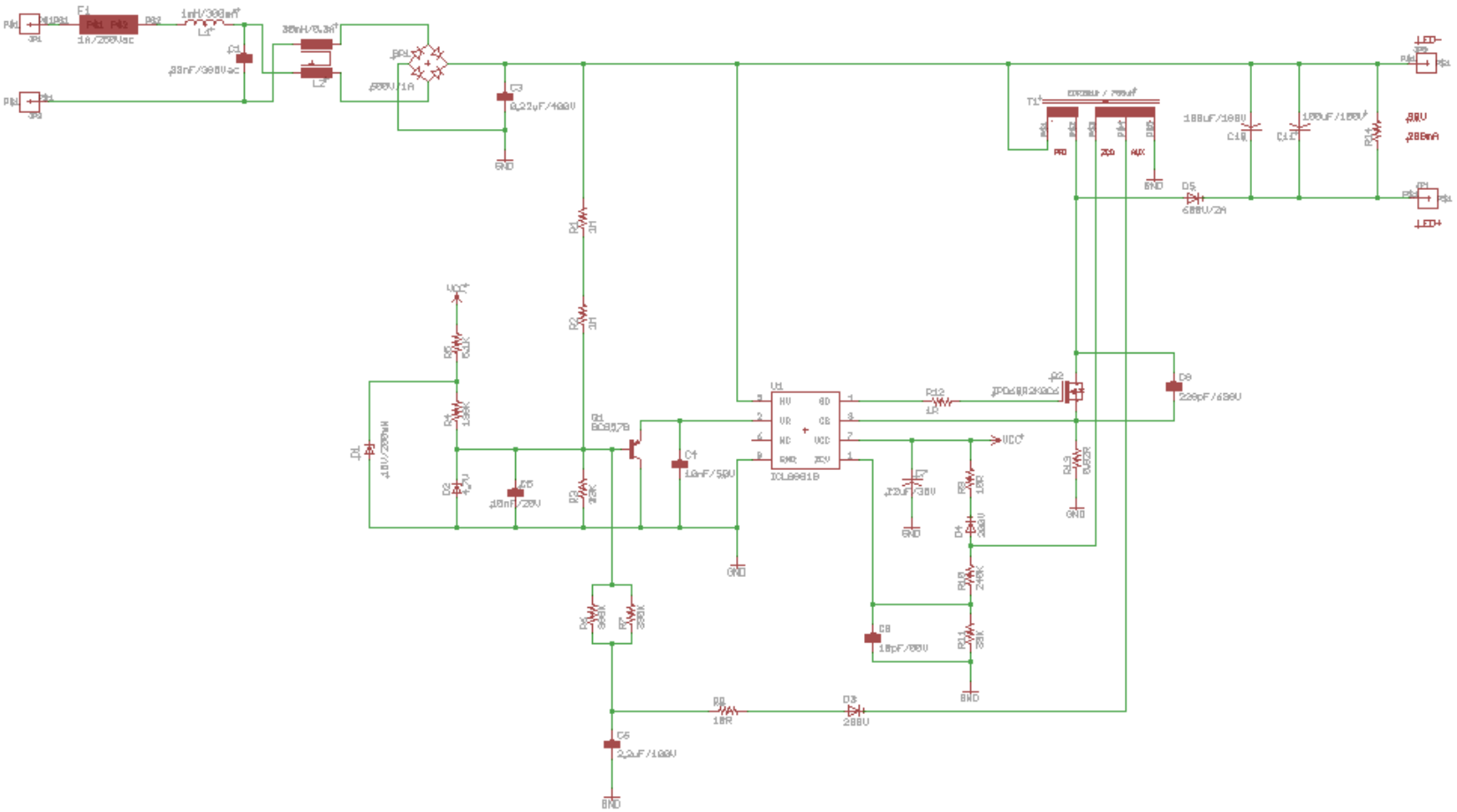




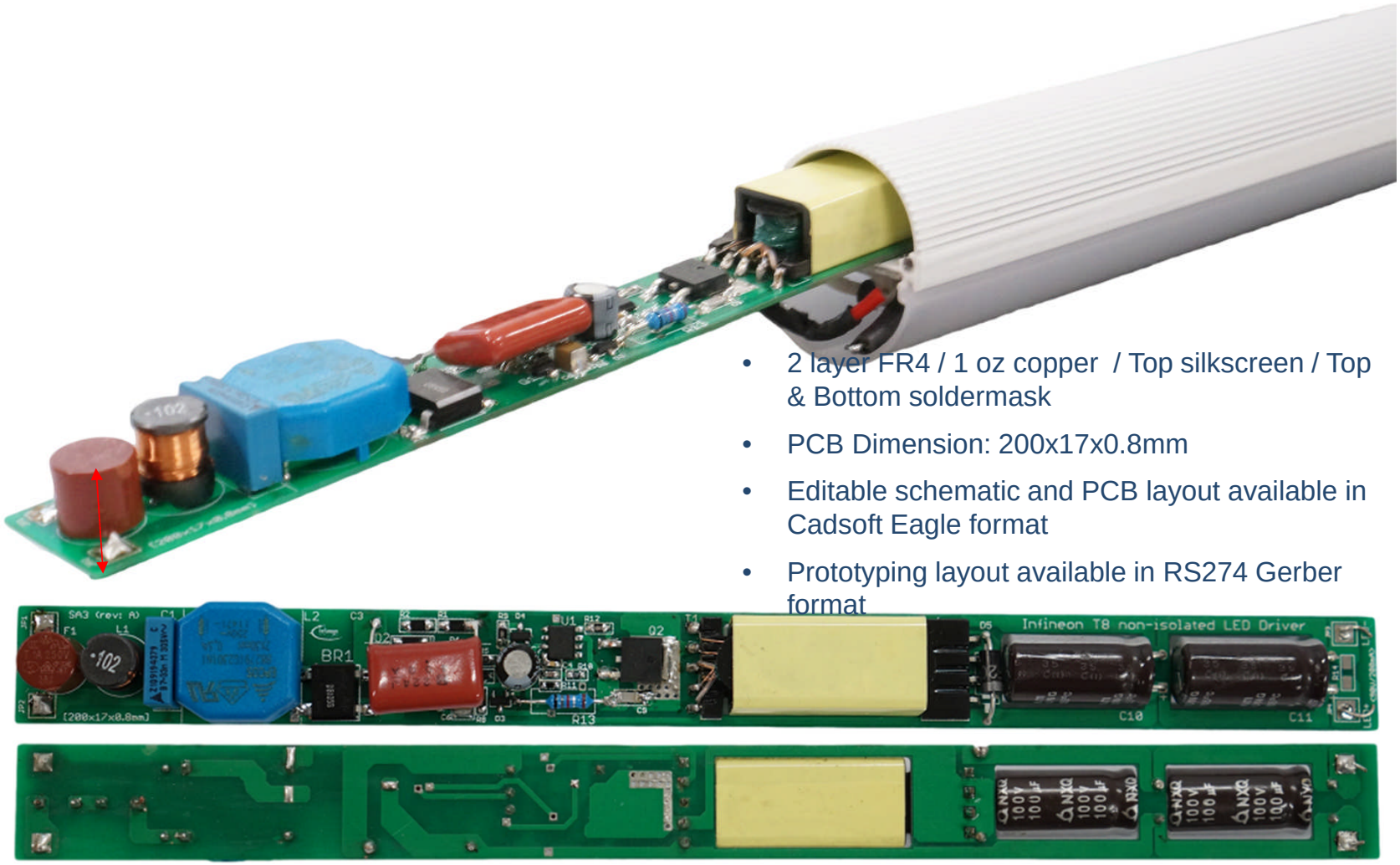
(PFC)Flyback/Buck

- **PWM ICs**: ICL8001/2G
- **CoolMOS™**: CE, E6, C6

原理图



替换安装



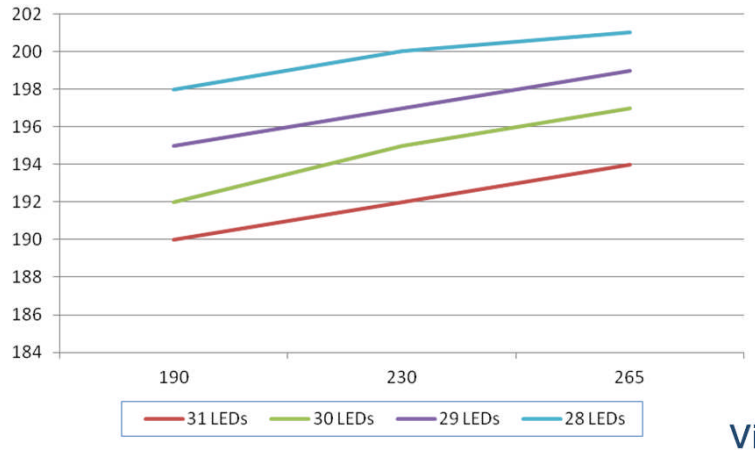
- 2 layer FR4 / 1 oz copper / Top silkscreen / Top & Bottom soldermask
- PCB Dimension: 200x17x0.8mm
- Editable schematic and PCB layout available in Cadsoft Eagle format
- Prototyping layout available in RS274 Gerber format

关键性能指标

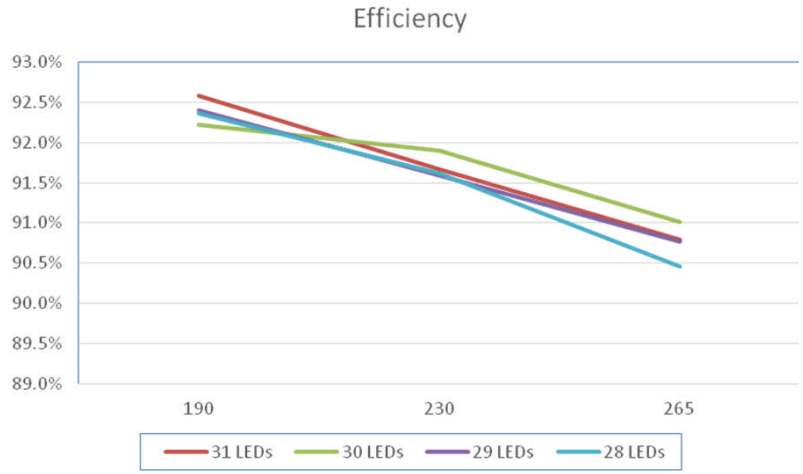
参数	最小	典型	最大
输入电压(Vac)	190	230	265
输出电压(VDC)	85.4	90	94.5
输出电流 (mA)		200	
输入功率(W)		19.4	
输出功率(W)		17.8	
效率@ Full Load 230Vac		91%	
总谐波 @ Full Load 230Vac		10%	
输出电流纹波@ Full Load		±20%	

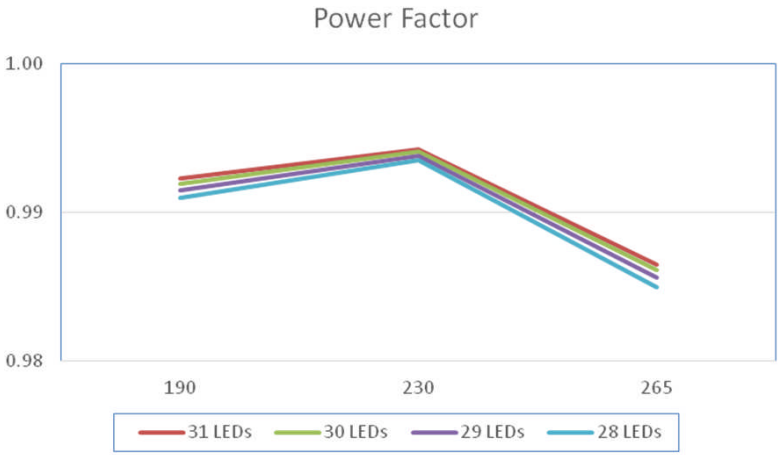
性能测试曲线

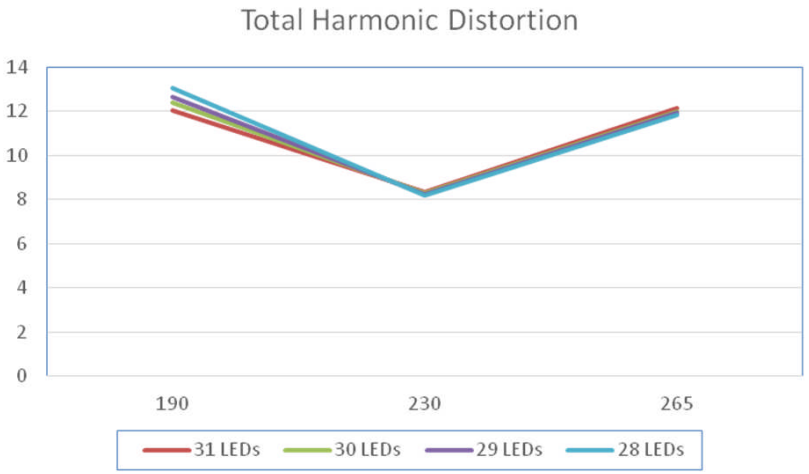
I_{out}(mA)



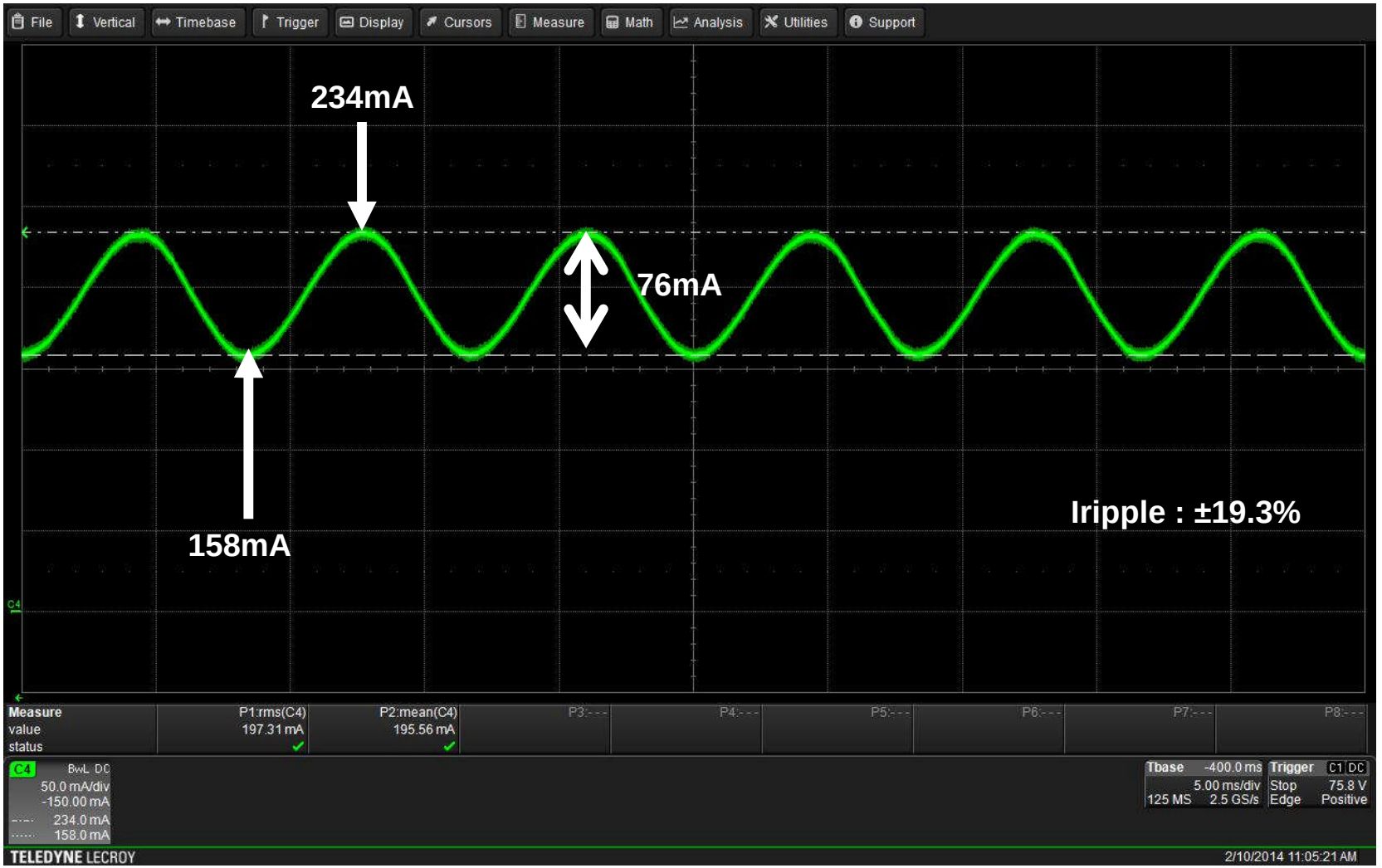
Vin(AC)





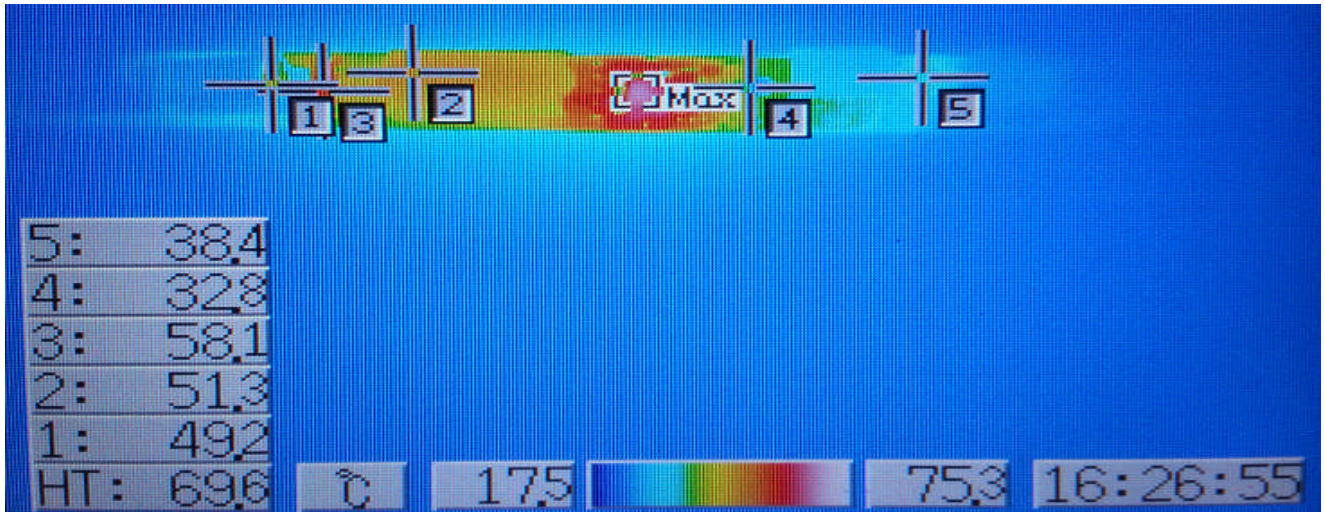


输出电流纹波@ 230Vac / 满载

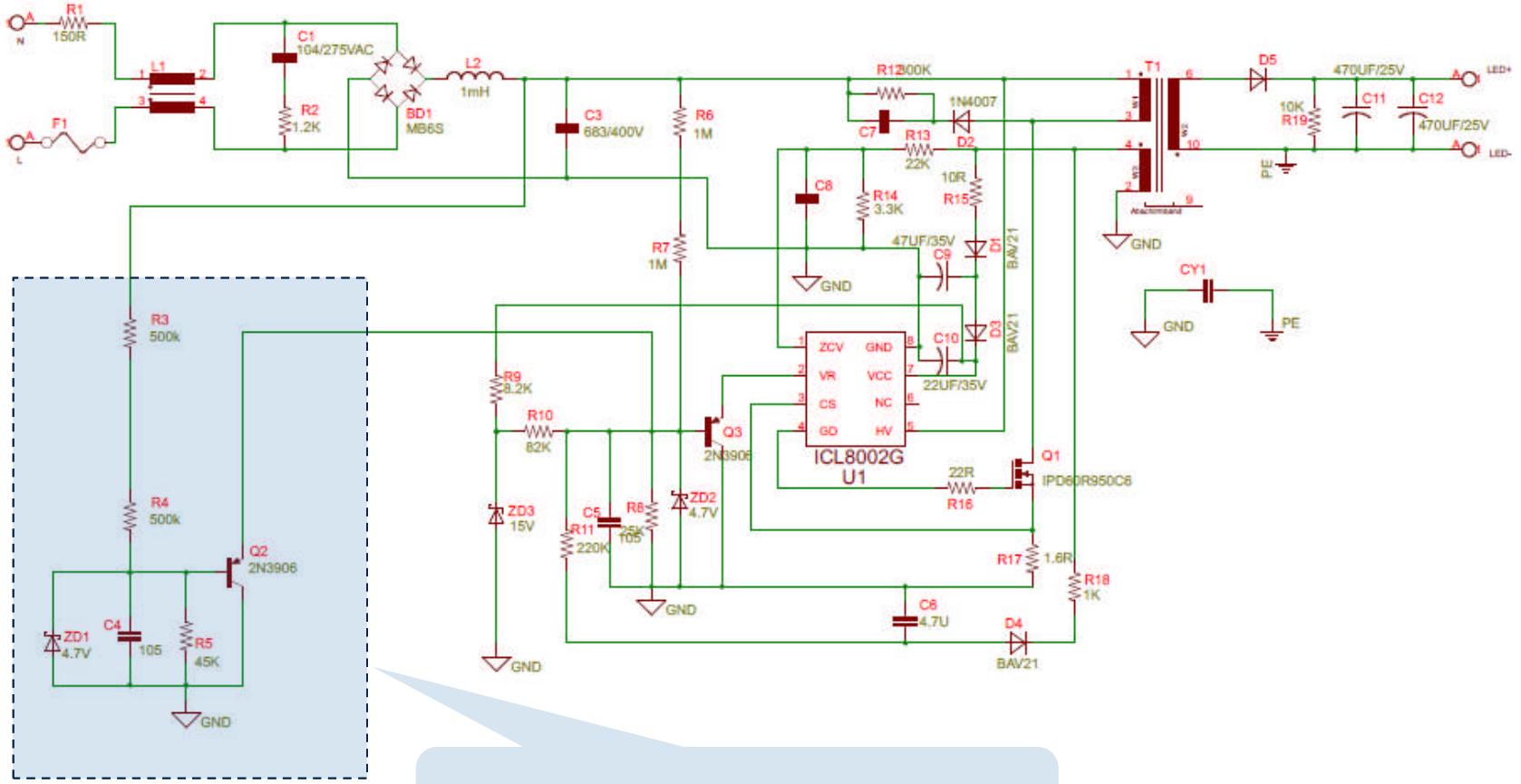


热测试@ Ta=25 degrees / 满载

S/N	Reference Designator	Descriptions	190VAC	230VAC	265VAC
1	L1	1mH/300mA Inductor	28.8	27.4	26.3
2	L2	Common mode choke	33	31.8	31.6
3	BR1 (5)	600V/1A bridge rectifier	40.5	37.5	38.2
4	C3	CIN	34.3	34.4	34.7
5	C7 (4)	VCC Cap. 22uF/35V	29.6	27.9	31.4
6	U1	ICL8001G	45.1	47.5	52.2
7	Q2 (HT)	Power MOSFET, IPD60R2K0C6	52.1	59.8	70
8	T1 (2)	Xuyi Ouge EDR2810 transformer	45.7	47.7	51.8
9	D5 (3)	Catch Diode	55.7	56.7	59.8
10	C10 (1)	Output capacitor	44.3	47	49.1
11	C11	Output capacitor	33.8	34	34.7



基于ICL8002G的球泡灯深度调光方案



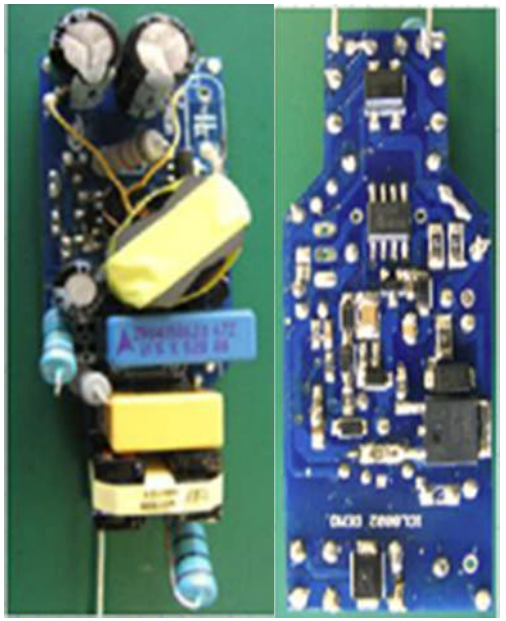
增加调光深度并有助减小微闪

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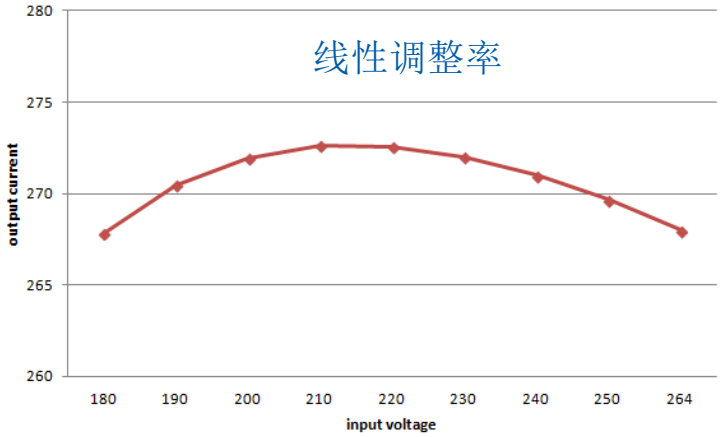
基于ICL8002G的深度调光方案

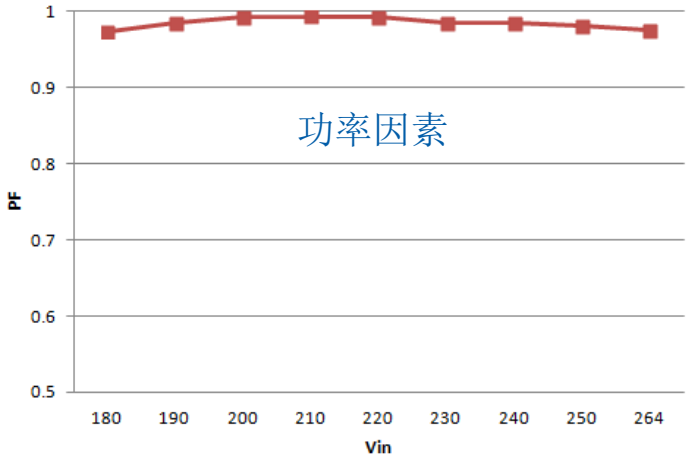
输入电压（AC）	200-264	V
输入功率（W）	12	W
交流频率(Hz)	50	Hz
输出功率（W）	11	W
输出电压(V)	36-43	V
输出电流（mA）	270	mA
效率（%）	>85%	
功率因素(PF)	>0.95	
电流总谐波失真(THD)(%)	<20%	

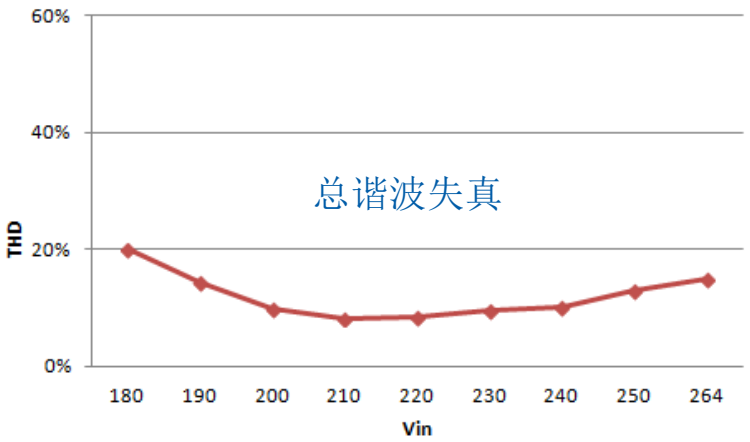
- 高调光器兼容性
- 准谐振工作模式实现高达85%的效率
- 功率因数> 0.95
- 完善的保护功能（开路短路过压过温等）
- 深度调光并改善因调光器相邻半波不对称引起的微闪

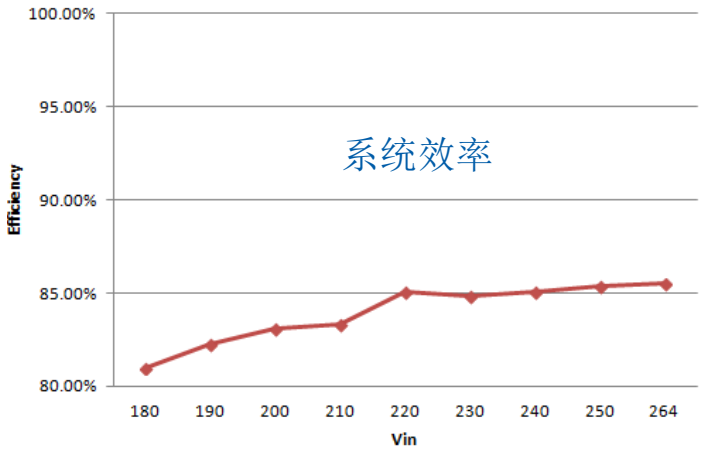


性能测试曲线

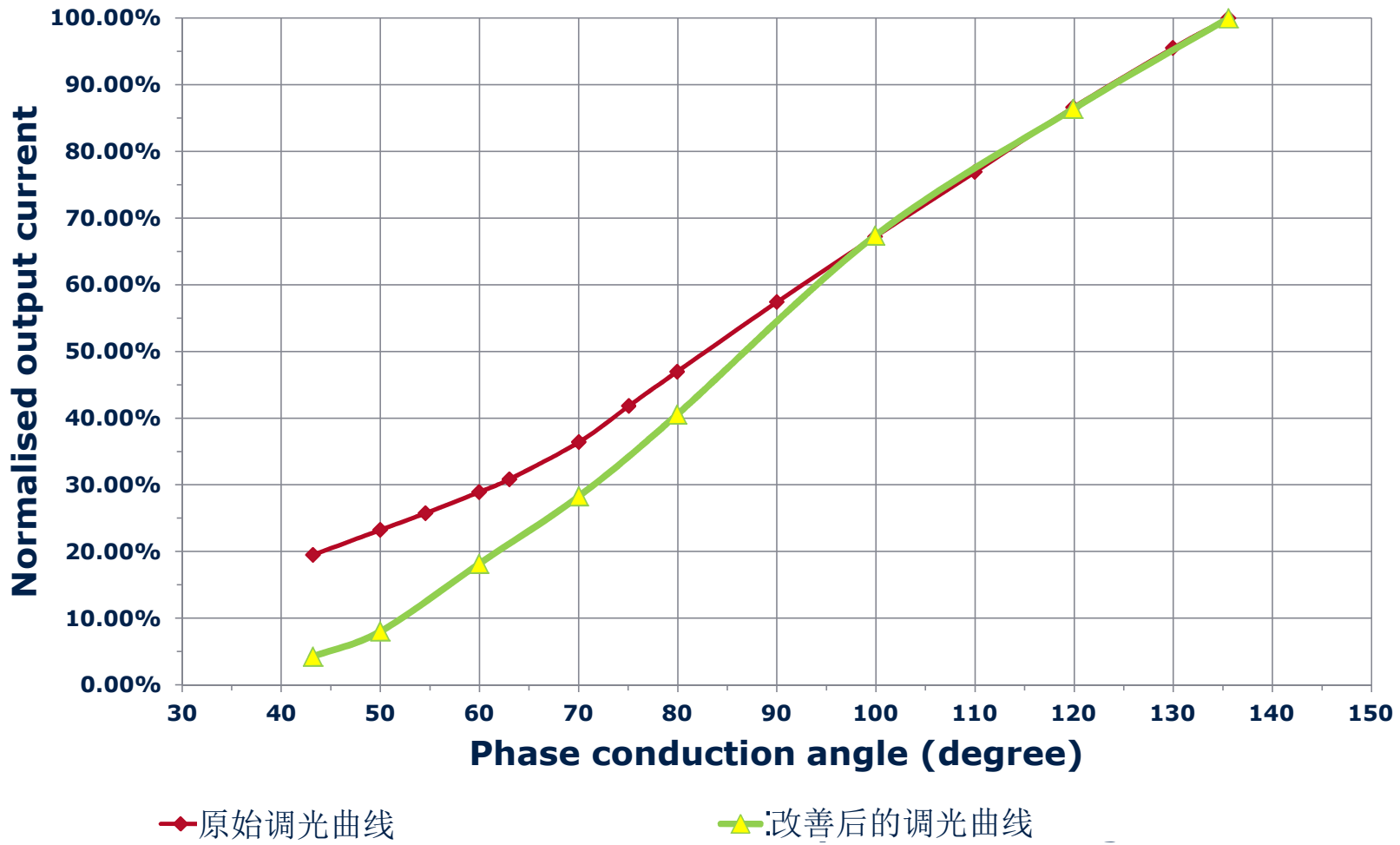

线性调整率
output current
280
275
270
265
260
180
190
200
210
220
230
240
250
264
input voltage


功率因素
PF
1
0.9
0.8
0.7
0.6
0.5
180
190
200
210
220
230
240
250
264
Vin


总谐波失真
THD
60%
40%
20%
0%
180
190
200
210
220
230
240
250
264
Vin

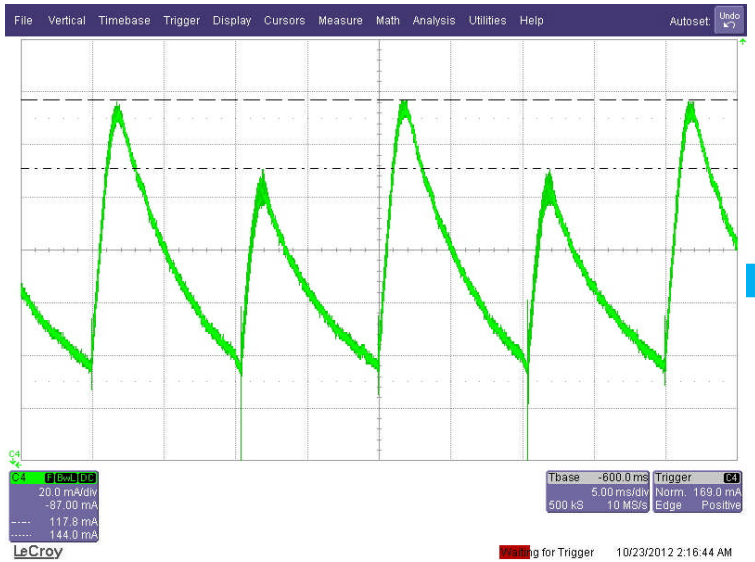

系统效率
Efficiency
100.00%
95.00%
90.00%
85.00%
80.00%
180
190
200
210
220
230
240
250
264
Vin

改善调光深度


100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Normalised output current
30
40
50
60
70
80
90
100
110
120
130
140
150
Phase conduction angle (degree)
原始调光曲线
改善后的调光曲线

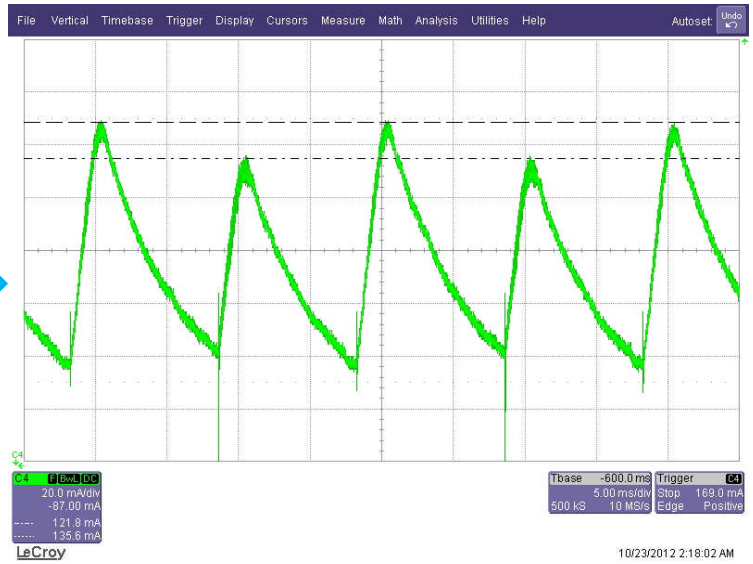
改善因为调光器相邻半波不对称引起的微闪

原始的LED电流波形



相邻两个AC半波的电流峰值差： 26mA

改善后的LED电流波形



相邻两个AC半波的电流峰值差： 14mA

基于TDA4863-2的单级PFC恒流LED驱动电源方案

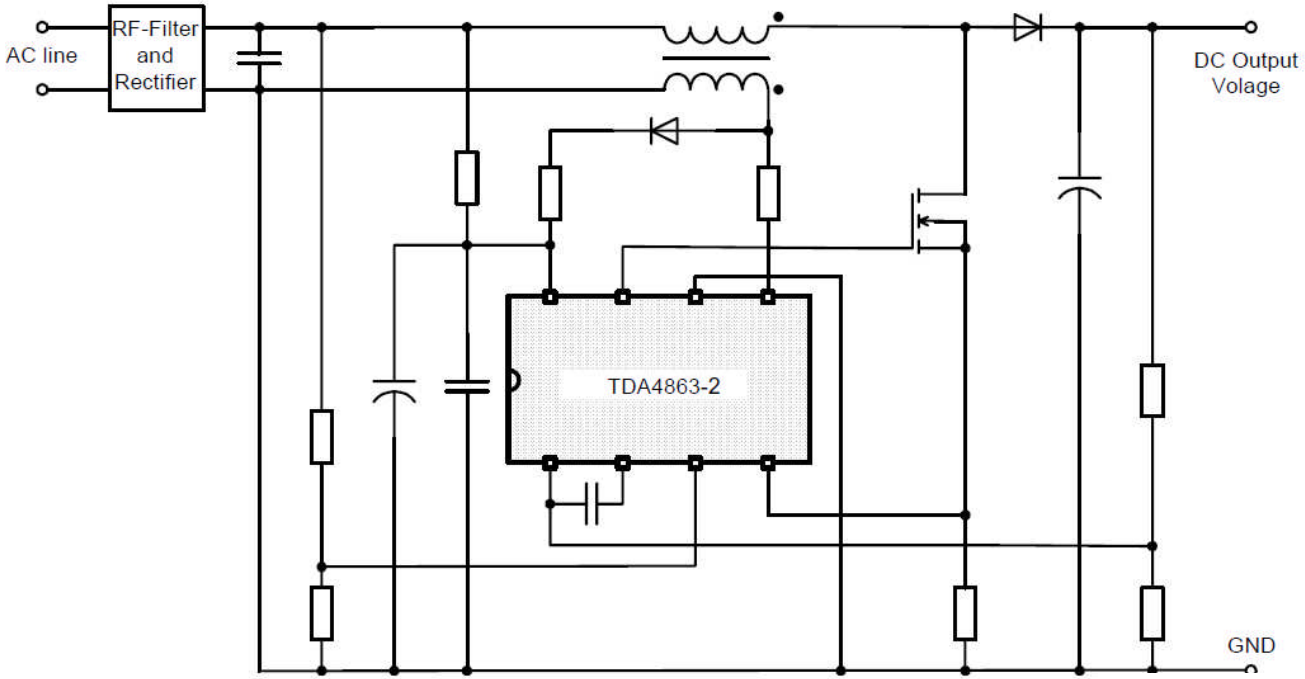
- 参考设计规格 48W (48V/1A)

Description		Symbol	Min	Typ.	Max	Unit	Remarks
Input	Voltage	Vin	85	110/240	305	Vac	
	Frequency	Flin	47	50/60	63	Hz	
	PowerFactors	PF	0.9	0.95			Full load
Output	Voltage	Vo	24	30	48	V	
	Current	Io		1000		mA	
	Power	Po				W	
	Ripple	r-pp		+/-50%		mA	
Efficiency		η		88		%	Full load



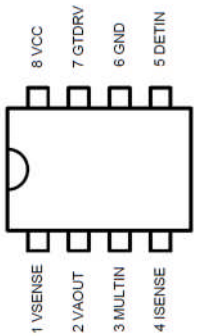
- 基于反激拓扑的单级PFC方案
- 完善的保护
- 高效率，元器件个数少
- TDA4863-2和CoolMOS™

TDA4863-2G 典型系统(Boost PFC) 概览

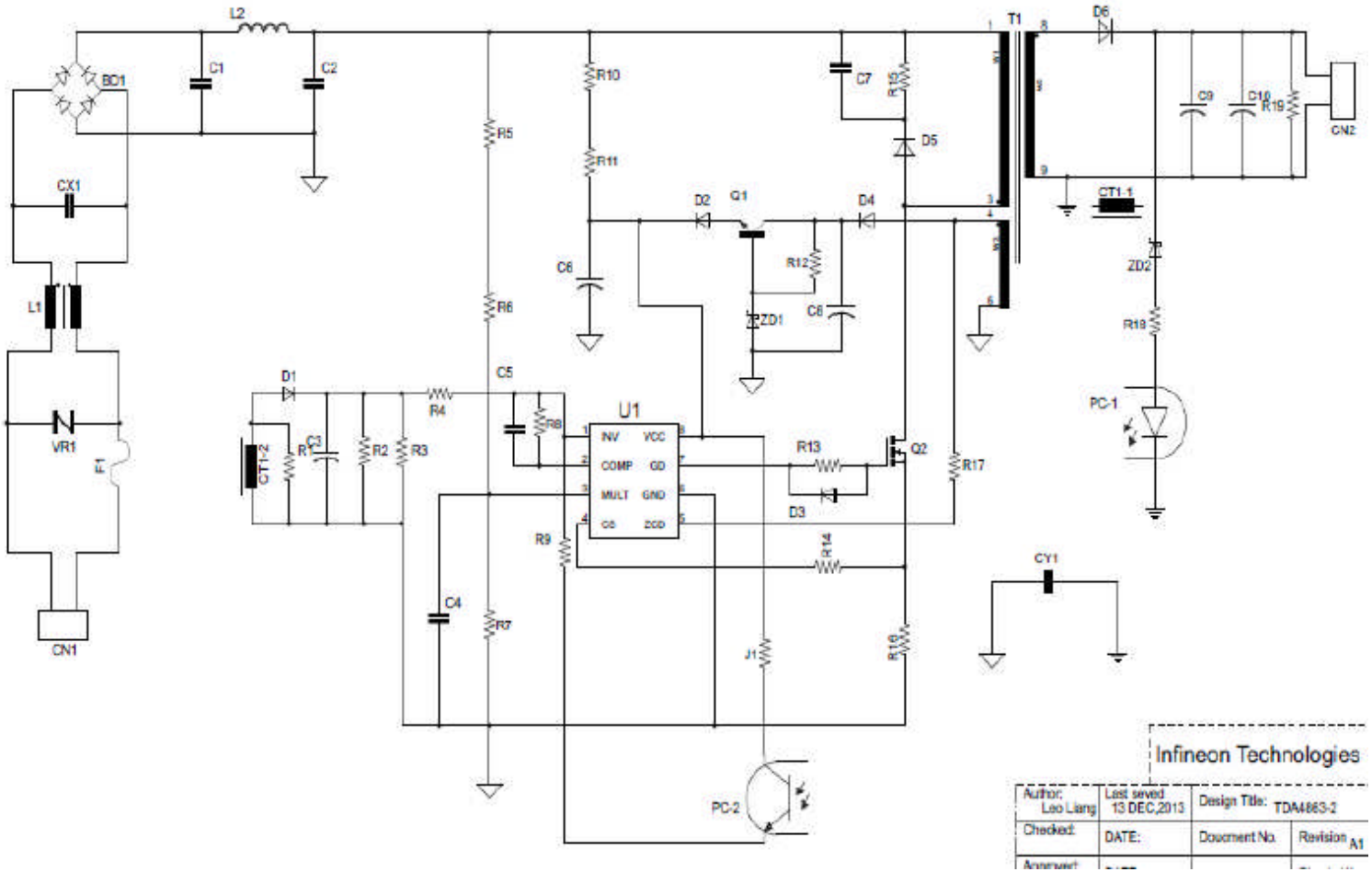


- 功率因数接近1
- 低谐波
- 断续模式
- 微电流启动
- 输出电压保护

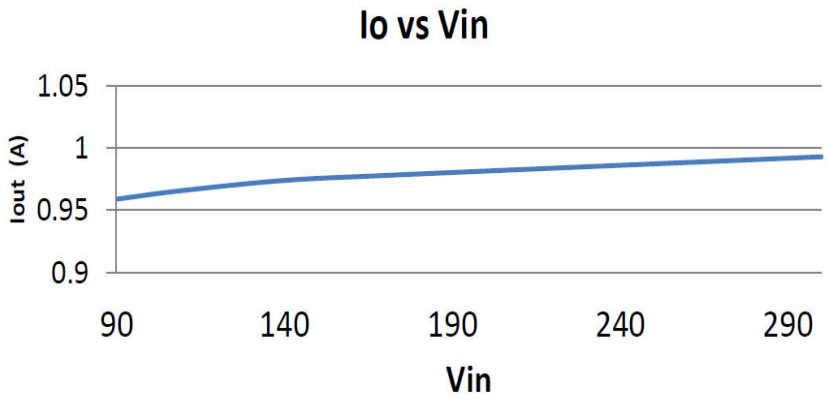


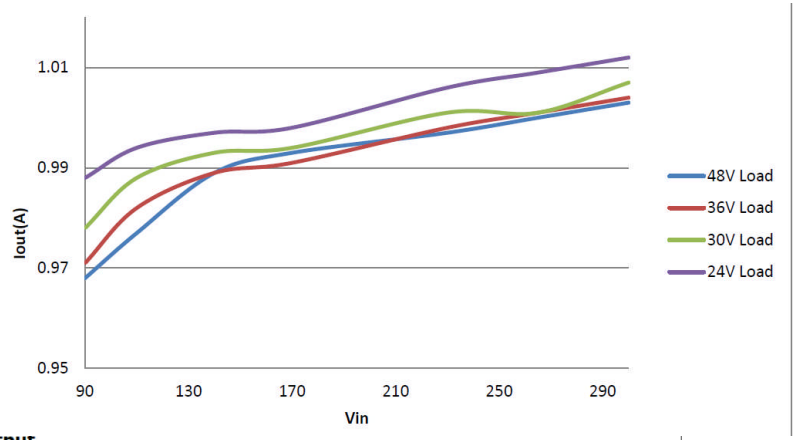


48W (48V/1A) LED 驱动器原理图



LED 电流测试





48V Output

Vin	Pin	PF	Vo	Io	Eff.	Tolerance	iTHD
90	52.68	0.99	48.89	0.968	**89.84%**	-3.20%	5.30%
110	52.56	**0.99**	48.96	0.977	**91.01%**	-2.30%	5.00%
140	52.9	0.99	49.07	0.989	**91.74%**	-1.10%	4.90%
170	52.99	**0.99**	49.11	0.993	**92.03%**	-0.70%	5.00%
230	53.29	0.99	49.15	0.997	**91.95%**	-0.30%	6.40%
265	53.6	**0.98**	49.18	1	**91.75%**	0.00%	6.60%
300	53.9	0.97	49.2	1.003	**91.55%**	0.30%	6.60%

36V Output

Vin	Pin	PF	Vo	Io	Eff.	Tolerance	iTHD

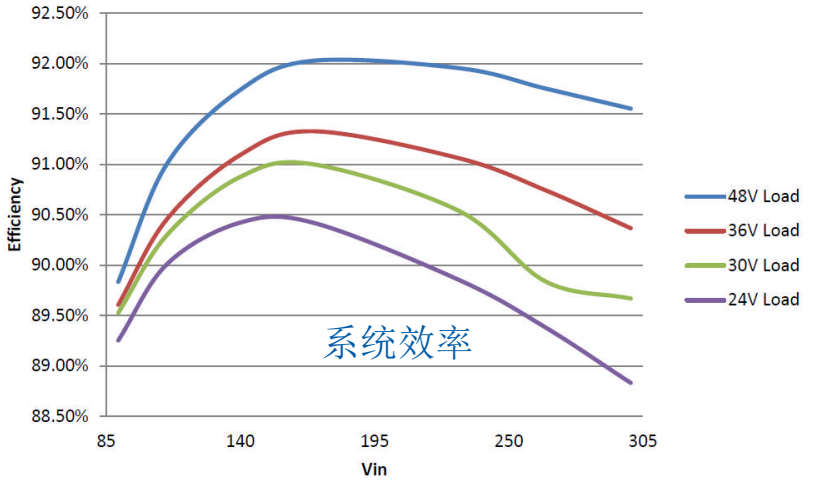
30V Output

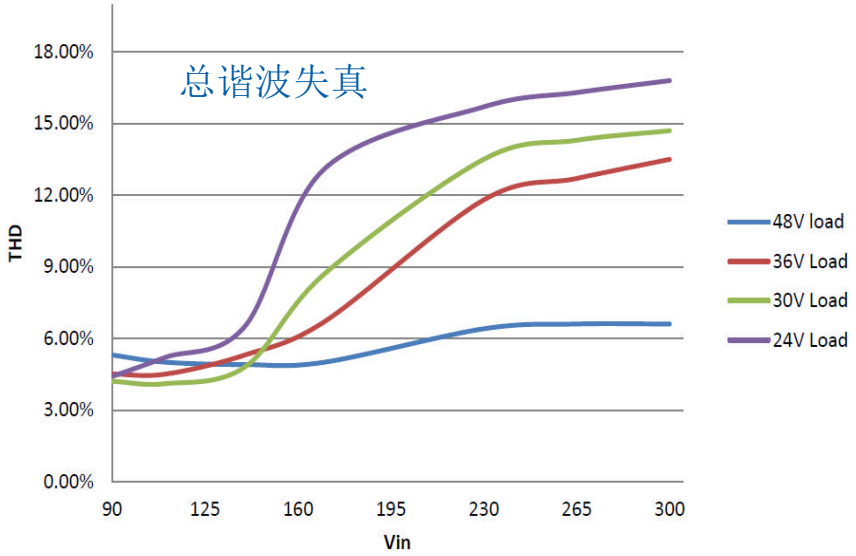
Vin	Pin	PF	Vo	Io	Eff.	Tolerance	iTHD
90	32.75	0.99	29.98	0.978	**89.53%**	-2.20%	4.20%
110	32.9	0.99	30.07	0.988	**90.30%**	-1.20%	4.10%
140	32.89	0.99	30.1	0.993	**90.88%**	-0.70%	4.80%
170	32.9	0.99	30.12	0.994	**91.00%**	-0.60%	8.70%
230	33.38	0.98	30.19	1.001	**90.53%**	0.10%	13.50%
265	33.66	0.96	30.21	1.001	**89.84%**	0.10%	14.30%
300	33.96	0.94	30.24	1.007	**89.67%**	0.70%	14.70%

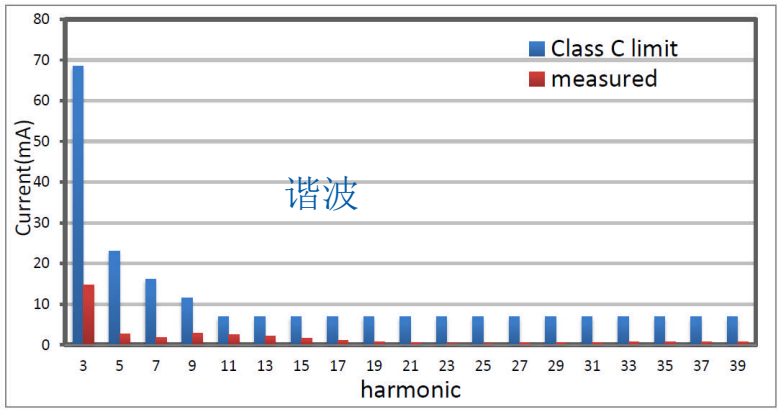
24V Output

Vin	Pin	PF	Vo	Io	Eff.	Tolerance	iTHD
90	27.22	0.99	24.59	0.988	**89.25%**	-1.20%	4.40%
110	27.21	0.99	24.64	0.994	**90.01%**	-0.60%	5.20%
140	27.19	0.99	24.66	0.997	**90.42%**	-0.30%	6.50%
170	27.24	0.98	24.68	0.998	**90.42%**	-0.20%	13.10%
230	27.7	0.96	24.74	1.006	**89.85%**	0.60%	15.70%
265	27.95	0.94	24.76	1.009	**89.38%**	0.90%	16.30%
300	28.23	0.91	24.78	1.012	**88.83%**	1.20%	16.80%

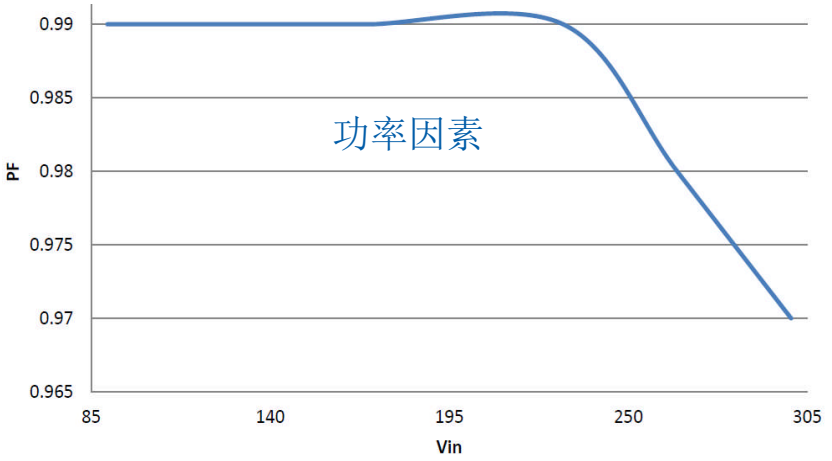
效率，总谐波，功率因数测试



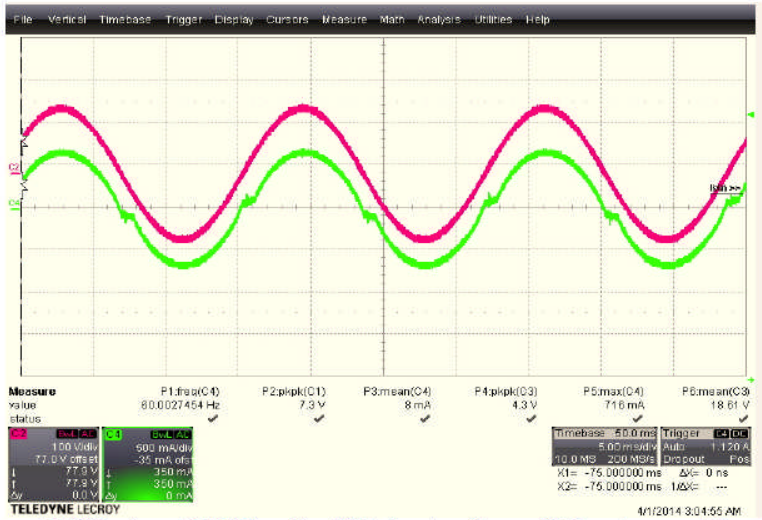




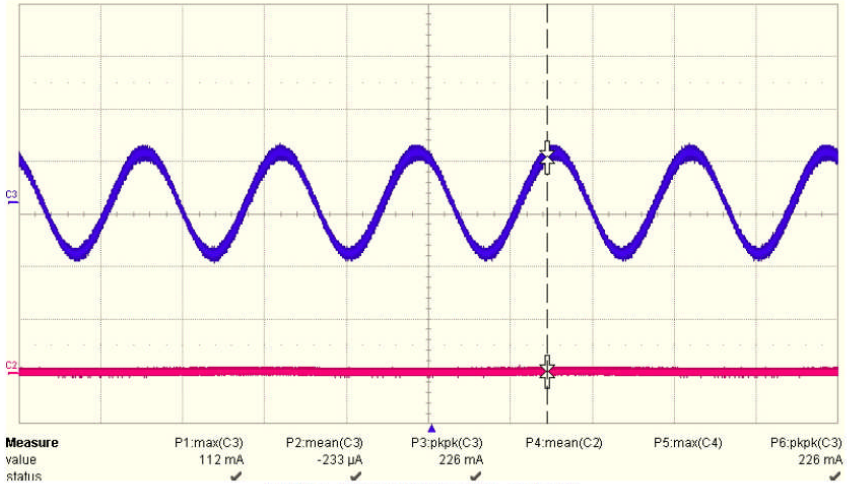
230Vac harmonic for full load



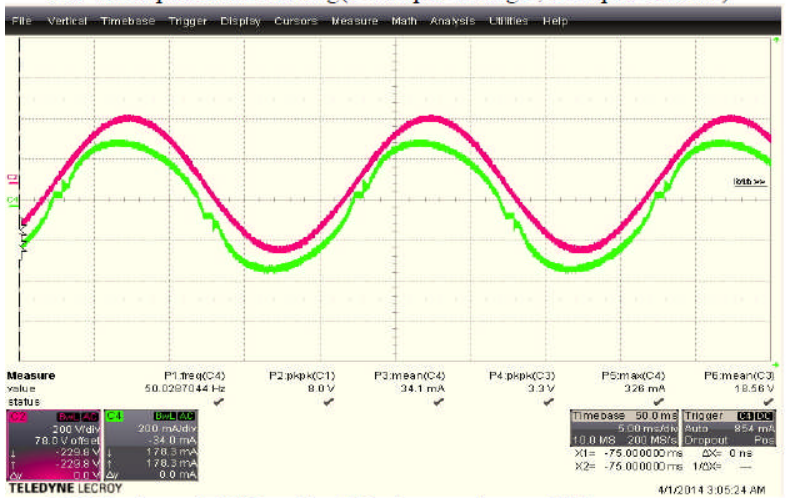
输入/输出电流波形



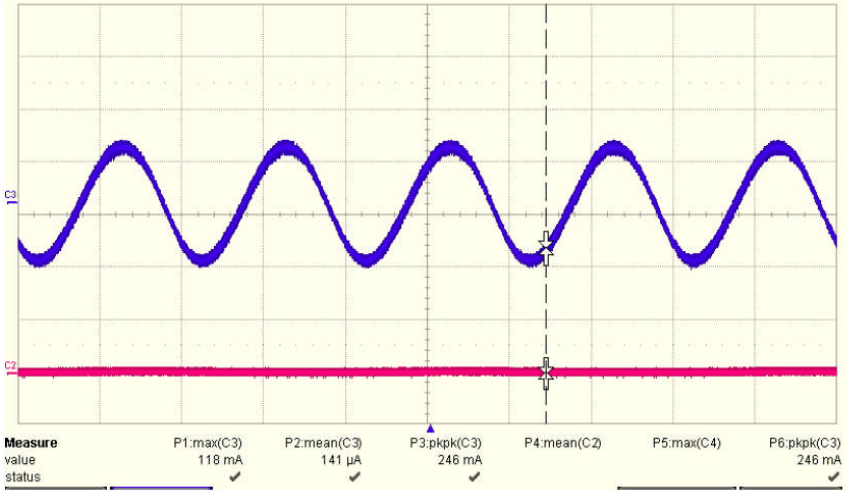
110Vac input Full Loading(C2 :input voltage ,C4 input current)



110Vac input Full Loading <+/-13%

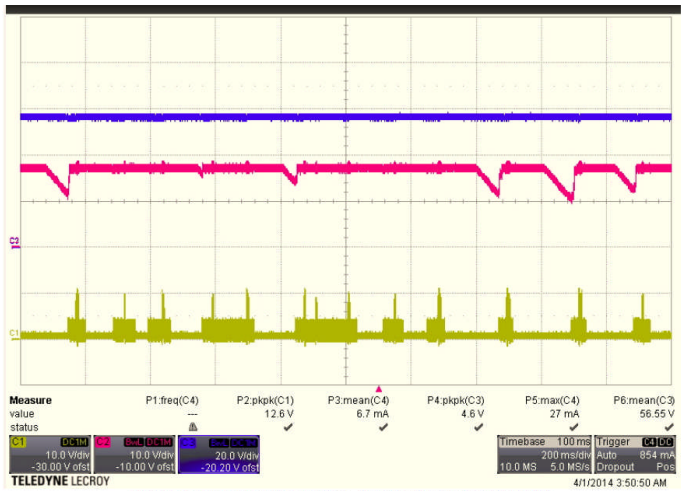


230Vac input Full Loading(C2 :input voltage ,C4 input current)



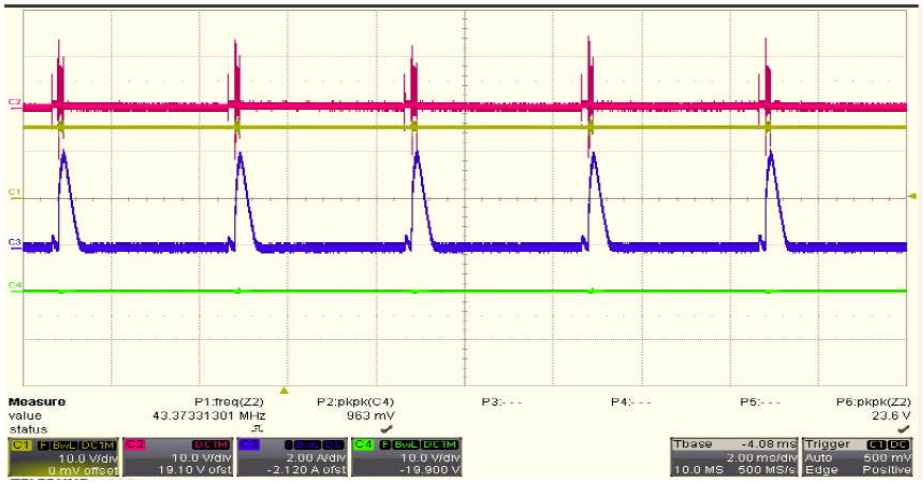
230Vac input Full Loading <+/-13%

负载开路，短路保护， 启动时间测试

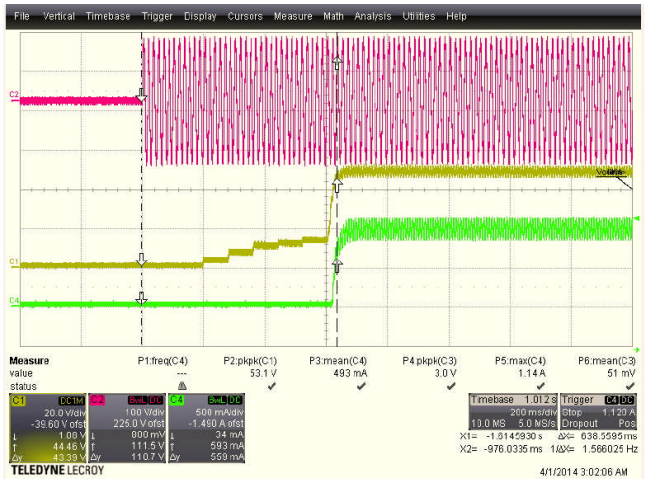


Open circuit protection (C3:Vo. C2:Vcc.C1:Vgs) at Vo=48V

The max <=56V when the rated Vo set to 48V

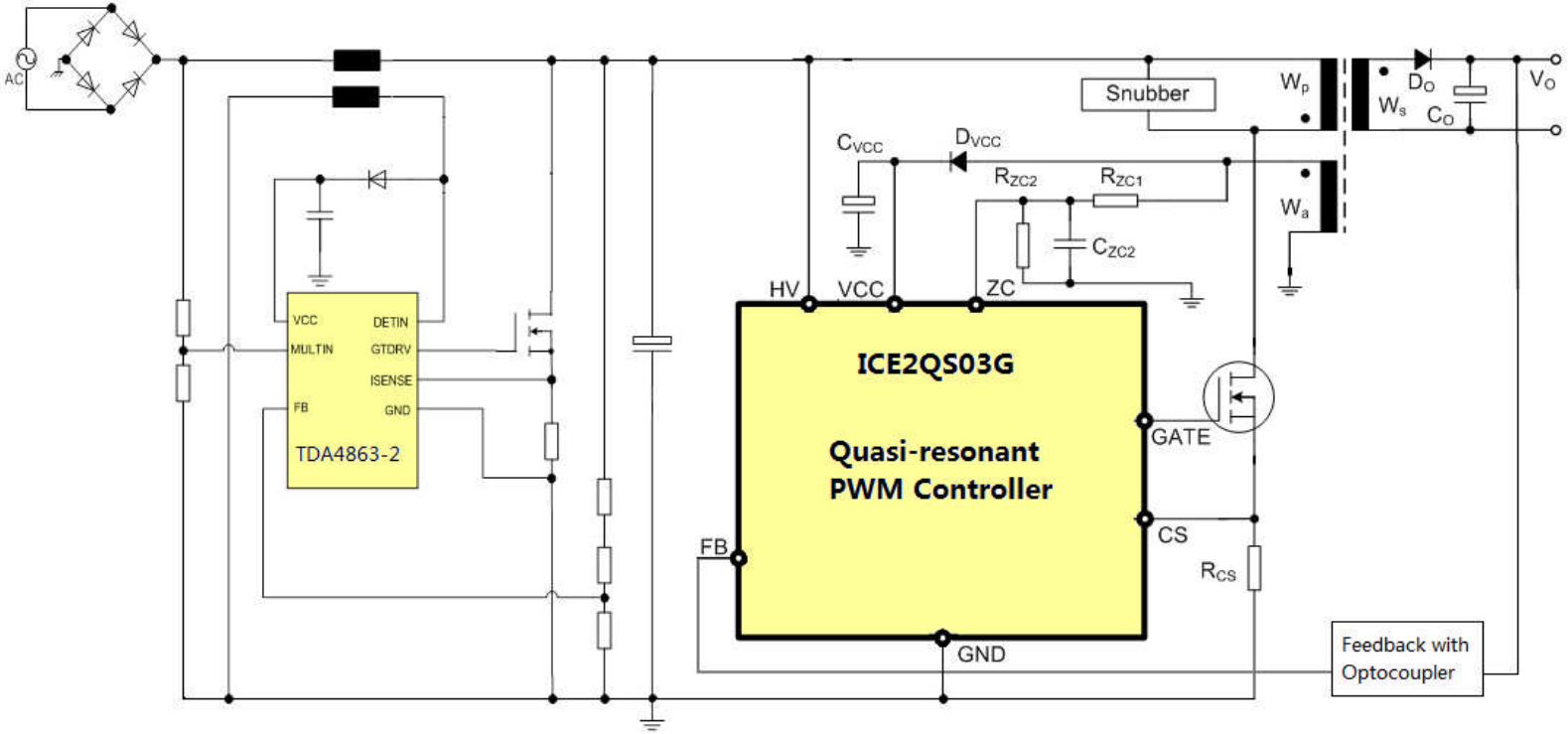


Short circuit protection (C1:VCC.C2:Vgs.C4:Vo.C3:Io) input power less than 1.8W at 300Vac.

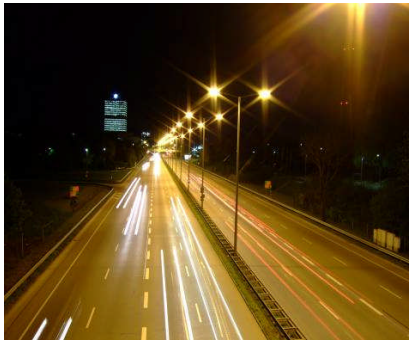


Start up time C2:Vac,C1:Vo, C4:Io **time to light <650mS** at 90Vac

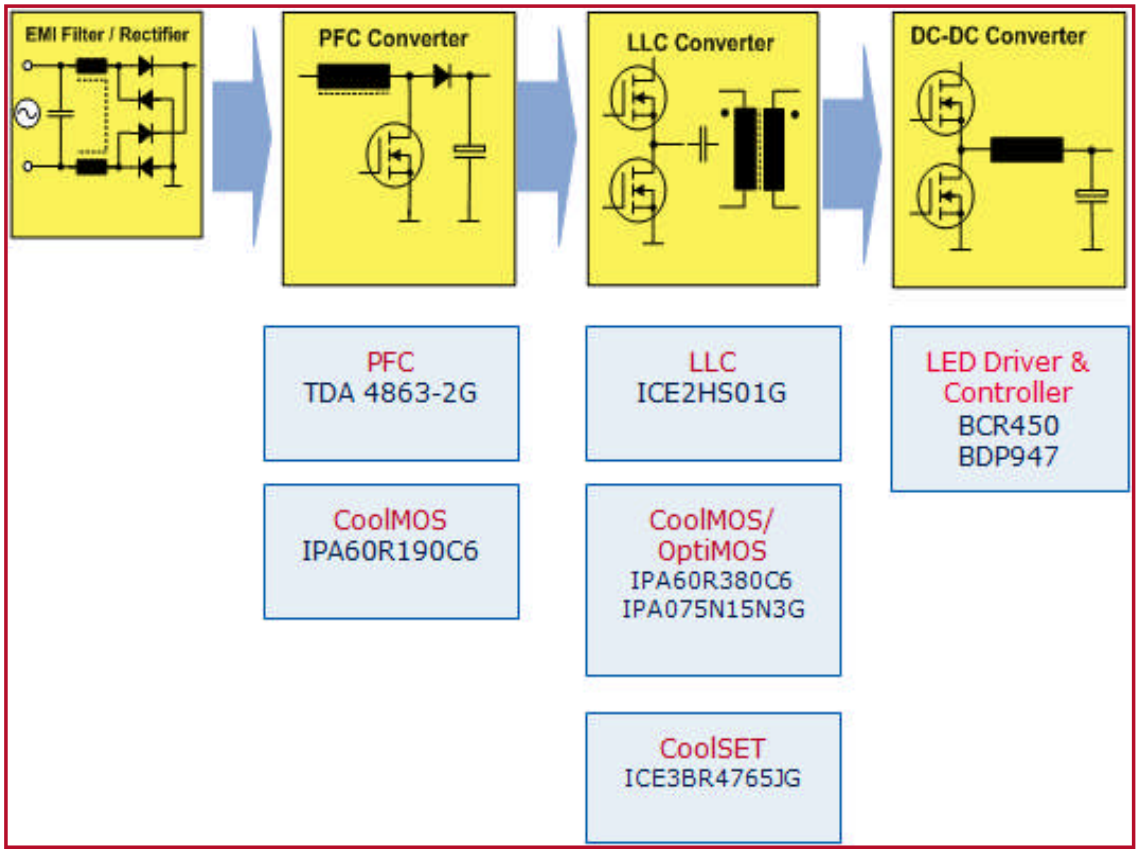
基于TDA4863-2和ICE2QS03的中功率(50~200W)LED路灯电源方案

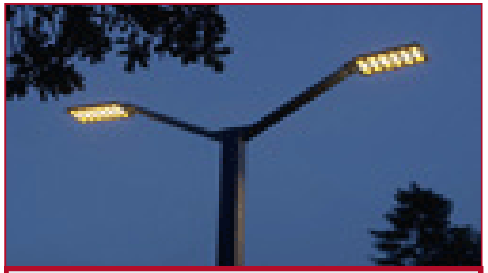


- 全电压输入80-270V AC
- 完善的保护，高可靠性
- 高功率因素(>0.98)，低纹波输出
- 效率>85%
- 设计灵活，可用于恒压或恒流输出



基于TDA4863-2和ICE2HS01G的大功率(>200W)LED路灯电源方案



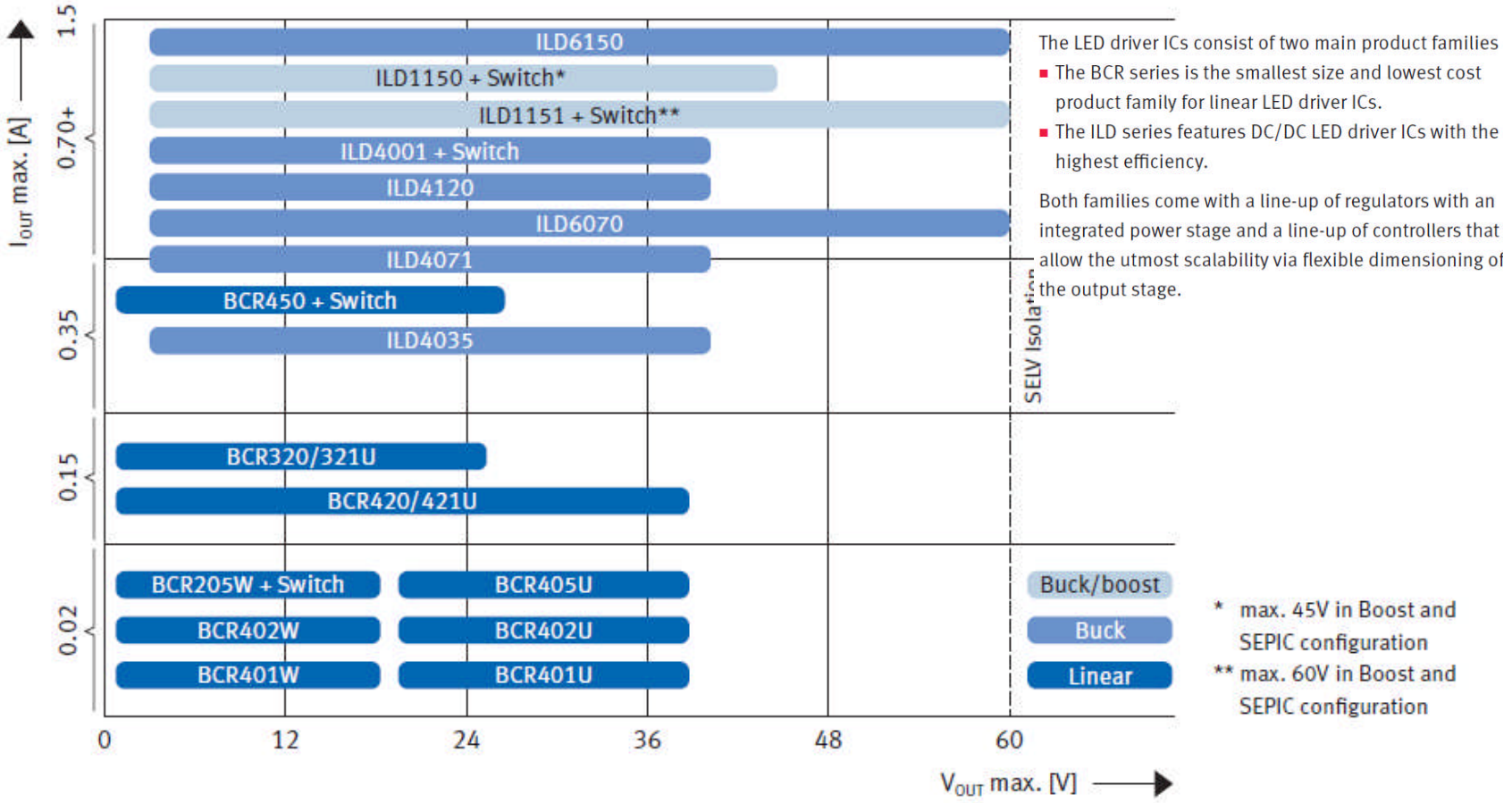


- 全电压输入90-270V AC
- 完善的保护，高可靠性
- 高功率因素(>0.98)，低纹波输出
- 高效率>92%
- PWM 调光

目录

- 英飞凌照明总体介绍
- 英飞凌AC/DC LED驱动方案
- **英飞凌DC/DC LED驱动方案**
- 英飞凌MOSFET

LED驱动电源 DC/DC类产品控制器



The LED driver ICs consist of two main product families

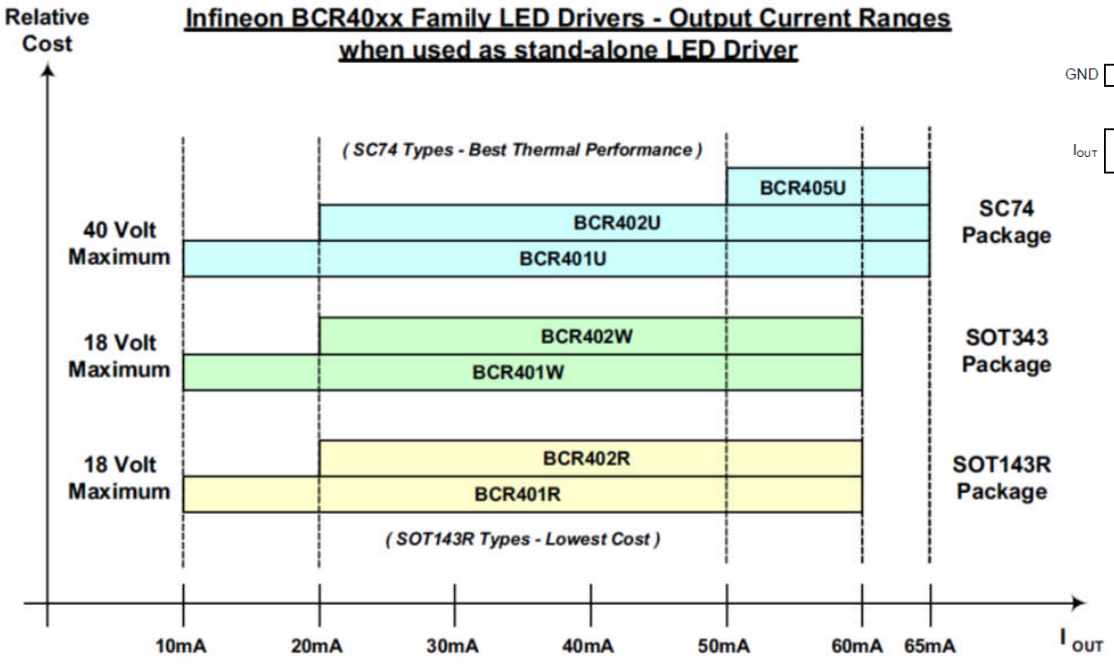
- The BCR series is the smallest size and lowest cost product family for linear LED driver ICs.
- The ILD series features DC/DC LED driver ICs with the highest efficiency.

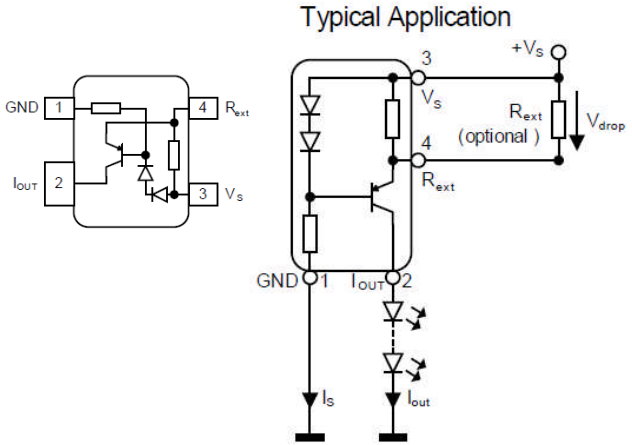
Both families come with a line-up of regulators with an integrated power stage and a line-up of controllers that allow the utmost scalability via flexible dimensioning of the output stage.

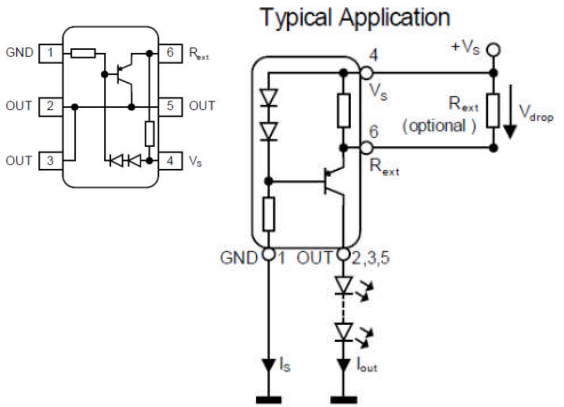
* max. 45V in Boost and SEPIC configuration

** max. 60V in Boost and SEPIC configuration

线性模式 LED驱动控制器







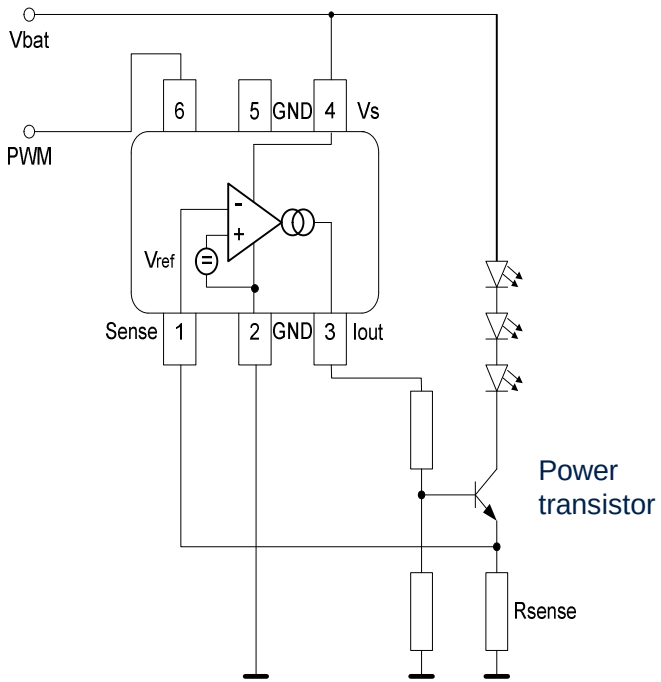






- SOT143R 封装小;
- SC74 热性能好

BCR450 驱动外置三极管用于驱动大功率LEDs



性能

- Vsense 150mV 低压降
- 操作电压8-27V
- EN 脚位用于PWM调光控制和开关控制
- 热关断
- 过压保护
- 过流保护

功率扩展

0.5W LED's:

BCR450 + BC817SU

1W LED's:

BCR450 + BCX68

3W LED's and above:

BCR450 + BDP947

开关模式 LED 驱动控制器

LED Driver ICs for Buck Topology

Product Type	Group	V_S (min) [V]	V_S (max) [V]	I_{out} (typ) [mA]	I_{out} (max) [mA]	Dimming	Package	P_{tot} (max) [mW]
ILD4001	LED controller	4.5	42	10	ext. Switch	Analog or Digital	SC74	500
ILD4035	LED drivers for buck high-power LEDs	4.5	40	350	400	Analog or Digital	SC74	1000
ILD4071	LED drivers for buck high-power LEDs	5.0	40	100	700	Analog or Digital	PG-DSO-8	–
ILD4120	LED drivers for buck high-power LEDs	4.5	40	1200	1200	Analog or Digital	PG-DSO-8	1500
ILD6070	LED drivers for buck high-power LEDs	4.5	60	700	700	Analog or Digital	PG-DSO-8	–
ILD6150	LED drivers for buck high-power LEDs	4.5	60	1500	1500	Analog or Digital	PG-DSO-8	–

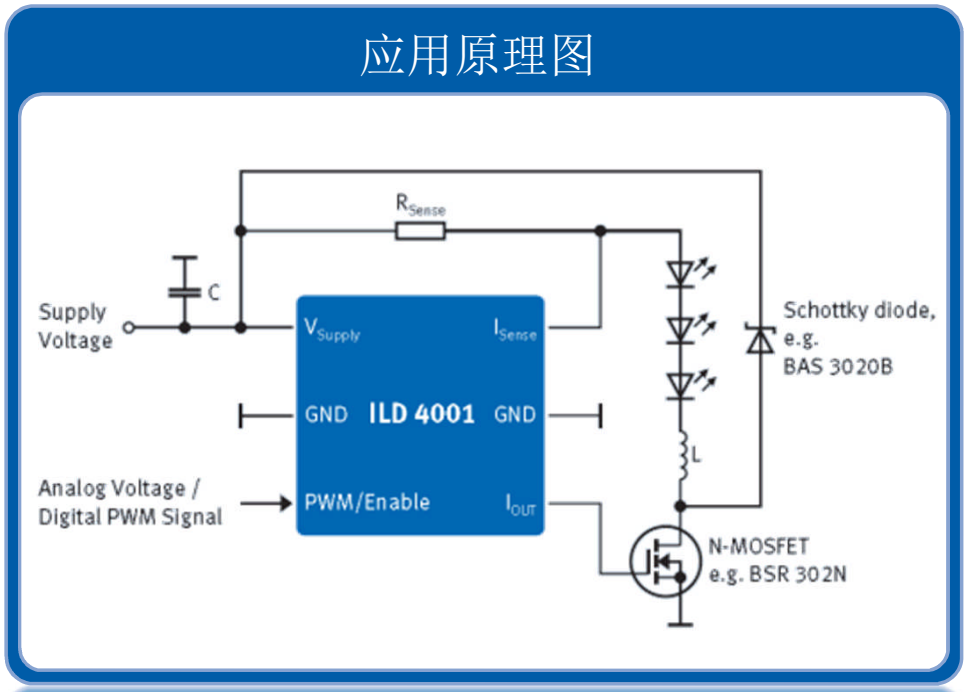
LED Driver ICs for Buck/Boost, Boost and SEPIC Topology

Product Type	Group	V_S (min) [V]	V_S (max) [V]	I_{out} (typ) [mA]	I_{out} (max) [mA]	Dimming	Package	P_{tot} (max) [mW]
ILD1150	LED controller	–	45	90	ext. Switch	Digital	SSOP-14	–
ILD1151	LED controller	–	45	90	ext. Switch	Analog or Digital	SSOP-14	–

- 广泛的产品组合，支持电流从150mA 到高达 3A
- 高功率和超高功率通用照明LED驱动的理想选择

ILD4001 优秀扩展性应用的代表

应用原理图

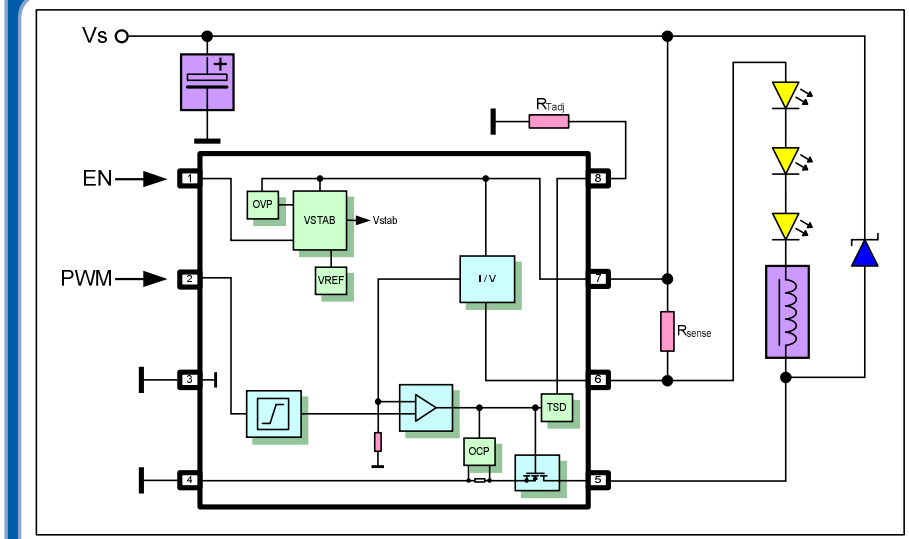


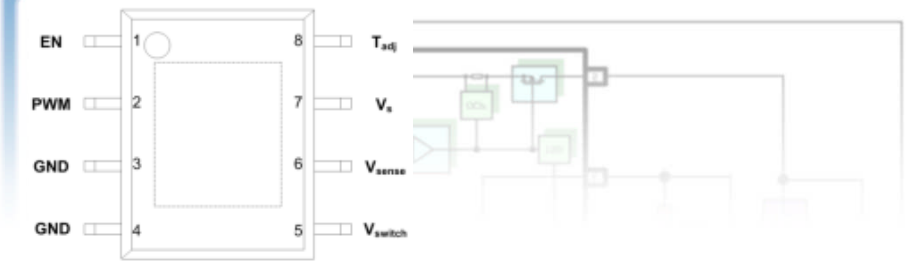
适用 MOSFET BSR 302N (30V, SC59), BSP 318S (60V, SOT223)

- Operation — 降压结构
- Flexibility — 宽输入电压范围4.5V – 40V
- Output current — 10mA – 3000mA 电流扩展能力，可以简单的复制到新设计中
- Efficiency — DC/DC 效率高达98%
- Dimming — 调光模式: 模拟或数字
- Protection — 系统热关断

ILD6070 / ILD6150 高效，精确，宽范围

Application diagram





Operation

- 降压结构
- 最大开关频率 1MHz
- 电流精度± 3%

Flexibility

宽输入电压范围4.5V – 60V

Output current

集成 MOSFET能力700 / 1500 mA

Efficiency

DC/DC 效率高达98%

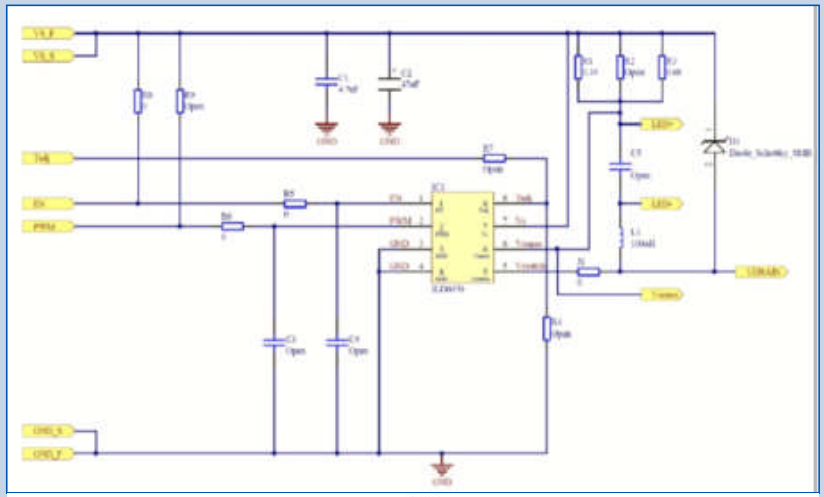
Dimming

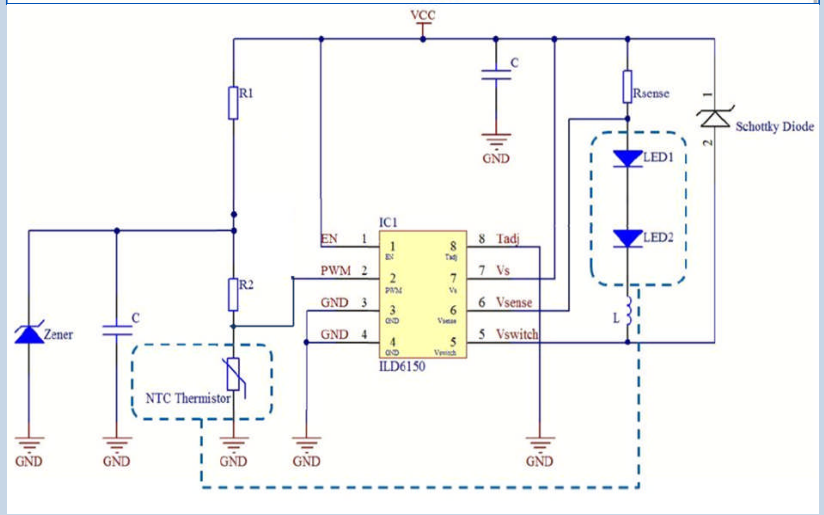
- 数字/模拟 调光

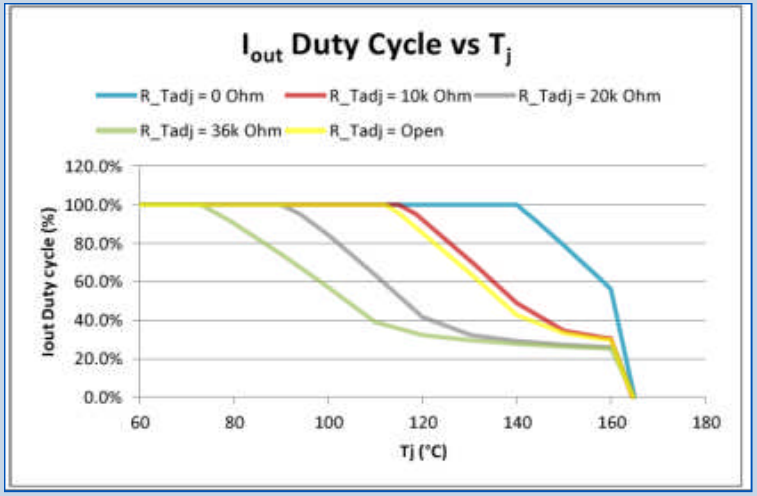
Protection

- 可调节的过温度保护
- 过流保护

ILD6070 / ILD6150 应用电路







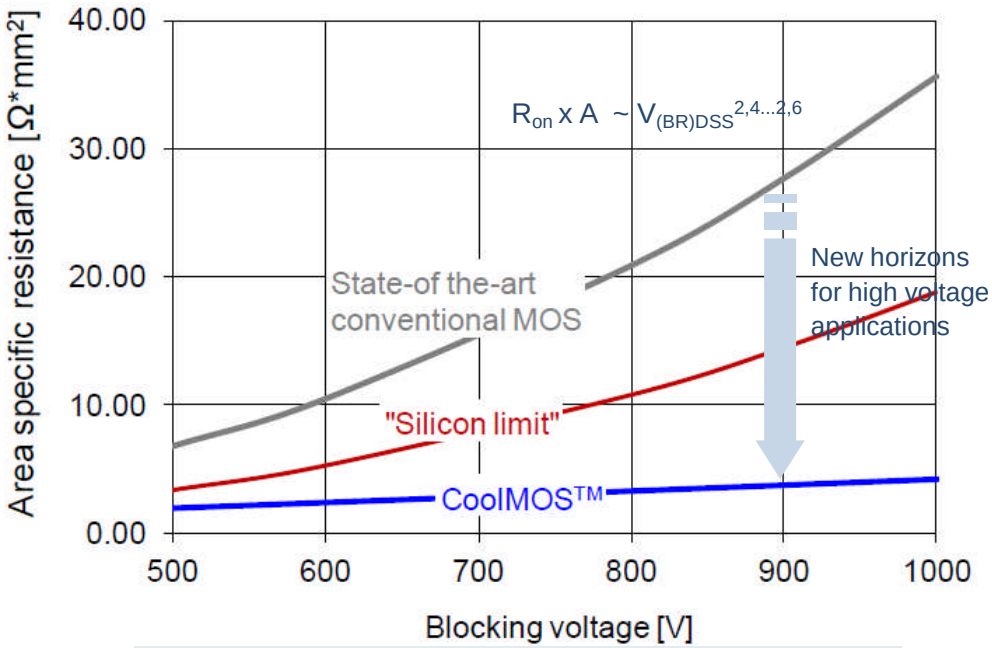
- The ILD6070 集成过温度保护电路(OTP)，一旦设定的结温阈值超过，通过内部PWM调制降低电流输出。
- 过温度保护通过一个普通的电阻调节，电阻接于Tadj和GND脚之间。
- 外部过温度保护可通过外部的NTC电阻实现，NTC电阻通常靠近LEDs,达到精确检测LEDs温度的目的。

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- **英飞凌MOSFET**

CoolMOS™简述

- 高压MOSFET 电压范围 500V, 600V, 650V, 800V, 以及 900V
- 显著减少导通和开关损耗
- 进一步提升功率转换系统的功率密度提高，效率
- 业界领先的性价比



$R_{ds(on)}$ 和 $V_{(BR)DSS}$接近线性关系显示了CoolMOS™ 和 传统MOSFET显著的区别

CoolMOS™ – 高压MOSFETs 的技术领导者

CoolMOS™ 产品组合

S5 系列 1998

The first family CoolMOSTM, established the new Superjunction principle in the market and was the first High voltage MOSFET to break the limit line of silicon

C3 系列 2001

The second family CoolMOSTM is today the best selling Superjunction MOSFET worldwide and helped to create the brand of “CoolMOS”.

CFD 系列 2004

For applications such as HID lamps, resonant SMPS topologies and applications with increased reverse requirements such as the Photovoltaic market.

CP 系列 2005

Target applications are server and telecom power supplies, notebook adapters, LCD TV, ATX and gaming power supplies and lighting ballasts

C6/E6 系列 2009/2010

Is the successor of C3 series, is capable to fulfill the needs of a very wide range of applications comprising fields such as computing, lighting, industrial, and consumer.

+

P6 系列 2012

For particularly applications, where the focus is not only in high efficiency and power density, but also provide ease o fuse as key requirements

+

CFD2 系列 2011

Is the successor of CFD, suitable for resonant topology

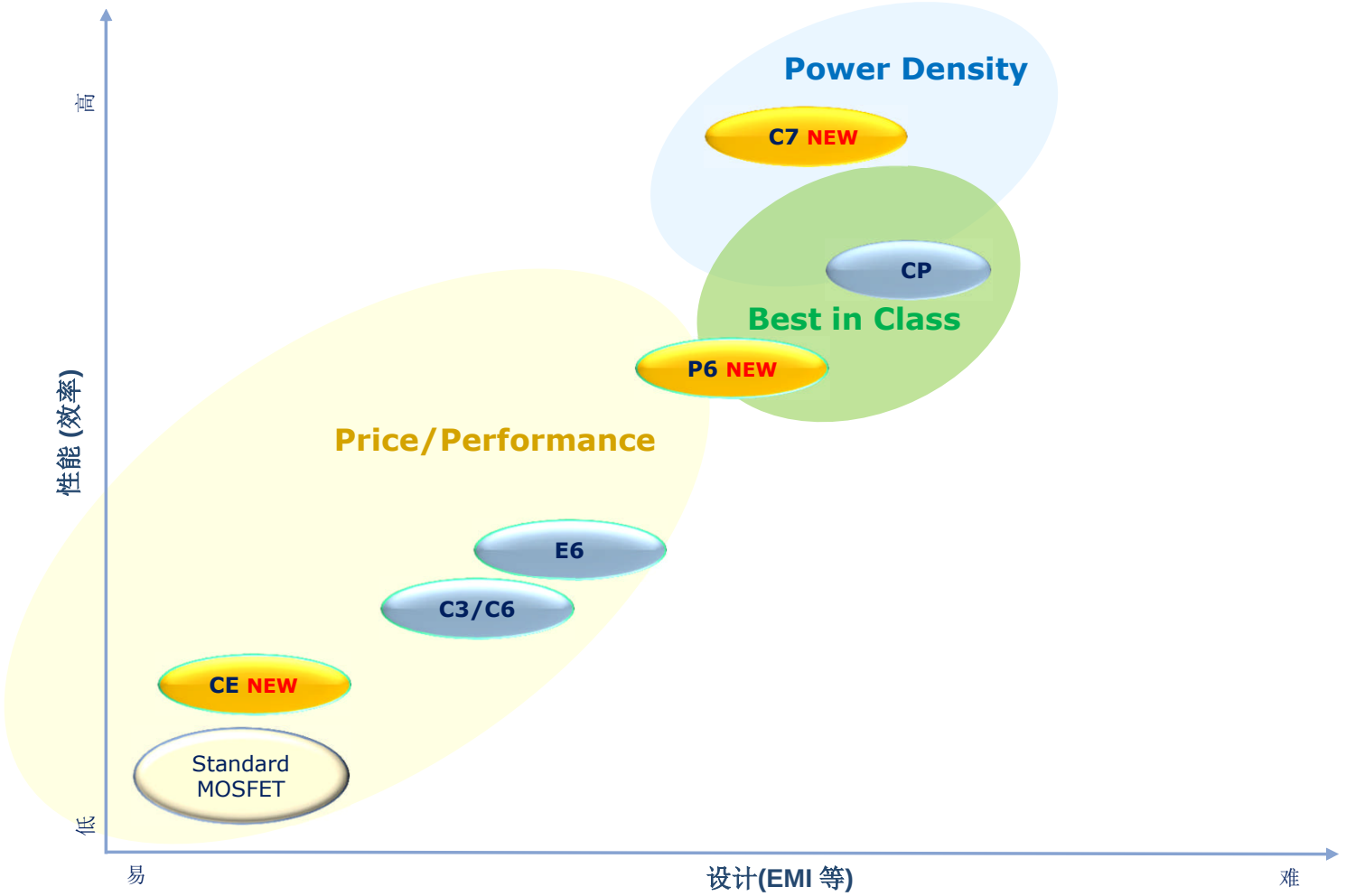
CE 系列 2012

Cost optimized platform for price sensitive applications such as Consumer Electronics applications and Lighting

C7 系列 2013

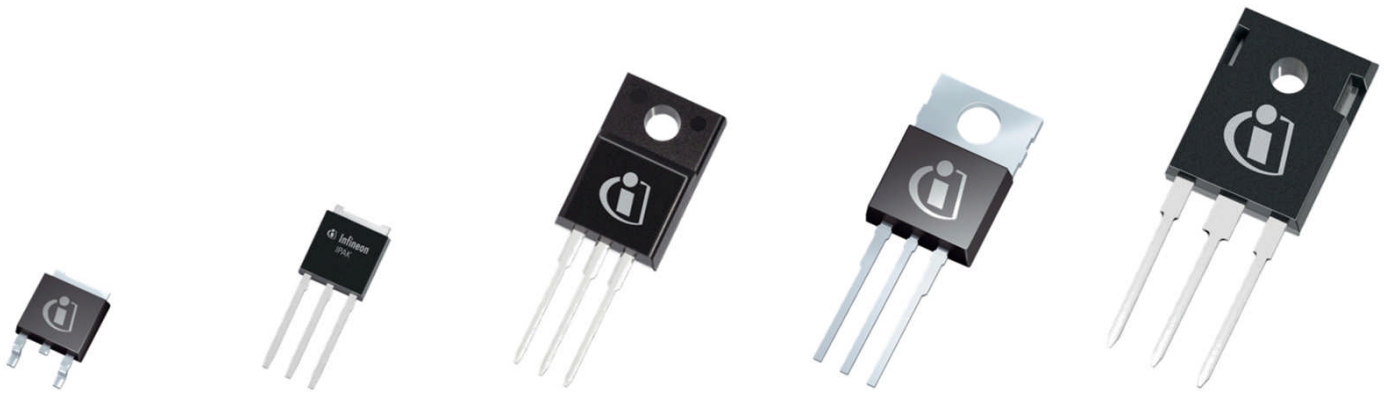
Is the successor to the CP series, brings a new level of performance in hard switching applications such as Power Factor Correction (PFC).

CoolMOS™ 定位

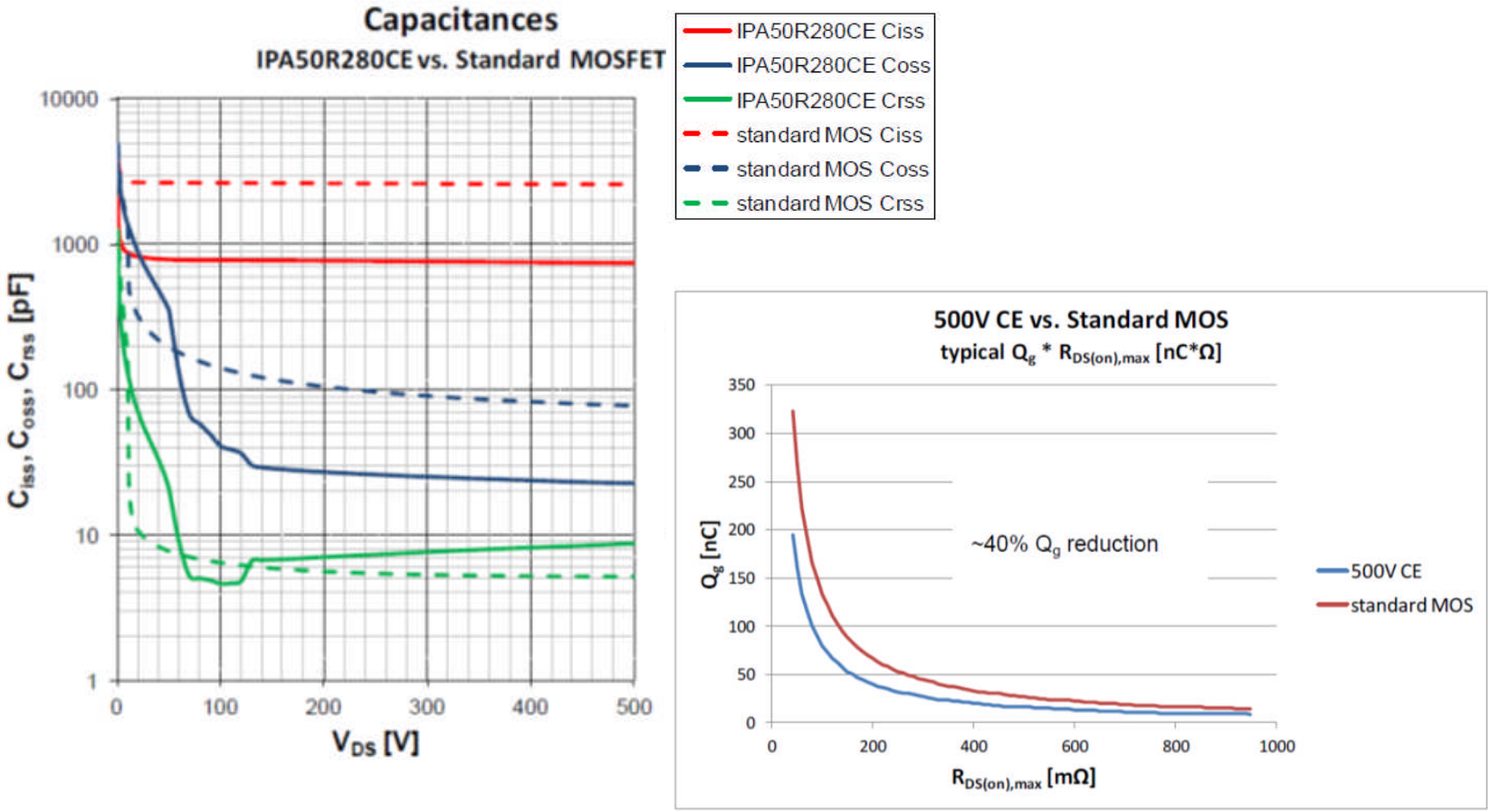

Power Density
C7 NEW
CP
Best in Class
P6 NEW
Price/Performance
E6
C3/C6
CE NEW
Standard
MOSFET
高
性能 (效率)
低
易
设计(EMI 等)
难

500V/800V CE 产品系列介绍

- CoolMOS™ 500V/800V CE 是目标应用中传统MOSFET的极具价格吸引力的替换品
- CoolMOS™ CE 具有超级结MOSFET的优点的同时，而又不牺牲设计和使用的易用性。
- 500V/800V CE 产品组合在提供高性价比的 同时，还提供着更高的效率。

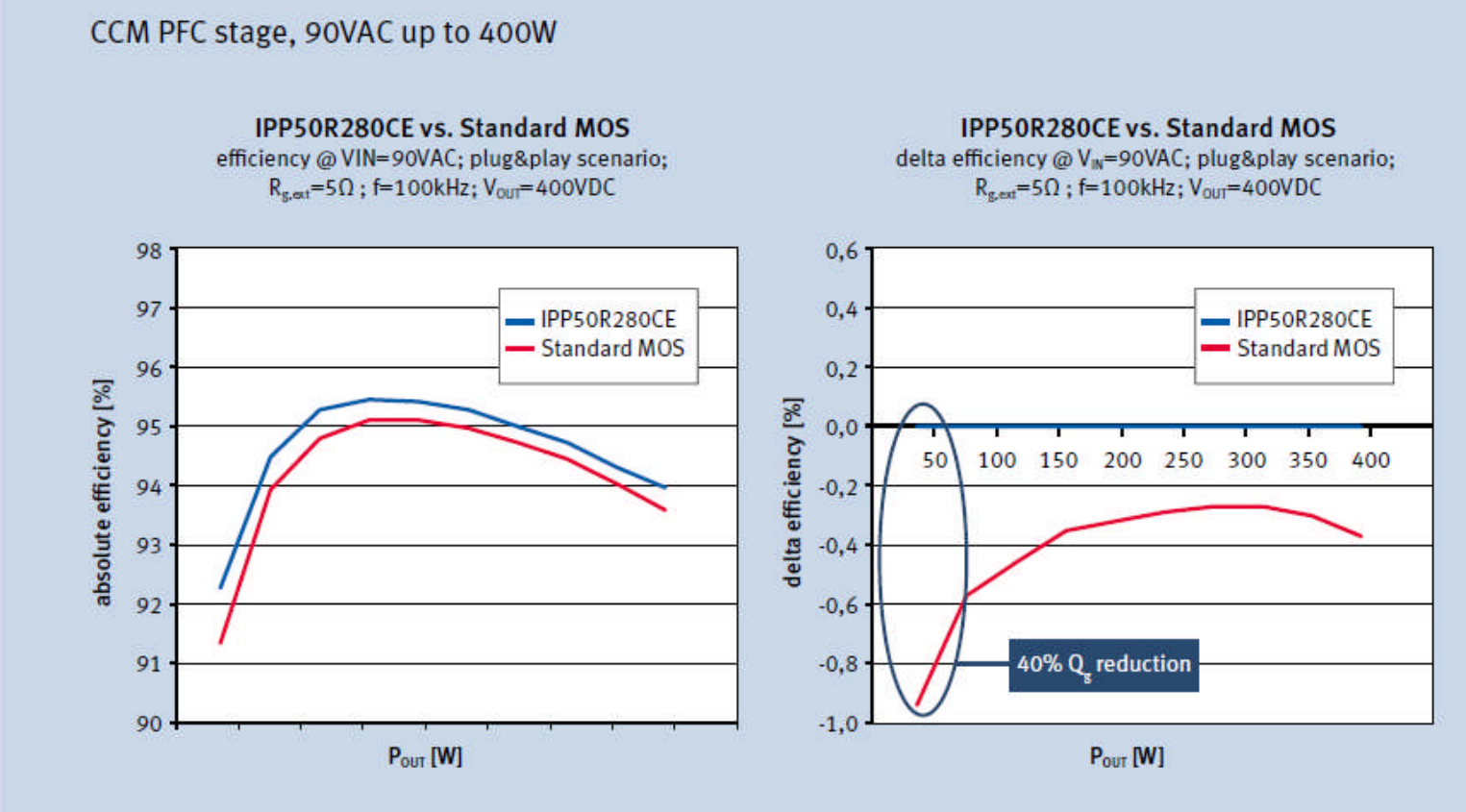


CoolMOS™ 500V CE 产品性能



CoolMOS™ 500V CE 产品性能

- 效率对比：500V CoolMOS™ CE 和同等级传统MOSFET



CoolMOS™ 500V CE 产品组合

					
RDS(on) [mΩ]	**TO-220 FullPAK**	**DPAK (TO-252)**	**TO-220**	**TO-247**	**IPAK**
3000		IPD50R3K0CE			IPU50R3K0CE
2000		IPD50R2K0CE			IPU50R2K0CE
1400		IPD50R1K4CE			IPU50R1K4CE
950	IPA50R950CE	IPD50R950CE			IPU50R950CE
800	IPA50R800CE	IPD50R800CE			
650	IPA50R650CE	IPD50R650CE			
500	IPA50R500CE	IPD50R500CE	IPP50R500CE		
380	IPA50R380CE	IPD50R380CE	IPP50R380CE		
280	IPA50R280CE	IPD50R280CE	IPP50R280CE	IPW50R280CE	
190	IPA50R190CE		IPP50R190CE	IPW50R190CE	

CoolMOS™ 800 V CE 产品组合

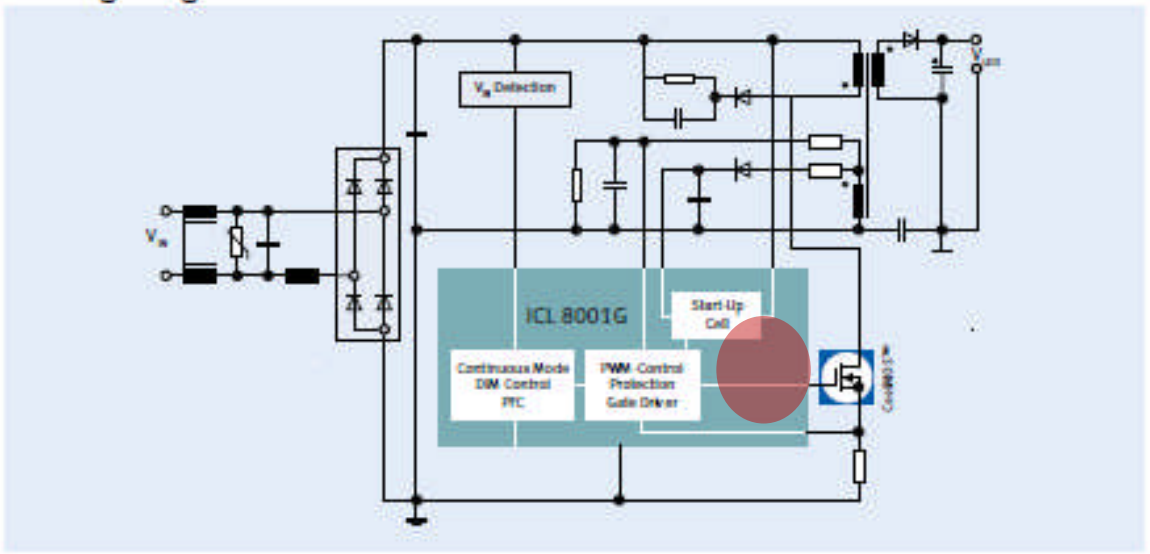




$R_{DS(ON)}$[mΩ]	DPAK (TO-252)	IPAK (TO-251)
2800	IPD80R2K8CE	IPU80R2K8CE*
1500	IPD80R1K5CE	IPU80R1K5CE*
1000	IPD80R1K0CE	IPU80R1K0CE*

Applications	LED Lighting

LED Lighting







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800V MOSFET提高浪涌抗扰度

	United States	Europe S. America	Japan	Taiwan	China	Korea
Surge Immunity (Combo Wave) **1.2X50us Voc/8X20us Isc** Integrated LED light bulbs	Energy Star Ring wave **2.5kV 100kHz** Class A	IEC/EN 61000-4-5 **500V/250A** **1kV/500A**	JIS C 61000-4-5 **500V/250V** **1kV/500A**	CNS 14676-5 **500V/250A** **1kV/500A**	GB/T 18595 **500V/250A** **1kV/500A**	K61547 **500V/250A** **1kV/500A**

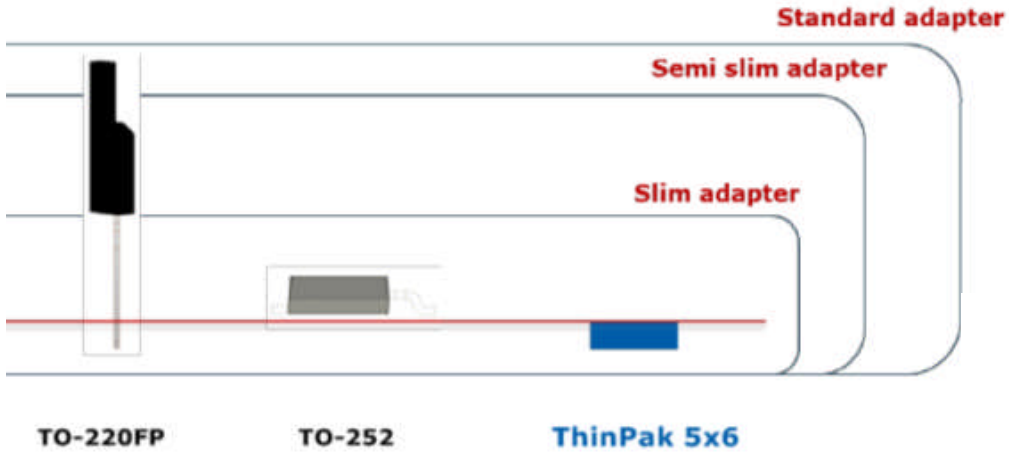
浪涌电压	浪涌保护MOV	MOSFETs
0.5 kV	X 1	600V/650V
1kV	X 2	650V/700V
2kV	X 2	800V/900V

IPU80R2K8CE 适用于10W的LED灯泡设计

1. 更高的耐压以实现2kV浪涌抗扰度
2. 更小的导通及开关损耗以实现更高的效率
3. IPAK封装以实现更紧凑的设计

CoolMOS™ Thinpak 5x6封装

- End consumers demand nowadays lighter, smaller and more compact solutions e.g. adapters/chargers for mobile devices
- Thinpak 5x6 provides 80% volume reduction in a smaller foot print than conventional SMDs available in the market and in combination with established CoolMOS™ technologies





CoolMOS™ Thinpak 5x6封装

APPLICATIONS	Part number	Maximum Ratings		$R_{DS(on)}$(Ohm)		Q_g(nC)typ
		V_{DSS}(V)	I_D(A)	Typ@25°C	Max@25°C	
CONSUMER	IPL60R360P6S	600	30	0.32	0.36	22
	IPL60R650P6S	600	16.5	0.59	0.65	12
LIGHTING/ ADAPTERS	IPL60R1k5C6S	600	7.7	1.35	1.5	9.4
	IPL60R2k1C6S	600	5.4	1.89	2.1	6.7
CHARGERS/ ADAPTERS	IPL65R650C6S	650	16.6	0.59	0.65	23
	IPL65R1k0C6S	650	12.3	0.9	1	15
	IPL65R1k5C6S	650	8.4	1.35	1.5	11



Engineering samples available in ISAR !! **NOW**!!
Mass production in Q3 2014

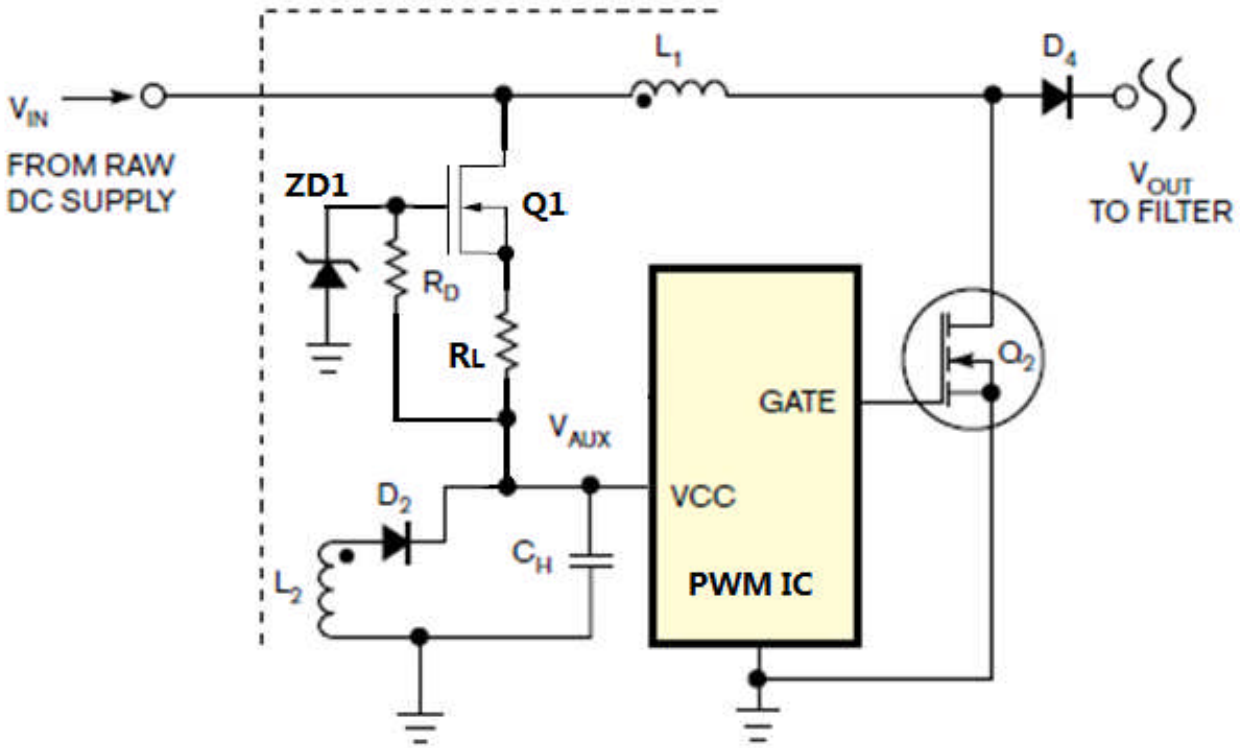


英飞凌 N沟道耗尽型MOSFETs

	SOT-23	SOT-223
		
3.5 Ω (200V)		**BSP149**
6 Ω (240V)		**BSP129**
8 Ω (60V)	**BSS159N**	
12 Ω (100V)	**BSS169**	
30 Ω (240V)	**BSS139**	
60 Ω (600V)		**BSP135**
700 Ω (600V)	**BSS126**	

所有产品通过 **AEC-Q101 (汽车)**认证.

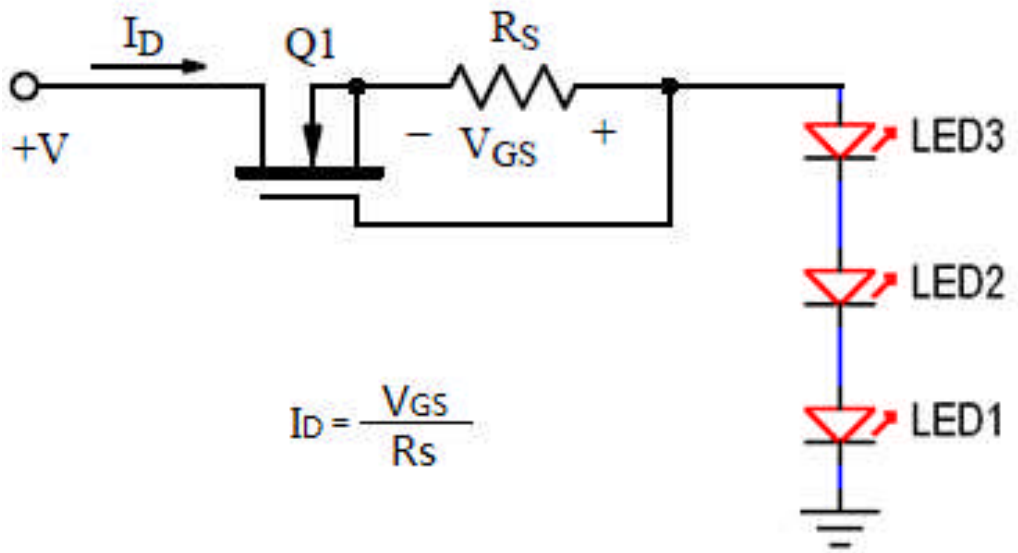
耗尽型MOSFET用于IC启动电路



- 电路简单
- 更高的系统效率
- 更短的启动时间

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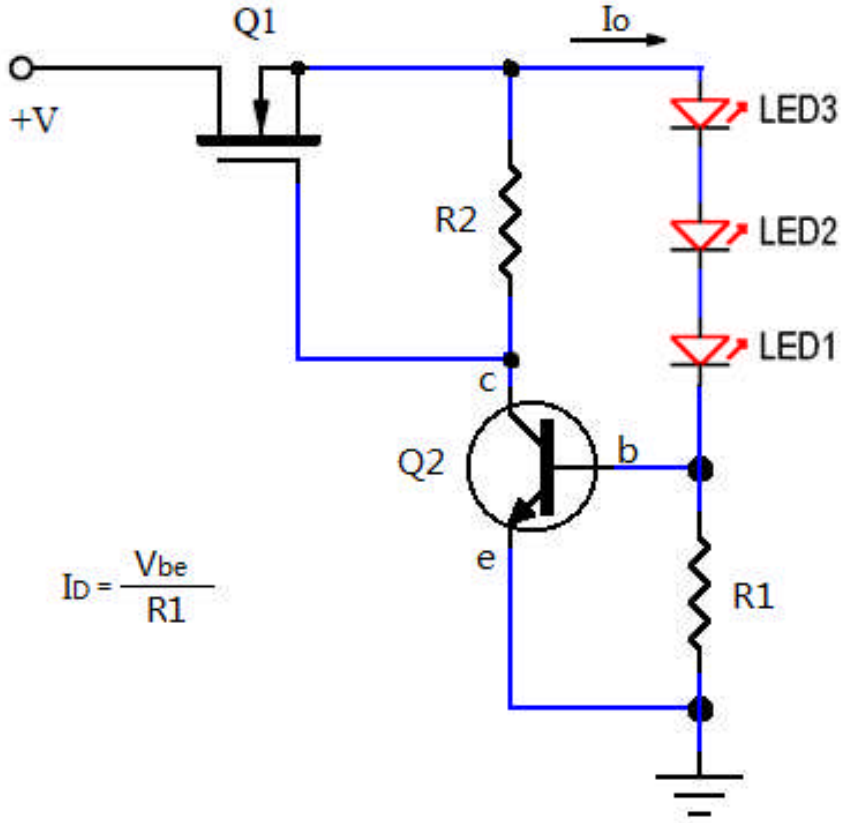
耗尽型MOSFET用做恒流LED驱动-1



- 电路简单
- 适用于高压输入

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耗尽型MOSFET用做恒流LED驱动-2



- 更高的恒流精度
- 适用于高压输入

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$V_{GS(th)}$ 分档

Example: BSP149

Every sorting band has a distribution of 0.2V $V_{GS(th)}$

Threshold voltage $V_{GS(th)}$ sorted in bands[3)]

J	$V_{GS(th)}$	V_{DS}=3 V, I_D=400 µA	-1.2	-	-1	V
K			-1.35	-	-1.15	
L			-1.5	-	-1.3	
M			-1.65	-	-1.45	
N			-1.8	-	-1.6	

Band ranges are 0 hour values

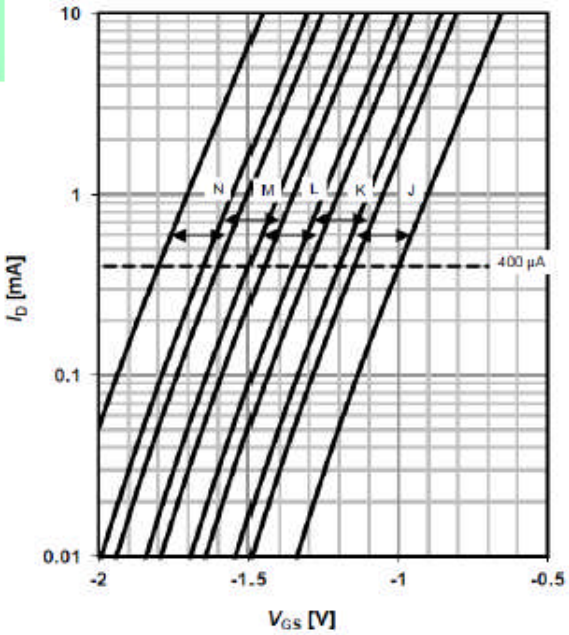
The general $V_{GS(th)}$ range is the device lifetime range

Sorted groups are available in 5 bands

Please note: a specific band cannot be ordered separately. **Each reel contains transistors out of one band** whose identifying letter is printed on the reel label.

11 Threshold voltage bands

I_D=f(V_{GS}); V_{DS}=3 V; T_j=25 °C



订单信息

Example: BSP149

Standard ordering code with no $V_{GS(th)}$ selection

Type	Package	Tape and Reel Information	Marking	Packaging
BSP149	PG-SOT223	H6327 1000 pcs/reel	BSP149	Non dry
BSP149	PG-SOT223	H6906: 1000 pcs/reel sorted in $V_{GS(th)}$ bands 1)	BSP149	Non dry

Ordering code for limited $V_{GS(th)}$ spread

SIPMOS® Small-Signal-Transistor

Features

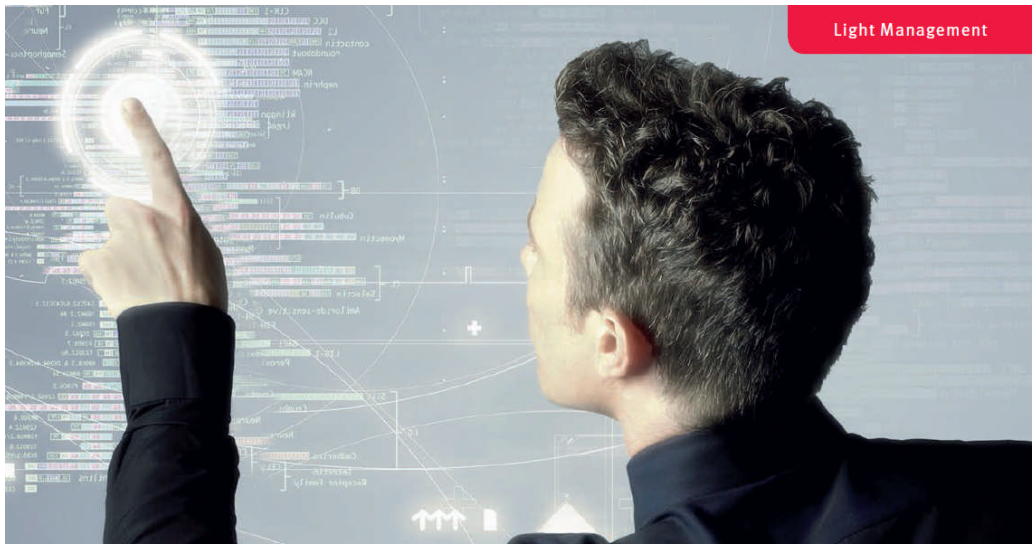
- N-channel
- Depletion mode
- dv/dt rated
- Available with $V_{GS(th)}$ indicator on reel
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC61249-2-21

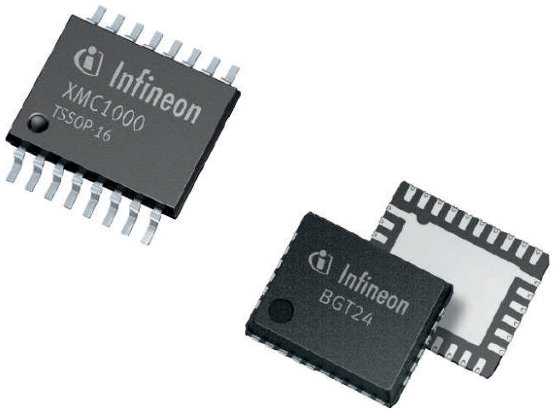
Halogen-Free RoHS AEC Qualified

Available with limited $V_{GS(th)}$ spread
The $V_{GS(th)}$ band is indicated on the reel label

注意: 不可以单独购买某个VGS(th) 分档

照明管理



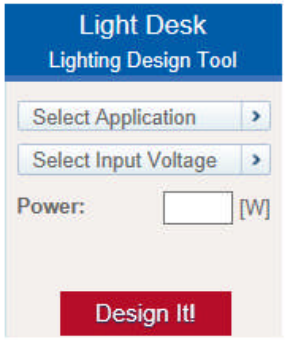


- LED照明带来全新的智能照明机遇
  - LEDs 大幅延长光源寿命，而不受开关影响
  - 在调光状态下更节能
  - 电路驱动可以作为整体的一部分集成于LED灯具内部，易于连接到照明控制系统中。

- 微控制器和传感器是智能照明中关键器件
- 微控制器在照明中的主要功能：
  - 连接总线系统，比如DALI, DMX, KNX 等
  - 连接传感器件
  - 光特性的智能编程，根据终端客户的需求
- 传感器件在照明中的主要功能：
  - 存在检测
  - 环境光检测

文档资料

- 照明手册2014版
- PMM 选型指南 2014版
- 照明设计工具 www.infineon.com/lightdesk
- OptiMOS™选型指南
- 英飞凌电源管理和射频技术社区 www.infineon-power-rf.org
- PFC 选型指南
- 应用手册和演示电路板 www.infineon.com/LED.a







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