

PART NUMBER (型号) RT8470 RT8450 RT8465

DESCRIPTION

This application note present Richtek solutions for MR16 based on different LED connection and output power. For $V_{out}<10.5V$, RT8470 buck is recommended. For $V_{out}>18V$, RT8450 boost is recommended. RT8450 buck-boost also work well with wide V_{out} range. The two stage solutions with RT8465 is a big improvement on MR16/AR111 design. The low voltage PFC simulates the performance of a real halogen bulb and let the electronic transformer(ET) works in normal mode. This reduces the inrush current on current MR16 design to improve the reliability. It also require smaller E-cap especially for high power application ($P_{out}>7W$), and make the ET compatibility become perfect.

IC FEATURES (IC特性)

Distinctive Features 特点: The enhanced circuit design improve the ET compatibility with high efficiency 强化後的线路设计，改善了电子变压器的兼容性同时保有很高的效率

Topology 线路结构: Buck, Boost, Buck-Boost, two stage solutions based on low voltage PFC 降压、升压、升降压、以及基於低压PFC的两级式方案

Protection 保护: OCT, OVP, OTP 过流保护、过压保护、过温保护

Driving Ability 驱动能力: RT8470 up to 700mA, RT8450 up to 500mA, RT8482 as an external MOSFET option can drive up to 10A
(The ratings are reduced because of the high ambient temperature inside MR16)
RT8470/700mA, RT8450/500mA, RT8482 使用外挂MOS, 可以驱动到10A
(建议的最大电流已因考量MR16内部温度较高而调低变频)

COMPARISON ON MR16 SOLUTIONS (几种MR16方案的比较)

1. BUCK : BUCK has the lowest cost and the smallest PCB. It may also has the highest efficiency. The ET compatibility is reasonable after the improvement of new circuit design. One significant drawback is the output current may drop due to the input voltage drop. This become worse when the test condition include input 90V to a 110V ET or input 200V to a 220V ET. This will reduce the output luminance.

2. BOOST : The cost and PCB size of BOOST will be higher than BUCK. The efficiency will also be lower than BUCK but no big difference. The LED current will be consistent even the input voltage drop. This solution also offer a better ET compatibility than buck topology.

3. BUCK-BOOST : BUCK-BOOST need higher cost and larger PCB. The efficiency will also be lower. Suggest not to have LED output voltage between 10.5V~18V to avoid using this topology.

4. RT8465 Two Stage Solution : This topology has very good ET compatibility and also very good reliability due to smaller inrush current. But the PCB size will be difficult to fit into a regular MR16. It is good for higher power solution that can offer more space for driver board.

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描述

本应用手册介绍立錡科技的MR16/AR111设计方案。對於输出电压在10.5V以下的应用，建议使用RT8470降压方案。输出电压在18V以上的，建议使用RT8450升压，而RT8450升降压的方案亦适用于极大的输出电压范围。RT8465的两级式方案是MR16/AR111的一大进步。利用低压PFC来模拟传统卤素灯，让电子变压器在正常模式下工作。此方案可以降低目前MR16方案中普遍存在的突波电流问题，以改善产品可靠性。使用较小的电解电容，特别是高功率($P_{out}>7W$)的项目。同时大大的改进了电子变压器的兼容性。



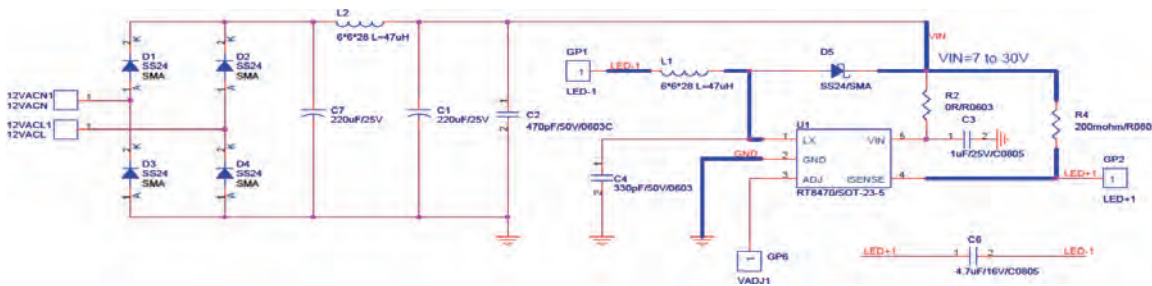
降压方案有最低的成本跟最小的PCB。同时也有可能是所有方案里效率最高的。电子变压器在线路改善後也提高到了合理的程度。此方案最大的缺点在於当输入电压过低时，输出电流会下降，特别是当测试规格包括将110V的ET输入90V或是220VET输入200V。这会导致输出亮度下降。

升压方案需要比较降压稍高的成本跟较大的PCB。效率也会稍微低一点。但是尽管在输入电压下降时，仍能维持很好的输出一致性。这方案同时有较好的电子变压器兼容性。

升降压结构需要较高的成本及较大的PCB，效率也会比较低，建议尽量不要选择LED输出电压落在10.5V~18V之间以避免使用到升降压结构。

RT8465的两级式结构有很好的电子变压器兼容性以及因为较低的突波电流带来较高的可靠性，但是因为整体方案需要较大的PCB，比较适合输出功率较高，灯体较大的案子。

RT8470 SOLUTION FOR MR16 (基于RT8470的MR16方案)



RT8465 TWO STAGE MR16/AR111 SOLUTION (基于RT8465的MR16/AR111两级式方案)

