Controller Exploits BJT To Cut Standby Power And Cost

An addition to CamSemi's C2160 family of primary-side sensing (PSS) controllers enables manufacturers of higher-power embedded and multiple-output power supplies to fully exploit the cost benefits of bipolar junction transistors (BJTs) in developing lower cost and more energy-efficient solutions. The C2163 PSS controller is aimed at universal-input adapters and chargers above 8 W (Fig. 1.)

C2163 enables ultra-low standby power consumption and high efficiency power supplies for major applications such as networking products and set-top boxes, typically around 16 W but is also well suited for tablet computer and power tool chargers and other fast-growing, higher-power sectors. The controller uses a low-cost bipolar transistor to cut power supply system costs without impacting performance.

For example, a 12-W adapter based on the C2163 delivers an average efficiency greater than 80% and a no-load power consumption of less than 100 mW, which is well below the current Energy Star 2.0 no-load requirement of 300 mW. Equally importantly for manufacturers, the BOM cost is lower than any of today's MOSFET-based solutions, according to the company.

The C2163 employs the same architecture as the existing C2162 controller. However, the latter chip employs a built-in emitter switch for controlling the main BJT and having that switch on-chip limits supplies based on the C2162 to a power rating of 8 W. With the C2163, an external low-cost MOSFET is used in place of the internal emitter switch, which enables development of adapters with higher levels of power output.

According to CamSemi, the BOM cost for a MOSFET-based 12-W adapter design is in the sub-$1 ballpark. That includes only the electronics, not the cable or case. A similar adapter design based on the C2163 solution would be about 5 cents lower. Although this sounds like a small amount, it represents greater than 5% savings, which becomes significant when multiplied across high manufacturing volumes.

The 5-cent savings is attributed to the difference in the cost of BJT versus the MOSFET. At the 12-W power level, a high-voltage MOSFET would typically cost 15 cents while the low-cost bipolar transistor and its associated low-voltage MOSFET would together cost about 10 cents, according to the company. CamSemi also notes another cost advantage for its solution. Because a bipolar transistor has slightly softer edges on switching, EMI filtering requirements are reduced versus a MOSFET-based solution. The controller itself is priced at 23 cents per unit in 10K quantities.

"CamSemi's new C2163 controller is the first of our products targeting higher power universal chargers and builds on the success we are achieving with our other PSS controllers in the mobile phone charger market. All the techniques we developed to cut no-load power consumption to less than 30 mW for 5 star-rated chargers have been utilized but at higher powers. C2163 is unique in combining low cost and energy efficiency with greater design and manufacturing flexibility where one controller can be utilized for multiple designs," says David Baillie, CEO of CamSemi.

Other benefits of the C2163 include 'best in class' voltage and current regulation without board-level trimming; easily programmable cable compensation of up to 10%; switching frequency adjustment; and quasi-resonant switching to improve efficiency and reduce EMI. The C2163PX2 part is packaged in SOT23-6 and available in volume now. An abbreviated C2163 datasheet is available at www.camsemi.com/support/datasheets.

Fig. 1. By exploiting bipolar transistors, the C2163 controller enables development of more energy-efficient embedded and multiple-output power supplies that cost less than conventional MOSFET-based designs.

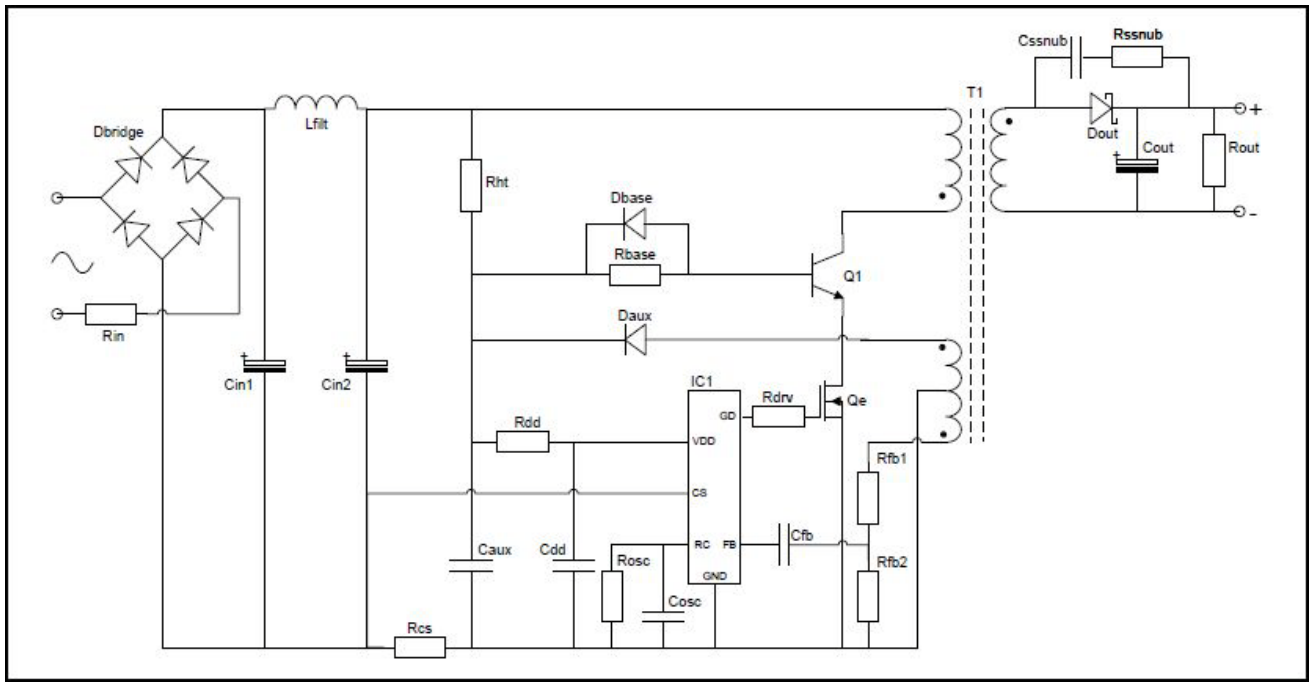

Fig. 2. A typical application of the C2163 PSS controller is this 12-W adapter design, which features universal-input, 12-V output, and no-load power consumption that's less than 100 mW.