

DESIGN NOTES

LTC1628-SYNC Minimizes Input Capacitors in Multioutput, High Current Power Supplies – Design Note 249

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Introduction

In broadband networking and high speed computing applications, multiple high current, low voltage power supplies are needed to power FPGAs, flash memory, DSPs and microprocessors. One such example calls for a maximum of 60A of current to power the CPU at 1.5V and up to 15A to power the memory at 2.5V from a 12V input. While a customized DC/DC module is usually expensive, the external circuitry for synchronization further increases the cost of individual supplies.

The newly released LTC[®]1628-SYNC PolyPhase™ controller can provide a simple and low cost solution. Compared to the LTC1628, the LTC1628-Sync has a PLLIN pin that enables external synchronization. By combining the LTC1628-SYNC with the LTC1629, a true 3-phase circuit can be achieved for the 60A CPU supply and the second output of the LTC1628-SYNC circuit can be used to generate the memory power supply. Because the channel used for the memory power is interleaved out of phase from the other three channels used for CPU power, the net ripple current seen by the input bus is further reduced. In addition, the LTC1629's differential amplifier enables true remote sensing to ensure accurate voltage regulation at the CPU supply pins.

Design Details

The block diagram and schematic diagrams are shown in Figures 1 and 2, respectively. With only twelve SO-8 MOSFETs (FDS7760A) and two SSOP-28 controllers, efficiencies of 85% and 88% are achieved for the 1.5V/60A and 2.5V/15A outputs, respectively.

Table 1 compares the input ripple current requirement of the PolyPhase design and a conventional single phase design. The PolyPhase technique reduces input capacitance by almost 60%.

Table 1. Comparison of Input Ripple Current and Input Capacitors for Single Phase and PolyPhase Configurations

Phases	Worst-Case Input Ripple Current (A_{RMS})	Number of Input Capacitors: OS-CON 16SP270M at 65°C
Single Phase	23.4	7
PolyPhase (LTC1629 + LTC1628-SYNC)	10.2	3

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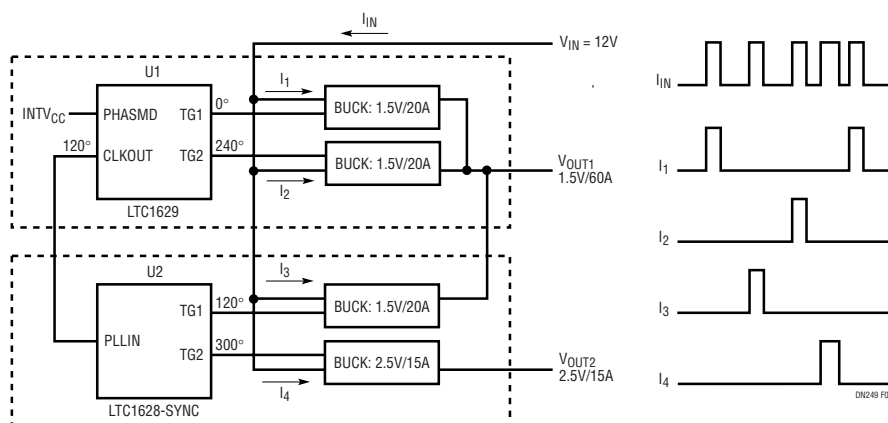


Figure 1. Block Diagram of 2-Output Power Supplies

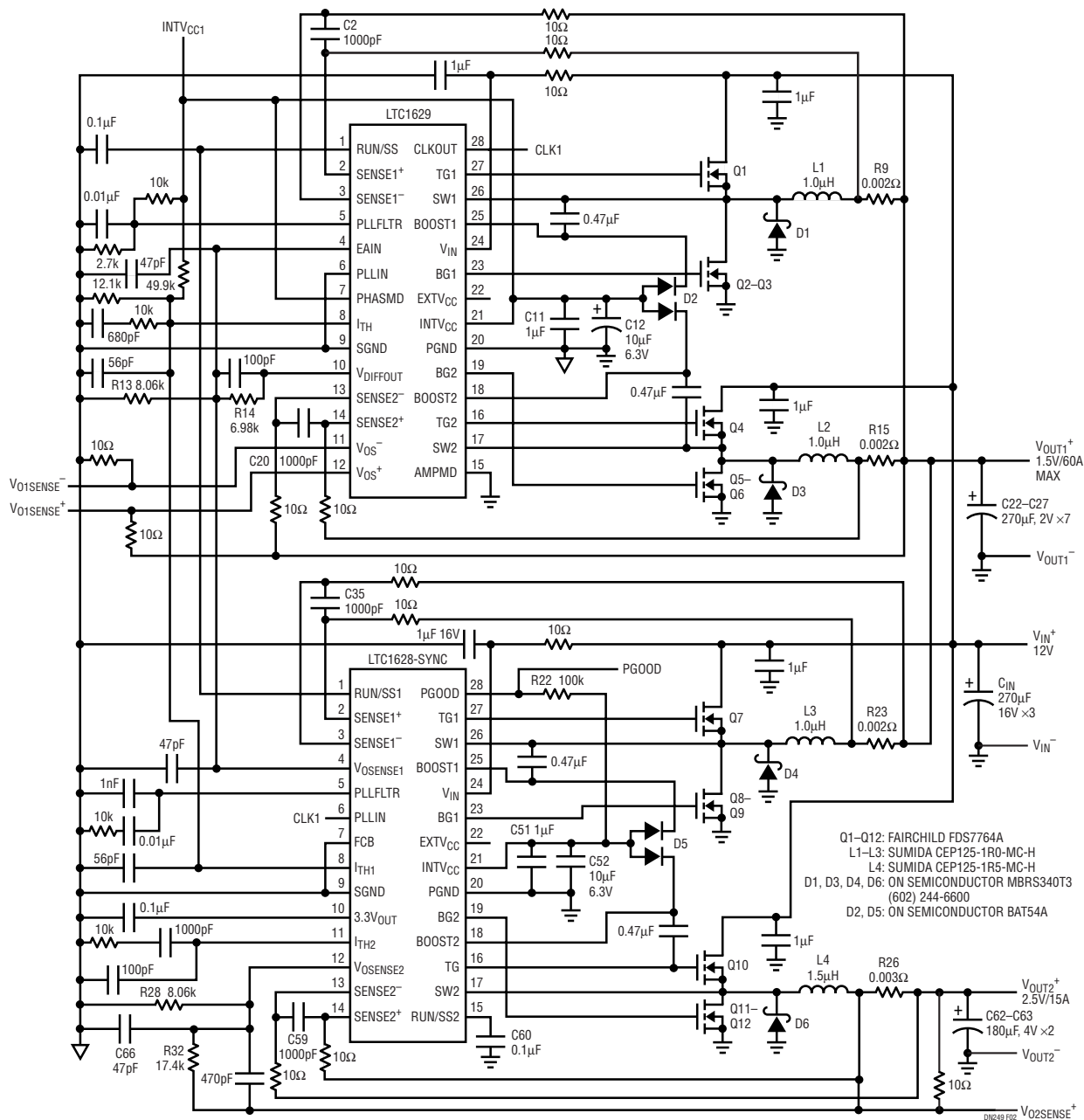


Figure 2. Schematic Diagram of 2-Output Circuit: Input 12V; Outputs 1.5V/60A, 2.5V/15A

Conclusion

The synchronization capability of the LTC1628-SYNC helps reduce input capacitor requirements and prevents beat frequencies at the input bus. Combined with the LTC1629, it can effectively provide a 3-phase solution for

multiple output applications and minimize the size and cost of the complete power supply.

For applications with more than two outputs, several LTC1628-SYNCS can be combined with the LTC1629 for multiphase operation. Refer to LTC1628-SYNC data sheet for more information.

Data Sheet Download

<http://www.linear-tech.com/go/dnLTC1628-SYNC>

For literature on our PolyPhase Controllers, call **1-800-4-LINEAR**. For applications help, call (408) 432-1900, Ext. 2593