



1.0 Design Specifications

Inputs	Outputs #1	Outputs #2	Outputs #3
VinMin=13.5	Vout1=1.8	Vout2=3.3	Vout3=2.5
VinMax=13.5	Iout1=1.5	Iout2=2.0	Iout3=0.1

2.0 Design Description

The design uses a LM2651 synchronous controller utilizing integrated high side and low side MOSFETs operating at 300kHz. Synchronous rectification provides high efficiency for the design. At light loads LM2651 enters hysteretic control to keep the efficiency high. When the load is greater than the sleep mode threshold, LM2651 operates in PWM mode at fixed frequency of 300khz. When the load current decreases below the sleep mode threshold, LM2651 enters hysteretic mode operation. Cycle by Cycle current limit turns off high side Mosfet whenever the current reaches 2A. Careful PC board layout is critical to achieve low switching losses and clean, stable operation. The switching power stage requires particular attention.

Few points to note for this design are:

1. Decoupling capacitors are close to IC pins as possible. Keep separate power ground plane.

2. Input and output capacitors are connected to the power ground plane; all other capacitors are connected to the signal ground plane.

3. High current paths are very short.

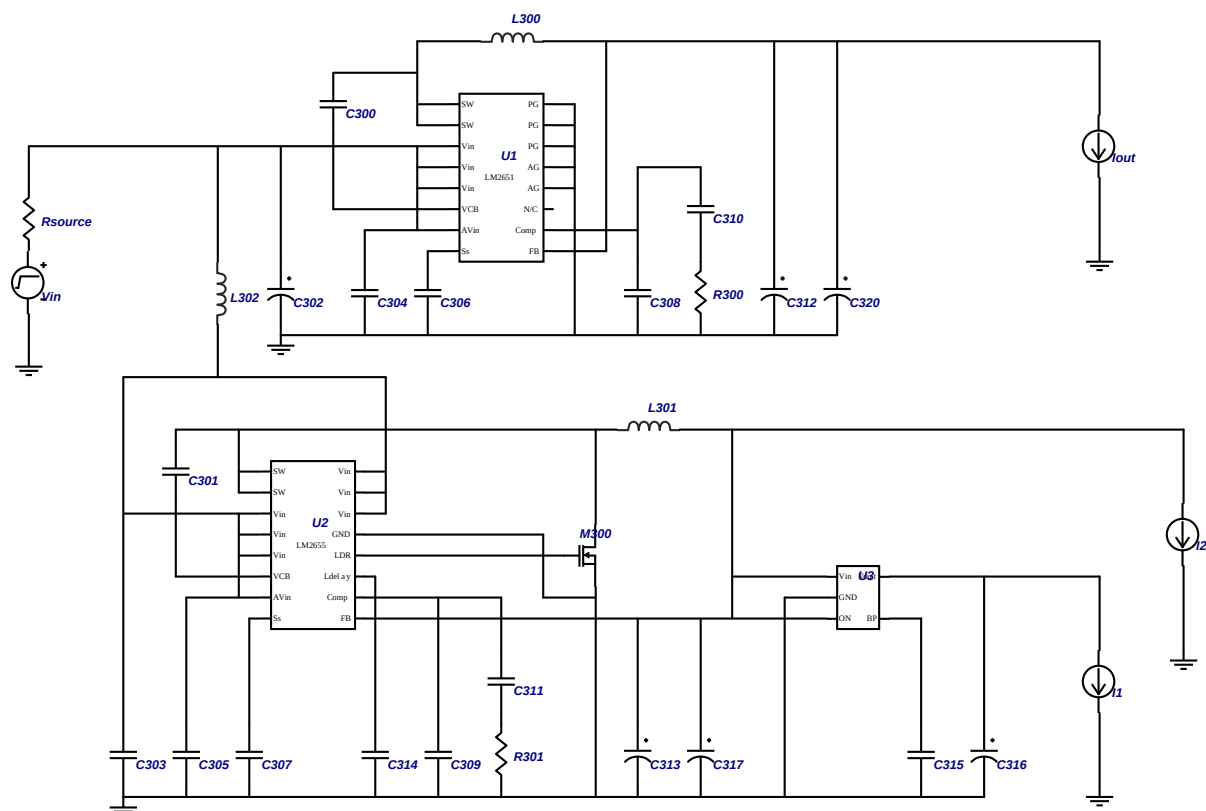
4. Multiple MOSFETs have been used to reduce the conduction and switching losses.

5. Feedback connections are short and direct and routed away from any noisy traces (i.e. switch node).

6. High-side MOSFETs are as close as possible to the controller.

Notes: The LM2651 used here is in 1.8V option and provides the 1.8V 1.5A output. The 3.3V 2A output is provided by the LM2655 in 3.3V option. The LP2985 in 2.5V option provides the 2.5V 0.1A output.

3.0 Schematic



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FIGURE 1. Example Schematic Showing Connection for all Components.

4.0 Bill Of Materials

Part	Manufacturer	Part#	Attributes
C300	Vishay	VJ0805Y104KXXAT	0.1u F
C301	Vishay	VJ0805Y104KXXAT	0.1u F
C302	Sanyo	25MV220WX	220u F, 0.056 Ohms
C303	Sanyo	25MV330WX	330u F, 0.072 Ohms
C304	Vishay	VJ0805Y104KXXAT	0.1u F
C305	Vishay	VJ0805Y104KXXAT	0.1u F
C306	Vishay	VJ0805Y472KXXAT	4.7n F
C307	Vishay	VJ0805Y472KXXAT	4.7n F
C308	Vishay	VJ0805Y472KXXAT	4.7n F
C309	Vishay	VJ0805Y472KXXAT	4.7n F
C310	Vishay	VJ0805Y104KXXAT	100n F
C311	Vishay	VJ0805Y104KXXAT	100n F
C312	Sanyo	6MV560WX	560u F, 0.072 Ohms
C313	Sanyo	6MV560WX	560u F, 0.072 Ohms
C314	Vishay	VJ0805Y104KXXAT	100n F
C315	Vishay	VJ0805Y104KXXAT	0.1u F
C316	TDK	C2012X7R0J475K	4.7u F
C317	TDK	C2012X7R0J225K	2.2u F

Part	Manufacturer	Part#	Attributes
C320	Vishay	VJ0805Y104KXXAT	0.1u F
L300	Coilcraft	DO3308P-103	10u H, 0.085 Ohms
L301	Coilcraft	DO3316P-153	15u H, 0.046 Ohms
L302	Coilcraft	DO1608C-472	4.7u H, 0.09 Ohms
M300	Vishay	SI3460DV	
R300	Vishay	CRCW08051002FRT6	10.0k Ohms
R301	Vishay	CRCW08051002FRT6	10.0k Ohms
U1	National Semiconductor	LM2651	
U2	National Semiconductor	LM2655	
U3	National Semiconductor	LP2985	

Notes

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