Design Solution #58

SP7655: 12V-22V Input to 1.2V Output at 8A

Designed by: Tim Sullivan

Part Number: SP7655

Application Description: 12V-22Vin to 1.2Vout at 8A

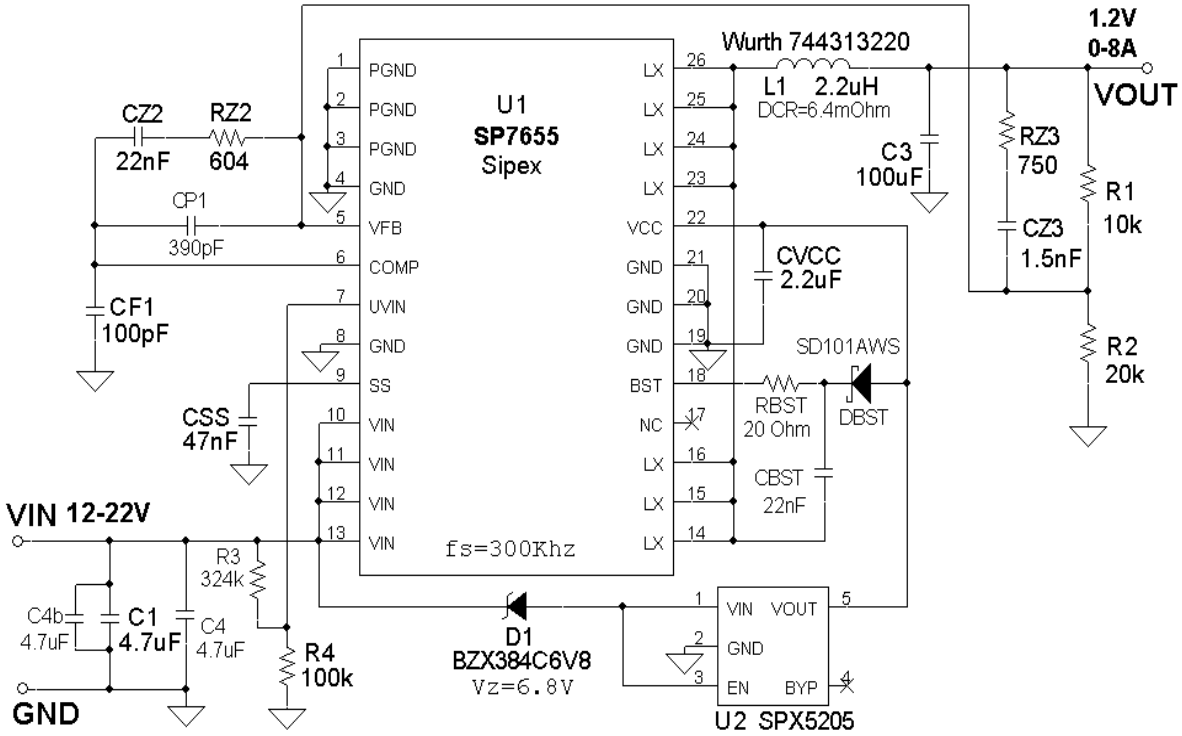
Electrical Requirements:

Input Voltage:	12V – 22V
Output Voltage:	1.2V
Output Current:	0A to 8A

Circuit Description:

This circuit has been designed to provide 1.2Vout up to 8A of output current from a 12V to 22V supply. It uses the Power Blox solution SP7655 and 23 parts (not including pcb and I/O pins) and uses approximately 1 square inch of board space. It is possible to maintain this small area usage due to the incorporation of the high and low side FETs and the PWM controller in to one package. The solution uses a Wurth low profile inductor which is a good balance of size and performance for this solution. An inexpensive Sipex SPX5205 LDO was used to provide the 5V Vcc for the part. Ceramic capacitors were used on the input and output.
This report includes an application schematic complete with component values, a complete Bill of Materials, and figures illustrating the electrical performance of the design.

Application Schematic:



Performance Measurements

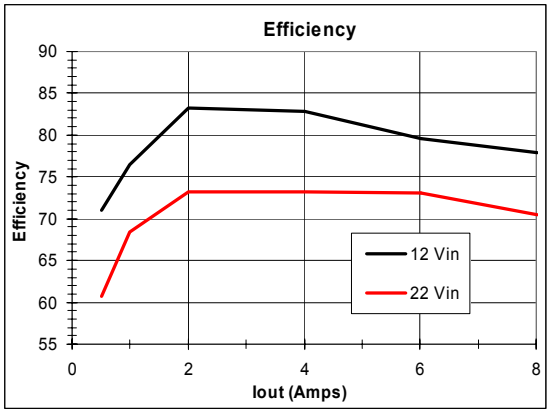


Figure 1 – Efficiency vs Vin

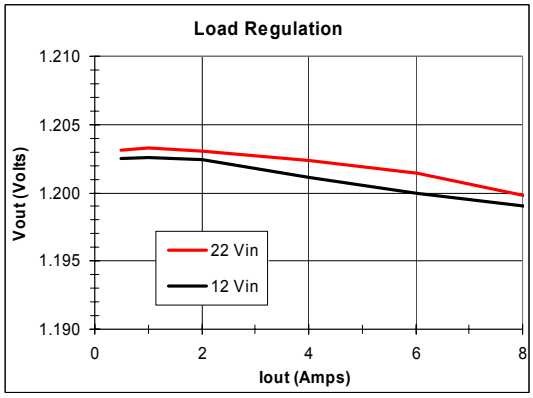


Figure 2 – Output Regulation

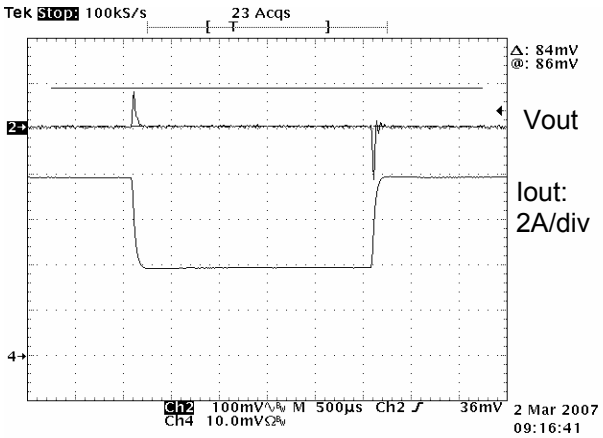


Figure 3 – Transient response
Vin = 12V, Iout = 4A - 8A

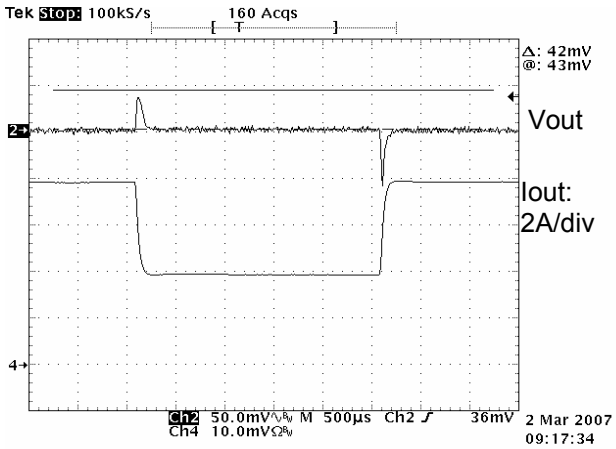


Figure 4 – Transient response
Vin = 22V, Iout = 4A - 8A

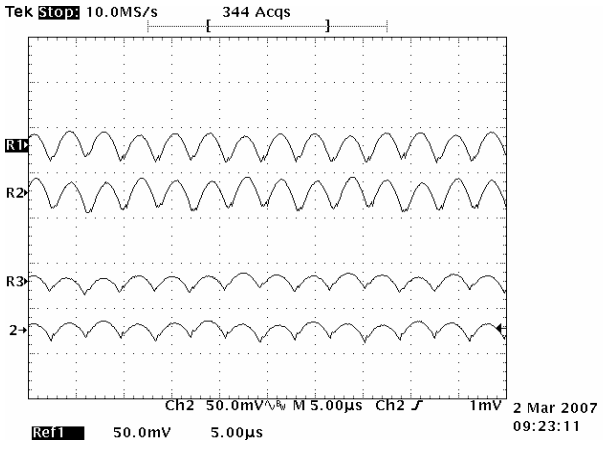


Figure 5 – Vout Ripple
R1:22Vin 8Aout, R2:12Vin 8Aout R3:12Vin 0Aout
CH2:22Vin 0Aout

Converter Bill of Materials:

Bill Of Materials					3/28/2007
Item #	Qty.	Ref.	Manuf.	Component part #	Component
PCB	1	PCB	Sipex	146-6570-01	SP7655EB
1	3	C1,C4,C4b	muRata	GRM32ER71H475K	4.7uF/50V, 1210, X5R
2	1	C3	muRata	GRM31CR60J107M	100uF/6.3V, 0603, X5R
3	2	CBST,CZ2	muRata	GRM188R71H223K	22nF/50V, 0603, X7R
4	1	CF1	muRata	GRM1885C1H101J	100pF/50V, 0603, C0G
5	1	CP1	muRata	GRM1885C1H391J	390pF/50V, 0603, C0G
6	1	CSS	muRata	GRM188R71E473K	47nF/25V, 0603, X7R
7	1	CVCC	muRata	GRM188R61A225K	2.2uF/10V, 0603, X5R
8	1	CZ3	muRata	GRM188R71H152K	1.5nF/50V, 0603, X7R
9	1	D1	Vishay	BZX384C6V8	SOD323 Zener diode, 5%
10	1	DBST	Vishay	SD101AWS	SOD323 Schottky diode
11	1	L1	Wurth	744313220	2.2uH, DCR=6.4mOhm
12	1	R1	Vishay	CRCW06031002F	10k, 0603, 1%
13	1	R2	Vishay	CRCW06032002F	20k, 0603, 1%
14	1	R3	Vishay	CRCW06033243F	324K, 0603, 1%
15	1	R4	Vishay	CRCW06031003F	100K, 0603, 1%
16	1	RBST	Vishay	CRCW060320R0F	20 Ohm, 0603, 1%
17	1	RZ2	Vishay	CRCW0603604RF	604 Ohm, 0603, 1%
18	1	RZ3	Vishay	CRCW0603750RF	750 Ohm, 0603, 1%
19	1	U1	Sipex	SP7655	DFN-26, 2FETs Buck Ctrl.
20	1	U2	Sipex	SPX5205M5-5.0	SOT23-5, LDO

For further assistance:

Email: Sipexsupport@sipex.com
WWW Support page: http://www.sipex.com/content.aspx?p=support
Sipex Application Notes: http://www.sipex.com/applicationNotes.aspx

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