

SP6652: 5V input to 1.2V output at 1A

Designed by: Brian Kennedy

Part Number: SP6652ER

Application Description: 5V input to 1.2V output at 1.0A

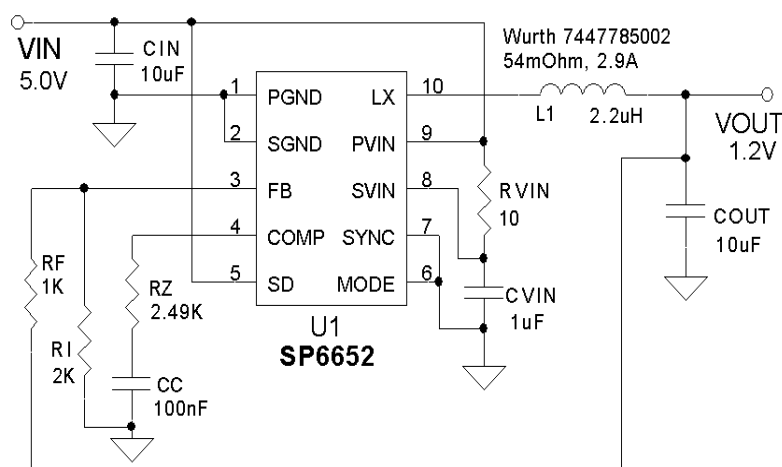
Electrical Requirements:

Input Voltage	5V
Output Voltage	1.2V
Output Current	1.0A

Circuit Description:

This application has been designed for 5V input to 1.2V output at 1.0A load with large or small output capacitance, with a controlled 5 to 10msec startup. The SP6652 uses Pulse Width Modulation (PWM) with a 1.4MHz oscillator for low output ripple and a small inductor value of 2.2uH inductor for good transient response. Using current mode control, the SP6652 internal error amplifier is compensated with just two small 0402 components R_z and C_c. The C_c value has been selected at 100nF to provide a slow and controlled 5 to 10 msec start-up. The results show that the output is stable with a 500mA to 1A load step with just a 10uF low ESR ceramic capacitor or with added 1000uF electrolytic capacitor. This report includes data in figures 1 to 7 for startup waveforms with different loads, load transient data for conditions of low output capacitance or large output capacitance, efficiency and ripple data and a BOM.

Schematic:



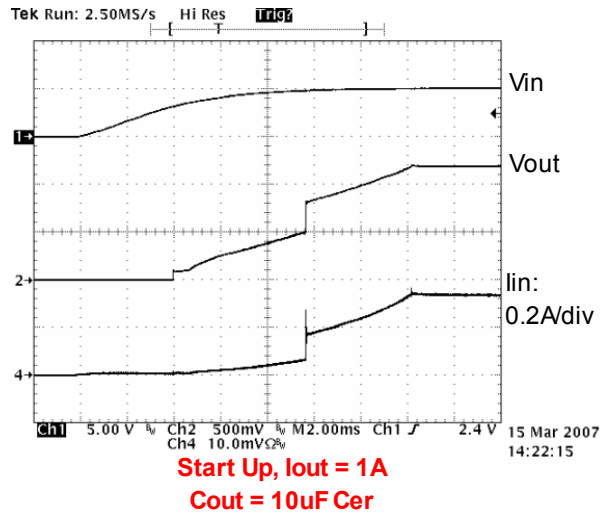


Figure 1: 1A Startup with Cout=10uF

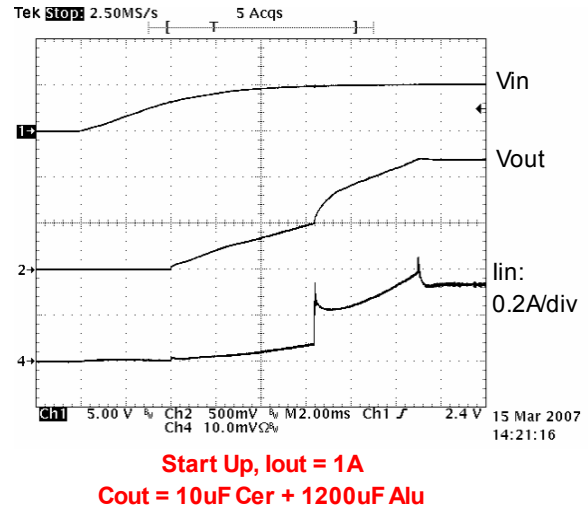


Figure 2: 1A Startup with Cout=10uF + 100uF Al EI

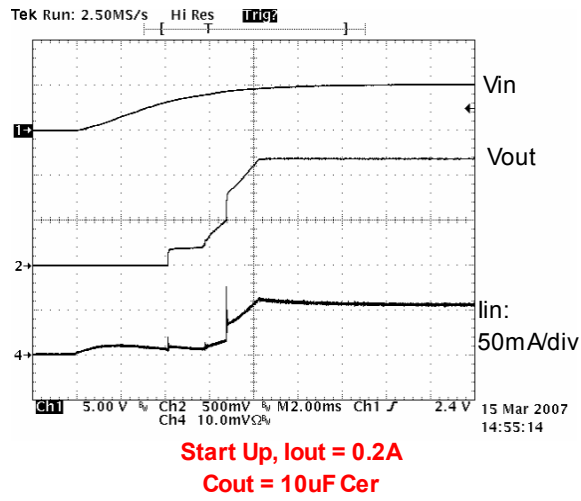


Figure 3: 0.2A Startup with Cout=10uF

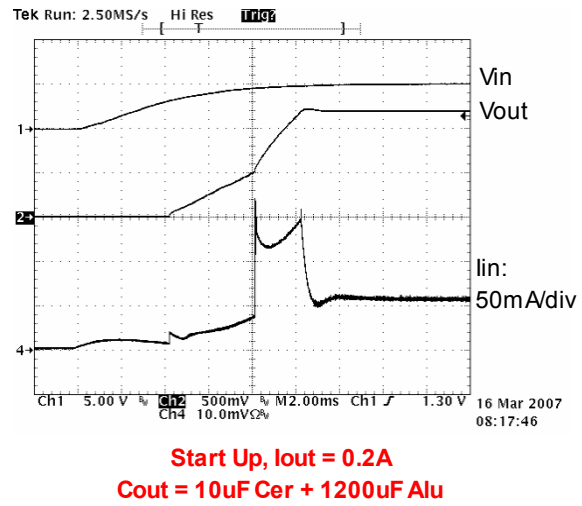
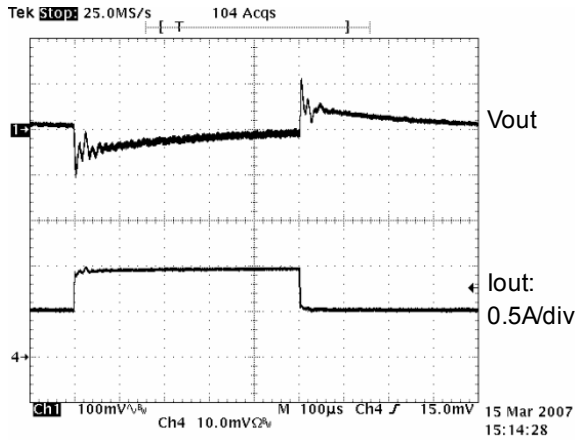
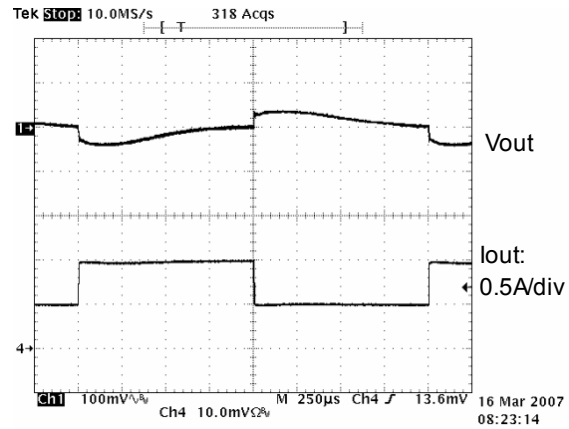


Figure 4: 0.2A Startup with Cout=10uF+100uF Al EI



**Load Step, Iout = 0.5A - 1A
Cout = 10uF Cer**

Figure 5: Load Step with Cout=10uF



**Load Step, Iout = 0.5A - 1A
Cout = 10uF Cer + 1200uF Alu**

Figure 6: Load Step with Cout=10uF+100uF Alu

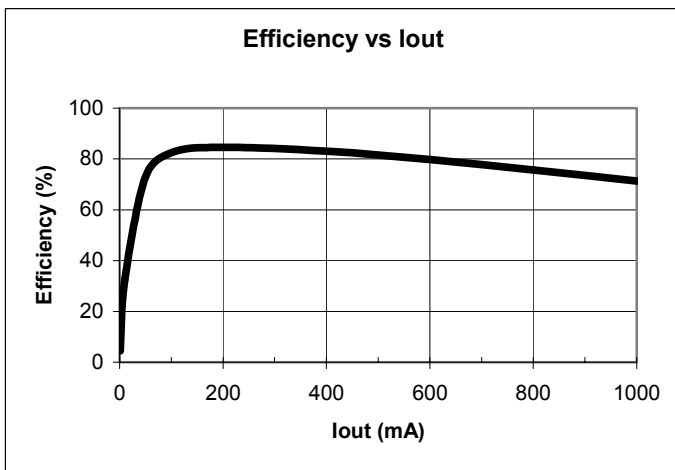


Figure 7: Efficiency Curve

Vin (V)	Iin (mA)	Vout (V)	Iout (mA)	Ripple (mV)	Efficiency (%)
5.0	5.29	1.185	1.00	10	4.5
5.0	7.28	1.185	10.00	11	32.6
5.0	16.28	1.185	50.07	7	72.9
5.0	29.05	1.185	101.20	7	82.6
5.0	56.18	1.184	200.60	7	84.6
5.0	114	1.183	400.30	7	83.1
5.0	178	1.183	600.20	8	79.8
5.0	251	1.184	801.50	10	75.6
5.0	333	1.185	1001.30	13	71.3

Table 1: Efficiency & Output Ripple Data

Bill Of Materials					3/28/2007
Item #	Qty.	Ref.	Manuf.	Component part #	Component
1	1	CC	muRata	GRM188R71E104K	100nF/25V, 0603 X7R
2	2	CIN,COUT	muRata	GRM21BR61A106K	10uF/10V, 0603, X5R
3	1	CVIN	muRata	GRM188R61A105K	1uF/10V, 0603, X5R
4	1	L1	Wurth	7447785002	2.2uH, 54mΩ DCR, 2.9A I _{SAT}
5	1	RF	Vishay	CRCW06031001F	1k, 0603, 1%
6	1	RI	Vishay	CRCW06032001F	2k, 0603, 1%
7	1	RVIN	Vishay	CRCW060310R0F	10 Ohms, 0603, 1%
8	1	RZ	Vishay	CRCW06032491F	2.49K, 0603, 1%
9	1	U1	Sipex	SP6652ER	MSOP-10, PWM Buck Regulator

Table 2. BOM

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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