



ADP1821 Reference Design

Preliminary Technical Data

FCDC 00100

FEATURES

One Output Voltage: 5 V

Output Current: 4 A

Input voltage: 12.0-44.0 V

Ripple 2% ppk of Output Voltage

Transient step $\pm 5\%$, 50% max load

ADP1821 REFERENCE DESIGN DESCRIPTION

This ADP1821 Reference Design uses 12.0 V to 44.0 V for the input voltage. The output voltage and current is as follows:

- $V_{OUT1} = 5.0$ V with a maximum output current of 4 A,

The ripple and transient assumptions are 2% peak to peak voltage ripple and 5% deviation due to 50% instantaneous load step. The switching frequency is fixed at 300 kHz for V_{OUT1} . Maximum non-operating input voltage of 55 V can be sustained indefinitely. Designed for nominal efficiency of 92% at 24 V in.

Rev. 1

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REVISION HISTORY

2/8/2008—Revision 1: Initial Version

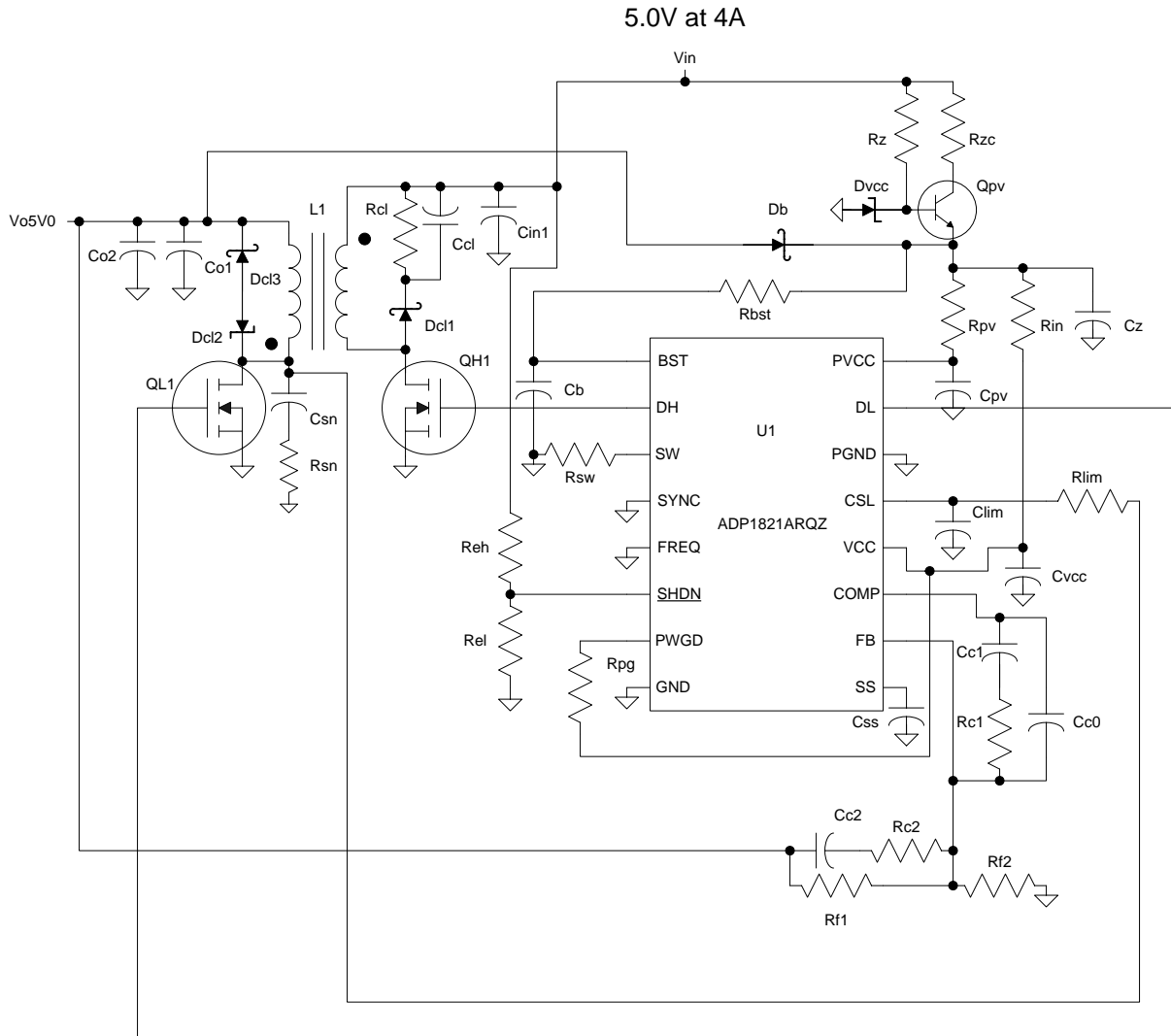
GENERAL DESCRIPTION

ADP1821

The ADP1821 is a versatile and inexpensive, synchronous, pulse width-modulated (PWM), voltage-mode, step-down controller. It drives an all N-channel power stage to regulate an output voltage as low as 0.6 V. The ADP1821 can be configured to provide output voltages from 0.6 V to 85% of the input voltage and is sized to handle large MOSFETs for point-of-load regulators. The ADP1821 is well suited for a wide range of high power applications, such as DSP and processor core power in telecom, medical imaging, high performance servers, and industrial applications. It operates from a 3.0 V to 5.5 V supply with a power input voltage ranging from 1.0 V to 24 V. The ADP1821 operates at a pin-selectable, fixed switching frequency of either 300 kHz or 600 kHz, minimizing external component size and cost. For noise-sensitive applications, it can be synchronized to an external clock to achieve switching frequencies between 300 kHz and 1.2 MHz. The ADP1821 includes soft start protection to limit the inrush current from the input supply during startup, reverse current protection during soft start for precharged outputs, as well as a unique adjustable lossless current-limit scheme utilizing external MOSFET sensing. The ADP1821 operates over the -40°C to $+85^{\circ}\text{C}$ temperature range and is available in a 16-lead QSOP.

SCHEMATIC

Figure 1. Schematic 5.0V @ 4A



BILL OF MATERIALS

Table 1. Vout1 Bill of Materials (5.0 V)

Description	Designator	Quantity	Manufacturer	MFR#
Capacitor Ceramic COG 820p 0603 50V	Cc0	1	Vishay	Generic
Capacitor Ceramic X7R 47n 0603 16V	Cc1	1	Vishay	Generic
Capacitor Ceramic X7R 4.7n 0603 50V	Cc2	1	Vishay	Generic
Capacitor Ceramic X7R 100n 0603 25V	Cvcc, Cb, Ccs, Cpv, Cz, Ccl	6	Vishay	Generic
Capacitor Ceramic COG 33p 0603 50V	Clim	1	Vishay	Generic
Capacitor Ceramic X7R 1n 0603 50V	Csn	1	Vishay	Generic
Capacitor Ceramic X7R 1u 1206 100V	Cin1	1	Murata	GRM31CR72A105KA01L
Capacitor Ceramic X7R 22u 1210 16V	Co1	1	TDK	C3225X7R1C226M
Capacitor Polymer 330u D-case SMT 6.3V	Co2	1	Kemet	T525D337M006ATE025
Diode Zener 200mW SOD-323 28V	Dcl2	1	Diodes inc	MMSZ5255BS
Diode Zener 200mW SOD-323 4.7V	Dvcc	1	Diodes inc	MMSZ5230BS
Diode Schottky 200mA SOD-323 30V	Db, Dcl3	2	Diodes inc	BAT54WS
Diode Fast Recovery 1A PowerDI-123 200V	Db	1	Diodes inc	DFLU1200
Transformer Ferrite 50uH 20mmx30mm	L1	1	Coilcraft	FA2898-ALD
Single NPN SOT-23 60V	Qpv	1	Diodes inc	MMBTA05
Single N-Channel MOSFET D-pak 100V	QH1	1	IR	IRLR3110
Single N-Channel MOSFET TDSO-8 30V	QL1	1	Infineon	BSC025N03LS
Thick Film 0 Ohm jumper 0603	Rsw	1	Vishay	Generic
5% Thick Film 10 Ohms 0603	Rin, Rpv, Rbst	3	Vishay	Generic
1% Thick Film 20.0k 0603	Rf1, Rel	2	Vishay	Generic
1% Thick Film 2.74k 0603	Rf2	1	Vishay	Generic
1% Thick Film 2.00k 0603	Rc2	1	Vishay	Generic
1% Thick Film 866 Ohms 0603	Rlim	1	Vishay	Generic
1% Thick Film 3.01k 0603	Rc1	1	Vishay	Generic
1% Thick Film 10.0k 0603	Rpg	1	Vishay	Generic
5% Thick Film 10 Ohms 0805	Rsn	1	Vishay	Generic
1% Thick Film 4.99k 0805	Rzc	1	Vishay	Generic
1% Thick Film 49.9k 0805	Rz	1	Vishay	Generic
1% Thick Film 107k 0805	Reh	1	Vishay	Generic
1% Thick Film 2.00k 1206	Rcl	1	Vishay	Generic
1 chan 300k to 600k PWM QSOP-16	U1	1	Analog Devices	ADP1821ARQZ

NOTES

If a different number, or different type of output capacitors are used on the switching outputs the loop compensation components may need adjustment.