



## ADP1828 Reference Design

Preliminary Technical Data

FCDC 00107

### FEATURES

**A high density and cost-effective solution for low voltage DC-DC power conversion**

**Input Voltage Range: 2.25 V – 2.75 V**

**Output Voltage: 1 V**

**Output Current: 12 A**

**Ripple 20 mV ppk**

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

### ADP1828 DESCRIPTION

This ADP1828 reference design uses 2.25 V to 2.75 V for the input voltage, with a separate 3.3 V bias rail. The output voltage and current is:

- $V_{OUT1} = 1.0$  V with a maximum output current of 12 A,

Design criteria require no tracking or sequencing. The ripple and transient assumptions are 20 mV peak to peak voltage ripple and 5% deviation due to 50% instantaneous load step respectively. The nominal switching frequency is fixed at 300 kHz.

#### Rev. 0

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**TABLE OF COTENTS**

Features..... 1  
ADP1828 Description ..... 1  
Revision History..... 2  
ADP1828 General Description ..... 3  
Schematic ..... 3  
Bill of Materials ..... 4  
Performance..... 5  
Notes: ..... 6

**TABLE OF FIGURES**

Figure 1. Schematic ..... 3  
Figure 2. Calculated Efficiency..... 5  
Figure 3. Calculated Gain and Phase Response ..... 5

**REVISION HISTORY**

3/12/2008—Revision 0: Initial Version

**ADP1828 GENERAL DESCRIPTION**

The ADP1828 is a versatile and synchronous PWM voltage mode buck controller. It drives an all N-channel power stage to regulate an output voltage as low as 0.6 V to 85% of the input voltage and is sized to handle large MOSFETs for point-of-load regulators. The ADP1828 is ideal for a wide range of high power applications, such as DSP and processor core I/O power, and general-purpose power in telecommunications, medical imaging, PC, gaming, and industrial applications. It operates from input bias voltages of 3 V to 18 V with an internal LDO that generates a 5 V output for input bias voltages greater than 5.5 V. The ADP1828 operates at a pin-selectable, fixed switching frequency of either 300 kHz or 600 kHz, or at any frequency between 300 kHz and 600 kHz with a resistor. The switching frequency can also be synchronized to an external clock up to 2× the part's nominal oscillator frequency. The clock output can be used for synchronizing additional ADP1828s (or the ADP1829 controllers), thus eliminating the need for an external clock source. The ADP1828 includes soft start protection to limit any inrush current from the input supply during startup, reverse current protection during soft start for a precharged output, as well as a unique adjustable lossless current-limit scheme utilizing external MOSFET RDSON sensing. For applications requiring power-supply sequencing, the ADP1828 provides a tracking input that allows the output voltage to track during startup, shutdown, and faults. The additional supervisory and control features include thermal overload, undervoltage lockout, and power good. The ADP1828 operates over the -40°C to +125°C junction temperature range and is available in a 20-lead QSOP.

**SCHEMATIC**

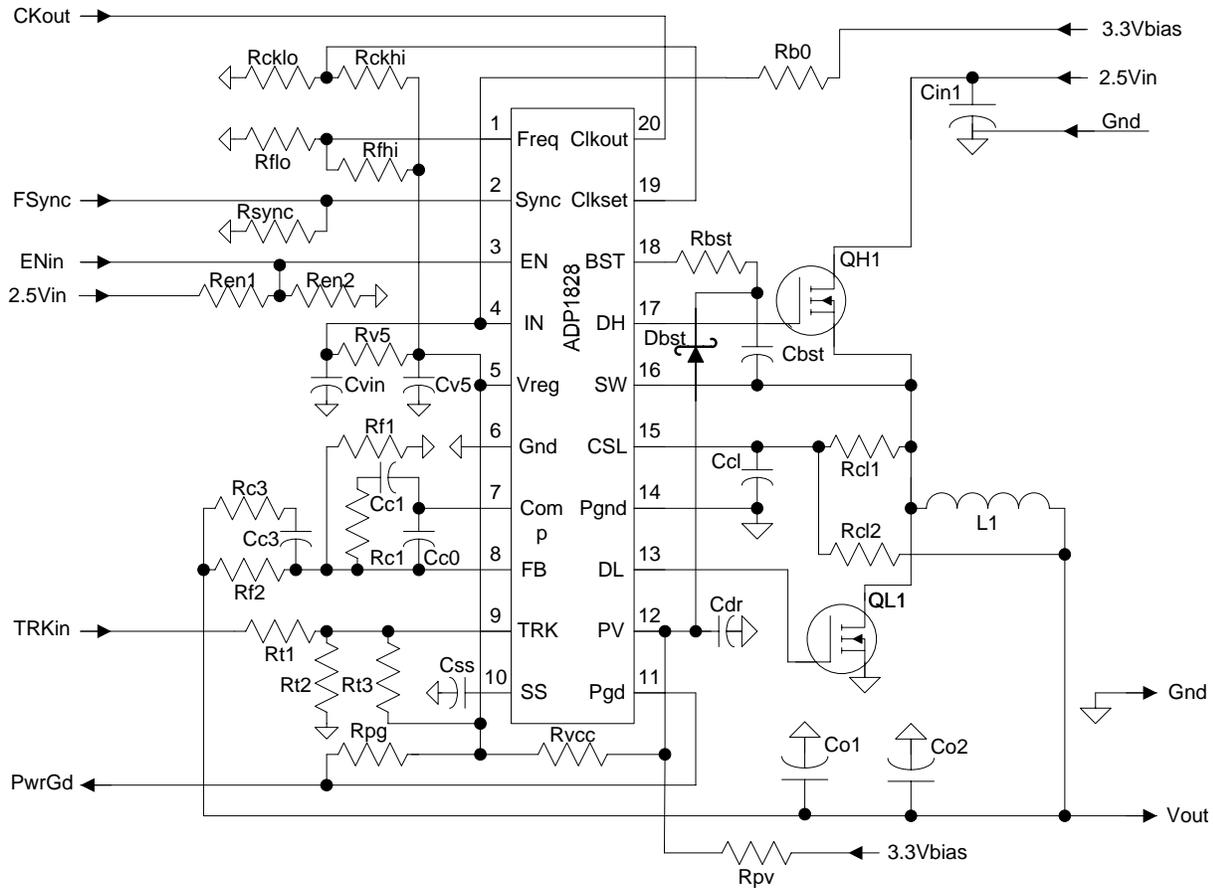


Figure 1. Schematic

**BILL OF MATERIALS**

Table 1. Bill of Materials

Designator	Part Number	Manufacturer	Value	Package	Comment
U1	ADP1828	Analog Devices		QSOP-20L	Voltage Mode Controller
QH1	BSC020N03MS	Infineon		PG-TDSON-8	N-Channel MOSFET
QH1, QL1	BSC016N03MS	Infineon		PG-TDSON-8	N-Channel MOSFET
L1	PA1320.301NL	Pulse	300nH	10.4mm x 8.0mm	Power Inductor / DCR = .48mO / Ferrite / Bead
Cin1	grm32er60j107m	Murata	100uF	1210	Input MLCC / X5R / 6.3V
Co1, Co2	grm32er60j107m	Murata	100uF	1210	Output MLCC / X5R / 6.3V
Cv5, Cpv	C2012X7R1C105K	TDK	1uF	0603	MLCC / X7R / 16V
Rf1	Generic 1%	Vishay	30.1k	0402	Feedback Resistor
Rf2	Generic 1%	Vishay	20.0k	0402	Feedback Resistor
Rc3	Generic 10%	Vishay	287ohms	0402	Compensation Resistor
Cc3	Generic 10%	Vishay	330pF	0402	Compensation Capacitor
Rc1	Generic 10%	Vishay	20.0k	0402	Compensation Resistor
Cc1	Generic 10%	Vishay	470pF	0402	Compensation Capacitor
Cc0	Generic 10%	Vishay	33pF	0402	Compensation Capacitor
Css	Generic 10%	Vishay	10nF	0402	COG or X7R / Soft Start Capacitor
Rpg	Generic 10%	Vishay	100k	0402	POK1 Resistor
Rpv, Rb0	Generic 10%	Vishay	10ohms	0402	Decoupling Resistor
Rcl1	Generic 10%	Vishay	1.40k	0402	Current Limit Resistor
Ccl1	Generic 10%	Vishay	33pF	0402	Current Limit Signal Filter Capacitor
Dbst	BAT54	Any		SOD-323	Bootstrap Diode
Cbst	Generic 10%	Vishay	100nF	0402	COG or X7R / Boost Capacitor
Rt1, Rt2, Rvcc, Rcl2, Ren2, Rflow, Rckhi			NP		
Rt3, Rbst, Ren1, Rsync, Rfhigh, Rcklo, Rv5			0ohms	0402	

PERFORMANCE



Figure 2. Calculated Efficiency

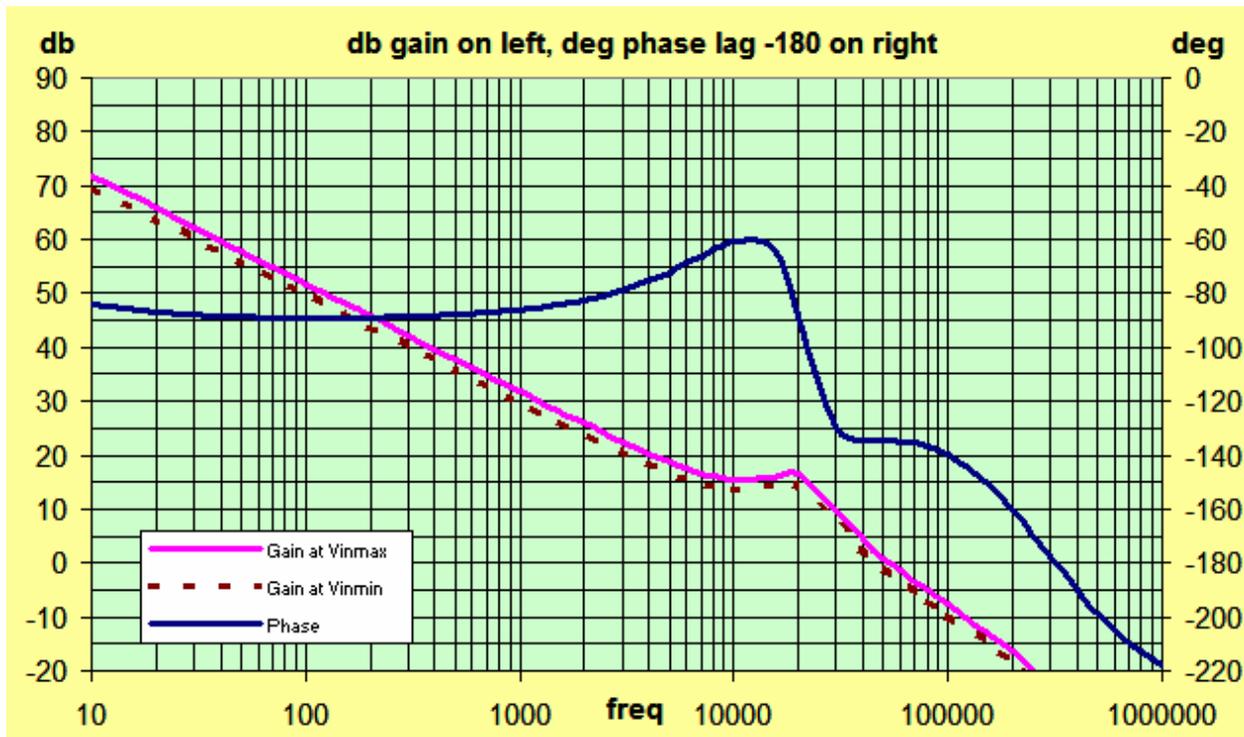


Figure 3. Calculated Gain and Phase Response

**NOTES:**

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