



ADP1829 Reference Design

Preliminary Technical Data

FCDC 00064

FEATURES

Four Output Voltages: 7.0 V, 3.3 V, 1.8 V, 1.2 V

Output Current: 1.6 A to 12.6 A

Input voltage: 19-21 V

Ripple 2% ppk of Output Voltage

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

ADP1829 REFERENCE DESIGN DESCRIPTION

This ADP1829 Reference Design uses 19.0 V to 21.0 V for the input voltage. The output voltages and currents are as follows:

- $V_{OUT1} = 7.0$ V with a maximum output current of 12.6 A,
- $V_{OUT2} = 3.3$ V with a maximum output current of 3.8 A,
- $V_{OUT3} = 1.8$ V with a maximum output current of 1.6 A,
- $V_{OUT4} = 1.2$ V with a maximum output current of 9.0 A.

The ripple and transient assumptions are 2% peak to peak voltage ripple and 5% deviation due to 50% instantaneous load step. The nominal switching frequency is fixed at 300 kHz for all outputs. V_{OUT1} and V_{OUT2} are 180° out of phase from each other and V_{OUT3} and V_{OUT4} are 180° out of phase from each other. V_{OUT1} and V_{OUT2} are not synchronized with V_{OUT3} and V_{OUT4} . Synchronization could be done by connecting the synch pins of U1 and U3 to a 600kHz clock.

Rev. 0

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TABLE OF CONTENTS

Features..... 1
ADP1829 Reference Design Description 1
Revision History..... 2
General Description 3
 ADP1829..... 3
Schematic 4
Bill of Materials 6

TABLE OF FIGURES

Figure 1. Schematic: V_{OUT1} and V_{OUT2} 4
Figure 2. Schematic: V_{OUT3} and V_{OUT4} 5

REVISION HISTORY

10/1/2007—Revision 0: Initial Version

GENERAL DESCRIPTION

ADP1829

The ADP1829 is a versatile, dual output, interleaved, synchronous PWM buck controller that generates two independent outputs from an input voltage of 2.9 V to 20 V. Each channel can be configured to provide output voltage from 0.6V to 85% of the input voltage. The two channels operate 180° out of phase, which reduces the current stress on the input capacitor and allows the use of a smaller and lower cost input capacitor.

The ADP1829 operates at a pin-selectable fixed switching frequency of either 300 kHz or 600 kHz. For some noise sensitive applications, it can also be synchronized to an external clock to achieve switching frequency between 300 kHz and 1 MHz. The switching frequency chosen is 300 kHz to get good efficiency over a wide range of input and output conditions.

The ADP1829 includes an adjustable soft start to limit input inrush current, voltage tracking for sequencing or DDR termination, independent power-good output, and a power enable pin. It also provides current-limit and short-circuit protection by sensing the voltage on the synchronous MOSFET.

BILL OF MATERIALS

Table 1. Vout1 and Vout2 Bill of Materials (Vo7V0 and Vo3V3)

Description	Designator	Quantity	Manufacturer	MFR#
Capacitor Ceramic COG 150p 0603 50V	Cc10	1	Vishay	Generic
Capacitor Ceramic X7R 4.7n 0603 50V	Cc11	1	Vishay	Generic
Capacitor Ceramic COG 470p 0603 50V	Cc12	1	Vishay	Generic
Capacitor Ceramic COG 100p 0603 50V	Cc20	1	Vishay	Generic
Capacitor Ceramic X7R 2.2n 0603 50V	Cc21	1	Vishay	Generic
Capacitor Ceramic COG 820p 0603 50V	Cc22	1	Vishay	Generic
Capacitor Ceramic X7R 1u 0603 16V	Cbias1, Cpv1, Cvcc1	3	Murata	GRM188R71C105KA12D
Capacitor Ceramic X7R 47n 0603 16V	Css1	1	Vishay	Generic
Capacitor Ceramic X7R 33n 0603 16V	Css2	1	Vishay	Generic
Capacitor Ceramic X5R 22u 1210 16V	Co12	1	Murata	grm32er61c226k
Capacitor Ceramic X7R 100n 0603 16V	Cb1, Cb2, Creg	3	Vishay	Generic
Capacitor Ceramic COG 33p 0603 50V	Clim3, Clim4	2	Vishay	Generic
Capacitor Ceramic X7R 10u 1210 25V	Co11, Cin11, Cin12, Co21, Cin21	5	TDK	C3225X7R1E106K
Capacitor Al Poly 105C 39u 10mm x 7.7mm 25V	Cinb	1	Nippon Chemi-con	APXA250ARA390MJ80G
Diode Schottky 200mA SOD-323 30V	Db1, Db2, Dreg	3	Diodes inc	BAT54WS
Diode Zener 200mW SOD-323 6.2V	Dreg	1	Diodes inc	BZT52C6V2S
Inductor Powder 2.80uH 14.5mm x 13.2mm	L1	1	Pulse	PG0277.282NL
Inductor Ferrite 22uH 12.2mm x 12.2mm	L2	1	Pulse	P1172.103
Single N-Channel MOSFET PG-TSDSON-8 30V	QH1	1	Infineon	BSC050N03LS
Single N-Channel MOSFET PG-TSDSON-8 30V	QL1	1	Infineon	BCS025N03LS
Single N-Channel MOSFET PG-TSDSON-8 30V	QH2	1	Infineon	BSC120N03LS
Single N-Channel MOSFET PG-TSDSON-8 30V	QL2	1	Infineon	BCS057N03LS
Single NPN Transistor SOT-23 40V	Qreg	1	Diodes inc	MMBT3904
1A Thick Film 0 Ohm jumper 0603	Rf23, Rcb1, Rcb2	3	Vishay	Generic
5% Thick Film 10 Ohms 0603	Rpv1, Rin1	2	Vishay	Generic
1% Thick Film 10.0k 0603	Rpg1, Rpg2, Rreg	3	Vishay	Generic
1% Thick Film 4.42k 0603	Rf22	1	Vishay	Generic
1% Thick Film 1.87k 0603	Rf12	1	Vishay	Generic
1% Thick Film 20.0k 0603	Rf11, Rf21	2	Vishay	Generic
1% Thick Film 2.10k 0603	Rlim1	1	Vishay	Generic
1% Thick Film 1.54k 0603	Rlim2	1	Vishay	Generic
1% Thick Film 100 Ohms 0603	Rc12	1	Vishay	Generic
1% Thick Film 2.26k 0603	Rc11	1	Vishay	Generic
1% Thick Film 30.1 Ohms 0603	Rc22	1	Vishay	Generic
1% Thick Film 7.32k 0603	Rc21	1	Vishay	Generic
2 chan 300k to 600k PWM LFCSP-32	U1	1	Analog Devices	ADP1829ACPZ

Table 2. Vout3 and Vout4 Bill of Materials (Vo1V8 and Vo1V2)

Description	Designator	Quantity	Manufacturer	MFR#
Capacitor Ceramic COG 100p 0603 50V	Cc30	1	Vishay	Generic
Capacitor Ceramic X7R 2.7n 0603 50V	Cc31	1	Vishay	Generic
Capacitor Ceramic COG 820p 0603 50V	Cc32	1	Vishay	Generic
Capacitor Ceramic COG 56p 0603 50V	Cc40	1	Vishay	Generic
Capacitor Ceramic X7R 2.2n 0603 50V	Cc41	1	Vishay	Generic
Capacitor Ceramic X7R 1.0n 0603 50V	Cc42	1	Vishay	Generic
Capacitor Ceramic X7R 1u 0603 16V	Cbias3, Cpv3, Cvcc3	3	Murata	GRM188R71C105KA12D
Capacitor Ceramic X7R 22n 0603 16V	Css3, Css4	2	Vishay	Generic
Capacitor Ceramic X7R 10u 1210 25V	Cin31, Cin41	2	TDK	C3225X7R1E106K
Capacitor Ceramic X7R 100n 0603 16V	Cb3, Cb4	2	Vishay	Generic
Capacitor Ceramic COG 33p 0603 50V	Clim3, Clim4	2	Vishay	Generic
Capacitor Ceramic X5R 22u 1210 16V	Co31, Co41, Co42	3	Murata	grm32er61c226k
Capacitor Al Poly 105C 390u 6.3mm x 5.8mm 2.5V	Co43	1	Nippon Chemicon	APXF2R5ARA391MF61G
Diode Schottky 200mA SOD-323 30V	Db3, Db4	2	Diodes inc	BAT54WS
Inductor Ferrite 12uH 12.2mm x 12.2mm	L3	1	Pulse	P1172.123
Inductor Ferrite 1.3uH 12.2mm x 12.2mm	L4	1	Pulse	P1172.132
Single N-Channel MOSFET 2x2 WDFN 30V	QH3, QL3	2	On-Semi	NTLJS4114N-D
Single N-Channel MOSFET PG-TSDSON-8 30V	QL4	1	Infineon	BCS025N03LS
Single N-Channel MOSFET PG-TSDSON-8 30V	QH4	1	Infineon	BSC120N03LS
1A Thick Film 0 Ohm jumper 0603	Rf43, Rcb3, Rcb4	3	Vishay	Generic
5% Thick Film 10 Ohms 0603	Rpv3, Rin3	2	Vishay	Generic
1% Thick Film 10.0k 0603	Rf32, Rpg3, Rpg4, Rc41	4	Vishay	Generic
1% Thick Film 20.0k 0603	Rf31, Rf41, Rf42	3	Vishay	Generic
1% Thick Film 2.49k 0603	Rlim3	1	Vishay	Generic
1% Thick Film 1.65k 0603	Rlim4	1	Vishay	Generic
1% Thick Film 60.4 Ohms 0603	Rc32	1	Vishay	Generic
1% Thick Film 5.90k 0603	Rc31	1	Vishay	Generic
1% Thick Film 4.12k 0603	Rc42	1	Vishay	Generic
2 chan 300k to 600k PWM LFCSP-32	U3	1	Analog Devices	ADP1829ACPZ

NOTES

Reference designators shown on the schematic but not listed on the Bill of Materials are place holders for possible design adjustments (snubbers, additional decoupling capacitors and clamp diodes). These components should be put in the layout, but not populated unless after testing it is deemed necessary.

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