

LT3668

40V Step-Down Regulator with Dual Tracking LDOs

DESCRIPTION

Demonstration circuit 2243A is a triple power supply that includes one 400mA step-down regulator and two 200mA low dropout (LDO) linear tracking regulators featuring the LT[®]3668. The demo circuit is designed for one 6V and dual 5V outputs from a 7V to 40V input. Two LDO outputs are configured as post-regulators of the switching regulator output. The total current capability of three output channels is up to 400mA, while the two LDO regulators are capable of 200mA each.

The switching frequency of the step-down regulator can be programmed via an oscillator resistor (R8) over a 250kHz to 2.2 MHz range. The default setting is 600kHz.

The LT3668 internal boost diode and loop compensation reduce the components count and solution size. The current mode control scheme creates fast transient response

and good loop stability. The switching regulator has cycle-by-cycle current limit and diode current sense, providing protection against shorted outputs.

JP1 can be used to set the whole LT3668 in shutdown mode. JP3 and JP4 enable and disable the outputs of the dual 5V tracking LDOs respectively.

The LT3668 data sheet gives a complete description of the part, operation and application information. The data sheet must be read in conjunction with this quick start guide for demo circuit 2243A. Proper board layout is essential for both proper operation and maximum thermal performance. See the data sheet section “PCB Layout”.

Design files for this circuit board are available at <http://www.linear.com/demo/DC2243A>

LT, LT, LTC, LTM, Linear Technology and the Linear logo are registered trademarks of Linear Technology Corporation. All other trademarks are the property of their respective owners.

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V _{IN1}	Input Supply Range of V _{IN1}		7		40	V
f _{SW}	Switching Frequency	V _{IN1} = 12V, V _{OUT1} = 6V/I _{OUT1} = 400mA V _{OUT2} = 5V/I _{OUT2} = 0 V _{OUT3} = 5V/I _{OUT3} = 0	510		690	kHz
V _{OUT1}	Output Voltage 1	V _{IN1} = 12V, V _{OUT1} = 6V/I _{OUT1} = 0 ~ 400mA V _{OUT2} = 5V/I _{OUT2} = 0 V _{OUT3} = 5V/I _{OUT3} = 0	5.88		6.12	V
V _{OUT2}	Output Voltage 2	V _{IN1} = 12V, V _{OUT1} = 6V/I _{OUT1} = 0 V _{OUT2} = 5V/I _{OUT2} = 0 ~ 190mA V _{OUT3} = 5V/I _{OUT3} = 0	4.9		5.1	V
V _{OUT3}	Output Voltage 3	V _{IN1} = 12V, V _{OUT1} = 6V/I _{OUT1} = 0 V _{OUT2} = 5V/I _{OUT2} = 0 V _{OUT3} = 5V/I _{OUT3} = 0 ~ 190mA	4.9		5.1	V
I _{OUT1} + I _{OUT2} + I _{OUT3}	Maximum Total Output Current		400			mA
I _{OUT2} , I _{OUT3}	Maximum LDO Output Current		190	200		mA

DESCRIPTION

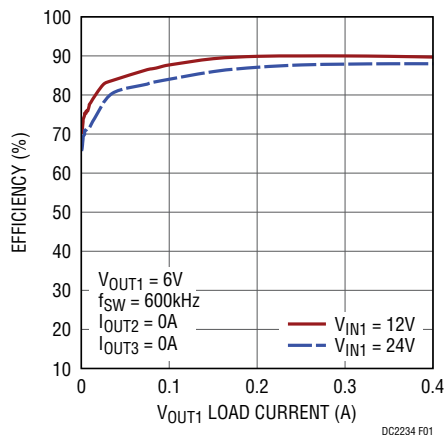


Figure 1. V_{OUT1} Typical Efficiency vs. Load Current

QUICK START PROCEDURE

Demonstration circuit 2243A is easy to set up to evaluate the performance of the LT3668. Refer to Figure 2 for proper measurement equipment setup and follow the procedure below:

NOTE. When measuring the input or output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across the V_{IN} or V_{OUT} and GND terminals. See Figure 3 for the proper scope technique.

1. Place JP1, JP3 and JP4 on the EN position.
2. With power off, connect the input power supply to V_{IN1} and GND.
3. With power off, connect loads from V_{OUT1} to GND, from V_{OUT2} to GND, and from V_{OUT3} to GND.

4. Turn on the power at the input.

NOTE: Make sure that the input voltage does not exceed 40V.

5. Check for the proper output voltages:
V_{OUT1} = 6V, V_{OUT2} = 5V, V_{OUT3} = 5V

NOTE: If there is no output, temporarily disconnect the load to make sure that the loads are not set too high or are shorted.

6. Once the proper output voltages are established, adjust the loads within the operating ranges and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

QUICK START PROCEDURE

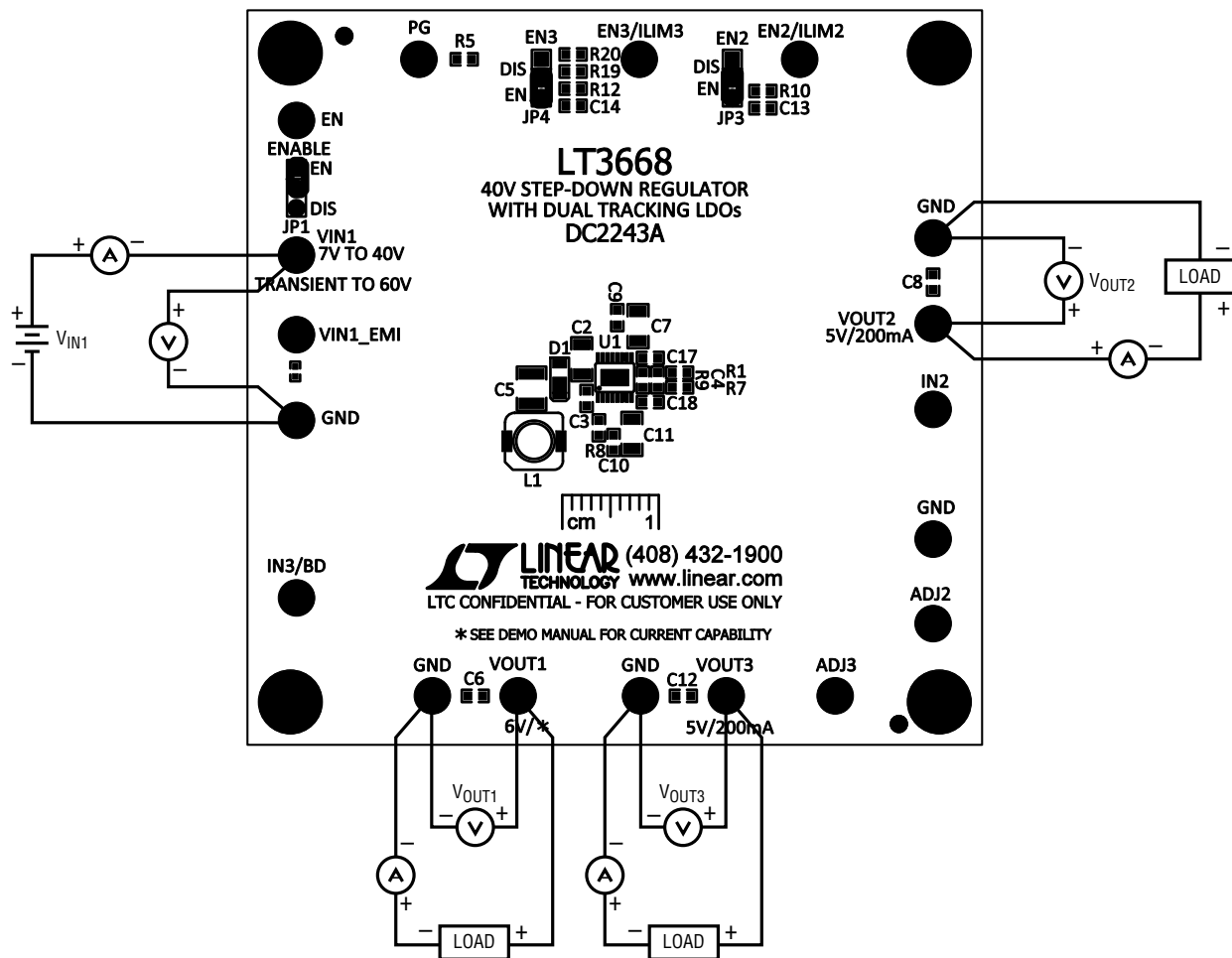


Figure 2. Proper Measurement Equipment Setup

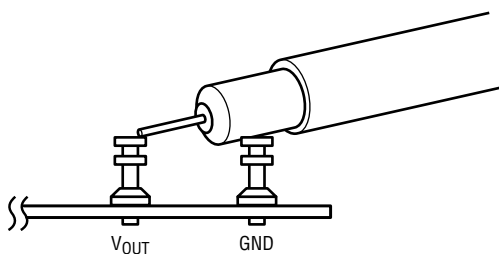


Figure 3. Measuring Input or Output Ripple

DEMO MANUAL DC2243A

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C2	CAP, X7R 2.2μF 100V 10% 1206	AVX, 12061C225KAT2A
2	1	C3	CAP, X7R 0.22μF 25V 10% 0603	AVX, 06033C224KAT2A
3	1	C4	CAP, NPO 22pF 25V 5% 0603	AVX, 06033A220JAT2A
4	1	C5	CAP, X5R 22μF 25V 20% 1210	MURATA, GRM32ER61E226ME15L
5	2	C7, C11	CAP, X5R 10μF 10V 10% 1206	AVX, 1206ZD106KAT2A
6	2	C9, C10	CAP, X5R 1μF 25V 20% 0603	AVX, 06033D105MAT2A
7	1	D1	DIODE, SCHOTTKY 60V 1A POWERDI123	DIODES INC., DFSL160-7
8	1	L1	INDUCTOR, 27μH	SUMIDA, CDRH5D28RHPNP-270MC
9	1	R1	RES., CHIP 243k 0.10W 1% 0603	VISHAY, CRCW0603243KFKEA
10	1	R5	RES., CHIP 150k 0.10W 5% 0603	VISHAY, CRCW0603150KJNEA
11	1	R7	RES., CHIP 931k 0.10W 1% 0603	VISHAY, CRCW0603931KFKEA
12	1	R8	RES., CHIP 174k 0.10W 1% 0603	VISHAY, CRCW0603174KFKEA
13	1	R9	RES., CHIP 294k 0.10W 1% 0603	VISHAY, CRCW0603294KFKEA
14	1	U1	I.C., VOLTAGE REG. MSOP(16)-MSE16	LINEAR TECH., LT3668EMSE#PBF
Additional Demo Board Circuit Components				
1	1	C1	CAP, Alum 10μF 63V 20% OSCON-CE-6.3	SUN ELECTRONIC INDUSTRIES, 63CE10GA
2	1	C6	CAP, X7R 0.1μF 25V 10% 0603	MURATA, GRM188R71E104KA01D
3	0	C8, C12, C17, C18 (Opt)	CAP, 0603	
4	2	C13, C14	CAP, X7R 0.047μF 25V 20% 0603	AVX, 06033C473MAT2A
5	0	C15, C16 (OPT)	CAP, OSCON-CE-6.3	
6	0	C19, C20 (OPT)	CAP, 1206	
7	0	FB1 (OPT)	FERRITE BEAD, 600Ω/500mA 0603	TDK, MMZ1608S601AT
8	0	L2 (OPT)	INDUCTOR, 4.7μH	SUMIDA, CDRH2D18/LDNP-4R7NC
9	4	R6, R13, R17, R18	RES/JUMPER, CHIP 0Ω 0.25W 5A 0603	VISHAY, CRCW06030000Z0EA
10	2	R10, R12	RES., CHIP 1.50k 0.10W 1% 0603	VISHAY, CRCW06031K50FKEA
11	2	R19, R20	RES., CHIP 200k 0.10W 5% 0603	VISHAY, CRCW0603200KJNEA
Hardware: For Demo Board Only				
1	18	E1-E18	TURRET, TESTPOINT	MILL-MAX, 2501-2-00-80-00-00-07-0
2	3	JP1, JP3, JP4	HEADERS, 3 PINS 2mm CTRS.	SULLINS, NRPN031PAEN-RC
3	3	XJP1, XJP3, XJP4	SHUNT, 2mm CTRS.	SAMTEC, 2SN-BK-G
4	4	MH1-MH4	STANDOFF, NYLON 0.25"	KEYSTONE, 8831(SNAP ON)

SCHEMATIC DIAGRAM

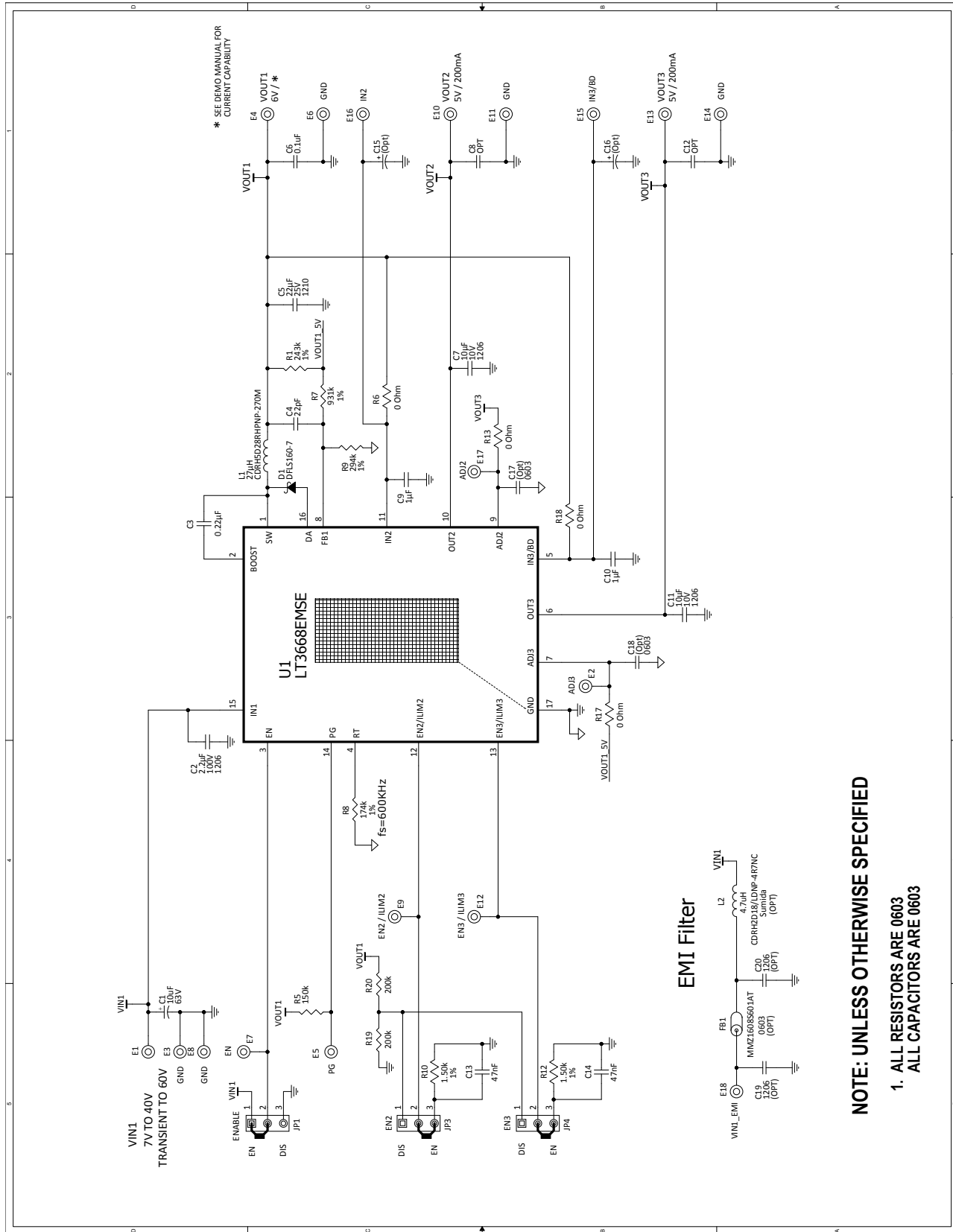


Figure 4. DC2243A Demo Circuit Schematic

DEMO MANUAL DC2243A

DEMONSTRATION BOARD IMPORTANT NOTICE

Linear Technology Corporation (LTC) provides the enclosed product(s) under the following **AS IS** conditions:

This demonstration board (DEMO BOARD) kit being sold or provided by Linear Technology is intended for use for **ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY** and is not provided by LTC for commercial use. As such, the DEMO BOARD herein may not be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including but not limited to product safety measures typically found in finished commercial goods. As a prototype, this product does not fall within the scope of the European Union directive on electromagnetic compatibility and therefore may or may not meet the technical requirements of the directive, or other regulations.

If this evaluation kit does not meet the specifications recited in the DEMO BOARD manual the kit may be returned within 30 days from the date of delivery for a full refund. **THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY THE SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THIS INDEMNITY, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.**

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user releases LTC from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge. Also be aware that the products herein may not be regulatory compliant or agency certified (FCC, UL, CE, etc.).

No License is granted under any patent right or other intellectual property whatsoever. **LTC assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or any other intellectual property rights of any kind.**

LTC currently services a variety of customers for products around the world, and therefore this transaction **is not exclusive**.

Please read the DEMO BOARD manual prior to handling the product. Persons handling this product must have electronics training and observe good laboratory practice standards. **Common sense is encouraged.**

This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact a LTC application engineer.

Mailing Address:

Linear Technology
1630 McCarthy Blvd.
Milpitas, CA 95035

Copyright © 2004, Linear Technology Corporation

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [Power Management IC Development Tools](#) category:

Click to view products by [Analog Devices](#) manufacturer:

Other Similar products are found below :

[EVAL-ADM1168LQEBZ](#) [EVB-EP5348UI](#) [MIC23451-AAAYFL EV](#) [MIC5281YMME EV](#) [DA9063-EVAL](#) [ADP122-3.3-EVALZ](#) [ADP130-0.8-EVALZ](#) [ADP130-1.2-EVALZ](#) [ADP130-1.5-EVALZ](#) [ADP130-1.8-EVALZ](#) [ADP1714-3.3-EVALZ](#) [ADP1716-2.5-EVALZ](#) [ADP1740-1.5-EVALZ](#) [ADP1752-1.5-EVALZ](#) [ADP1828LC-EVALZ](#) [ADP1870-0.3-EVALZ](#) [ADP1871-0.6-EVALZ](#) [ADP1873-0.6-EVALZ](#) [ADP1874-0.3-EVALZ](#) [ADP1882-1.0-EVALZ](#) [ADP199CB-EVALZ](#) [ADP2102-1.25-EVALZ](#) [ADP2102-1.875EVALZ](#) [ADP2102-1.8-EVALZ](#) [ADP2102-2-EVALZ](#) [ADP2102-3-EVALZ](#) [ADP2102-4-EVALZ](#) [ADP2106-1.8-EVALZ](#) [ADP2147CB-110EVALZ](#) [AS3606-DB](#) [BQ24010EVM](#) [BQ24075TEVM](#) [BQ24155EVM](#) [BQ24157EVM-697](#) [BQ24160EVM-742](#) [BQ24296MEVM-655](#) [BQ25010EVM](#) [BQ3055EVM](#) [NCV891330PD50GEVB](#) [ISLUSBI2CKIT1Z](#) [LM2744EVAL](#) [LM2854EVAL](#) [LM3658SD-AEV/NOPB](#) [LM3658SDEV/NOPB](#) [LM3691TL-1.8EV/NOPB](#) [LM4510SDEV/NOPB](#) [LM5033SD-EVAL](#) [LP38512TS-1.8EV](#) [EVAL-ADM1186-1MBZ](#) [EVAL-ADM1186-2MBZ](#)