DEMO MANUAL DC1439A

LT3688 Dual 800mA Step-Down Switching Regulator with Power-On Reset and Watchdog Timer

DESCRIPTION

Demonstration circuit 1439A is an adjustable dual monolithic step-down switching regulator with two power-on reset timers and a watchdog timer. The regulator operates off inputs up to 36V and withstands transients up to 60V. The two buck outputs are capable of generating up to 800mA each and both of them have independent RUN/SS function. The reset and watchdog timeout periods are both adjustable using external capacitors.

The LT3688 is available in 24-Pin TSSOP and 4mm × 4mm QFN packages, each with an exposed pad for low thermal resistance.

The LT3688 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 1439A.

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

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN}	Input Supply Range	V_{OUT1} = 5V, I_{OUT1} = 800mA V_{OUT2} = 3.3V, I_{OUT2} = 800mA	7		36	V
V_{OUT1}	Output Voltage 1	V_{IN} = 12V, I_{OUT1} = 800mA	4.85	5	5.15	V
V_{OUT2}	Output Voltage 2	V_{IN} = 12V, I_{OUT2} = 800mA	3.20	3.3	3.40	V
I_{OUT1}	Output Current 1		0		800	mA
I_{OUT2}	Output Current 2		0		800	mA
F_{SW}	Switching Frequency		0.9	1	1.1	MHz
t_{WDU}	Watchdog Upper Boundary Period	C7 = 1000pF		20		ms
t_{WDL}	Watchdog Lower Boundary Period	C7 = 1000pF		1.3		ms
t_{RST1}	Programmed Reset Period 1	C8 = 1000pF		5		ms
t_{RST2}	Programmed Reset Period 2	C9 = 1000pF		5		ms

QUICK START PROCEDURE

Demonstration circuit 1439A is easy to set up to evaluate the performance of the LT3688. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. Place Jumper JP1 in the following position:

   OFF: Watchdog Disabled

   ON: Watchdog Enabled

2. With power off, connect the input power supply to VIN and GND.

3. With power off, connect loads from VOUT1 to GND and VOUT2 to GND.

4. Turn on the power at the input.

   NOTE. Make sure that the input voltage does not exceed 36V.

5. Check for the proper output voltages:

   VOUT1 = 5V, VOUT2 = 3.3V

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

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

7. To test the watchdog timer, connect a clock input to the WDI terminal. Observe the output at the $\overline{WDO}$ terminal while the clock parameters are adjusted.

8. To test Power-On Reset, observe output at the RESET terminals: $\overline{RST1}$ and $\overline{RST2}$.

QUICK START PROCEDURE

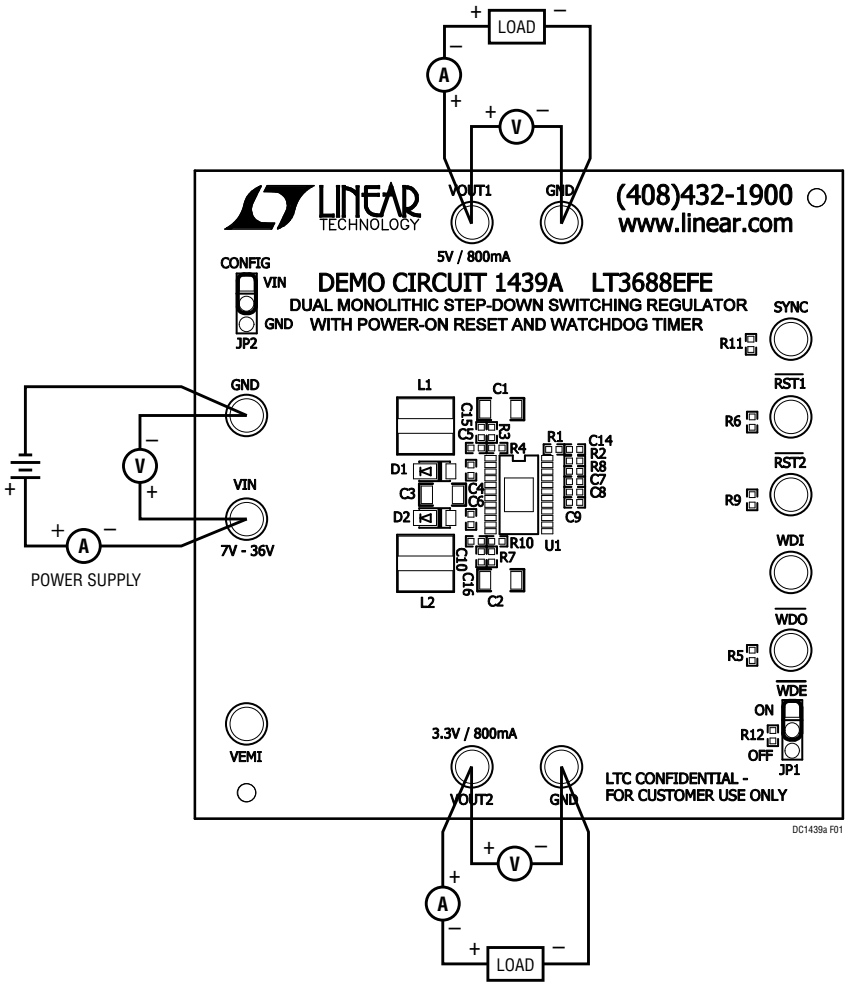


Figure 1. DC1439A Proper Equipment Setup

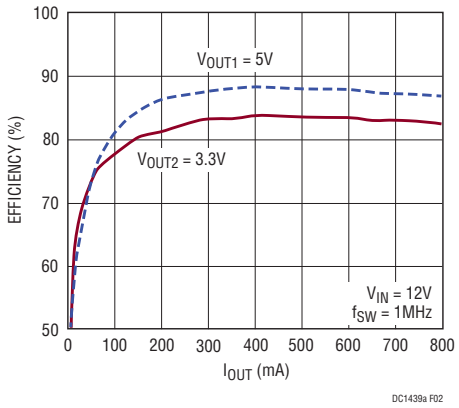
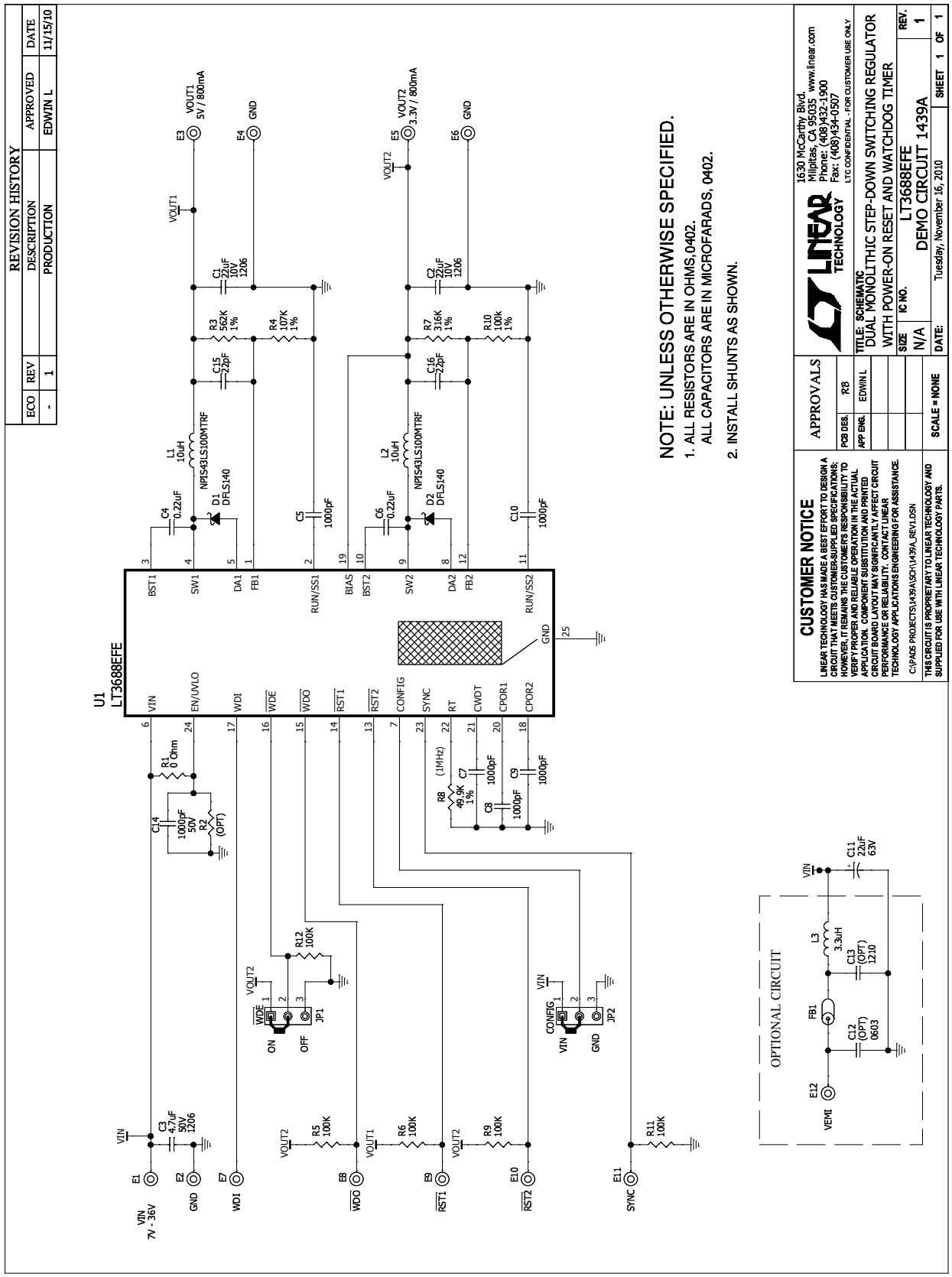


Figure 2. Buck Efficiency vs Output Load

PARTS LIST

ITEM	QUANTITY	REFERENCE	DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components:				
1	2	C1, C2	CAP, X7R 22µF 10V 10% 1206	MURATA GRM31CR71A226ME15K
2	1	C3	CAP, X7R 4.7µF 50V 10% 1206	MURATA GRM31CR71H475K
3	2	C4, C6	CAP, X5R 0.22µF 6.3V 20% 0402	AVX 04026D224MAT2A
4	2	C5, C10	CAP, X7R 1000pF 25V 20% 0402	AVX 04023C102MAT2A
5	3	C7, C8, C9	CAP, NPO 1000pF 25V 5% 0402	AVX 04023A102JAT2A
6	2	C15, C16	CAP, NPO 22pF 25V 10% 0402	AVX 04023A220KAT2A
7	2	D1, D2	SCHOTTKY DIODE 1A/40V, PowerDI-123	DIODES INC. DFLS140
8	2	L1, L2	INDUCTOR, 10µH, NPIS43LS	NIC COMPONENTS CORP. NPIS43LS100MTRF
9	1	R3	RES, CHIP 562k 0.06W 1% 0402	VISHAY CRCW0402562KFKED
10	1	R4	RES, CHIP 107k 0.06W 1% 0402	VISHAY CRCW0402107KFKED
11	5	R5, R6, R9, R11, R12	RES, CHIP 100k 0.06W 5% 0402	VISHAY CRCW0402100KJNED
12	1	R7	RES, CHIP 316k 0.06W 1% 0402	VISHAY CRCW0402316KFKED
13	1	R8	RES, CHIP 49.9k 0.06W 1% 0402	VISHAY CRCW040249K9FKED
14	1	R10	RES, CHIP 100k 0.06W 1% 0402	VISHAY CRCW0402100KFKED
15	1	U1	IC, VOLTAGE REGULATOR TSSOP24-FE/AA	LINEAR TECHNOLOGY CORPORATION LT3688EFE
Additional Demo Board Circuit Components:				
1	1	C11	CAP, ALUM 22µF 63V 25%, OSCON-CE-6.3	SANYO 63CE22BS
2	0	C12 (OPT)	CAP, 0603	
3	0	C13 (OPT)	CAP, 1210	
4	1	C14	CAP, NPO 1000pF 50V 5% 0402	AVX 04025A102JAT2A
5	1	R1	RES/JUMPER, CHIP 0Ω 1/16W 1A 0402	VISHAY CRCW04020000ZOEA
6	0	R2 (OPT)	RES, 0402	
7	0	L3 (OPT)	INDUCTOR, 3.3µH, CDRH4D22	COILCRAFT LPS4018-332ML
8	0	E12 (OPT)	TURRET, TESTPOINT 0.062 THICK BRD. 0.094"	MILL MAX 2501-2-00-80-00-00-07-0
9	0	FB1 (OPT)	FERRITE BEAD, FBMJ4516HS720NB(BEAD), 1206	
Hardware for Demo Board Only:				
1	11	E1 to E11	TURRET, TESTPOINT 0.062 THICK BRD. 0.094"	MILL MAX 2501-2-00-80-00-00-07-0
2	2	JP1, JP2	HEADERS, 3 PINS 2mm CTRS.	SAMTEC TMM-103-02-L-S
3	2	XJP1, XJP2	SHUNT, 2mm CTRS.	SAMTEC 2SN-BK-G

SCHEMATIC DIAGRAM



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

Linear Technology Corporation
1630 McCarthy Blvd., Milpitas, CA 95035-7417
(408) 432-1900 • FAX: (408) 434-0507 • www.linear.com

LT 0111 • PRINTED IN USA