DEMO MANUAL DC823B-B

LTM4600HV: 28V, 10A Step-Down Power µModule® Regulator

DESCRIPTION

Demonstration circuit DC823B-B features the LTM®4600HVEV, a 10A high efficiency, high density switch mode step-down power module. The input voltage is from 4.5V to 28V. The output voltage is programmable from 0.6V to 5V. The rated load current is 10A, while derating is necessary for different V_{IN}, V_{OUT}, and thermal conditions. Integrated input and output filters enable a simple PCB layout. Only bulk input and output capacitors are needed.

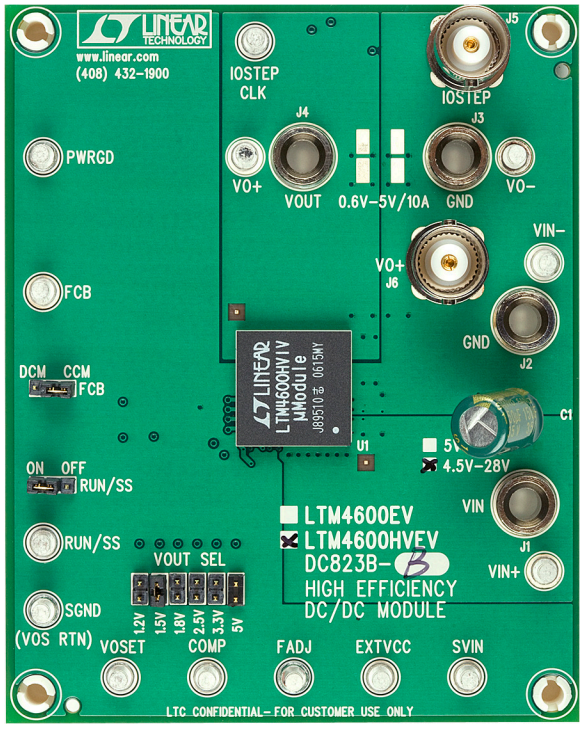
The LTM4600HV data sheet must be read in conjunction with this demo manual prior to working on or modifying demo circuit DC823B-B.

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

PERFORMANCE SUMMARY (T_A = 25°C)

PARAMETER	TEST CONDITION	VALUE
Input Voltage Range		4.5V to 28V
Output Voltage V_{OUT}	Selectable with Jumpers (Open for 0.6V)	1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5V
Maximum Continuous Output Current	5V to $28V_{IN}$, $1.5V_{OUT}$	10 A_{DC}
Efficiency	V_{IN} = 24V, V_{OUT} = 2.5V, I_{OUT} = 10A	83%, See Figure 2

BOARD PHOTO



QUICK START PROCEDURE

Demonstration circuit DC823B-B is easy to set up to evaluate the performance of the LTM4600HVEV. Refer to Figure 1 for proper measurement equipment set-up and follow the procedure below:

1. Place jumpers in the following positions for a typical $1.5V_{OUT}$ application :

FCB	RUN/SS	V_{OUT} Select
CCM	ON	1.5V

2. With power off, connect the input power supply, load, optional 5V bias supply and meters as shown in Figure 1. Preset the load to 0A and V_{IN} supply to be less than 28V. The optional 5V bias supply applied to the EXTVCC pin must be off while the main V_{IN} is turned off.
3. Turn on the power at the input. The output voltage should be 1.5V ± 2%.
4. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters. Output voltage ripple should be measured at J6 with a BNC cable.
5. For optional load transient test, apply an adjustable pulse signal between IOSTEP CLK and GND pins. Pulse amplitude sets the current step. The pulse signal should have very small duty cycle (<15%) to limit the thermal stress of the transient load circuit. The output transient current can be monitored at BNC connector J5 (10mV/A).

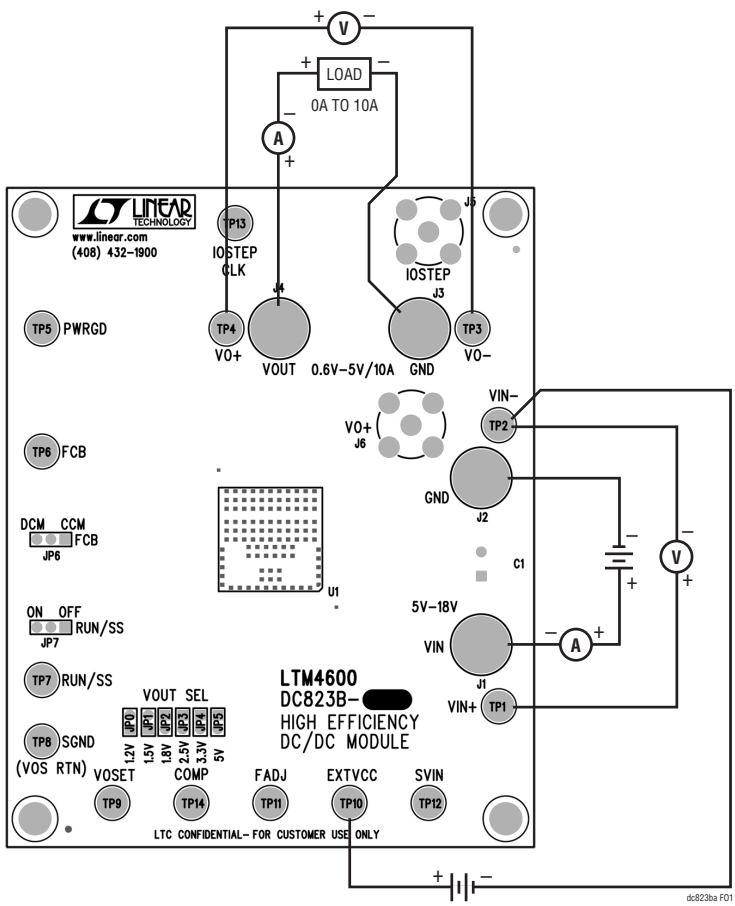


Figure 1. Test Set-Up of DC823B-B (EXTVCC V_{BIAS} Supply is Optional)

QUICK START PROCEDURE

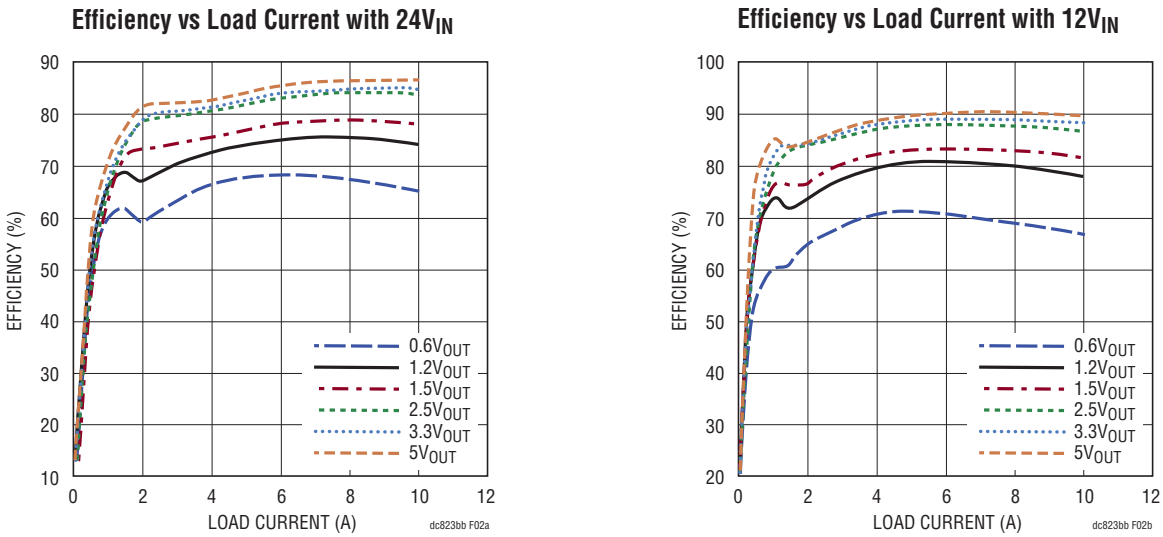


Figure 2. Measured Supply Efficiencies with Different V_{IN} and V_{OUT}

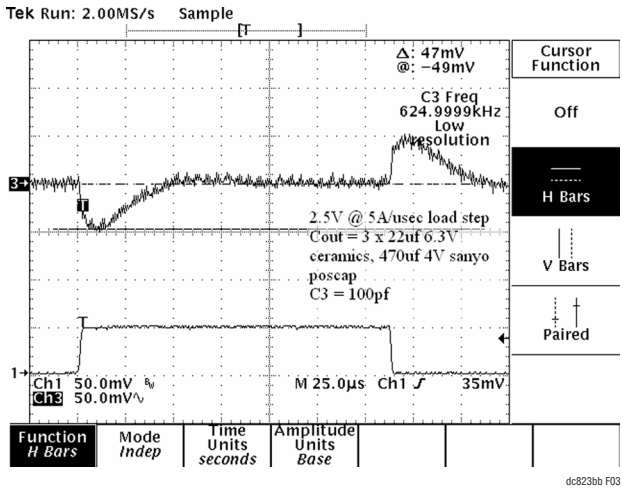
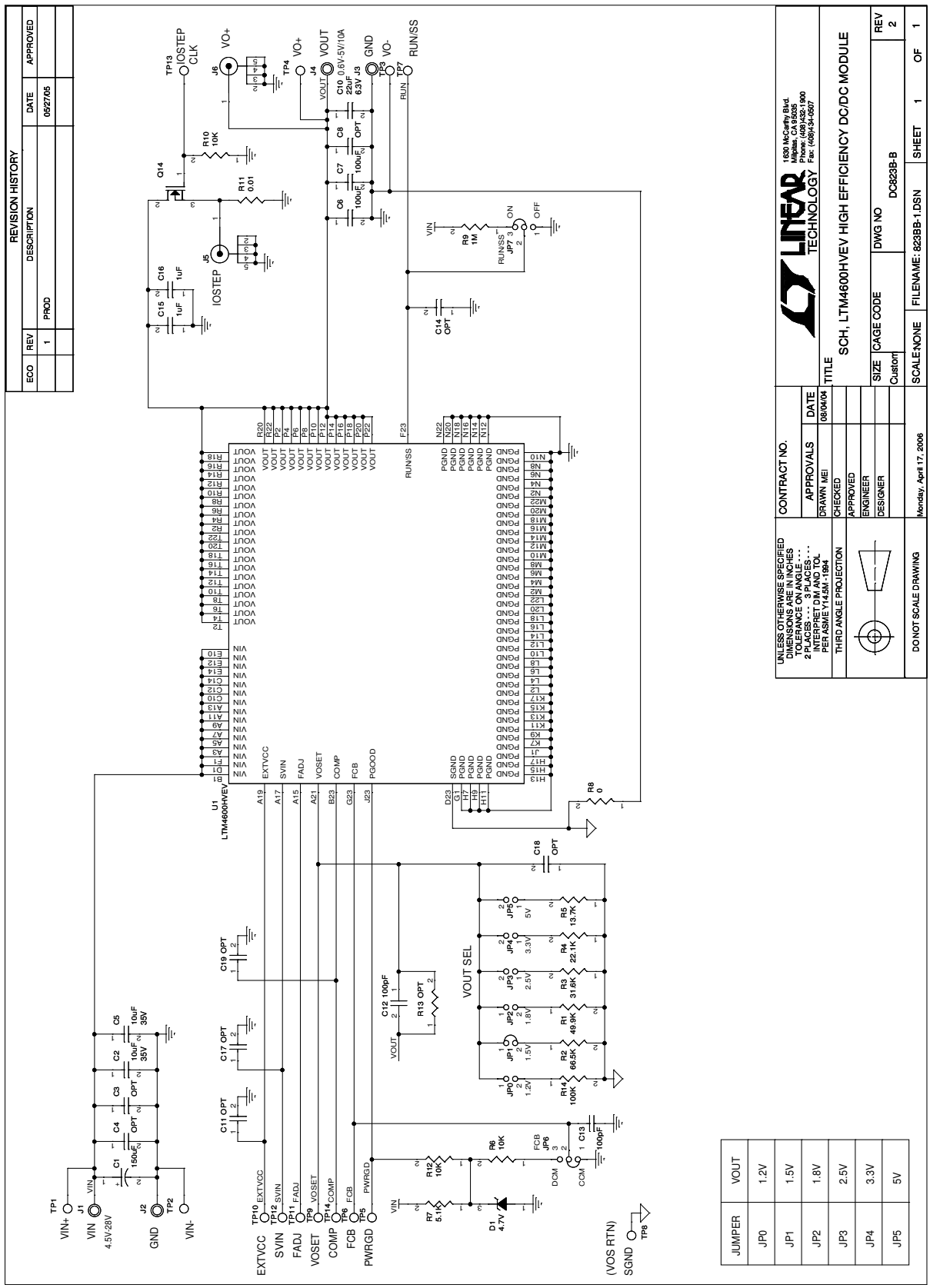


Figure 3. Measured Load Transient Response (0A to 5A Step)

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C1	CAP, 150µF 20% 35V ALUM	SANYO 35MV150WXV (now SUNCON 35ME150WXV)
2	2	C5, C2	CAP, 1206 10µF 20% 35V X5R	TAIYO YUDEN GMK316BJ106ML-T
3	2	C7, C6	CAP, 1812 100µF 20% 6.3V X5R	TDK C4532X5R0J107M
4	1	C10	CAP, 1206 22µF 20% 6.3V X5R	TAIYO YUDEN JMK316BJ226ML-T
5	1	C12	CAP, 0603 100pF 10% 50V X7R	AVX 06035C101KAT1A
6	1	R1	RES, 0603 49.9k 1% 1/10W	AAC CR16-4992FM
7	1	R8 - ALTERNATE	RES, 0603 0Ω JUMPER	ACC CJ06-000M
		R8	RES, 0603 0Ω JUMPER	VISHAY CRCW06030000Z0EA
8	1	U1	IC, LTM4600HVEV	LINEAR TECHNOLOGY LTM4600HVEV
Additional Demo Board Circuit Components				
1	0	C4, C3	CAP, 1206 OPTION	TAIYO YUDEN EMK316BJ475ML-T
2	0	C8	CAP, 1812 OPTION	TAIYO YUDEN JMK432BJ107MU-T
3	0	C11, C14, C18, C19	CAP, 0603 OPTION	OPTION
4	1	C13	CAP, 0603 100pF 10% 50V NPO	AVX 06035A101KAT
5	2	C15, C16	CAP, 0603 1µF 20% 10V X5R	TAIYO YUDEN LMK107BJ105MA-T
6	0	C17	CAP, 0805 1µF 20% 16V X5R OPTION	TAIYO YUDEN EMK212BJ105MG-T
7	1	D1	DIODE, ZENER 4.7V	DIODES INC. BZX84C4V7-7-F
8	1	Q14	XSTR, SUD50N03-10CP MOSFET	SILICONIX SUD50N03-10CP-E3
9	1	R2	RES, 0603 66.5k 1% 1/10W	AAC CR16-6652FM
10	1	R3	RES, 0603 31.6k 1% 1/10W	AAC CR16-3162FM
		R3 - ALTERNATE	RES, 0603 31.6k 1% 1/10W	PANASONIC ERJ-3GEY512V
11	1	R4	RES, 0603 22.1k 1% 1/10W	AAC CR16-2212FM
12	1	R5	RES, 0603 13.7k 1% 1/10W	AAC CR16-1372FM
13	3	R6, R10, R12	RES, 0603 10k 5% 1/10W	VISHAY CRCW060310K0JNEA
		R6, R10, R12- ALTERNATE	RES, 0603 10k 5% 1/10W	VISHAY CRCW0603103J
14	1	R7	RES, 0603 5.1k 5% 1/10W	AAC CR16-512JM
		R7	RES, 0603 5.1k 5% 1/10W	PANASONIC ERJ-3GEY512V
15	1	R9	RES, 0603 1MΩ 5% 1/16W	AAC CR16-105JM
16	1	R11	RES, 2512 0.01Ω 5% 1W	IRC LRF2512-01-R010-J
17	0	R13	RES, 0603 OPTION	OPTION
18	1	R14	RES, 0603 100k 1% 1/10W	AAC CR16-1003FM
Hardware				
1	6	JP0 TO JP5	HEADER, 2-PIN, 2mm	COMM CON 2802S-02G2
2	2	JP6, JP7	HEADER, 3-PIN, 2mm	COMM CON 2802S-03G2
3	4	J1, J2, J3, J4	JACK, BANANA	KEYSTONE 575-4
4	2	J5, J6	CONN, BNC, 5 PINS	CONNEX 112404
5	14	TP1 TO TP14	TURRET	MILL-MAX 2501-2-00-80-00-00-07-0
6	3	JP3, JP6, JP7	SHUNT	SAMTEC 2SN-BK-G
7	4		STANDOFF, SNAP ON	KEYSTONE_8831

SCHEMATIC DIAGRAM



dc823bdf

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