LTM4602
20V, 6A Step-Down µModule Regulator

DESCRIPTION

Demonstration circuit DC1084A-A features the LTM®4602, the high efficiency, high density step-down µModule® regulator. The input voltage range is from 5V to 20V. The output voltage is jumper programmable from 0.6V to 5V, refer to the step-down ratio curve in the LTM4602 data sheet. The rated load current is 6A, while derating is necessary for certain V_{IN}, V_{OUT} and thermal conditions.

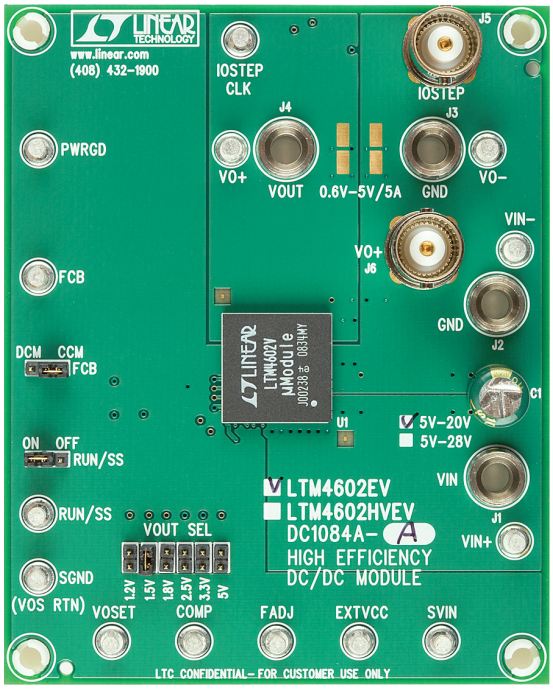
The LTM4602 data sheet must be read in conjunction with this demo manual prior to working on or modifying demo circuit DC1084A-A.

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

PERFORMANCE SUMMARY (T_A = 25°C)

PARAMETER	CONDITION	VALUE
Input Voltage Range		4.5V to 20V
Output Voltage V_{OUT}	Jumper Selectable (Open for 0.6V)	1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5V
Maximum Continuous Output Current	Derating is Necessary for Certain V_{IN}, V_{OUT} and Thermal Conditions	6A DC
Default Operating Frequency		800kHz

BOARD PHOTO



QUICK START PROCEDURE

Demonstration circuit DC1084A-A is an easy way to evaluate the performance of the LTM4602EV. Please refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

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

FCB	RUN/SS	VOUT SEL
CCM	ON	1.5V

2. With power off, preset the load to 0A and V_{IN} supply to be less than 20V. Connect the input power supply, load, optional 5V bias supply and meters as shown in Figure 1. The optional 5V bias supply must be off anytime the supply to VIN 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 ripple should be measured at J6 with a BNC cable.
5. For optional load transient test, apply 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 on the transient load circuit. The output transient current can be monitored at BNC connector J5 (10mV/A).

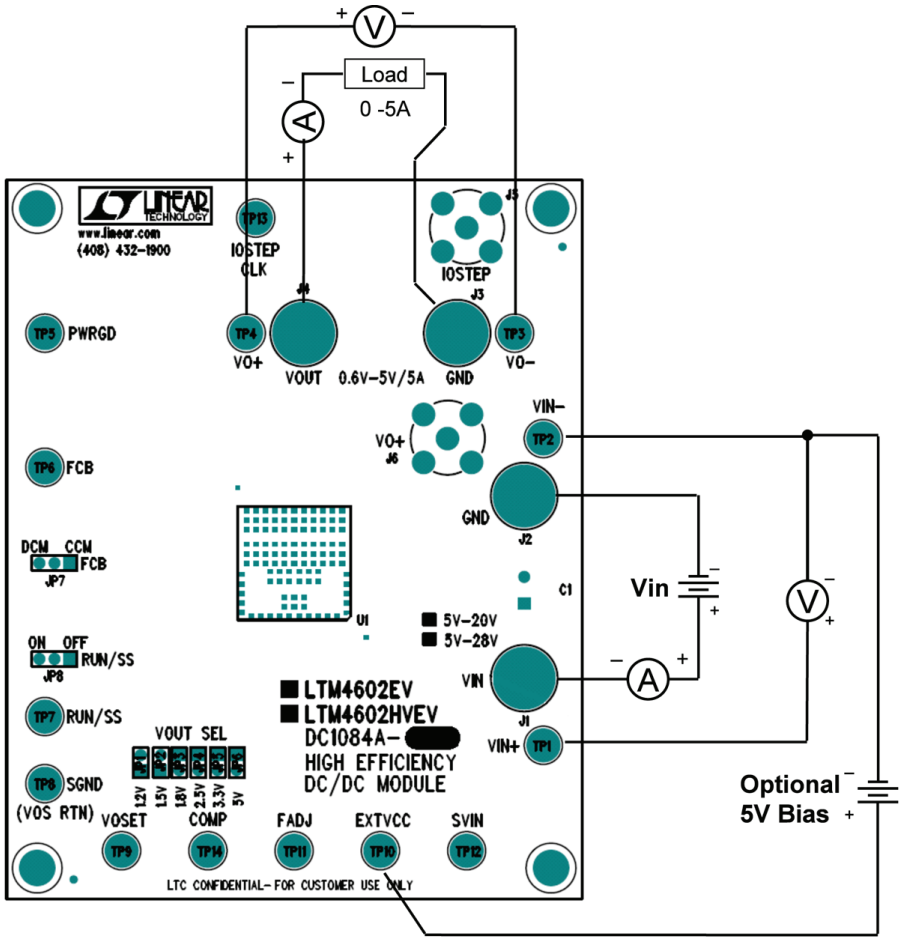


Figure 1. Test Setup of DC1084A-A ($EXTV_{CC}$ Bias Supply is Optional)

QUICK START PROCEDURE

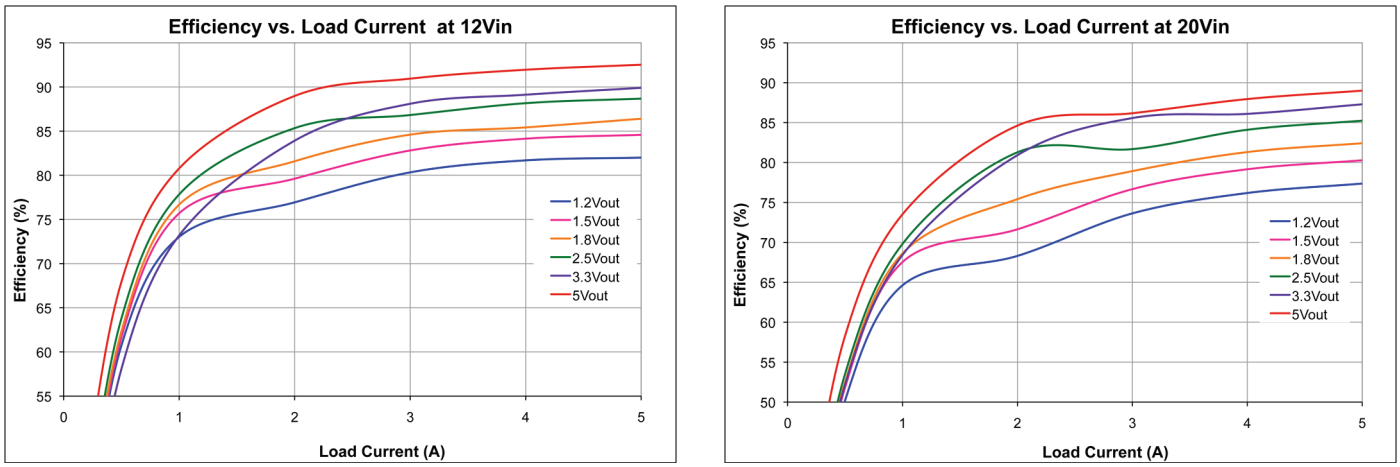
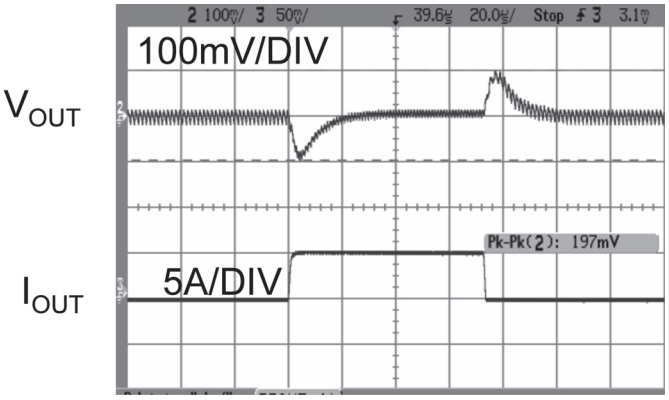


Figure 2. Measured Supply Efficiency with Different V_{IN} and V_{OUT} ($FADJ Open: 1.2V_{OUT}$ to $2.5V_{OUT}$, FADJ = 15kΩ: $3.3V_{OUT}$ to $5V_{OUT}$)



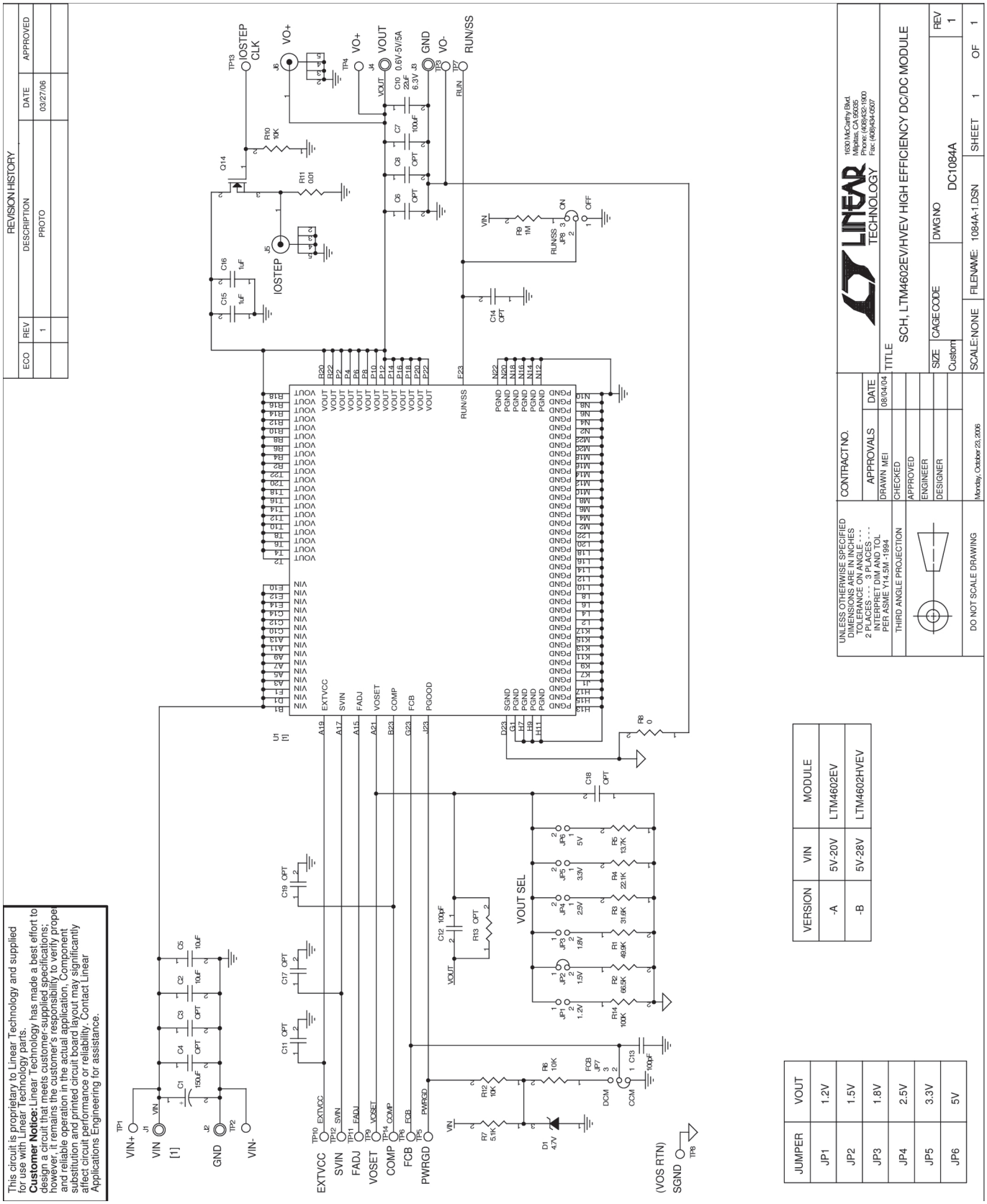
V_{IN} = 12V, V_{OUT} = 1.5V
0A to 5A LOAD STEP
FCB = 0V
C_{OUT} = 1 × 22µF CERAMIC (1206), 1 × 100µF CERAMIC (1812),
C3 = 100pF

Figure 3. Measured Load Transient Response (0A-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 35MV150WXV)
2	2	C5, C2	CAP, 1206 10µF 20% 35V X5R	TAIYO YUDEN GMK316 BJ106ML-T
3	1	C10	CAP, 1206 22µF 20% 6.3V X5R	AVX 12066D266MAT2A
4	1	C7	CAP, 1812 100µF 20% 6.3V X5R	TDK C4532X5R0J107MZ
5	1	C12	CAP, 0603 100pF 10% 50V X7R	AVX 06035C101KAT1A
6	1	R2	RES, 0603 66.5k 1% 1/10W	AAC CR16-6652FM
7	1	R8	RES, 0603 0Ω JUMPER	ACC CJ06-000M
8	1	U1	IC, LTM4602EV	LINEAR TECH. LTM4602EV
Additional Demo Board Circuit Components				
1	0	C4, C3	CAP, 1206 OPTION	TAIYO YUDEN EMK316BJ475ML-T OPTION
2	0	C8	CAP, 1812 100µF 20% 6.3V X5R OPTION	TDK C4532X5R0J107MZ OPTION
3	0	C6	CAP, 1812 OPTION	TAIYO YUDEN JMK432BJ107MU-T OPTION
4	0	C11, C14, C18, C19	CAP, 0603 OPTION	OPTION
5	1	C13	CAP, 0603 100pF 10% 50V NPO	AVX 06035A101KAT
6	2	C15,C16	CAP, 0603 1µF 20% 10V X5R	TAIYO YUDEN LMK107BJ105MA-T
7	0	C17	CAP, 0805 1µF 20% 16V X5R OPTION	TAIYO YUDEN EMK212BJ105MG-T OPTION
8	1	D1	DIODE, ZENER 4.7V	DIODES INC. BZX84C4V7
9	1	Q14	XSTR, SUD50N03-10CP MOSFET	SILICONIX SUD50N03-10CP
10	1	R1	RES, 0603 49.9k 1% 1/10W	AAC CR16-4992FM
11	1	R3	RES, 0603 31.6k 1% 1/10W	AAC CR16-3162FM
12	1	R4	RES, 0603 22.1k 1% 1/10W	AAC CR16-2212FM
13	1	R5	RES, 0603 13.7k 1% 1/10W	AAC CR16-1372FM
14	3	R6, R10, R12	RES, 0603 10k 5% 1/10W	VISHAY CRCE060310K0JNEA
15	1	R7	RES, 0603 5.1k 5% 1/10W	AAC CR16-512JM
16	1	R9	RES, 0603 1M 5% 1/16W	AAC CR16-105JM
17	1	R11	RES, 2512 0.01Ω 5% 1W	IRC LRF2512-01-R010-J
18	0	R13	RES, 0603 OPTION	OPTION
19	1	R14	RES, 0603 100k 1% 1/10W	AAC CR16-1003FM

SCHEMATIC DIAGRAM



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

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