LTM4624EY

10A Step-Down µModule® Regulator

DESCRIPTION

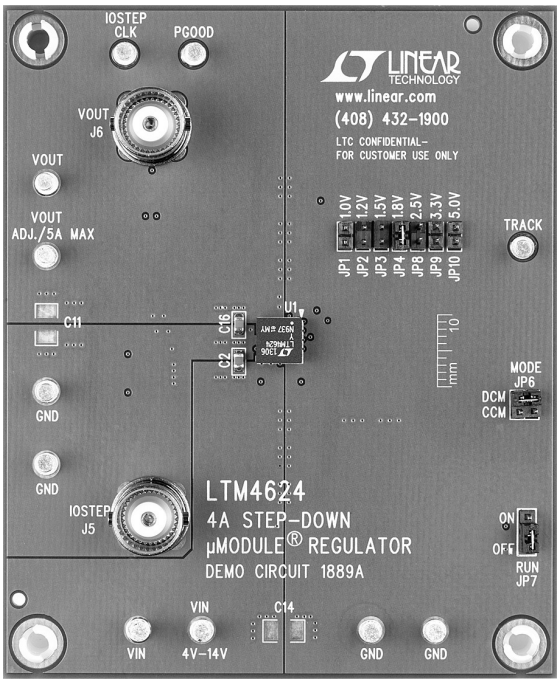
Demonstration circuit 1889A features the LTM®4624EY µModule regulator, a tiny high-performance high efficiency step-down regulator. The LTM4624EY has an operating input voltage range of 4V to 14V and is able to provide an output current of up to 4A. The output voltage is programmable from 0.6V to 5V. The LTM4624EY is a complete DC-DC point of load regulator in a thermally enhanced 6.25mm x 6.25mm x 5.01mm BGA package requiring only a few input and output capacitors. Output voltage tracking is available through the TRACK/SS pin for supply rail sequencing. The LTM4624 datasheet must be read in conjunction with this demo manual for working on or modifying demo circuit 1889A.

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

Table 1. Performance Summary

PARAMETER	CONDITIONS / NOTES	VALUE
Input Voltage Range		4V – 14V
Output Voltage V_{OUT}	Jumper selectable	$1.0V_{DC}$, $1.2V_{DC}$, $1.5V_{DC}$, $1.8V_{DC}$, $2.5V_{DC}$, $3.3V_{DC}$, $5V_{DC}$
Maximum Continuous Output Current	De-rating is necessary for certain operating conditions. See datasheet for details	$4A_{DC}$
Default Operating Frequency		1MHz
Efficiency	V_{IN} = 12V, V_{OUT} = 1.8V, I_{OUT} = 4A	83.6% See Figure 2

DEMO BOARD PHOTO



QUICK START PROCEDURE

Demonstration circuit 1889A is an easy way to evaluate the performance of the LTM4624EY. Please refer to Figure 1 for test setup connections and follow the procedure below.

1. With power off, place the jumpers in the following positions for a typical 1.8V_{out} application:

JP7	*JP6*	*JP4*
RUN	**MODE**	**V_{OUT} Select**
ON	CCM	1.8V

2. Before connecting input supply, load and meters, pre-set the input voltage supply to be between 4V to 14V. Pre-set the load current to 0A.

3. With power off, connect the load, input voltage supply and meters as shown in Figure 1.

4. Turn on input power supply. The output voltage meter should display the selected output voltage ± 2%.

5. Once the proper output voltage is established, adjust the load current within the 0-4A range and observe the load regulation, efficiency, and other parameters. Output voltage ripple should be measured at J6 with a BNC cable terminated into 50Ω and an oscilloscope.

6. To observe increased light load efficiency place the Mode pin jumper (JP6) in the DCM position.

7. For optional load transient testing apply an adjustable positive pulse signal between IOSTEP CLK and GND pins. The pulse amplitude sets the load step current amplitude. The pulse width should be short (< 1ms) and pulse duty cycle should be low (< 15%) to limit the thermal stress on the load transient circuit. The load step current can be monitored with a BNC connected to J5 (50mV/A).

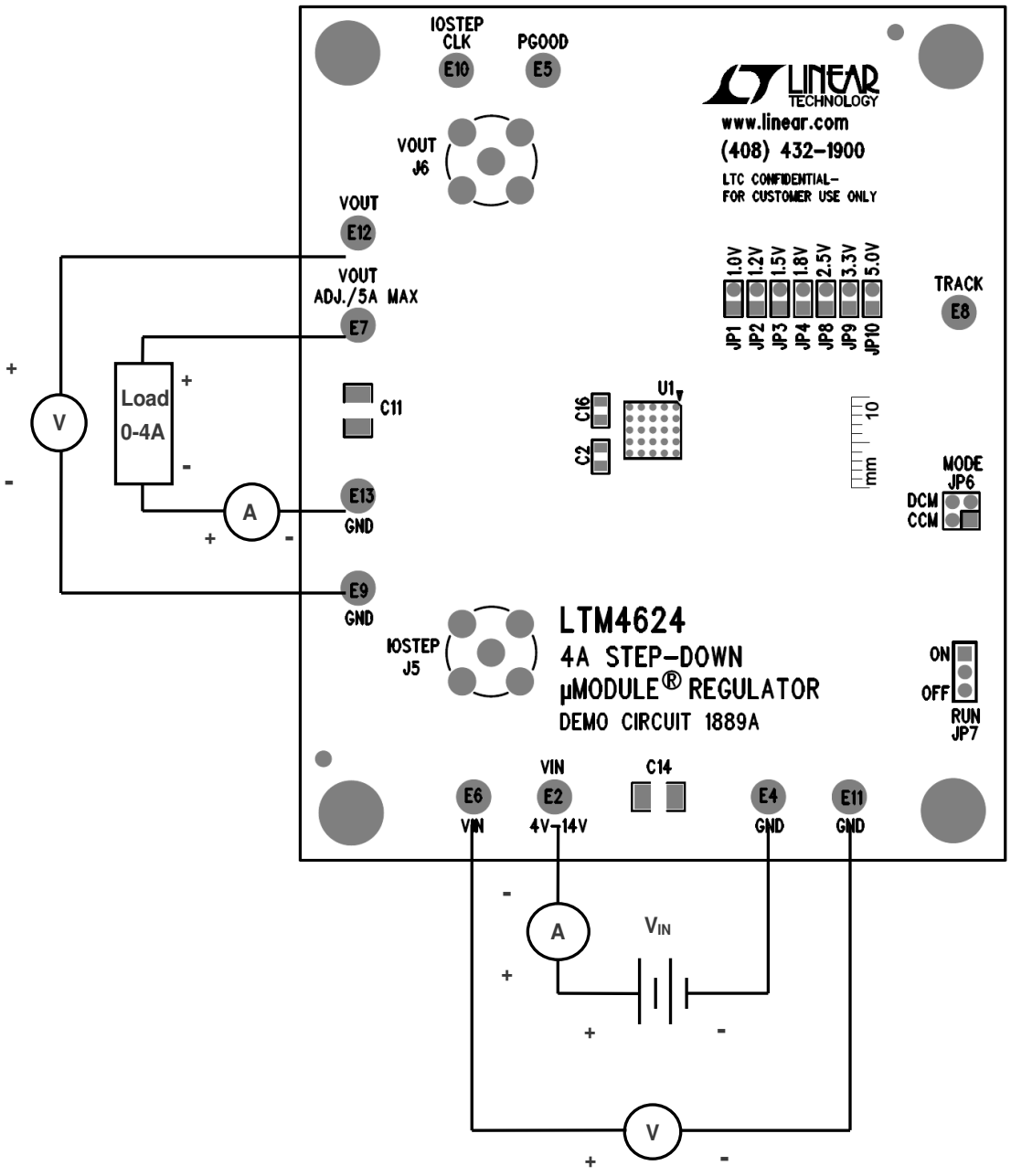
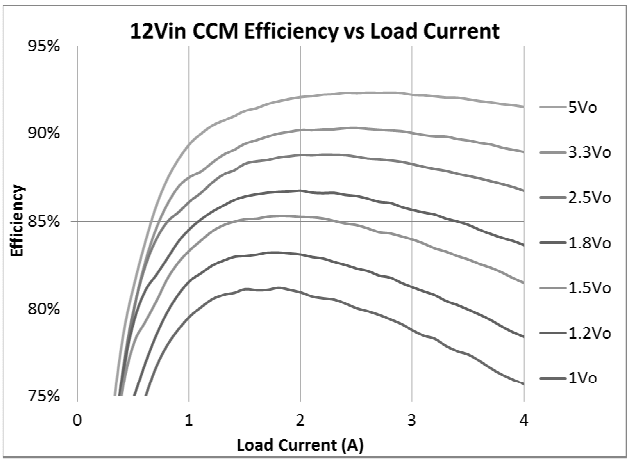


Figure 1. Test Setup



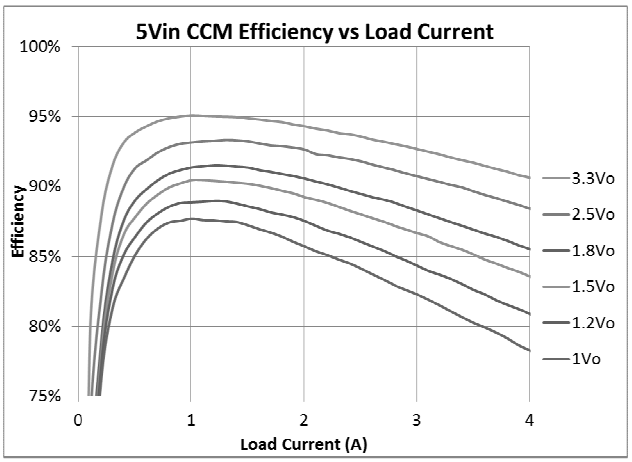
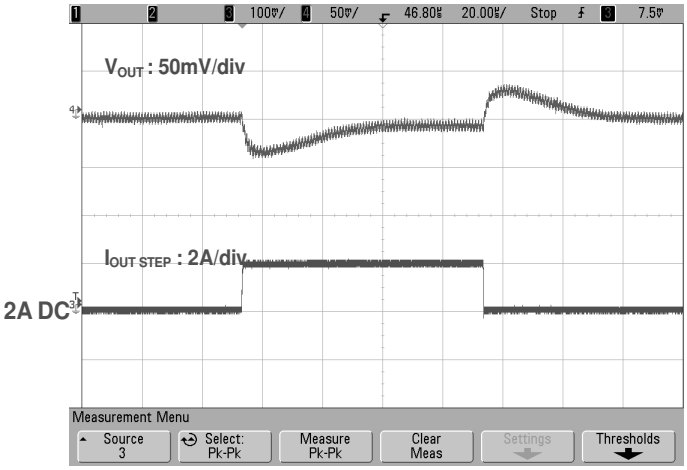
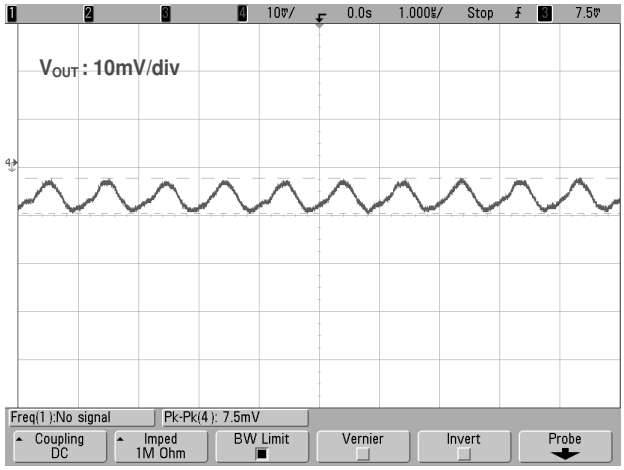


Figure 2. Measured Supply Efficiency at 12Vin & 5Vin



V_{in} (V)	V_{out}(V)	C_{out}
12	1.8	1x100uF/6.3V + 1x22uF/6.3V + 1x47uF/6.3V

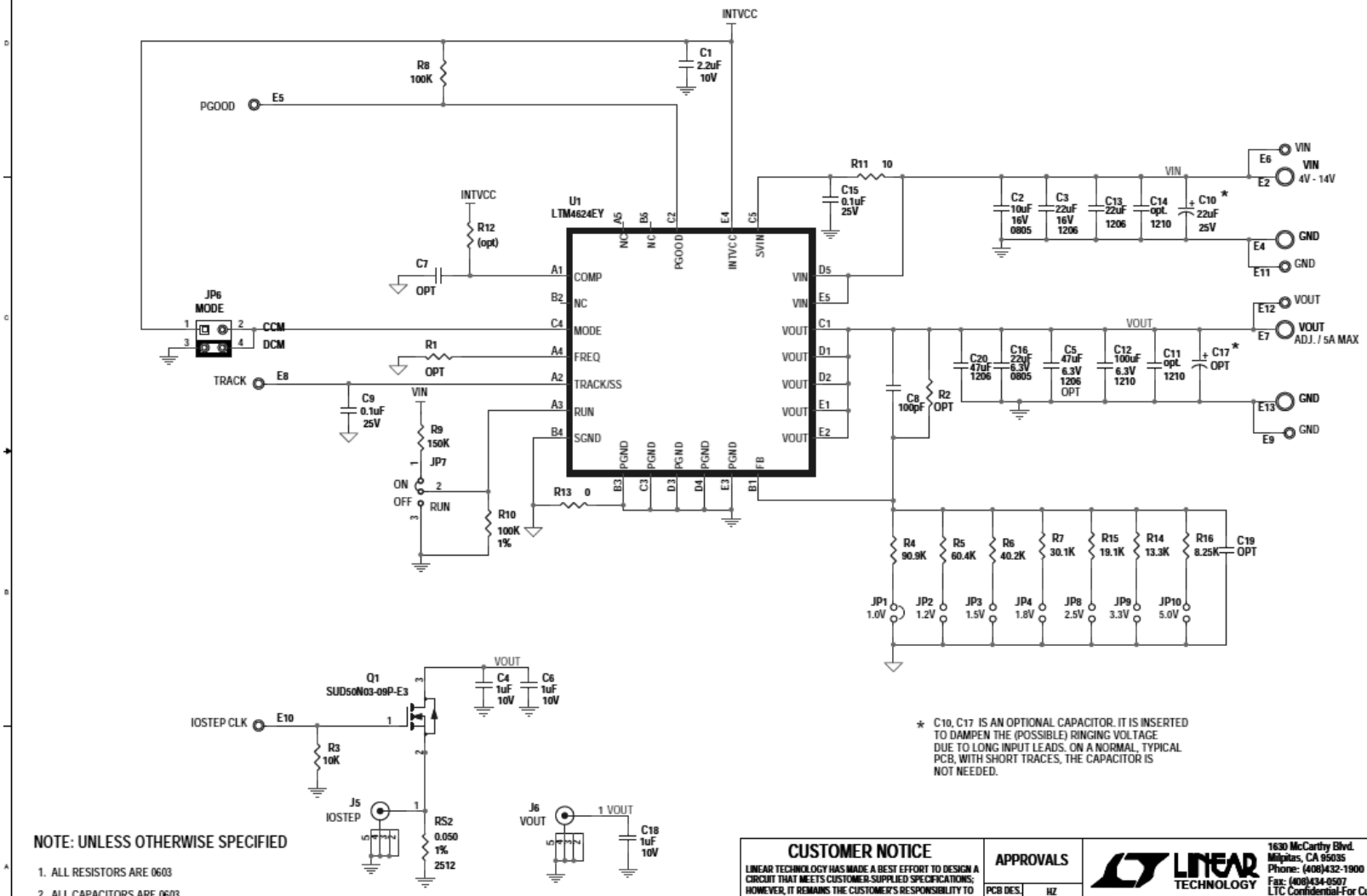
Figure 3. Measured load transient response (2A-4A load step)



V_{in} (V)	V_{out}(V)	I_{out} (A)	C_{out}
12	1.8	4	1x100uF/6.3V + 1x22uF/6.3V + 1x47uF/6.3V

Figure 4. Measured Vout Ripple

REVISION HISTORY				
ECO	REV	DESCRIPTION	APPROVED	DATE
–	2	PRODUCTION	SAM Y.	2-13-13



* C10, C17 IS AN OPTIONAL CAPACITOR. IT IS INSERTED TO DAMPEN THE (POSSIBLE) RINGING VOLTAGE DUE TO LONG INPUT LEADS. ON A NORMAL, TYPICAL PCB, WITH SHORT TRACES, THE CAPACITOR IS NOT NEEDED.

NOTE: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTORS ARE 0603
2. ALL CAPACITORS ARE 0603.

CUSTOMER NOTICE

LINEAR TECHNOLOGY HAS MADE A BEST EFFORT TO DESIGN A CIRCUIT THAT MEETS CUSTOMER-SUPPLIED SPECIFICATIONS; HOWEVER, IT REMAINS THE CUSTOMER'S RESPONSIBILITY TO VERIFY PROPER AND RELIABLE OPERATION IN THE ACTUAL APPLICATION. COMPONENT SUBSTITUTION AND PRINTED CIRCUIT BOARD LAYOUT MAY SIGNIFICANTLY AFFECT CIRCUIT PERFORMANCE OR RELIABILITY. CONTACT LINEAR TECHNOLOGY APPLICATIONS ENGINEERING FOR ASSISTANCE.

THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.

APPROVALS	
PCB DES.	HZ
APP ENG.	SAM Y.

SCALE = NONE

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TITLE: SCHEMATIC

4A STEP-DOWN µMODULE® REGULATOR

SIZE	IC NO.	REV.
N/A	LTM4624EY DEMO CIRCUIT 1889A	2

DATE: Thursday, March 21, 2013 SHEET 1 OF 1

Linear Technology Corporation
LTM4624EY

Bill Of Materials
Demo Bd. 1889A
4/9/2013

REQUIRED CIRCUIT COMPONENTS:				
Item	*Qty*	*Reference*	*Part Description*	*Manufacturer / Part #*
1	1	C1	CAP., X5R, 2.2uF, 10V, 10%, 0603	TAIYO YUDEN, LMK107BJ225KA-T
2	2	C3,C13	CAP., X5R, 22uF, 16V, 20%, 1206	TAIYO YUDEN, EMK316BJ226ML-T
3	1	C20	CAP., X5R, 47uF, 6.3V, 20%,1206	TAIYO YUDEN, JMK316BJ476ML
4	1	C12	CAP., X5R, 100uF, 6.3V, 20%,1210	TAIYO YUDEN, JMK325ABJ107MM-T
5	2	C9,C15	CAP., X5R, 0.1uF, 25V, 10%, 0603	AVX, 06033D104KAT
6	1	R4	RES., CHIP, 90.9K, 1/16W, 1%, 0603	VISHAY, CRCW060390K9FKEA
7	1	R11	RES., CHIP, 10, 1/16W, 1%, 0603	VISHAY, CRCW060310R0FKEA
8	1	U1	I.C., LTM4624EY, BGA	LINEAR TECH., LTM4624EY#PBF
ADDITIONAL DEMO BOARD CIRCUIT COMPONENTS:				
1	1	C10	CAP., X5R, 22uF, 25V, 10%, 7343	SANYO, 25TQC22MV
2	0	C11, C14	CAP., 1210, OPTION	OPTION
3	0	C5	CAP., 1206, OPTION	OPTION
4	3	C4,C6,C18	CAP., X5R, 1uF, 10V, 10%, 0603, OPTION	TAIYO YUDEN, LMK107BJ105KA-T
5	0	C7,C19	CAP., 0603, OPTION	OPTION
6	0	C17	CAP., 7343, OPTION	OPTION
7	1	C2	CAP., X5R, 10uF, 16V, 20%, 0805	TAIYO YUDEN, EMK212ABJ106KG-T
8	1	C16	CAP., X5R, 22uF, 6.3V, 20%, 0805	TAIYO YUDEN, JMK212ABJ226MD-T
9	1	C8	CAP., X7R, 100pF, 50V, 10%, 0603	AVX, 06033C101KAT2A
10	1	Q1	N-Channel 30-V MOSFET,TO-252	VISHAY, SUD50N03-09P-E3
11	1	RS2	RES., CHIP, 0.05ohm, 1W, 1%, 2512	VISHAY, WSL2512R0500FEB
12	1	R3	RES., CHIP, 10K, 1/16W, 1%, 0603	VISHAY, CRCW060310K0FKEA
13	7	R5, R6, R7, R14, R15, R16, R10	RES., CHIP, OPTION, 1/16W, 1%, 0603	OPTION
14	0	R1, R12, R2	RES., CHIP, OPTION, 1/16W, 1%, 0603	OPTION
15	1	R8	RES., CHIP, 100K, 1/16W, 1%, 0603	VISHAY, CRCW0603100KFKEA
16	1	R9	RES., CHIP, 150K, 1/16W, 1%, 0603	VISHAY, CRCW0603150KFKEA
17	1	R13	RES., CHIP, 0, 1/16W, 1%, 0603	VISHAY, CRCW06030000Z0EA
HARDWARE				
1	11	E2,E4-E13	TESTPOINT, TURRET, .095"	MILL-MAX, 2501-2-00-80-00-00-07-0
2	7	JP1-JP4,JP8-JP10	2MM SINGLE ROW HEADER, 2 PIN	SAMTEC, TMM102-02-L-S
3	1	JP6	2MM DOUBLE ROW HEADER, 2X2 PIN	SAMTEC, TMM-102-02-L-D
4	1	JP7	2MM SINGLE ROW HEADER, 3 PIN	SAMTEC, TMM-103-02-L-S
5	2	J5,J6	CONN, BNC, 5PINS	CONNEX, 112404
6	3	JP1,JP6,JP7	SHUNT,	SAMTEC, 2SN-BK-G
7	4	STAND OFF	STAND OFF, SNAP ON	KEYSTONE_8832