LTM4624EY
4A 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 5.5V. The LTM4624EY is a complete DC/DC point-of-load regulator in a thermally enhanced 6.25mm × 6.25mm × 5.01mm BGA package requiring only a couple capacitors and a resistor. Output voltage tracking is available through the TRACK/SS pin for supply rail sequencing. The LTM4624 data sheet must be read in conjunction with this demo manual prior to working on or modifying demo circuit 1889A.

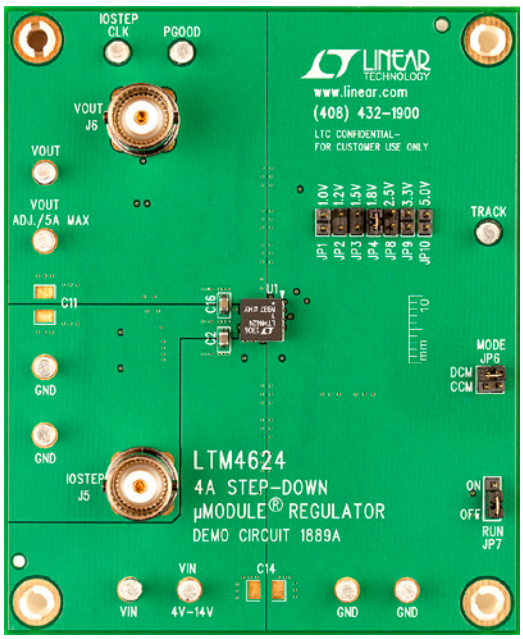
Design files for this circuit board are available at http://www.linear.com/demo

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

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	Derating is Necessary for Certain operating Conditions. See Data Sheet for Details	4A DC
Default Operating Frequency		1MHz
Efficiency	V_{IN} = 12V, V_{OUT} = 1.8V, I_{OUT} = 4A	83.6% See Figure 2

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 follow-ing positions for a typical 1.8Vout application:

JP7	JP6	JP4
RUN	**MODE**	**VOUT 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 0A to 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 while input power is removed.
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).

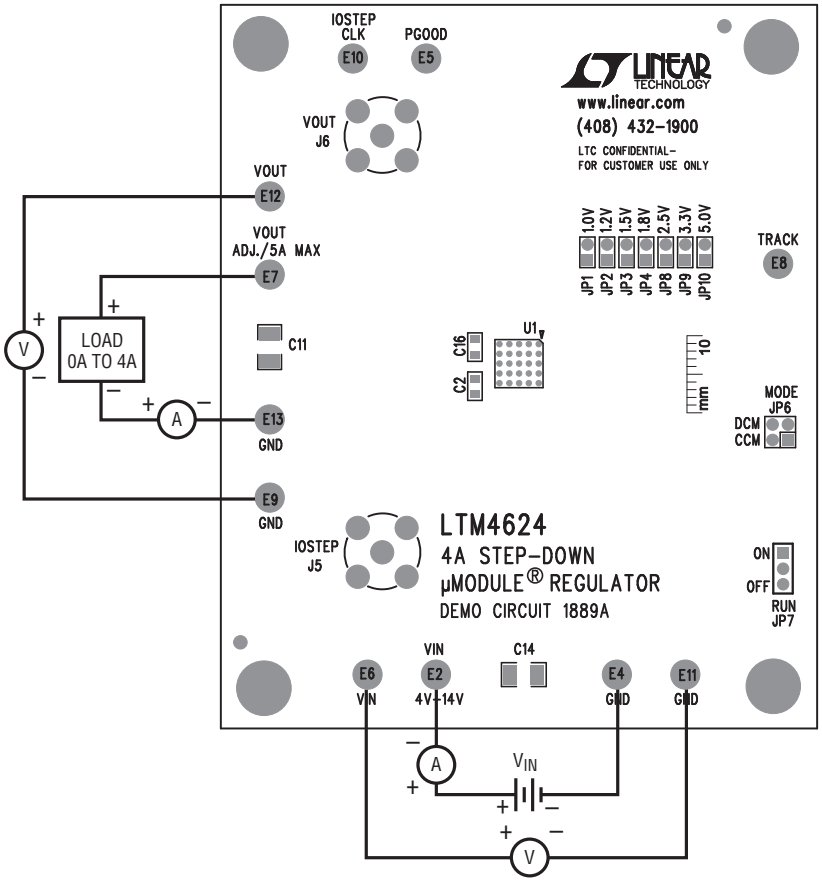


Figure 1. Test Setup

QUICK START PROCEDURE

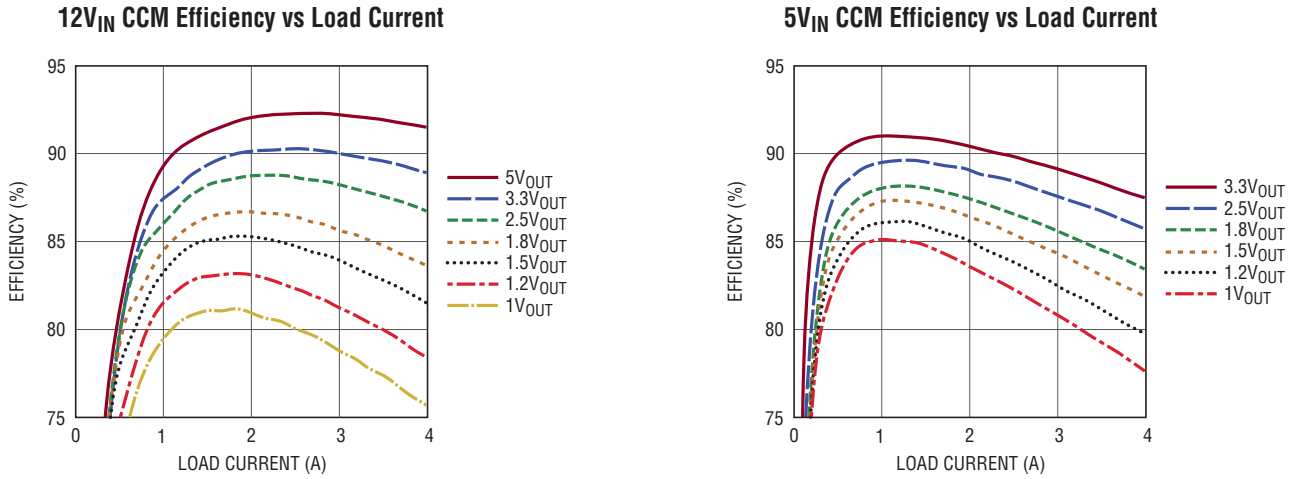
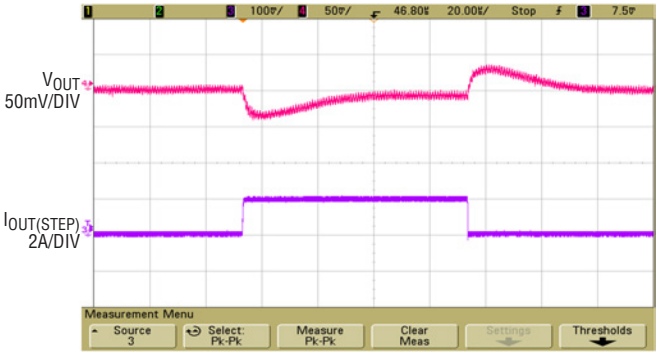
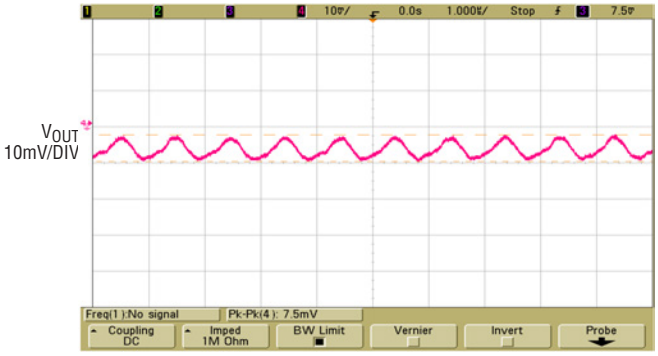


Figure 2. Measured Supply Efficiency at $12V_{IN}$ and $5V_{IN}$



V_{IN} (V)	V_{OUT} (V)	C_{OUT}
12	1.8	1 × 100µF/6.3V+ 1 × 22µF/6.3V+ 1 × 47µF/6.3V

Figure 3. Measured Load Transient Response (2A to 4A Load Step)



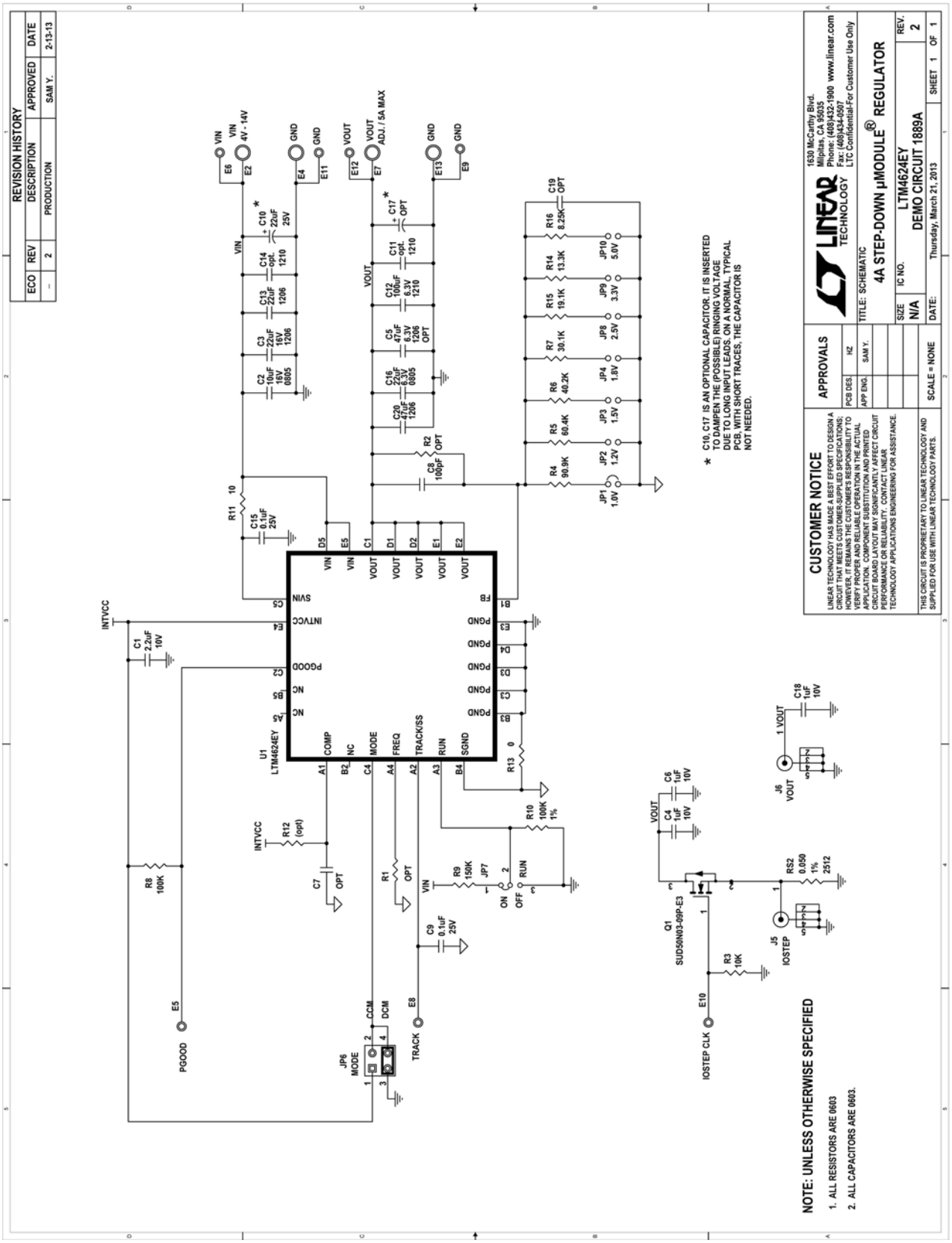
V_{IN} (V)	V_{OUT} (V)	i_{OUT} (A)	C_{OUT}
12	1.8	4	1 × 100µF/6.3V+ 1 × 22µF/6.3V+ 1 × 47µF/6.3V

Figure 4. Measured V_{OUT} Ripple (20MHz)

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	1	C1	CAP., X5R, 2.2µF, 10V, 10%, 0603	TAIYO YUDEN, LMK107BJ225KA-T
2	2	C3, C13	CAP., X5R, 22µF, 16V, 20%, 1206	TAIYO YUDEN, EMK316BJ226ML-T
3	1	C20	CAP., X5R, 47µF, 6.3V, 20%,1206	TAIYO YUDEN, JMK316BJ476ML
4	1	C12	CAP., X5R, 100µF, 6.3V, 20%,1210	TAIYO YUDEN, JMK325ABJ107MM-T
5	2	C9, C15	CAP., X5R, 0.1µF, 25V, 10%, 0603	AVX, 06033D104KAT
6	1	R4	RES., CHIP, 90.9k, 1/16W, 1%, 0603	VISHAY, CRCW060390K9FKEA
7	1	R11	RES., CHIP, 10Ω, 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, 22µF, 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, 1µF, 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, 10µF, 16V, 20%, 0805	TAIYO YUDEN, EMK212ABJ106KG-T
8	1	C16	CAP., X5R, 22µF, 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, 0.05Ω, 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, 0Ω, 1/16W, 1%, 0603	VISHAY, CRCW06030000Z0EA
Hardware				
1	11	E2, E4-E13	TESTPOINT, TURRET, 0.095"	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, 5 PINS	CONNEX, 112404
6	3	JP1, JP6, JP7	SHUNT	SAMTEC, 2SN-BK-G
7	4	STAND OFF	STAND OFF, SNAP ON	KEYSTONE_8832

SCHEMATIC DIAGRAM



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