LTM4630EY-1
Dual 18A or Single 36A µModule Regulator with ±0.8% DC and ±3% Transient Accuracy

DESCRIPTION

Demonstration circuit 2081A-B features the LTM®4630EY-1, the high efficiency, high density, dual 18A, switch mode step-down µModule® regulator with ±0.8% total DC output accuracy. The input voltage is from 4.5V to 15V. The output voltage is programmable from 0.6V to 1.8V. DC2081A-B is configured as dual-phase, single-output, which can deliver up to 36A maximum. With the help of external compensation, ±3% transient accuracy can be achieved with 25% load step. The board designs with minimum components to demonstrate this high efficiency, high density µModule. As explained in the data sheet, output current de-rating is necessary for certain V_{IN}, V_{OUT}, and thermal conditions. These features and the availability of the LTM4630EY-1 in a compact 16mm × 16mm × 5.01mm BGA package make it ideal for use in many high-density point-of-load applications. The LTM4630-1 data sheet must be read in conjunction with this demo manual for working on or modifying the demo circuit DC2081A-B.

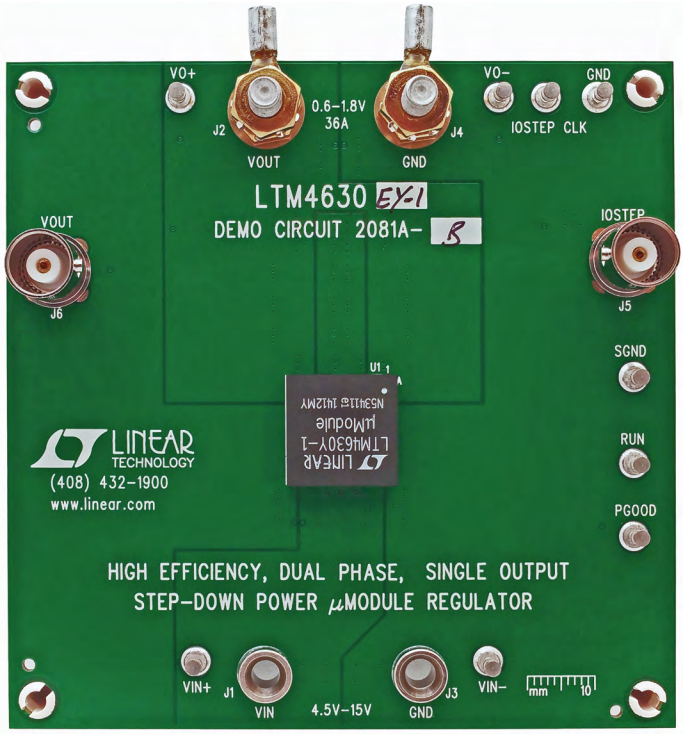
Design files for this circuit board are available at http://www.linear.com/demo/DC2081A-B

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

PARAMETER	CONDITIONS	VALUE
Input Voltage Range		4.5V ~ 15V
Output Voltage V_{OUT}	V_{IN} = 4.5 ~ 15V, I_{OUT} = 0 ~ 36A (for LTM4630-1A)	1.0V ± 0.8% (0.992V ~ 1.008V)
Maximum Continuous Output Current	De-rating is Necessary for Certain V_{IN}, V_{OUT} and Thermal Conditions, See Data Sheet for Detail	36A
Default Operating Frequency		400kHz
Efficiency	V_{IN} = 5V, V_{OUT} = 1.0V, I_{OUT} = 36A, f_{SW} = 400kHz	85.7%, See Figure 2
Load Transient	V_{IN} = 12V, V_{OUT} = 1.0V, I_{STEP} = 0 ~ 9A	< 56.3mV_{P-P}, See Figure 3

DC2081A-B BOARD PHOTO



QUICK START PROCEDURE

Demonstration circuit DC2081A-B is easy to set up to evaluate the performance of the LTM4630-1. Please refer to Figure 1 for proper measurement setup and follow the procedure below:

1. With power off, connect the input power supply, load and meters as shown in Figure 1. Preset the load to 0A and V_{IN} supply to 12V.
2. Turn on the power supply at the input. The output voltage should be 1.0V ± 0.8% (0.992V ~ 1.008V).
3. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, output voltage ripple, efficiency and other parameters. Output ripple can be measured at J6 with BNC cables.
4. (Optional) For optional load transient test, apply an adjustable pulse signal between "IOSTEP CLK" and "GND" test point. Pulse amplitude (3V ~ 3.5V) sets the load step current amplitude. The output transient current can be monitored at the BNC connector J5 (15mV/A). The pulse signal should have very small duty cycle (< 10%) to limit the thermal stress on the transient load circuit.

QUICK START PROCEDURE

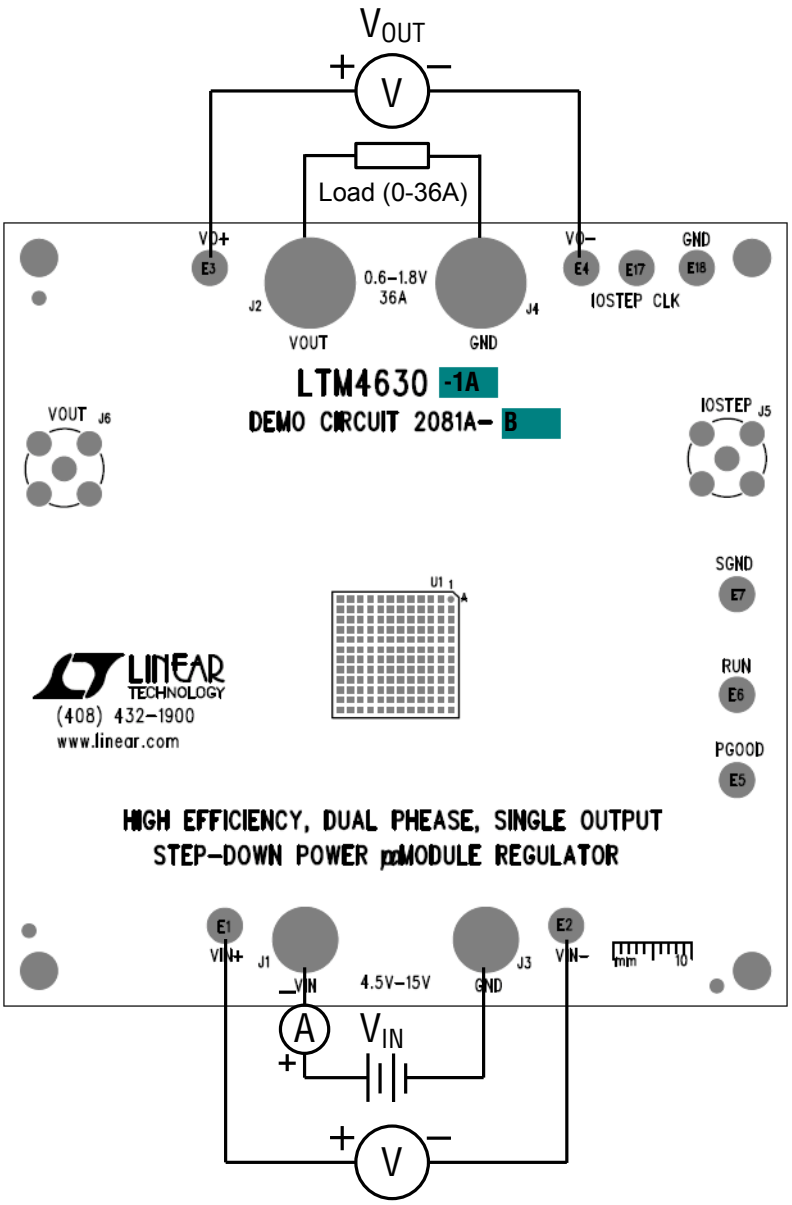


Figure 1. Test Setup of DC2081A-B

QUICK START PROCEDURE

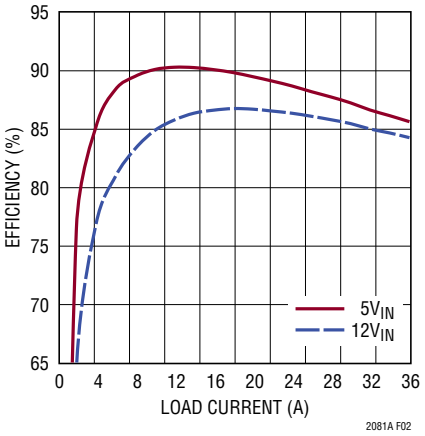


Figure 2. Measured LTM4630-1 Efficiency (V_{OUT} = 1.0V, f_{sw} = 400kHz)

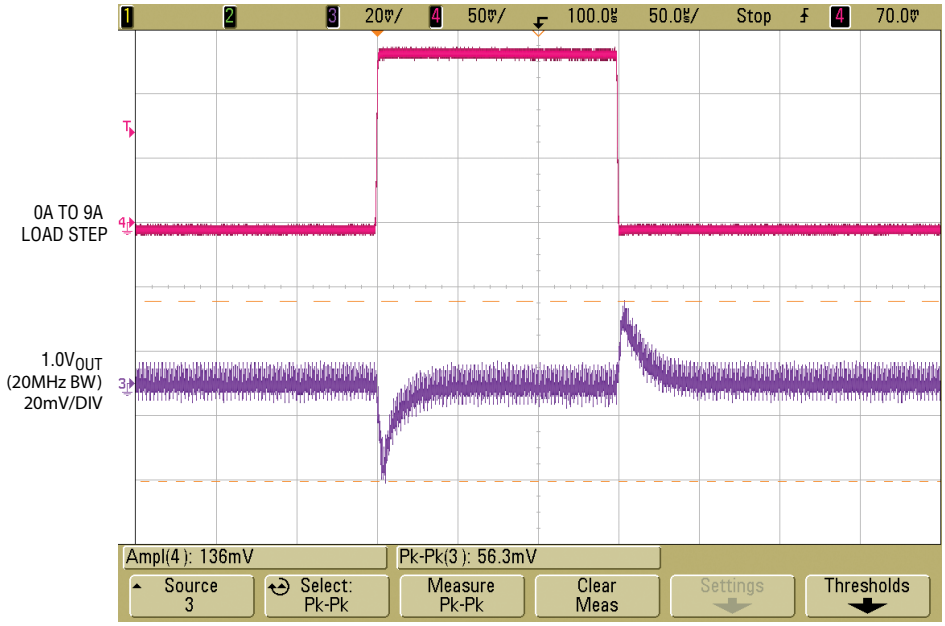


Figure 3. Measured LTM4630-1 0A – 9A Load Transient (V_{IN}=12V, V_{OUT} = 1.0V, f_{sw} = 400kHz)

QUICK START PROCEDURE

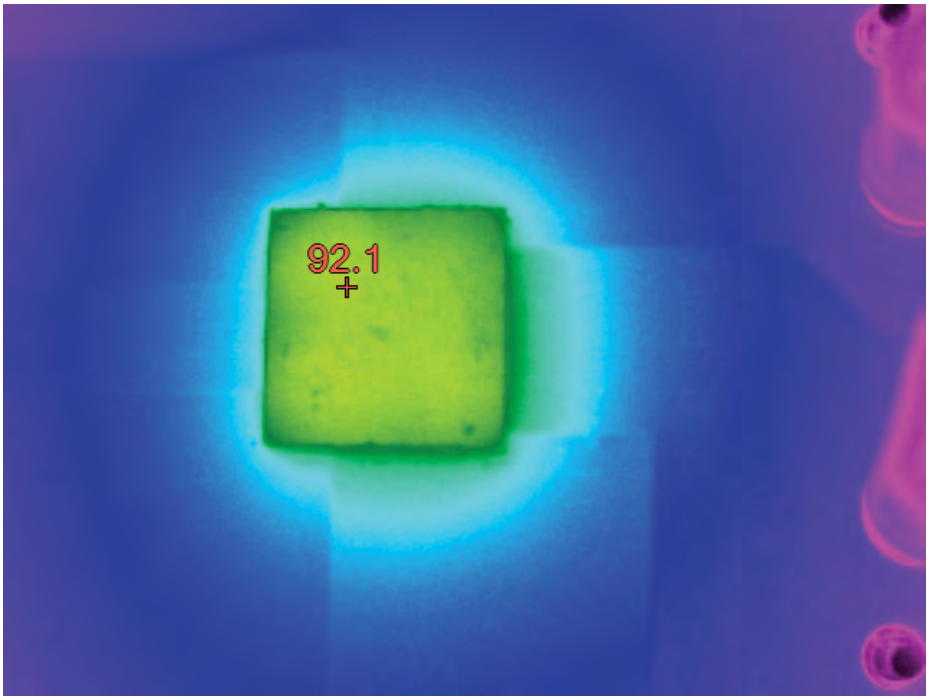
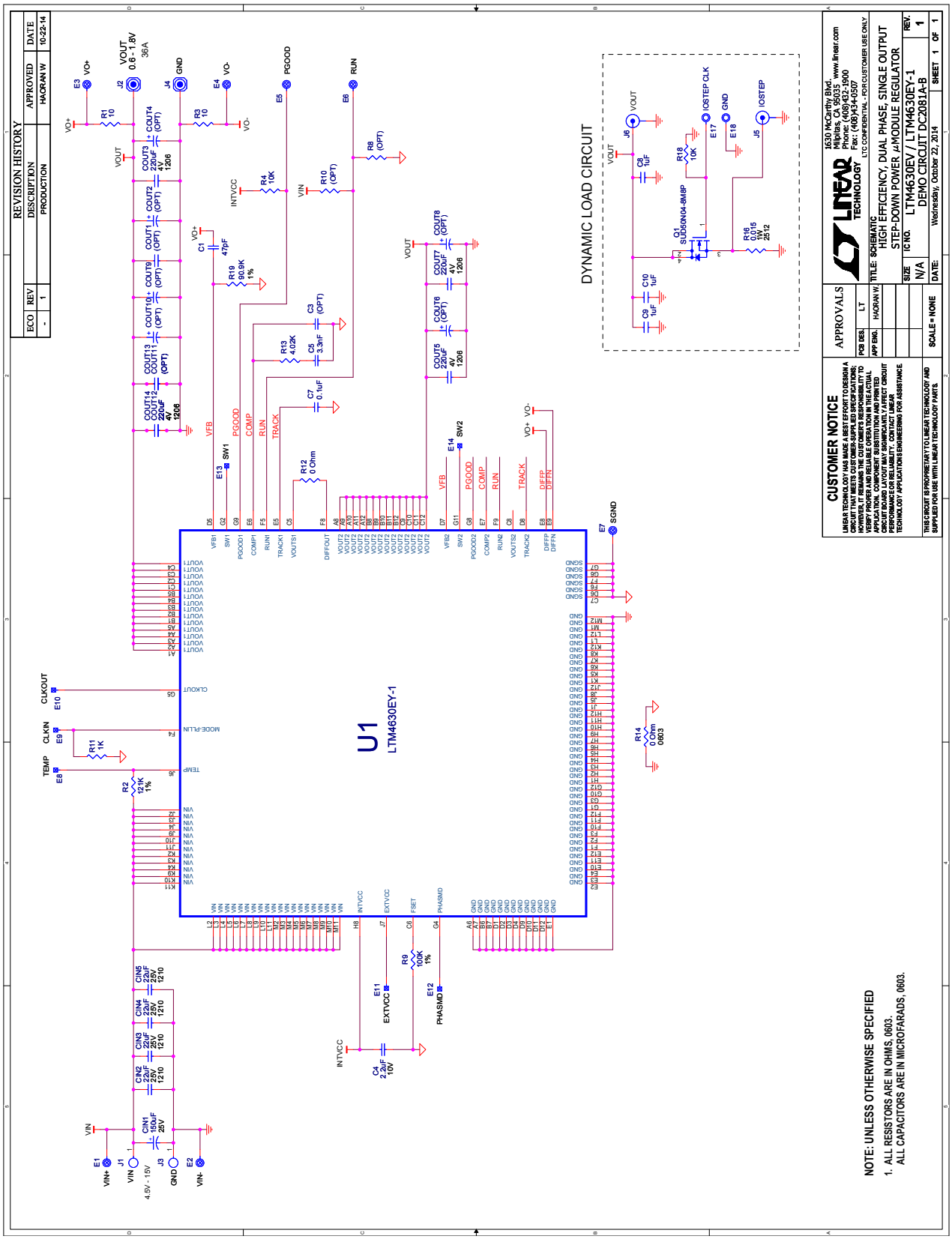


Figure 4. LTM4630-1 Thermal Capture (V_{IN}=12V, V_{OUT} = 1.0V/36A, f_{sw}=400kHz, T_A = 25°C, No Airflow and No Heat Sink)

DC2081A-B PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	CIN1	CAP., ALUM., 150µF, 25V, 20%	SUN ELECT., 25CE150AX
2	4	CIN2, CIN3, CIN4, CIN5	CAP., CER., 22µF, X5R, 25V, 10%, 1210	MURATA, GRM32ER61E226KE15L
3	5	COUT3, COUT5, COUT7, COUT12, COUT14	CAP., CER., 220µF, X5R, 4V, 20%, 1206	MURATA, GRM31CR60G227ME11L
4	1	C1	CAP., CER., X7R, 47pF, 25V, 10%, 0603	AVX, 06033C470KAT2A
5	1	C4	CAP., CER., 2.2µF, X5R, 10V, 10% 0603	MURATA, GRM188R61A225KE34D
6	1	C5	CAP., C0G, 3300pF, 50V, 5%, 0603	MURATA, GRM1885C1H332JA01D
7	1	C7	CAP., CER., 0.1µF, X5R, 25V, 10% 0603	AVX, 06033D104KAT2A
8	3	C8, C9, C10	CAP., CER., 1µF, X7R, 10V, 10%, 0603	AVX, 0603ZC105KAT2A
9	1	Q1	XSTR., SUD50N04-8M8P-4GE3 MOSFET	VISHAY, SUD50N04-8M8P-4GE3
10	2	R1, R3	RES., 10Ω, 1/10W, 1%, 0603	VISHAY, CRCW060310R0FKEA
11	1	R2	RES., 121k, 1/10W, 1%, 0603	VISHAY, CRCW0603121KFKEA
12	2	R4, R18	RES., 10k, 1/10W, 1%, 0603	VISHAY, CRCW060310K0FKEA
13	1	R9	RES., 100k, 1/10W, 1%, 0603	VISHAY, CRCW0603100KFKEA
14	1	R11	RES., 1k, 1/10W, 1%, 0603	VISHAY, CRCW06031K00FKEA
15	1	R13	RES., CHIP, 4.02k, 1%, 0603	VISHAY, CRCW06034K02FKEA
16	1	R16	RES., SENSE, 0.015Ω, 1W, 2512	VISHAY, WSL2512R0150FEA
17	1	R19	RES., 90.9k, 1/10W, 1%, 0603	VISHAY, CRCW060390K9FKEA
18	1	U1	LTM4630EY-1#PBF, 16X16X4.41-LGA	LINEAR TECH., LTM4630EY-1A#PBF
Additional Demo Board Circuit Components				
1	0	COUT2, COUT4, COUT6, COUT8	OPT., SANYO-D4D	OPT.
2	0	COUT9, COUT10	OPT., SANYO-D4D	OPT.
3	0	COUT1, COUT11, COUT13	OPT. 1210	OPT.
4	0	C3	OPT.	OPT.
5	0	R8, R10	OPT 0603	OPT
6	2	R12, R14	RES., 0Ω, 1/10W, 0603	VISHAY, CRCW06030000Z0EA
Hardware				
1	9	E1-E7, E17, E18	TEST POINT, TURRET, .094" MTG. HOLE	MILL-MAX, 2501-2-00-80-00-00-07-0
2	0	E8-E14 (OPT)	TESTPAD SMD	TESTPAD SMD
3	2	J1, J3	JACK, BANANA	KEYSTONE, 575-4
4	2	J2, J4	STUD, TESTPIN	PEM KFH-032-10
5	4	J2, J4 (X2)	NUT, BRASS 10-32	ANY #10-32
6	2	J2, J4	RING, LUG #10	KEYSTONE #10
7	2	J2, J4	WASHER, TIN PLATED BRASS	ANY #10
8	2	J5, J6	CONN., BNC, 5 PINS	CONNEX, 112404
9	4	(STAND-OFF)	STANDOFF, NYLON, SNAP-ON, .500" TALL	KEYSTONE, 8833

DC2081A-B SCHEMATIC DIAGRAM



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