

LTM4630EV

High Efficiency Dual 18A or Single 36A μ Module Regulator

DESCRIPTION

Demonstration circuit 2081A-A features the **LTM[®]4630EV**, the high efficiency, high density, dual 18A, switch mode step-down μ Module[®] regulator. The input voltage is from 4.5V to 15V. The output voltage is programmable from 0.6V to 1.8V. DC2081A-A is configured as dual-phase, single-output, which can deliver up to 36A maximum. The board designs with minimum components to demonstrate this high efficiency, high density μ Module. 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 LTM4630EV in a compact 16mm \times 16mm \times 4.41mm LGA package make it ideal for use in many high-density point-of-load applications. The LTM4630 data sheet must be read in conjunction with this demo manual for working on or modifying the demo circuit DC2081A-A.

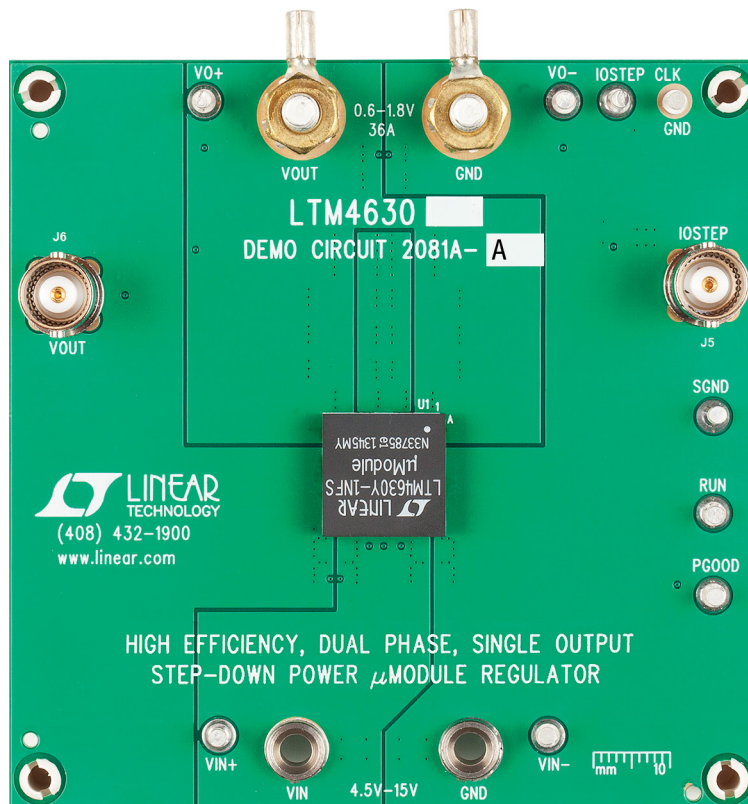
Design files for this circuit board are available at <http://www.linear.com/demo/DC2081A-A>

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PERFORMANCE SUMMARY Specifications are at $T_A = 25^\circ\text{C}$

PARAMETER	CONDITIONS	VALUE
Input Voltage Range		4.5V ~ 15V
Output Voltage V_{OUT}	$V_{IN} = 4.5 \sim 15\text{V}$, $I_{OUT} = 0 \sim 36\text{A}$	$1.0\text{V} \pm 1.5\%$ (0.985V ~ 1.015V)
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	$V_{IN} = 5\text{V}$, $V_{OUT} = 1.0\text{V}$, $I_{OUT} = 36\text{A}$, $f_{SW} = 400\text{kHz}$	85.7%, See Figure 2
Load Transient	$V_{IN} = 12\text{V}$, $V_{OUT} = 1.0\text{V}$, $I_{STEP} = 0 \sim 9\text{A}$	< 62.5mV _{p-p} , See Figure 3

DC2081A-A BOARD PHOTO



QUICK START PROCEDURE

Demonstration circuit DC2081A-A is easy to set up to evaluate the performance of the LTM4630EV. 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 $1.0V \pm 1.5\%$ (0.985V ~ 1.015V).
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

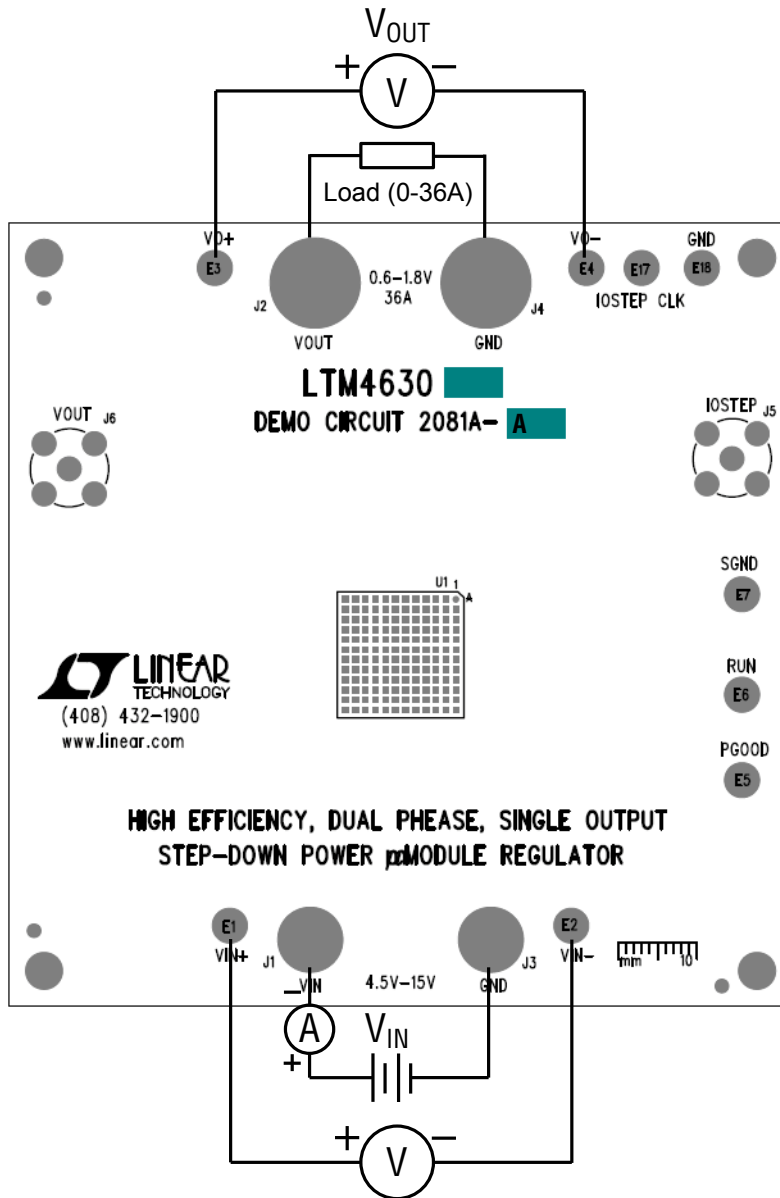


Figure 1. Test Setup of DC2081A-A

QUICK START PROCEDURE

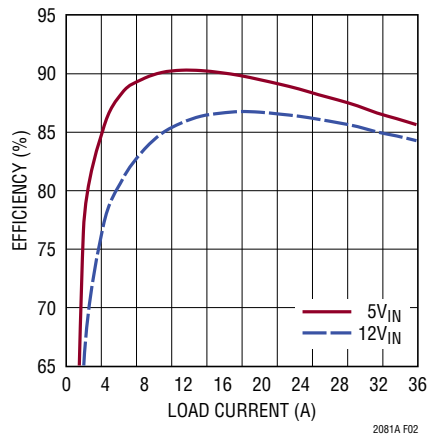


Figure 2. Measured LTM4630 Efficiency ($V_{OUT} = 1.0V$, $f_{SW} = 400kHz$)



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

QUICK START PROCEDURE

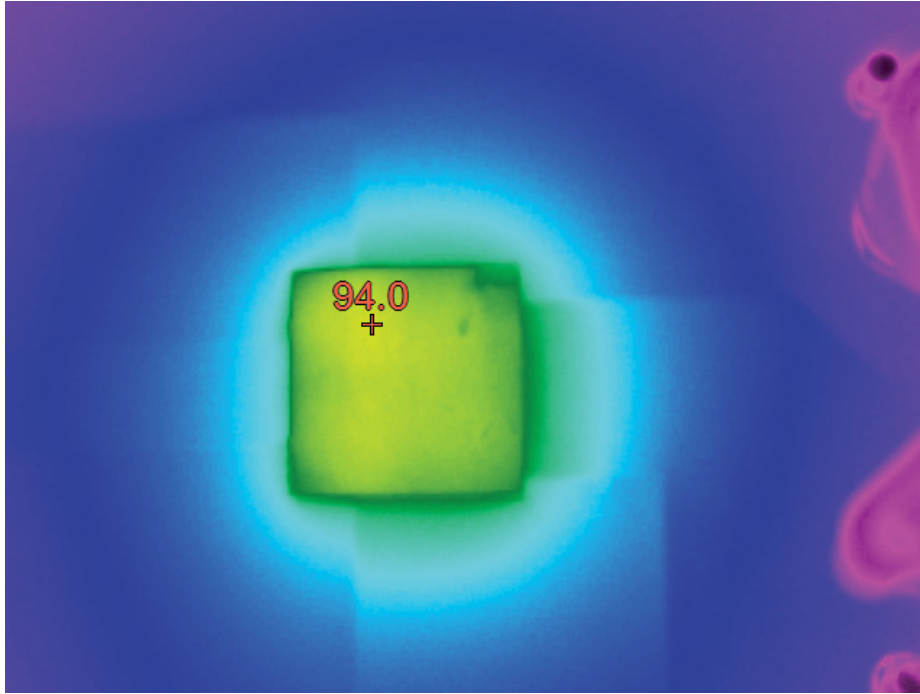


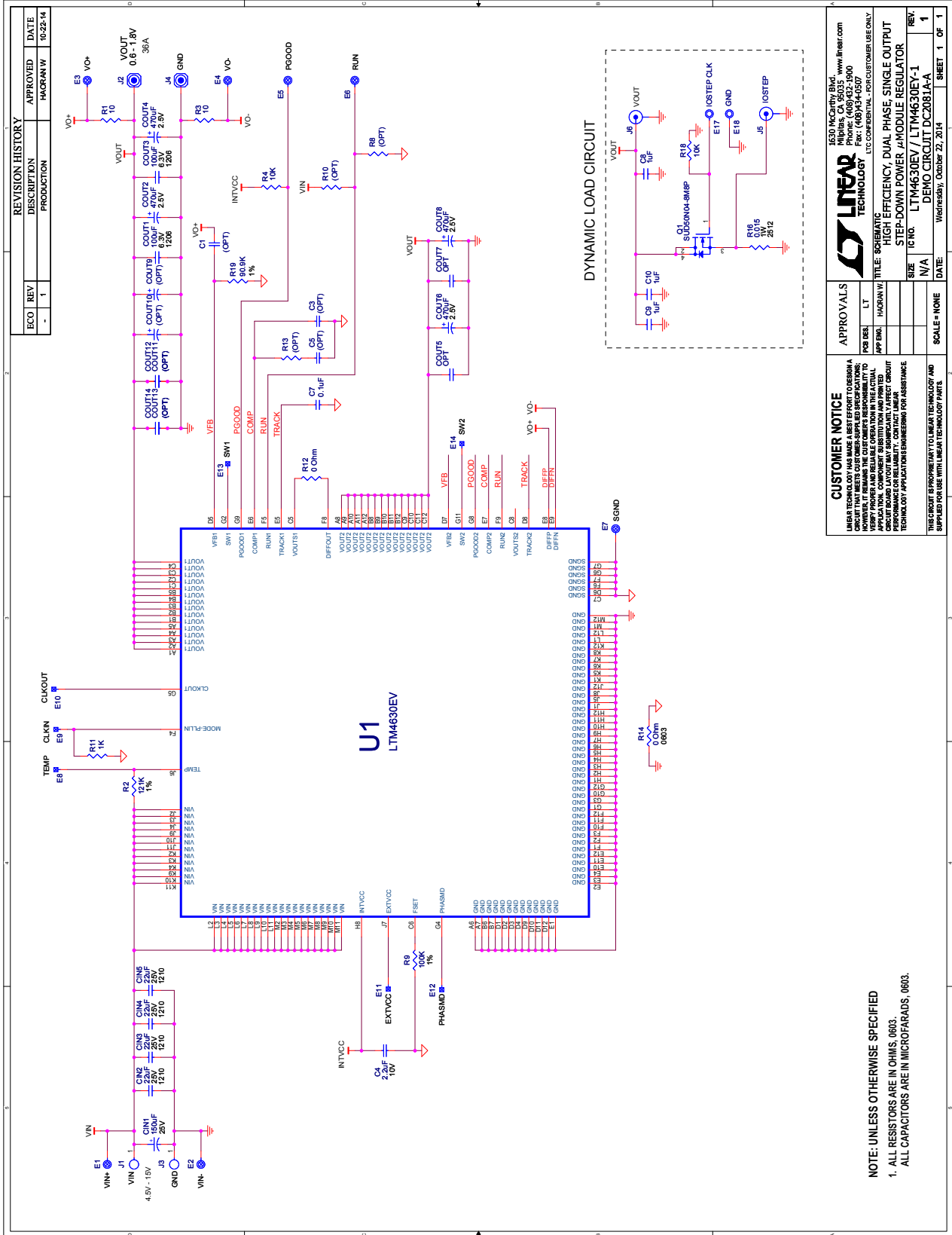
Figure 4. LTM4630 Thermal Capture ($V_{IN}=12V$, $V_{OUT} = 1.0V/36A$, $f_{sw}=400kHz$, $T_A = 25^\circ C$, No Airflow and No Heat Sink)

DEMO MANUAL DC2081A-A

DC2081A-A 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	2	COUT1, COUT3	CAP., CER., 100µF, X5R, 6.3V, 20%, 1206	AVX, 12066D107MAT2A
4	4	COUT2, COUT4, COUT6, COUT8	CAP., POSCAP, 470µF, 2.5V, F8, D4D	PANASONIC, 2R5TPF470M6L
5	1	C4	CAP., CER., 2.2µF, X5R, 10V, 10% 0603	MURATA, GRM188R61A225KE34D
6	1	C7	CAP., CER., 0.1µF, X5R, 25V, 10% 0603	AVX, 06033D104KAT2A
7	3	C8, C9, C10	CAP., CER., 1µF, X7R, 10V, 10%, 0603	AVX, 0603ZC105KAT2A
8	1	Q1	XSTR., SUD50N04-8M8P-4GE3 MOSFET	VISHAY, SUD50N04-8M8P-4GE3
9	2	R1, R3	RES., 10Ω, 1/10W, 1%, 0603	VISHAY, CRCW060310R0FKEA
10	1	R2	RES., 121k, 1/10W, 1%, 0603	VISHAY, CRCW0603121KFKEA
11	2	R4, R18	RES., 10k, 1/10W, 1%, 0603	VISHAY, CRCW060310K0FKEA
12	1	R9	RES., 100k, 1/10W, 1%, 0603	VISHAY, CRCW0603100KFKEA
13	1	R11	RES., 1k, 1/10W, 1%, 0603	VISHAY, CRCW06031K00FKEA
14	1	R16	RES., SENSE, 0.015Ω, 1W, 2512	VISHAY, WSL2512R0150FEA
15	1	R19	RES., 90.9k, 1/10W, 1%, 0603	VISHAY, CRCW060390K9FKEA
16	1	U1	I.C., LTM4630EV#PBF, 16X16X4.41-LGA	LINEAR TECH., LTM4630EV#PBF
Additional Demo Board Circuit Components				
1	0	COUT9, COUT10	OPT., SANYO-D4D	OPT.
2	0	COUT5, COUT7, COUT11, COUT12, COUT13, COUT14	OPT. 1210	OPT.
3	0	C1, C3, C5	OPT. 0603	OPT.
4	0	R8, R10, R13	OPT 0603	OPT
5	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-A SCHEMATIC DIAGRAM



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DEMO MANUAL DC2081A-A

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