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# LTM4620A

## Dual 13A or Single 26A μModule Regulator

### DESCRIPTION

Demonstration circuit 2268A-B is a high efficiency, high density, dual 13A, switch mode step-down power supply on a compact 1.5' × 1.2' PCB. It features the **LTM4620A** μModule regulator. The input voltage is from 5.5V to 16V. The output voltage is programmable from 0.6V to 5V. DC2268A-B can deliver up to 13A maximum in each channel. As explained in the data sheet, output current derating is necessary for certain  $V_{IN}$ ,  $V_{OUT}$ , and thermal conditions. The board operates in continuous conduction mode in heavy load conditions. For high efficiency at low load currents, the resistor jumper (R1/R2) selects pulse-skipping mode for noise sensitive applications or Burst Mode® in less noise sensitive applications. Two outputs can be connected in parallel for a single 26A output solution with optional jumper resistors. The board allows the user to program how its output ramps up and down through

the TRACK/SS pin. Remote output voltage sensing is available for improved output voltage regulation at the load point. An optional input inductor L1 reduces the EMI noise for noise sensitive applications. DC2268A can be easily inserted to an edge connector for testing and debugging. These features and the availability of the LTM4620A in a compact 16mm × 16mm × 5.01mm BGA package make it ideal for use in many high-density point-of-load regulation applications. The LTM4620A data sheet must be read in conjunction with this demo manual for working on or modifying the demo circuit DC2268A-B.

**Design files for this circuit board are available at <http://www.linear.com/demo/DC2268A-B>**

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### BOARD PHOTO



Figure 1. LTM4620A/DC2268A-B Demo Board

# DEMO MANUAL DC2268A-B

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

PARAMETER	CONDITIONS	VALUE
Input Voltage Range		5.5V ~ 16V
Output Voltage $V_{OUT1}$	$V_{IN} = 4.5V \sim 15V, I_{OUT1} = 0A \sim 13A$	$3.3V \pm 1.5\%$
Output Voltage $V_{OUT2}$	$V_{IN} = 4.5V \sim 15V, I_{OUT2} = 0A \sim 13A$	$1.5V \pm 1.5\%$
Per-Channel Maximum Continuous Output Current	Derating Is Necessary for Certain $V_{IN}$ , $V_{OUT}$ and Thermal Conditions.	13A
Default Operating Frequency		750kHz
Resistor Programmable Frequency Range		250kHz to 780kHz
External Clock Sync. Frequency Range		400kHz to 780kHz
Efficiency of Channel 1	$V_{IN} = 12V, V_{OUT2} = 3.3V, I_{OUT2} = 13A, f_{SW} = 750kHz$	91.8% See Figure 3
Efficiency of Channel 2	$V_{IN} = 12V, V_{OUT1} = 5V, I_{OUT1} = 13A, f_{SW} = 750kHz$	93.9% See Figure 4
Load Transient of Channel 1	$V_{IN} = 12V, V_{OUT2} = 3.3V, I_{STEP} = 6.5A \sim 13A$	See Figure 5
Load Transient of Channel 2	$V_{IN} = 12V, V_{OUT1} = 5V, I_{STEP} = 6.5A \sim 13A$	See Figure 6

## QUICK START PROCEDURE

Demonstration circuit DC2268A-B is easy to set up to evaluate the performance of the LTM4620A. It can be easily inserted to an edge connector (SAMTEC MEC2-20-01-L-DV--TR) for testing and debugging. Please refer to Figure 2 for proper measurement setup and follow the procedure below:

1. Pull up the RUN1 (J1 pin 22) and RUN2 (J1 pin 24) between 1.4V to 5V or leave them floating.
2. 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.
3. Turn on the power supply at the input. The output voltage in channel 1 should be  $3.3V \pm 1.5\%$  ( $3.2505V \sim 3.3495V$ ) and the output voltage in channel 2 should be  $5V \pm 1.5\%$  ( $4.925V \sim 5.075V$ ),
4. 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 should be measured at Co3 and Co4.
5. (Optional) LTM4620A can be synchronized to an external clock signal. Remove R2 and apply a clock signal (0~5V, square wave) to MODE-PLLIN pin.
6. (Optional) LTM4620A can be configured for a 2-phase single output at up to 36A on DC2268A-B. Install  $0\Omega$  resistors on R26, R27, R28, R29, R32, and remove R14, R18, R30. Output voltage is set by R7 based on equation  $V_{OUT} = 0.6V(1 + 60.4k/R7)$ .

## QUICK START PROCEDURE

Table 2. DC2268A Demo Circuit

DEMO BOARD NUMBER	μMODULE REGULATOR ON THE BOARD	OUTPUT CURRENT
DC2268A-A	LTM4620	13A, 13A
DC2268A-B	LTM4620A	13A, 13A
DC2268A-C	LTM4628	8A, 8A
DC2268A-D	LTM4630	18A, 18A
DC2268A-E	LTM4630-1	18A, 18A
DC2268A-F	LTM4630A	18A, 18A
DC2268A-G	LTM4631	10A, 10A

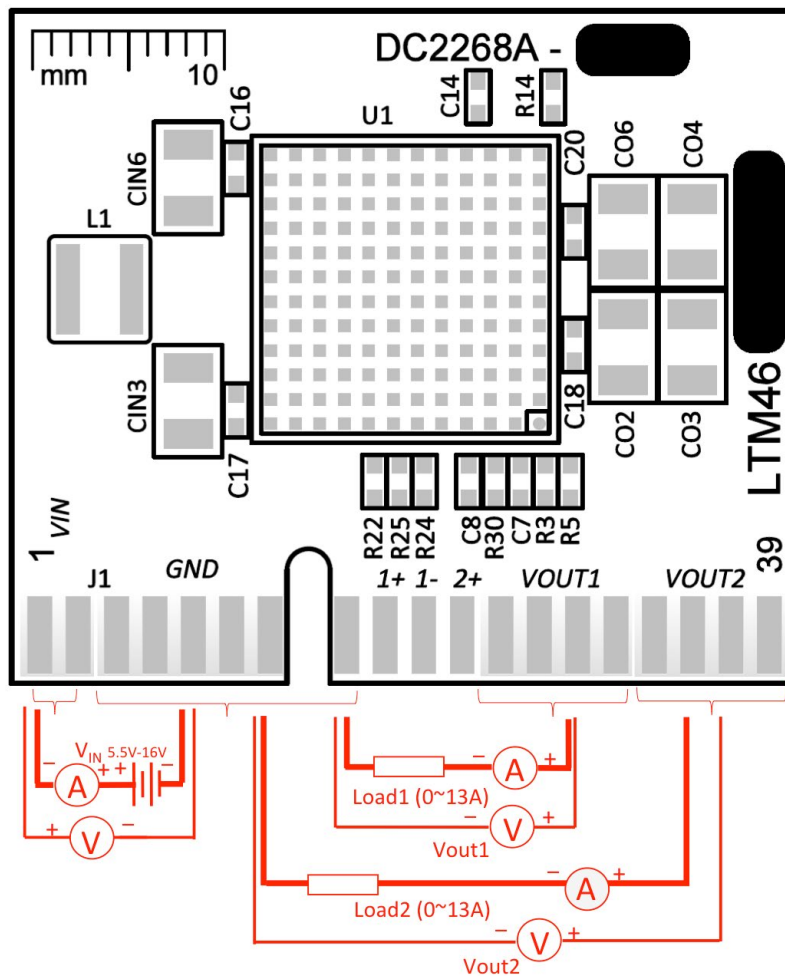


Figure 2. Test Setup of DC2268A-B

## QUICK START PROCEDURE

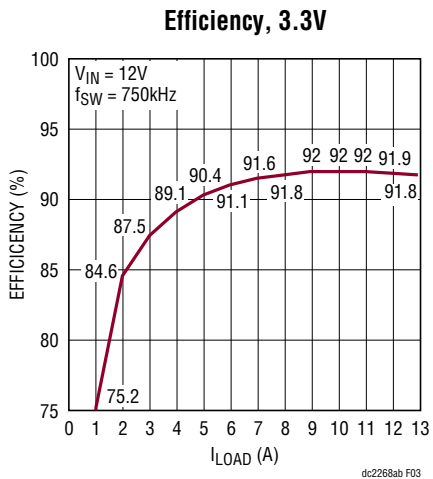


Figure 3. Measured Efficiency on Channel 1 ( $V_{OUT1} = 3.3V$ ,  $f_{SW} = 750kHz$ , Channel 2 Disabled)

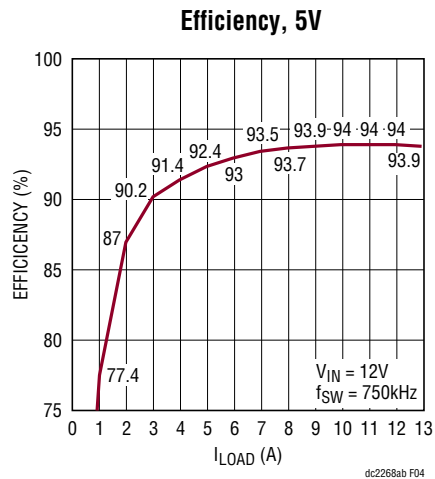


Figure 4. Measured Efficiency on Channel 2 ( $V_{OUT2} = 5V$ ,  $f_{SW} = 750kHz$ , Channel 1 Disabled)

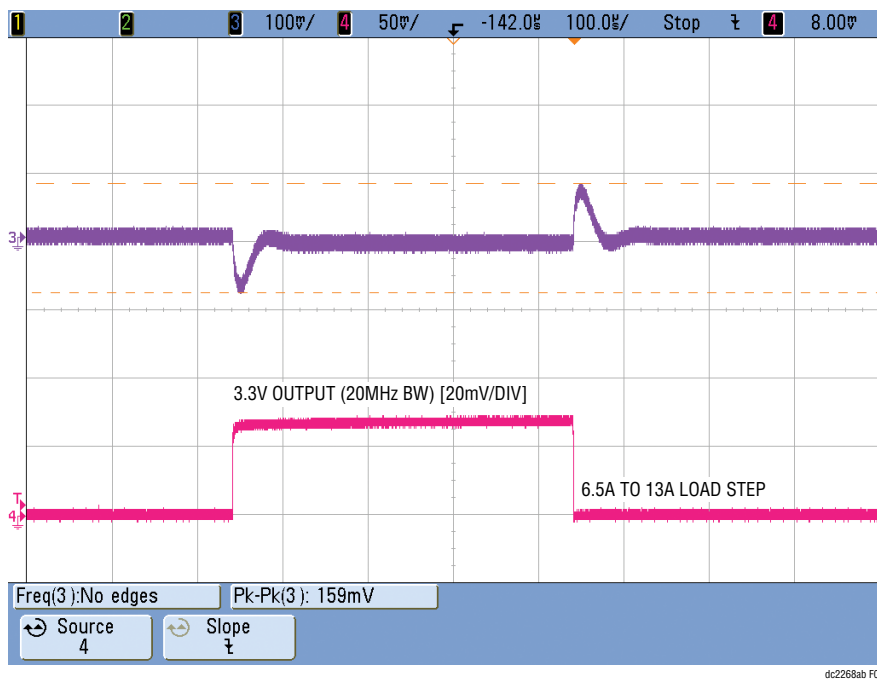


Figure 5. Measured Channel 6.5A to 13A Load Transient ( $V_{IN} = 12V$ ,  $V_{OUT1} = 3.3V$ )

**QUICK START PROCEDURE**



Figure 6. Measured Channel 2 6.5A to 13A Load Transient ( $V_{IN} = 12V$ ,  $V_{OUT2} = 5V$ )

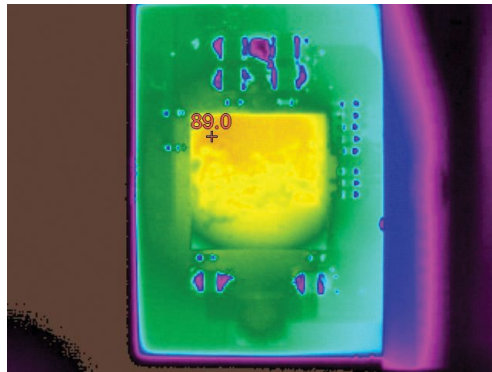
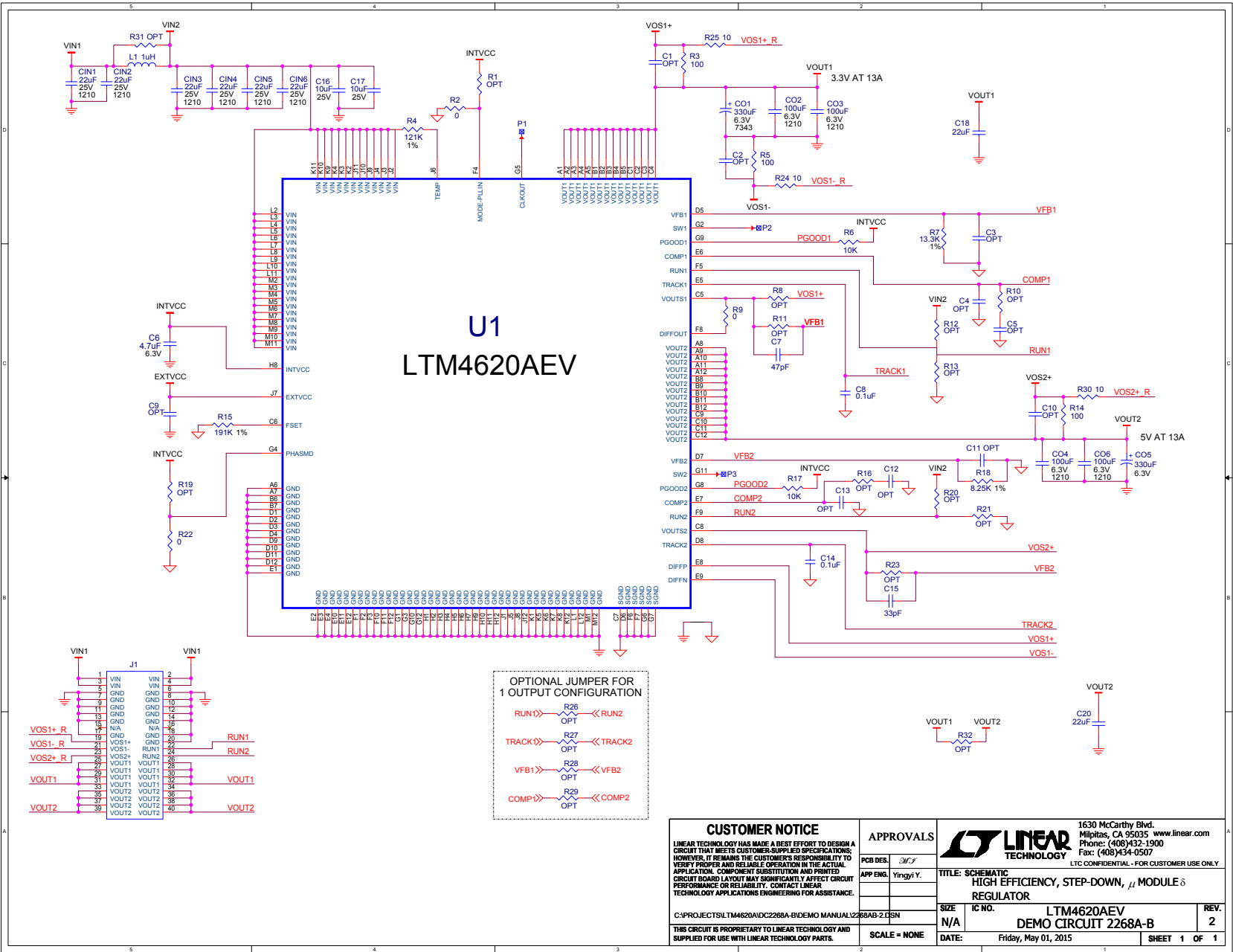


Figure 7. Thermal Performance at  $V_{IN} = 12V$ ,  $V_{OUT1} = 3.3V/8A$ ,  $V_{OUT2} = 5V/8A$ ,  $f_{sw} = 750kHz$ ,  $T_A = 23^{\circ}C$ , 200LFM Airflow

# DEMO MANUAL DC2268A-B

## PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
<b>Required Circuit Components</b>				
1	6	CIN1, CIN2, CIN3, CIN4, CIN5, CIN6	CAP, 1210 22µF 10% 25V X5R	AVX 12103D226KAT2A
2	2	CO1, CO5	CAP, 7343 330µF 20% 6.3V POSCAP	PANASONIC 6TPF330M9L
3	4	CO2, CO3, CO4, CO6	CAP, 1210 100µF 10% 6.3V X5R	AVX 12106D107KAT2A
4	1	C6	CAP, 0603 4.7µF 20% 6.3V X5R	AVX 06036D475MAT2A
5	1	C7	CAP, 0603 47pF 5% 50V COG / NPO	AVX 06035A470JAT2A
6	2	C8, C14	CAP, 0603 0.1µF 10% 25V X7R	AVX 06033C104KAT2A
7	1	C15	CAP, 0603 33pF 5% 50V COG	AVX 06035A330JAT2A
8	2	C16, C17	CAP, 0603 10µF 20% 25V X5R	TDK C1608X5R1E106M080AC
9	2	C18, C20	CAP, 0603 22µF 20% 6.3V X5R	TDK C1608X5R0J226M080AC
10	1	L1	IND, 1.0µH	COILCRAFT XAL5030-102MEC
11	2	R2, R22	RES, 0603 0Ω JUMPER	VISHAY CRCW06030000Z0EA
12	3	R3, R5, R14	RES, 0603 100Ω 5% 0.1W	VISHAY CRCW0603100RJNEA
13	1	R4	RES, 0603 121k 1% 0.1W	VISHAY CRCW0603121KFKEA
14	2	R6, R17	RES, 0603 10k 5% 0.1W	VISHAY CRCW060310K0JNEA
15	1	R7	RES, 0603 13.3k 1% 0.1W	VISHAY CRCW060313K3FKEA
16	1	R9	RES, 0603 0Ω	VISHAY CRCW06030000Z0EA
17	1	R15	RES, 0603 191k 1% 0.1W	VISHAY CRCW0603191KFKEA
18	1	R18	RES, 0603 8.25k 1% 0.1W	VISHAY CRCW06038K25FKEA
19	3	R24, R25, R30	RES, 0603 10Ω 5% 0.1W	VISHAY CRCW060310R0JNEA
20	1	U1	IC, VOLTAGE REGULATOR LGA	LINEAR TECH. LTM4620AEV#PBF
<b>Additional Demo Board Circuit Components</b>				
1	0	C1, C2, C3, C4, C5, C9, C10, C11, C12, C13	CAP, 0603 OPTION	OPTION
2	0	R1, R8, R10, R11, R12, R13, R16, R19, R20, R21, R23, R26, R27, R28, R29	RES, 0603 OPTION	OPTION
3	0	R31, R32	RES, 2512 OPTION	OPTION
<b>Hardware: For Demo Board Only</b>				
1	1	J1	CONN., CARD EDGE 1.6mm	SAMTEC MEC2-20-01-L-DV--TR



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IC NO. LTM4620AEV  
DEMO CIRCUIT 2268A-B



# DEMO MANUAL DC2268A-B

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