LINEAR TECHNOLOGY

LTM4628
Dual 8A or Single 16A
µModule Regulator

DESCRIPTION

Demonstration circuit 2268A-C is a high efficiency, high density, dual 8A, switch mode step-down power supply on a compact 1.5″ × 1.2″ PCB. It features the LTM®4628 µModule® regulator. The input voltage is from 5.5V to 16V. The output voltage is programmable from 0.6V to 5.5V. DC2268A-C can deliver up to 8A 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® operation in less noise sensitive applications. Two outputs can be connected in parallel for a single 16A 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 LTM4628 in a compact 15mm x 15mm x 4.41mm LGA package make it ideal for use in many high-density point-of-load regulation applications. The LTM4628 data sheet must be read in conjunction with this demo manual for working on or modifying the demo circuit DC2268A-C.

Design files for this circuit board are available at http://www.linear.com/demo/DC2268A-C

BOARD PHOTO
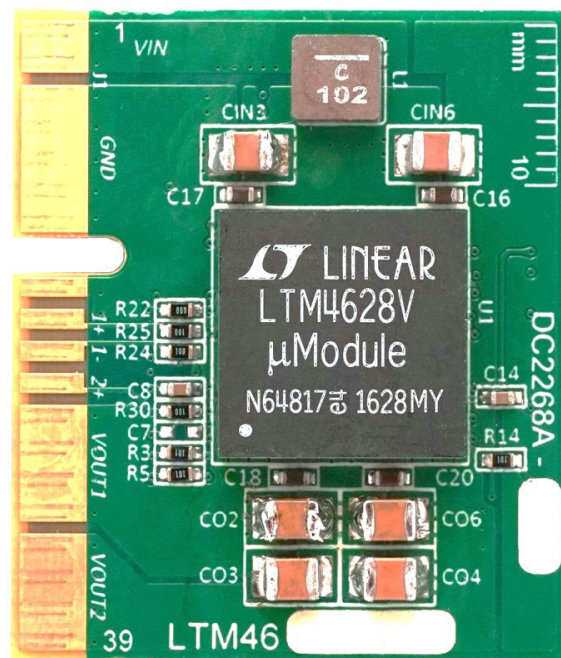
Figure 1. LTM4628/DC2268A-C Demo Board

PERFORMANCE SUMMARY Specifications are at T_A = 25°C

PARAMETER	CONDITIONS	VALUE
Input Voltage Range		5.5V to ~16V
Output Voltage V_{OUT1}	V_{IN} = 4.5V to ~16V, I_{OUT1} = 0V to ~8A	1.0V ± 1.5%
Output Voltage V_{OUT2}	V_{IN} = 4.5V to ~16V, I_{OUT2} = 0V to ~8A	1.5V ± 1.5%
Per-channel Maximum Continuous Output Current	Derating is necessary for certain V_{IN}, V_{OUT} and thermal conditions.	8A (per channel)
Default Operating Frequency		500kHz
Resistor Programmable Frequency Range		250kHz to 780kHz
External Clock Sync. Frequency Range		400kHz to 780kHz
Efficiency of Channel 1	V_{IN} = 12V, V_{OUT2} = 1.0V, I_{OUT2} = 8A, f_{SW} = 500kHz	80.7% See Figure 3
Efficiency of Channel 2	V_{IN} = 12V, V_{OUT1} = 1.5V, I_{OUT1} = 8A, f_{SW} = 500kHz	84.6% See Figure 4
Load Transient of Channel 1	V_{IN} = 12V, V_{OUT2} = 1.0V, I_{STEP} = 4A to 6A	V_{OPP} = 56mV See Figure 5
Load Transient of Channel 2	V_{IN} = 12V, V_{OUT1} = 1.5V, I_{STEP} = 4A to 6A	V_{OPP} = 67mV See Figure 6

QUICK START PROCEDURE

Demonstration circuit DC2268A-C is easy to set up to evaluate the performance of the LTM4628. 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 and 5V or leave them floating.

2. With power off, connect the input power supply, load and meters as shown in Figure 2. 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 1.0V ± 1.5% (0.985V be ~1.015V) and the output voltage in channel 2 should be 1.5V ±1.5% (1.4775V to ~1.5225V),

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 C_{O3} and C_{O4}.

5. (Optional) LTM4628 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) LTM4628 can be configured for a 2-phase single output at up to 16A on DC2268A-C. Install 0Ω resistors on R26, R27, R28, R29, R32, and remove R14, R18 and R30. Output voltage is set by R7 based on the equation: V_{OUT} = 0.6V (1 + 60.4K/R7).

QUICK START PROCEDURE

Table 1. 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
DC2268A-H	LTM4650-1	25A, 25A
DC2268A-I	LTM4650A-1	25A, 25A

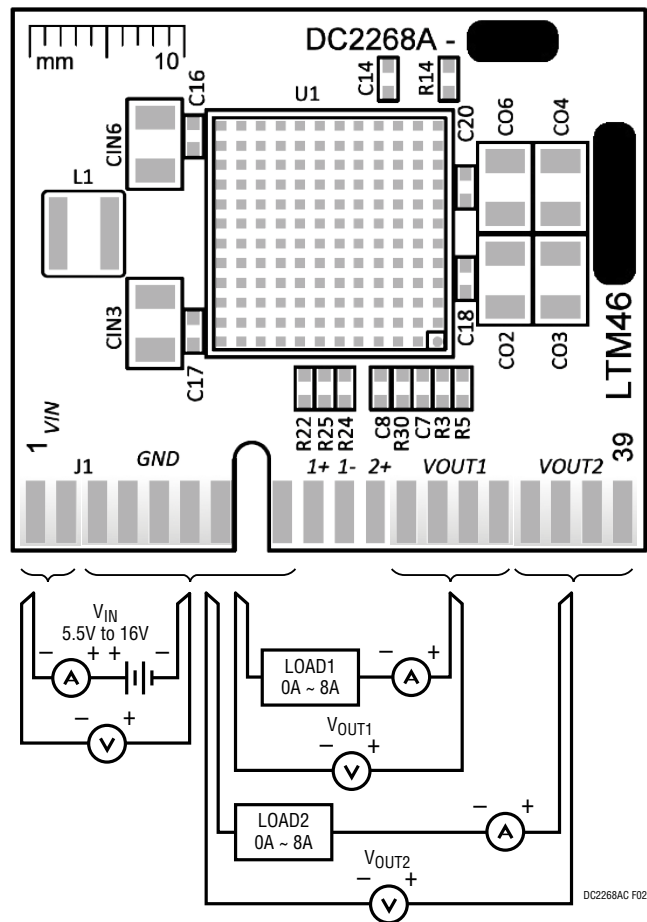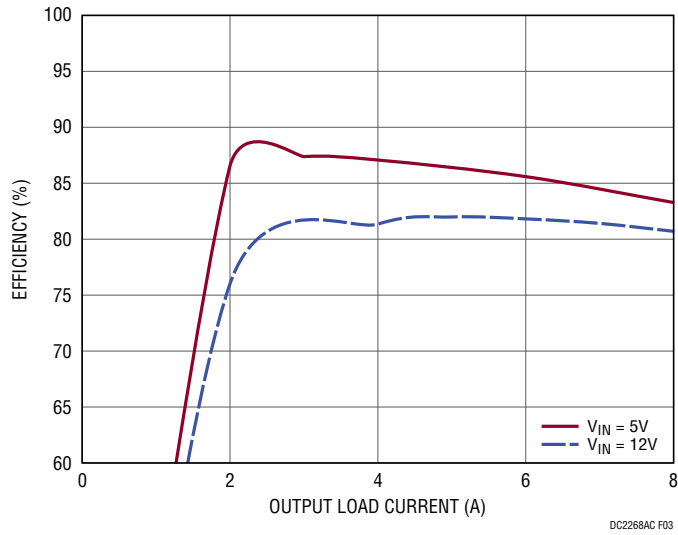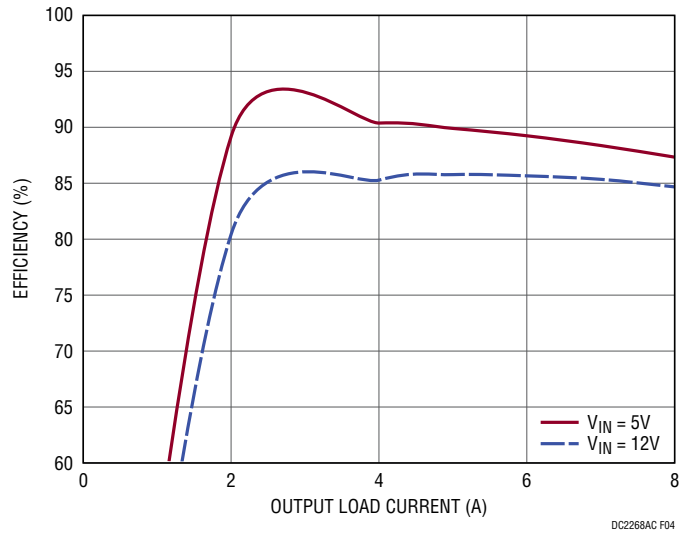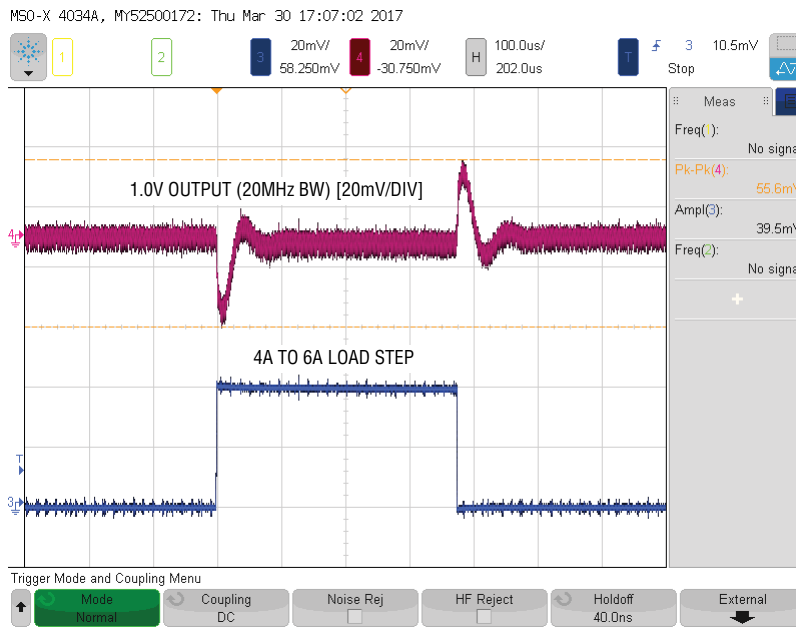**Figure 2. Test Setup of DC2268A-C**

QUICK START PROCEDURE

Figure 3. Measured Efficiency on Channel 1
(V_{OUT1} = 1.0V, f_{SW} = 500kHz, Channel 2 Disabled)

Figure 4. Measured Efficiency on Channel 2
(V_{OUT2} = 1.5V, f_{SW} = 500kHz, Channel 1 Disabled)

Figure 5. Measured Channel 1, 4A to 6A Load Transient (V_{IN} = 12V, V_{OUT1} = 1.0V)
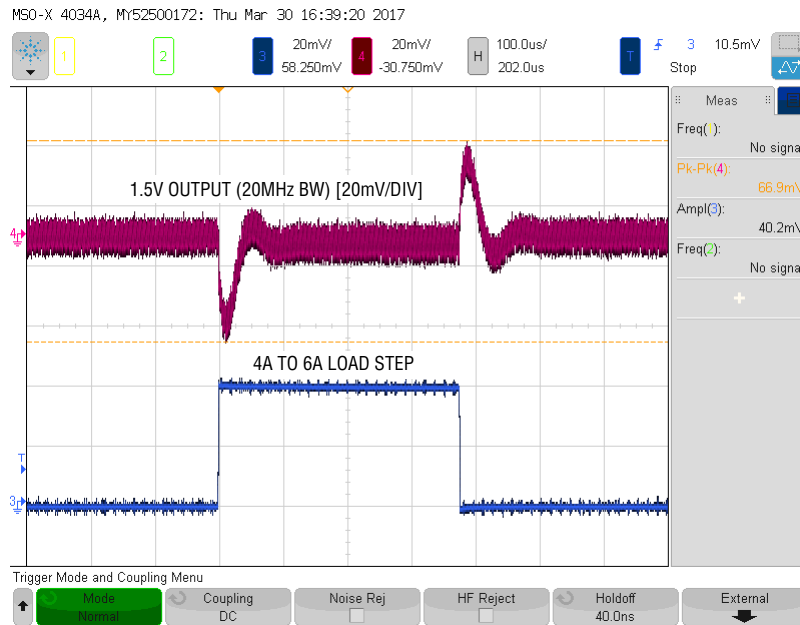
QUICK START PROCEDURE

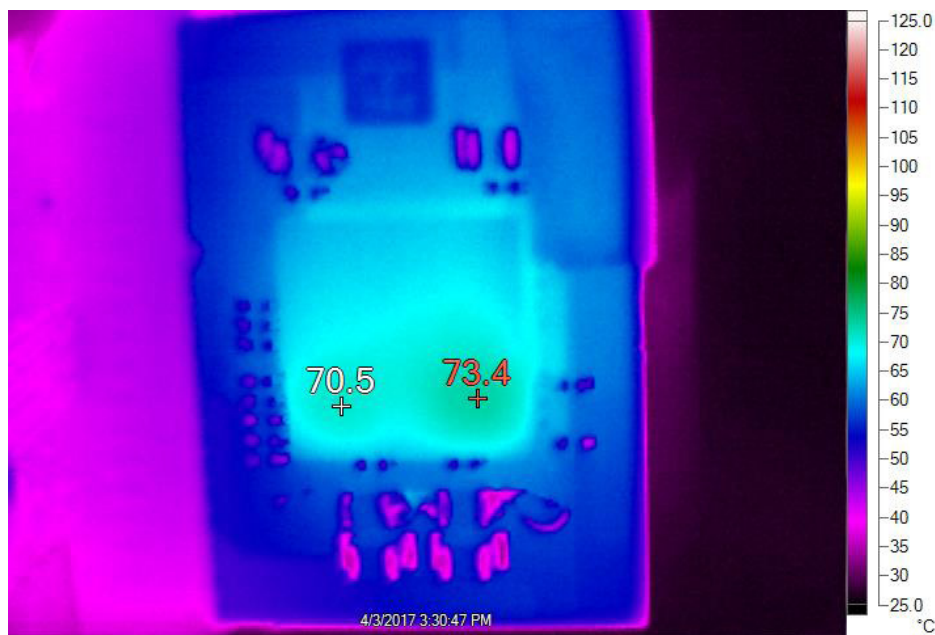Figure 6. Measured Channel 2, 4A to 6A Load Transient (V_{IN} = 12V, V_{OUT2} = 1.5V)

Figure 7. Thermal Performance at V_{IN} = 12V, V_{OUT1} = 1.0V/8A, V_{OUT2} = 1.5V/8A, f_{SW} = 500kHz, T_A = 23°C, 200LFM Airflow

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
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 C0G / NP0	AVX, 06035A470JAT2A
6	2	C8, C14	CAP, 0603 0.1µF 10% 25V X7R	AVX, 06033C104KAT2A
7	1	C15	CAP, 0603 33pF 5% 50V C0G	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	COILCCRAFT, 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., LTM4628EV#PBF
Additional Demo Board Circuit Components				
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
Hardware: For Demo Board Only				
1	1	J1	CONN., CARD EDGE 1.6mm	SAMTEC MEC2-20-01-L-DV--TR

SCHEMATIC DIAGRAM
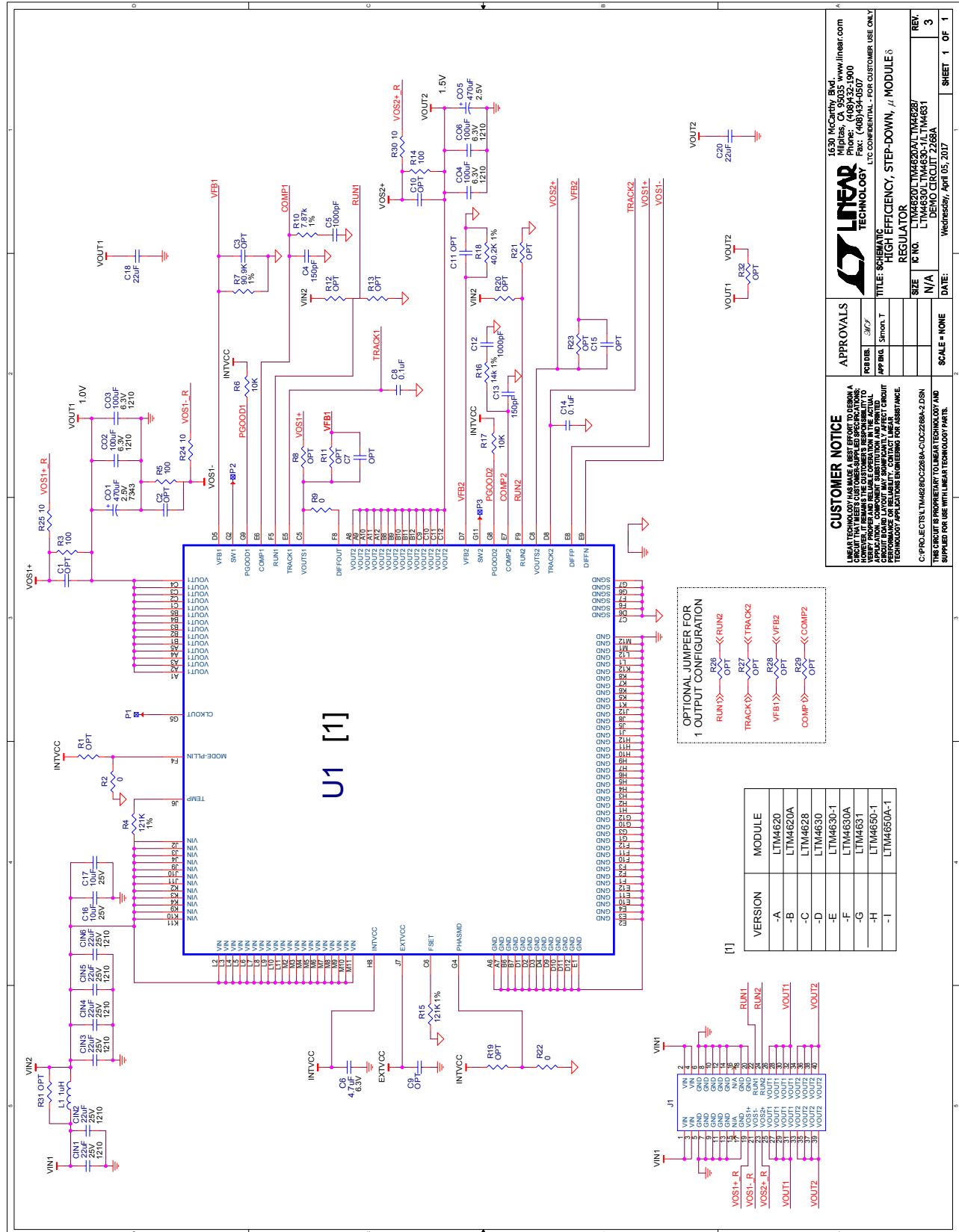
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This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact a LTC application engineer.

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