

# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT DC1043A-A HIGH DENSITY POWER MODULE

## LTM4601EV


### DESCRIPTION

Demonstration circuit DC1043A-A features the LTM<sup>®</sup>4601EV and LTM4601-1EV, the high efficiency, high density switch mode step-down power modules. The input voltage range is from 5.0V to 20V. The output voltage is programmable from 0.6V to 3.3V; refer to step down ratio curve in the LTM4601 datasheet. The rated load current is 20A, while de-rating is necessary for certain  $V_{IN}$ ,  $V_{OUT}$ , and thermal conditions. 24A load current can be achieved by applying forced airflow convection or attaching heatsinks. Master module U1 provides differential remote sensing to accurately regulate output voltage independent of load current. Integrated input and output filters enable a simple PCB layout. Only bulk input and output capacitors are needed externally. The DC1043A-A has onboard 180 degree interleaving clock generator. The

default clock frequency is 750 KHz. The LTM4601 allows the user to program output ramp-up and ramp-down through the TRACK/SS pin. The output can be set to coincidentally or ratiometrically track with another supply's output. Margining function is provided for the user who wants to stress their system by varying supply voltages during testing; refer to data-sheet for functional diagram.

If desired, slave unit U2 could be substituted by LTM4601-1EV.

**Design files for this circuit board are available. Call the LTC Factory.**

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**Table 1. Performance Summary ( $T_A = 25^\circ\text{C}$ )**

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		5V
Maximum Input Voltage		20V
Output Voltage $V_{OUT}$	Jumper selectable (open for 0.6V)	1.2V, 1.5V, 1.8V, 2.5V, 3.3V
Maximum Continuous Output Current	De-rating is necessary for certain $V_{IN}$ , $V_{OUT}$ , and thermal conditions	$20A_{DC}$
Default Operating Frequency		750kHz
Efficiency	$V_{IN}=12V$ , $V_{OUT}=1.5V$ , $I_{OUT}=20A$	83.2%, See Figure 3
Load Transient	$V_{IN}=12V$ , $V_{OUT}=1.5V$	See Figure 4

### QUICK START PROCEDURE

Demonstration circuit DC1043A-A is easy to set up to evaluate the performance of the LTM4601EV. Please refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. Place jumpers in the following positions for a typical  $1.5V_{OUT}$  application:

Vout Select	RUN	MARGO	MARG1
1.5V	ON	LO	LO

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 be less than 20V.
3. Turn on the power at the input. The output voltage should be  $1.5V \pm 2\%$ .
4. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other pa-

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rameters. Output ripple should be measured across the output capacitors.

- For optional load transient test, apply adjustable pulse signal between IOSTEP CLK and GND pins. Pulse amplitude sets the current step. The pulse signal should have very small duty cycle (<15%) to limit the thermal stress on the transient load circuit. The output transient current can be monitored at BNC connector J5 (25mV/10A).

- For Margining function test, place jumper MARG0 and MARG1 in the configurations shown in the following table, measure the output voltage at Vo+ and Vo-.

MARG1	MARG0	Vout
LO	LO	0
LO	HI	+5%
HI	LO	-5%
HI	HI	0

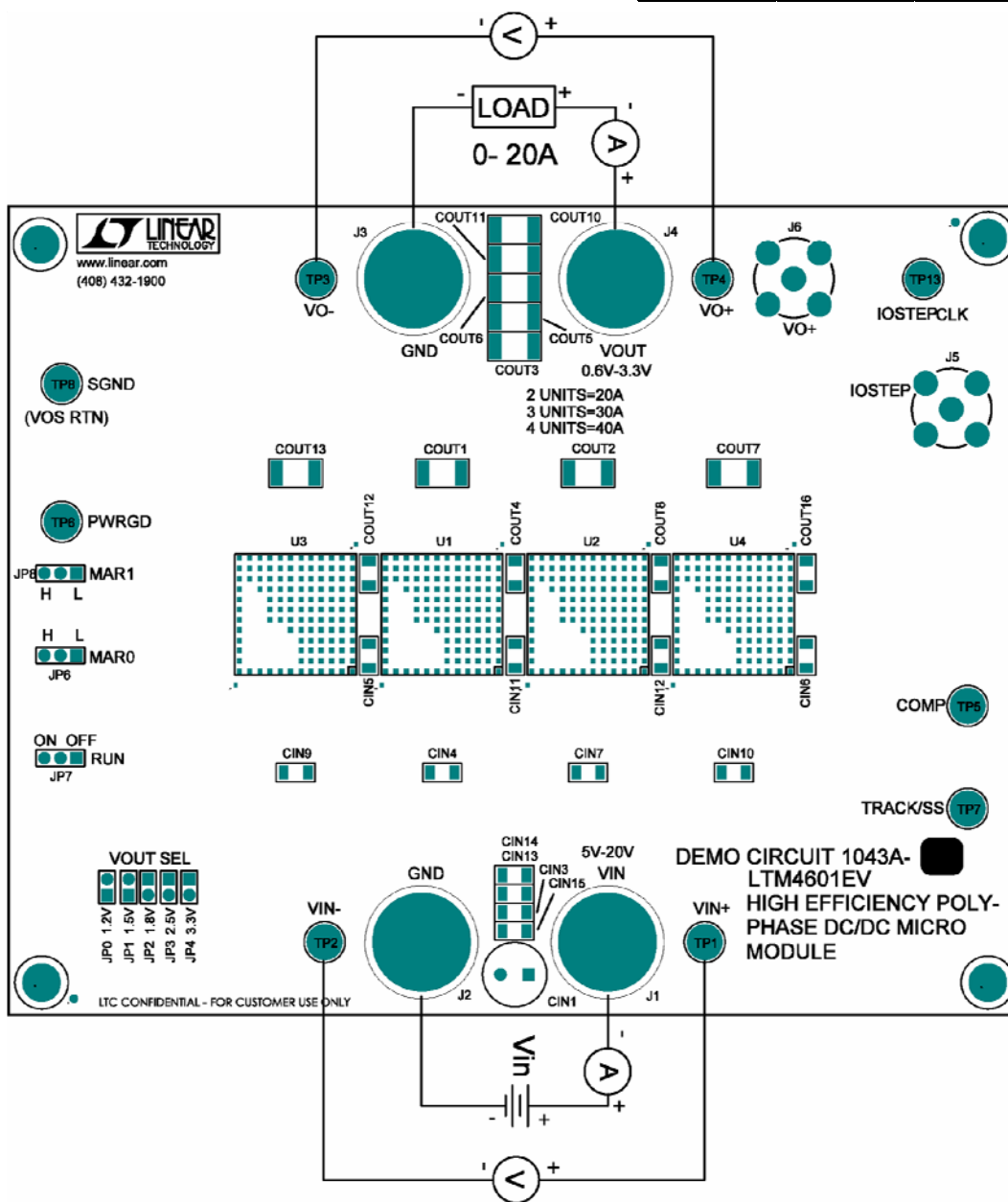


Figure 1. Test Setup of DC1043A-A

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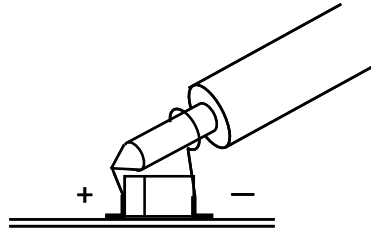


Figure 2. Scope Probe Placements for Measuring Input or Output Ripple.

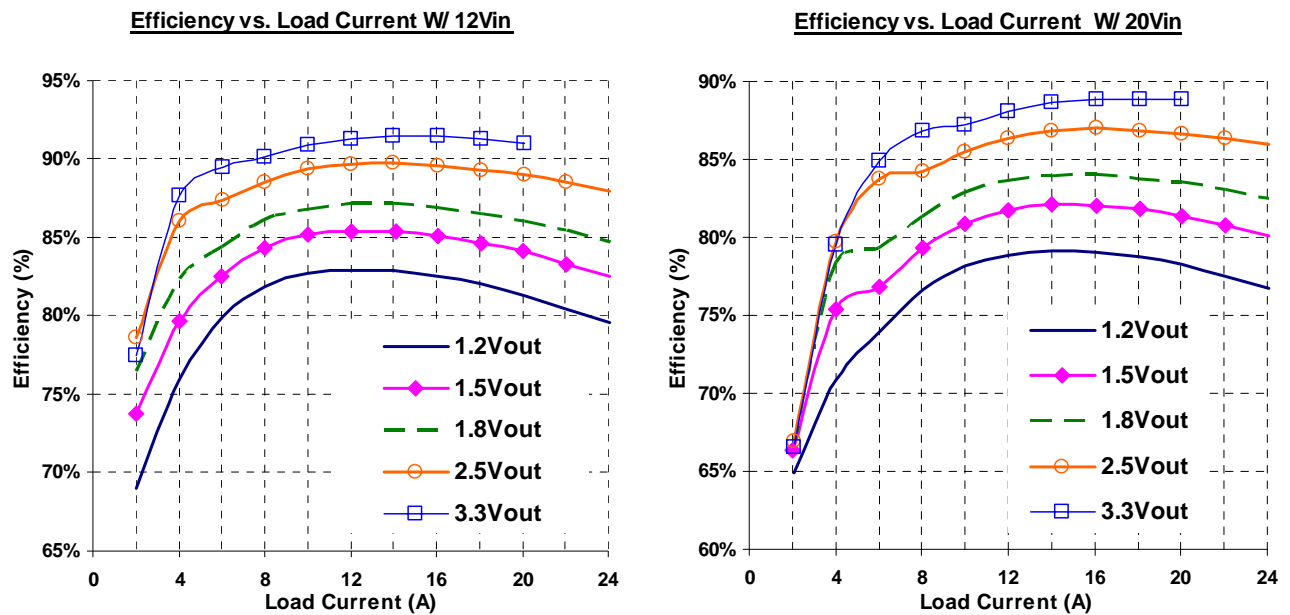
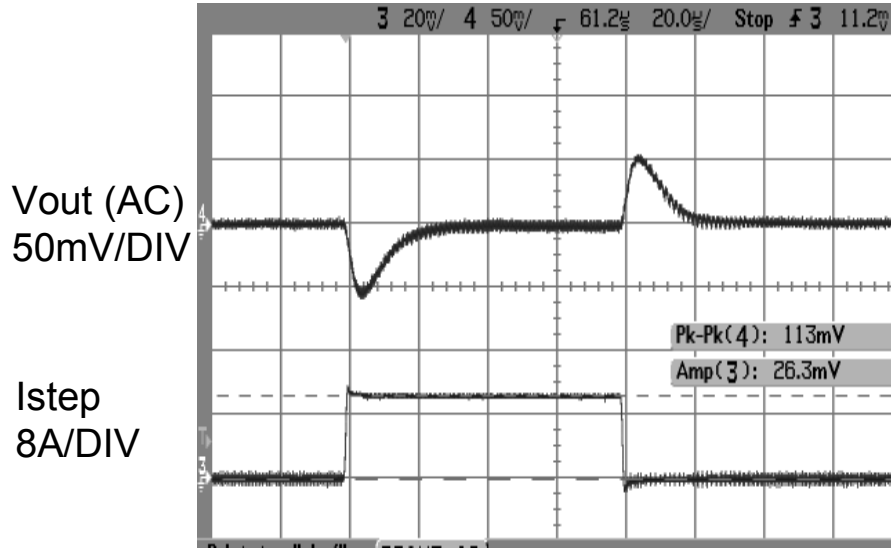


Figure 3. Measured Supply Efficiency with Different  $V_{IN}$  and  $V_{OUT}$

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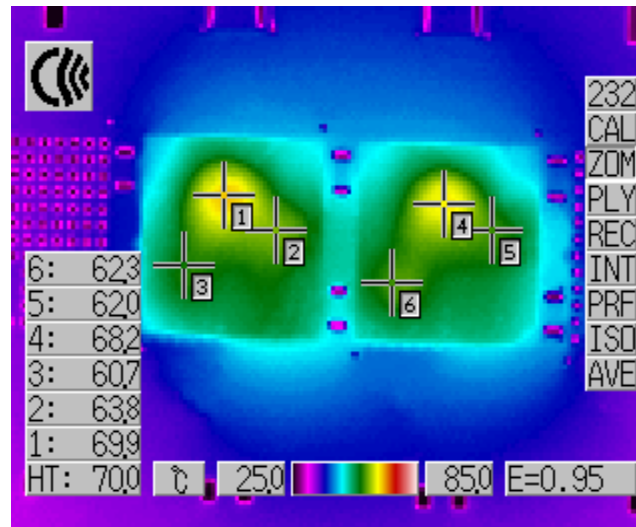
Vin = 12V

Vout = 1.5V

5A to 15A LOAD STEP (50%)

Cout = 2 X 22uF ceramic, 4X100uF ceramic; C12 = 47pF

**Figure 4. Measured Load Transient Response (5-15A Step)**



Vo = 1.5V@20A

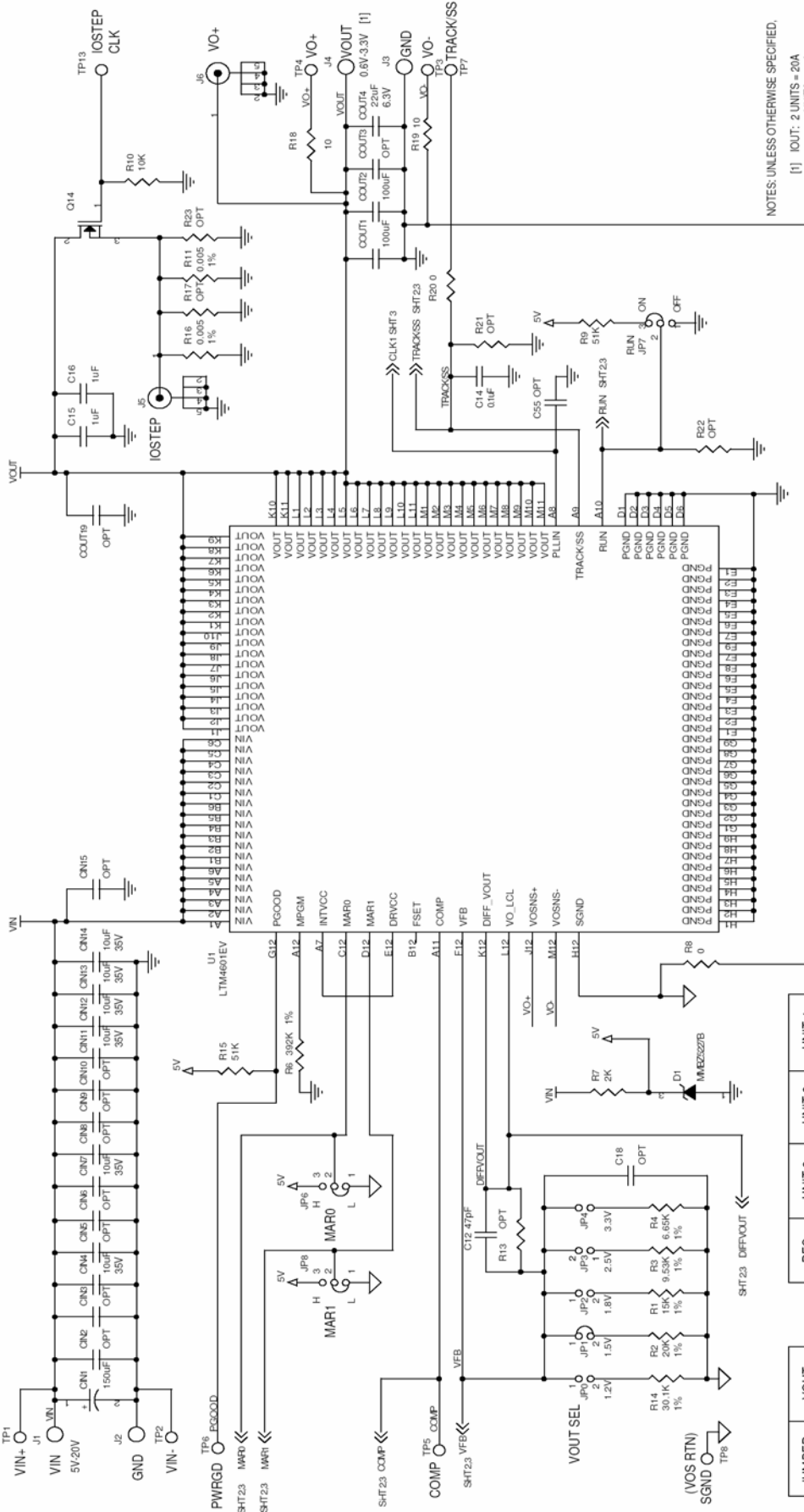
Vin = 20V

**Figure 5. Measured Thermal Performance**

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## REVISION HISTORY

ECO	REV	DESCRIPTION	DATE	APPROVED
	1	PROTO	12/23/05	
	2	Change, Correction, Modifications 05/09/06 more chgs	04/04/06	
	3	Change 01, R7, R2a, 10/06/06: More Changes 11/09/06: More Changes	10/06/06	



NOTES: UNLESS OTHERWISE SPECIFIED,  
 [1] IOUT: 2 UNITS = 20A  
 3 UNITS = 30A  
 4 UNITS = 40A

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JUMPER	VOUT	RES	UNIT 2	UNIT 3	UNIT 4
JP0	1.2V	R14	30.1K	20K	15K
JP1	1.5V	R2	20K	13.3K	10K
JP2	1.8V	R1	15K	10K	7.5K
JP3	2.5V	R3	9.53K	6.34K	4.75K
JP4	3.3V	R4	6.65K	4.42K	3.32K

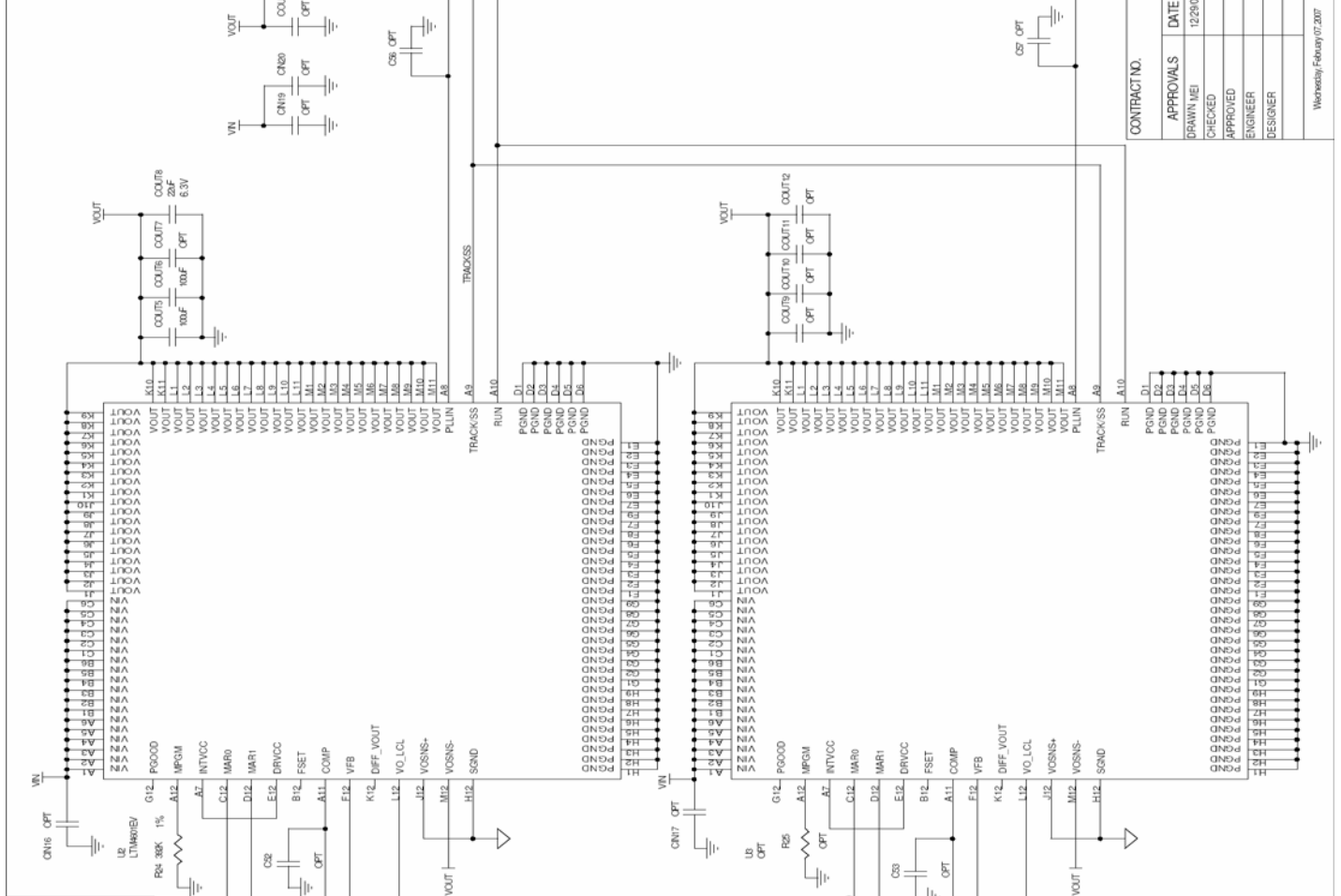


CONTRACT NO.		TITLE	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCE ON ANGLE 2 PLACES ... 3 PLACES ... INTERPRET DIM AND TOL PER ASME Y14.5M - 1994	DATE 12/23/05	SCH. LTM4601EV HIGH EFFICIENCY POLYPHASE DC/DC MICRO MODULE	
APPROVALS	DESIGNER	SIZE	REV
DRAWN IN/ENI	APPROVED	CAGE CODE	3
CHECKED	ENGINEER	DWG NO	
	DESIGNER	DC1043A-A	
DO NOT SCALE DRAWING		SCALE: NONE	SHEET 1 OF 3



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REVISION HISTORY				
ECO	REV	DESCRIPTION	DATE	APPROVED
	1	PROTO	12/29/05	
	2	Change Connection Modifications 05/09/06 more chgs.	04/04/06	
	3	Change D1, R7, R26, 10/05/06, New Change	10/05/06	



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CONTRACT NO.		DATE	
APPROVALS	12/29/05		
DRAWN: MEI			
CHECKED			
APPROVED			
ENGINEER			
DESIGNER			
TITLE		SIZE	SCALE
SCH, LTM601EV HIGH EFFICIENCY POLYPHASE DC/DC MICRO MODULE		B	1043A-3.DSN
DWG NO		DC1043A-A	
REV		3	
SHEET		2	OF 3

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Wednesday, February 07, 2007



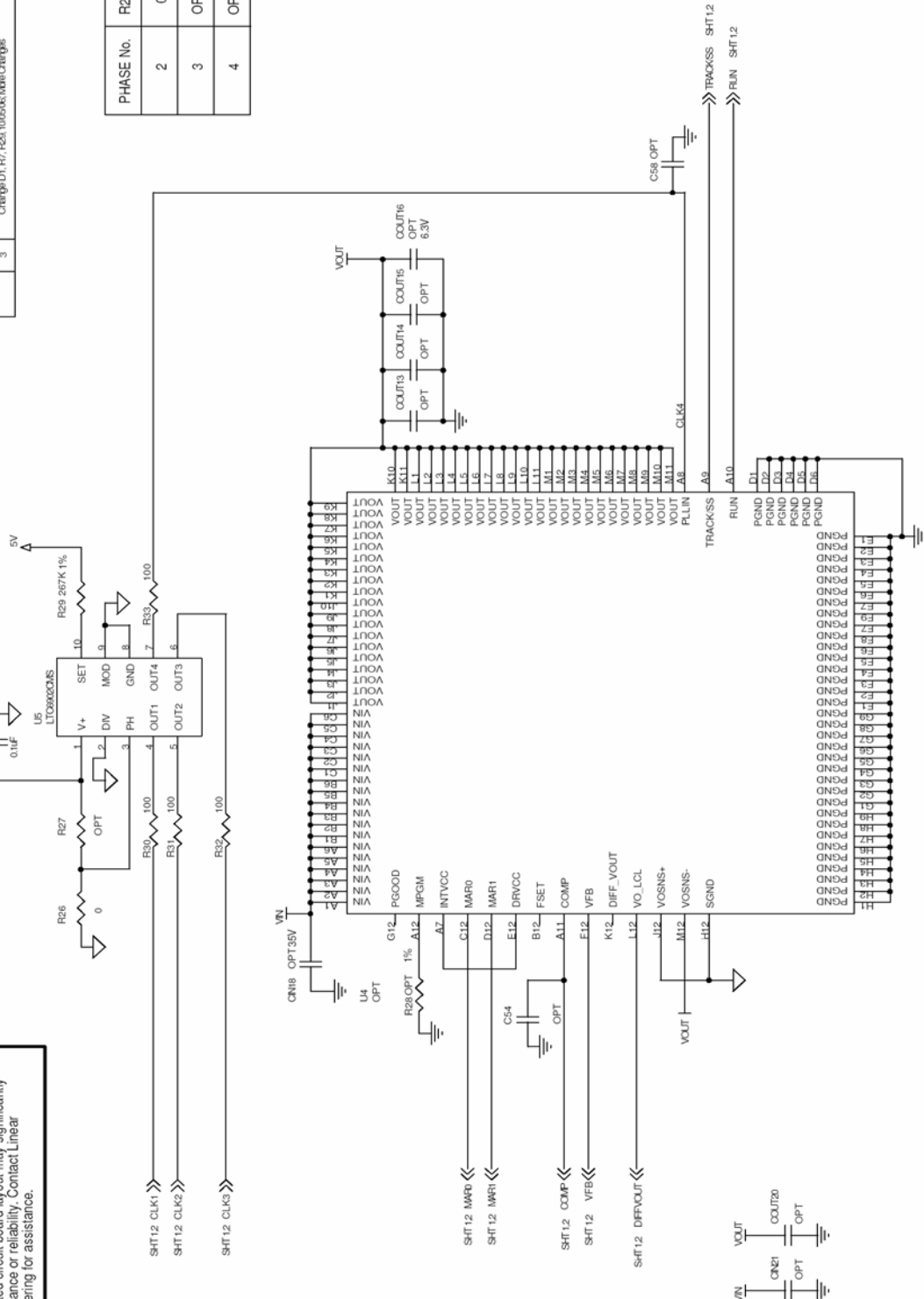
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## REVISION HISTORY

ECO	REV	DESCRIPTION	DATE	APPROVED
	1	PROTO	12/29/05	
	2	Change, Correction, Modifications, 05/08/06 More chgs.	04/04/06	
	3	Change D1, R7, R20, 1005068 New Changes	10/05/06	

PHASE No.	R26	R27	R29
2	0	OPT	267K
3	OPT	OPT	88.7K
4	OPT	OPT	66.5K

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CONTRACT NO.	DATE	TITLE
	12/29/05	SCH, LTM4601EV HIGH EFFICIENCY POLYPHASE DC/DC MICRO MODULE
DRAWN BY	MEI	
CHECKED		
APPROVED		
ENGINEER		
DESIGNER		
SCALE	NONE	FILENAME: 1043A-3.DSN
SHEET	3	OF 3

APPROVALS	DATE	SIZE	CAGE CODE	DWG NO	REV
	12/29/05	Custom		DC1043A-A	3

USED IN PCB MANUFACTURING

X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14
1	1	1	1	1	1	1	1	1	1	1	1	1	1



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