

# LTM4614EV: Dual 4A Step-Down $\mu$ Module<sup>®</sup> Regulator

## DESCRIPTION

Demonstration circuit DC1385A features the LTM<sup>®</sup>4614EV, the high efficiency, high density power module with dual 4A switch mode outputs. Derating is necessary for certain  $V_{IN}$ ,  $V_{OUT}$ , and thermal conditions. In the default configuration, the two outputs share the same input supply, however each regulator may have its own input supply simply by removing a resistor. By enabling the tracking feature, the outputs

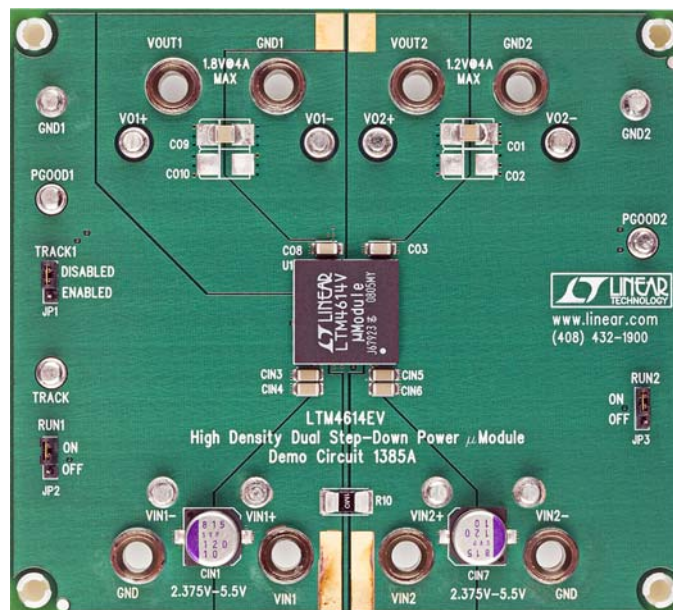
coincidentally follow another supply rail. The LTM4614 data sheet must be read in conjunction with this demo board prior to working on or modifying demo circuit DC1477A. **Design files for this circuit board are available at <http://www.linear.com/demo>**

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## PERFORMANCE SUMMARY (T<sub>A</sub> = 25°C)

PARAMETER	CONDITIONS	VALUE
Input Voltage Range	$V_{IN1}$ and $V_{IN2}$	2.375V to 5.5V
Output Voltage $V_{OUT1}$ , $V_{OUT2}$	$V_{IN} = 5V_{DC}$ , $I_{OUT1}$ , $I_{OUT2} = 4A$ .	$V_{OUT1} = 1.8V \pm 2\%$ , $V_{OUT2} = 1.2V \pm 2\%$
Maximum Continuous Output Current	Derating is Necessary for Certain $V_{IN}$ , $V_{OUT}$ , and Thermal Conditions, See Data Sheet for Details	$4A_{DC}$ for $V_{OUT1}$ , $V_{OUT2}$
Default Operating Frequency		1.25MHz
Efficiency of Channel 1	$V_{IN1} = 5V$ , $V_{OUT1} = 1.8V$ , $I_{OUT1} = 4A$	81.5%, See Figure 3
Efficiency of Channel 2	$V_{IN2} = 5V$ , $V_{OUT2} = 1.2V$ , $I_{OUT2} = 4A$	75.4%, See Figure 3

## BOARD PHOTO



dc1385af

## QUICK START PROCEDURE

Demonstration circuit DC1385A is an easy way to evaluate the performance of the LTM4614EV. 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 1.8V and 1.2V application:

TRACK1	RUN1	RUN2
DISABLED	ON	ON

2. With the power off, connect the input power supply, load and meters as shown in Figure 1. Preset the loads to 0A and  $V_{IN}$  supply to be less than 5.5V.
3. Turn on the power at the input. The output voltage between  $VO1^+$  and  $VO1^-$  should be  $1.8V \pm 2\%$ , and the voltage between  $VO2^+$  and  $VO2^-$  should be  $1.2V \pm 2\%$ .
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 parameters. To measure input and output ripple, please refer to Figure 2 for proper setup.

5. Channel 1 can track another supply by connecting TP17, TRACK to another supply and setting JP1 to ENABLED. Resistors R8 and R9 are set up for coincidental tracking. Channel 2 is set up to coincidentally track the output of channel 1 by resistor R6 and R7. Please refer to the circuit schematic and data sheet.
6. Because DC1385A is assembled in a way that  $V_{OUT2}$  tracks  $V_{OUT1}$  automatically, placing the JP2 (RUN1) to OFF position turns off both outputs. To disable tracking function of  $V_{OUT2}$ , please remove R6 and R7 and connect TRACK2 to  $V_{IN2}$ .
7.  $V_{IN1}$  and  $V_{IN2}$  are shorted on DC1385A through a 1mohm resistor, R10. If desired, remove R10 and different supplies can be applied to  $V_{IN1}$  and  $V_{IN2}$  of this demo circuit.

**QUICK START PROCEDURE**

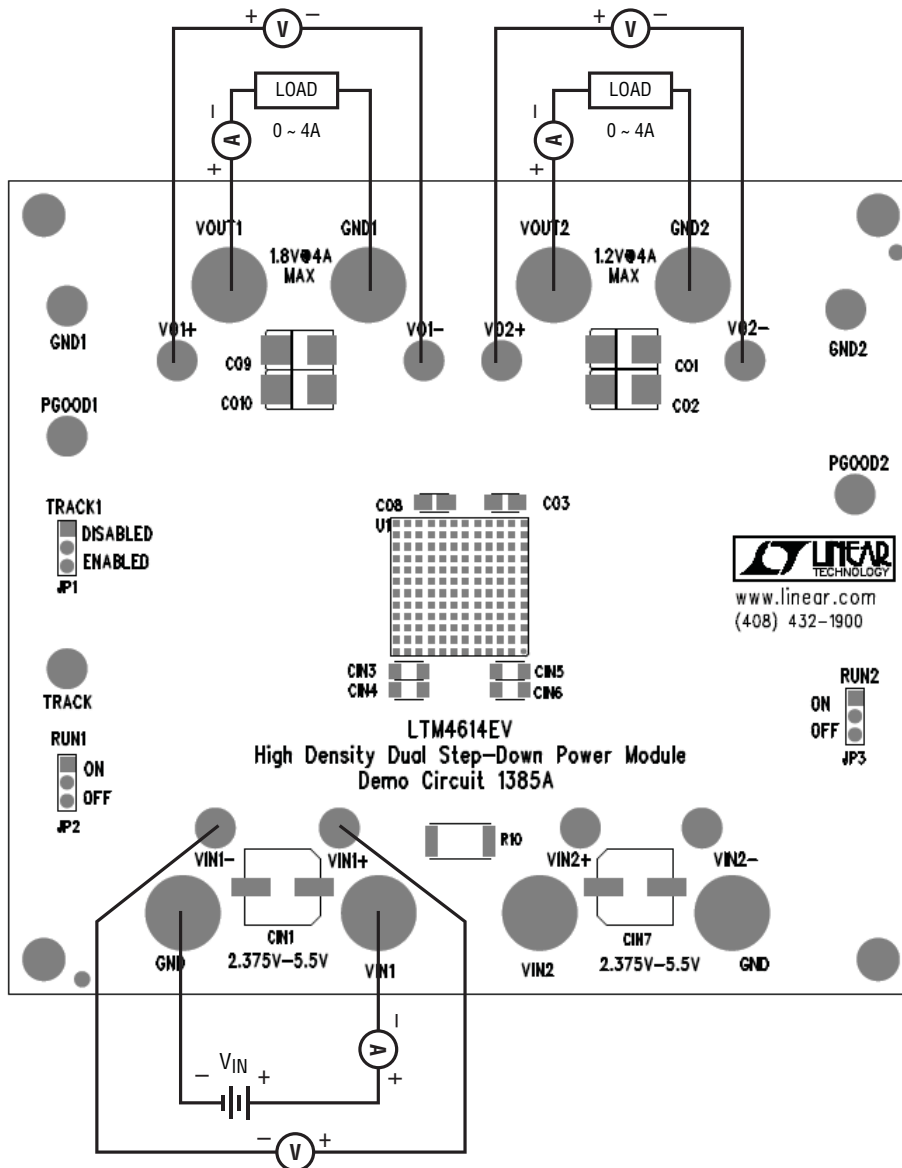


Figure 1. Test Setup of DC1385A

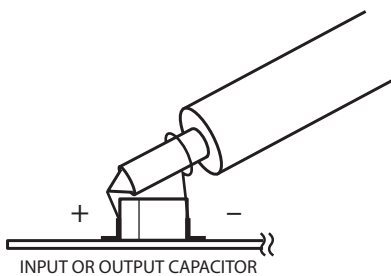


Figure 2. Proper Scope Probe Placement for Measuring Input or Output Ripple

QUICK START PROCEDURE

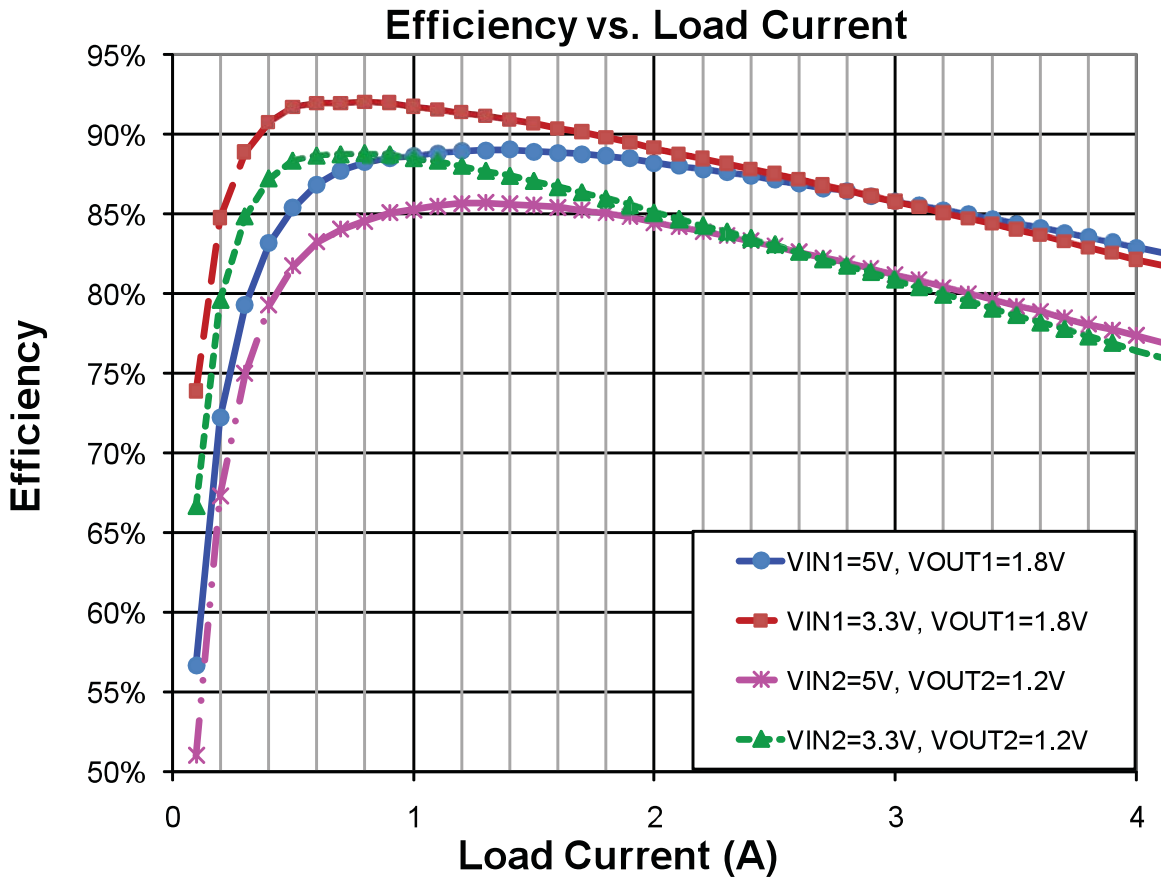
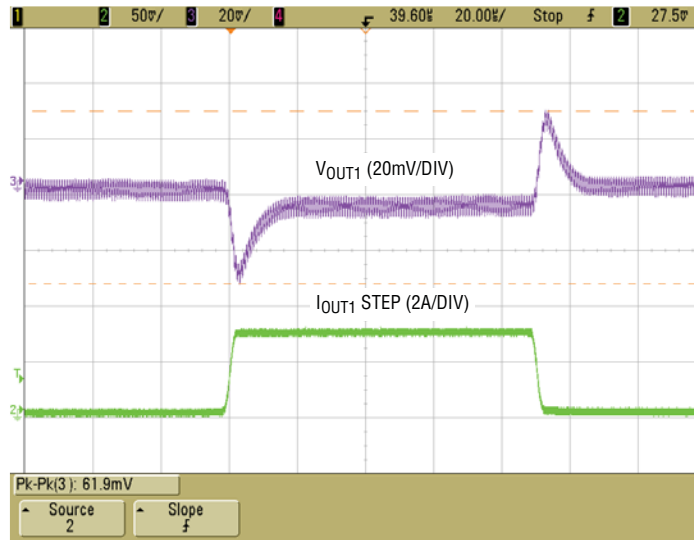


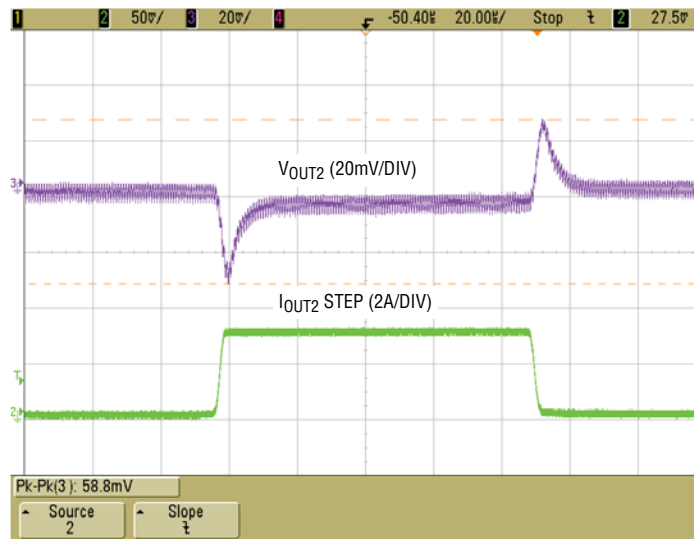
Figure 3. Measured Efficiency for Different Channels

**QUICK START PROCEDURE**



$V_{IN1} = 5V$   
 $V_{OUT1} = 1.8V$   
 CONTINUOUS CURRENT MODE (CCM)  
 1A TO 4A LOAD STEP ON  $V_{OUT1}$   
 $C_{OUT1} = 100\mu F$  CERAMIC (1210, X5R, 6.3V) +  $22\mu F$  CERAMIC (1206, X5R, 6.3V)

**Figure 4. Measured Load Transient Response for  $V_{OUT1}$**



$V_{IN2} = 5V$   
 $V_{OUT2} = 1.2V$   
 CONTINUOUS CURRENT MODE (CCM)  
 1A TO 4A LOAD STEP ON  $V_{OUT2}$   
 $C_{OUT2} = 100\mu F$  CERAMIC (1210, X5R, 6.3V) +  $22\mu F$  CERAMIC (1206, X5R, 6.3V)

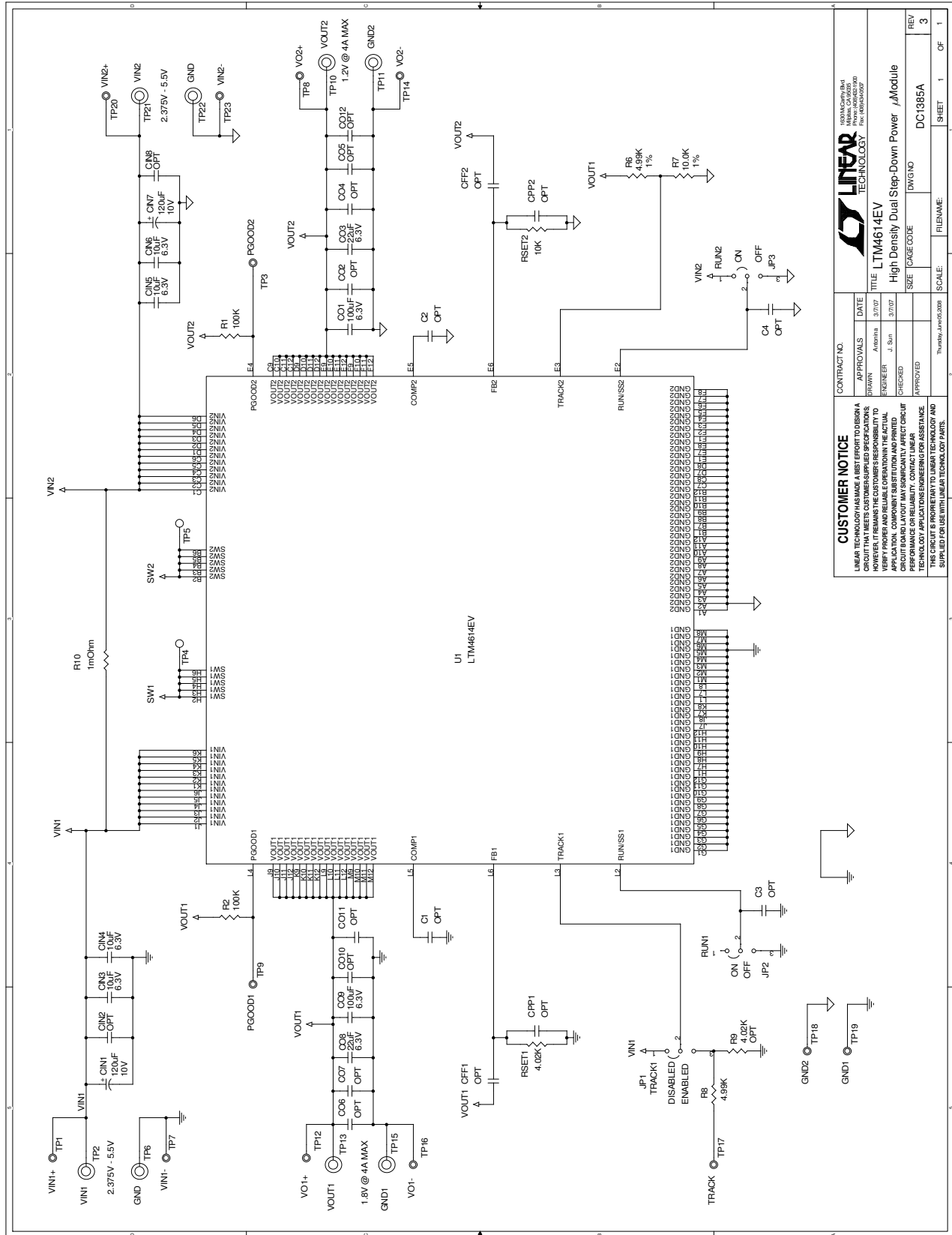
**Figure 5. Measured Load Transient Response for  $V_{OUT2}$**

# DEMO MANUAL DC1385A

## PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
<b>Required Circuit Components</b>				
1	2	CIN1, CIN7	CAP, OSCON 120uF, 10V, E7	SANYO, 10SVP120M
2	4	CIN3, CIN4, CIN5, CIN6	CAP, X5R, 10uF, 6.3V, 20%, 1206	AVX, 12066D106MAT2A
3	2	CO3, CO8	CAP, X5R, 22uF, 6.3V, 20%, 1206	AVX, 12066D226MAT2A
4	2	CO1, CO9	CAP, X5R, 100uF, 6.3V, 20%, 1210	AVX, 12106D107MAT2A
5	1	RSET1	RES., CHIP, 4.02k, 1/16W, 1%, 0402	VISHAY, CRCW04024K02FKED
6	1	RSET2	RES., CHIP, 10.0k, 1/16W, 1%, 0402	VISHAY, CRCW040210K0FKED
7	2	R2, R1	RES., CHIP, 100k, 1/16W, 1%, 0402	VISHAY, CRCW0402100KFKED
8	1	U1	I.C. LTM4614EV 144 PIN LGA	LINEAR TECH., LTM4614EV
<b>Additional Demo Board Circuit Components</b>				
1	0	CPP1, CFF1, CPP2, CFF2	CAP, 0402, OPT	
2	0	CIN2, CIN8, CO11, CO12	CAP, 1206, OPT	
3	0	CO2, CO4, CO5, CO6, CO7, CO10	CAP, 7343, OPT	CAP7343
4	0	C1, C2, C3, C4	CAP, 0402, OPT	
5	1	R9	RES., CHIP, 4.02k, 1/16W, 1%, 0402	VISHAY, CRCW04024K02FKED
6	1	R7	RES., CHIP, 10.0k, 1/16W, 1%, 0402	VISHAY, CRCW040210K0FKED
7	2	R8, R6	RES., CHIP, 4.99k, 1/16W, 1%, 0402	VISHAY, CRCW04024K99FKED
8	1	R10	RES., CHIP, 1mΩ, 1W, 5%, 2512	PANASONIC, ERJM1WTJ1MOV
<b>Hardware-For Demo Board Only</b>				
1	3	JP1, JP2, JP3	HEADER 3 PIN 0.079 SINGLE ROW	SAMTEC, TMM103-02-L-S
2	3	JPX1, JPX2, JPX3	SHUNT, 0.079" CENTER	SAMTEC, 2SN-BK-G
3	13	TP1, TP3, TP7-9, TP12, TP14, TP16-20, TP23	TESTPOINT, TURRET, 0.094" PBF	MILL-MAX, 2501-2-00-80-00-00-07-0
4	8	TP2, TP6, TP10, TP11, TP13, TP15, TP21, TP22	JACK BANANA	KEYSTONE, 575-4
5	4	(STAND-OFF)	STAND-OFF, NYLON 0.50"	KEYSTONE, 8833(SNAP ON)

## SCHEMATIC DIAGRAM



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THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.		DRAWN	ALBERTA	3/7/02
		ENGINEER	J. SUN	3/7/02
		CHECKED		
		APPROVED		
		FILENAME:	SCALE:	SHEET 1 OF 1
		TITLE	DC1385A	REV 3
		SIZE	DWG NO	
		PACKAGE CODE		



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# DEMO MANUAL DC1385A

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