LTM4614EV: Dual 4A Step-Down µModule® Regulator

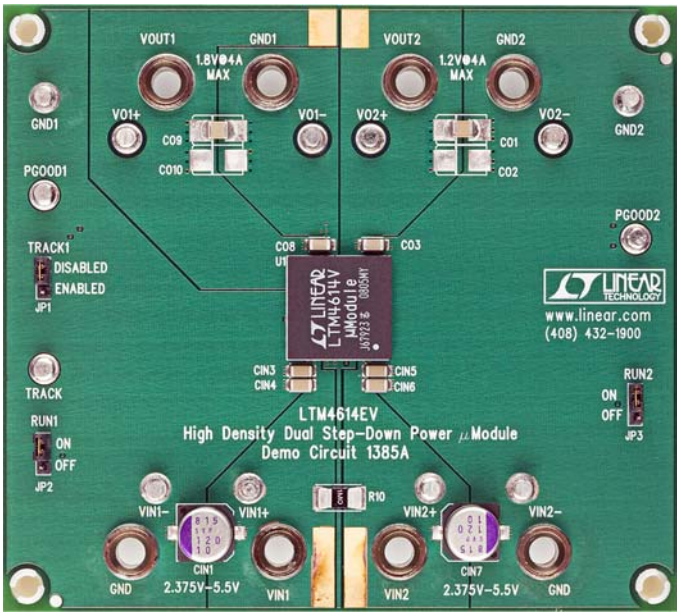
DESCRIPTION

Demonstration circuit DC1385A features the LTM®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**

PERFORMANCE SUMMARY (T_A = 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 ±2%, V_{OUT2} = 1.2V ±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



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 ± 2%, and the voltage between $VO2^+$ and $VO2^-$ should be 1.2V ±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

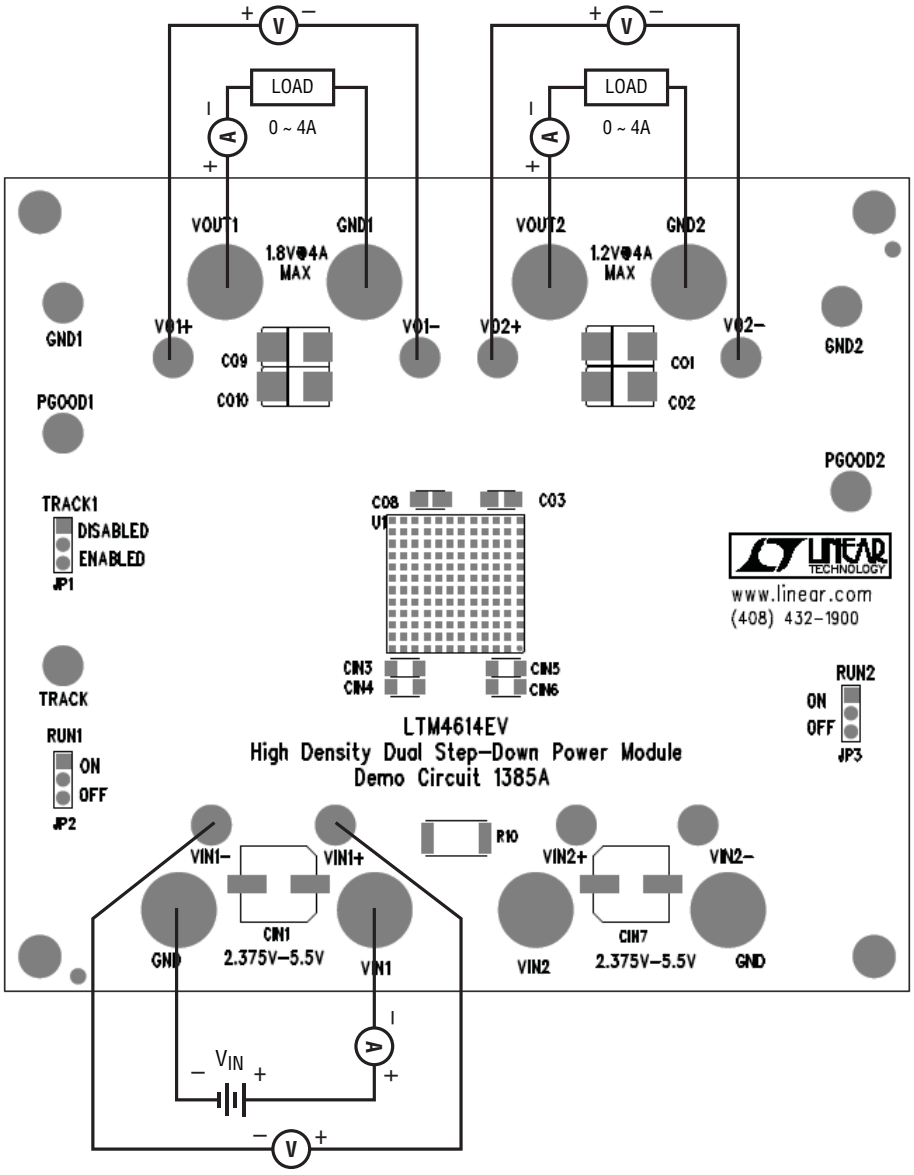


Figure 1. Test Setup of DC1385A

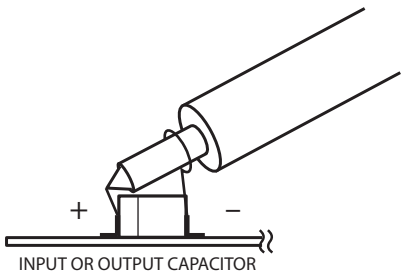


Figure 2. Proper Scope Probe Placement for Measuring Input or Output Ripple

QUICK START PROCEDURE

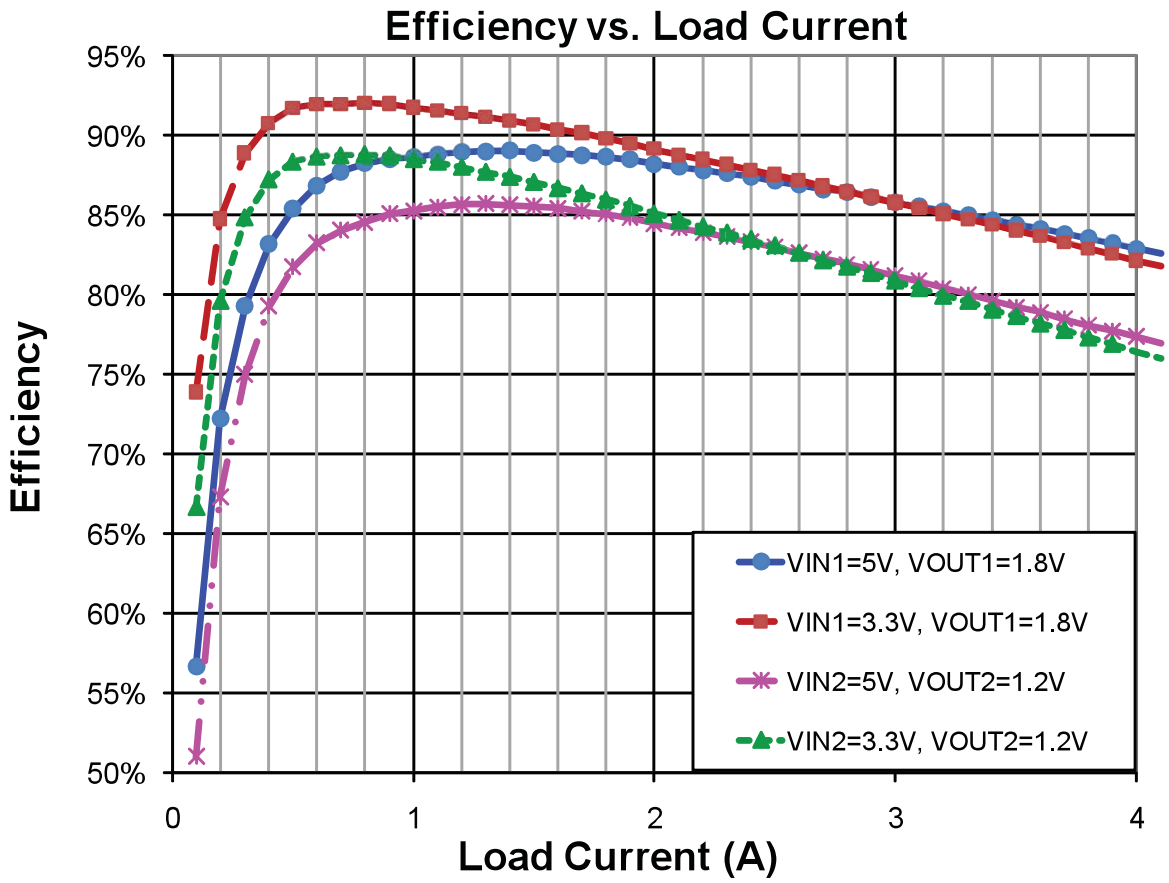
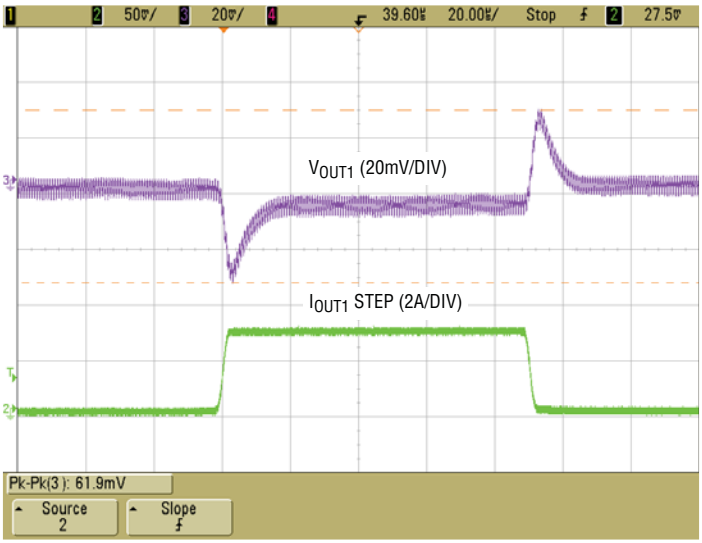


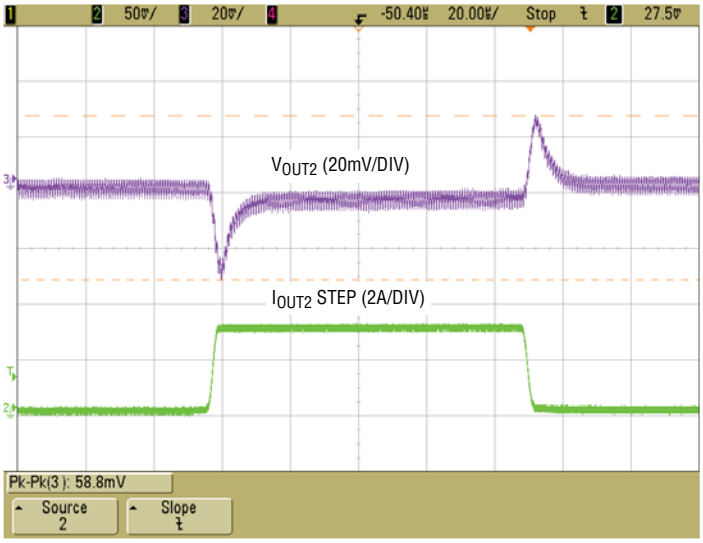
Figure 3. Measured Efficiency for Different Channels

QUICK START PROCEDURE



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

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



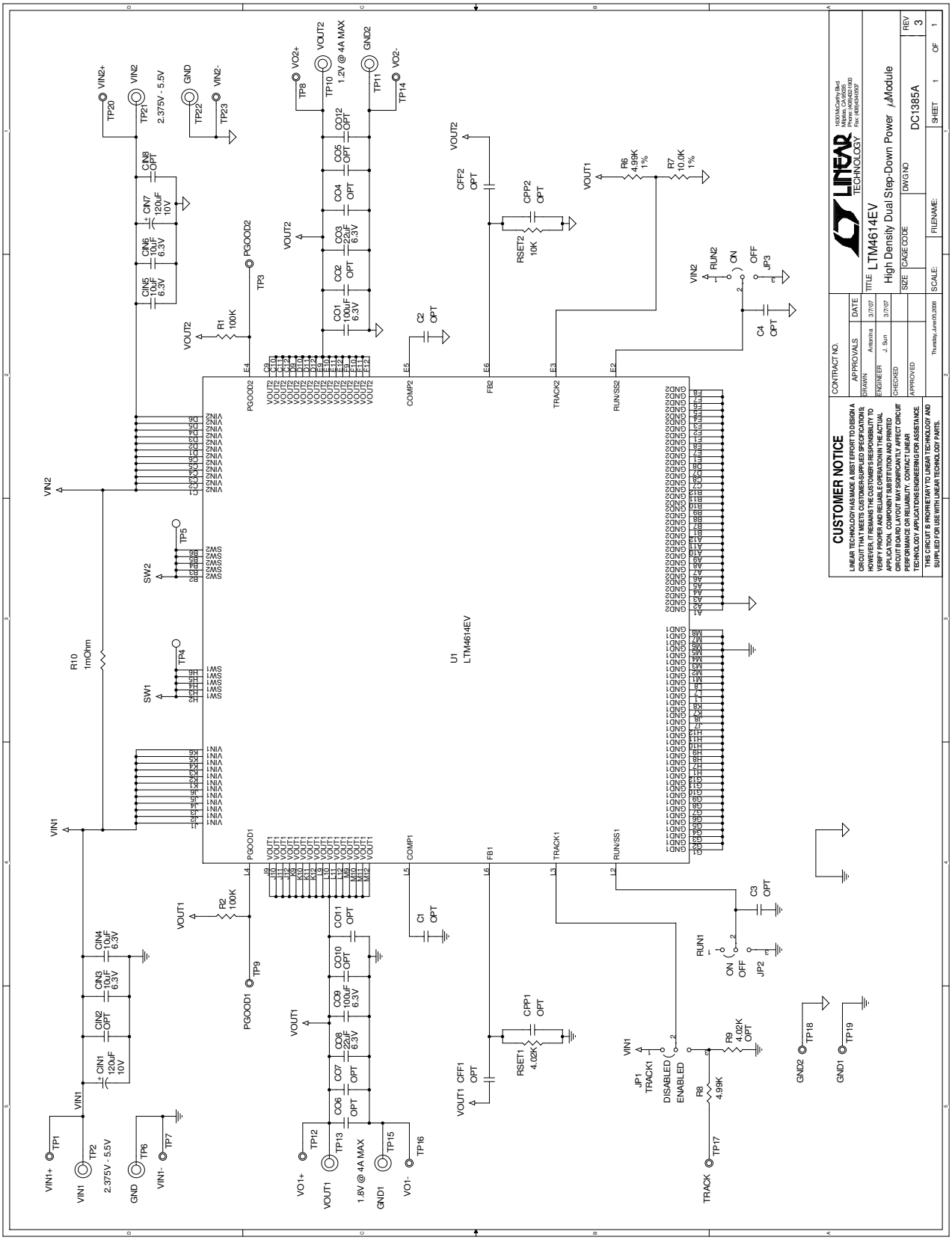
V_{IN2} = 5V
V_{OUT2} =1.2V
CONTINUOUS CURRENT MODE (CCM)
1A TO 4A LOAD STEP ON V_{OUT2}
C_{OUT2} = 100µF CERAMIC (1210, X5R, 6.3V) + 22µF CERAMIC (1206, X5R, 6.3V)

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

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	2	CIN1, CIN7	CAP., OSCON 120uF, 10V, E7	SANYO, 10SVP120M
2	4	CIN3, CIN4, CIN5, CIN6	CAP., X5R, 10µF, 6.3V, 20%, 1206	AVX, 12066D106MAT2A
3	2	CO3, CO8	CAP., X5R, 22µF, 6.3V, 20%, 1206	AVX, 12066D226MAT2A
4	2	CO1, CO9	CAP., X5R, 100µF, 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
Additional Demo Board Circuit Components				
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, ERJM1WTJ1M0V
Hardware-For Demo Board Only				
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,	TESTPOINT, TURRET, 0.094" PBF	MILL-MAX, 2501-2-00-80-00-00-07-0
		TP14, TP16-20, TP23		
4	8	TP2, TP6, TP10, TP11, TP13,	JACK BANANA	KEYSTONE, 575-4
		TP15, TP21, TP22		
5	4	(STAND-OFF)	STAND-OFF, NYLON 0.50"	KEYSTONE, 8833(SNAP ON)

SCHEMATIC DIAGRAM



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Mailing Address:

Linear Technology
1630 McCarthy Blvd.
Milpitas, CA 95035

Linear Technology Corporation
1630 McCarthy Blvd., Milpitas, CA 95035-7417
(408) 432-1900 • FAX: (408) 434-0507 • www.linear.com

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