LT3507A
Triple Monolithic Step-Down Regulator with LDO

DESCRIPTION

Demo circuit 1781A is a Triple Monolithic Step-Down Regulator with LDO featuring the LT3507A. The demo circuit is designed for 1.8V, 3.3V, 5.0V and 2.5V outputs from a 7V to 36V input. The current capability of each channel is 2.7A, 1.5A, 1.8A and 0.3A respectively. Independent input voltage, feedback, soft-start and power good pins for each channel simplify complex power supply tracking/sequencing requirements.

All three converters are either synchronized to a common external clock input or single-resistor programmable from 250kHz to 2.5MHz using internal oscillator. At all frequencies, a 180° phase shift between V_{OUT1} and the other two outputs is maintained, reducing input voltage ripple and component size. Programmable frequency allows for optimization between efficiency and external component size.

Each output can be independently disabled using its own soft-start pin, or by using the $\overline{SD}$ terminal the entire part can be placed in a low quiescent current shutdown mode.

The LT3507A data sheet gives a complete description of the part, operation and application information. The data sheet must be read in conjunction with this quick start guide for demo circuit 1781A.

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

LT, LTC, LTM, Linear Technology and the Linear logo are registered trademarks of Linear Technology Corporation. All other trademarks are the property of their respective owners.

PERFORMANCE SUMMARY (T_A = 25°C)

PARAMETER	CONDITIONS	VALUE
Minimum Input Voltage		7V
Maximum Input Voltage		36V
Output Voltage V_{OUT1}	V_{IN} = 7~36V	1.80V ±3%
Output Voltage V_{OUT2}	V_{IN} = 7~36V	3.33V ±3%
Output Voltage V_{OUT3}	V_{IN} = 7~36V	5.0V ±3%
Output Voltage V_{OUT4}	V_{IN} = 7~36V	2.52V ±3%
Switching Frequency		450kHz ±10%
Maximum Output Current I_{OUT1}	V_{IN} = 7~36V	2.7A
Maximum Output Current I_{OUT2}	V_{IN} = 7~36V	1.5A
Maximum Output Current I_{OUT3}	V_{IN} = 7~36V	1.8A
Maximum Output Current I_{OUT4}	V_{IN} = 7~36V	0.3A
Voltage Ripple V_{OUT1}	V_{IN} = 12V, I_{OUT1} = 2.7A	<20mV
Voltage Ripple V_{OUT2}	V_{IN} = 12V, I_{OUT2} = 1.5A	<20mV
Voltage Ripple V_{OUT3}	V_{IN} = 12V, I_{OUT3} = 1.8A	<20mV
Voltage Ripple V_{OUT4}	V_{IN} = 12V, I_{OUT4} = 0.3A	<10mV

QUICK START PROCEDURE

Demo circuit 1781A is easy to set up to evaluate the performance of the LT3507A. Refer to Figure 2 for proper measurement equipment setup and follow the procedure below:

NOTE. When measuring the input or output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across the V_{IN} or V_{OUT} and GND terminals. See Figure 3 for proper scope probe technique.

1. With power off, connect the input power supply to V_{IN} and GND.
2. Turn on the power at the input.

   NOTE. Make sure that the input voltage does not exceed 36V.

3. Check for the proper output voltages.

   NOTE. If there is no output, temporarily disconnect the load to make sure that the load is not set too high.

4. Once the proper output voltages are established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

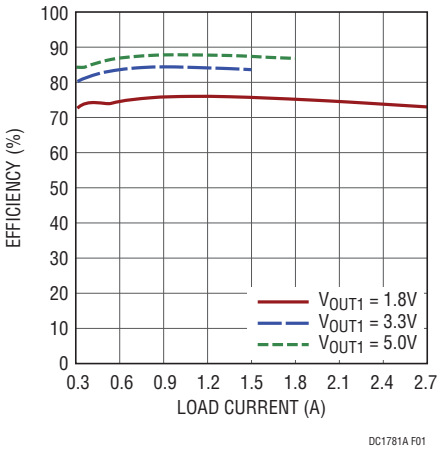


Figure 1. DC1781A Buck Channel Efficiency at V_{IN} = 12V, f = 450kHz

QUICK START PROCEDURE

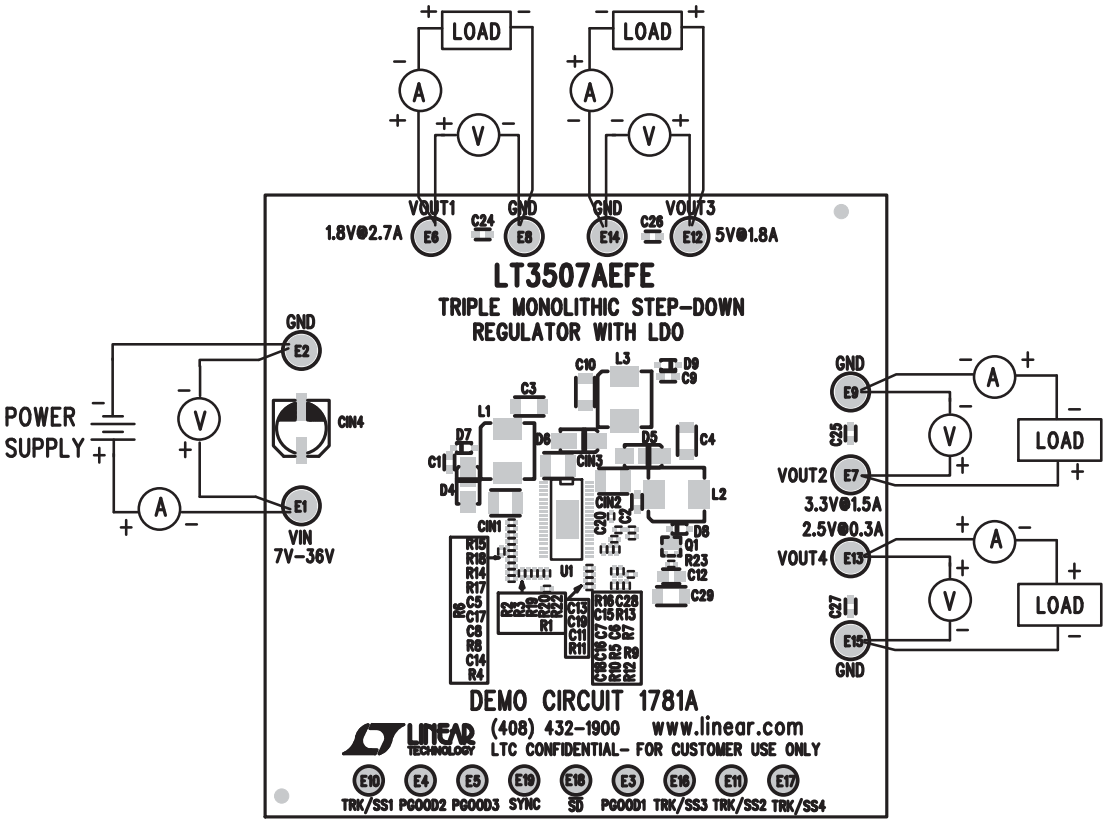


Figure 2. DC1781A Proper Equipment Setup

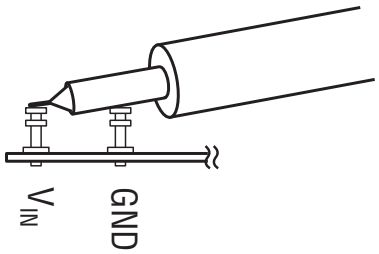


Figure 3. Measuring Input or Output Ripple

QUICK START PROCEDURE

SYNC FUNCTION

Install a 10k R20 resistor if the board is synchronized from an external signal generator.

EMI FILTER

Install EMI filters on the backside of the DC1781A, however, a trace cut is required for the insertion of the option circuit. See Figure 4 for the cut line.

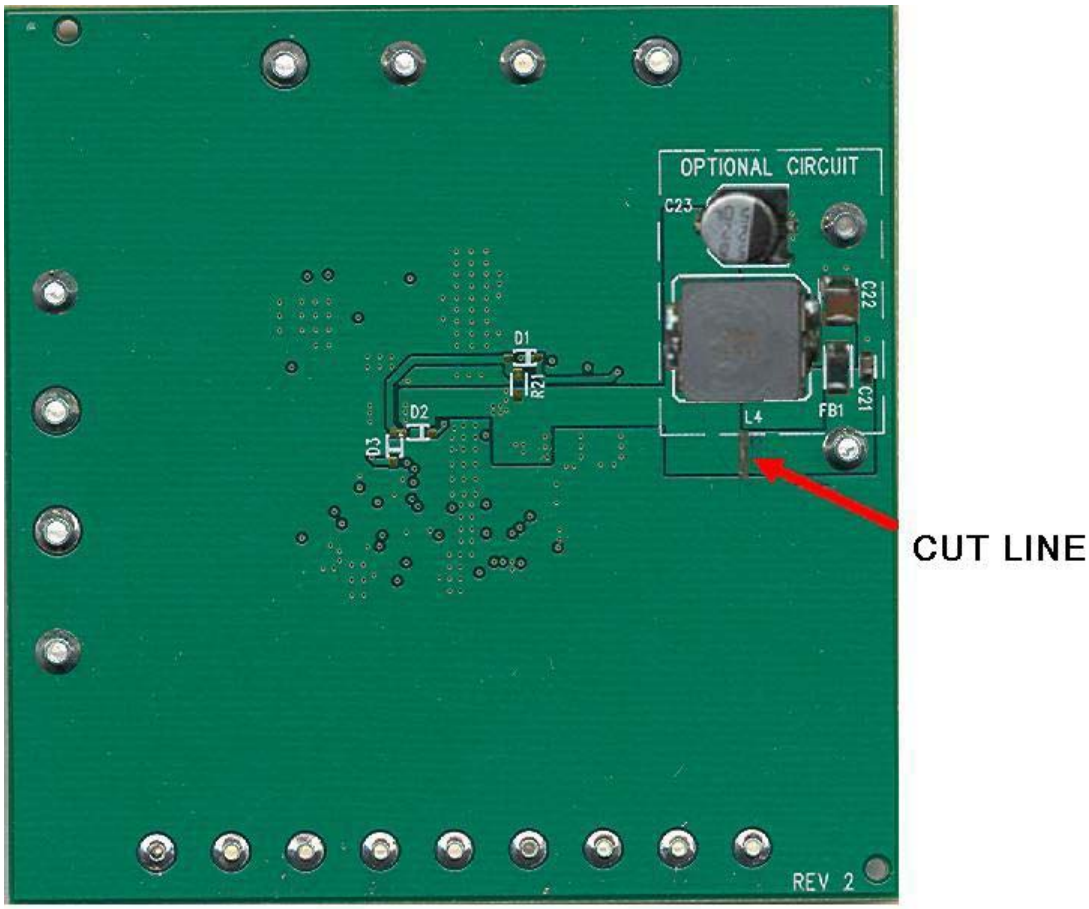


Figure 4. Cut Line for the EMI Filter Installation

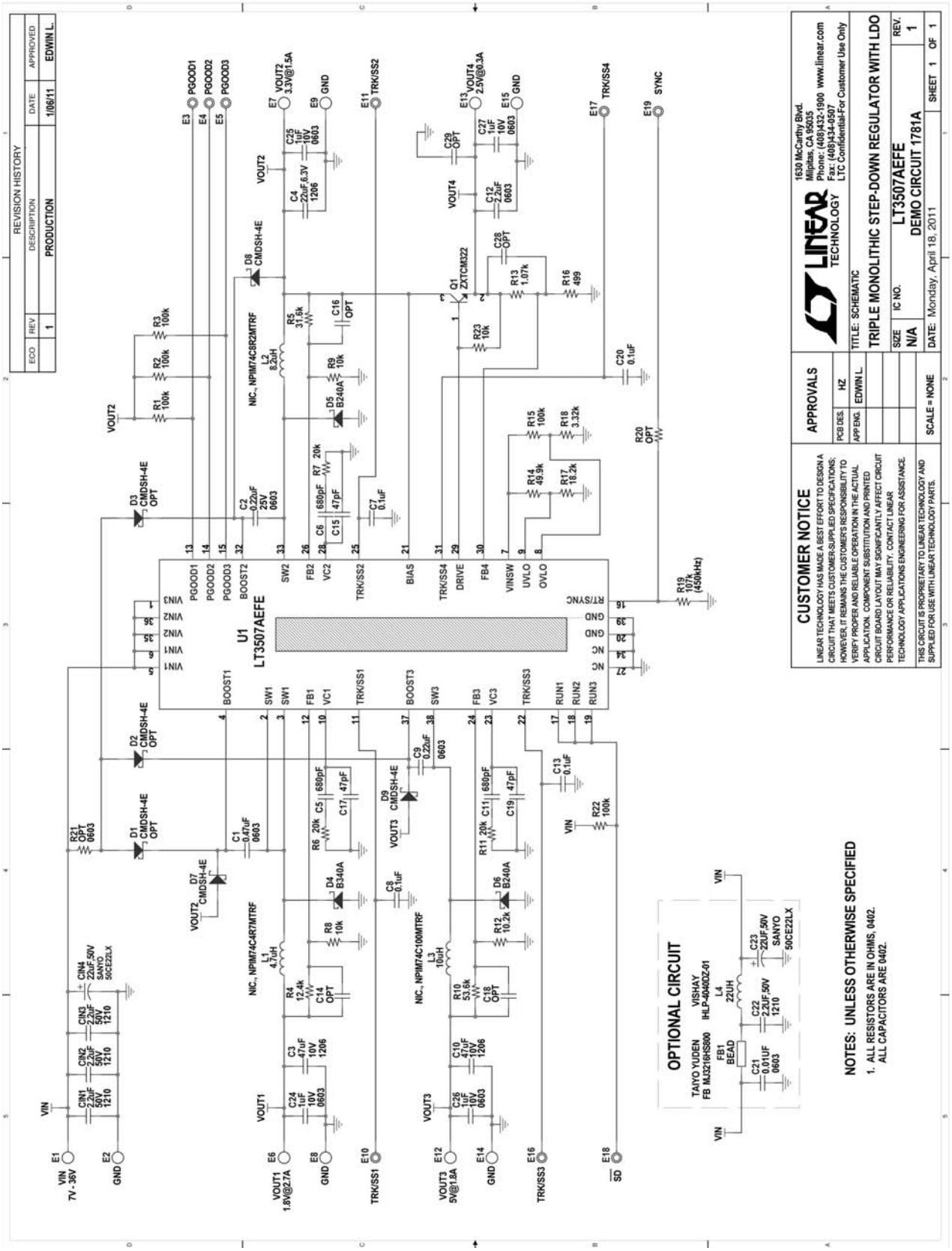
PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	3	CIN1, CIN2, CIN3	CAP., X7R, 2.2µF, 50V, 10%, 1210	TDK, C3225X7R1H225K
2	1	C1	CAP., X7R, 0.47µF, 25V, 10%, 0603	MURATA, GRM188R71E474KA12D
3	2	C2, C9	CAP., X7R, 0.22µF, 25V, 10%, 0603	TDK, C1608X7R1E224K
4	2	C3, C10	CAP., X5R, 47µF, 10V, 20%, 1206	TAIYO YUDEN, LMK316BJ476ML-T
5	1	C4	CAP., X5R, 22µF, 6.3V, 20%, 1206	TAIYO YUDEN, JMK316BJ226ML
6	3	C5, C6, C11	CAP., X7R, 680pF, 50V, 10%, 0402	AVX, 04025C681KAT
7	4	C7, C8, C13, C20	CAP., X5R, 0.1µF, 10V, 10%, 0402	AVX, 0402ZD104KAT
8	1	C12	CAP., X5R, 2.2µF, 6.3V, 20%, 0603	TAIYO YUDEN, JMK107BJ225MA
9	3	C15, C17, C19	CAP., NPO, 47pF, 50V, 5%, 0402	AVX, 04025A470JAT
10	1	D4	DIODE, SCHOTTKY, B340A, SMA-DIODE	DIODES INC., B340A
11	2	D5, D6	DIODE, SCHOTTKY, B240A, SMA-DIODE	DIODES INC., B240A
12	3	D7, D8, D9	DIODE, SCHOTTKY, CMDSH-4E, SOD323	CENTRAL SEMI., CMDSH-4E
13	1	L1	IND., 4.7µH	NIC, NPIM74C4R7MTRF
14	1	L2	IND., 8.2µH	NIC, NPIM74C8R2MTRF
15	1	L3	IND., 10µH	NIC, NPIM74C100MTRF
16	1	Q1	XTOR, NPN, 50V LOW SATURATION, MLP322	ZETEX, ZXTCM322TA
17	5	R1, R2, R3, R15, R22	RES., CHIP, 100k, 1/16W, 1%, 0402	YAGEO, RC0402FR-07100KL
18	1	R4	RES., CHIP, 12.4k, 1/16W, 1%, 0402	VISHAY, CRCW040212K4FKEA
19	1	R5	RES., CHIP, 31.6k, 1/16W, 1% 0402	VISHAY, CRCW040231K6FKEA
20	3	R6, R7, R11	RES., CHIP, 20k, 1/16W, 1% 0402	VISHAY, CRCW040220K0FKEA
21	3	R8, R9, R23	RES., CHIP, 10k, 1/16W, 1% 0402	YAGEO, RC0402FR-0710KL
22	1	R10	RES., CHIP, 53.6k, 1/16W, 1% 0402	VISHAY, CRCW040253K6FKEA
23	1	R12	RES., CHIP, 10.2k, 1/16W, 1% 0402	NIC, NRC04F1022TRF
24	1	R13	RES., CHIP, 1.07k, 1/16W, 1% 0402	YAGEO, RC0402FR-071K07L
25	1	R14	RES., CHIP, 49.9k, 1/16W, 1% 0402	VISHAY, CRCW040249K9FKEA
26	1	R16	RES., CHIP, 499, 1/16W, 1% 0402	AAC, CR05-4990FM
27	1	R17	RES., CHIP, 18.2k, 1/16W, 1% 0402	VISHAY, CRCW040218K2FKEA
28	1	R18	RES., CHIP, 3.32k, 1/16W, 1% 0402	VISHAY, CRCW04023K32FKEA
29	1	R19	RES., CHIP, 107k, 1/16W, 1% 0402	AAC, CR05-1073FM
30	1	U1	I.C., LT3507EUHF, QFN38UHF	LINEAR TECH., LT3507EUHF

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Additional Demo Board Circuit Components				
1	1	CIN4	CAP., ELECTROLYTIC, 22µF, 50V	SANYO, 50CE22LX
2	0	C14, C16, C18, C28	CAP., 0402	OPT
3	0	C21	CAP., X7R, 0.01µF, 50V, 10%, 0603	OPT
4	0	C22	CAP., X7R, 2.2µF, 50V, 10%, 1210	OPT
5	0	C23	CAP., ELECTROLYTIC, 22µF 50V	OPT
6	4	C24-C27	CAP., X5R, 1µF, 10V, 10%, 0603	MURATA, GRM188R61A105K
7	0	C29	CAP., 1206	OPT
8	0	D1, D2, D3	DIODE, SCHOTTKY, CMDSH-4E, SOD323	OPT
9	0	FB1	BEAD, 1206 OPT	TAIYO YUDEN, FB MJ3216HS800
10	0	L4	IND., 22µH, OPT	VISHAY, IHLP4040DZER220-M01
11	0	R20	RES., CHIP, 0402	OPT
12	0	R21	RES., CHIP, 0603	OPT
Hardware-For Demo Board Only:				
1	10	E1, E2, E6-E9, E12-E15	TP, TURRET, 0.094"	MILL-MAX, 2501-2-00-80-00-00-07-0
2	9	E3, E4, E5, E10, E11, E16-E19	TP, TURRET, 0.064"	MILL-MAX, 2308-2-00-44

SCHEMATIC DIAGRAM



Information furnished by Linear Technology Corporation is believed to be accurate and reliable. However, no responsibility is assumed for its use. Linear Technology Corporation makes no representation that the interconnection of its circuits as described herein will not infringe on existing patent rights.

DEMONSTRATION BOARD IMPORTANT NOTICE

Linear Technology Corporation (LTC) provides the enclosed product(s) under the following **AS IS** conditions:

This demonstration board (DEMO BOARD) kit being sold or provided by Linear Technology is intended for use for **ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY** and is not provided by LTC for commercial use. As such, the DEMO BOARD herein may not be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including but not limited to product safety measures typically found in finished commercial goods. As a prototype, this product does not fall within the scope of the European Union directive on electromagnetic compatibility and therefore may or may not meet the technical requirements of the directive, or other regulations.

If this evaluation kit does not meet the specifications recited in the DEMO BOARD manual the kit may be returned within 30 days from the date of delivery for a full refund. THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY THE SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THIS INDEMNITY, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user releases LTC from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge. Also be aware that the products herein may not be regulatory compliant or agency certified (FCC, UL, CE, etc.).

No License is granted under any patent right or other intellectual property whatsoever. **LTC assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or any other intellectual property rights of any kind.**

LTC currently services a variety of customers for products around the world, and therefore this transaction **is not exclusive**.

Please read the DEMO BOARD manual prior to handling the product. Persons handling this product must have electronics training and observe good laboratory practice standards. **Common sense is encouraged**.

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

Mailing Address:

Linear Technology

1630 McCarthy Blvd.

Milpitas, CA 95035

Copyright © 2004, Linear Technology Corporation

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

LT 0711 • PRINTED IN USA

© LINEAR TECHNOLOGY CORPORATION 2011

ООО «ЛайфЭлектроникс» “LifeElectronics” LLC

ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- *Конкурентоспособные цены и скидки постоянным клиентам.*
- *Специальные условия для постоянных клиентов.*
- *Подбор аналогов.*
- *Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.*

- *Приемлемые сроки поставки, возможна ускоренная поставка.*
- *Доставку товара в любую точку России и стран СНГ.*
- *Комплексную поставку.*
- *Работу по проектам и поставку образцов.*
- *Формирование склада под заказчика.*

- *Сертификаты соответствия на поставляемую продукцию (по желанию клиента).*
- *Тестирование поставляемой продукции.*
- *Поставку компонентов, требующих военную и космическую приемку.*
- *Входной контроль качества.*
- *Наличие сертификата ISO.*

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- *Регистрацию проекта у производителя компонентов.*
- *Техническую поддержку проекта.*
- *Защиту от снятия компонента с производства.*
- *Оценку стоимости проекта по компонентам.*
- *Изготовление тестовой платы монтаж и пусконаладочные работы.*

Тел: +7 (812) 336 43 04 (многоканальный)
Email: org@lifeelectronics.ru

www.lifeelectronics.ru