

LTC3600

16V, 1.5A Synchronous Step-Down Regulator with Programmable Reference

DESCRIPTION

Demonstration circuit DC1667A is a step-down DC/DC converter using LTC®3600 monolithic synchronous buck regulator. DC1667A has an input voltage range of 4.5V to 15V, and is capable of delivering up to 1.5A of output current. The output voltage of the DC1667 can be set by a single resistor from 0V to $(V_{IN} - 0.5)V$. At light load conditions, DC1667 can operate in discontinuous mode to improve the efficiency. During shutdown mode, LTC3600 consumes less than 1 μ A. The switching frequency of LTC3600 is programmable from 200kHz to 4MHz. DC1667A uses low profile surface mount components.

These features and the availability of LTC3600 in a 12-lead DFN/MSOP package, make it ideal for use in point-of-load power supplies, battery-powered equipments and voltage tracking systems. The LTC3600 data sheet must be read in conjunction with this demo manual for working on or modifying the demo circuit DC1667A.

Design files for this circuit board are available at
<http://www.linear.com/demo/DC1667A>

LT, LTC, LTM, μ Module, 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 ($T_A = 25^\circ\text{C}$)

PARAMETER	CONDITIONS	VALUE
Input Voltage Range		4.5V to 15V
Default Output Voltage V_{OUT}	$V_{IN} = 4.5V$ to 15V, $I_{OUT} = 0A$ to 1.5A, JP10: CCM	$1.215V \pm 2\%$ (1.19V to 1.24V)
Maximum Continuous Output Current		1.5A
Default Operating Frequency		1MHz
Typical Output Voltage Ripple	$V_{IN} = 5V$, $V_{OUT} = 1.2V$, $I_{OUT} = 1.5A$, $f_{SW} = 1MHz$	<10mV (See Figure 4)
Efficiency	$V_{IN} = 5V$, $V_{OUT} = 1.2V$, $I_{OUT} = 1.5A$, $f_{SW} = 1MHz$	78% (See Figure 3)

DEMO MANUAL DC1667A

QUICK START PROCEDURE

Demonstration circuit DC1667A is easy to set up to evaluate the performance of the LTC3600. 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 1.2V output application:

JP2	JP7	JP8	JP9	JP10
1.2V	COMP	PGOOD	RUN	MODE/SYNC
1.2V	EXT	DIS	OFF	CCM

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 5V.

3. Turn on the power supply at the input. Measure and make sure the input voltage is 5V. Turn on the circuit by inserting the shunt in header JP9 to the ON position. The output voltage should be $1.215V \pm 2\%$ (1.19V to 1.24V).
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. Refer to Figure 2 for proper input/output voltage ripple measurement.
5. To select other output voltages, LTC3600 has to be shut down by putting RUN pin jumper to the OFF position or turning off the input supply. After the IC is shut down, move the shunt to other output voltage selections, such as 1.8V or 3.3V, and repeat tests 1 through 4. The output voltage tolerance should remain at $V_{OUT} \pm 2\%$.

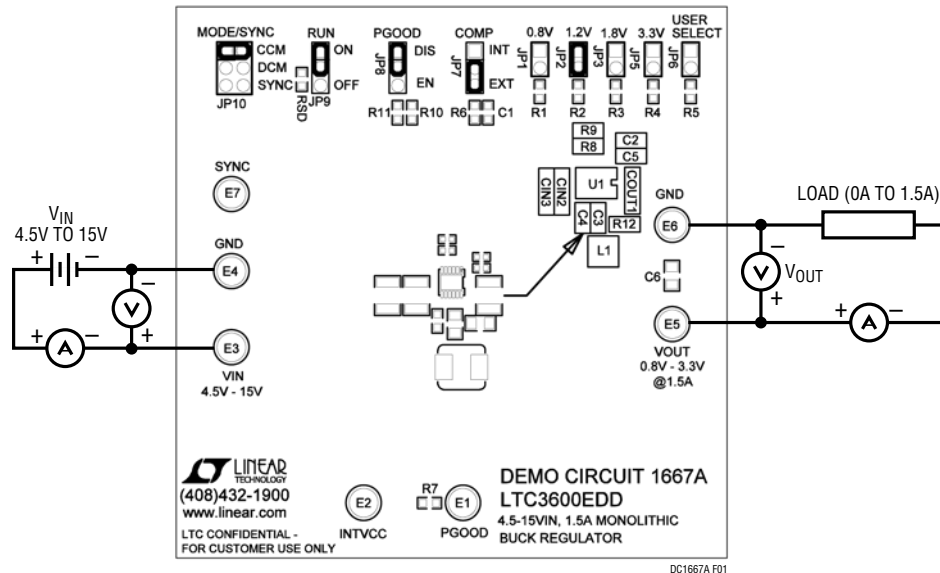


Figure 1. Proper Equipment Measurement Setup

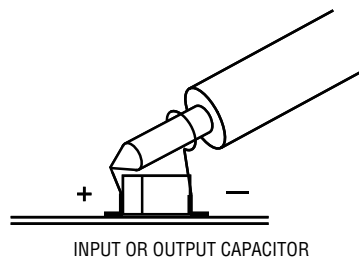


Figure 2. Scope Probe Placements for Measuring Input or Output Ripple

QUICK START PROCEDURE

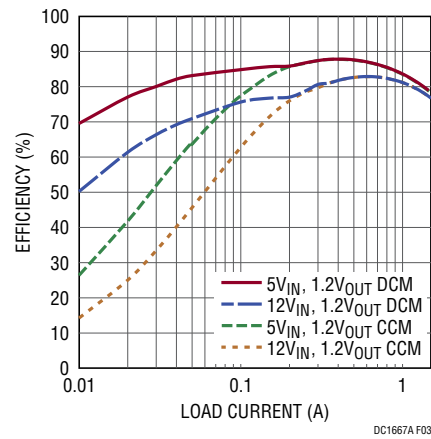


Figure 3. Measured Efficiency ($V_{OUT} = 1.2V$)

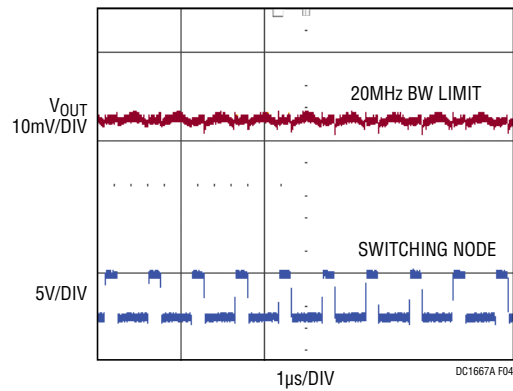


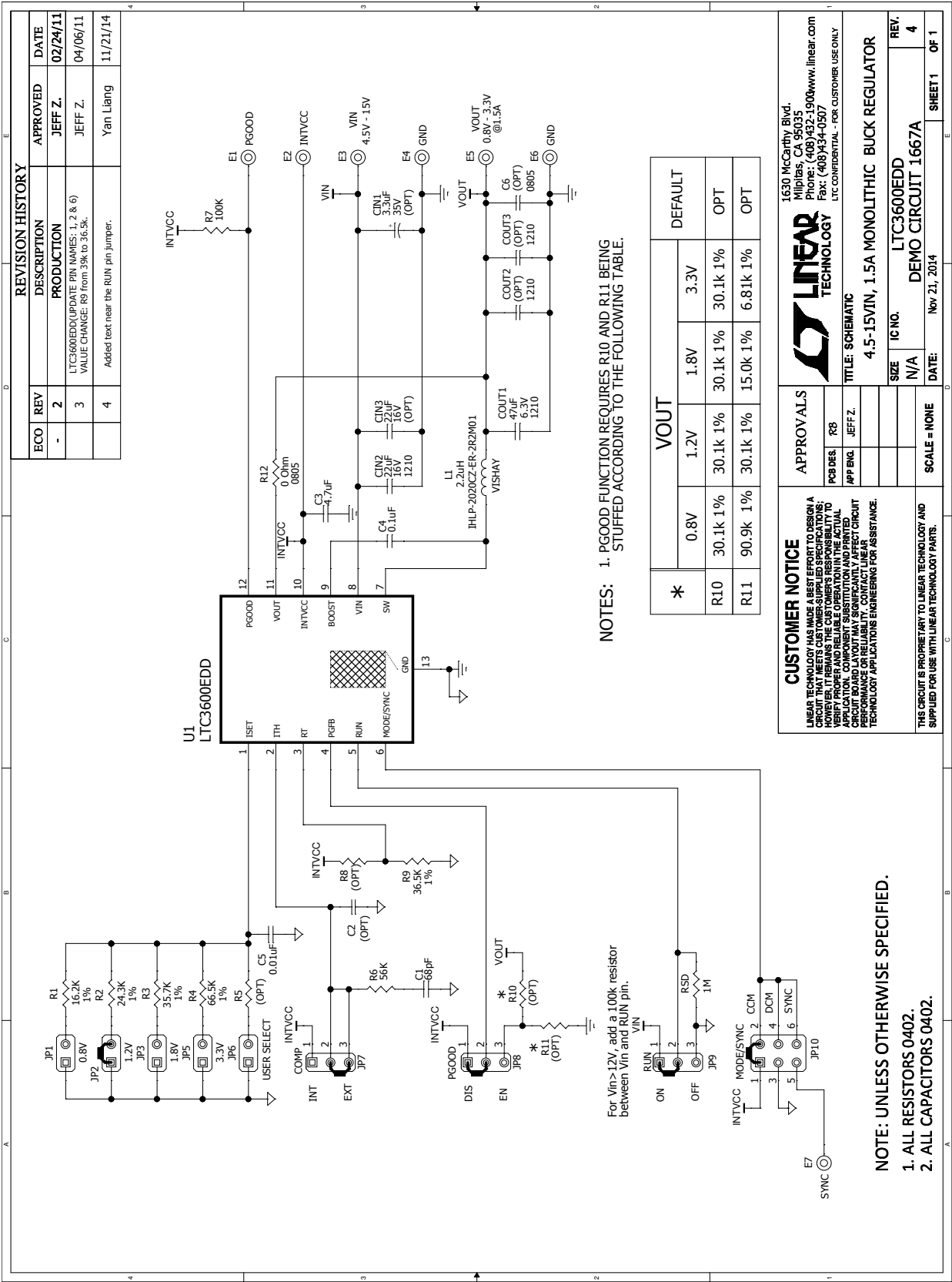
Figure 4. Measured Output Voltage Ripple at 5V Input, 1.2V Output, 1.5A with Standard Demo Circuit Default Setup

DEMO MANUAL DC1667A

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	CIN2	Capacitor, X5R 22 μ F 16V 20% 1210	TDK C3225X5R1C226M
2	1	COUT1	Capacitor, X5R 47 μ F 6.3V 20% 1210	Taiyo Yuden JMK325BJ476MM-T
3	1	C3	Capacitor, X5R 4.7 μ F 16V 20% 0805	Taiyo Yuden EMK212BJ475MG
4	1	C4	Capacitor, X7R 0.1 μ F 25V 10% 0603	AVX 06033C104KAT2A
5	1	L1	Inductor, 2.2 μ H IHLP-2020CZ-01	Vishay IHLP-2020CZ-ER 2R2M01
6	1	R2	Resistor, Chip 24.3K 0.06W 1% 0603	Vishay CRCW060324K3FKEA
7	1	R9	Resistor, Chip 36.5K 0.06W 1% 0402	Vishay CRCW040236K5FKED
8	1	U1	I.C., Voltage Regulator DFN(12)(DD) 3mm $\times$ 3mm	Linear Technology Corporation LTC3600EDD
Additional Demo Board Circuit Components				
1	1	CIN1	Capacitor, Tantalum 3.3 μ F 35V 20% 6032	AVX TAJW335M035R
2	1	CIN3	Capacitor, X5R 22 μ F 16V 20% 1210	TDK C3225X5R1C226M
3	2	COUT2, COUT3	Capacitor, 1210	
4	1	C1	Capacitor, NPO 68pF 50V 10% 0603	AVX 06035A680KAT1A
5	1	C2	Capacitor, 0402	
6	1	C5	Capacitor, X7R 0.01 μ F 16V 20% 0402	AVX 0402YC103MAT2A
7	1	C6	Capacitor, 0805	
8	1	RSD	Resistor, Chip 1M 0.06W 5% 0603	Vishay CRCW06031M00JNEA
9	1	R1	Resistor, Chip 16.2k 0.06W 1% 0603	Vishay CRCW060316K2FKEA
10	1	R3	Resistor, Chip 35K7 0.06W 1% 0603	Vishay CRCW060335K7FKEA
11	1	R4	Resistor, Chip 66.5k 0.06W 1% 0603	Vishay CRCW060366K5FKEA
12	1	R5	Resistor, 0603	
13	1	R6	Resistor, Chip 56k 0.06W 5% 0603	Vishay CRCW060356K0JKEA
14	1	R7	Resistor, Chip 100k 0.06W 5% 0603	Vishay CRCW0603100KJNEA
15	1	R8	Resistor, 0402	
16	2	R10, R11	Resistor, 0603	
17	1	R12	Resistor/Jumper, Chip 0 Ω 1/8W 1A 0805	Vishay CRCW08050000Z0EA
Hardware-For Demo Board Only				
1	7	E1-E7	Turret, Testpoint .062 Thick Board	Mill Max 2501-2-00-80-00-00-07-0
2	4	JP1-JP3, JP5	Jumper, 2 Pins 2mm Ctrs.	Samtec TMM-102-02-L-S
3	1	JP6		Samtec TMM-102-02-L-S
4	3	JP7-JP9	Headers, Single Row 3 Pins 2mm Ctrs.	Samtec TMM-103-02-L-S
5	1	JP10	Headers, Double Row 2mm $\times$ 3 2mm Ctrs.	Samtec TMM-103-02-L-D
6	5	XJP2, XJP7-XJP10	Shunt, 2mm Ctrs.	Samtec 2SN-BK-G
7	1		Stencil	Stencil DC1667A

SCHEMATIC DIAGRAM



DEMO MANUAL DC1667A

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



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.