



LTC3630AEMSE/LTC3630EMSE
High Efficiency High Voltage 500mA
Synchronous Step-Down Converter

DESCRIPTION

Demonstration circuit 2105A is a 500mA output DC/DC power supply. There are two versions: DC2105A-A is a board featuring LTC[®]3630A, with 4V to 76V input range; DC2105A-B is a board featuring LTC3630, with 4V to 65V input range. The LTC3630A/LTC3630 operates in a high efficiency Burst Mode[®] operation and includes internal high and low side switches. The board provides jumper selected output voltages of 1.8V, 3.3V, 5V and an option for additional voltages. LTC3630A/LTC3630 has internal soft-start and a provision for increasing soft-start time.

Included on the board is an ON/OFF jumper that can also be configured as a precision undervoltage lockout. Additional PC pads are included for programming current limit to optimize efficiency and for reducing output voltage

ripple and reducing component size. A terminal (FBO) is available to allow multiple boards to be paralleled for increasing output current.

Output voltage between 800mV and V_{IN} can be programmed using optional resistors, although higher voltage output capacitors will be required.

The LTC3630A/LTC3630 data sheet gives a complete description of the operation and application information. The data sheet must be read in conjunction with this demo manual.

Design files for this circuit board are available at
<http://www.linear.com/demo/DC2105A>

LTC, 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

Specifications are at $T_A = 25^\circ\text{C}$

| PARAMETER | CONDITION | VALUE |
|-----------------------------------|--|------------------------|
| Input Voltage Range for DC2105A-A | LTC3630A | 4V to 76V |
| Input Voltage Range for DC2105A-B | LTC3630 | 4V to 65V |
| 1.8V Output | $V_{IN} = 20\text{V}$, V_{OUT} Load = 100mA | $1.8\text{V} \pm 2\%$ |
| 3.3V Output | $V_{IN} = 20\text{V}$, V_{OUT} Load = 100mA | $3.3\text{ V} \pm 2\%$ |
| 5V Output | $V_{IN} = 20\text{V}$, V_{OUT} Load = 100mA | $5\text{V} \pm 2\%$ |
| Maximum Output Current | $V_{IN} = 20\text{V}$, $V_{OUT} = 5\text{V}$ | 500mA |
| Typical Output Voltage Ripple | $V_{IN} = 20\text{V}$, $V_{OUT} = 5\text{V}$ | 75mV _{P-P} |

DEMO MANUAL DC2105A

QUICK START PROCEDURE

This DC2105A can be evaluated using the setup shown in Figure 1.

1. Connect the DVMs to the input and output. Select 5V setting using jumper JP1 (lower position) and JP2 (upper position), select ON position for JP3.
2. With input power supply set for 0V, connect the supply to V_{IN} and GND terminals using short (less than 10 inches) leads, preferably twisted leads. Connect a suitable load to V_{OUT} and GND terminals.
3. Slowly increase the input power supply to 10V. Observe output voltage and verify that it meets the specifications in the Performance Summary. Measure output voltage with and without the load.
4. Move jumpers JP1 and JP2 to the other two fixed voltage settings and verify that each output voltage meets the values as shown in the Performance Summary.

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

NOTES:

- 1. IMPORTANT: 60V or higher voltage can result in an electric shock if care is not taken. Also, hot plugging the circuit to a power supply that has more than 40V present at its output can produce a high voltage transient exceeding the absolute maximum input voltage which can damage the LTC3630A/LTC3630.**
2. 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.

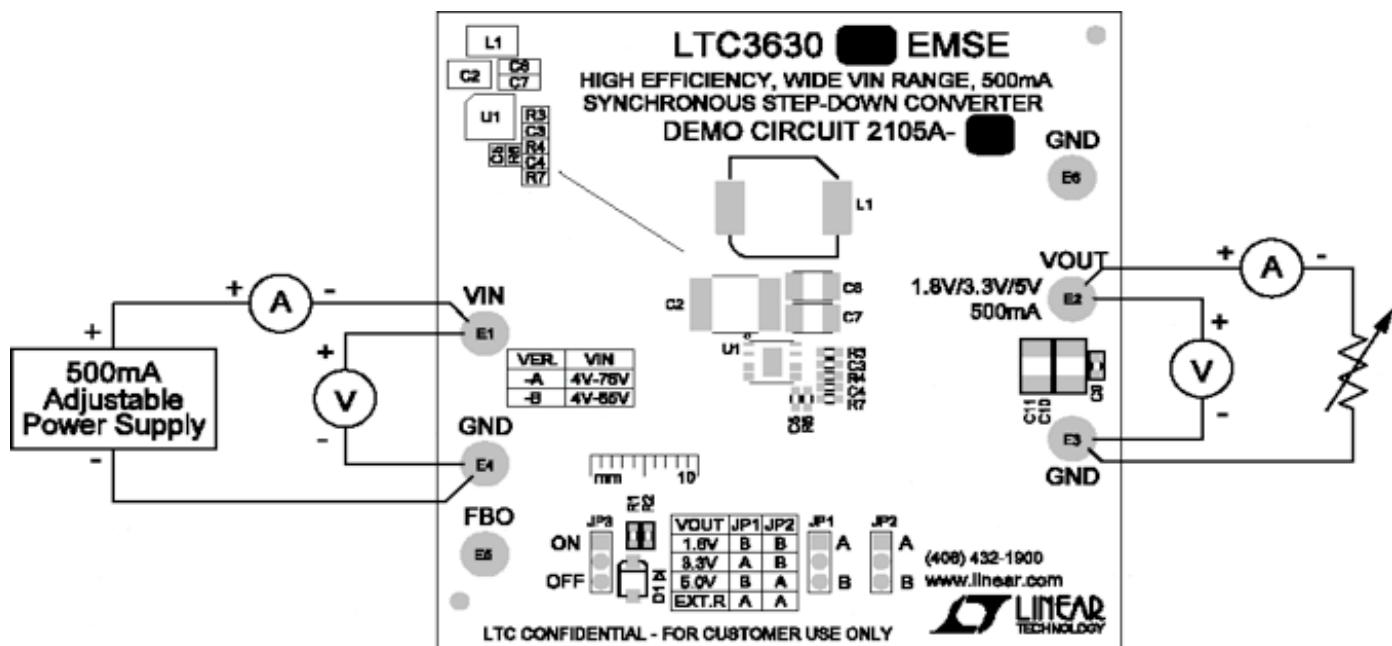


Figure 1. Proper Measurement Equipment Setup

QUICK START PROCEDURE

Circuit Options

Detailed information is contained in the data sheet.

Optional Output Voltage: Additional output voltages can be programmed by selecting proper resistors for the R6 and R7 feedback network. C5 is a feed-forward capacitor to optimize transient response and increase stability. JP1 and JP2 must be in the lower position if R6 and R7 are used. The 10V rated output capacitors must be replaced with suitable voltage ratings.

ISET Components: C3, R3 and R4 are used to provide a number of features and circuit enhancements such as, output current limit, input current limit, optimizing output ripple voltage reduction and efficiency improvement. R4 sets maximum output current, see Figure 2 in the

LTC3630A/LTC3630 data sheet, leave open for maximum load current. R3 and R4 can be used to set input current limit. C3 is used to reduce output voltage ripple and optimize efficiency. See data sheet for details.

RUN Pin Components: The converter is enabled when the RUN pin voltage exceeds 1.21V and is disabled when dropping below 0.7V. Moving JP3 to the ON position allows an internal current to pull the RUN pin up to 5V. R1 and R2 are used to program input undervoltage lockout. Select suitable resistors to divide the input voltage down to the precision threshold voltage levels that enable and disable the converter. Note that the maximum voltage on the RUN pin is 6V, therefore a nominal 5V Zener diode (D1) is required to limit the RUN pin voltage when high input voltages are used.

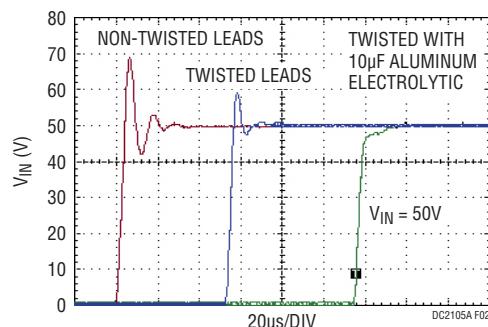


Figure 2. Hot Plugging Input Voltage Transient Using 12" Leads

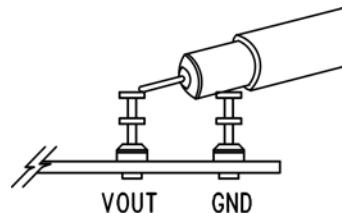
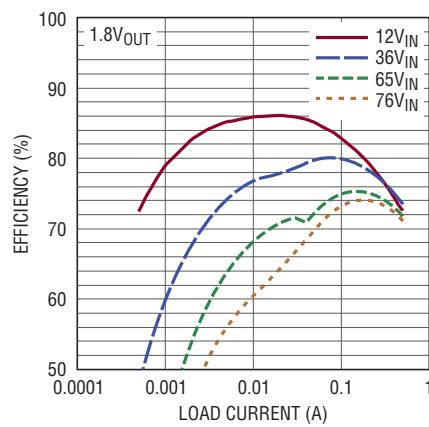
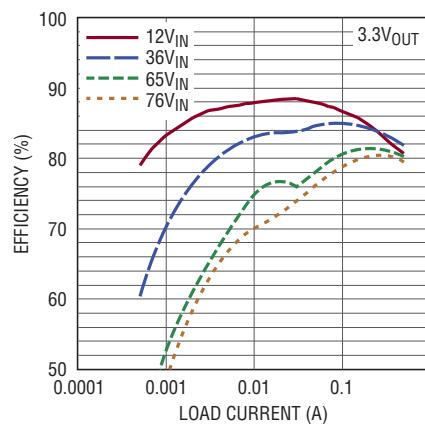


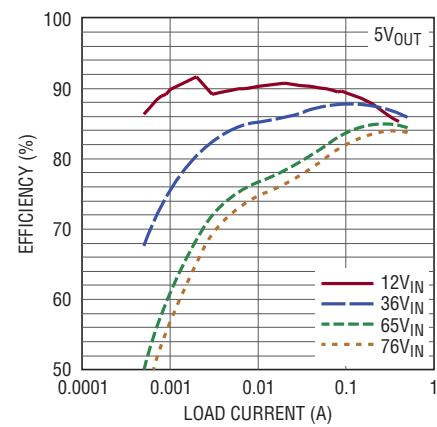
Figure 3. Measuring Input or Output Voltage Ripple



DC2105A F04a



DC2105A F04b



DC2105A F04c

Figure 4. Efficiency vs Load Current Curves

DEMO MANUAL DC2105A

PARTS LIST

DC2105A-A

| ITEM | QTY | REFERENCE | PART DESCRIPTION | MANUFACTURER/PART NUMBER |
|---|-----|------------------------|-------------------------------------|----------------------------------|
| Required Circuit Components | | | | |
| 1 | 1 | C1 | CAP, 0805 220nF 10% 100V X7R | MURATA GRM21AR72A224KAC5L |
| 2 | 1 | C2 | CAP, 2220 4.7µF 20% 100V X7R | TDK C5750X7R2A475M |
| 3 | 1 | C3 | CAP, 0603 220pF 10% 50V X7R | AVX 06035C221KAT2A |
| 4 | 1 | C4 | CAP, 0603 47nF 10% 25V X7R | AVX 06033C473KAT |
| 5 | 2 | C6, C7 | CAP, 1210 100µF 20% 10V X5R | TAIYO YUDEN LMK325ABJ107MM-T |
| 6 | 1 | C9 | CAP, 0603 0.1µF 10% 25V X7R | AVX 06033C104KAT2A |
| 7 | 1 | L1 | IND, 68µH | SUMIDA CDRH105RNP-680N |
| 8 | 1 | R4 | RES, 0603 220kΩ 5% 1/10W | VISHAY CRCW0603220KJNEA |
| 9 | 1 | R5 | RES, 0805 4.7Ω 5% 1/8W | VISHAY CRCW08054R70JNEA |
| 10 | 1 | R6 | RES, 0603 0Ω JUMPER | VISHAY CRCW06030000Z0EA |
| 11 | 1 | U1 | IC, SYNCHRONOUS STEP-DOWN CONVERTER | LINEAR TECH. LTC3630AEMSE |
| Additional Demo Board Circuit Components | | | | |
| 1 | 0 | C5 | CAP, 0603 OPTION | OPTION |
| 2 | 0 | C8, C10, C11 | CAP, 1210 OPTION | OPTION |
| 3 | 0 | D1 | DIODE, OPTION | OPTION |
| 4 | 0 | R1, R2, R3, R7 | RES, 0603 OPTION | OPTION |
| Hardware | | | | |
| 1 | 6 | E1, E2, E3, E4, E5, E6 | TURRET | MILL MAX 2501-2-00-80-00-00-07-0 |
| 2 | 3 | JP1, JP2, JP3 | HEADER, 3 PIN, 2mm | SAMTEC TMM-103-02-L-S |
| 3 | 3 | JP1, JP2, JP3 | SHUNT, 2mm | SAMTEC 2SN-BK-G |

DEMO MANUAL DC2105A

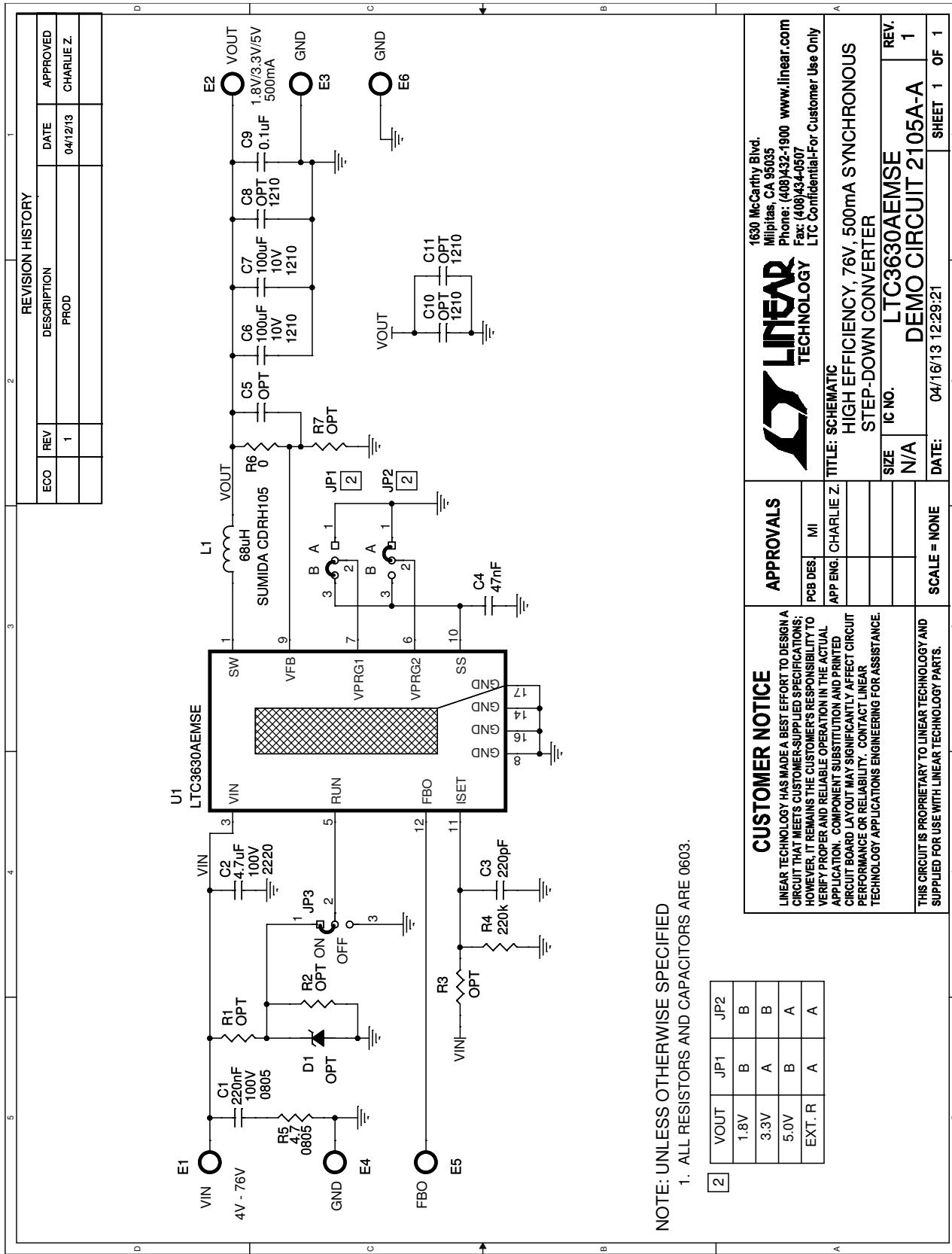
PARTS LIST

DC2105A-B

| ITEM | QTY | REFERENCE | PART DESCRIPTION | MANUFACTURER/PART NUMBER |
|---|-----|------------------------|-------------------------------------|----------------------------------|
| Required Circuit Components | | | | |
| 1 | 1 | C1 | CAP, 0805 220nF 10% 100V X7R | MURATA GRM21AR72A224KAC5L |
| 2 | 1 | C2 | CAP, 2220 4.7µF 20% 100V X7R | TDK C5750X7R2A475M |
| 3 | 1 | C3 | CAP, 0603 220pF 10% 50V X7R | AVX 06035C221KAT2A |
| 4 | 1 | C4 | CAP, 0603 47nF 10% 25V X7R | AVX 06033C473KAT |
| 5 | 2 | C6, C7 | CAP, 1210 100µF 20% 10V X5R | TAIYO YUDEN LMK325ABJ107MM-T |
| 6 | 1 | C9 | CAP, 0603 0.1µF 10% 25V X7R | AVX 06033C104KAT2A |
| 7 | 1 | L1 | IND, 68µH | SUMIDA CDRH105RNP-680N |
| 8 | 1 | R4 | RES, 0603 220kΩ 5% 1/10W | VISHAY CRCW0603220KJNEA |
| 9 | 1 | R5 | RES, 0805 4.7Ω 5% 1/8W | VISHAY CRCW08054R70JNEA |
| 10 | 1 | R6 | RES, 0603 0Ω JUMPER | VISHAY CRCW06030000Z0EA |
| 11 | 1 | U1 | IC, SYNCHRONOUS STEP-DOWN CONVERTER | LINEAR TECH. LTC3630EMSE |
| Additional Demo Board Circuit Components | | | | |
| 1 | 0 | C5 | CAP, 0603 OPTION | OPTION |
| 2 | 0 | C8, C10, C11 | CAP, 1210 OPTION | OPTION |
| 3 | 0 | D1 | DIODE, OPTION | OPTION |
| 4 | 0 | R1, R2, R3, R7 | RES, 0603 OPTION | OPTION |
| Hardware | | | | |
| 1 | 6 | E1, E2, E3, E4, E5, E6 | TURRET | MILL MAX 2501-2-00-80-00-00-07-0 |
| 2 | 3 | JP1, JP2, JP3 | HEADER, 3 PIN, 2mm | SAMTEC TMM-103-02-L-S |
| 3 | 3 | JP1, JP2, JP3 | SHUNT, 2mm | SAMTEC 2SN-BK-G |

DEMO MANUAL DC2105A

SCHEMATIC DIAGRAM

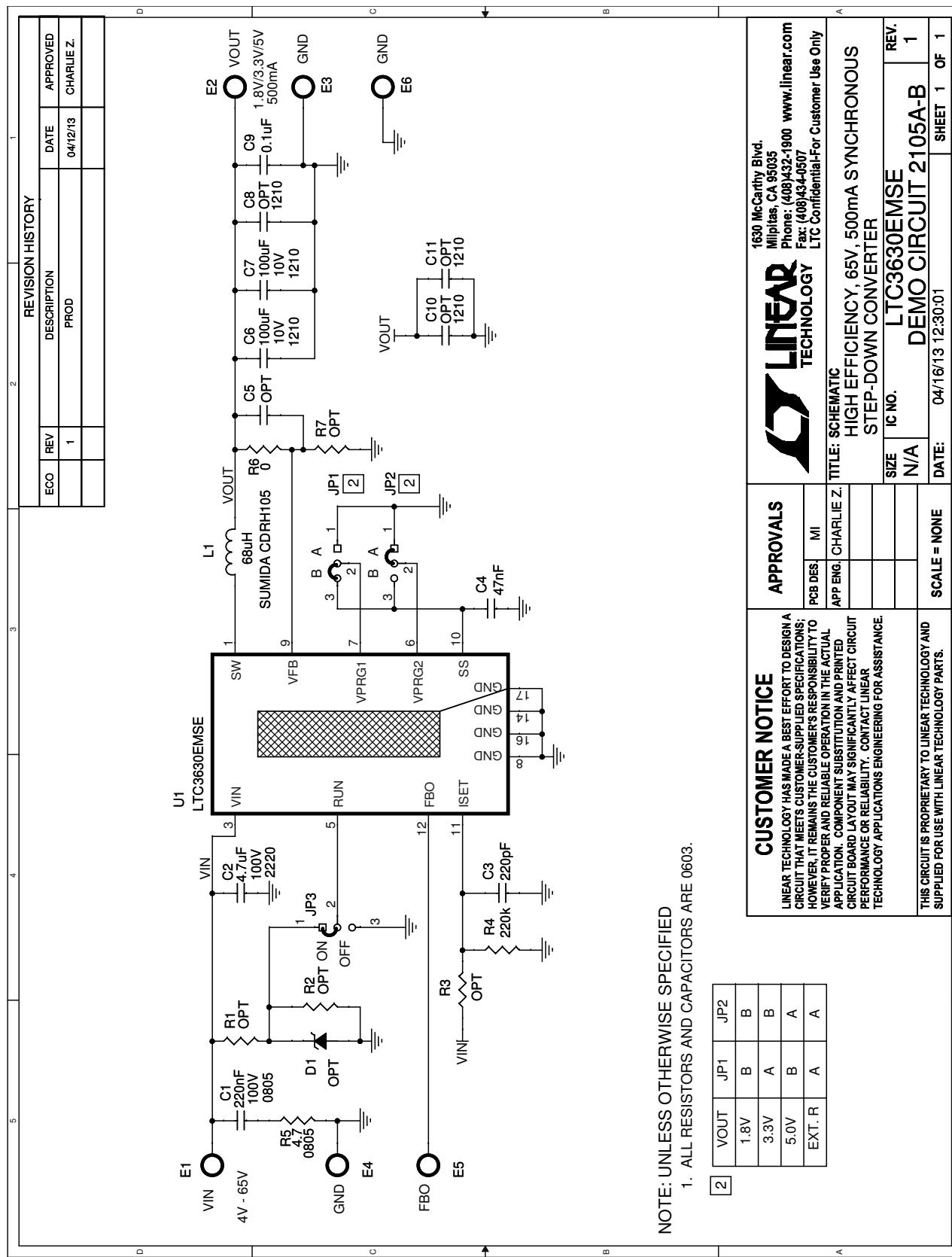


NOTE: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS AND CAPACITORS ARE 0603

| | VOUT | JP1 | JP2 |
|--------|------|-----|-----|
| 1.8V | B | B | |
| 3.3V | A | B | |
| 5.0V | B | A | |
| EXT. R | A | A | |



SCHEMATIC DIAGRAM



NOTE: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS AND CAPACITORS ARE 0603.

| 2 | VOUT | JP1 | JP2 |
|--------|------|-----|-----|
| 1.8V | B | B | |
| 3.3V | A | B | |
| 5.0V | B | A | |
| EXT. R | A | A | |

DEMO MANUAL DC2105A

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

dc2105af



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, помошь 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 помошь 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.