

DESCRIPTION

Demonstration circuit 649 is a Telecom isolated DC/DC converter featuring the LTC[®]3803 constant frequency current mode flyback controller. The DC649 converts an isolated 36V to 72V input and provides 2A of output current at 5V. The 200kHz constant frequency operation is maintained down to very light load to reduce low frequency noise generated over a wide range of load current. The converter provides high output voltage accuracy (typically $\pm 2\%$) over wide load range with no minimum load requirement.

The DC649 also provides non-isolated design by removing opto coupler and LT[®]1431 circuit. The demonstration circuit can be easily modified to generate different output voltages up to 15V. The

output current is limited by total output power to 10W. Higher output voltages and currents can be achieved by changing the MOSFET, transformer and output capacitors. Please consult LTC factory for details.

The DC649 has a small circuit footprint. It is a high performance and cost effective solution for Telecom, Automotive and Power over Ethernet applications.

Design files for this circuit board are available. Call the LTC factory.

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QUICK START PROCEDURE

Demonstration circuit 649 is easy to set up to evaluate the performance of the LTC3803. For proper measurement equipment setup refer to Figure 1 and follow the procedure below:

NOTE: When measuring the input or output voltage ripple, care must be taken to minimize the length of the oscilloscope probe ground lead. Measure the input or output voltage ripple by connecting the probe tip directly across the V_{IN} or V_{OUT} and GND terminals as shown in Figure 2.

1. With power off, connect the input power supply to +Vin and -Vin.
2. Turn the input power source on and slowly increase the input voltage. Be careful not to exceed 72V.

NOTE: Make sure that the input voltage V_{IN} does not exceed 72V. If higher operating voltage is required,

power components with higher voltage ratings should be used.

3. Check for proper output voltage. $V_{out}=5V$.

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

4. To shut the converter down, pull the shut down pin below 0.28V.

NOTE: Do not apply voltage to \overline{SHDN} Pin.

5. Once the proper output voltage is established, adjust the load within 2A range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

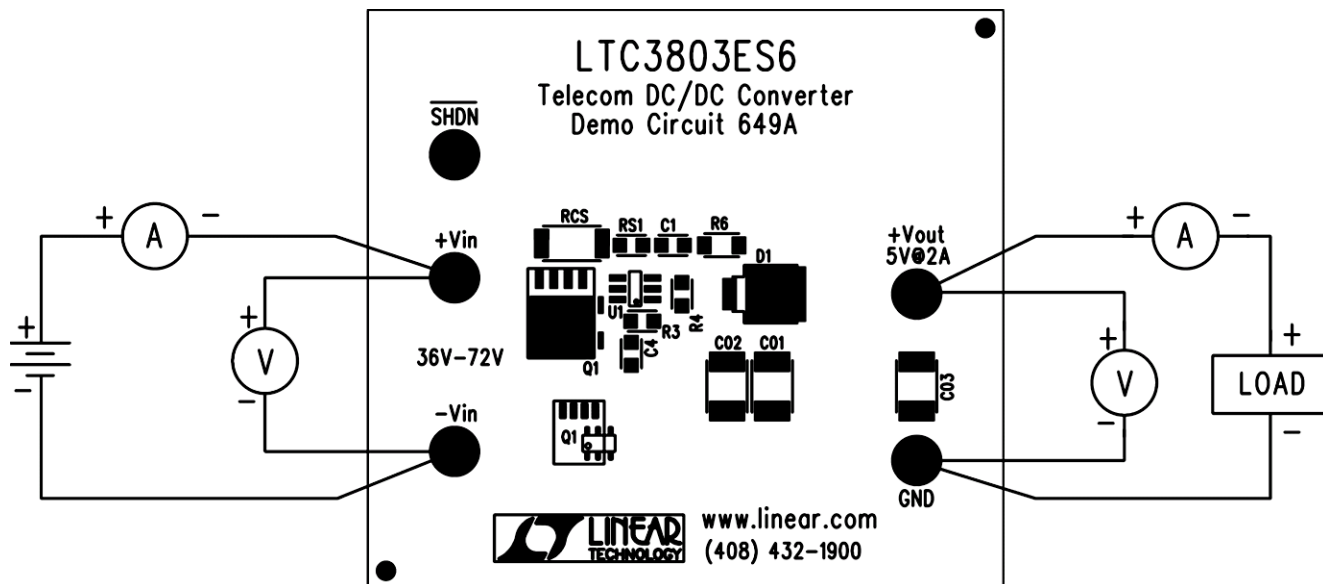


Figure 1. Proper Measurement Equipment Setup

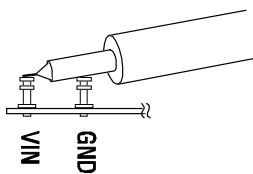
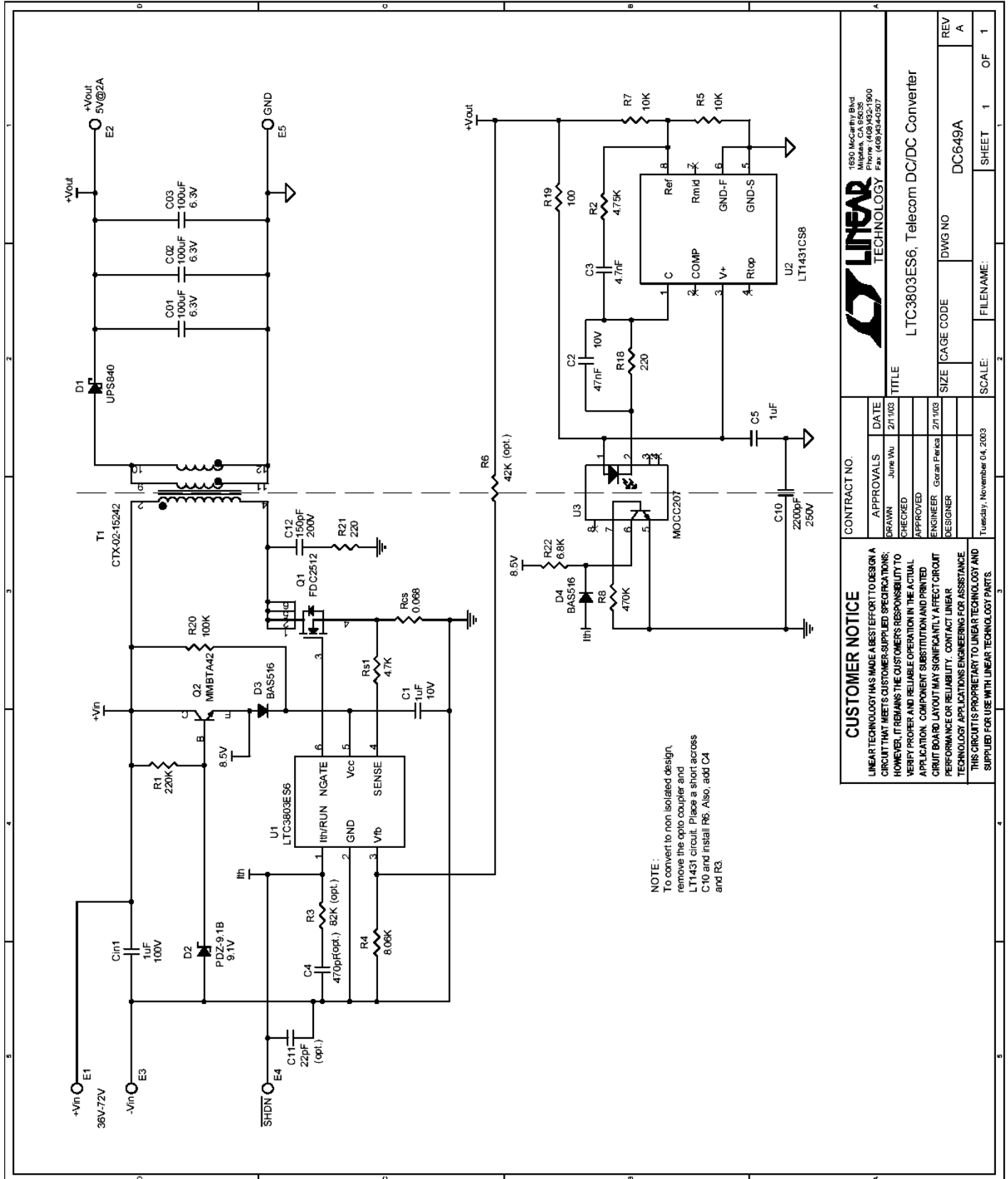


Figure 2. Measuring Input or Output Ripple

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 649 TELECOM DC/DC CONVERTER



| | | | |
|--|--------------|-------------------------------------|------|
| CUSTOMER NOTICE | | CONTRACT NO. | |
| LINEAR TECHNOLOGY HAS MADE A BEST EFFORT TO DESIGN A CIRCUIT THAT MEETS CUSTOMER SUPPLIED SPECIFICATIONS; HOWEVER, IT REMAINS THE CUSTOMER'S RESPONSIBILITY TO VERIFY PROPER AND RELIABLE OPERATION IN THE ACTUAL APPLICATION. COMPONENT SUBSTITUTION AND PRINTED CIRCUIT BOARD LAYOUT MAY SIGNIFICANTLY AFFECT CIRCUIT PERFORMANCE OR RELIABILITY. CONTACT LINEAR TECHNOLOGY APPLICATIONS ENGINEERING FOR ASSISTANCE. | | LTC3803ES6, Telecom DC/DC Converter | |
| THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS. | | TITLE | |
| APPROVALS | | DATE | |
| DRAWN | June Wu | 2/11/03 | |
| CHECKED | | | |
| APPROVED | | | |
| ENGINEER | Gregg Perica | 2/11/03 | |
| DESIGNER | | | |
| Tuesday, November 04, 2003 | | SCALE: | |
| SIZE | CAGE CODE | DWG NO | REV |
| | | DC649A | A |
| FILENAME: | SHEET | 1 | OF 1 |

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| <u>Item</u> | <u>Qty</u> | <u>Reference</u> | <u>Part Description</u> | <u>Manufacture / Part #</u> |
|-------------|------------|------------------|--|-----------------------------|
| 1 | 1 | Cin1 | CAP., X7R, 1uF, 100V, 10% 1210 | TDK, C3225X7R2A105K |
| 2 | 3 | C01,C02,C03 | CAP., X5R, 100uF, 6.3V, 20% 1210 | TDK, C3225X5R0J107M |
| 3 | 1 | C1 | CAP., X7R, 1uF, 10V, 20% 0805 | Taiyo Yuden, LMK212BJ105MG |
| 4 | 1 | C2 | CAP., X7R, 0.047uF, 10V, 10% 0805 | AVX, 0805ZC473KAT2A |
| 5 | 1 | C3 | CAP., X7R, 4.7nF, 16V, 10% 0805 | AVX, 0805YC472KAT2A |
| 6 | 0 | C4 (opt.) | CAP., 470pF 0805 | |
| 7 | 1 | C5 | CAP., X5R, 1uF, 16V, 20% 0805 | Taiyo Yuden, EMK212BJ105MG |
| 8 | 1 | C10 | CAP., X7R, 2200pF, 250V, 10% 1812 | Murata, GA343DR7GD222KW01L |
| 9 | 0 | C11 (opt.) | CAP., X7R, 22pF, 0805 | AVX, 0805YC222KAT2A |
| 10 | 1 | C12 | CAP., C0G, 150pF, 200V, 5% 1206 | AVX, 12062A151JAT2A |
| 11 | 1 | D1 | Schottky Barrier REC., UPS840 ,Powermite | MICROSEMI., UPS840 |
| 12 | 1 | D2 | Diode, 9.1V, PDZ-9.1B, SOD-323 | Philips, PDZ9.1B |
| 13 | 2 | D3,D4 | High Speed Diode, BAS516 SOD523 | Philips, BAS516 |
| 14 | 5 | E1,E2,E3,E4,E5 | TURRET, | MILL-MAX, 2501-2 |
| 15 | 1 | Q1 | N-Chan. Mosfet, FDC2512, Super-SOT-6 | Fairchild, FDC2512 |
| 16 | 1 | Q2 | TRAN NPN, MMBTA42, SOT23 | Diodes Inc., MMBTA42-7 |
| 17 | 1 | Rcs | RES., CHIP, 0.068, 1% 1206 | Thin Film., RL1632R-R068-F |
| 18 | 1 | Rs1 | RES., CHIP, 4.7K, 5% 0805 | AAC, CR10-472JM |
| 19 | 2 | R5,R7 | RES., CHIP, 10K, 1% 0805 | AAC, CR10-1002FM |
| 20 | 1 | R1 | RES., CHIP, 220K, 5% 0805 | AAC, CR10-224JM |
| 21 | 1 | R2 | RES., CHIP, 4.75K, 1% 0805 | AAC, CR10-4751FM |
| 22 | 0 | R3 (opt.) | RES., CHIP, 82K, 0805 | |
| 23 | 1 | R4 | RES., CHIP, 8.06K, 1% 0805 | AAC, CR10-8061FM |
| 24 | 0 | R6 (opt.) | RES., CHIP, 42K, 1206 | |
| 25 | 1 | R8 | RES., CHIP, 470K, 5% 0805 | AAC, CR10-474JM |
| 26 | 1 | R18 | RES., CHIP, 220ohm, 5% 0805 | AAC, CR10-221JM |
| 27 | 1 | R19 | RES., CHIP, 100, 5% 0805 | AAC, CR10-101JM |
| 28 | 1 | R20 | RES., CHIP, 100K, 5% 1206 | AAC, CR18-104JM |
| 29 | 1 | R21 | RES., CHIP, 220, 5% 1206 | AAC, CR18-221JM |
| 30 | 1 | R22 | RES., CHIP, 6.8K, 5% 0805 | AAC, CR10-682JM |
| 31 | 1 | T1 | Transformer, CTX02-15242 | COOPER., CTX02-15242 |
| 32 | 1 | U1 | I.C., LTC3803ES6, SOT23-6 | LINEAR., LTC3803ES6 |
| 33 | 1 | U2 | I.C., LT1431CS8, SO8 | LINEAR., LT1431CS8 |
| 34 | 1 | U3 | Optocouplers, MOC207-M | Fairchild, MOC207M |
| 35 | 1 | | PRINTED CIRCUIT BOARD | FAB., DEMO CIRCUIT 649A |
| 36 | 2 | | STENCIL | STENCIL |