

DESCRIPTION

Demonstration circuit 839 is a triple input ideal diode based PowerPath circuit featuring the LTC4413 dual Ideal diode controller with dual Integrated MOSFETs.

The circuit allows one of 3 sources to become the primary power source. Under certain circumstance, current sharing is possible among all power sources at any given time. However, only the BAT and USB inputs can share current equally given identical sources. Furthermore, only the BAT and USB power inputs are protected from reverse current flow. Wall input FET Q1 is not driven as an Ideal Diode.

The WALL input (Q1) will automatically come on when the voltage is high enough to pick up the load on Vout being supplied by the BAT input. The turn-on trip voltage will be Q1's internal diode drop above Vout. The LTC4413 will sense the drop in current the BAT input and turns on Q1 through its status output. Once Q1 is turned on, Q1's internal diode drop is eliminated creating a snap-on hysteresis effect. Likewise the snap action works in reverse once the WALL input voltage drops below the BAT input voltage allowing the BAT input to supply current to the load. The USB input has no influence over Q1's state unless the BAT input is reversed or disabled. See Table 2 for Truth Table Information.

The LTC4413 is offered in a MS08 exposed pad 8 pin package. Careful PCB layout in terms of heat sinking is critical to obtaining maximum circuit current. Q1 has no short circuit or thermal overload protection and care must be taken to not destroy the MOSFET.

The maximum continuous current in free air room temp is about 2.4A. 2.6A is permissible with some air cooling or improved thermal management. Current levels above 280mA, the output voltage drop will become a function of the LTC4413 Rds-on value.

The LTC4413 has weak internal pull-downs that allow BAT and USB inputs to be on by default with no connections to the ENBA and ENBB control inputs.

Test points are provided to monitor or control WALL, BAT, USB, VOUT, ENBA and ENBB. Multiple Ground Test-points are also provided.

When using ceramic capacitors, care must be taken to not cause voltage spikes. The 10 Ω resistors address this issue. See LT Application Note 88 for more information.

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

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QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 839

DUAL IDEAL DIODE-TRIPLE POWER PATH CONTROLLER

Table 1. Performance Summary

PARAMETER	CONDITION/NOTES	MAX VALUE
Maximum Input Voltage		5.5V
Minimum Input Voltage		2.5V
Datasheet Max Current BAT & USB	Thermally Limited	2.6A
839 Max Current BAT & USB	Room temp, No fan, 5V on BAT or USB input	2.4A
Typical Voltage Drop	3.6V on BAT or USB input. 100mOhm Rds-on.	50mV @0.5A
Typical Transition Current	3.6V, From Vfwd = Regulated @ 28mV to = (Rds-on x Iload)	280mA
Thermal Overload Current Limit	Thermal overload caused by Short Circuit on output.	1.8A min.
Typical DCIN MOSFET Rds-on	Fairchild FDC606P 2.5Vgs / 4.5Vgs	35mOhm / 26mOhm
Maximum Current on WALL input	Thermally Limited.	4A @ 2.5V

Table 2. Q1 & LED State table

BAT FOWARED CURRENT	USB FORWARD CURRENT	WALL (Q1) / LED STATE
OFF	OFF	ON
OFF	ON	ON
ON	OFF	OFF
ON	ON	OFF
Disabled	OFF	ON
Disabled	ON	OFF
OFF	Disabled	ON
ON	Disabled	OFF
Disabled	Disabled	ON

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DUAL IDEAL DIODE-TRIPLE POWER PATH CONTROLLER

QUICK START PROCEDURE

Demonstration circuit 839 is easy to set up to evaluate the performance of the LTC4413. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. Connect a power source to the WALL and GND. The power supply must be capable of at least enough current to supply the VOUT Load.
2. Connect an adjustable load to the VOUT and GND terminals and set it to 0Amps
3. Turn on the DCIN input power supply and 839 should power up. LED should come on.
4. Turn on the other sources as required (BAT or USB).
5. Adjust load and/or input voltage as required for evaluation.

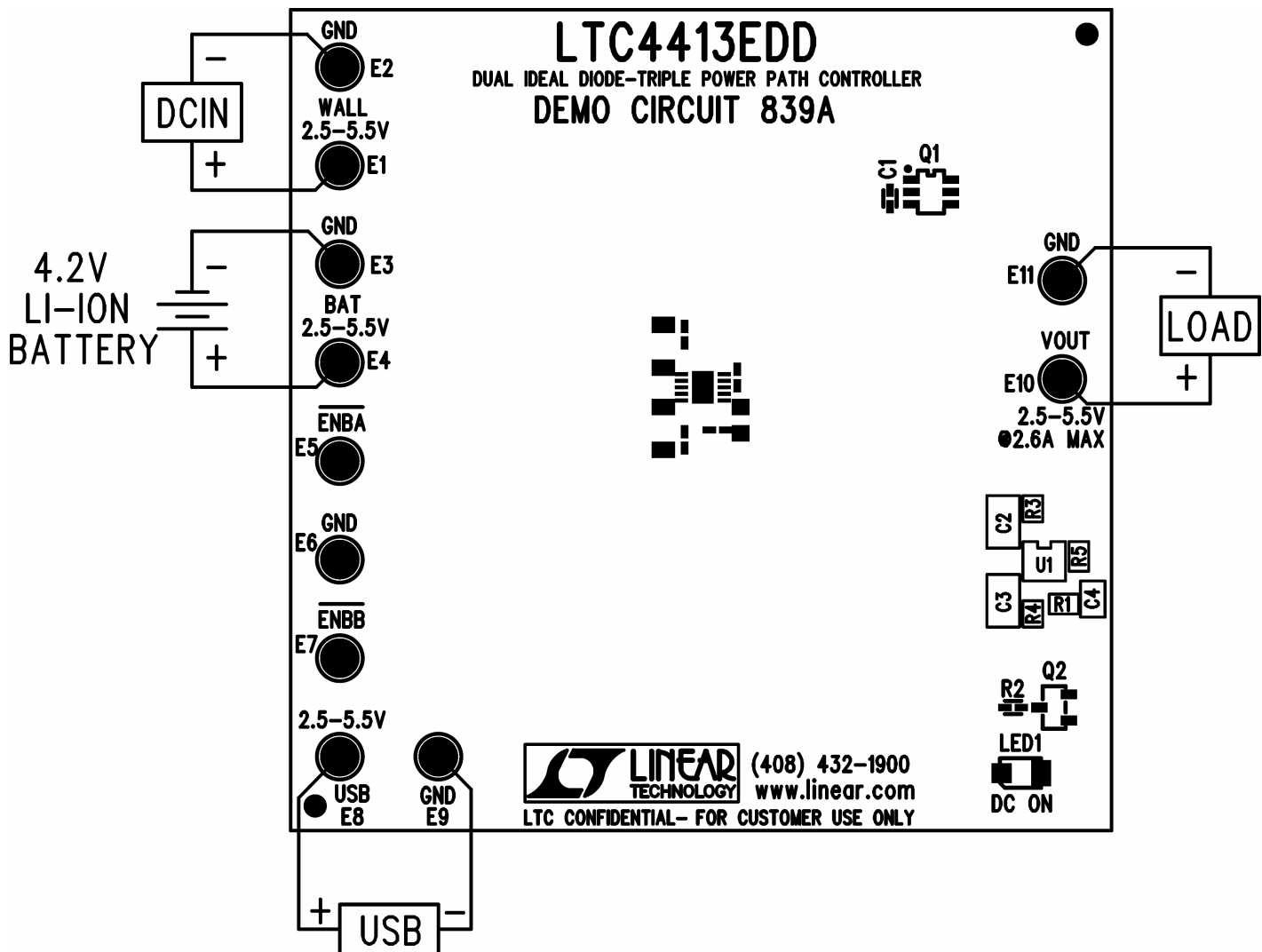
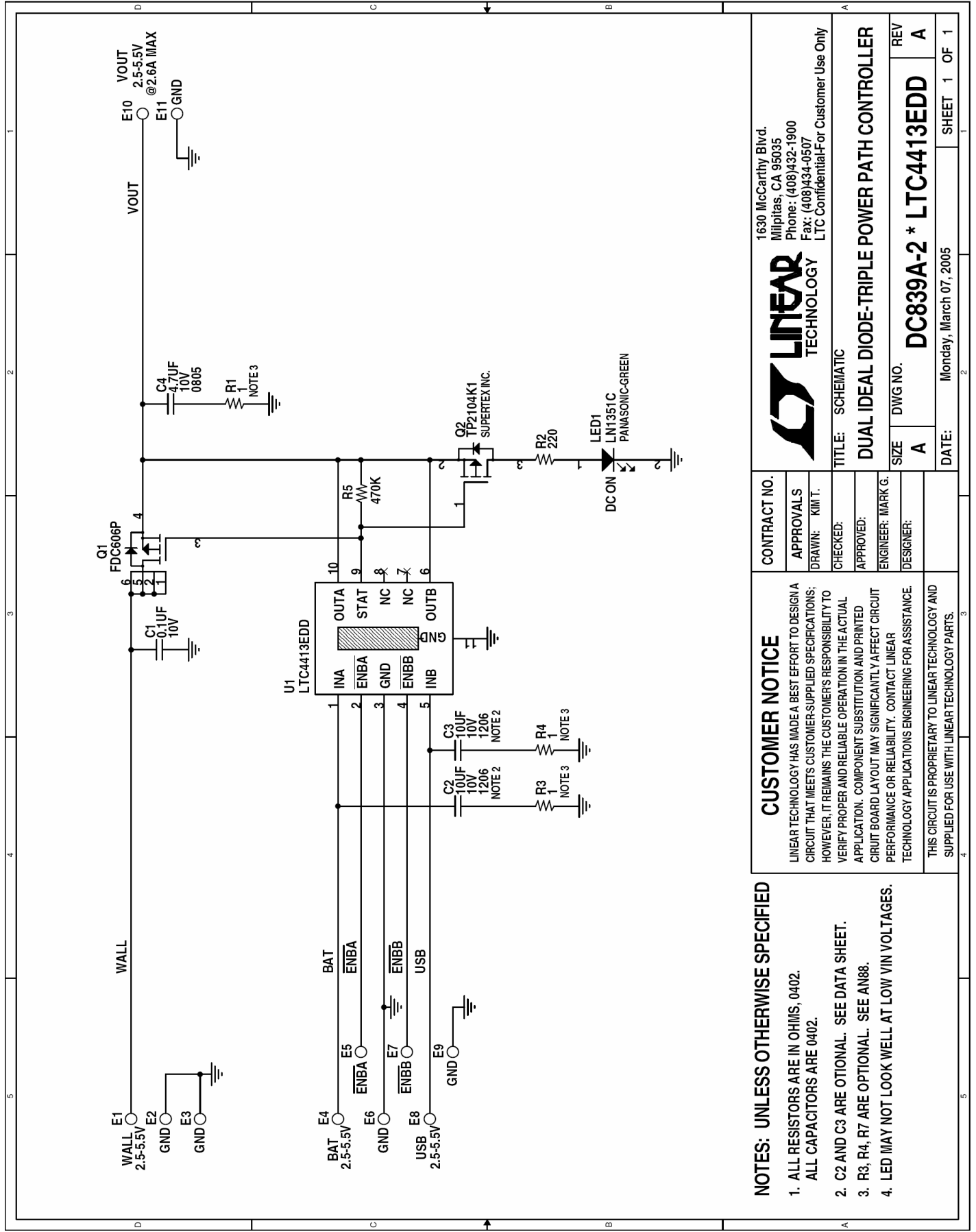


Figure 1. Proper Measurement Equipment Setup

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DUAL IDEAL DIODE-TRIPLE POWER PATH CONTROLLER



NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTORS ARE IN OHMS, 0402.
ALL CAPACITORS ARE 0402.
2. C2 AND C3 ARE OPTIONAL. SEE DATA SHEET.
3. R3, R4, R7 ARE OPTIONAL. SEE AN88.
4. LED MAY NOT LOOK WELL AT LOW VIN VOLTAGES.

CUSTOMER NOTICE

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.

THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.

CONTRACT NO.

APPROVALS

DRAWN: KIM T.

CHECKED:

APPROVED:

ENGINEER: MARK G.

DESIGNER:

1630 McCarthy Blvd.

Milpitas, CA 95035

Phone: (408)432-1900

Fax: (408)434-0507

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TITLE: SCHEMATIC

DUAL IDEAL DIODE-TRIPLE POWER PATH CONTROLLER

SIZE DWG NO. **DC839A-2 * LTC4413EDD** REV **A**

DATE: Monday, March 07, 2005 SHEET 1 OF 1

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