QUICK START GUIDE FOR DEMONSTRATION CIRCUIT DC867
DUAL INPUT USB / AC ADAPTER STANDALONE LI-ION CHARGER

LTC4075XEDD

DESCRIPTION

Demonstration circuit DC867 features the LTC4075X standalone linear charger that is capable of charging a single-cell Li-Ion battery from both AC adapter and USB inputs. DC867 is designed to demonstrate the LTC4075X capability to automatically select the appropriate power source for charging. DC867 is set up so that when the USB source is used as the input, the charge current is set to 500mA and when the AC adapter is available, regardless of the USB input connection, the charge current increases to 800mA.

The enable operation of the LTC4075X changes with different input sources. When the LTC4075X is charging from the AC adapter source, a "logic low" enables the charger and when the USB input is used for charging, "logic high" is needed to activate the LTC4075X. DC867 is design to start charging with AC adapter as default mode. For USB input charging, the JP1 jumper has to be set to the **USB on** position or the **USB ENABLE** pin (turret) has to be pulled above 1V. The jumper setting can be **USB on** for AC adapter charging mode but the **USB ENABLE** terminal (turret) has to be floating or pulled low to enable AC adapter mode charging.

There are two LED indicators (the third LED is for optional "USB power" indication) for battery charge status and input power status. The "CHRG" LED will be turned on when LTC4075X is charging and it will be turned off when charging is terminated or the LTC4075X is disabled. The "PWR" LED will be turned on when the input source is sufficient to begin charging. The "PWR" LED will be turned off when the input source is not present or the input source is below the under voltage lockout threshold (Typically 4.2V for AC adapter and 4V for USB inputs).

The charge currents for both USB and AC adapter charging modes and termination current setting can be easily adjusted by changing the program resistors. Please refer to the LTC4075X datasheet for more information.

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

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Table 1. Performance Summary (T_A = 25°C unless otherwise noted)

PARAMETER FOR LED DRIVER	CONDITION	VALUE
Input Voltage Range AC adapter and USB		4.3V to 6V
Output Float Voltage VBAT (constant voltage mode)	Over The Full Operating Temperature Range (0°C to 85°C)	4.2V +/- 1%
Charge Current AC adapter	R4 = 1.24K	800mA
Charge Current USB Input	R3 = 2.10K	476mA (500mA max, 0°C to 85°C)
Charge Termination	R5 = 2.00K	50mA

QUICK START PROCEDURE

Demonstration circuit 867 is easy to set up to evaluate the performance of the LTC4075X. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

The charger can be evaluated using an actual Lithium Ion battery or a battery simulator. The battery simulator is faster because all battery state-of-charge conditions can be quickly simulated.

A battery simulator consists of an adjustable power supply with a load resistor across the power supply output. The resistor value is selected that will provide approximately 1A when the power supply is set for 2.5V and power supply must provide at least 1.7A when adjusted for 4.2V. An example for battery simulator would be a 2 Ohm, 10 Watt power resistor connected to the output of a 5V, 5A bench supply.

1. With the input power supply and battery simulator power supply adjusted to 0V, connect the two power supply outputs to the **ADAPTER INPUT** and **GND** terminals; and **LI-ION+** and **GND** terminals as shown in Figure 1 to test AC adapter charging mode. Make sure that **USB ENABLE** terminal (turret) is floating or pulled low for enabling AC adapter mode charging.
2. Increase the battery voltage to 3.6V. Observe the 800mA battery charge current (measured at input). Start to increase the adapter input voltage. When the input supply voltage exceeds 4.2V, the charger should activate and the PWR and CHRG LEDs will illuminate.
3. Increase the battery voltage to 4.2V and note that the charge current falls to 0 and “CHRG” LED will be turned off. This illustrates the constant voltage portion of the charging characteristic.
4. Set both power supply and battery simulator back to 0V and connect the power supply (or USB source) to **USB INPUT** and **GND** terminals; and **LI-ION+** and **GND** terminals as shown in Figure 1 to test the USB charging mode. Make sure that the **USB ENABLE** jumper is set to “**USB ON”** position for enabling USB input charging mode.
5. Increase the battery voltage to 3.6V. Observe the 476mA battery charge current (measured at input). Start to increase the USB input voltage. When the input supply voltage exceeds 4V the charger should activate and the CHRG LED will illuminate.
6. Test the USB shutdown mode by placing the **USB ENABLE** jumper to “**USB OFF”** position. Note that the input current (or USB current) falls to under 30uA to comply with the USB shutdown mode.
7. Place jumper back to “**USB ON”** position for enabling USB charging. Increase the battery voltage to 4.2V and note that the charge current falls to 0 and “CHRG” LED will be turned off. This illustrates the constant voltage portion of the charging characteristic. Note that the input current (or USB current) decrease down to 50uA, which is the typical USB current under standby mode (when the charging is terminated).

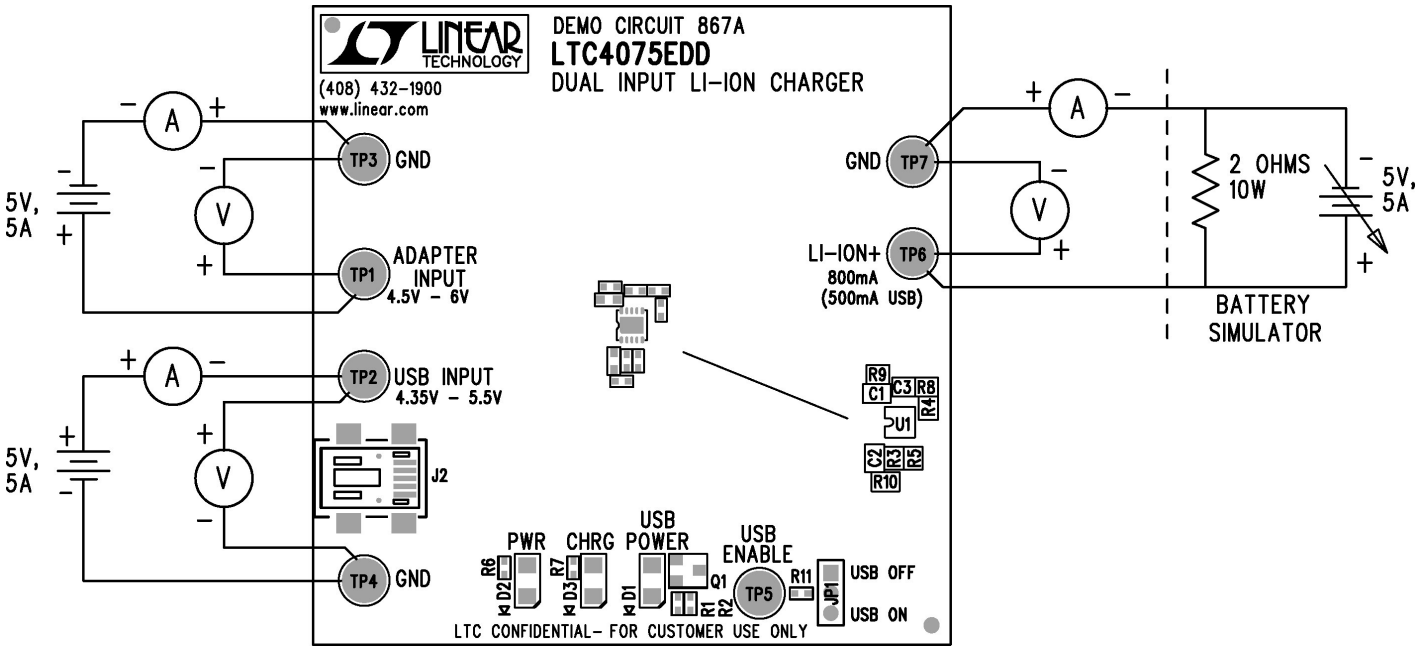


Figure 1. Proper Measurement Equipment Setup

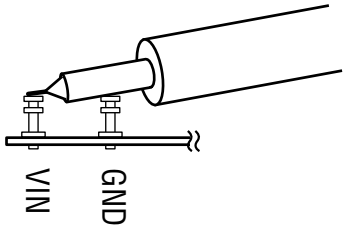
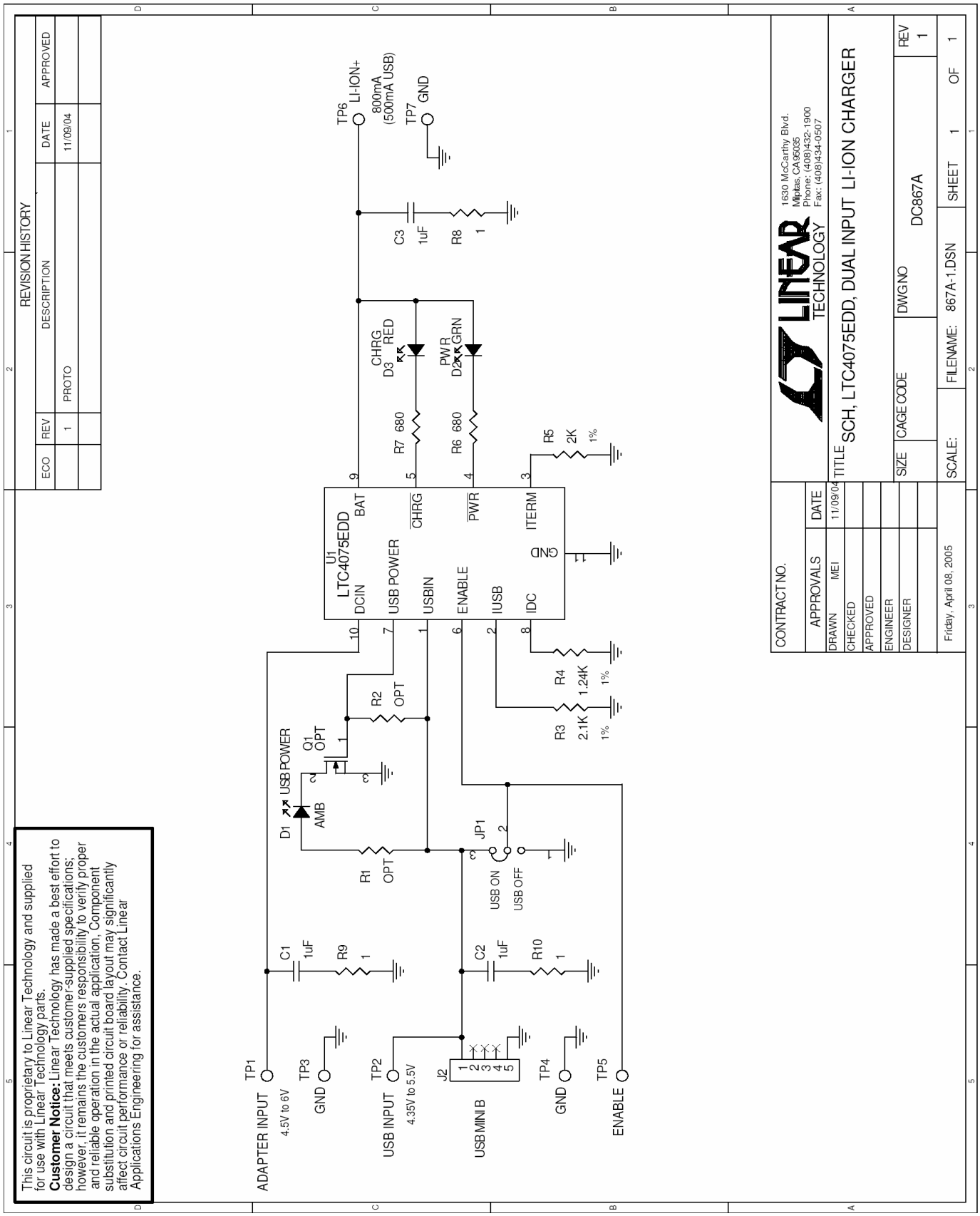


Figure 2. Measuring Input or Output Ripple


REVISION HISTORY
ECO
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DESCRIPTION
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APPROVED
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11/09/04
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TITLE
SCH, LTC4075EDD, DUAL INPUT LI-ION CHARGER
SIZE
CAGE CODE
DWG NO
DC867A
REV
1
SCALE:
FILENAME: 867A-1.DSN
SHEET 1 OF 1
U1
LTC4075EDD
DCIN
USB POWER
USBIN
ENABLE
IUSB
IDC
GND
ITERM
PWR
CHRG
BAT
TP1
ADAPTER INPUT
4.5V to 6V
TP2
USB INPUT
4.35V to 5.5V
TP3
GND
TP4
GND
TP5
ENABLE
TP6
LI-ION+
800mA
(500mA USB)
TP7
GND
J2
USB MINI B
D1
USB POWER
AMB
Q1
OPT
D2
PWR
GRN
D3
CHRG
RED
JP1
USB ON
USB OFF
R1 OPT
R2 OPT
R3 2.1K 1%
R4 1.24K 1%
R5 2K 1%
R6 680
R7 680
R8 1
R9 1
R10 1
C1 1uF
C2 1uF
C3 1uF

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