LTC4065EDC

DESCRIPTION

Demonstration circuit DC763 is a complete constant-current, constant-voltage battery charger designed to charge single-cell lithium-ion batteries. DC763 is based on the LTC4065 that is available in a 2mm × 2mm DFN package featuring an exposed bottom-side metal pad for soldering to the PC board. The LTC4065 features an internal MOSFET with thermal feedback loop that regulates the charge current to limit the die temperature during high power operation or high ambient thermal conditions. The preset float voltage is 4.2V with 0.6% accuracy and the constant charge current is 650mA. The DC763 has a jumper for enabling the charger (JP1). Placing the jumper to "OFF" turns off the charger and jumper to "ON" enables the charger. The full-featured DC763 also includes automatic recharge, low–battery charge conditioning (trickle charging), soft-start (to limit inrush current) and a C/10 charge LED indicator. Small surface mount components are used to minimize board space and height.

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

Table 1. **Performance Summary**

PARAMETER	CONDITION	VALUE
Input Voltage		3.75-5.25V
I_{BAT} (constant current mode)	Vin=5V, Vbat=3.6V	650mA +/-5%
Float Voltage	Vin=5V	4.20V +/-0.6%
Trickle Charge Threshold		2.9V +/-0.15V
I_{BAT} (trickle current mode)		65mA +/-20mA

QUICK START PROCEDURE

Demonstration circuit DC763 is easy to set up to evaluate the performance of the LTC4065. Refer to Figure 1. for proper measurement equipment setup and follow the procedure below:

1. **Set jumper JP1 to the "ON" position.** Adjust the output voltage of the input power supply to 0V and then connect the power supply to the Vin and GND pins of the demo board.
2. Set the battery simulator to 0V, and then connect it to the BAT and GND pins.
3. Connect the digital voltmeters as shown in the setup diagram to measure the input voltage V_{IN}, charger voltage (VBAT) and the charge current (IBAT).
4. Begin increasing the input voltage to 5V and keep the battery simulator power supply at 0V. The CHRG LED should be on, and the charge current should be approximately 65mA. **This is the trickle charge mode for a deeply discharged battery.** Typically, a battery that has not been charged for a long time.
5. Starting from 0V, slowly increase the battery simulator power supply (VBAT), observing the charger's output voltage on the DVM. When the charger's output voltage exceeds approximately 2.9V, the charger will enter the Constant Current mode of the charge cycle with the charge current (IBAT) increased to the programmed value of approximately 650mA. **This is the Constant Current mode.**
6. Continue to slowly increase the battery simulator power supply, thus simulating a battery accepting charge. The charge current should remain at the programmed value of 650mA until the charger output voltage is within

10mV of the preset voltage, at which time the charge current will begin to decrease. This is the beginning of the Constant Voltage mode of the charge cycle. Continue to slowly increase the battery simulator power supply while observing the CHRG LED to go out when the charge current drops to approximately 10% of the programmed charge current.

7. After the timer has timed out, slowly decrease the battery simulator power supply. At approximately 4.1V, the charge current resumes and a new charge cycle begins. **This is the Recharge Threshold Voltage.**

8. To verify the shutdown mode, move jumper JP1 to the "OFF" position. This shuts the charger down dropping the charge current to 0mA.

9. To verify battery drain current, remove the input supply voltage. The ammeter that was reading charge current now reads the battery drain current. A typical value is less than 1µA.

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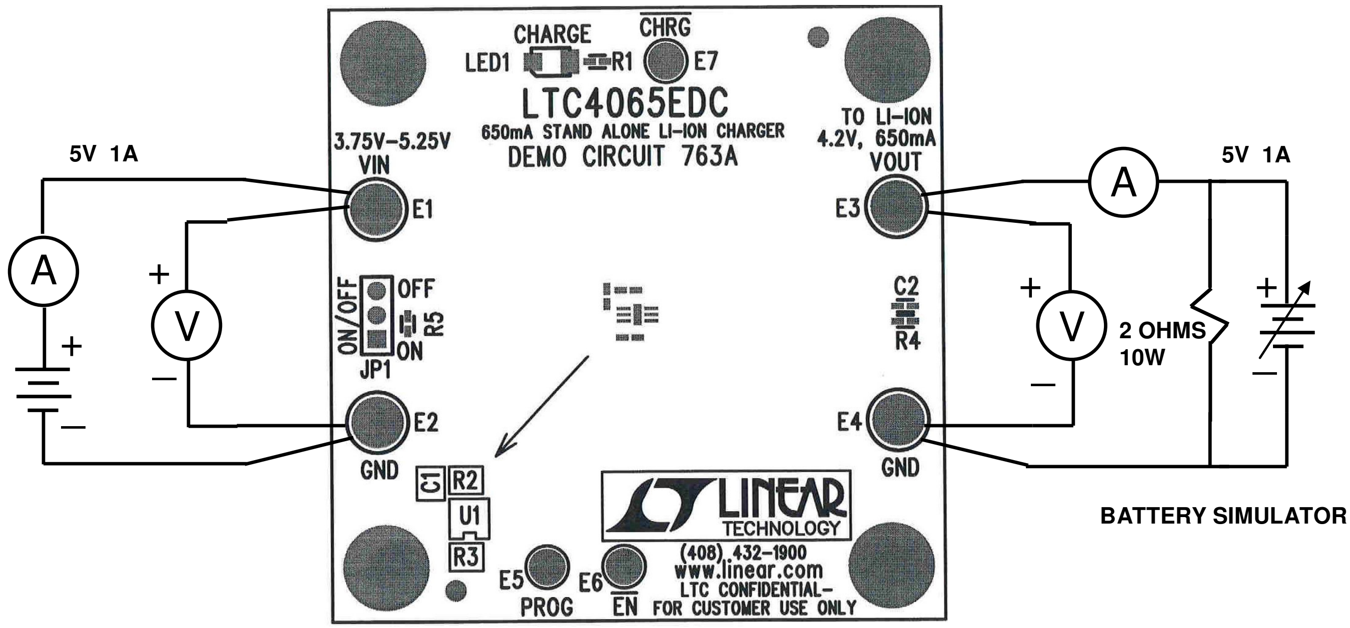


Figure 1. Proper Measurement Equipment Setup

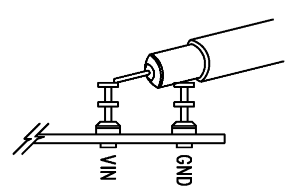
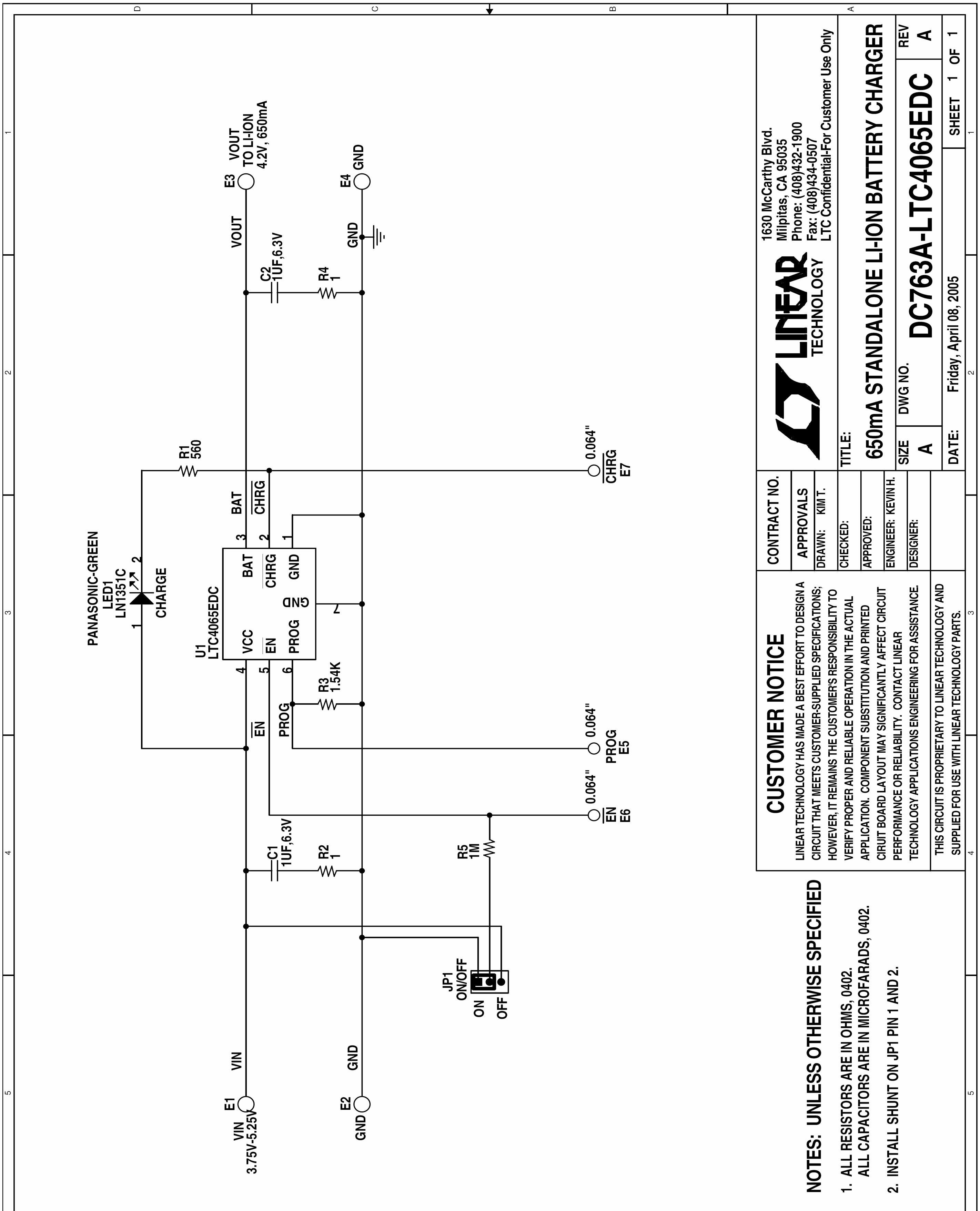


Figure 2. Scope Probe Placement for Measuring Input or Output Ripple


VIN 3.75V-5.25V
E1
VIN
E2
GND
GND
C1 1UF,6.3V
R2 1
R5 1M
JP1 ON/OFF
ON
OFF
EN
PROG
U1 LTC4065EDC
VCC
EN
PROG
GND
BAT
CHRG
GND
4 5 6 7 3 2 1
R3 1.54K
PANASONIC-GREEN LED1 LN1351C
CHARGE
R1 560
BAT
CHRG
C2 1UF,6.3V
R4 1
VOUT
GND
E3 VOUT TO LI-ION 4.2V, 650mA
E4 GND
0.064" EN E6
0.064" PROG E5
0.064" CHRG E7
NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE IN OHMS, 0402.
ALL CAPACITORS ARE IN MICROFARADS, 0402.
2. INSTALL SHUNT ON JP1 PIN 1 AND 2.
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 CIRUIT 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.
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LTC Confidential-For Customer Use Only
TITLE:
650mA STANDALONE LI-ION BATTERY CHARGER
SIZE A
DWG NO. DC763A-LTC4065EDC
REV A
DATE: Friday, April 08, 2005
SHEET 1 OF 1