QUICK START GUIDE FOR DEMONSTRATION CIRCUIT DC512B

4A SMART BATTERY CHARGER

LTC4100

DESCRIPTION

Demonstration circuit DC512B is a single battery switching step-down charge controller featuring the LTC4100. The recommended input power is 15 to 20V at 3.5A. A two-position jumper allows choice of protected output voltage range suitable for 3- and 4-Cell Li-ion batteries. Removal of the jumper allows full output voltage range. The maximum charge current is 4A.

The demo board is initially configured for 12.6V at 3A for popular 3-cell Li-ion battery packs. LTC4100 will automatically charge a Smart Battery to termination as soon as input power is applied with a battery connected prior to power up. A VOUT pin automatically provides power to the system load from the wall adapter or battery. Status LEDs are provided for CHG, ACP, $\overline{\text{SMBALERT}}$ and SMBus activity.

The optional DC1223A-B SMBUS to USB adapter and associated software to control, monitor, and data log the system for demonstration purposes only. This software is not required to charge a battery with the DC512B. Contact your LT representative for ordering a DC1223A-B.

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

Performance Summary T_A = 25°C

PARAMETER	CONDITIONS / NOTES	VALUE
Input Voltage Range	VIN > VBAT to charge. Limited by input capacitor ratings.	15 – 25V
ACP Trip voltage	V_{DCDIV} Rising	14.6V ± 3%
Input Current Limit		3.5A ± 7%
Battery Voltage Limit	3CELL (R_{VILIM} = 10kΩ ± 1%)	13.104VBAT, Typ.
	4CELL (R_{VILIM} = 33kΩ ± 1%)	17.408VBAT, Typ.
	R_{VILIM} OPEN	28.006, Typ.
Programmable Float Voltage Accuracy		± 0.8%
Minimum Voltage Step	All VLIM Settings	16mV
# of Voltage Steps	11-Bit range	2048 steps
Battery Current Sense Voltage Limit	3A (R_{ILIM} = 33kΩ ± 1%)	82.3mV, Max
	4A (R_{ILIM} OPEN)	107.3mV, Max
Programmable Charge Current Accuracy		±5%, 3% is typical
Minimum Current Step	3A & 4A Settings	4mA
# of Current Steps	10-Bit range	1024 Steps

QUICK START PROCEDURE

Demonstration circuit 512B is easy to set up to evaluate the performance of the LTC4100. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below.

1. Set the jumpers according to the voltage and current specifications of the pack under evaluation.
2. With all power off, connect input power supply, and meters as shown in Figure 1.
3. Preset the system load to 0A and the input supply to 0V, 0A current limit.
4. Turn on the supply, setting the current limit to 3.5A.
5. Adjust the input voltage to the desired value, up to 25V.
6. Connect the battery to begin charging. Plug in the battery. An industry standard 5-pin Smart Battery connector is provided as well as generic soldering test points for hardwire connections.

Optional

1. For different ILIM & VLIM settings, adjust JP1 & JP3 as necessary.
2. To disable charging through hardware, connect CHGEN to GND.
3. To probe the SMBus communication or connect to an external host, connect leads to SDA, SCL, and GND.
4. To use an external logic supply, disable the onboard 5V linear regulator by setting JP2 to OFF. **Note:** Not supplying an alternative VLOGIC will disable the LEDs as well as SMBus communications, which prevents charging. It is always recommended to supply a VLOGIC at all times.
5. Use DC1223A-B USB-to-SMBus demoboard to control and configure the provided DC512B evaluation software.

Please refer to the LTC4100 datasheet for additional information.

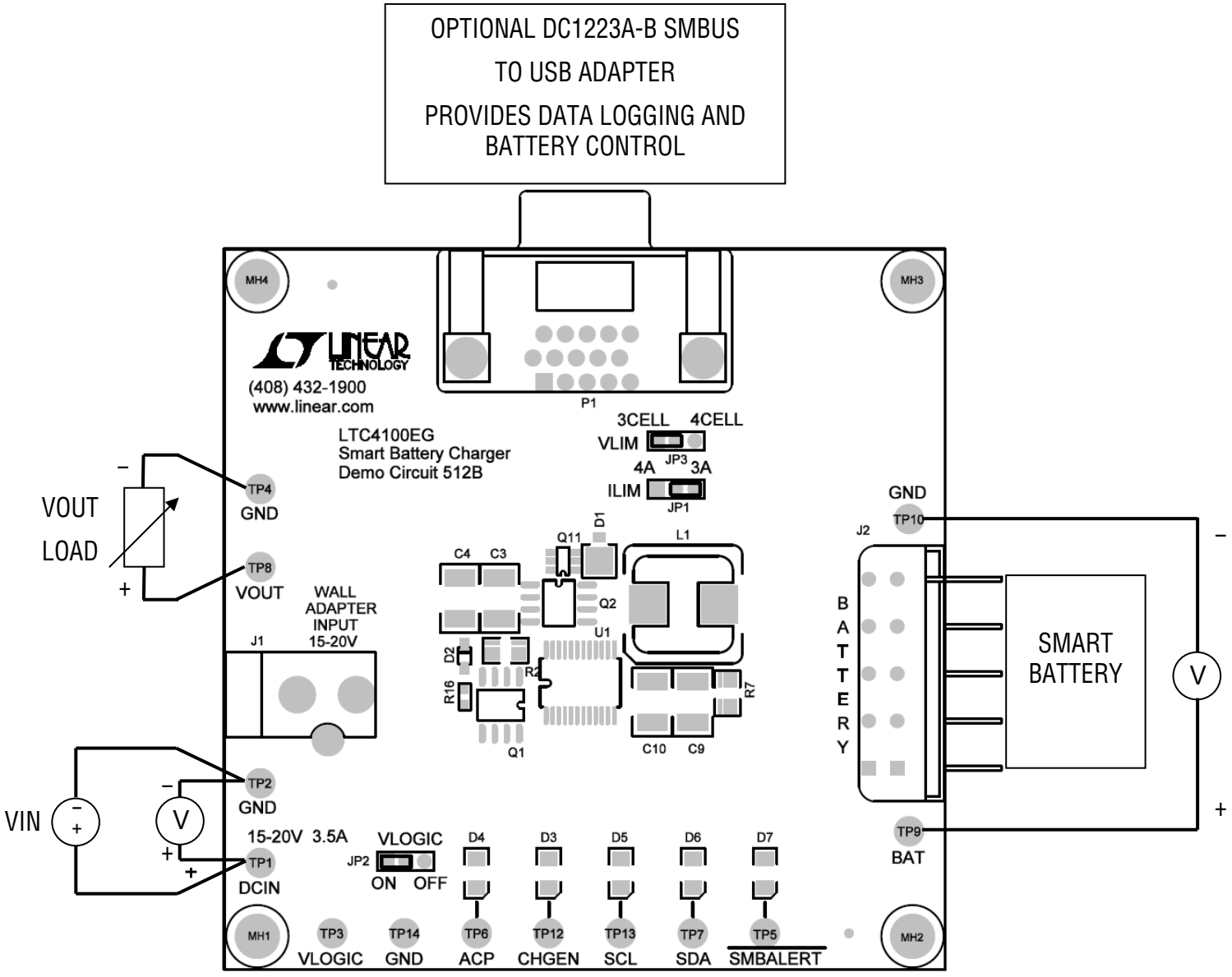


Figure 1. Proper Measurement Equipment Setup

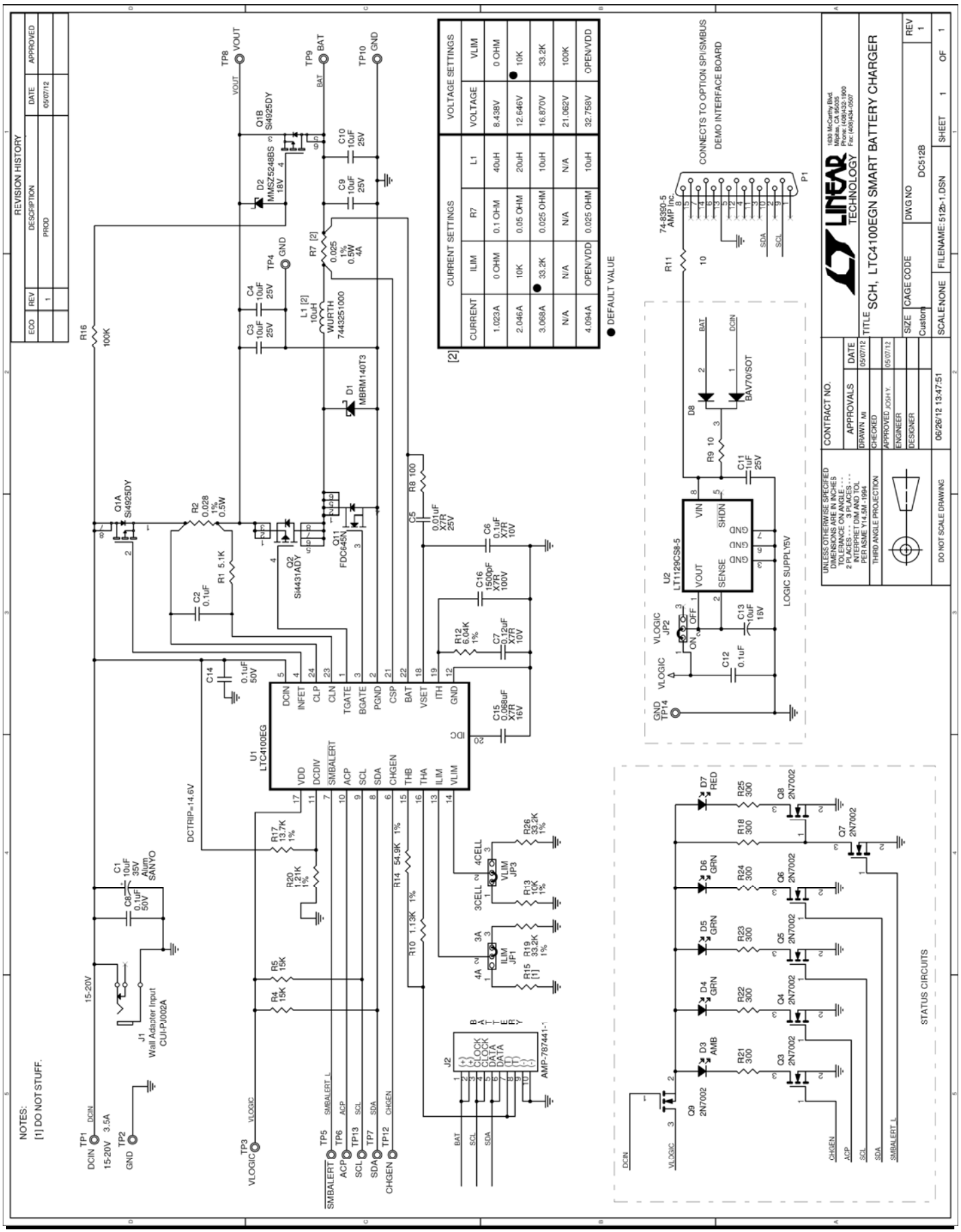
PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURE / PART #
Required Circuit Components				
1	1	C2	Capacitor, Y5V, 0.1µF, 80%, 25V 0603	AVX, 06033G104ZAT2A
2	4	C3, C4, C9, C10	Capacitor, X5R, 10µF, 20%, 25V 0603	AVX, 18123D106MAT2A
3	1	C5	Capacitor, X7R, 0.01µF, 20%, 25V 0603	AVX, 06033C103KAT2A
4	1	C6	Capacitor, X7R, 0.1µF, 10%, 10V 0603	AVX, 0603ZC104MAT2A
5	1	C7	Capacitor, X7R, 0.12µF, 10%, 10V 0603	AVX, 0603ZC124MAT2A
6	2	C8, C14	Capacitor, X7R, 0.1µF, 10%, 16V 0805	AVX, 0805YC104KAT2A
7	1	C16	Capacitor, X7R, 1500pF, 10%, 100V 0603	AVX, 06031C152KAT2A
8	1	D1	Diode Schottky, 1A, 40V POWERMITE	Diodes Inc., MMSZ5248BS-7-F
9	1	L1	Inductor, 10µH, High Current, WE-HCL 1050	Wurth Electronik, 7443251000
10	1	Q1	MOSFET, Dual P-Channel, SO-8	Vishay, Si4925DDY-T1-GE3
11	1	Q2	MOSFET, Single P-Channel, SO-8	Vishay, Si4431CDY-T1-GE3
12	7	Q3-Q9	MOSFET, N-Channel, 60V, 115mA, SOT23-3	Diodes Inc./Zetex, 2N7002TA
13	1	Q11	MOSFET, Single N-Channel, SSOT-6	Fairchild, FDC655BN
14	1	R1	Resistor, 5.1K, 1/16W, 5% 0603	Vishay, CRCW06035K10JNEA
15	1	R2	Resistor, 0.028Ω, 1/2W, 1% 1206	Vishay, WSL1206R0280FEA
16	2	R4, R5	Resistor, 15K, 1/16W, 5% 0603	Vishay, CRCW04023K00JNED
17	1	R7	Resistor, 0.025Ω, 1/2W, 1% 1206	Vishay, WSL1206R0250FEA
18	1	R8	Resistor, 100Ω, 1/16W, 5% 0603	Vishay, CRCW0603100RJNEA
19	1	R10	Resistor, 1.13k, 1/16W, 1% 0603	Vishay, CRCW06031K13FKEA
20	1	R12	Resistor, 6.04k, 1/16W, 1% 0603	Vishay, CRCW06036K04FKEA
21	1	R14	Resistor, 54.9k, 1/16W, 1% 0603	Vishay, CRCW060354K9FKEA
22	1	R16	Resistor, 100K, 1/16W, 1% 0603	Vishay, CRCW0603100KFKEA
23	1	R17	Resistor, 13.7k, 1/16W, 1% 0603	Vishay, CRCW060313K7FKEA
24	1	R20	Resistor, 1.21k, 1/16W, 1% 0603	Vishay, CRCW06031K21FKEA
25	1	U1	I.C. Smart Battery Charger SSOP-24	Linear Technology LTC4100EG#PBF

PARTS LIST

Additional Demo Board Circuit Components

1	1	C1	Capacitor, ELECT., 10µF, 10% 35V	Sun Electronics, 35CE10AX
2	1	C11	Capacitor, Y5V, 1µF, 80%, 25V 1206	AVX, 12063G105ZAT2A
3	1	C12	Capacitor, X7R, 0.1µF, 20%, 16V 0603	AVX, 0603YC104KAT2A
4	1	C13	Capacitor, TANT, 10µF, 20%, 16V 3828	AVX, TAJB106M016RNJ
5	1	C15	Capacitor, X7R, 0.068µF, 10%, 16V 0603	AVX, 0603YC683KAT2A
6	1	D2	Diode, Zener, 18V SOD-323	Diode Inc., MMSZ5248BS-7
7	1	D3	LED, Orange	Rohm, SML-010DTT86L
8	3	D4, D5, D6	LED, Green	Rohm, SML-010FTT86L
9	1	D7	LED, Red	Rohm, SML-010VTT86L
10	1	D8	Diode, Dual Schottky, 75V, 350mW, SOT23-3	Diodes Inc., BAV70-7-F
11	2	R9, R11	Resistor, 10Ω, 1/16W, 5% 0603	Vishay, CRCW060310R0JNEA
12	1	R13	Resistor, 10k, 1/16W, 5% 0603	Vishay, CRCW060310K0FKEA
13	0	R15	OPT.	
14	6	R18, R21-R25	Resistor, 300Ω, 1/16W, 5%, 0603	Vishay, CRCW0603300RJNEA
15	1	R19, R26	Resistor, 33.2k, 1/16W, 1% 0603	Vishay, CRCW060333K2FKEA
16	1	U2	I.C. Linear Regulator SO-8	Linear Technology LT1129CS8-5#PBF
Hardware/Components (For Demo Board Only)				
1	3	JP1-JP3	Header, 3 Pin, single row, 0.079"CC	Sullins, NRPN031PAEN
2	1	J1	Connector., Power Jack 2.1mm	CUI Inc., PJ-002A
3	1	J2	Header, Right Angle	TE Connectivity, 5787441-1
4	3	JP1-JP3	Shunt	Samtec, 2SN-BK-G
5	9	TP1-TP10, TP12-TP14	Turret, Test Pin, .061"	Mill-Max, 2308-2-00-80-00-00-07-0
6	4	MH1-MH4	Standoff, Snap-on Nylon	KEYSTONE, 8831


NOTES:
[1] DO NOT STUFF.
REVISION HISTORY
ECO REV DESCRIPTION DATE APPROVED
1 PROD 05/07/12
CURRENT SETTINGS
VOLTAGE SETTINGS
[2]
CURRENT ILIM R7 L1 VOLTAGE VLIM
1.023A 0 OHM 0.1 OHM 40uH 8.438V 0 OHM
2.046A 10K 0.05 OHM 20uH 12.646V 10K
3.068A 33.2K 0.025 OHM 10uH 16.870V 33.2K
N/A N/A N/A N/A 21.062V 100K
4.094A OPEN/VDD 0.025 OHM 10uH 32.758V OPEN/VDD
DEFAULT VALUE
U1 LTC4100EG
U2 LT1129CS8-5
J1 Wall Adapter Input CUI-PJ002A
J2 AMP-787441-1
P1 74-8390-5 AMP Inc.
CONNECTS TO OPTION SPI/SMBUS DEMO INTERFACE BOARD
LOGIC SUPPLY 5V
STATUS CIRCUITS
DCTRIP=14.6V
LINEAR TECHNOLOGY
1630 McCarthy Blvd. Milpitas, CA 95035 Phone: (408)432-1900 Fax: (408)434-0507
TITLE SCH, LTC4100EGN SMART BATTERY CHARGER
CONTRACT NO.
APPROVALS DATE
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DESIGNER
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