

## DESCRIPTION

Demonstration circuit DC1104A is a single-battery charge controller with featuring the LTC4009-2. The input voltage is 13.5 to 20V. The charger output voltage is programmed by jumpers to support 1, 2, 3 and 4-Cell Li-ion batteries with a cell voltage of 4.2V/Cell. The maximum charge current is 2A. The demo board is initially configured for 12.6V Li-ion batteries. The board will automatically charge a battery as soon as input power is applied with a battery connected prior to power up. Status LEDs are provided for CHG, ACP, C/10, and ICL although this charger is not a smart battery charger, a popular smart battery connector is provided that can be used for data-logging with the

OPTIONAL DC1223A-B Demoboard and software. To be clear, you DO NOT need a smart battery to use this board. The optional DC1223A-B SMBus-to-USB port adapter and associated software is to monitor a smart battery for demonstration purposes only. Contact your LT representative for ordering a DC1223A-B.

This Demoboard is capable of supporting the LTC4009 and LTC4009-1 with a simple IC swap-out. See schematic.

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

**Table 1. Performance Summary**

PARAMETER	CONDITIONS / NOTES	VALUE
Maximum Input Voltage	Limited by Input Capacitor Volt Ratings.	20V +/- 10 %
Default Battery Charge Voltage	Jumper Selectable: 4.2V, 8.4V, 12.6V & 16.8V	12.6V
Minimum Input Voltage	$V_{in} > V_{bat}$ Float voltage & $DCDIV > 1.2V$ .	13.5V when using a 12.6V Li-ion battery. Recommend 15V.
Shutdown Configuration	$V_{in} > V_{batmax} > 6V$ , Jumper Selectable: OFF, THM & ON	ON
Input Current Limit	Set by value of R2 at 100mV.	2 Amps using a 0.05 Ohm resistor.
Maximum Charge Current	$V_{in} > V_{bat} > 6V$ & $DCDIV > 1.2V$	2A +/- 5%

## QUICK START PROCEDURE

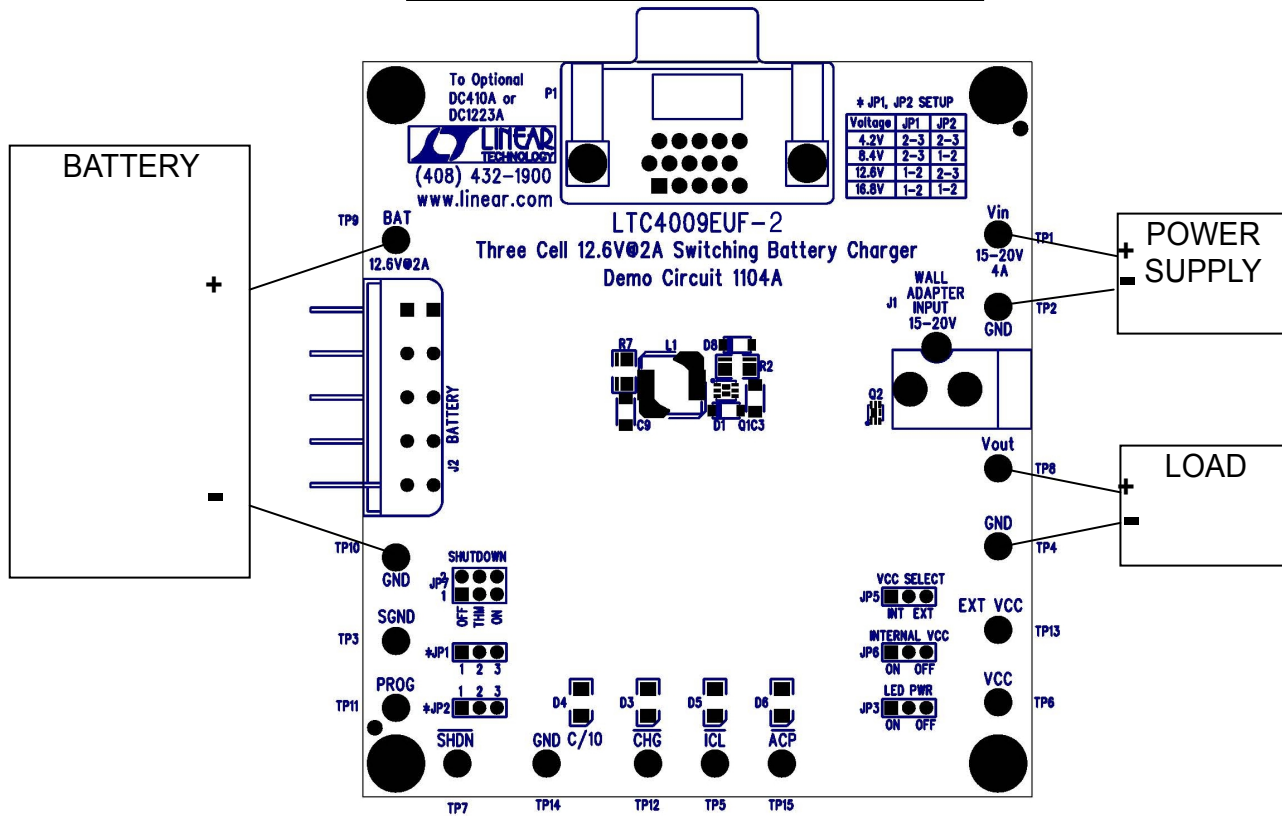
# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT DC1104A

## MULTI CELL LI-ION BATTERY CHARGER BOARD

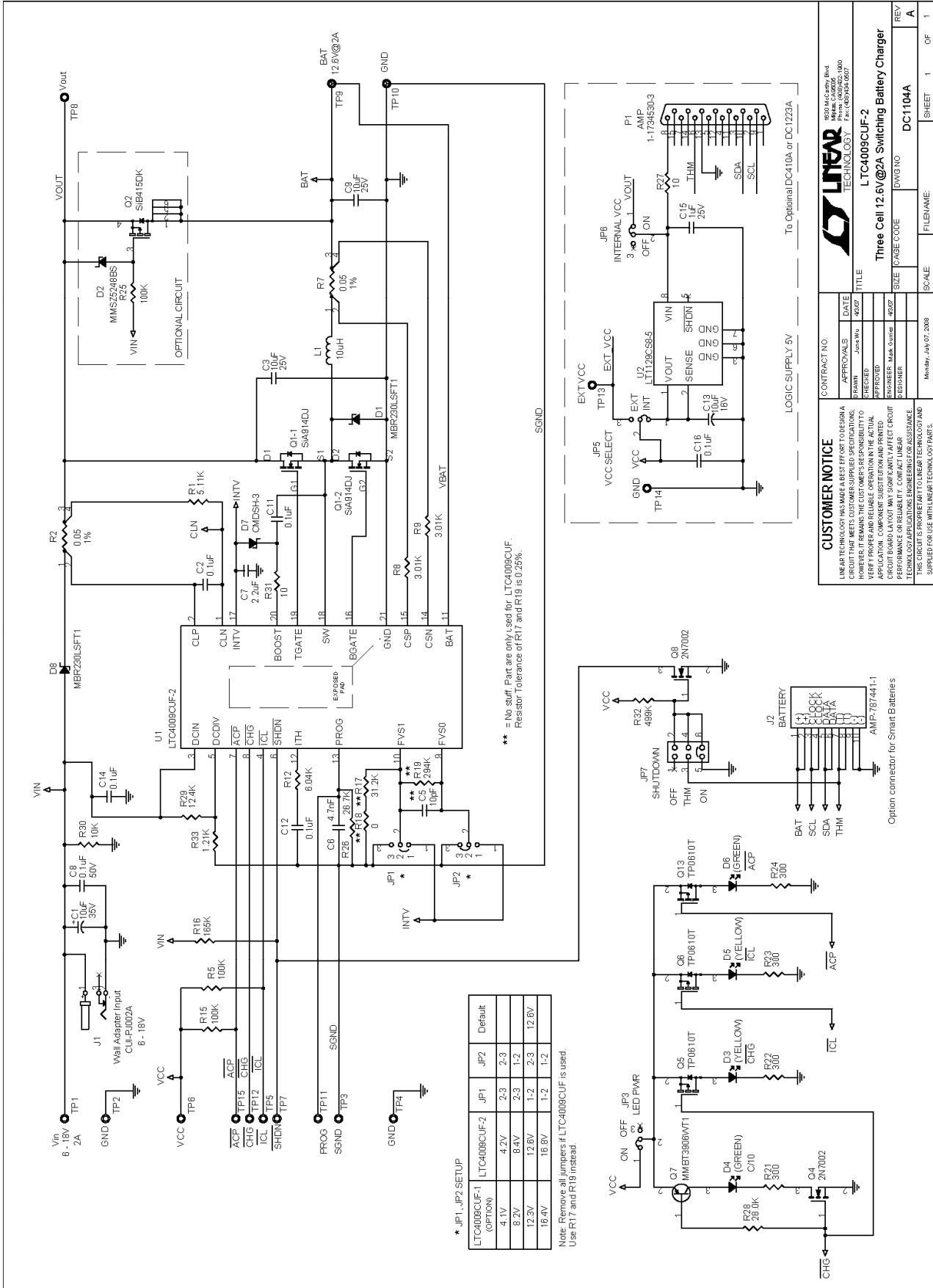
1. Connect the input power source to VIN terminals J1 or VIN and GND using a power supply capable of handling 2.5A of current within a 13.5 to 20V range. The input supply voltage MUST be greater than the full voltage value of the battery to allow a full charge to take place.
2. Connect the load to VOUT and GND terminals.
3. Configure the jumpers for your specific battery.
4. Plug in the battery. Industry-standard 5 Pin AMP Smart Battery connector is provided as well as generic soldering Test Points for hard-wire connections.
5. Turn on the input power supply.
6. Optionally use the provided DC1223A-B demonstration software to configure and communicate with the DC1104A.

OPTIONAL DC1223A-B SMBUS  
TO USB ADAPTER

PROVIDES DATA LOGGING AND  
BATTERY CONTROL



# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT DC1104A MULTI CELL LI-ION BATTERY CHARGER BOARD



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## MULTI CELL LI-ION BATTERY CHARGER BOARD

Item	Qty	Reference	Part Description	Manufacturer / Part #
<b>REQUIRED CIRCUIT COMPONENTS</b>				
1	1	C1	CAP., Alum. 10uF, 35V, 5X6.0 size	SANYO..35CE10AX
2	5	C2,C8,C11,C14,C16	CAP., X7R, 0.1uF, 50V, 10% 0603	TDK, C1608X7R1H104K
3	1	C12	CAP., X7R, 0.1uF, 16V, 10% 0402	TDK, C1005X7R1C104K
4	2	C3,C9	CAP., X5R, 10uF, 25V, 20% 1206	Taiyo Yuden, TMK316BJ106ML
5	1	C6	CAP., X7R, 4.7nF, 50V, 10% 0402	TDK, C1005X7R1H472K
6	1	C7	CAP., X5R, 2.2uF, 16V, 20% 0805	TDK, C2012X5R1C225M
7	1	C13	CAP., Tant. 10uF 16V 20% 3828	AVX TAJB106M016
8	1	C15	CAP., X7R 1.0uF 25V 10% 1206	AVX 12063C105KAT
9	2	D1,D8	Schottky Rect., MBR230LSFT1 SOD-123FL	On Semi., MBR230LSFT1G
10	2	D3,D5	LED, AMBER	Panasonic, LN1451C-(TR) PBF
11	2	D4,D6	LED, GREEN	Panasonic, LN1351C-(TR) PBF
12	1	D7	DIODE, CMDSH-3, SOD-323	CENTRAL SEMI.,CMDSH-3TR (PBF)
13	1	L1	Inductor, 10uH, CDR7D28MN SERIES	Sumida, CDR7D28MNNP-100 NC
14	1	Q1	Dual-N-CH FET, SiA914DJ, Powerpak SC-70-6	VISHAY, SiA914DJ-T1-E3
15	1	R1	RES., CHIP, 5.11K, 1/16W, 1% 0603	VISHAY, CRCW06035K11FKEA
16	2	R2,R7	SENSE RES., LRC, 0.05, 0.25W, 1% 1206	WISHAY, WSL1206R0500FEA
17	2	R5,R15	RES., CHIP, 100K, 1/16W, 5% 0402 e3	VISHAY, CRCW0402100KJNED
18	2	R8,R9	RES., CHIP, 3.01K, 1/16W, 1% 0402	VISHAY, CRCW04023K01FKED
19	1	R12	RES., CHIP, 6.04K, 1/16W, 1% 0402	VISHAY, CRCW04026K04FKED
20	1	R16	RES., CHIP, 165K, 1/16W, 1% 0402 e3	VISHAY, CRCW0402165KFKED
21	1	R26	RES., CHIP, 26.7K, 1/16W, 1% 0402	VISHAY, CRCW040226K7FKED
22	2	R27,R31	RES., CHIP, 10, 1/16W, 5% 0603	VISHAY, CRCW060310R0JNEA
23	1	R29	RES., CHIP, 12.4K, 1/16W, 1% 0402	VISHAY, CRCW040212K4FKED
24	1	R30	RES., CHIP, 10K, 1/16W, 5% 0603 e3	VISHAY, CRCW060310K0JNEA
25	1	R33	RES., CHIP, 1.21K, 1/16W, 1% 0402 e3	VISHAY, CRCW04021K21FKED
26	1	U1	I.C. LTC4009CUF-2, QFN-20(4X4)	LINEAR TECH., LTC4009CUF-2#PBF
27	1	U2	I.C. LT1129CS8-5 SOS	LINEAR TECH., LT1129CS8-5#PBF

Item	Qty	Reference	Part Description	Manufacturer / Part #
<b>ADDITIONAL DEMO BOARD CIRCUIT COMPONENTS</b>				
1	1	D2	DIODE, MMSZ5248BS, SOD-323	Diodes Inc., MMSZ5248BS-7-F
2	1	Q2	P-CH MOSFET, SiB415DK, Powerpak SC-75-6L	VISHAY, SiB415DK-T1-E3
3	1	R25	RES., CHIP, 100K, 1/16W, 5% 0402 e3	VISHAY, CRCW0402100KJNED
4	0	(U1 Option)	I.C. LTC4009CUF-1, QFN-20(4X4)	LINEAR TECH., LTC4009CUF-1#PBF
5	0	(U1 Option)	I.C. LTC4009CUF, QFN-20(4X4)	LINEAR TECH., LTC4009CUF#PBF
6	0	R17(for 4009CUF only)	RES., CHIP, 31.2K, 1/16W, 025% 0402 e3	
7	0	R18(for 4009CUF only)	RES., CHIP, 0, 0402 e3	
8	0	R19(for 4009CUF only)	RES., CHIP, 294K, 1/16W, 0.25% 0402 e3	
9	0	L1 (Option)	Inductor, 10uH, IHLP-2525CZ-01 SERIES	VISHAY, IHLP2525CZER100M01
10	0	C5(for U1=4009CUF only)	CAP., COG, 10pF, 50V, +/-0.5pF 0402	

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## MULTI CELL LI-ION BATTERY CHARGER BOARD

Item	Qty	Reference	Part Description	Manufacturer / Part #
<b>HARDWARE FOR DEMO BOARD ONLY</b>				
1	15	TP1-TP15	TESTPOINT, TURRET, .061"	MILL-MAX, 2308-2-00-80-00-00-07-0
2	1	J1	Connector	Cui-Stack, CUI-PJ002A(PBF)
3	1	J2	Connector	AMP Inc. 787441-1 (PBF)
4	5	JP1~JP3,JP5,JP6	HEADER 3 PIN 0.079 SINGLE ROW	SAMTEC, TMM103-02-L-S
5	6	JP1~JP3,JP5~JP7	SHUNT, .079" CENTER	SAMTEC, 2SN-BK-G
6	1	JP7	2X3, 0.079 DOUBLE ROW HEADER	SAMTEC, TMM103-02-L-D
7	3	Q6,Q5,Q13	P-Chan., TP0610T SOT-23	VISHAY, TP0610T-E3
8	1	Q7	TRANSISTOR, MMBT3906WT1 SOT-323	On Semi., MMBT3906WT1G
9	2	Q4,Q8	N-CH MOSFET, 2N7002	ZETEX, 2N7002 (PBF)
10	1	R32	RES., CHIP, 499K, 1/16W, 1% 0603 e3	VISHAY, CRCW0603499KFKEA
11	1	R28	RES., CHIP, 28.0K, 1/16W, 1% 0603	VISHAY, CRCW060328K0FKEA
12	4	R21,R22,R23,R24	RES., CHIP, 300, 1/16W, 5% 0603	VISHAY, CRCW0603300RJNEA
13	1	P1	Connector, DSUB, 15 PIN	AMP Inc. 1-1470250-3
14	4	STAND-OFF	STAND-OFF, NYLON 0.25"	KEYSTONE, 8831(SNAP ON)
15	1		FAB, PRINTED CIRCUIT BOARDS	DEMO CIRCUIT #1104A
16	2		STENCIL	STENCIL 1104A

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