



MAX1870A Evaluation Kit

General Description

The MAX1870A evaluation kit (EV kit) is an accurate and efficient multichemistry battery charger. It uses analog inputs to control charge voltage and current. The EV kit can charge any battery with charge current up to 2.4A. High efficiency is achieved by a buck-boost topology. The EV kit provides outputs that can be used to monitor the input current and the presence of an AC adapter.

The MAX1870A EV kit is a fully assembled and tested surface-mount printed circuit (PC) board.

Features

- ◆ Step-Up/Step-Down Topology
- ◆ Charges Any Battery Chemistry: Li+, NiCd, NiMH, Lead Acid, etc.
- ◆ +10V to +25V Input Voltage Range
- ◆ 2.4A (max) Battery Charge Current
- ◆ Up to 17.6V Battery Compliance Voltage
- ◆ $\pm 0.5\%$ Charge-Voltage Accuracy
- ◆ Input Current Limiting
- ◆ Analog Inputs Control Charge Current, Charge Voltage, and Input Current Limit
- ◆ Analog Output Indicates Input Current
- ◆ Fully Assembled And Tested
- ◆ Surface-Mount Components

Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX1870AEVKIT	0°C to +70°C	32 Thin QFN 5mm x 5mm

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C7, C13, C14	4	1 μ F $\pm 20\%$, 10V X5R ceramic capacitors (0805) Taiyo Yuden LMK212BJ105KG or TDK C2012X5R1A105M
C2, C3, C4	3	0.01 μ F $\pm 10\%$, 50V X7R ceramic capacitors (0805) Murata GRM216R71H103K
C5	1	1 μ F $\pm 10\%$, 25V X7R ceramic capacitor (0805) TDK C2012X7R1E105K
C6	1	0.1 μ F $\pm 10\%$, 25V X7R ceramic capacitor (0603) Murata GRM188R71E104K or TDK C1608X7R1E104K
C8, C10, C11	3	22 μ F $\pm 20\%$, 25V X5R ceramic capacitors (1812) TDK C4532X5R1E226M

DESIGNATION	QTY	DESCRIPTION
C9	0	Not installed (1812)
C16, C17	2	2.2 μ F $\pm 10\%$, 25V X5R ceramic capacitors (1206) TDK C3216X7R1E225K
D2, D3	2	3A, 30V Schottky diodes Nihon EC31QS03L
JU1	1	2-pin header
JU2	1	3-pin header
L1	1	10 μ H, 4.4A power inductor Sumida CDRH104R-100 or TOKO 919AS-100M
Q1	1	Dual n- and p-channel MOSFET (SO-8) Vishay/Siliconix Si4542DY
R2	1	1k Ω $\pm 5\%$ resistor (0805)
R3	1	470k Ω $\pm 5\%$ resistor (0805)
R4, R16–R19	0	Not installed (0805)

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Component List (continued)

DESIGNATION	QTY	DESCRIPTION
R5, R11	2	10k Ω $\pm$ 5% resistors (0805)
R7, R9, R10	3	0.030 Ω $\pm$ 1%, 1/2W resistors (2010) Dale WSL-2010-R030-F or IRC LRC-LR2010-01-R030-F
R8	1	10k Ω $\pm$ 1% resistor (0805)
R12	1	30 Ω $\pm$ 5% resistor (0805)
R13	1	620 Ω $\pm$ 5% resistor (0805)
R14	0	Not installed, 50k Ω potentiometer
R15	1	50k Ω potentiometer Mouser 652-3266X-1-503 or equivalent
U1	1	MAX1870AETJ (32-TQFN 5mm x 5mm)
None	1	Shunt
None	1	MAX1870A PC board

Detailed Description

The MAX1870A EV kit includes all of the circuitry needed to charge Li+, NiMH, and NiCD batteries.

The EV kit includes input source-current limiting and analog inputs for setting the charge voltage and charge current. The input current limit on the EV kit has been set to 3.5A. The voltage at ICTL, set by potentiometer R15 (50k Ω) along with resistor R10 (0.030 Ω), sets the charging current (0 to 2.4A). The voltage at VCTL is set to VL by JU4. This sets the battery-voltage set point at 4.2V times the number of cells. The voltage at VCTL can also be set by resistor-divider R16/R17 or by potentiometer R14 (open), which adjusts the battery output voltage. Refer to the MAX1870A data sheet for more information.

Shutdown (Jumper JU1)

Jumper JU1 either enables the MAX1870A or places it into shutdown. See Table 1 for jumper settings.

Table 1. Jumper JU1 Functions

SHUNT LOCATION	SHDN PIN	MAX1870A
Installed	Connected to GND.	MAX1870A disabled.
Not installed	Connected to REFIN with a 10k Ω resistor.	MAX1870A enabled.

Selecting the Number of Cells

The number of battery-pack cells is selected by jumper JU2 (Table 2). Place the shunt across the JU2 pins to select the desired number of cells. **This EV kit is shipped configured for 3 cells.**

Table 1. Jumper JU2 Functions

SHUNT LOCATION	CELLS PIN	NUMBER OF CELLS
1 and 2	Connected to REFIN	4
Not installed	Floating	3
2 and 3	Connected to GND	2

Input Current Measurement

The board's IINP pad is used to monitor the system input current. The IINP voltage range is 0 to 3.5V. V_{IINP} is proportional to the AC adapter current by:

$$V_{IINP} = 0.84 \times I_{ADAPTER} (V)$$

Refer to the *Input Current Measurement* section of the MAX1870A data sheet for information on V_{IINP} .

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Component Suppliers

SUPPLIER	PHONE	FAX	WEBSITE
Central Semiconductor	631-435-1110	631-435-1824	www.centrasemi.com
IRC	361-992-7900	361-992-3377	www.irctt.com
Murata	770-436-1300	770-436-3030	www.murata.com
Nihon	847-843-7500	847-843-2798	www.niec.co.jp
Sumida	847-545-6700	847-545-6720	www.sumida.com
Taiyo Yuden	800-348-2496	847-925-0899	www.t-yuden.com
TDK	847-803-6100	847-390-4405	www.component.tdk.com
TOKO	847-297-0070	847-699-1194	www.tokoam.com
Vishay	402-564-3131	402-563-6296	www.vishay.com

Note: Indicate that you are using the MAX1870A when contacting these component suppliers.

Evaluates: MAX1870A

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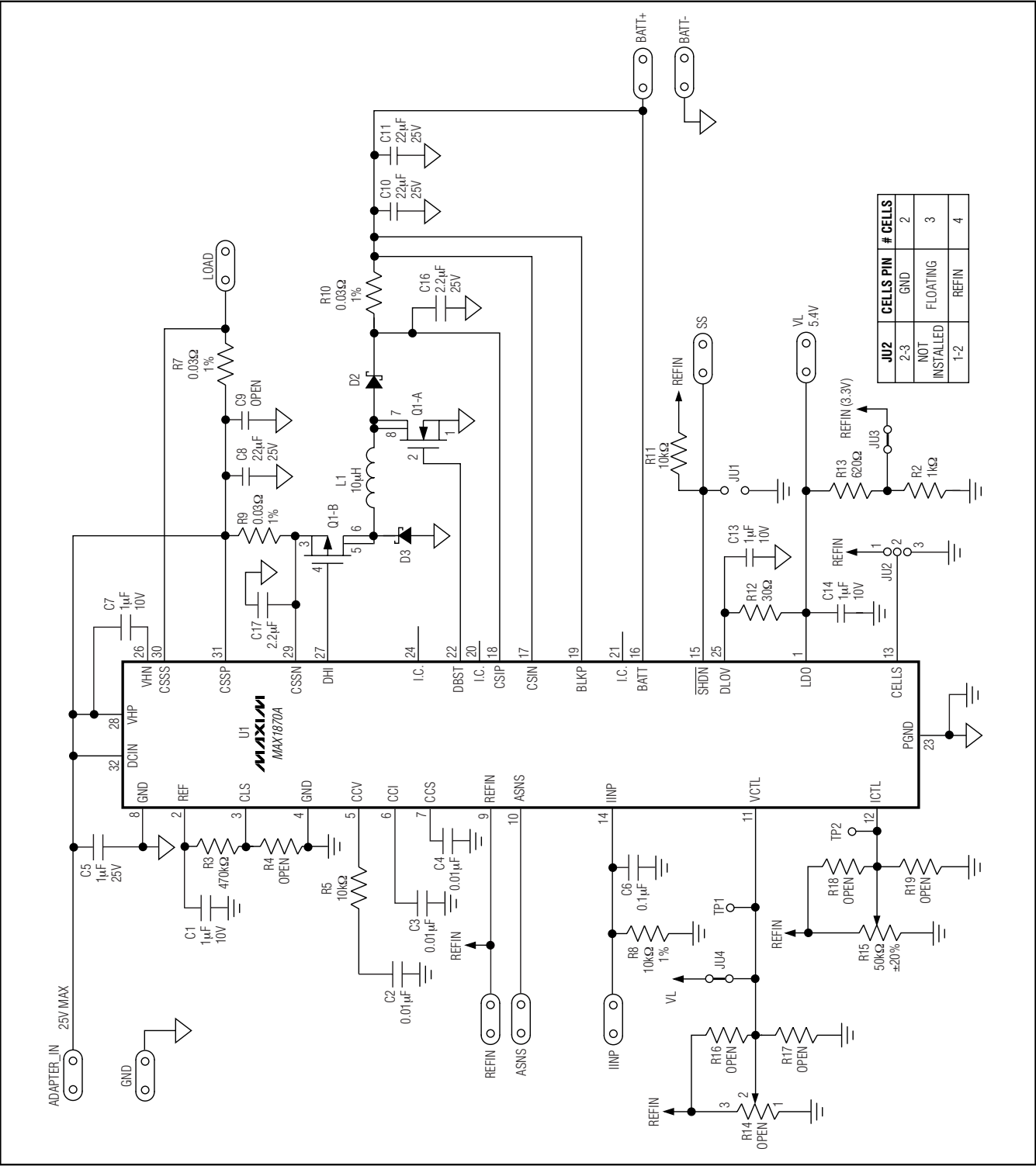


Figure 1. MAX1870A EV Kit Schematic

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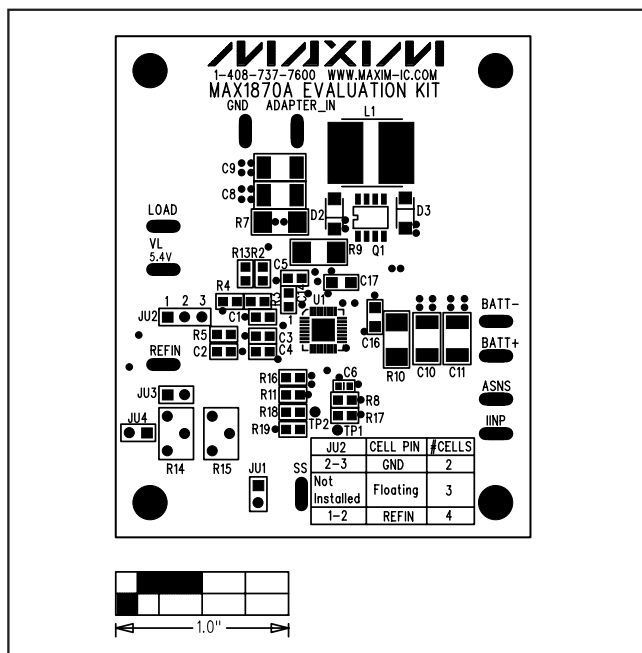


Figure 2. MAX1870A EV Kit Component Placement Guide—Component Side

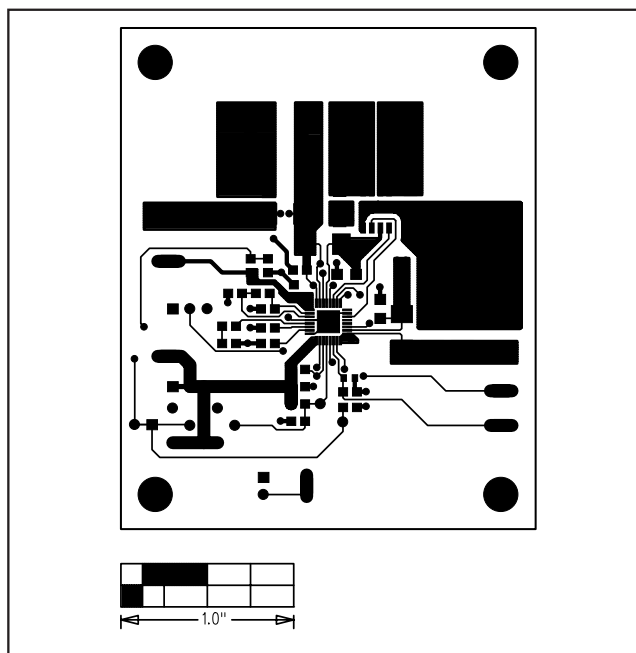


Figure 3. MAX1870A EV Kit PC Board Layout—Component Side

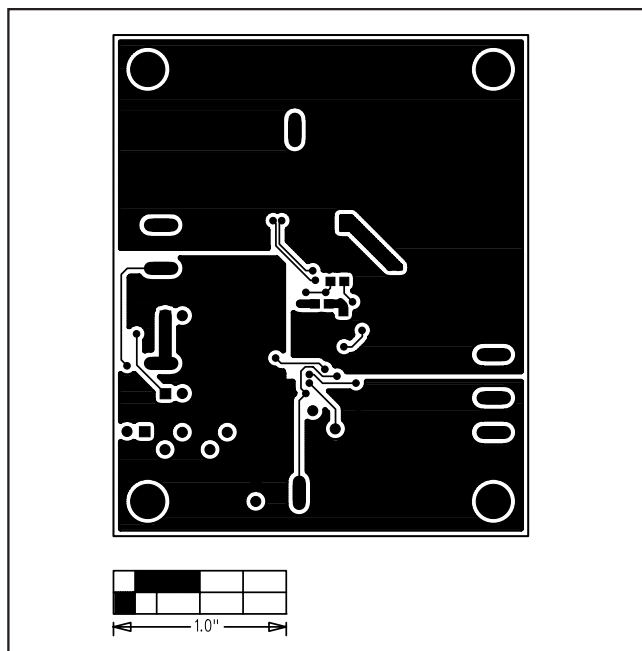


Figure 4. MAX1870A EV Kit PC Board Layout—Solder Side

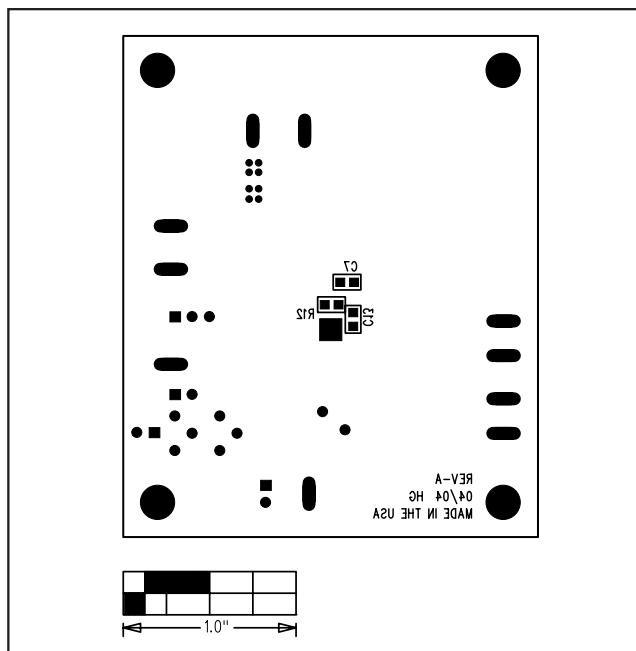


Figure 5. MAX1870A EV Kit Component Placement Guide—Solder Side

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Maxim Integrated Products, 120 San Gabriel Drive, Sunnyvale, CA 94086 408-737-7600 5