



# MAX846A Evaluation Kit

## General Description

The MAX846A evaluation kit (EV kit) is a stand-alone charger for lithium-ion (Li-Ion) batteries. The charging regulator consists of voltage and current loops driving an external, low-cost, PNP pass transistor. In voltage-regulation mode, a current-to-voltage converter supplies a voltage proportional to the current flowing through the Li-Ion battery. The float voltage and charging current can be programmed with just two external resistors. The MAX846A EV kit is shipped configured for charging two Li-Ion cells at 800mA from a 10V power source.

The MAX846A EV kit is a fully assembled and tested surface-mount printed circuit board.

## Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	22 $\mu$ F, 35V electrolytic capacitor Sanyo 35CV22GX
C2	1	0.1 $\mu$ F ceramic capacitors
C3	1	4.7 $\mu$ F, 16V tantalum capacitor Sprague 595D475X0016A2B
C4, C5, C6	3	0.01 $\mu$ F ceramic capacitors
C7	1	4.7 $\mu$ F, 35V electrolytic capacitor Sanyo 35CV4.7GX
D1	1	1A, 100V fast-recovery diode Nihon EC10DS1
Q1	1	PNP power transistor (SOT-223) Zetex FZT749
R1, R6	2	0.400 $\Omega$ , 1%, 1/2W resistors Dale WSL-2010-R400-F or IRC LR2010-01-R400-F
R2	1	680 $\Omega$ , 5% resistor
R3	1	10k $\Omega$ , 5% resistor
R4	1	100k $\Omega$ , 5% resistor
R5	1	825k $\Omega$ , 1% resistor
U1	1	Maxim MAX846AEEE
J1	1	PC mount jack RDI Electronics DJ-005
J2	1	2-pin term connector
JU1–JU4	4	3-pin headers
JU5	1	2-pin header
None	0	6.0V at 800mA AC adapter (1 cell) James Electronics 14311 (not supplied) 9V at 830mA AC adapter (2 cells) James Electronics 14323 (not supplied)
None	4	Shunts
None	1	MAX846A PC board

## Features

- ◆ **0.5% Internal Reference for Li-Ion Charging**
- ◆ **Regulates Voltage and Current into Battery**
- ◆ **Selectable 1 or 2-Cell Li-Ion Charge**
- ◆ **1%, 3.3V, On-Chip, Low-Dropout Linear Regulator**
- ◆ **1 $\mu$ A Max Battery Drain when Off**
- ◆ **Power-Good Function**
- ◆ **Surface-Mount Components**
- ◆ **Fully Assembled and Tested**

## Ordering Information

PART	TEMP. RANGE	BOARD TYPE
MAX846EVKIT	0°C to +70°C	Surface Mount

## Component Suppliers

SUPPLIER	PHONE	FAX
AVX	(803) 946-0690 (800) 282-4975	(803) 626-3123
Dale-Vishay	(402) 564-3131	(402) 563-6418
IRC	(512) 992-7900	(512) 992-3377
James Electronics	(312) 463-6500	(312) 463-1504
Motorola	(602) 303-5454	(602) 994-6430
Nichicon	(847) 843-7500	(847) 843-2798
Nihon	(805) 867-2555	(805) 867-2698
Sanyo	(619) 661-6835	(619) 661-1055
Sprague	(603) 224-1961	(603) 224-1430
RDI Electronics	(914) 773-1000	(914) 773-1111
Vishay/Vitramon	(203) 268-6261	(203) 452-5670
Zetex	(516) 543-7100	(516) 864-7630

Evaluates: MAX846A

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## Quick Start

The MAX846A Evaluation Kit (EV kit) is fully assembled and tested. Follow these steps to verify board operation. **Do not turn on the power supply until all connections are completed.**

- 1) Place the shunt across JU2's pins to set the number of cells being charged in the battery pack. The EV kit is shipped configured for two lithium-ion (Li-Ion) cells (shunt across pins 1 and 2).
- 2) Set the charging current with R1 and R6. The charge current is preset for 800mA ( $R1 = R6 = 400m\Omega$ ). For 400mA charge current, remove R6. Consult the battery manufacturer for recommended charging currents.
- 3) Connect the battery pack to the two-pin power connector J2. Observe the polarity markings.
- 4) Connect the external supply voltage to the VIN and GND pads. For charging one cell, use a 6V supply; for 2 cells, use a 10V supply.
- 5) Turn on the power supply to the board and confirm the voltage across the battery using a voltmeter.

## Detailed Description

The MAX846A EV kit is a stand-alone charger for Li-Ion batteries. The charging regulator consists of voltage and current loops driving an external, low-cost, PNP pass transistor (Q1). The MAX846A requires an input 1V greater than the maximum charging voltage.

**Higher input voltages and charging currents can be used as long as Q1's power dissipation does not exceed 2W.** (At 2W, Q1 may exceed +70°C). For higher power dissipation and cooler operation, replace Q1 with a TO220 transistor (TIP42) and heatsink in holes provided.

### Selecting the Number of Li-Ion Cells

Jumper JU2 selects the number of battery-pack cells. Place the shunt across JU2's pins to select the desired number of cells (Table 1). The MAX846A EV kit is shipped configured for two cells.

**Table 1. Jumper JU2 Functions**

SHUNT LOCATION	CELL2 PIN	NUMBER OF CELLS
1 & 2	Connected to VL	2
2 & 3	Connected to GND	1

## Jumper Selection

The three-pin header JU1 selects shutdown mode. Table 2 lists the selectable jumper options.

**Table 2. Jumper JU1 Functions**

SHUNT LOCATION	ON PIN	MAX846A OUTPUT
1 & 2	Connected to PWROK	Enabled
2 & 3	Connected to GND	Shutdown mode, $I_{BATT} < 1\mu A$

The three-pin header JU3 disables the voltage-regulation loop. Table 3 lists the selectable jumper options. The MAX846A EV kit is shipped configured for two Li-Ion cells with the voltage-regulation loop enabled.

**Table 3. Jumper JU3 Functions**

SHUNT LOCATION	OFFV PIN	CHARGER STATUS
1 & 2	Connected to VL	Voltage loop disabled
2 & 3	Connected to GND	Voltage loop enabled

The three-pin header JU4 selects the float-voltage reference. An 825k $\Omega$ , 1% resistor is provided for adjusting the float voltage. Table 4 lists the selectable jumper options. The MAX846A EV kit is shipped configured for two Li-Ion cells with the default float voltage reference at 8.4V.

**Table 4. Jumper JU4 Functions**

SHUNT LOCATION	VSET PIN	FLOAT VOLTAGE
1 & 2	Connected to VL	Adjust up
2 & 3	Connected to GND	Adjust down
Open	Floating	8.4V for 2 Li-Ion cells, 4.2V for 1 Li-Ion cell

The two-pin header JU5 enables adjustment of the current-regulation point. When shorted, a 10k $\Omega$ , 5% resistor (R3) connects the ISET pin to GND, and the charging current is determined by R1 and R6. During float charge, the charging current can be monitored at the ISET pin. When open, an external voltage source must be connected between ICNTRL and GND to adjust the charging current. Refer to the *Detailed Description* in the MAX846A data sheet for more information.

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Evaluates: MAX846A

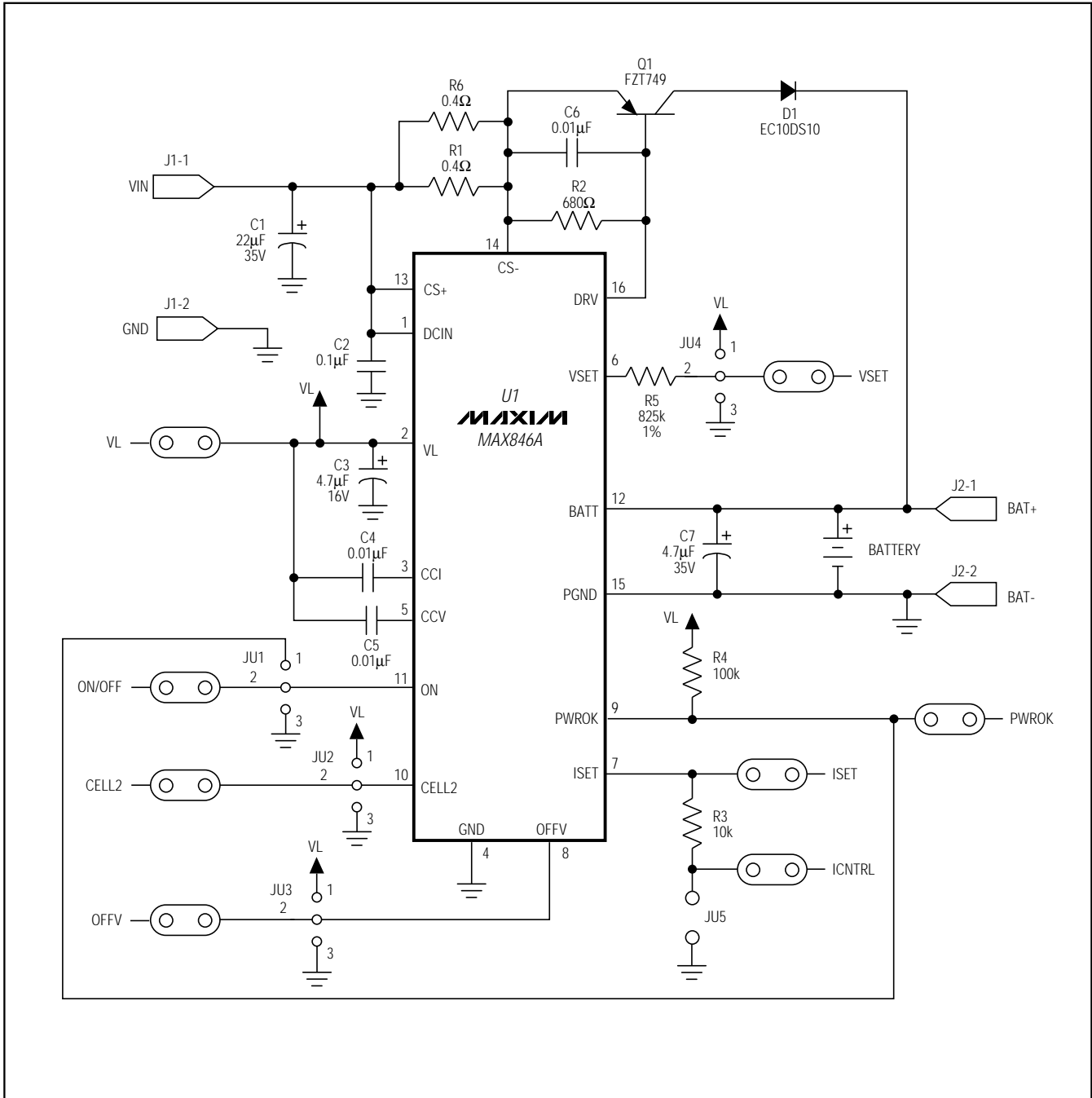


Figure 1. MAX846A EV Kit Schematic

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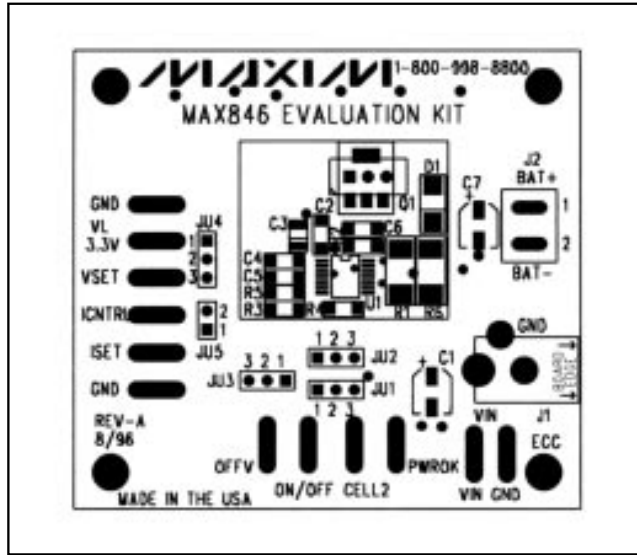


Figure 2. MAX846A EV Kit Component Placement Guide

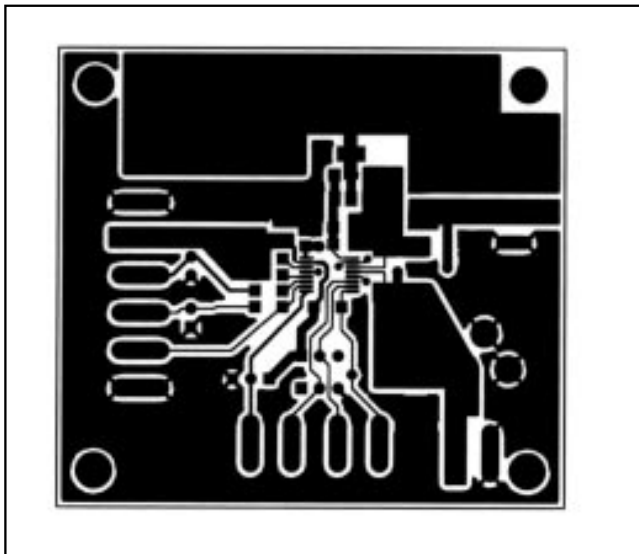


Figure 3. MAX846A EV Kit PC Board Layout—Component Side

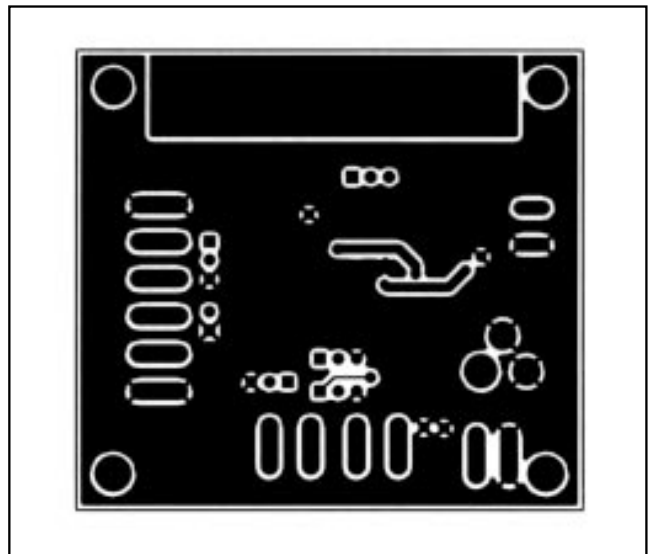


Figure 4. MAX846A EV Kit PC Board Layout—Solder Side

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