

MAXIM

MAX1874 Evaluation Kit

General Description

The MAX1874 evaluation kit (EV kit) is designed to evaluate the MAX1874 USB and/or AC-adaptor-powered, single-cell Li+ battery charger. The EV kit board contains an AC-adaptor power jack, a male USB type-B connector, and a charging LED indicator.

The MAX1874 EV kit has four jumpers (JU1–JU4) to easily change the battery charger's configuration. Jumper JU1 enables or disables charging, jumper JU2 selects the USB charging current for either a maximum of 100mA or 500mA, jumper JU3 allows thermistor sensing, and jumper JU4 sets the DC input fast-charge current for either 750mA or 1A. The DC input fast-charge current is also resistor-adjustable.

The DC input accepts up to 18V, but inhibits charging above 6.2V. The USB input accepts inputs up to 6.5V.

Features

- ◆ DC Input Up to 18V
- ◆ USB Input Up to 6.5V
- ◆ Charge from USB and/or AC Adapter
- ◆ Male USB Type-B Connector
- ◆ AC-Adapter Power Jack
- ◆ Easy Configuration Changes Using Jumpers

Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX1874EVKIT	0°C to +70°C	16 (5 × 5) Thin QFN

Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	4.7μF ±10%, 6.3V X5R ceramic capacitor (0805) TDK C2012X5R0J475K
C2	1	1μF ±10%, 10V X7R ceramic capacitor (0603) TDK C1608X7R1A105K
C3	1	2.2μF ±10%, 6.3V X5R ceramic capacitor (0603) TDK C1608X5R0J225K
C4	1	2.2μF ±20%, 10V X5R ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C5	1	4.7μF ±20%, 25V X7R ceramic capacitor (1210) TDK C3225X7R1E475M
C6	1	0.1μF ±10%, 10V X5R capacitor (0402) TDK C1005X5R1A104K
D1	0	Not installed (SOD-123)
D2, D3	2	500mA Schottky diodes (SOD-123) Fairchild Semiconductor MBR0520L Top-Mark: B2
D4	1	Small red LED
J1	1	Male USB type-B connector, right angle Assmann Electronics AU-Y1007

DESIGNATION	QTY	DESCRIPTION
J2	1	2mm power jack, right angle
JU1, JU2	2	3-pin headers
JU3, JU4	2	2-pin headers
None	4	Shunts
Q1	0	Not installed (SuperSOT-3)
Q2, Q3	2	P-channel MOSFETs 0.055Ω, -20V (SuperSOT-3) Fairchild Semiconductor FDN302P Top-Mark: 302
R1	1	10kΩ ±5% resistor (0603)
R2	1	1kΩ ±5% resistor (0603)
R3, R4	0	Not installed (0603)
R5	1	100kΩ ±1% resistor (0603)
R6	1	301kΩ ±1% resistor (0603)
R7	1	3kΩ ±5% resistor (0603)
U1	1	MAX1874ETE (16-pin 5 × 5 thin QFN)
None	1	MAX1874 EV kit PC board

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Component Suppliers

SUPPLIER	PHONE	WEBSITE
Assmann Electronics	877-277-6266	www.usa-assmann.com
Fairchild Semiconductor	888-522-5372	www.fairchildsemi.com
TDK	847-803-6100	www.component.tdk.com

Note: Please indicate that you are using the MAX1874 when contacting these component suppliers.

Recommended Equipment

- +5V DC power supply
- Single-cell Li+ battery
- Digital voltmeter (DVM)

Quick Start

The MAX1874 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. Observe all precautions on the battery manufacturer's data sheet. Only use a single Li+ cell with this charger.**

- 1) Ensure a shunt is placed across pins 1-2 of jumper JU1 to enable charging.
- 2) Ensure a shunt is placed across pins 1-2 of jumper JU2 to set the maximum USB charging current to 500mA.
- 3) Ensure a shunt is ON jumper JU3 to disable thermistor sensing.
- 4) Ensure a shunt is ON jumper JU4 to set the DC input fast-charging current to 750mA.
- 5) Connect the +5V DC power supply across the USBIN and GND pads.
- 6) Turn on the power supply.
- 7) Using the DVM, verify that the battery voltage between the BATT+ and GND pads is 4.2V ($\pm 0.75\%$).
- 8) **Observe the correct Li+ polarity.** Connect a single-cell Li+ battery between the BATT+ and GND pads.
- 9) Monitor the BATT+ voltage until it reaches 4.2V ($\pm 0.75\%$).

Detailed Description

Jumper Selection

Table 1. Enable Charging (EN)

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2	Enable charging (default)
	2-3	Disable charging

Caution: Do not connect an external controller to the EN pad while a shunt is on jumper JU1.

Table 2. Maximum USB Charging Current (USEL)

JUMPER	SHUNT POSITION	DESCRIPTION
JU2	1-2	Maximum of 500mA of USB charging (default)
	2-3	Maximum of 100mA of USB charging

Caution: Do not connect an external controller to the USEL pad while a shunt is on jumper JU2.

Table 3. Thermistor Setting (THRM)

JUMPER	SHUNT POSITION	DESCRIPTION
JU3	ON	Disable thermistor sensing (default)
	OFF	Enable thermistor sensing (see the <i>Using Thermistor Sensing</i> section for more details)

Table 4. DC Input Fast-Charge Current (DCI)

JUMPER	SHUNT POSITION	DESCRIPTION
JU4	ON	DC input fast-charge current is 750mA (default)
	OFF	DC input fast-charge current is 1A

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Evaluating Other DC Input Fast-Charge Currents (IBATT)

The MAX1874 EV kit is preset with a DC input fast-charge current (IBATT) of 750mA. Taking the shunt OFF jumper JU4 changes IBATT to 1A. However, IBATT can also be resistor-programmed by placing the shunt ON jumper JU4 and changing the R5 and R6 resistors using the equation below:

$$I_{BATT} = (R6 / (R5 + R6)) A$$

Allowing USB to Power the System Load

The MAX1874 EV kit is shipped with Q1 and D1 not installed. To allow the USB to power the system load, install a P-channel MOSFET such as the Fairchild FDN302P, and a Schottky diode, such as the Fairchild MBR0520L, on the Q1 and D1 pads, respectively, of the MAX1874 EV kit board.

Using Thermistor Sensing

The MAX1874 EV kit is preset with thermistor sensing disabled through jumper JU3. Removing jumper JU3 and installing a $10k\Omega \pm 1\%$ resistor for R4 allows an NTC-type thermistor ($10k\Omega$ at $+25^{\circ}\text{C}$) to be used. The thermistor must be located in close proximity to the single-cell Li+ battery with the ungrounded end connected to the THRM pad of the MAX1874 EV kit board. Charging is interrupted when the cold temperature limit is reached, which typically occurs at $V_{THRM} \geq 2.22\text{V}$. Charging also is interrupted when the hot temperature limit is reached, which typically occurs at $V_{THRM} \leq 0.87\text{V}$.

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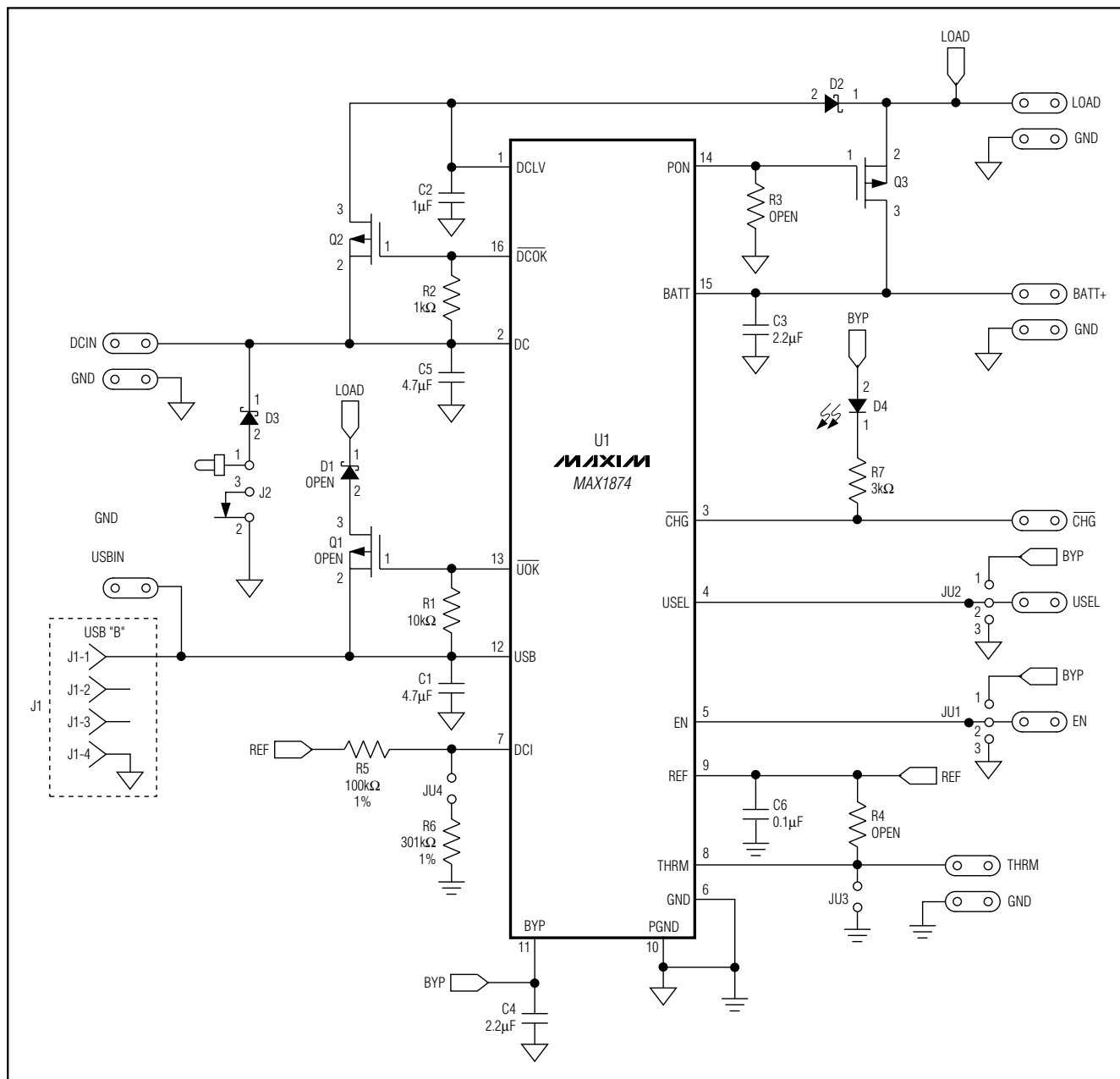


Figure 1. MAX1874 EV Kit Schematic

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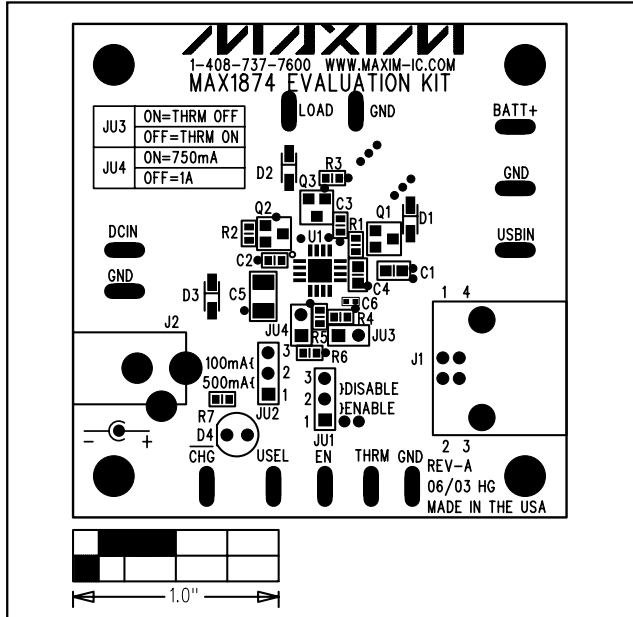


Figure 2. MAX1874 EV Kit Component Placement Guide—Component Side

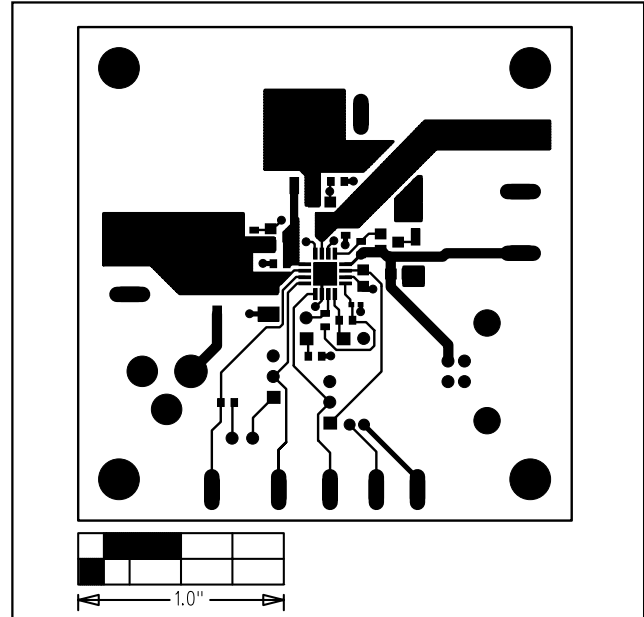


Figure 3. MAX1874 EV Kit PC Board Layout—Component Side

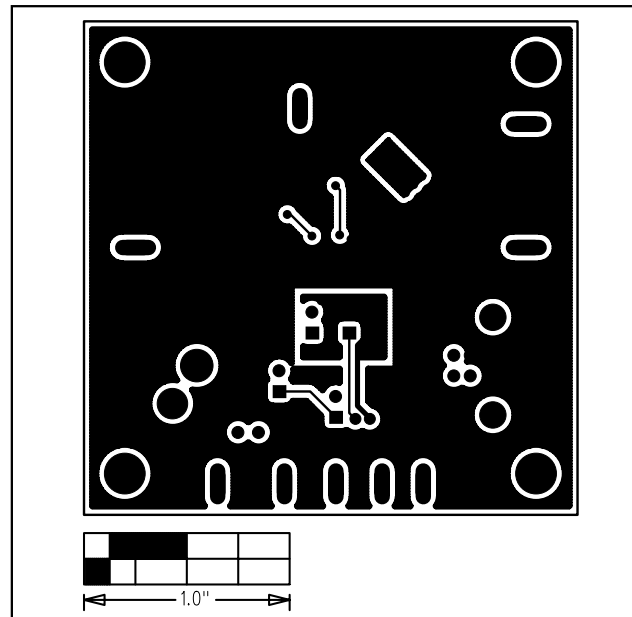


Figure 4. MAX1874 EV Kit PC Board Layout—Solder Side

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