

# MAXIM

## MAX1926 Evaluation Kit

### General Description

The MAX1926 evaluation kit (EV kit) is a complete, fully assembled and tested, single-cell lithium-ion (Li+) battery charger. The EV kit provides a 4.2V output from input as high as 12V, and delivers up to 1A charge current. A light-emitting diode (LED) indicates the cell's charging status.

The EV kit can be also used to evaluate the MAX1925, which is a single-cell Li+ battery charger with a 4.5V to 6.1V input voltage charge range.

### Component List

| DESIGNATION | QTY | DESCRIPTION   |
|-------------|-----|---|
| C1          | 1   | 10 $\mu$ F $\pm$ 20%, 16V X5R ceramic capacitor (1210)<br>Taiyo Yuden EMK325BJ106MN or TDK C3225X5R1C106MT                              |
| C2          | 1   | 22 $\mu$ F $\pm$ 20%, 6.3V tantalum capacitor (A case)<br>AVX TAJA226M006R  |
| C3          | 1   | 0.1 $\mu$ F $\pm$ 10%, 16V X7R ceramic capacitor (0603)<br>Taiyo Yuden EMK107BJ104KA or TDK C1608X7R1C104KT or Murata GRM39X7R104K016AD |
| C4          | 0   | Not installed, capacitor (0603)   |
| D1, D2      | 2   | 1A, 30V Schottky diodes<br>Nihon EP10QY03   |
| D3          | 1   | Surface-mount LED (0805)  |
| JU1         | 1   | 2-pin header  |
| JU2         | 0   | Not installed, shorted by PC trace  |
| L1          | 1   | 10 $\mu$ H, 1.3A inductor<br>Toko A915AY-100M or Sumida CDRH5D28-100  |
| Q1          | 1   | P-channel MOSFET 3-pin SOT23<br>Fairchild FDN360P   |
| R1          | 1   | 0.14 $\Omega$ $\pm$ 1%, 1/2W sense resistor (1206)<br>IRC LR1206-01-R140-F  |
| R2          | 1   | 100k $\Omega$ $\pm$ 5% resistor (0603)  |
| R3, R4      | 0   | Not installed, resistors (0603)   |
| R5          | 1   | 10k $\Omega$ $\pm$ 5% resistor (0603)   |
| U1          | 1   | MAX1926ETC 12-pin thin QFN 4mm x 4mm, top mark AABF   |
| None        | 1   | Shunt   |
| None        | 1   | MAX1926 PC board  |

### Features

- ◆ 5V to 12V Input Voltage Range
- ◆ Up to 1A Fast Charge Current
- ◆ LED Charge Status and Fault Indicator
- ◆ 12-Pin Thin QFN Package
- ◆ Surface-Mount Construction
- ◆ Fully Assembled and Tested

### Ordering Information

| PART         | TEMP RANGE   | IC PACKAGE            |
|--------------|--------------|-----------------------|
| MAX1926EVKIT | 0°C to +70°C | 12 Thin QFN 4mm x 4mm |

**Note:** To evaluate the MAX1925, request a MAX1925 free sample with the MAX1926EVKIT.

### Quick Start

The MAX1926 EV kit is a fully assembled and tested surface-mount board. Follow the steps below to verify board operation. **Do not turn on the power supply until all connections are completed:**

- 1) Verify that there is a no shunt across jumper JU1 (EN).
- 2) Connect a voltmeter across the EV kit's BATT and GND pads.
- 3) Connect a 5V to 12V power supply to the VIN pad. Connect the power-supply ground to the GND pad closest to VIN.
- 4) **Observe correct Li+ cell polarity.** Connect the positive terminal of a single-cell Li+ battery to the BATT pad. Connect the negative terminal of the battery to the GND pad closest to BATT.
- 5) Turn on the power supply. The LED turns on if the battery voltage is below 4.2V and the charging current is above 125mA. See Table 3 for additional LED state descriptions.
- 6) The LED turns off once the Li+ cell has been fully charged.

To evaluate the MAX1925, see the *Evaluating the MAX1925* section.

Evaluates: MAX1925/MAX1926

# MAX1926 Evaluation Kit

## Component Suppliers

| SUPPLIER    | PHONE         | FAX           | WEBSITE               |
|-------------|---------------|---------------|-----------------------|
| AVX         | 843-946-0238  | 843-626-3123  | www.avxcorp.com       |
| Fairchild   | 888-522-5372  | 408-882-2102  | www.fairchildsemi.com |
| IRC         | 361-992-7900  | 361-992-3377  | www.irctt.com         |
| Murata      | 770-436-1300  | 770-436-3030  | www.murata.com        |
| Nihon       | 81-33343-3411 | 81-33342-5407 | 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        |

**Note:** Please indicate that you are using the MAX1925/MAX1926 when contacting these component suppliers.

### Detailed Description

The MAX1926 EV kit is a fully assembled and tested single-cell Li+ battery charger. The EV kit contains an external P-channel MOSFET for current switching and can deliver up to 1A of current to a Li+ battery. An LED indicates the charging status of the battery. The maximum charging time is set to 3 hours with 0.1 $\mu$ F at C3.

#### Jumper Selection

In the MAX1926, EN is internally pulled to 3V with an internal 300k $\Omega$  resistance. When jumper JU1 is open, EN goes to 3V and the charger is enabled. When JU1 is shorted, EN is 0V and the charger is disabled. See Table 1 for JU1 functions

In the MAX1925, EN does not have an internal pullup and must be driven high (5.5V max) or low. Extra pads (R3 and R4) are provided so that EN can be driven from a voltage-divider connected to a higher voltage without exceeding the 5.5V limit.

Jumper JU2 provides options to connect THRM to a thermistor or a 10k $\Omega$  resistor. The MAX1926 is disabled when

the resistance connected to THRM is greater than 28.69 $\Omega$  or less than 3.967k $\Omega$ . The MAX1926 EV kit comes with THRM connected to a 10k $\Omega$  resistor. JU2 is not populated and is shorted by a PC trace. To connect a thermistor to the EV kit, cut open the PC trace shorting JU2. Table 2 lists JU2 functions.

#### LED States

The LED on the EV kit is driven by the CHG pin. Depending on the Li+ cell's charging status, the pin is low or high impedance, thus turning the LED on or off. The LED blinks at 0.5Hz when the MAX1926 enters Fault Prequal1, Fault Prequal 2, Fault Full, Fault BATT Voltage, or the Fault Temp state. For driving logic circuits, remove the LED and install a pullup resistor from a logic supply to CHG. Table 3 lists the LED states.

#### Evaluating the MAX1925

To evaluate the MAX1925, replace the MAX1926ETC with a MAX1925ETC. Install 100k $\Omega$  resistors R3 and R4 to enable the IC.

Table 1. JU1 Functions

| SHUNT LOCATION | EN PIN                     | MAX1926 OUTPUT      |
|----------------|----------------------------|---------------------|
| Installed      | Connected to GND           | MAX1926 is disabled |
| Not installed  | EN internally pulled to 3V | MAX1926 is enabled  |

Table 2. JU2 Functions

| JUMPER STATE         | THRM PIN                                    | MAX1926 OUTPUT   |
|----------------------|---|--|
| Open                 | Connected to a thermistor using THRM pad    | MAX1926 enabled with valid THRM resistance and EN high |
| Shorted (by Default) | Connect to a 10k $\Omega$ pulldown resistor | MAX1926 is enabled if EN is high                       |

# MAX1926 Evaluation Kit

Evaluates: MAX1925/MAX1926

**Table 3. LED States**

| CHARGING STATE     | CONDITION  | LED STATE   |
|--------------------|--|---|
| Off                | EN low, or no battery, or no wall power.   | Off.  |
| Prequal1           | Charge current = 4mA until BATT reaches 2V.  | On.   |
| Prequal2           | Charge current = C/10 (100mA) until BATT reaches 3V.   | On.   |
| Fast Charge        | Charge current = C = 142mV/R1 (1A).  | On.   |
| Full Charge        | Charge current has fallen to C/8 (125mA).  | Off.  |
| Fault Prequal1     | BATT does not reach 2V before Prequal1 timeout.  | Blinking at 0.5Hz. Clear fault by cycling input power, THRM, or EN.         |
| Fault Prequal2     | BATT does not reach 3V before Prequal2 timeout.  |   |
| Fault Full         | Charge current does not drop to C/8 (125mA) before full-charge timeout.  |   |
| Fault Batt Voltage | Battery voltage has exceeded 4.35V.  |   |
| Fault Temp         | Temperature has risen above +50°C or fallen below 0°C if a thermistor is installed. Temp fault clears by itself. | MAX1925: Off.<br>MAX1926: Blinking at 0.5Hz.                                |
| None               | Initial power-up or enable with no battery.  | Blinking at rapid rate as charger cycles through Reset, Prequal1, and Done. |

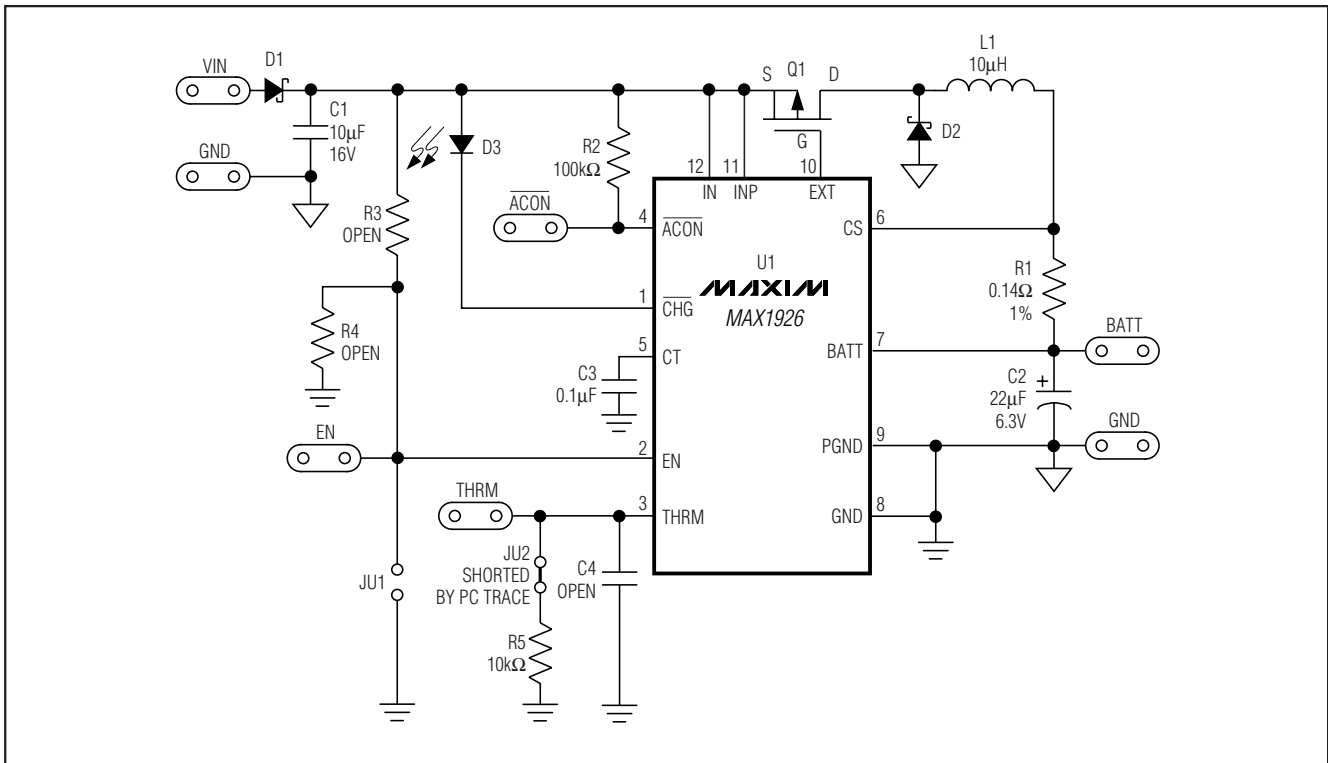


Figure 1. MAX1926 EV Kit Schematic

# MAX1926 Evaluation Kit

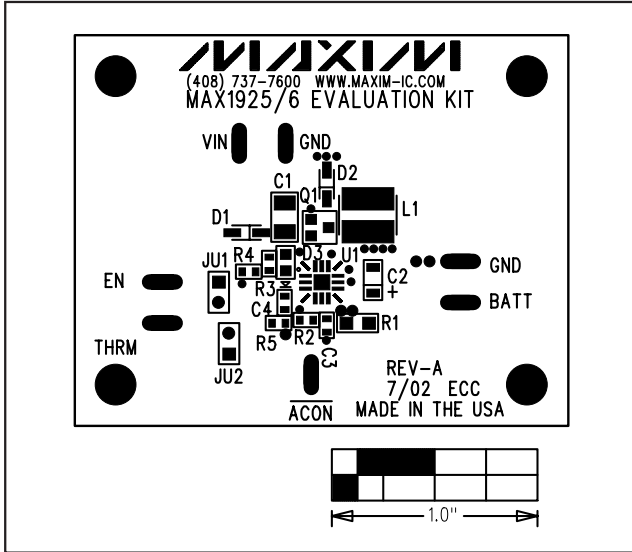


Figure 2. MAX1926 EV Kit Component Placement Guide—Top Silkscreen

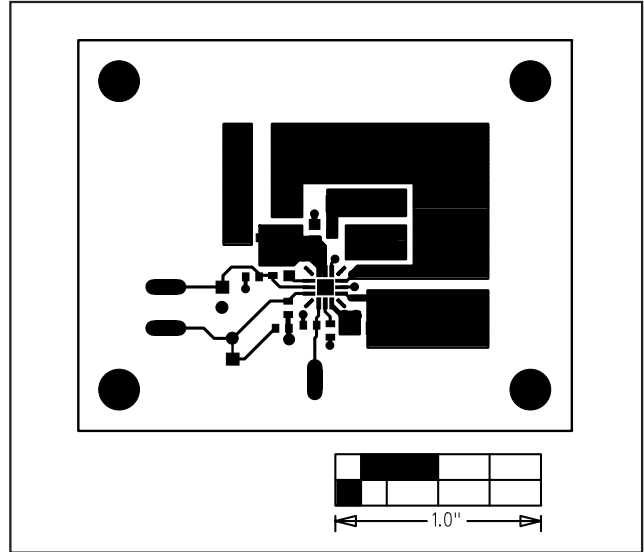


Figure 3. MAX1926 EV Kit PC Board Layout—Component Side

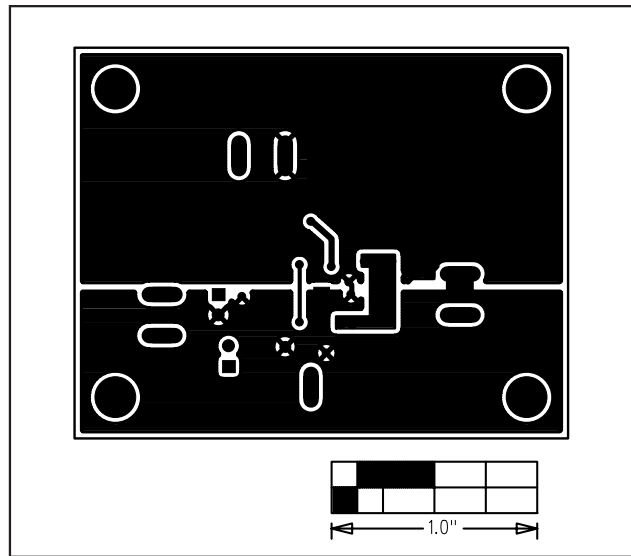


Figure 4. MAX1926 EV Kit PC Board Layout—Solder Side

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