19-1863; Rev 0; 11/00

MAXIM

MAX1772 Evaluation Kit

Evaluates: MAX1772

General Description

The MAX1772 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 4A. High efficiency is achieved by a buck topology with synchronous rectification. The EV kit provides outputs that can be used to monitor the input current, battery charging current, and the presence of an AC adapter.

The MAX1772 EV kit is a fully assembled and tested surface-mount printed circuit (PC) board.

Ordering Information

PART	TEMP. RANGE	IC PACKAGE
MAX1772EVKIT	0°C to +70°C	28 QSOP

Features

- **Input Current Limiting**
- **±0.7% Output Voltage Accuracy**
- **Analog Inputs Control Charge Current and Charge Voltage**
- **Monitor Outputs for:**
  - **Current Drawn from AC Input Source**
  - **Charging Current**
  - **AC Adapter Presence**
- **Up to 18.2V Battery Voltage**
- **+8V to +28V Input Voltage**
- **4A (max) Battery Charge Current**
- **Charges Any Battery Chemistry: Li+, NiCd, NiMH, Lead Acid, etc.**
- **Fully Assembled and Tested**
- **Surface-Mount Components**

Component List

DESIGNATION	QTY	DESCRIPTION
C1–C4	4	22µF, 35V low-ESR tantalum capacitors AVX TPSE226M035R0300 or Sprague 593D226X0035E2W
C5	1	1µF, 50V ceramic cap (1210) Murata GRM42-2X7R105K050
C6, C7	2	0.47µF, 25V ceramic capacitors (1206) Taiyo Yuden TMK316BJ474ML
C8	1	4.7µF, 16V tantalum capacitor Sprague 595D475X0016A2B
C9	1	0.022µF ceramic capacitor (0805)
C10, C11	2	0.01µF ceramic capacitors (0805)
C12, C13	2	1µF, 10V ceramic caps (0805) Taiyo Yuden LMK212BJ105MG
C14–C20, C23	8	0.1µF, 50V ceramic capacitors (0805) Taiyo Yuden UMK212BJ104MG or Murata GRM40-034X7R104M050
C21, C22, C24	0	Not installed
D1	1	Schottky diode (DPAK) STM-Microelectronics STPS8L30B or ON Semiconductor MBRD630CT or Toshiba U5FWK2C42
D2	1	30V, 3A Schottky diode Nihon EC31QS03L
D3, D4	2	100mA Schottky diodes (SOT23) Central Semiconductor CMPSH-3 or Hitachi HRB0103A
L1	1	22µH, 3.6A power inductor Sumida CDRH127-220
N1	1	N-channel MOSFET Fairchild FDS6680
N2	1	N-channel MOSFET Fairchild FDS6612A
R1	1	0.040Ω ±1%, 1W resistor Dale WSL-2512-R040-F or IRC LR2512-01-R040-F

Component List (continued)

DESIGNATION	QTY	DESCRIPTION
R2	1	0.050Ω ±1%, 1W resistor Dale WSL-2512-R050-F or IRC LR2512-01-R050-F
R3, R4 R19–R22	0	Not installed
R5	1	8.2kΩ ±5% resistor (0805)
R6	1	59kΩ ±1% resistor (0805)
R7	1	19.6kΩ ±1% resistor (0805)
R8	1	1MΩ ±5% resistor (0805)
R9	1	15.4kΩ ±1% resistor (0805)
R10	1	12.4kΩ ±1% resistor (0805)
R11, R12	2	1Ω ±5% resistors (0805)
R13	1	33Ω ±5% resistor (1206)
R14, R15	2	4.7Ω ±5% resistors (1206)
R16	1	220Ω ±5% resistor (0805)
R17, R18	2	51kΩ ±5% resistors (0805)
R23, R24	2	50kΩ ±20% potentiometers Mouser 569-68WR-50K or equivalent
LED1	1	Green light-emitting diode (T-1)
JU1	1	6-pin header
None	1	Shunt
None	4	Rubber bumpers 3M SJ-5007 Mouser 517-SJ-5007BK or equivalent
U1	1	MAX1772EEI (28-pin QSOP)
U2	1	MAX1615EUK (5-pin SOT23)
U3	1	SN74AHC14PWR (14-pin TSSOP) Digi-Key 296-1086-1-ND
None	1	MAX1772 PC board
None	1	MAX1772 data sheet
None	1	MAX1772 EV kit data sheet

Detailed Description

The MAX1772 EV kit includes all the circuitry needed to charge lithium-ion (Li+), NiMH, and NiCd batteries. The MAX1772 employs a high-efficiency step-down synchronous rectifier that controls both charging voltage and charging current. The control scheme is a constant off-time variable frequency, cycle-by-cycle current mode.

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 5.1A. The voltage at ICTL, set by potentiometer R24 (50kΩ) along with resistor R2 (0.050Ω), sets the charging current (4A). The voltage at VCTL, set by potentiometer R23 (50kΩ), adjusts the battery output voltage range. The VCTL range is from 0 to REFIN (3.3V). Refer to the MAX1772 data sheet for more detailed information.

Selecting the Number of Cells

The number of battery-pack cells is selected by jumper JU1 (Table 1). Place the shunt across JU1 pins to select the desired number of cells. This EV kit is shipped configured for 3 cells, 12.6V.

Table 1. Jumper JU1 Functions

SHUNT LOCATION	CELL PIN	NUMBER OF CELLS
1 and 2	Connected to LDO	4
3 and 4	Connected to R17/R18 divider	3
5 and 6	Connected to GND	2

AC Adapter Detection

The AC adapter input voltage is connected through a voltage-divider (R6/R7) to ACIN of the MAX1772 to detect when AC power is available for charging. LED1 turns on whenever the AC adapter input voltage falls below 8V.

Current Measurement

The board's ICHG pad is used to monitor the battery-charging current. The ICHG voltage range is 0 to 3V. V_{ICHG} is proportional to the charge current by:

$$V_{ICHG} = 0.77 \times ICHG\ (V)$$

The board's IINP pad is used to monitor the system input current. The IINP voltage range is 0 to 3V. V_{IINP} is proportional to the AC adapter current by:

$$V_{IINP} = 0.496 \times IADAPTER\ (V)$$

Refer to the *Current Measurement* section of the MAX1772 data sheet for information on V_{ICHG} and V_{IINP}.

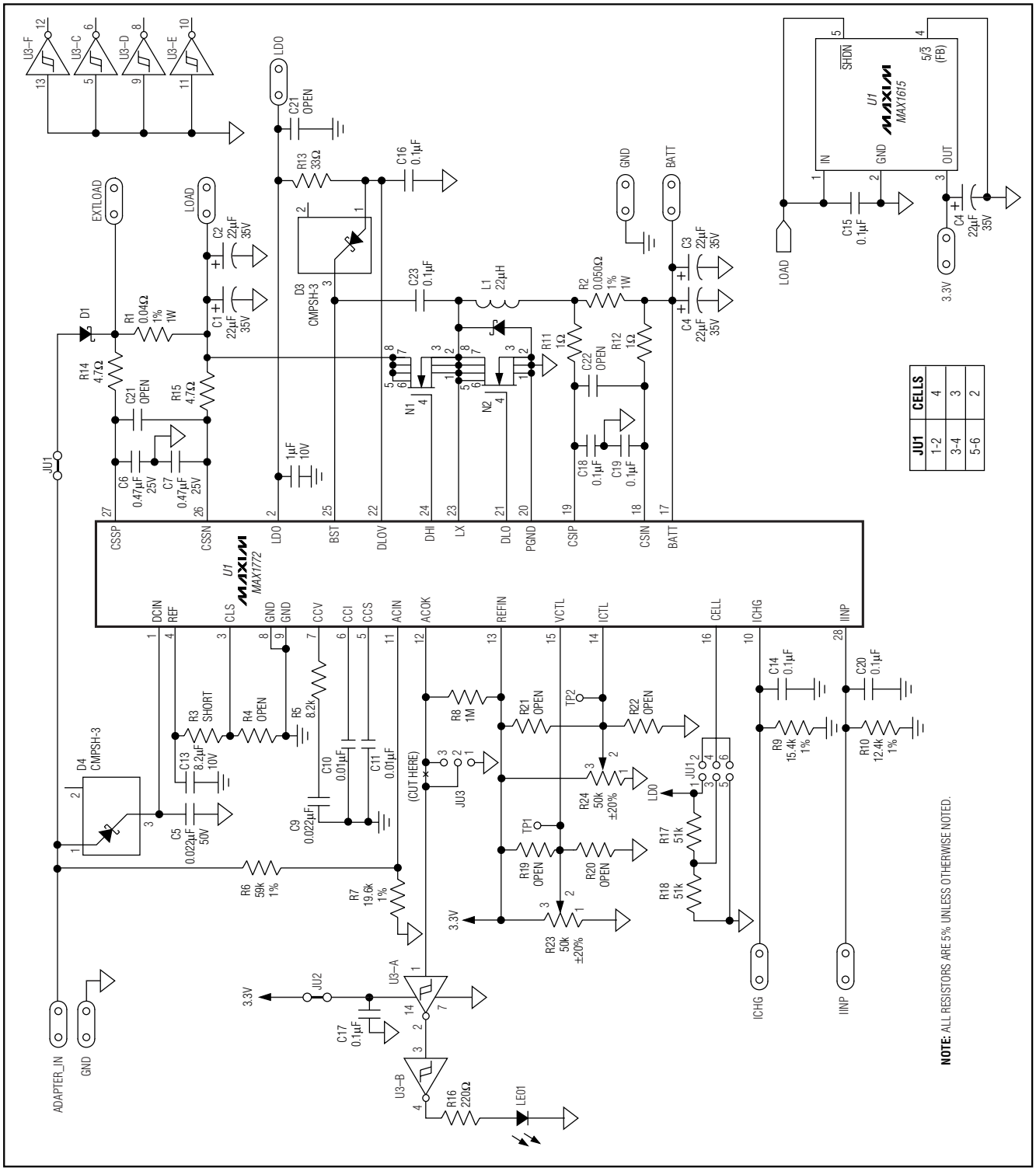

Figure 1. MAX1772 EV Kit Schematic

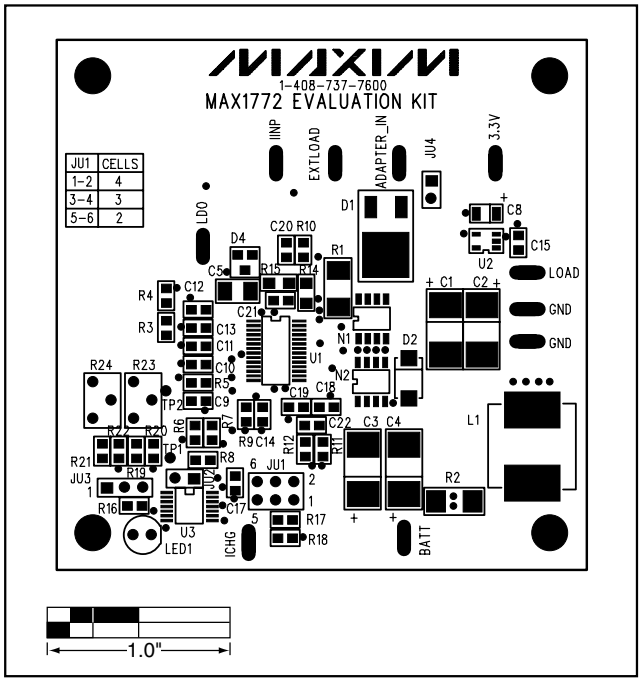

Figure 2. MAX1772 EV Kit Component Placement Guide—Component Side

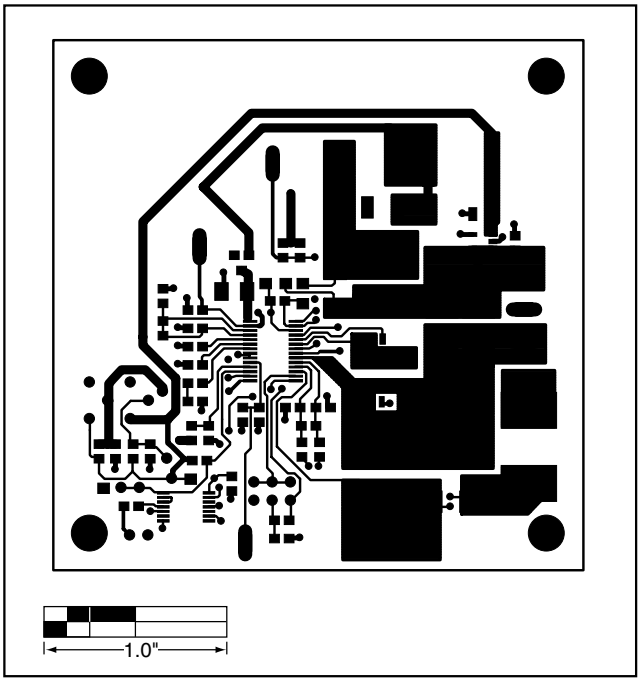

Figure 3. MAX1772 EV Kit PC Board Layout—Component Side

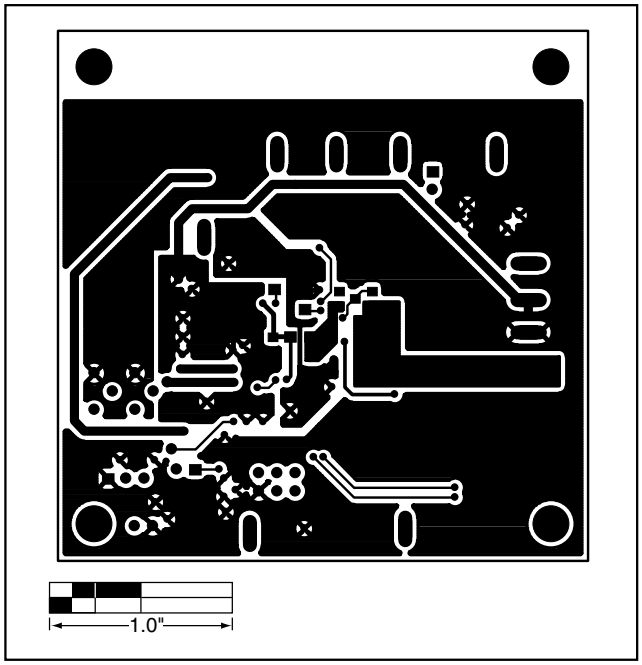

Figure 4. MAX1772 EV Kit PC Board Layout—Solder Side

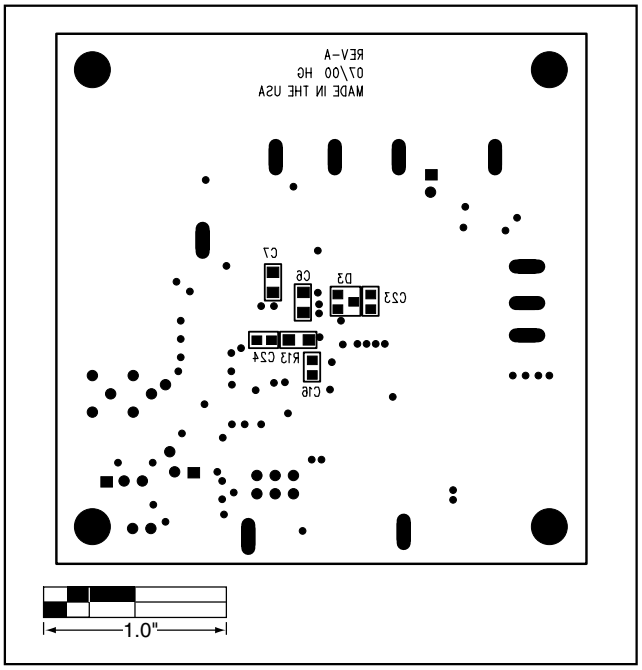

Figure 5. MAX1772 EV Kit Component Placement Guide—Solder Side