

MAXIM

MAX1574 Evaluation Kit

Evaluates: MAX1574

General Description

The MAX1574 evaluation kit (EV kit) is a fully assembled and tested circuit for evaluating the MAX1574 white LED 1x/2x charge pump. The EV kit comes with 3 white surface-mount LEDs installed. A pulse generator circuit is provided on the EV kit for easy evaluation of the single-wire serial pulse-dimming feature of the MAX1574. The pulse generator also has a flash setting for flashing the LEDs at full brightness.

Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX1574EVKIT	0°C to +70°C	10 TDFN (3mm x 3mm)

Features

- ◆ Up to 180mA (60mA/LED) Drive Capability
- ◆ 83% Average Efficiency (PLED / PBATT) over Li+ Battery Discharge
- ◆ 0.6% LED Current Matching
- ◆ Adaptive 1x/2x Mode Switchover
- ◆ Low Input Ripple and EMI
- ◆ 5% to 100% Single-Wire Serial Pulse Dimming
- ◆ 0.1µA Low Shutdown Current
- ◆ 2.7V to 5.5V Supply Voltage Range
- ◆ 10-Pin, 3mm x 3mm TDFN Package
- ◆ Fully Assembled and Tested

Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	0.22µF ±10%, 6.3V X5R ceramic capacitor (0402) TDK C1005X5R0J224K Taiyo Yuden JMK105BJ224KV or equivalent
C2, C3	2	1µF ±20%, 6.3V X5R ceramic capacitors (0402) TDK C1005X5R0J105M Panasonic ECJ0EB0J105M or equivalent
C4	1	2.2µF ±10%, 6.3V X5R ceramic capacitor (0603) TDK C1608X5R0J225K Panasonic ECJ1VB0J225K or equivalent
C5	1	1000pF ±10%, 25V X7R ceramic capacitor (0402) TDK C1005X7R1E102K or equivalent
C6	1	0.15µF ±10%, X7R ceramic capacitor (0402) TDK C1005X5R0J154K or equivalent
D1, D2, D3	3	White surface-mount right-angle LEDs Nichia NSCW215T

DESIGNATION	QTY	DESCRIPTION
D4	1	Diode (SOD-323) Central Semiconductor CMDD4448
JU1	1	3-pin header
JU2	1	Not installed, PC board short
JU3	0	Not installed, PC board open
R1	1	13.7kΩ ±1% resistor (0402)
R2	1	4.42kΩ ±1% resistor (0402)
R3	1	10kΩ ±5% resistor (0402)
R4	1	1Ω ±5% resistor (0805)
S1	1	Momentary pushbutton switch Panasonic EVQ-PHP03T
S2	1	DPDT, vertical 9mm x 3.5mm slide switch Panasonic ESD11V220
U1	1	Maxim MAX1574ETB (10 TDFN 3mm x 3mm)
U2	1	MAX6816EUS-T (4-pin SOT143)
U3	1	MAX6422XS23-T (4-pin SC70)
—	1	MAX1574 EV kit PC board
—	1	Shunt, 2 position



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Component Suppliers

SUPPLIER	PHONE	WEBSITE
Central	631-435-1110	www.centalsemi.com
Kamaya	260-489-1533	www.kamaya.com
Murata	814-237-1431	www.murata.com
Nichia	248-352-6575	www.nichia.com
Panasonic	714-373-7939	www.panasonic.com
Taiyo Yuden	408-573-4150	www.t-yuden.com
TDK	847-803-6100	www.component.tdk.com
Vishay	402-563-6866	www.vishay.com

Note: Indicate that you are using the MAX1574 when contacting these component suppliers.

Quick Start

Recommended Equipment

- A 2.7V to 5.5V power supply or battery capable of delivering 400mA.

Procedure

Follow the steps below to verify board operation.

Dimming

- 1) Verify that jumper JU1 is shorted between pins 1-2.
- 2) Set switch S2 to the DIM position (indicated on the EV kit PC board).
- 3) Turn on the power supply and preset to between 2.7V and 5.5V.
- 4) Turn the power supply off. Do not turn on the power supply until all connections are completed.
- 5) Connect the positive power-supply lead to the EV kit terminal labeled IN.
- 6) Connect the power-supply ground to the EV kit terminal labeled GND.
- 7) Turn the power supply on.
- 8) The LEDs should be lit at full brightness.
- 9) To test the dimming feature, press button S1 to reduce the LEDs' brightness to 90%. Press S1 again to further reduce the LEDs' brightness. See the *LED Dimming* section for more information.

Flash

- 1) Verify that jumper JU1 has pins 1-2 shorted.
- 2) Set switch S2 to the FLASH position (indicated on the EV kit PC board).

- 3) Turn on the power supply and preset to between 2.7V and 5.5V.
- 4) Turn the power supply off. Do not turn on the power supply until all connections are completed.
- 5) Connect the positive power-supply lead to the EV kit terminal labeled IN.
- 6) Connect the power-supply ground to the EV kit terminal labeled GND.
- 7) Turn the power supply on. The LEDs will flash once. This is due to the pulse generator circuit powering up and not the MAX1574.
- 8) Press switch S1 to flash the LEDs.

Detailed Description

LED Dimming

To test the dimming feature, set switch S2 to the DIM position and press button S1 to dim the LEDs. Each of the first nine button presses dims the LEDs by 10%. The tenth press dims the LEDs by 5%, and the eleventh press returns the LEDs to full brightness. Refer to the MAX1574 data sheet for more information on the dimming feature.

Using an External Pulse Generator for Dimming

To use an external pulse generator in place of the pulse generator included on the EV kit, simply connect the output of the pulse generator to the pad labeled EN. Connect the ground of the pulse generator to the EV kit pad labeled GND. Set S2 to the DIM position. Remove the shunt from JU1 when using a logic-level pulse generator, or short pins 1-2 of JU1 to provide a 10kΩ pullup resistor from EN to IN when driving EN with an open-drain output. Refer to the MAX1574 data sheet for a timing diagram.

Adjusting the 100% Brightness Level

The LED current is adjusted by changing the value of resistor R1. Calculate the value of R1 with the following equation, where $I_{LED_}$ is the current through one of the LEDs with no dimming (100% brightness):

$$R1 = \frac{0.6V \times 393}{I_{LED_}}$$

Adjusting the Flash Brightness Level

To test the flash, set switch S2 to the FLASH position and press button S1 to flash the LEDs.

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To adjust the brightness of the flash, replace resistor R2. Calculate the value of R2 from the following equation, where $I_{LED_}$ is the flash current through one of the LEDs:

$$R2 = \frac{0.6V \times 393}{I_{LED_}}$$

Shutdown

To turn off the LEDs and place the EV kit in low-power shutdown mode, short pins 2-3 of JU1. To enable the circuit, short pins 1-2 of JU1. To control enable/shutdown with an external logic signal, short pins 1-2 of JU1 (providing a 10kΩ pullup resistor), or remove the shunt from JU1 (no pullup) and connect the digital control signal to the pad labeled EN.

Changing the Number of LEDs

The EV kit comes with 3 white surface-mount LEDs installed. To use fewer LEDs, connect the pad labeled LED_ (corresponding to any unused LED) to the pad labeled IN.

Connecting External LEDs

To connect external LEDs to the MAX1574 EV kit, cut the trace shorting JU2. Connect the anodes of all the external LEDs to the pad labeled OUT. Connect the cathodes to the pads labeled LED_. Connect all unused LED_ pads to IN.

Input Filtering

The MAX1574 EV kit comes assembled with a 1Ω input filtering resistor to ensure stable operation when powering the EV kit with long leads from a noisy power source. JU3 is provided to short this 1Ω resistor for evaluation purposes. Short JU3 when powering the MAX1574 EV kit from a battery.

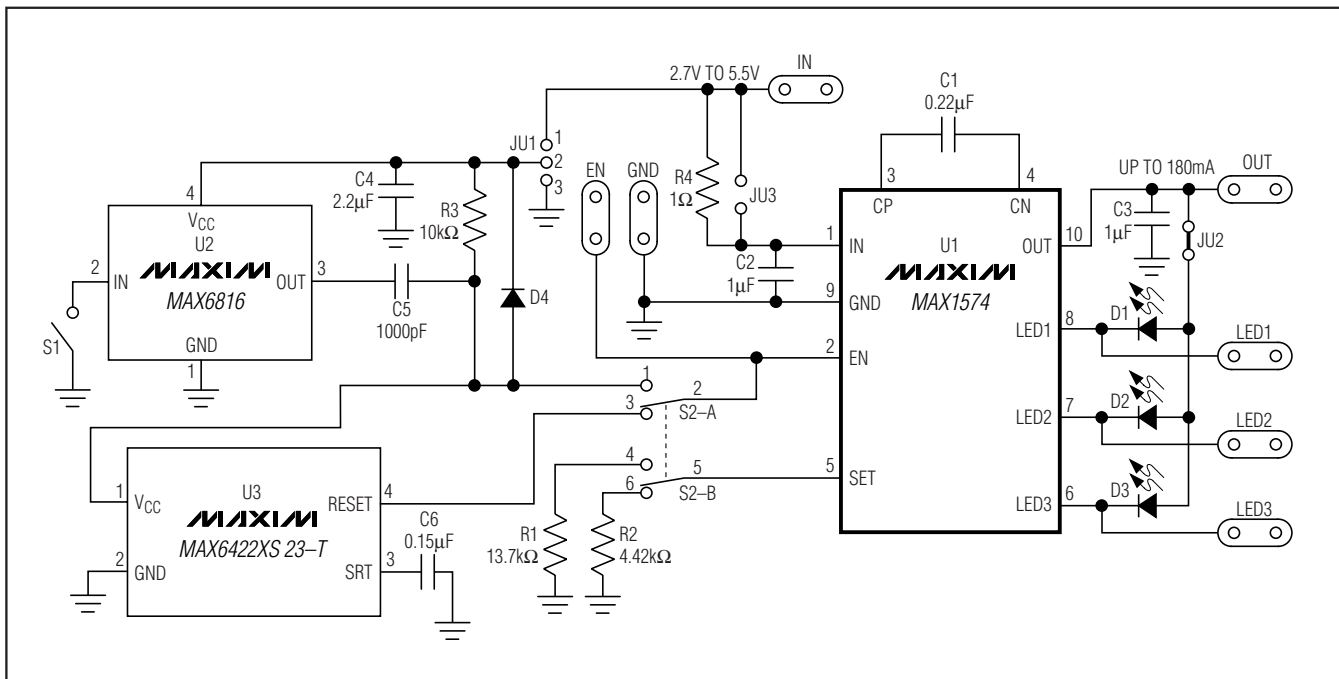


Figure 1. MAX1574 EV Kit Schematic

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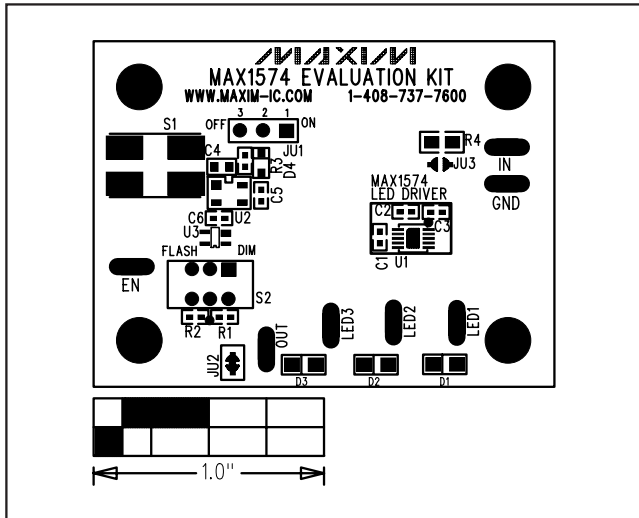


Figure 2. MAX1574 EV Kit Component Placement Guide—(Component Side)

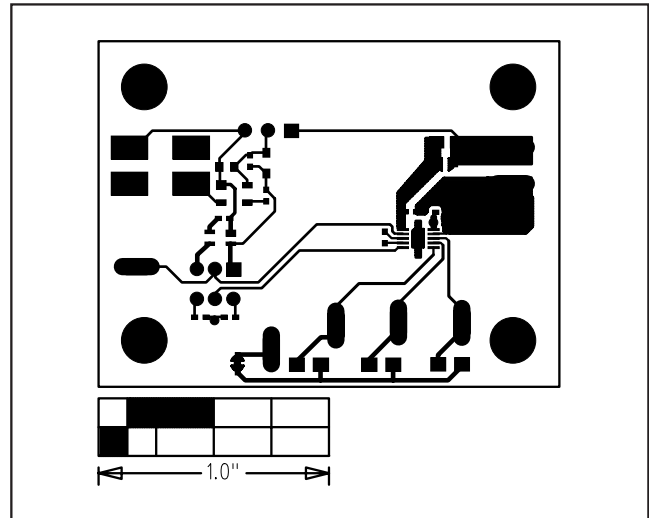


Figure 3. MAX1574 EV Kit Layout—Component Side

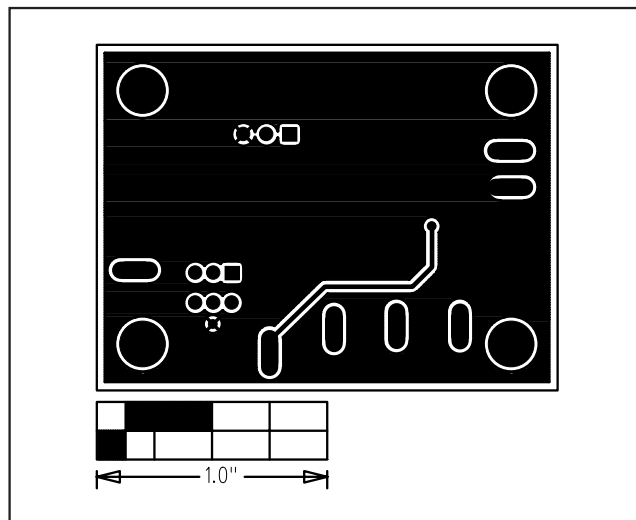


Figure 4. MAX1574 EV Kit Layout—Solder Side

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