



MAX8751 Evaluation Kit

General Description

The MAX8751 evaluation kit (EV kit) is an assembled and tested PC board that demonstrates the MAX8751 low-cost multiple CCFL backlight controller. Lamp brightness is adjustable by an on-board potentiometer.

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Central Semiconductor	631-435-1110	www.centrasemi.com
Diodes Incorporated	805-446-4800	www.diodes.com
Fairchild Semiconductor	888-522-5372	www.fairchildsemi.com
JST	847-473-1957	www.jst.com
Kemet	864-963-6300	www.kemet.com
Murata	770-436-1300	www.murata.com
Sumida	847-545-6700	www.sumida.com
TDK	847-803-6100	www.component.tdk.com
Vishay Semiconductor	402-564-3131	www.vishay.com

Note: Indicate you are using the MAX8751 when contacting these manufacturers.

Features

- ◆ +8V to +24V Input Range
- ◆ Brightness Adjustable by an On-Board Potentiometer
- ◆ 10:1 Dimming Range
- ◆ Lamp-Out Detection with Timeout
- ◆ Secondary Current Limit with Timeout
- ◆ Strike Voltage Up to 1.6kV
- ◆ High Power to Light Efficiency
- ◆ Fully Assembled and Tested

Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX8751EVKIT	0°C to +70°C	32 TQFN-EP*

*EP = Exposed paddle.

Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	22 μ F \pm 20%, 25V X5R ceramic capacitor (1812) TDK C4532X5R1E226M
C2, C4, C6, C7, C18	5	0.1 μ F \pm 10%, 25V X7R ceramic capacitors (0603) Kemet C0603C104K3RAC Murata GRM188R71E104K TDK C1608X7R1E104K
C3	1	1 μ F \pm 10%, 10V X5R ceramic capacitor (0603) Kemet C0603C105K8RAC Murata GRM188R61A105K TDK C1608X5R1A105K
C5	1	0.22 μ F \pm 10%, 16V X7R ceramic capacitor (0603) Kemet C0603C224K4RAC Murata GRM188R71C224K TDK C1608X7R1C224K

DESIGNATION	QTY	DESCRIPTION
C8, C19	2	0.01 μ F \pm 10%, 50V X7R ceramic capacitors (0603) Kemet C0603C103K5RAC Murata GRM188R71H103K TDK C1608X7R1H103K
C9, C10	2	1000pF \pm 10%, 50V ceramic capacitors (0603) Kemet C0603C102K5RAC Murata GRM188R71H102K TDK C1608X7R1H102K
C11, C12	2	12pF \pm 10%, 3kV HV ceramic capacitors (1808) Kemet C1808C120KHGAC TDK C4520C0G3F120K
C13	0	Not installed (0603)
C14-C17	4	100pF \pm 10%, 3kV HV ceramic capacitors (1808) Kemet C1808C101KHGAC TDK C4520C0G3F101K

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Component List (continued)

DESIGNATION	QTY	DESCRIPTION
C20	1	4.7 μ F \pm 10%, 25V X7R ceramic capacitor (1206) TDK C3216X7R1E475K
C23, C24	2	2.2 μ F \pm 10%, 25V X7R ceramic capacitors (1206) TDK C3216X7R1E225K
CN1–CN4	4	Shrouded headers for CCFL lamp connection, 3.5mm pin spacing, PC board mount JST SM02B-BHSS-1-TB
D1	1	Dual diode, common cathode, 1N4148-type, SOT23 Central Semiconductor CMPD2838 Fairchild Semiconductor MMBD4148CC
D2–D11	10	Diodes, 1N4148-type, SOD123 Central Semiconductor CMHD4448 Diodes Inc. 1N4148W Fairchild Semiconductor MMSD4148 Vishay Semiconductors 1N4148W
F1	1	Fuse, 3A, 32V (1206) Littelfuse 0466003 NR
J1	1	2 x 5 right-angle female receptacle
J2	1	2 x 5 right-angle header
JU1, JU3, JU4, JU5	4	3-pin headers
JU2, JU6, JU7	3	2-pin headers
JU8–JU12	0	Not installed
M1	1	2N7002 MOSFET, SOT23 Central Semiconductor 2N7002 Diodes Inc. 2N7002 Fairchild Semiconductor 2N7002
N1–N4	4	n-channel MOSFETs, 8-pin SO Fairchild Semiconductor FDS9412
Q1	1	2N3906-type pnp transistor, SOT23 Central Semiconductor CMPT3906 Diodes Inc. MMBT3906 Vishay Semiconductors MMBT3906
R1	1	10 Ω \pm 5% resistor (0603)
R2	1	100k Ω \pm 1% resistor (0603)

DESIGNATION	QTY	DESCRIPTION
R3	1	150k Ω \pm 1% resistor (0603)
R4–R7	0	Not installed (0603)
R8	1	15 Ω \pm 5% resistor (0603)
R9, R12, R13, R14	4	100k Ω \pm 5% resistors (0603)
R10	1	100k Ω potentiometer (multiturn), 3/8in square
R11	1	1k Ω \pm 5% resistor (0603)
R15	1	20k Ω \pm 5% resistor (0603)
R16, R17, R34	3	1M Ω \pm 5% resistors (0603)
R18, R19, R26–R29	6	10k Ω \pm 5% resistors (0603)
R20, R21	2	470k Ω \pm 5% resistors (0603)
R22–R25, R35–R38	8	510k Ω \pm 5% resistors (1206)
R30–R33, R40	5	3.0k Ω \pm 5% resistors (0603)
R39	1	27k Ω \pm 5% resistor (0603)
T1, T2	2	CCFL transformers, 1980:18 Sumida 1348-T009 (CEPH249 style)
T3, T4, T5	3	Current balancing transformers, 1:1 Sumida P05NZ-054
U1	1	MAX8751ETJ (32-pin thin QFN, 5mm x 5mm)
—	1	PC board MAX8751 evaluation kit
—	6	Shunts

Quick Start

Recommended Equipment

Before you begin, you need the following equipment:

- A DC power supply capable of supplying a voltage between +8V to +24V at 5A to power the MAX8751 board
- Four CCFL lamps with the following specifications:
 - a) Maximum RMS strike voltage \leq 1.6kV
 - b) RMS lamp current \leq 6mA
 - c) Input power \leq 4W

WARNING! High voltages are present on this evaluation kit. Use caution when making connections and applying power.

Do not turn on the power until all connections are complete.

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Procedure

- 1) Connect the lamps to connectors CN1–CN4.
- 2) Connect the +8V to +24V supply to the pads labeled VIN and GND on the MAX8751 EV kit.
- 3) Turn on the power supply.

Detailed Description

Brightness

The brightness of the lamp is adjustable using potentiometer R10.

Brightness Control Select Input

Jumper JU1 connects the brightness control select input (the SEL pin) to either VCC or GND. Connecting SEL to VCC (JU1 = 1-2) enables brightness control using an external sync signal. Connecting SEL to GND (JU1 = 2-3) enables analog control where the brightness is adjusted with an analog voltage on the CNTL pin. See Table 2 for jumper settings.

Slave Mode Operation

Place a shunt on JU2 to enable slave mode operation when using a daisy-chain configuration. See the *Daisy-Chain Configuration* section for more details. See Table 2 for jumper settings.

Shutdown

A shunt installed on JU3 2-3 places the MAX8751 in shutdown mode. See Table 2 for jumper settings.

Phase Shift (PS1 and PS2)

Jumpers JU4 and JU5 set the phase shift for daisy chaining up to five MAX8751s. See Table 1 for the phase shift settings.

HSYNC

Main switching frequency sync input. The switching frequency synchronizes to an external signal applied to HSYNC. Refer to the MAX8751 IC data sheet for more information. Place a shunt on JU6 to disable the HSYNC feature. See Table 2 for jumper settings.

Table 1. Phase Shift

PIN SETTINGS		PHASE SHIFT IN DEGREES				
JU4 (PS1)	JU5 (PS2)	MASTER	SLAVE 1	SLAVE 2	SLAVE 3	SLAVE 4
2-3 (GND)*	2-3 (GND)*	0	180	—	—	—
1-2 (VCC)	2-3 (GND)	0	120	240	—	—
2-3 (GND)	1-2 (VCC)	0	90	180	270	—
1-2 (VCC)	1-2 (VCC)	0	72	144	216	288

*Default position.

Table 2. Jumper Selection

JUMPER	SHUNT LOCATION	FUNCTION
JU1	1-2	An external sync signal controls the brightness.
	2-3*	An analog voltage on the CNTL pin controls the brightness.
JU2	Not installed*	Configures the MAX8751 for master operation.
	Installed	Configures the MAX8751 for slave operation.
JU3	1-2*	Enables the MAX8751.
	2-3	Disables the MAX8751.
	Not installed	Drive pad SHDN with an external logic signal.
JU4	—	Phase-shift select input 1 (PS1). See the phase shift table (Table 1).
JU5	—	Phase-shift select input 2 (PS2). See the phase shift table (Table 1).
JU6	Not installed	The switching frequency synchronizes to an external signal applied to HSYNC.
	Installed*	Disables the HSYNC feature.
JU7	Not installed	The DPWM frequency synchronizes to an external signal applied to LSYNC.
	Installed*	Disables the LSYNC feature.

*Default position.

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LSYNC

DPWM sync input. The DPWM frequency synchronizes to an external signal applied to LSYNC. Refer to the MAX8751 IC data sheet for more information. Place a shunt on JU7 to disable the LSYNC feature. See Table 2 for jumper settings.

Table 3. Daisy-Chain Connection

LOCATION IN DAISY CHAIN	CONNECTOR	CONNECTION
Master	J1	Not connected.
	J2	Connect to J1 of slave 1.
Slave 1	J1	Connect to J2 of master.
	J2	Connect to J1 of slave 2.
Slave 2	J1	Connect to J2 of slave 1.
	J2	Connect to J1 of slave 3.
Slave 3	J1	Connect to J2 of slave 2.
	J2	Connect to J1 of slave 4.
Slave 4	J1	Connect to J2 of slave 3.
	J2	Not connected.

Daisy-Chain Configuration

Up to five MAX8751 EV kits can be daisy-chained together. Connect J1 of slave 1 to J2 of the master. See Tables 3 and 4 for daisy-chain connection and jumper configuration.

Table 4. Master/Slave Jumper Configuration

MASTER		SLAVE	
JUMPER	SHUNT LOCATION	JUMPER	SHUNT LOCATION
JU1	User defined	JU1	2-3
JU2	Not installed	JU2	Installed
JU3	2-3	JU3	Not installed
JU4	See Table 1	JU4	Same setting as master
JU5	See Table 1	JU5	Same setting as master
JU6	User defined	JU6	Installed
JU7	User defined	JU7	Installed

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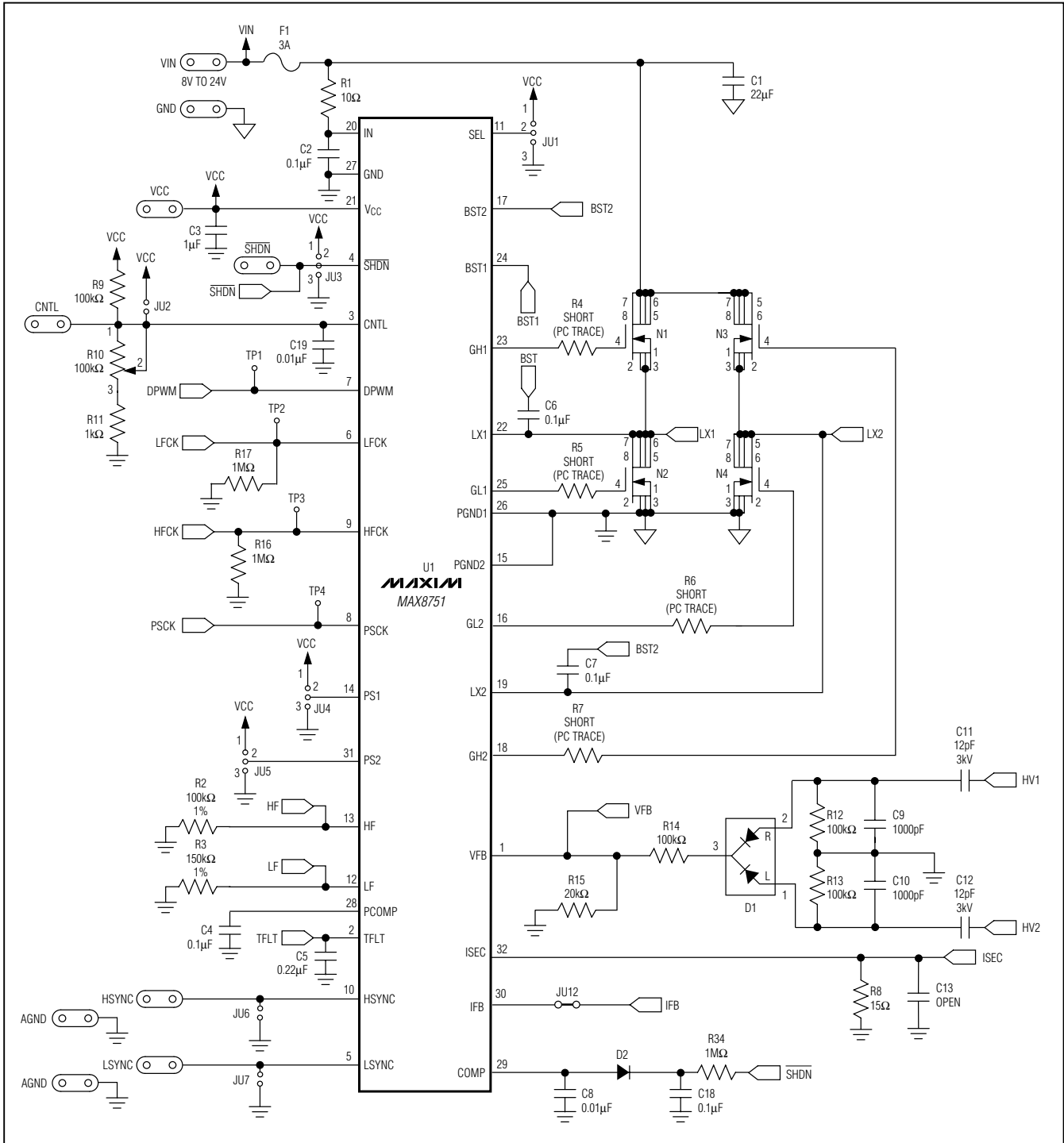


Figure 1. MAX8751 EV Kit Schematic

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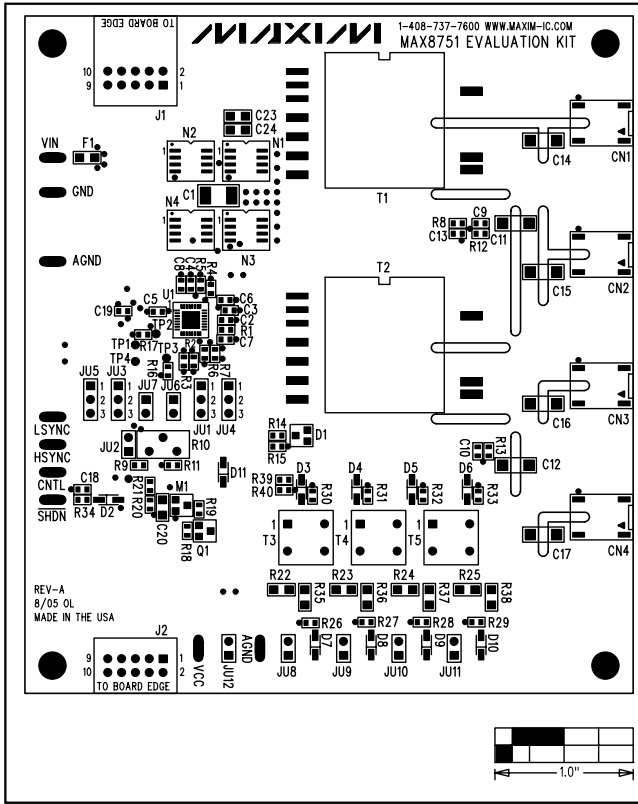


Figure 2. MAX8751 EV Kit Component Placement Guide—Component Side

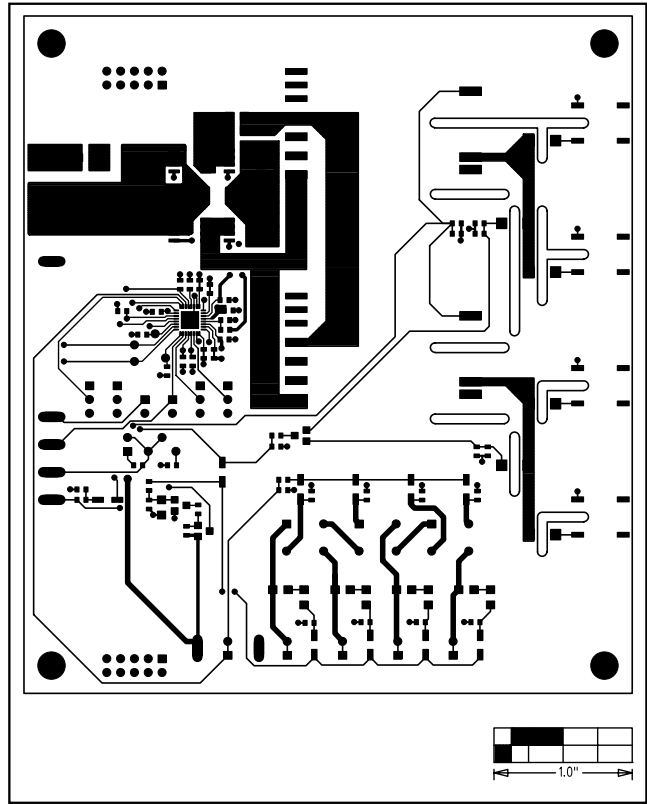


Figure 3. MAX8751 EV Kit PC Board Layout—Component Side

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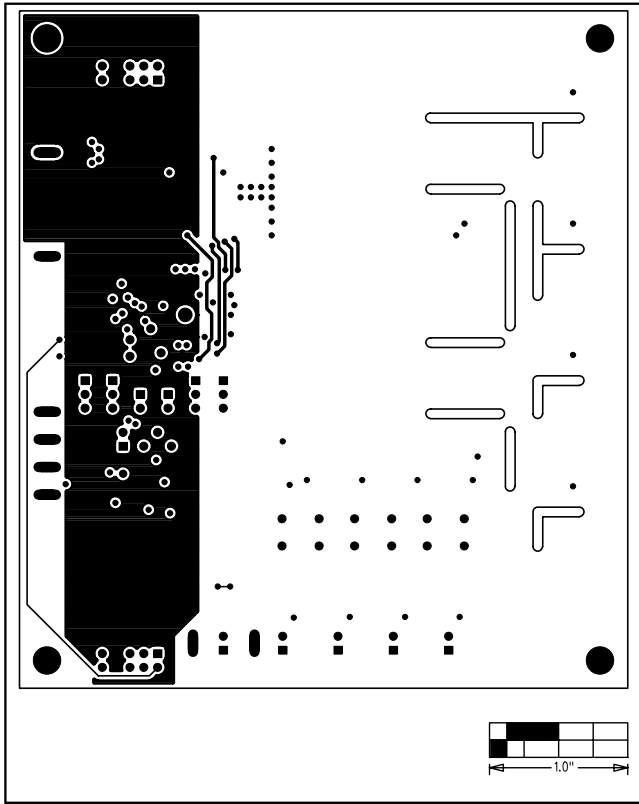


Figure 4. MAX8751 EV Kit PC Board Layout—Layer 2

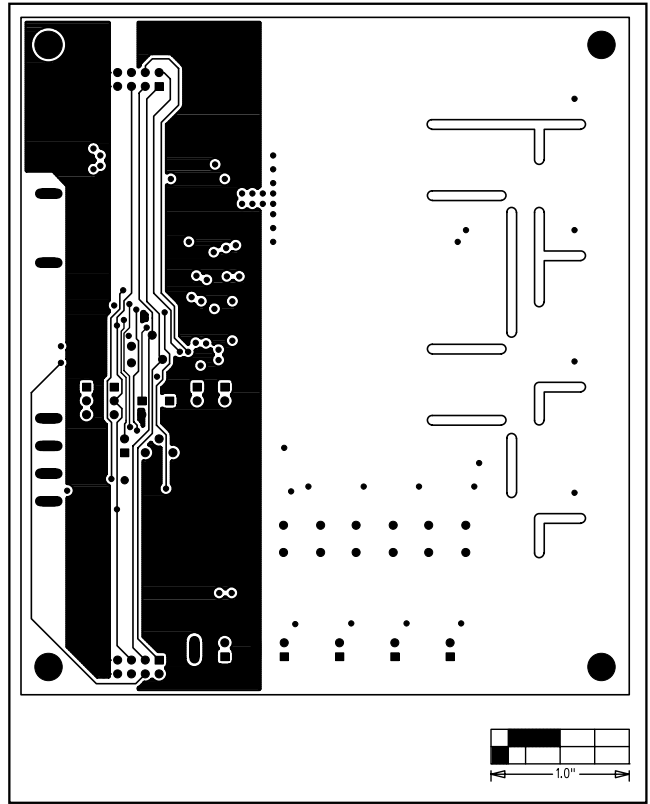


Figure 5. MAX8751 EV Kit PC Board Layout—Layer 3

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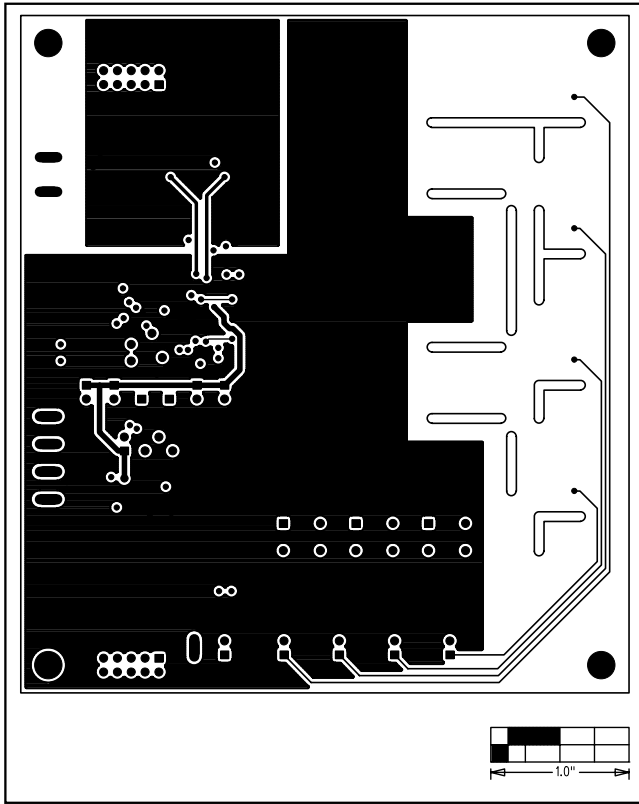


Figure 6. MAX8751 EV Kit PC Board Layout—Solder Side

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