19-4759; Rev 1; 1/99

MAXIM

MAX1701 Evaluation Kit

Evaluates: MAX1700/MAX1701

General Description

The MAX1701 evaluation kit provides a regulated 3.3V output while operating on input voltages as low as 0.7V. The input may be a DC source or a 1 to 2–cell battery. Efficiency is up to 95% with output loads up to 200mA.

The kit, which uses surface-mount components, is fully assembled and tested for quick evaluation. Jumpers are provided to select the output voltage, switching mode, and shutdown control. This EV kit can also be used to evaluate the MAX1700. Simply order a free sample of the MAX1700EEE and replace the MAX1701EEE that comes installed on the board.

Features

- ♦ **3.3V Output**
- ♦ **200mA Output**
- ♦ **0.7V to 3.5V Input**
- ♦ **Up to 95% Efficiency**
- ♦ **3µA Shutdown Current**
- ♦ **300kHz PWM Operation**
- ♦ **Optional Low-Power PFM Mode**
- ♦ **Small Surface-Mount Components**

Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	22µF, 25V, low-ESR tantalum capacitor AVX TPSD226M025R0200 Sprague 593D226X0025D
C2, C3	2	0.22µF, 25V ceramic capacitors
C4	1	0.10µF, 25V ceramic capacitor
C5	1	100µF, 10V low-ESR tantalum capacitor AVX TPSD107M010R0100 or Sprague 593D107X0010D7
C6, C7	0	Not installed. Space for optional user capacitor.
D1	1	0.5A, 20V Schottky diode Motorola MBR0520L
J1, J2, J3	3	3-pin jumpers
J4, J5	2	2-pin jumpers
L1	1	10µH, 1.6A power inductor CoilCraft DO3316-103, Coiltronics UP1B-100, Sumida CDR74B-100
R1, R4, R6	3	100kΩ, 1% resistors
R2, R3, R5	3	Not installed
R7, R8, R9	3	100kΩ, 5% resistors
R10, R11, R12	3	1MΩ, 5% resistors
R13	1	10Ω, 5% resistor
U1	1	MAX1701EEE
None	5	Shunts
None	1	3.4” x 2.4” printed circuit board
None	1	MAX1700/MAX1701 data sheet

Ordering Information

PART	TEMP. RANGE	PIN-PACKAGE
MAX1701EVKIT	0°C to +70°C	16-pin QSOP

Component Suppliers

SUPPLIER	PHONE	FAX
AVX	(803) 946-0690	(803) 626-3123
Coilcraft	(847) 639-6400	(847) 639-1469
Coiltronics	(561) 241-7876	(561) 241-9339
Sprague	(603) 224-1961	(603) 224-1430
Sumida	(847) 956-0666	(847) 956-0702
Motorola	(303) 675-2140	(303) 675-2150

Quick Start

The MAX1701 EV kit is shipped fully assembled and tested. Follow these steps to verify board operation. **Do not turn on the power supply until all connections are completed.**

1) Verify that the shunts are connected as listed in Table 2 for a 3.3V output.
2) Connect a +1.1V to +3.3V supply to the pad marked VIN. The ground connects to the GND pad. Note: the input voltage may drop as low as 0.7V after start-up.
3) Connect a voltmeter to the VOUT pad.
4) Turn on the power and verify that the output voltage is 3.3V.
5) Connect a load (if any).

Detailed Description

Jumper Selection

Five jumpers on the printed circuit board allow user selection of several configurations. Table 1 lists the jumpers and their functions. Table 2 lists the jumper positions when the board is set for normal 3.3V output operation.

Component Selection

The final circuit performance is determined by the quality of the components surrounding the MAX1701. The power inductor must not saturate at the 1.6A maximum peak current produced by MAX1701. Inductors in the *Component List* all have high current ratings and low coil resistance.

Table 1. Jumper Functions

JUMPER	SHUNT LOCATION	PIN CONNECTION	MAX1701 OPERATION
J1	1 and 2	ONA connected to GND	MAX1701 is disabled if ONB is VOUT.
	2 and 3	ONA connected to VOUT	MAX1701 is enabled.
	Open	ONA is not controlled by the board	ONA must be driven by a signal connected to the ONA pad.
J2	1 and 2	$\overline{ONB}$ connected to GND	MAX1701 is enabled.
	2 and 3	ONB connected to VOUT	MAX1701 is disabled if ONA = GND.
	Open	$\overline{ONB}$ is not controlled by the board	$\overline{ONB}$ must be driven by a signal connected to the ONB pad.
J3	1 and 2	CLK/SEL connected to GND	Low-power mode, MAX1701 operates in the PFM mode.
	2 and 3	CLK/SEL connected to VOUT	High-power mode, MAX1701 operates in the PWM mode.
	Open	CLK/SEL connected to CLK/SEL pad	CLK/SEL pin can be driven by an external source to select power mode, or a 200kHz to 400kHz signal to control switching frequency.
J4	Shorted	FB connected to GND	VOUT is preset to 3.3V.
	Open	FB connected to the resistor divider	Resistors must be installed in R3 and R4 for proper circuit operation.
J5	Shorted	Shorted for normal operation	VOUT connected to pull-up resistors.
	Open	Pull-ups disconnected	R7–R9 are disconnected so that MAX1701 shutdown current may be verified.

Table 2. Jumper Position for Normal 3.3V Operation

JUMPER	SHUNT LOCATION	PIN CONNECTION	MAX1701 OPERATION
J1	2 and 3	ONA connected to VOUT	MAX1701 is enabled.
J2	1 and 2	$\overline{ONB}$ connected to GND	MAX1701 is enabled.
J3	2 and 3	CLK/SEL connected to VOUT	High-power mode, MAX1701 operates in the PWM mode.
J4	Shorted	FB connected to GND	VOUT is preset to 3.3V. This jumper must be shorted or resistors installed in R3 and R4 for proper circuit operation.
J5	Shorted	VOUT connected to pull-up resistors	

The input and output capacitors must have low equivalent series resistance (ESR) to handle the high peak currents found in switching regulators. Low ESR is especially critical in low-voltage circuits to reduce the AC voltage across the capacitors. A higher ESR on the output capacitor will increase the output ripple. Consider using parallel capacitors to reduce the total ESR if the application requires lower output ripple. An additional output capacitor (C6) may be required for output current greater than 200mA or output voltages less than 3.3V.

A low-ESR input capacitor must be located physically close to the inductor. The Schottky diode must be connected between LX and P_{OUT} as close to the IC as possible. A Schottky diode is specified for the lower forward voltage drop as well as the fast switching characteristic. Most Schottky diodes with a sufficient current rating will work. The diode for the evaluation board was selected for its small size.

A separate low-noise ground plane connects pin 5 to the reference and signal grounds. This low-noise ground plane is then connected to the power-ground plane at the PGND pin (Figure 4).

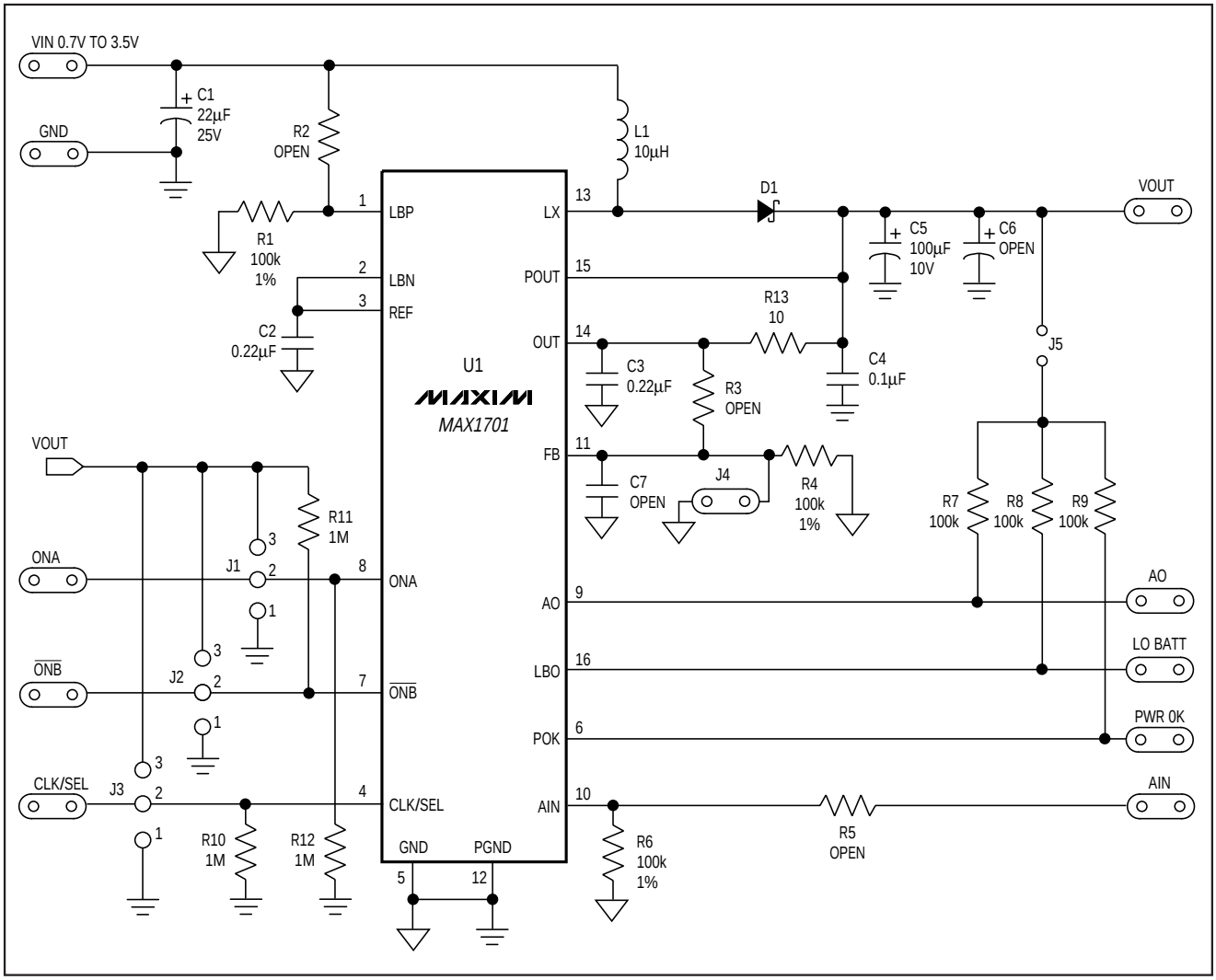

Figure 1. MAX1701 EV Kit Schematic

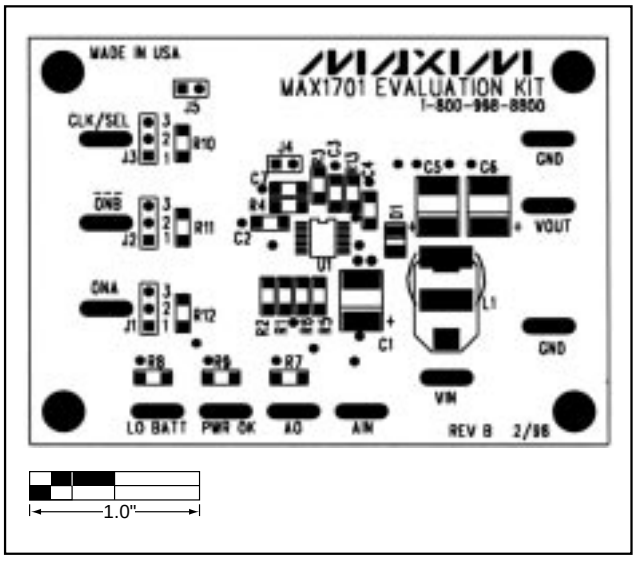

Figure 2. MAX1701 EV Kit Component Placement Guide

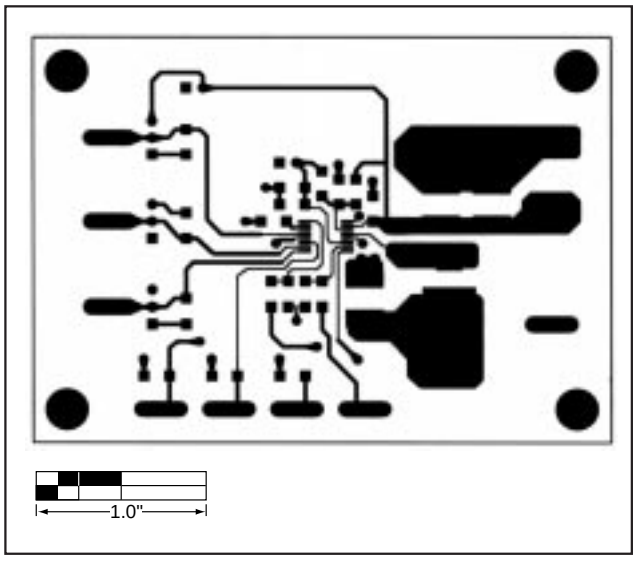

Figure 3. MAX1701 EV Kit PC Board Layout—Component Side

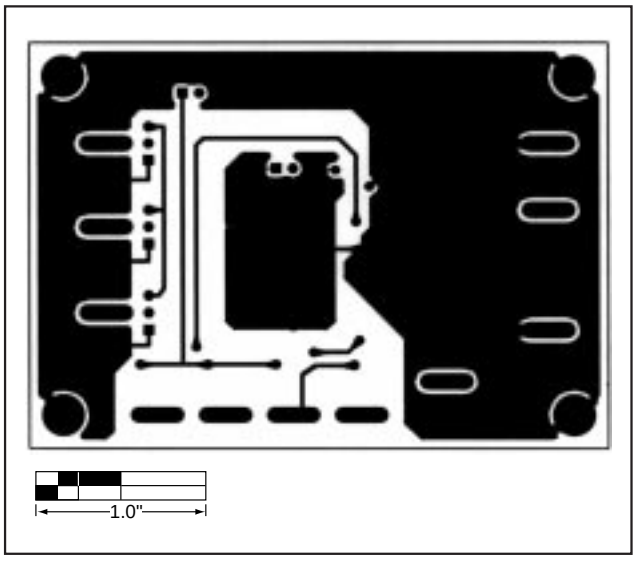

Figure 4. MAX1701 EV Kit PC Board Layout—Solder Side