

MAXIM

MAX1705 Evaluation Kit

General Description

The MAX1705 evaluation kit (EV kit) is a step-up switching regulator for battery-powered systems operating from 1 to 3 NiCd/NiMH cells or 1 Li-Ion cell. The EV kit accepts a +0.9V to +4.5V input and converts it to a 4.5V step-up output and a 3.3V linear-regulator output. It provides low quiescent current, high-efficiency pulse-frequency-modulation operation for maximum battery life, and a high-power, fixed-frequency pulse-width-modulation mode. The MAX1705 features a built-in, low-dropout linear post-regulator that reduces high-frequency ripple.

The MAX1705 EV kit is a fully assembled and tested surface-mount circuit board. It can also be used to evaluate the MAX1706.

Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	22 μ F, 25V tantalum capacitor Sprague 593D226X0025D2W or AVX TPSD226M025R0200
C8	1	220 μ F, 10V low-ESR tantalum capacitor Sprague 594D227X0010D2T, Sprague 593D227X0010D2W, or AVX TPSE227M010R0100
C3	1	0.1 μ F ceramic capacitor
C4	1	22 μ F, 6.3V tantalum capacitor Sprague 595D226X06R3B2T
C5, C7, C9	3	0.33 μ F ceramic capacitors
C6	1	22pF ceramic capacitor
C2	0	Open
D1	1	Schottky diode Motorola MBR0520L
L1	1	10 μ H inductor Sumida CDR74B-100
R1	1	267k Ω , 1% resistor
R2, R4	2	100k Ω , 1% resistors
R3	1	165k Ω , 1% resistor
R5	0	Open
R6	1	0 Ω resistor
R7, R8, R9	3	100k Ω , 5% resistors
U1	1	MAX1705EEE (QSOP-16)
JU1, JU2, JU3	3	2-pin headers
JU4	1	3-pin header
None	1	Shunt
None	1	MAX1705 PC board

Features

- ◆ +0.9V to +4.5V Input Range
- ◆ High-Power Output: 4.5V or Adjustable
- ◆ Dual Outputs: Step-Up and Linear Regulator
- ◆ 200mA Max Linear-Regulator Output Current
- ◆ Optional Track Mode for Highest Efficiency
- ◆ Low-Noise, 3.3V or Adjustable Output Voltage
- ◆ High-Efficiency Step-Up Converter: Up to 96%
- ◆ Up to 850mA Total Output Current
- ◆ Internal 300kHz Oscillator
- ◆ Internal MOSFET and Synchronous Rectifier
- ◆ 1 μ A Shutdown Current
- ◆ Power-Good Output
- ◆ Surface-Mount Components
- ◆ Fully Assembled and Tested

Ordering Information

PART	TEMP. RANGE	BOARD TYPE
MAX1705EVKIT	0°C to +70°C	Surface Mount

Note: To evaluate the MAX1706, request a MAX1706EEE free sample with the MAX1705 EV kit.

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
Dale-Vishay	(402) 564-3131	(402) 563-6418
Motorola	(602) 303-5454	(602) 994-6430
Sprague	(603) 224-1961	(603) 224-1430
Sumida	(847) 956-0666	(847) 956-0702
Vishay/Vitramon	(203) 268-6261	(203) 452-5670

Note: Please indicate that you are using the MAX1705 when contacting these component suppliers.

Evaluates: MAX1705/MAX1706



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Quick Start

The MAX1705 evaluation kit (EV kit) is fully assembled and tested. Follow these steps to verify board operation. **Do not turn on the power supply until all connections are completed.**

- 1) Connect a +2.4V power supply to the VIN pad. The ground connects to the GND pad.
- 2) Connect voltmeters, if any, to the POUT and VOUT pads.
- 3) Turn on the power supply and verify that POUT is 4.5V and VOUT is 3.3V.
- 4) Apply the loads, if any.
- 5) For other output voltages, refer to the *Setting the Output Voltages* section in the MAX1705/MAX1706 data sheet for instructions on selecting the feedback resistors.

Detailed Description

The MAX1705 EV kit is designed to supply both power and low-noise circuitry in portable RF and data-acquisition instruments. It combines a linear regulator, step-up switching regulator, N-channel power MOSFET, P-channel synchronous rectifier, precision reference, and low-battery comparator in a single, tiny 16-pin QSOP. The switching DC-DC converter boosts an input from one or two cells to a 4.5V output. An on-chip linear regulator also provides a low-noise 3.3V output.

The EV kit operates in a constant-frequency (300kHz), low-noise pulse-width-modulation (PWM) mode with 450mA total output current capability at $V_{IN} = 2.4V$. A low-quiescent-current standby pulse-frequency-modulation (PFM) mode offers a total output current up to 120mA and reduces quiescent power consumption to 500 μ W.

Shutdown Mode

The MAX1705 EV kit features a shutdown mode that reduces quiescent supply current to 7 μ A (1 μ A for the IC plus 6 μ A for the feedback resistors) to preserve battery life. During shutdown, the reference, the low-battery comparator, and all feedback and control circuitry are turned off. The step-up converter's output drops to within a Schottky diode drop below the input, and the linear-regulator output is turned off.

The two-pin header JU1 selects shutdown mode. Table 1 lists the selectable jumper options.

Table 1. Jumper JU1 Functions

SHUNT LOCATION	ONA PIN	MAX1705 OUTPUT
On	Connected to GND	Shutdown mode, $V_{OUT} = 0V$, $POUT = V_{IN} - V_{DIODE}$
Off	Connected to POUT	MAX1705 enabled, $V_{OUT} = 3.3V$, $POUT = 4.5V$

Switching Mode

The two-pin header JU2 selects either PFM or PWM switching mode. Table 2 lists the selectable jumper options.

Table 2. Jumper JU2 Functions

SHUNT LOCATION	CLK/SEL PIN	SWITCHING MODE
On	Connected to GND	PFM mode, $I_{TOTAL} = 120mA$ at 2.4V input
Off	Connected to POUT	Fixed PWM mode (300kHz), $I_{TOTAL} = 450mA$ at 2.4V input

Tracking Mode

Connecting the TRACK input to POUT implements a tracking mode that sets the step-up converter output to 300mV above the linear-regulator output, improving efficiency. In tracking mode, feedback for the step-up converter is derived from the OUT pin. Connect TRACK to GND for normal operation.

The two-pin header JU3 selects the tracking mode. Table 3 lists the selectable jumper options.

Table 3. Jumper JU3 Functions

SHUNT LOCATION	TRACK PIN	TRACKING MODE
On	Connected to POUT	Tracking mode; POUT is 300mV above VOUT
Off	Connected to GND	Normal operation

Power-Good Output

The MAX1705 has an on-chip comparator for power-good detection. This comparator can be used to detect a low battery voltage at the input or low-voltage output. The MAX1705 EV kit is supplied with the comparator's

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Evaluates: MAX1705/MAX1706

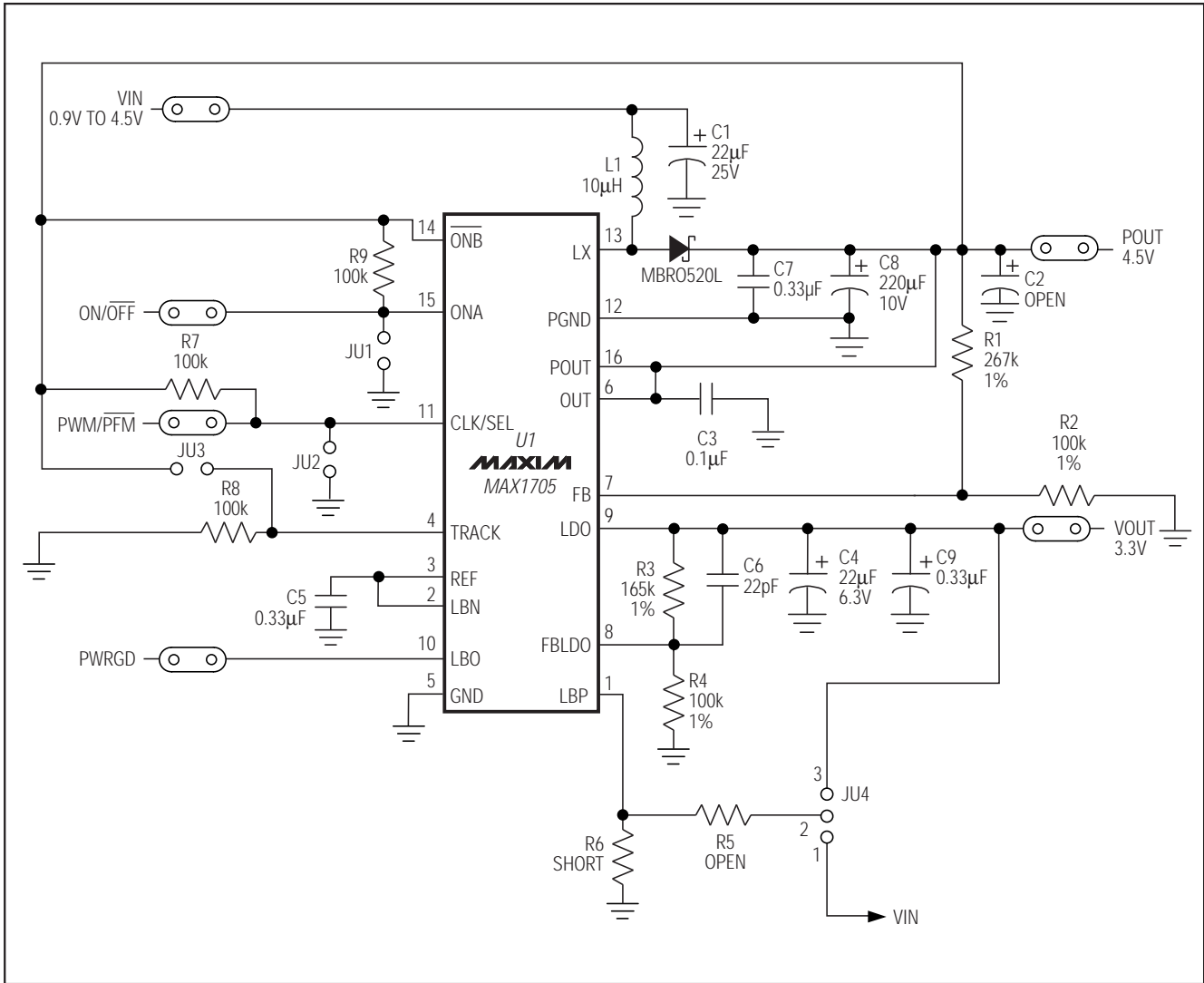


Figure 1. MAX1705 EV Kit Schematic Diagram

LBN input connected to the reference, and the LBP input connected to GND through R6 (0Ω). LBP can be connected to an external resistor-divider, R5-R6, to set the comparator threshold. PWRGD, an open-drain output, is low when LBN > LBP. Refer to the *Low-Battery Comparator* section of the MAX1705/MAX1706 data sheet for instructions on selecting R5 and R6. The three-pin header JU4 selects input or output detection. Remove R6 and refer to the *Low-Battery Comparator* section of the MAX1705/MAX1706 data sheet to determine R5 and R6. Table 4 lists the selectable jumper options.

Evaluating the MAX1706

The MAX1705 EV kit can also be used to evaluate the MAX1706. Simply replace the MAX1705EEE with the MAX1706EEE and replace the 10μH inductor, L1, with a 22μH inductor (Sumida CD74B-220).

Table 4. Jumper JU4 Functions

SHUNT LOCATION	PWRGD OUTPUT
1 and 2	Detects low-battery voltage input
2 and 3	Detects low-voltage output

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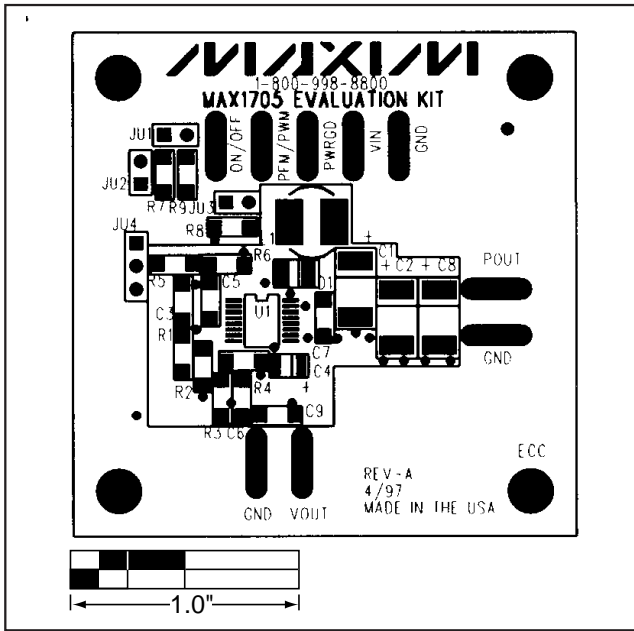


Figure 2. MAX1705 EV Kit Component Placement Guide—Component Side

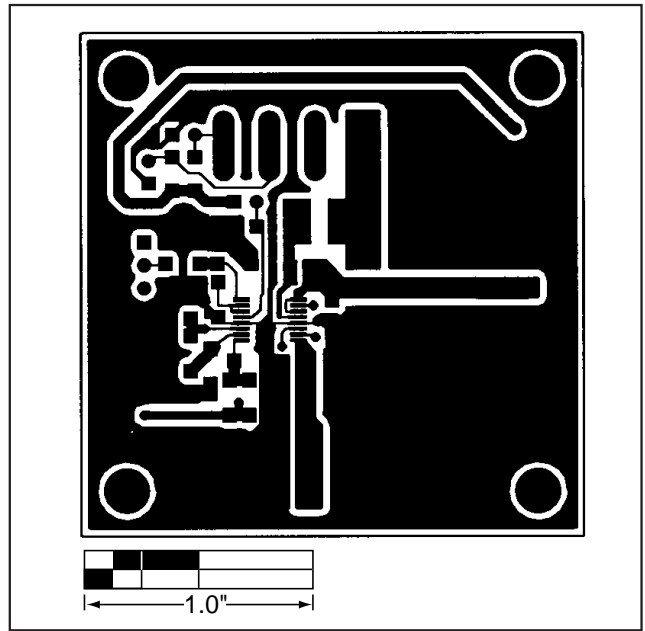


Figure 3. MAX1705 EV Kit PC Board Layout—Component Side

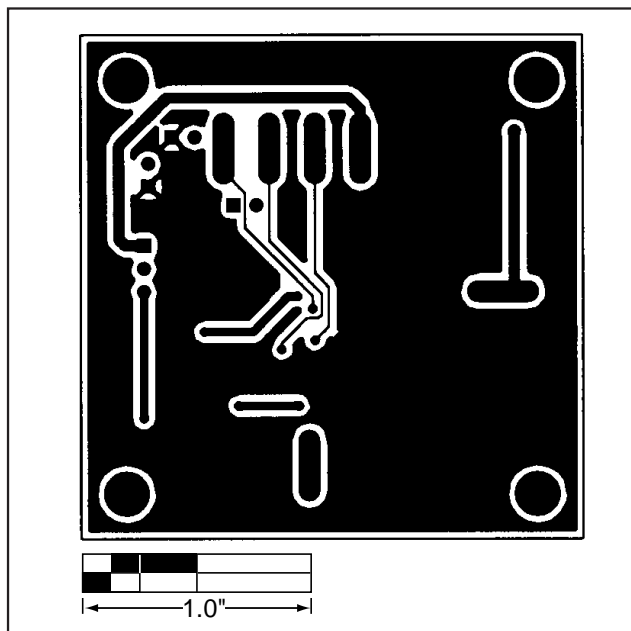


Figure 4. MAX1705 EV Kit PC Board Layout—Solder Side

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