

MAXIM

MAX1864 Evaluation Kit

Evaluates: MAX1864

General Description

The MAX1864 evaluation kit (EV kit) demonstrates the MAX1864's standard application circuit. This EV kit operates from 8V to 24V, generating three positive output voltages.

The MAX1864 EV kit includes a current-mode synchronous step-down controller and two positive regulator gain blocks. The main synchronous step-down controller provides a 3.3V output voltage with 1A output current from an 8V to 24V input voltage range. The positive regulator gain blocks use an external PNP pass transistor to generate 2.5V with 300mA output current from the main 3.3V output, and 5V with 100mA output current using coupled windings from the step-down converter. The EV kit operates at 200kHz switching frequency, allowing the use of low-cost aluminum electrolytic capacitors and a low-cost power transformer.

This EV kit is a fully assembled and tested circuit board. It also allows the evaluation of other main output voltages in the 1.236V to 5.5V range by installing feedback resistors R8 and R9.

Features

- ◆ 8V to 24V Input Voltage Range
- ◆ Preset 3.3V Main Output Voltage
- ◆ 1A Main Output Current
- ◆ 200kHz Switching Frequency
- ◆ No Current-Sense Resistor
- ◆ Linear Regulator Output Voltages
 - 2.5V at 300mA
 - 5.0V at 100mA
- ◆ Adjustable Output Voltages
- ◆ Power-Good Output
- ◆ 16-Pin QSOP Package
- ◆ Low-Cost Components
- ◆ Fully Assembled and Tested

Ordering Information

PART	TEMP. RANGE	IC PACKAGE
MAX1864EVKIT	0°C to +70°C	16 QSOP

Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	100 μ F, 35V aluminum electrolytic capacitor Sanyo 35MV100AX
C2, C9	2	470 μ F, 10V aluminum electrolytic capacitors Sanyo 10MV470AX
C3	1	0.1 μ F ceramic capacitor (0805)
C4	1	1 μ F, 10V X5R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C5	1	8200pF ceramic capacitor (0805)
C6, C7, C8, C12	4	10 μ F, 6.3V X5R ceramic capacitors (1210) Taiyo Yuden JMK325BJ106MN or TDK C3216X5R0J106M
C10	1	4700pF ceramic capacitor (0805)
C11	1	2200pF ceramic capacitor (0805)
C13	1	1 μ F, 25V X7R ceramic capacitor (1206) Taiyo Yuden TMK316BJ105ML or TDK C3216X7R1E105M

DESIGNATION	QTY	DESCRIPTION
R1	1	47k Ω \pm 5% resistor (0805)
R2, R5	2	220 Ω \pm 5% resistors (0805)
R3, R4, R12	3	10k Ω \pm 1% resistors (0805)
R6	1	30.1k Ω \pm 1% resistor (0805)
R7	1	100k Ω \pm 5% resistor (0805)
R8, R10, R11	0	Not installed (0805)
R9	0	Not installed (short PC trace)
R13, R14	2	10 Ω \pm 5% resistors (0805)
D1	1	Schottky diode Central Semiconductor CMPSH-3
D2	1	0.5A Schottky diode Nihon EP05Q03L or ON Semiconductor (Motorola) MBR0540
N1A, N1B	1	Dual N-channel MOSFET International Rectifier IRF7303 or Fairchild NDS9956A
Q1	1	PNP transistor (DPAK) Fairchild KSH30

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Component List (continued)

DESIGNATION	QTY	DESCRIPTION
Q2	1	PNP transistor (TO-92) Fairchild 2N3905 or On Semiconductor (Motorola) 2N3905
T1	1	Transformer Coiltronics VP3-0047 ICE Components (Alternate Supplier)
U1	1	MAX1864TEEE (16-QSOP)
None	1	MAX1864 PC board
None	1	MAX1864 data sheet
None	1	MAX1864 EV kit data sheet

Component Suppliers

SUPPLIER	PHONE	FAX
Central Semiconductor	631-435-1110	631-435-1824
Coilcraft	847-639-6400	847-639-1469
Coiltronics	561-639-5000	561-742-0134
ICE Components	703-257-7740	703-257-7547
International Rectifier	310-322-3331	310-252-7175
Fairchild	888-522-5372	972-910-8036
Nihon	661-867-2555	661-867-2698
On Semiconductor (Motorola)	602-303-5454	602-994-6430
Taiyo Yuden	408-573-4150	408-573-4159
TDK	547-803-6100	847-390-4405

Quick Start

The MAX1864 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 +8V to +24V supply to the VIN pad. Connect ground to the GND pad.
- 2) Connect voltmeters to VOUT1, VOUT2, and VOUT3 pads.
- 3) Turn the power supply on and verify that the output voltages are +3.3V (VOUT1), +2.5V (VOUT2), and +5V (VOUT3).

- 4) See the *Evaluating Other Output Voltages* section to modify the board for different output voltages.

Jumper Settings

Table 1. Jumper JU1 Functions (Fixed/Adj. Current-Limit Selection)

JU1	ILIM PIN	CURRENT-LIMIT THRESHOLD
Short (PC trace)	Connected	250mV (default)
Open (cut PC trace)	Connected to VL via voltage divider R10/R11. Refer to the <i>Current-Limit Circuit</i> section in the MAX1864 data sheet for information on selecting R10/R11.	Adjustable

Evaluating Other Output Voltages

The EV kit main output is preset to 3.3V, however the output voltage can also be adjusted between 1.236V and $(0.8V \times V_{IN})$ by selecting R8 and R9 values. Simply cut the PC board trace that is shorting R9, then select feedback resistors R8 and R9. Select R9 in the 5k Ω to 50k Ω range, and calculate R8 with the following equation:

$$R8 = R9 [(V_{OUT}/V_{FB}) - 1]$$

where $V_{FB} = 1.236V$. For output voltages greater than 5.5V, refer to the *Output Voltage Selection* section in the MAX1864 data sheet.

The positive linear-regulator output voltages are set by connecting a voltage divider from the main output to FB2/FB3 to GND. In the 5k Ω to 50k Ω range, select R4 or R12, and calculate R3 or R6 with the following equation:

$$R3 = R4 [(V_{OUT}/V_{FB}) - 1]$$

$$R6 = R12 [(V_{OUT}/V_{FB}) - 1]$$

where $V_{FB} = 1.24V$.

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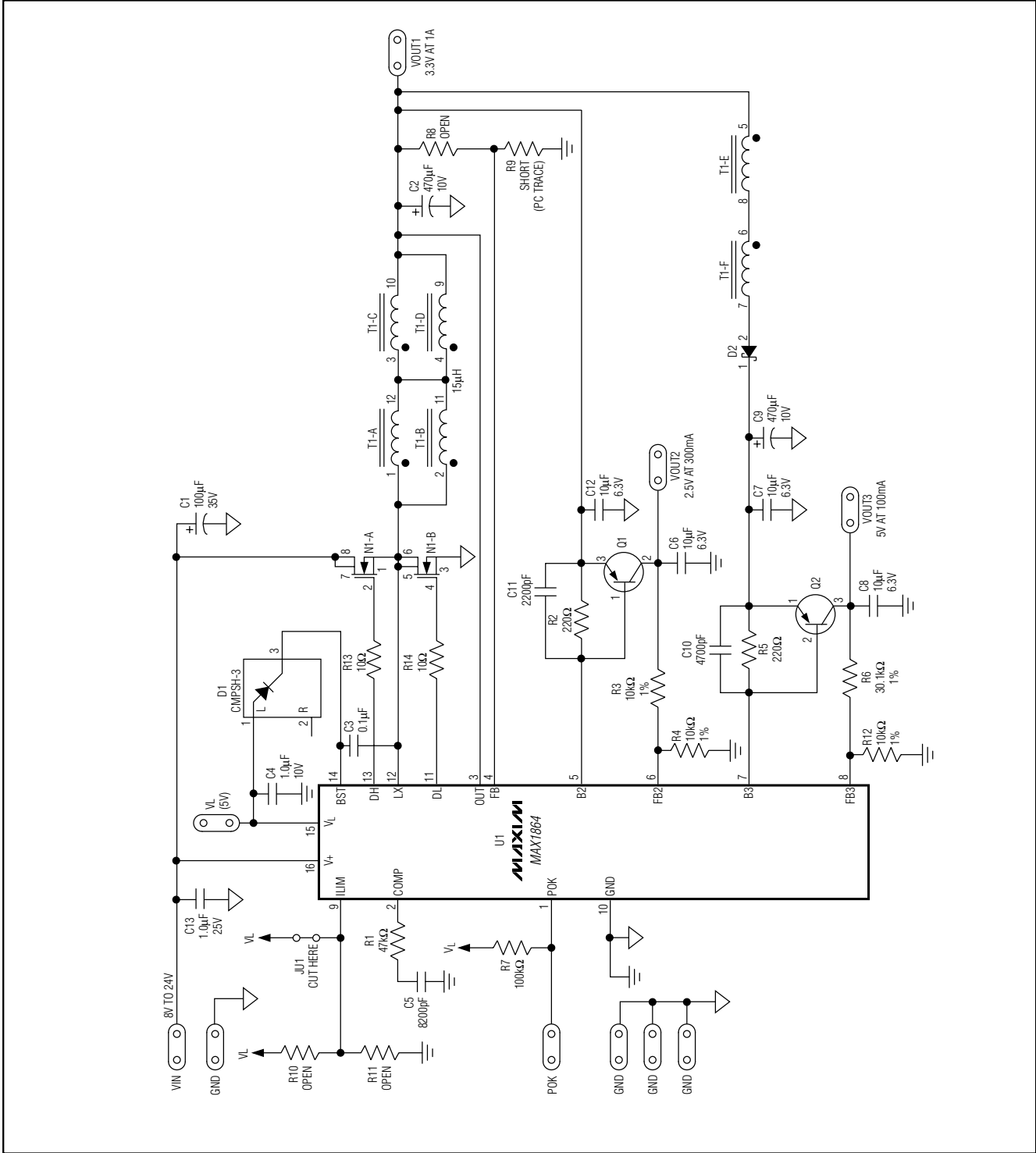


Figure 1. MAX1864 EV Kit Schematic

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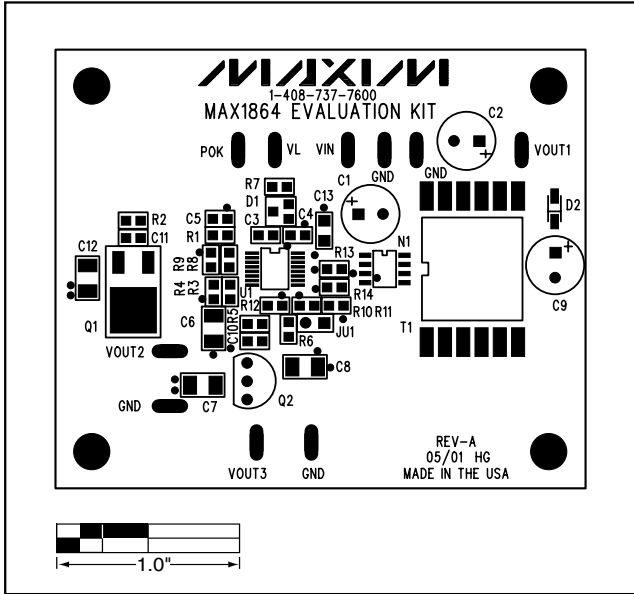


Figure 2. MAX1864 EV Kit Component Placement Guide—Component Side

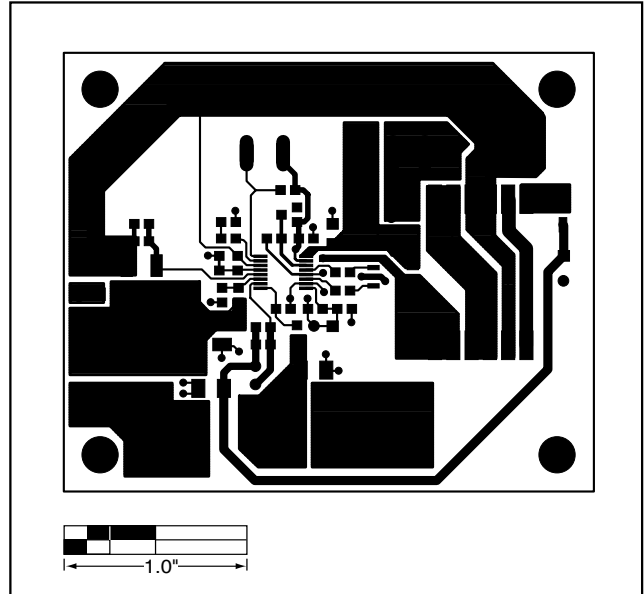


Figure 3. MAX1864 EV Kit PC Board Layout—Component Side

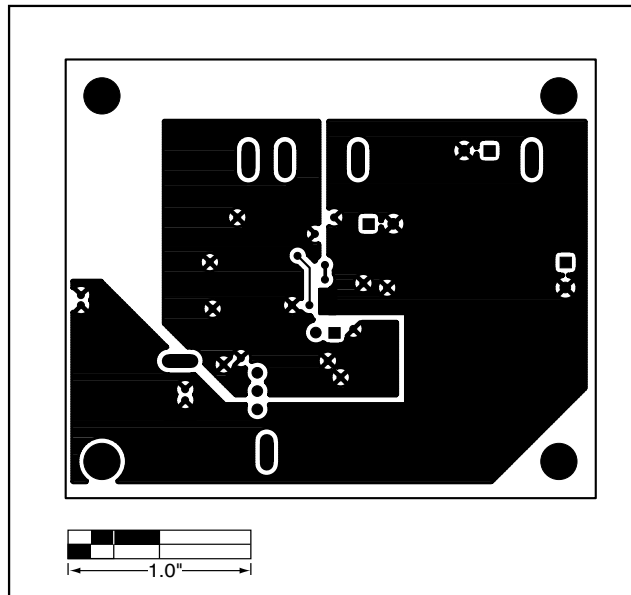


Figure 4. MAX1864 EV Kit PC Board Layout—Solder Side

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