

# MAXIM

## MAX1775 Evaluation Kit

**Evaluates: MAX1775**

### General Description

The MAX1775 evaluation kit (EV kit) is a fully assembled and tested surface-mount circuit board that contains a dual step-down switching regulator circuit. The circuit is configured for a main output voltage of +3.3V and a core output voltage of +1.8V. The main output provides up to 1.5A, and the core provides up to 500mA of current.

Power for the circuit can be provided from a +2.7V to +5.5V DC source. The EV kit can be reconfigured for input voltages up to +28V. The core's input can be powered from the input source or, for higher input voltages, from the main output.

The MAX1775 EV kit demonstrates low quiescent current and high efficiency up to 95% for maximum battery life. Operation up to 1.25MHz allows the use of tiny surface-mount components.

### Features

- ◆ +2.7V to +5.5V Input Range
- ◆ Output Voltages
  - +3.3V Output at 1.5A
  - +1.8V Output at 500mA
- ◆ Outputs are Adjustable with Resistors
- ◆ Internal MOSFET Switches (Core Output)
- ◆ 5 $\mu$ A (typ) IC Shutdown Current
- ◆ Switching Frequency Up to 1.25MHz
- ◆ Surface-Mount Components
- ◆ Fully Assembled and Tested

### Ordering Information

PART	TEMP. RANGE	IC PACKAGE
MAX1775EVKIT	0°C to +70°C	16 QSOP

### Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	10 $\mu$ F, 25V X5R ceramic capacitor (1812) Taiyo Yuden TMK432BJ106KM
C2, C5	2	1 $\mu$ F, 25V X7R ceramic capacitors (1206) Taiyo Yuden TMK316BJ105KL
C3	1	47 $\mu$ F, 6.3V low-ESR electrolytic capacitor (POSCAP) Sanyo 6TPA47M
C4	1	47 $\mu$ F $\pm$ 20%, 6.3V tantalum capacitor (C) Sprague-Vishay 592D476X06R3C2T or AVX TPSC476M016R0350 recommended
C6	1	0.22 $\mu$ F, 25V X7R ceramic capacitor (1206) Taiyo Yuden TMK316BJ224KF
C7, C8	2	10 $\mu$ F, 6.3V X5R ceramic capacitors (1206) Taiyo Yuden JMK316BJ106KL
C9, C10	0	Not installed, capacitors (0805)

DESIGNATION	QTY	DESCRIPTION
D1	0	Not installed, Schottky diode Nihon EC31QS04 optional
L1	1	5.0 $\mu$ H, 2.4A inductor Sumida CDRH6D28-5R0NC
L2	1	5.4 $\mu$ H, 1.6A inductor Sumida CDRH5D18-5R4NC
P1A/P1B	1	+30V/-20V, 5.5A/4.0A N/P-channel MOSFET (SO-8) Fairchild Semiconductor FDS8928A
R1	1	24.3k $\Omega$ $\pm$ 1% resistor (0805)
R2	1	30.1k $\Omega$ $\pm$ 1% resistor (0805)
R3	1	0.033 $\Omega$ $\pm$ 1%, 0.5W resistor (2010) Dale WSL-2010-R033-1%
R4	1	66.5k $\Omega$ $\pm$ 1% resistor (0805)
R5	1	40.2k $\Omega$ $\pm$ 1% resistor (0805)
U1	1	MAX1775EEE (16 QSOP)
JU1, JU2	2	3-pin headers
None	2	Shunts (JU1, JU2)
None	1	MAX1775 PC board
None	1	MAX1775 data sheet
None	1	MAX1775 EV kit data sheet

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## Component Suppliers

SUPPLIER	PHONE	FAX
AVX	803-946-0690	803-626-3123
Dale-Vishay	402-564-3131	402-563-6418
Fairchild	408-822-2000	408-822-2102
Nihon USA	661-867-2555	661-867-2698
Sanyo USA	619-661-6835	619-661-1055
Sprague-Vishay	603-224-1961	603-224-1430
Sumida	847-956-0666	847-956-0702
Taiyo Yuden	408-573-4150	408-573-4159

**Note:** Please indicate that you are using the MAX1775 when contacting these component suppliers.

## Quick Start

The MAX1775 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.**

### Outputs

- 1) Verify that shunts JU1 (SHDNM) and JU2 (SHDNC) are across pins 1 and 2.
- 2) Connect a voltmeter to the VMAIN pad.
- 3) Connect a +2.7V to +5.5V DC power supply to the VBATT pad. Connect the supply ground to the GND pad.
- 4) Turn on the power supply and verify that the main output (VMAIN) is +3.3V.
- 5) Verify that the core output (VCORE) is +1.8V.

For instructions on selecting the feedback resistors for other output voltages, refer to the *Evaluating Other Output Voltages* section.

## Detailed Description

The MAX1775 EV kit contains a dual step-down switching regulator. A +3.3V main output provides up to 1.5A, and a +1.8V core output provides up to 500mA of current. The EV kit operates from a +2.7V to +5.5V input voltage range. The EV kit can be reconfigured for input voltages up to +28V refer to the *Evaluating High Input Voltage Operation* section.

The MAX1775 EV kit features several jumper-selectable options. Shutdown mode jumpers that reduce the MAX1775 shutdown current to <math><5\mu\text{A}</math> (typ) are provided for the main and core outputs. Another option enables the main output (VMAIN) or an external voltage source to feed power to the core input.

The step-down switching regulator main output voltage can be adjusted from +2.5V to +5.5V, and the core output voltage can be adjusted from +1V to +5V with resistors.

## Jumper Selection

### Shutdown Mode (Main Output)

The MAX1775 EV kit features a shutdown mode that reduces the MAX1775 shutdown current to <math><5\mu\text{A}</math> (typ), which preserves battery life. The 3-pin jumper, JU1, selects the shutdown mode for the MAX1775 main output (VMAIN). Table 1 lists the selectable jumper options.

**Table 1. Jumper JU1 Functions**

SHUNT LOCATION	SHDNM PIN	MAX1775 OUTPUT
1 and 2	Connected to VBATT	MAX1775 enabled, VMAIN = +3.3V
2 and 3	Connected to GND	Shutdown mode, VMAIN = 0

### Shutdown Mode (Core Output)

The MAX1775 EV kit features a core shutdown mode that reduces the MAX1775 shutdown current, which preserves battery life. The 3-pin jumper, JU2, selects the shutdown mode for the MAX1775 core output (VCORE). Table 2 lists the selectable jumper options.

**Table 2. Jumper JU2 Functions**

SHUNT LOCATION	SHDNC PIN	MAX1775 OUTPUT
1 and 2	Connected to CVL	CORE output enabled, VCORE = +1.8V
2 and 3	Connected to GND	Shutdown mode, VCORE = 0

### Core Input Supply

The MAX1775 EV kit features an option that allows the main output voltage source to power the core's input. Jumper JU3 selects which voltage source feeds the core's input. Table 3 lists the jumper options.

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**Table 3. Jumper JU3 Functions**

PIN-HOLE TRACE	INC PIN	OPERATING MODE
1 and 2 (PC trace shorts 1 and 2)	Connected to VBATT	VBATT voltage source feeds core input
Short 2 and 3 (Cut open trace across pin holes 1 and 2)	Connected to VMAIN (core cascaded)	VMAIN voltage source feeds core input

## Evaluating High Input Voltage Operation

### Core Input

The MAX1775 EV kit is factory-set for both step-down switching regulators, deriving their power from the input voltage (VBATT). The input to the core regulator is limited to +5V. A cascaded configuration must be used for input voltages greater than +5V. (The core converter derives its power from the main output voltage.) To configure the MAX1775 EV kit cascaded, cut open the PC board trace, shorting pinholes 1 and 2 at jumper JU3. Place a short (soldered jumper wire) across pinholes 2 and 3 at jumper JU3. Consult Table 3 for input voltage jumper selection.

## Evaluating Other Output Voltages

### MAIN Output

The MAX1775 EV kit's step-down switching regulator main output (VMAIN) is set to +3.3V by feedback resistors (R4, R5). To generate output voltages other than +3.3V (+2.5V to +5V), select different voltage-divider resistors (R4, R5). Refer to the *Setting the Output Voltages* section in the MAX1775 data sheet for instructions on selecting the resistors.

### CORE Output

The MAX1775 EV kit's step-down switching regulator core output (VCORE) is set to +1.8V by feedback resistors (R1, R2). To generate output voltages other than +1.8V (+1V to +5V), select different voltage-divider resistors (R1, R2). Refer to the *Setting the Output Voltages* section in the MAX1775 data sheet for instructions on selecting the resistors.

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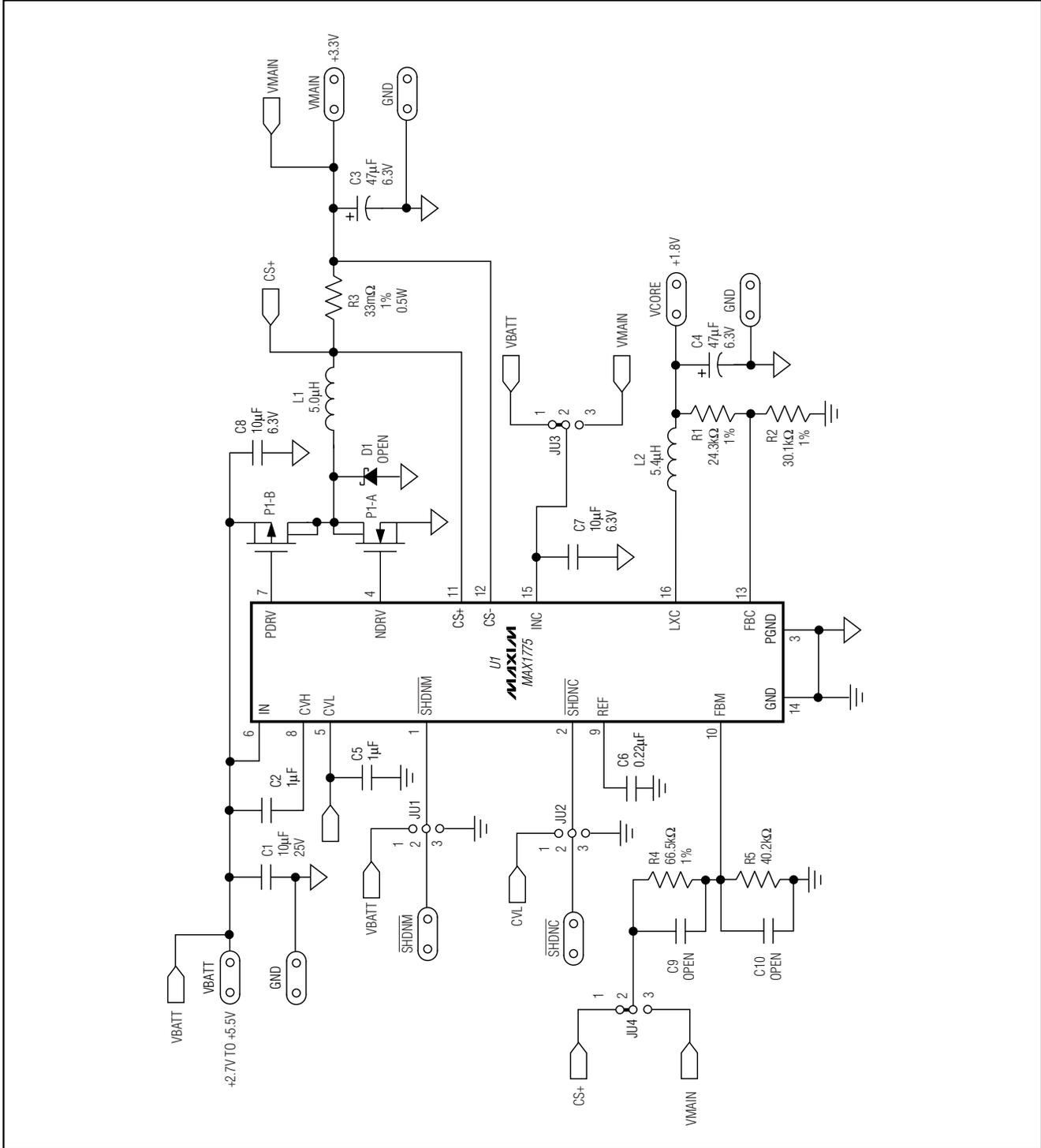


Figure 1. MAX1775 EV Kit Schematic

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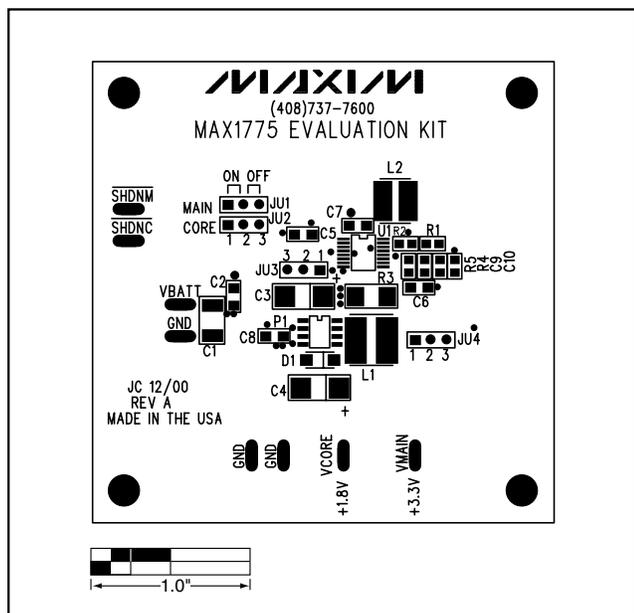


Figure 2. MAX1775 EV Kit Component Placement Guide—Component Side

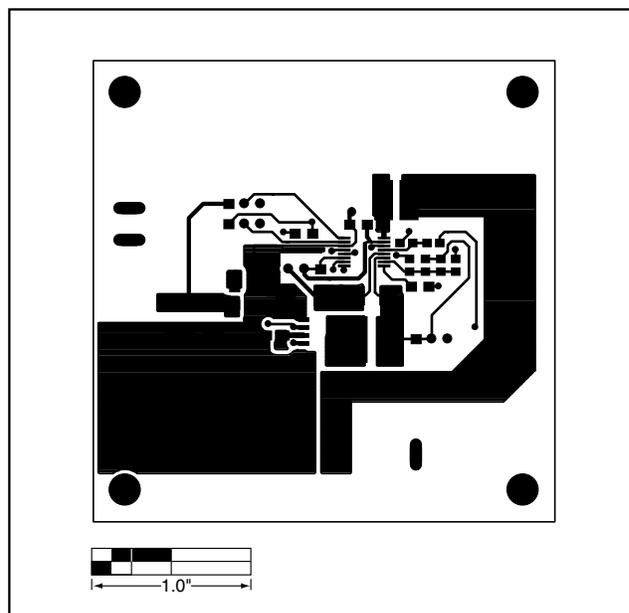


Figure 3. MAX1775 EV Kit PC Board Layout—Component Side

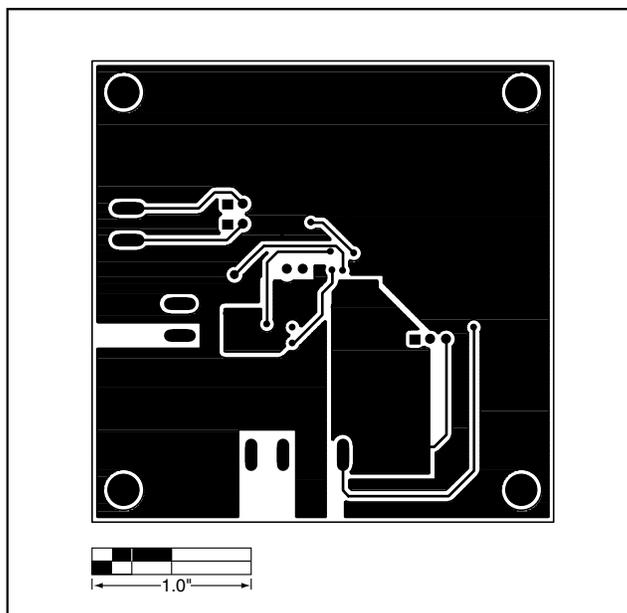


Figure 4. MAX1775 EV Kit PC Board Layout—Solder Side

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