

### General Description

The MAX1685 evaluation kit (EV kit) is a fully assembled and tested surface-mount circuit board that contains a pulse-width-modulated (PWM), step-down DC-DC converter. The EV kit provides a +3.33V output voltage from a +3.5V to +14V input source. It delivers up to 1A output current. The MAX1685 features internal MOSFET switches, low dropout voltage (100% duty-cycle operation), and an accurate +1.25V reference.

The MAX1685 EV kit provides low quiescent current, synchronous rectification, and high efficiency (up to 95%) for maximum battery life. Operation at 600kHz allows the use of a tiny surface-mount inductor.

The MAX1685 EV kit can also be used to evaluate the MAX1684, which operates at 300kHz and has slightly higher efficiency than the MAX1685.

## Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	22µF, 35V tantalum capacitor AVX TPSE226M035R0300 or Sprague 593D226X0035E2T
C2	1	100µF, 10V, low-ESR tantalum capacitor AVX TPSD107M010R0080, Sprague 594D107X0010C2T, or Sanyo 10TPB100M
C3, C4, C5, C9	4	0.1µF ceramic capacitors
C6	1	0.01µF ceramic capacitor
C7	1	1μF, 16V X7R ceramic capacitor Taiyo Yuden EMK316BJ105KL or TDK C3216X7R1C105M
C8	0	Not installed
D1	1	1A Schottky diode Motorola MBRS130LT3, International Rectifier 10BQ040, Nihon EC10QS03, or Nihon EP10QY03
L1	1	10µH inductor Sumida CDRH6D28-100NC or Sumida CDRH73-100
R1, R2	0	Not installed
R3, R4	2	100kΩ 5% resistors
U1	1	MAX1685EEE
JU1	1	3-pin header
JU2, JU3	2	2-pin headers
None	1	Shunt (JU1)
None	1	MAX1684/MAX1685 PC board
None	1	MAX1684/MAX1685 data sheet

Features

- ♦ +3.5V to +14V Input Voltage Range
- **♦ Fixed or Adjustable Output Voltage** 
  - +3.33V (Fixed)
  - +1.25V to V<sub>IN</sub> (Adjustable)
- **♦** Guaranteed 1A Output Current
- **♦ 100% Duty Cycle in Dropout**
- ♦ 600kHz Fixed-Frequency PWM Operation
- ♦ Internal MOSFET Switch and Synchronous Rectifier
- ♦ 2µA IC Shutdown Current
- **♦ Surface-Mount Components**
- ♦ Fully Assembled and Tested

## Ordering Information

PART	TEMP. RANGE	IC PACKAGE	-
MAX1685EVKIT	0°C to +70°C	16-QSOP	

Note: To evaluate the MAX1684, request a MAX1684EEE free sample with the MAX1685 EV kit.

## Component Suppliers

SUPPLIER	PHONE	FAX
AVX	803-946-0690	803-626-3123
Dale-Vishay	402-564-3131	402-563-6418
International Rectifier	310-322-3331	310-322-3332
Motorola	602-303-5454	602-994-6430
Nihon	661-843-7500	661-843-2798
Sanyo	619-661-6835	619-661-1055
Sprague	603-224-1961	603-224-1430
Sumida	708-956-0666	708-956-0702
TDK	847-390-4373	847-390-4428
Taiyo Yuden	408-573-4150	408-573-4159

Note: Please indicate that you are using the MAX1685 when contacting these component suppliers.

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# MAX1685 Evaluation Kit

### Quick Start

The MAX1685 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 +3.5V to +14V supply to the VIN pad. Connect ground to the GND pad.
- Connect a voltmeter and load (if any) to the VOUT pad.
- 3) Verify that the shunt is across JU1 pins 1 and 2.
- 4) Turn on the power supply and verify that the output is at +3.33V.

## Detailed Description

Jumper Selection

#### Shutdown Mode

The MAX1685 EV kit features a shutdown mode that reduces the MAX1685's quiescent current to  $2\mu A$ , preserving battery life. The 3-pin header, JU1, selects the shutdown mode (Table 1).

#### Operating Mode

The MAX1685 operates in one of four modes to optimize performance: a fixed-frequency (PWM) mode switches at a fixed frequency for easy postfiltering; a low-power standby mode; a synchronizable PWM mode that uses an external clock to minimize harmonics; and a normal mode that extends battery life by operating in PWM mode under heavy loads and PFM mode under light loads to reduce power consumption.

**Table 1. Jumper JU1 Functions** 

SHUNT LOCATION	SHDN PIN	MAX1685 OUTPUT
1 & 2	Connected to VIN	MAX1685 enabled, Vout = +3.33V
2 & 3	Connected to GND	Shutdown mode, V <sub>OUT</sub> = 0

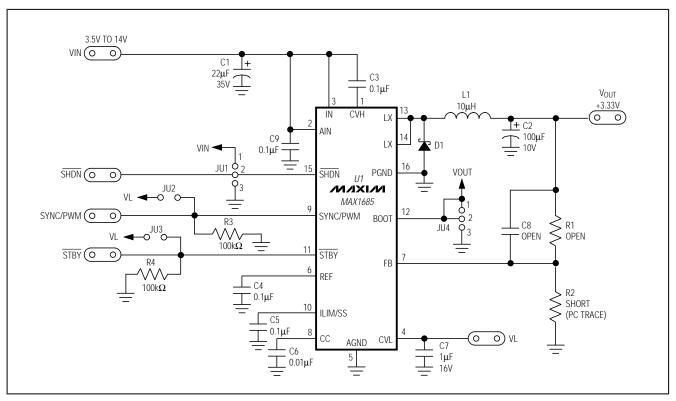


Figure 1. MAX1685 EV Kit Schematic

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The EV kit operates at 600kHz switching frequency and allows the use of a tiny inductor. The switching frequency can also be synchronized to an external clock ranging from 360kHz to 700kHz. The 2-pin headers JU2 and JU3 select the operating mode (Tables 2 and 3).

#### **Evaluating Other Output Voltages**

The EV kit output is preset to +3.33V. However, the output voltage can also be adjusted between 1.25V and V<sub>IN</sub> by selecting R1 and R2 values. Select feedback resistor R2 in the  $20k\Omega$  to  $100k\Omega$  range. R1 is then given by:

$$R1 = R2 [(V_{OUT} / V_{FB}) - 1]$$

where  $V_{FB} = 1.25V$ . Be sure to cut the PC trace shorting the pads of R2 before installing the resistor. Install a

4.7pF capacitor at location C8. For output voltages greater than +5.5V, cut the trace between pins 1 and 2 of JU4, and short pins 2 and 3 of JU4. Refer to the *Detailed Description* section of the MAX1684/MAX1685 data sheet for further details.

#### Evaluating the MAX1684

This EV kit can also be used to evaluate the MAX1684. Simply replace the MAX1685 with a MAX1684EEE, and change L1 to a 22µH, 1.7A inductor. Refer to the *Inductor Selection* section of the MAX1684/MAX1685 data sheet for more information.

**Table 2. Jumper JU2 Functions** 

SHUNT LOCATION	SYNC/PWM PIN	OPERATING MODE
On	Connected to VL	MAX1685 operates in fixed-frequency mode.
	Connected to GND	MAX1685 operates in normal mode.
Off (not installed)	Driven from external clock	SYNC/PWM pin is driven by an external clock between 360kHz and 700kHz.

**Table 3. Jumper JU3 Functions** 

SHUNT LOCATION	STBY PIN	OPERATING MODE
On	Connected to VL	Operation depends on the JU2 setting.
Off (not installed)	Connected to GND	MAX1685 operates in low-power mode. This overrides the JU2 setting.

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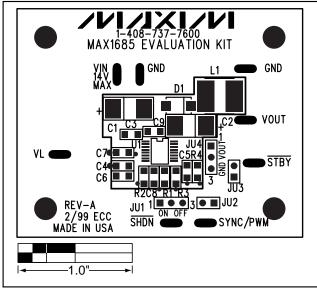


Figure 2. MAX1685 EV Kit Component Placement Guide-Component Side

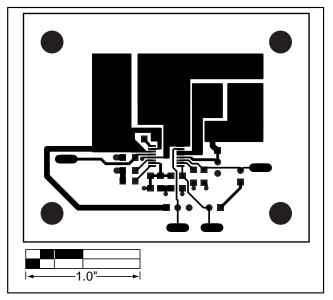


Figure 3. MAX1685 EV Kit PC Board Layout—Component Side

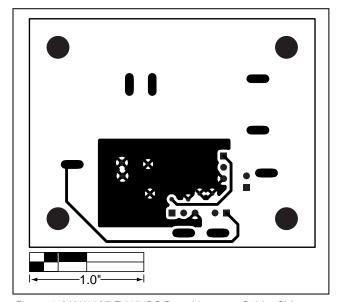


Figure 4. MAX1685 EV Kit PC Board Layout—Solder Side

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