19-2101; Rev 0; 8/01

MAXIM

MAX1845 Evaluation Kit

Evaluates: MAX1845

General Description

The MAX1845 evaluation kit (EV kit) demonstrates the MAX1845's standard application circuit. This DC-DC converter steps down high-voltage batteries and/or AC adapters, generating precision, low-voltage rails for use as chipset, DRAM supplies, CPU core, and IO supplies.

The MAX1845 EV kit provides dual 1.8V and 2.5V output voltages from a 7V to 22V battery input range. It delivers up to 4A output current for the 2.5V output and 7A for the 1.8V output, with greater than 90% efficiency. The EV kit operates at 255kHz/345kHz switching frequency and has superior line- and load-transient response.

This EV kit is a fully assembled and tested circuit board. It also allows the evaluation of other output voltages in the 1.0V to 5.5V range by changing feedback resistors R1–R4.

Ordering Information

PART	TEMP. RANGE	IC PACKAGE
MAX1845EVKIT	0°C to +70°C	28 QSOP

Features

- ♦ **7V to 22V Input Voltage Range**
- ♦ **1.8V and 2.5V Output Voltages**
- ♦ **1.0V to 5.5V Adjustable Outputs**
- ♦ **4A Output Current (2.5V Output)**
- ♦ **7A Output Current (1.8V Output)**
- ♦ **Adjustable Current-Limit Threshold**
- ♦ **255kHz/345kHz Switching Frequency**
- ♦ **Power-Good Output**
- ♦ **Over- and Undervoltage Protection**
- ♦ **28-Pin QSOP Package**
- ♦ **Low-Profile Components**
- ♦ **Fully Assembled and Tested**

Component List

DESIGNATION	QTY	DESCRIPTION
C1–C5	5	10µF, 25V ceramic capacitors (1812) Taiyo Yuden TMK432BJ106KM or TDK C4532X5R1E106M
C6–C9	4	470µF, 6.3V, 30mΩ low-ESR tantalum capacitors Kemet T510X477M006AS
C10, C11	2	0.1µF ceramic capacitors (0805)
C12	1	1µF, 10V X5R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C13	1	3.3µF, 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ335ML
C14, C15, C17, C18	0	Not installed
C16	1	0.22µF ceramic capacitor (1206)
C19	1	4.7µF, 16V tantalum capacitor Sprague 595D475X0016A2B
D1	1	100mA, 30V dual Schottky diode Central Semiconductor CMPSH-3A
D2, D3	2	1A, 30V Schottky diodes Nihon EP10QY03 or Toshiba CRS02
L1	1	2.2µH power inductor Panasonic ETQP6F2R2SFA or Sumida CDRH127-2R4
L2	1	4.7µH power inductor Sumida CDRH124-4R7MC
N1	1	N-channel MOSFET International Rectifier IRF7807 or Fairchild FDS6612A
N2	1	N-channel MOSFET International Rectifier IRF7805 or Fairchild FDS6670A
N3A, N3B	1	Dual N-channel MOSFET Fairchild FDS6982A
R1–R4, R7, R8, R10–R14	0	Not installed
R5	1	0.005Ω ±1%, 1W resistor (2512) Dale WSL-2512-R005F or Panasonic ERJM1WSF5MOU
R6	1	100kΩ ±5% resistor (0805)
R9, R15	2	1MΩ ±5% resistors (0805)
R19	1	0.010Ω ±1%, 1/2W resistor (2010) Dale WSL-2010-R010F
R20	1	10Ω ±5% resistor (0805)
U1	1	MAX1845EEI (28-pin QSOP)
JU1, JU2, JU3	3	3-pin headers
None	3	Shunts
None	4	Rubber feet
None	1	MAX1845 PC board
None	1	MAX1845 data sheet
None	1	MAX1845EVKIT data sheet

Component Suppliers

SUPPLIER	PHONE	FAX
Central Semiconductor	516-435-1110	516-435-1824
Dale-Vishay	402-564-3131	402-563-6418
Fairchild	408-721-2181	408-721-1635
International Rectifier	310-322-3331	310-322-3332
Kemet	408-986-0424	408-986-1442
Nihon	847-843-7500	847-843-2798
Panasonic	714-373-7939	714-373-7183
Sumida	708-956-0666	708-956-0702
Taiyo Yuden	408-573-4150	408-573-4159
TDK	847-390-4373	847-390-4428
Toshiba	949-455-2000	949-859-3963

Note: *Please indicate that you are using the MAX1845 when contacting these component suppliers.*

Recommended Equipment

- 7V to 22V, power supply, battery, or notebook AC adapter
- DC bias power supply, 5V at 100mA
- Dummy loads capable of sinking 4A and 7A
- Digital multimeters (DMMs)
- 100MHz dual-trace oscilloscope

Quick Start

1) Ensure that the circuit is connected correctly to the supplies and dummy load prior to applying any power.
2) Verify that the shunts are across JU1 pins 1 and 2, JU2 pins 1 and 2, and JU3 pins 1 and 2.
3) Turn on V_{IN} supply prior to +5V bias power; otherwise, the output UVLO timer will time out and the FAULT latch will be set, disabling the regulator outputs until +5V power is cycled or ON1/ON2 is toggled.
4) Verify that the output voltages are 1.8V (V_{OUT1}) and 2.5V (V_{OUT2}).

Evaluating Other Output Voltages

The EV kit outputs are preset to +1.8V and +2.5V. However, the output voltages can also be adjusted between 1.0V and 5.5V by selecting R1/R2 and R3/R4 values. Select feedback resistors R2 (or R4) in the 5kΩ to 50kΩ range. R1 (or R3) is then given by:

$$R1\ (or\ R3) = R2\ (or\ R4) \times [(V_{OUT} / V_{FB}) - 1]$$

where V_{FB} = 1.0V.

Table 1. Jumper JU1 Functions (Output Voltage V_{OUT1} Control)

JU1	ON1 PIN	OUTPUT VOLTAGE
1 and 2	Connected to VCC	V_{OUT1} = 1.8V, enabled
2 and 3	Connected to GND	V_{OUT1} = 0V, disabled

Table 2. Jumper JU2 Functions (Output Voltage V_{OUT2} Control)

JU2	ON2 PIN	OUTPUT VOLTAGE
1 and 2	Connected to VCC	V_{OUT2} = 2.5V, enabled
2 and 3	Connected to GND	V_{OUT2} = 0V, disabled

Table 3. Jumper JU3 Functions (SKIP Mode Selection)

JU3	$\overline{SKIP}$ PIN	OPERATING MODE
1 and 2	Connected to VCC	Low-noise mode, forced fixed-frequency PWM operation.
2 and 3	Connected to GND	Normal operation, allows automatic PWM/PFM switchover for pulse skipping at light load, resulting in highest efficiency.

Table 4. Jumper JU4 Functions (Output Voltage Selection)

JU4	FB1 PIN	OUTPUT VOLTAGE
1 and 2	Connected to VCC	V_{OUT1} = 1.5V
2 and 3	Connected to GND (PC board trace)	V_{OUT1} = 1.8V
Not installed	Connected to resistor-divider R3/R4	Adjustable mode

Table 5. Jumpers JU5/JU6/JU7 Functions (Switching-Frequency Selection)

JU5	JU6	JU7	TON PIN	V_{OUT1}/V_{OUT2} FREQUENCY (kHz)
Not installed	Not installed	Not installed	Floating	255/345 (as shipped)
Not installed	Installed	Not installed	Connected to VCC	170/235
Installed	Not installed	Not installed	Connected to REF	355/485
Not installed	Not installed	Installed	Connected to GND	460/620

IMPORTANT: *Don't change the operating frequency without first recalculating component values because the frequency has a significant effect on the peak current-limit level, MOSFET heating, preferred inductor value, PFM/PWM switchover point, output noise, efficiency, and other critical parameters.*

Table 6. Jumper JU8 Functions (Overvoltage Protection Selection)

JU8	OVP PIN	OVP THRESHOLD
Installed	Connected to VCC	OVP is disabled
Not installed	Connected to GND through R9	OVP is enabled. OVP threshold is 114% of nominal.
Not installed	Connected to voltage between 1.0V and 1.8V through REF divider R9, R10	OVP threshold set to 100% to 180% of nominal V_{OUT1} and V_{OUT2} according to divider R9, R10

Table 7. Jumper JU9 Functions (Undervoltage Protection Selection)

JU9	UVP PIN	UVP THRESHOLD
Not installed	Connected to VCC through R15	UVP is enabled. UVP threshold is 70% of nominal.
Installed	Connected to GND	UVP is disabled

Table 8. Jumper JU10 Functions (Fixed/Adjustable Current-Limit Selection for V_{OUT2})

JU10	ILIM2 PIN	CURRENT-LIMIT THRESHOLD
SHORT	Connected to VCC through a PC board trace	50mV (default)
OPEN	Connected to REF through resistor-divider R13/R14. Refer to the *Current-Limit Circuit* section in the MAX1845 data sheet for information on selecting R13/R14.	Adjustable between 30mV and 250mV

Table 9. Jumper JU11 Functions (Fixed/Adjustable Current-Limit Selection for V_{OUT1})

JU11	ILIM1 PIN	CURRENT-LIMIT THRESHOLD
SHORT	Connected to VCC through a PC board trace	50mV (default)
OPEN	Connected to REF through resistor-divider R11/R12. Refer to the *Current-Limit Circuit* section in the MAX1845 data sheet for information on selecting R11/R12.	Adjustable between 30mV and 250mV

MAX1845 Evaluation Kit

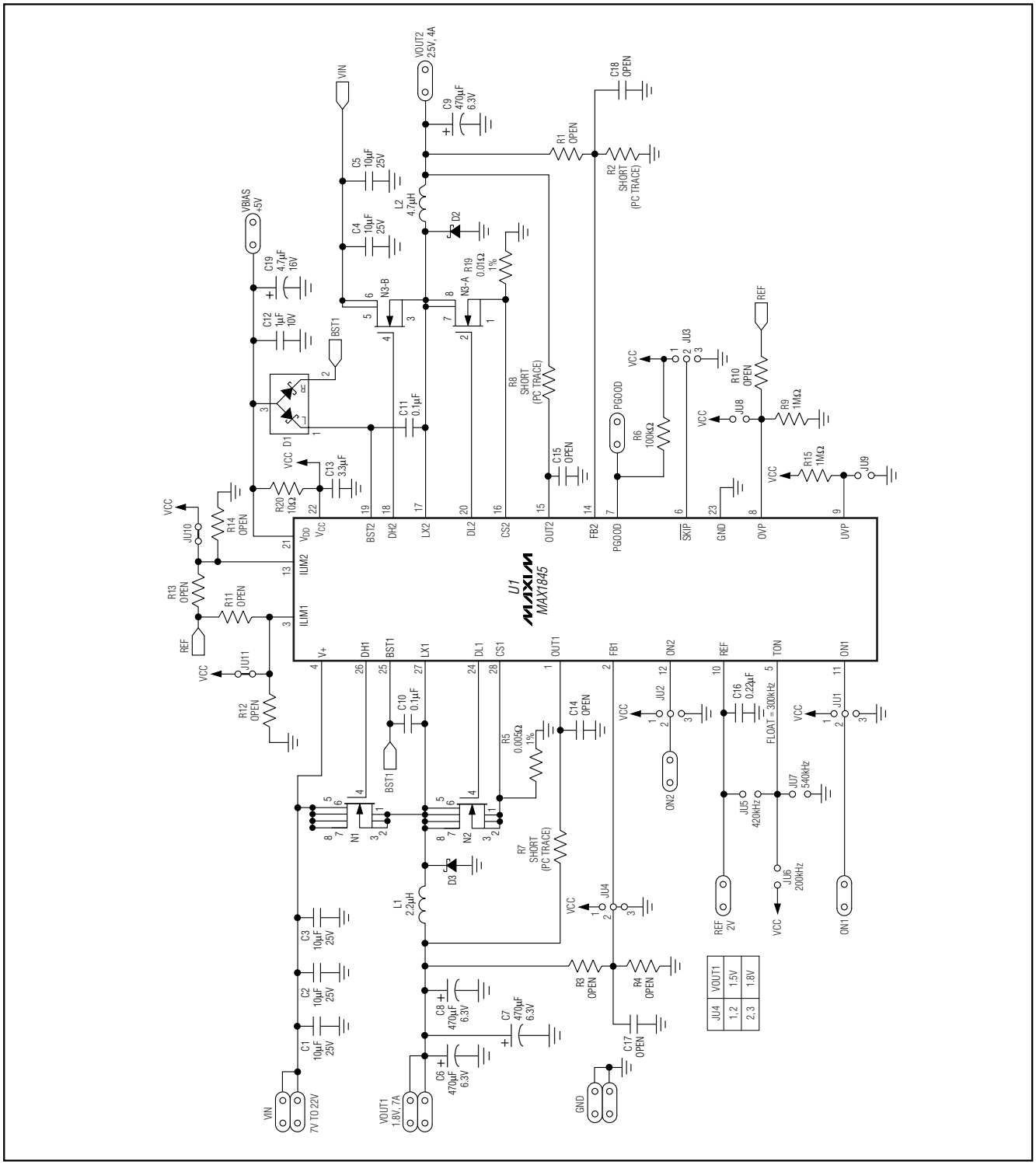

Figure 1. MAX1845 EV Kit Schematic

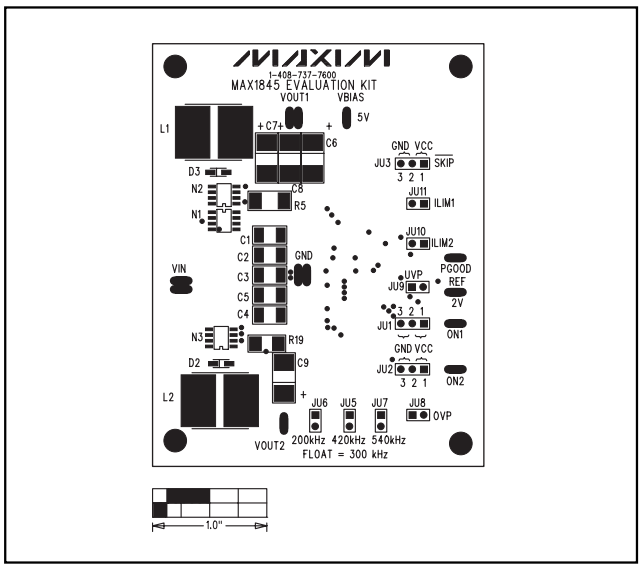

Figure 2. MAX1845 EV Kit Component Placement Guide—Component Side

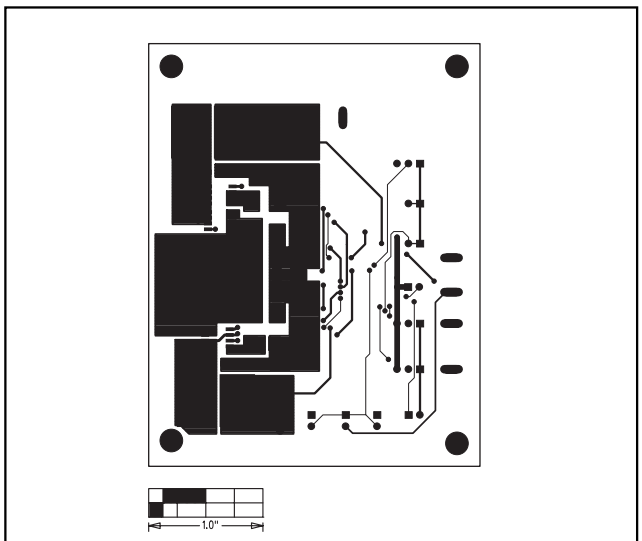

Figure 3. MAX1845 EV Kit PC Board Layout—Component Side

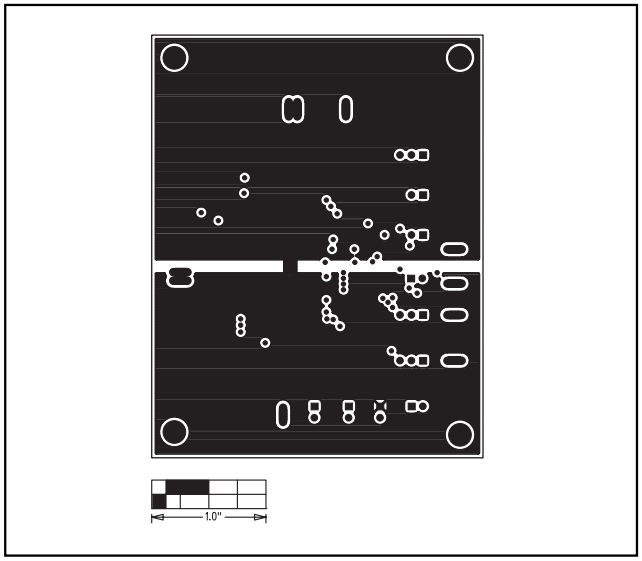

Figure 4. MAX1845 EV Kit PC Board Layout—Internal GND Plane (Layer 2)

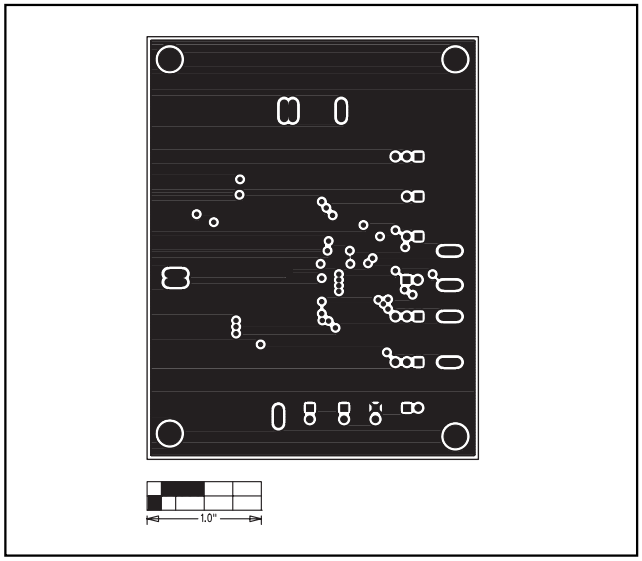

Figure 5. MAX1845 EV Kit PC Board Layout—Internal GND Plane (Layer 3)

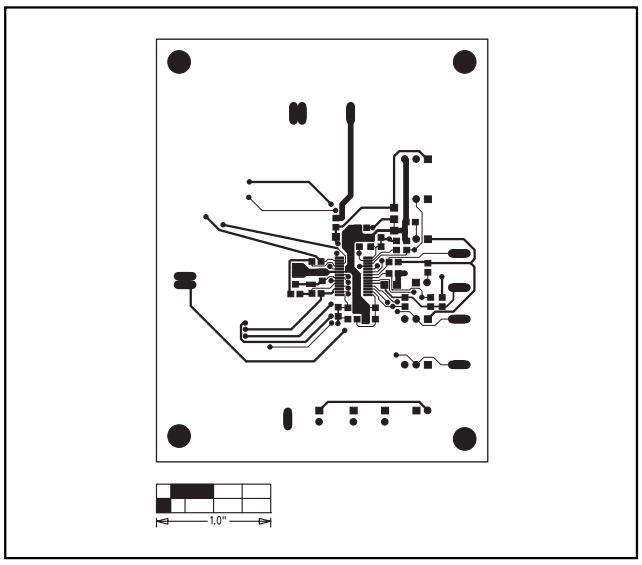

Figure 6. MAX1845 EV Kit PC Board Layout—Solder Side

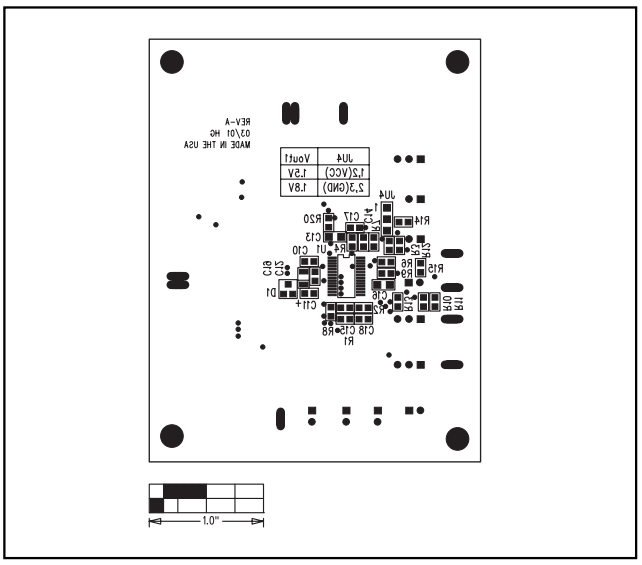

Figure 7. MAX1845 EV Kit Component Placement Guide—Solder Side