

# MAXIM

## MAX1858 Evaluation Kit

### General Description

The MAX1858 evaluation kit (EV kit) demonstrates the MAX1858's standard application circuit. This dual PWM synchronous DC-to-DC converter generates outputs down to 0.75V for core, I/O, and logic supplies.

The MAX1858 EV kit provides dual 1.8V and 2.5V output voltages from an 8V to 20V input voltage range. It delivers up to 10A output current for the 2.5V output and 10A for the 1.8V output with greater than 90% efficiency. Both converters operate 180 degrees out-of-phase to reduce input ripple current. The EV kit operates at 600kHz switching frequency and has superior line- and load-transient response.

This EV kit is a fully assembled and tested circuit board. It allows evaluation of other output voltages in the 0.75V to 15V range. The MAX1858 EV kit can also be used to evaluate the MAX1875 and MAX1876.

### Features

- ◆ 8V to 20V Input Voltage Range
- ◆ 1.8V and 2.5V Adjustable Output Voltages
- ◆ 10A Output Current (2.5V Output)
- ◆ 10A Output Current (1.8V Output)
- ◆ Lossless Foldback Current Limit
- ◆ 600kHz Switching Frequency
- ◆ RST Output with 140ms Delay
- ◆ 180 Degrees Out-of-Phase Operation
- ◆ 24-Pin QSOP Package
- ◆ Low-Profile Components
- ◆ Fully Assembled and Tested

### Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX1858EVKIT	0°C to +70°C	24 QSOP

### Component List

DESIGNATION	QTY	DESCRIPTION
C1-C4	4	10µF, 25V ceramic capacitors (1812) Taiyo Yuden TMK432BJ106KM or TDK C4532X5R1E106M
C5, C6, C22	3	0.1µF ceramic capacitors (0805)
C7	1	0.01µF ceramic capacitor (0805)
C8	1	0.0068µF ceramic capacitor (0805)
C9-C16	8	220µF, 4V, 40mΩ low-ESR capacitors Sanyo 4TPC220M
C17, C18	2	100pF ceramic capacitors (0805)
C19	1	0.22µF, 16V X5R ceramic capacitor (0805) Taiyo Yuden EMK212BJ224KG or TDK2012X7R1H224KT
C20	1	4.7µF, 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C21	1	0.22µF, 50V X7R ceramic capacitor (0805) Taiyo Yuden UMK212BJ224MG or TDK C2012X7R1H224M
D1	1	100mA, 30V dual Schottky diode Central Semiconductor CMPSH-3A
D2, D3	2	3A, 30V Schottky diodes Nihon EC31QS03L
D4, D5	2	100mA, 30V Schottky diodes Central Semiconductor CMSSH-3

DESIGNATION	QTY	DESCRIPTION
JU1, JU2	2	3-pin headers
L1, L2	2	1.1µH power inductors Sumida CEP12D38-H-1R1 (18.1A, 6mΩ, 12.5mm x 12.5mm x 4.0mm)
N1-N4	4	N-channel MOSFETs 8-pin SO International Rectifier IRF7811W or Fairchild FDS6694
R1	1	8.06kΩ ±1% resistor (0805)
R2, R4, R5	3	10kΩ ±1% resistors (0805)
R3	1	15kΩ ±1% resistor (0805)
R6	1	8.2kΩ ±5% resistor (0805)
R7	1	5.9kΩ ±5% resistor (0805)
R8	1	97.6kΩ ±1% resistor (0805)
R9	1	140kΩ ±1% resistor (0805)
R10	1	100kΩ ±5% resistor (0805)
R11	1	4.7Ω ±5% resistor (0805)
R12, R13	2	4.7Ω ±5% resistors (0603)
R14	1	118kΩ ±1% resistor (0805)
R15	1	84.5kΩ ±1% resistor (0805)
None	2	Shunts
U1	1	MAX1858EEG 24-pin QSOP
None	1	MAX1858 PC board

# MAX1858 Evaluation Kit

## Component Suppliers

SUPPLIER	PHONE	FAX	WEBSITE
Central Semiconductor	516-435-1110	516-435-1824	www.centralsemi.com
Fairchild	408-721-2181	408-721-1635	www.fairchildsemi.com
International Rectifier	310-322-3331	310-322-3332	www.irf.com
Nihon	847-843-7500	847-843-2798	www.niec.co.jp
Sanyo	619-661-6835	619-661-1055	www.sanyovideo.com
Sumida	708-956-0666	708-956-0702	www.sumida.com
Taiyo Yuden	408-573-4150	408-573-4159	www.t-yuden.com
TDK	847-390-4373	847-390-4428	www.component.tdk.com

**Note:** Please indicate that you are using the MAX1858 when contacting these component suppliers.

### Quick Start

The following equipment is required before beginning:

- 8V to 20V power supply
- Electronic loads capable of sinking 10A each
- Digital multimeters (DMMs)
- 100MHz dual-trace oscilloscope

Follow these steps to verify board operation. **Do not turn on the power supply until all connections are completed:**

- 1) Ensure that the circuit is connected correctly to the supply and electronic loads before applying any power. Set the electronic loads in resistive mode.
- 2) Verify that the shunts are across JU1 pins 1 and 2 and JU2 pins 1 and 2.
- 3) Turn on power supply.
- 4) Verify that the output voltages are 1.8V and 2.5V.

**Table 1. JU1 Functions (EN Mode Selection)**

JU1	EN PIN	MAX1858 OUTPUT
1 and 2	Connected to VL	MAX1858 enabled, $V_{OUT1} = 1.8V$ and $V_{OUT2} = 2.5V$
2 and 3	Connected to GND	Shutdown mode, $V_{OUT1} = 0V$ and $V_{OUT2} = 0V$
Not Installed	Connected to EN pad	MAX1858 must be enabled by an external signal

### Evaluating Other Output Voltages

The EV kit outputs are programmed for 1.8V and 2.5V. However, the output voltages can also be adjusted between 1V and 15V by selecting R1/R2 and R3/R4 values. Select feedback resistors R2 and R4. R1 and R3 are then given by:

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

where  $V_{FB} = 1V$ . Refer to the MAX1858 data sheet for selection of output capacitors, inductors, and compensation networks. For output voltages below 1V, refer to Figure 6 in the MAX1858 data sheet.

### Evaluating MAX1875/MAX1876

Replace U1 with the MAX1875/MAX1876.

**Table 2. JU2 Functions (SYNC Mode Selection)**

JU2	SYNC PIN	EFFECT
1 and 2	Connected to VL	Used to sync up an additional MAX1858. CKO is 2x DH1 and phase shifted by 90 degrees.
2 and 3	Connected to GND	Used to sync up an additional single buck. CKO is the same frequency and phase as DH1.
Not Installed	Connected to SYNC pad	External clock is applied to SYNC input (1100kHz to 1300kHz)

# MAX1858 Evaluation Kit

Evaluates: MAX1858/MAX1875/MAX1876

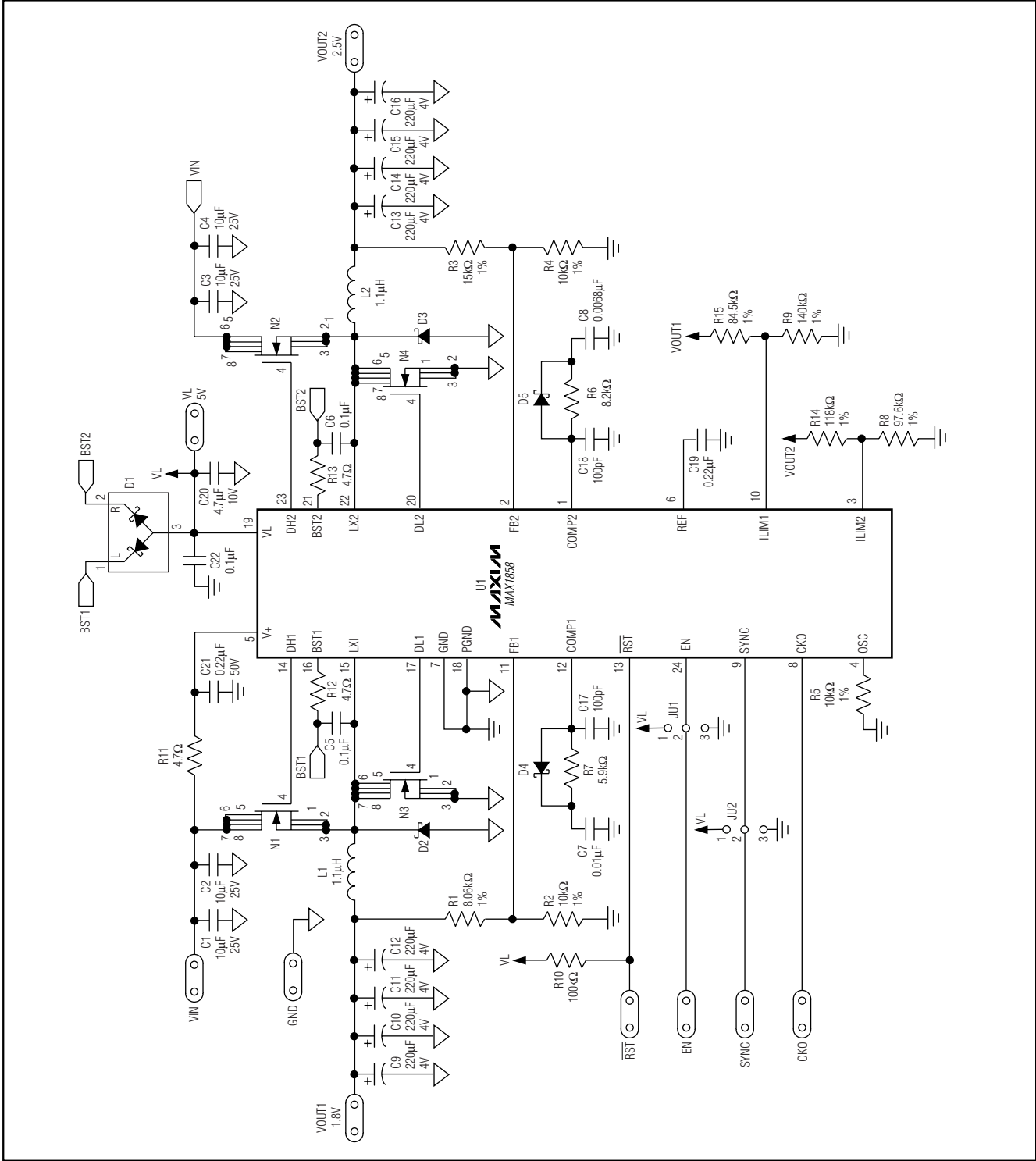


Figure 1. MAX1858 EV Kit Schematic

# MAX1858 Evaluation Kit

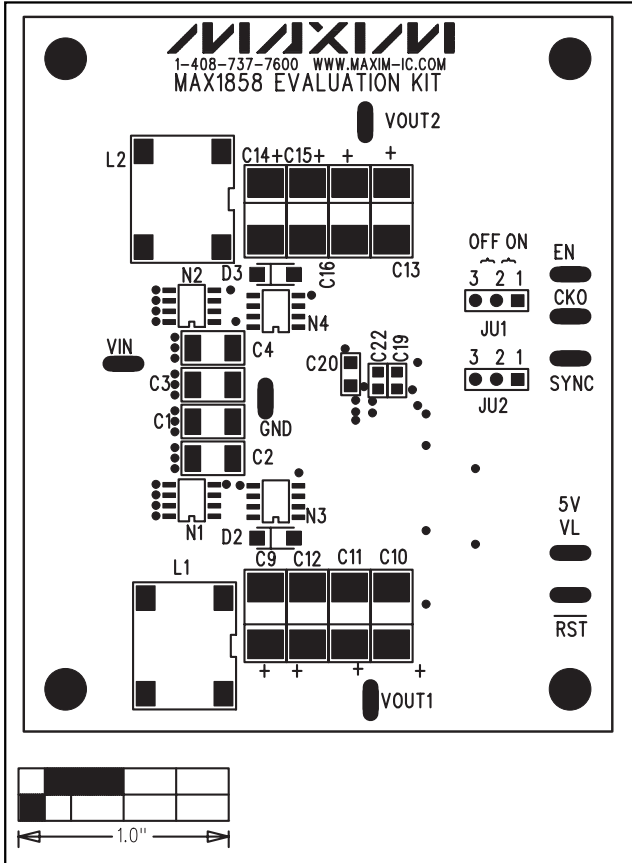


Figure 2. MAX1858 EV Kit Component Placement Guide—Top Silkscreen

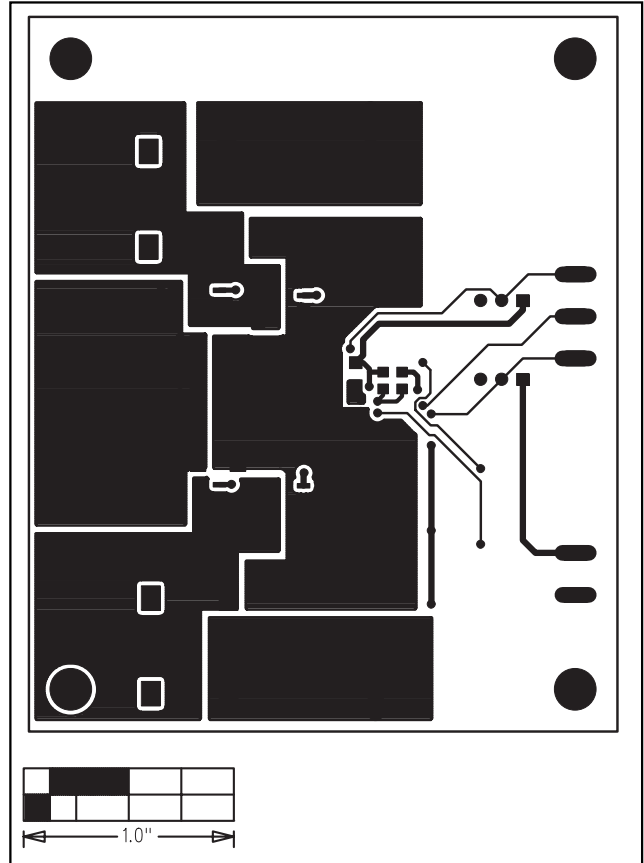


Figure 3. MAX1858 EV Kit PC Board Layout—Component Side

# MAX1858 Evaluation Kit

Evaluates: MAX1858/MAX1875/MAX1876

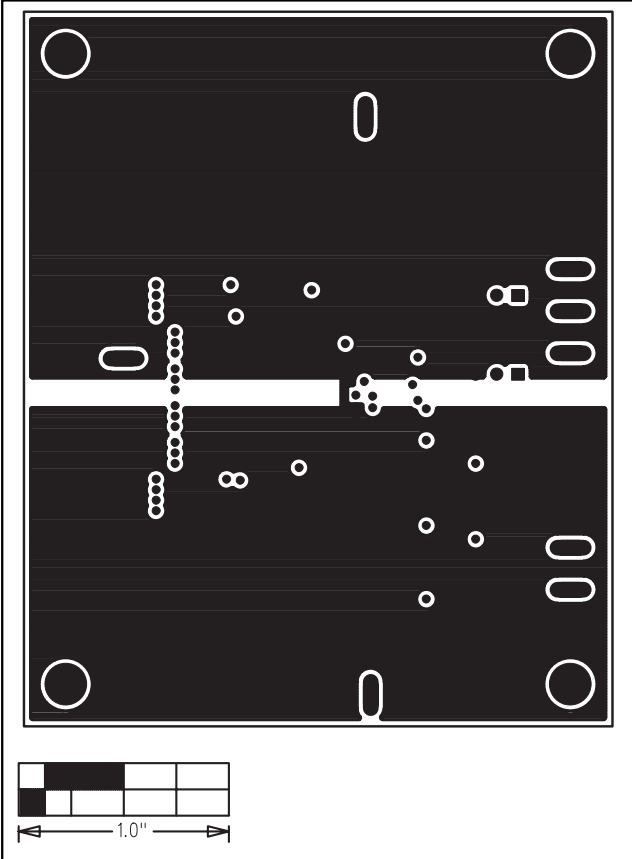


Figure 4. MAX1858 EV Kit PC Board Layout—Ground Layer 2

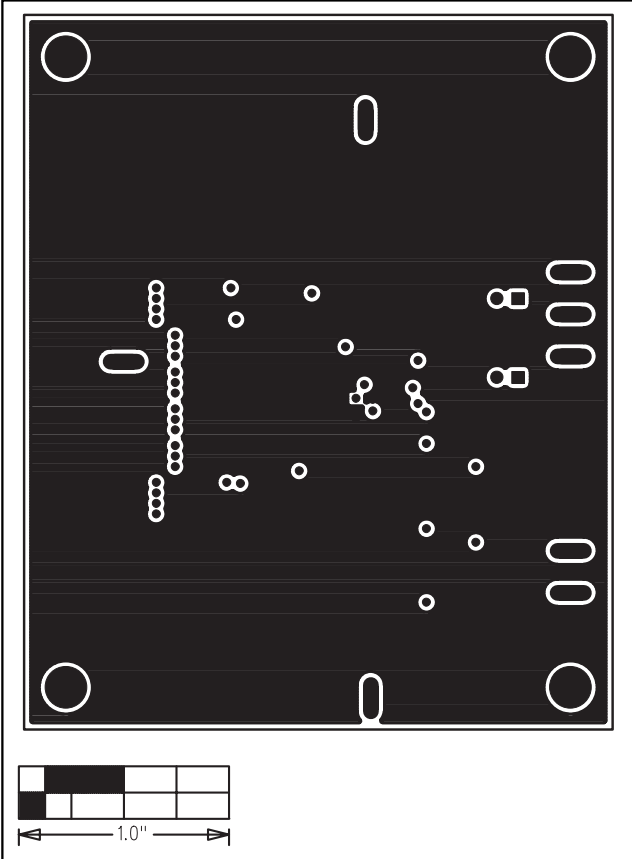


Figure 5. MAX1858 EV Kit PC Board Layout—Ground Layer 3

# MAX1858 Evaluation Kit

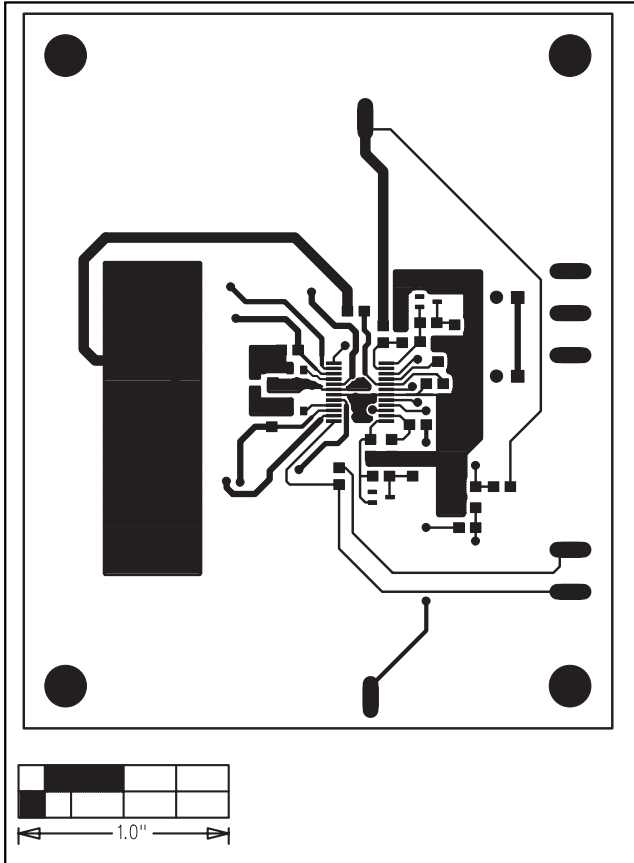


Figure 6. MAX1858 EV Kit PC Board Layout—Solder Side

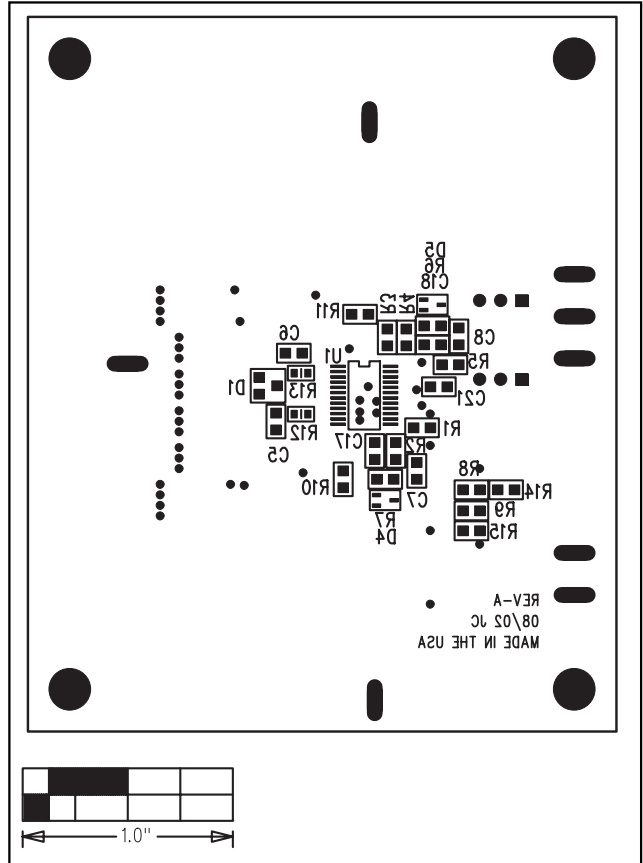


Figure 7. MAX1858 EV Kit Component Placement Guide—Bottom Silkscreen

Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

6 \_\_\_\_\_ **Maxim Integrated Products, 120 San Gabriel Drive, Sunnyvale, CA 94086 408-737-7600**