



MAX1630/MAX1631/MAX1632 Evaluation Kits

General Description

The MAX1630/MAX1631/MAX1632 evaluation kits (EV kits) each consist of one of three preassembled and tested evaluation boards (EV boards) that embody the standard application circuits. The MAX1630 and MAX1632 EV boards provide the triple-output 3.3V/5V/12V circuit, and the MAX1631 EV board provides the dual-output 3.3V/5V circuit.

All three use the same PC board but have different components to accommodate different input voltage ranges. The main differences between the MAX1630 and MAX1632 EV boards are in the turns ratio (1:4 or 1:2.2) and in the location of the transformer connection (3.3V side or 5V side). Connecting the transformer to the 3.3V side allows lower input voltage. Connecting the transformer to the 5V side provides slightly better efficiency and lower stress voltages.

These circuits are configured to deliver up to 3A of output current on each of the main PWM outputs with greater than 90% efficiency. The MAX1630/MAX1631/MAX1632 EV kits can also be used to evaluate other output voltages.

Features

- ◆ **Battery Range:** 5.2V to 20V (MAX1630)
5.2V to 28V (MAX1631)
6.5V to 28V (MAX1632)
- ◆ **Outputs:** 3.3V at 3A 12V at 120mA
5V at 3A 5V at 30mA Keep-Alive
- ◆ **1:4 Transformer (MAX1630)**
1:2.2 Transformer (MAX1632)
- ◆ **Adjustable 2.5V to 5.5V Outputs (optional resistor divider)**
- ◆ **Precision 2.5V Reference Output**
- ◆ **Oscillator Sync Input**
- ◆ **Low-Noise Mode Control Input ($\overline{\text{SKIP}}$)**
- ◆ **Power-Good Monitor ($\overline{\text{RESET}}$ output)**
- ◆ **Fully Assembled and Tested**

Ordering Information

| PART | TEMP. RANGE | BOARD TYPE |
|-----------------|--------------|---------------|
| MAX1630EVKIT-SO | 0°C to +70°C | Surface Mount |
| MAX1631EVKIT-SO | 0°C to +70°C | Surface Mount |
| MAX1632EVKIT-SO | 0°C to +70°C | Surface Mount |

Components Common to All Three EV Kits

| DESIGNATION | QTY | DESCRIPTION |
|-----------------------|-----|--|
| C1, C7, C21, C22, C25 | 5 | 0.1 μ F ceramic capacitors |
| C2, C3, C12, C13, C20 | 5 | 220 μ F, 10V, low-ESR tantalum caps Sprague 594D227X0010D2T or 595D227X0010R2T |
| C5, C6, C15, C16 | 4 | 10 μ F, 30V electrolytic capacitors Sanyo OS-CON 30SC10M |
| C8 | 1 | 4.7 μ F, 25V ceramic capacitor United Chemicon/Marcon THCR40E1E475Z |
| C9, C14 | 2 | 4.7 μ F, 16V tantalum capacitors Sprague 595D475X0016A2B |
| C10, C18, C23 | 3 | 0.01 μ F ceramic capacitors |
| C17 | 1 | 0.22 μ F ceramic capacitor |
| C19 | 0 | Open |
| C24 | 1 | 4.7 μ F, 35V tantalum capacitor Sprague 595D475X0035C2B or 5950475X0035B2B |
| D1, D5, D7, D8 | 4 | 1A, 40V Schottky diodes Nihon EC10QS04 or Motorola MBRS140T3 |

| DESIGNATION | QTY | DESCRIPTION |
|--------------------------|-----|--|
| D3 | 1 | 100mA, 30V dual Schottky diode Central Semiconductor CMPSH-3A |
| D6 | 1 | 200mA, 75V dual diode Central Semiconductor CMPD2838 |
| N1–N4 | 4 | N-channel MOSFETs International Rectifier IRF7413 or Siliconix Si4410DY |
| R1–R4 | 4 | 2M Ω , 5% resistors |
| R5, R8 | 2 | 0.020 Ω , 1% resistors Dale WSL-2010-R020-F or IRC LR2010-01-R020-F |
| R6, R7, R10–R13, R15–R18 | 0 | Open |
| R9 | 1 | 1k Ω , 5% resistor |
| R14 | 1 | 100k Ω , 5% resistor |
| R19 | 1 | 10 Ω , 5% resistor |
| SW1 | 1 | DIP-8 dip switch |
| None | 1 | MAX1630/MAX1631/MAX1632 PC board |



MAX1630/MAX1631/MAX1632 Evaluation Kits

MAX1630 EV Kit Additional Components

| DESIGNATION | QTY | DESCRIPTION |
|-------------------------------------|-----|--|
| C4 | 1 | 2.2µF, 25V tantalum capacitor Sprague 595D225X0025B2B |
| C11 | 0 | Open |
| D2 | 1 | 1A, 100V, fast-recovery diode Nihon EC11FS1 or Motorola MBRS1100T3 |
| D4 | 0 | Open |
| JU1, JU3-JU6, JU8, JU10, JU11 | 8 | 2-pin headers |
| JU5 | 1 | Shunt |
| L2 | 1 | 10µH power inductor Sumida CDRH125-100 (shielded) or Coiltronics UP2-100 or Coilcraft DO3316P-103 |
| T1 | 1 | 10µH, 1:4 transformer Transpower Technologies TTI-5902 |
| U1 | 1 | MAX1630 (SSOP-28) Maxim MAX1630CAI |

MAX1632 EV Kit Additional Components

| DESIGNATION | QTY | DESCRIPTION |
|-------------------------------------|-----|--|
| C4 | 0 | Open |
| C11 | 1 | 2.2µF, 25V tantalum capacitor Sprague 595D225X0025B2B |
| D4 | 1 | 1A, 100V, fast-recovery diode Nihon EC11FS1 or Motorola MBRS1100T3 |
| L1 | 1 | 10µH power inductor Sumida CDRH125-100 (shielded) or Coiltronics UP2-100 or Coilcraft DO3316P-103 |
| T2 | 1 | 10µH, 1:2.2 transformer Transpower Technologies TTI-5870 |
| JU1, JU3-JU6, JU8, JU10, JU11 | 8 | 2-pin headers |
| JU5 | 1 | Shunt |
| U1 | 1 | MAX1632 (SSOP-28) Maxim MAX1632CAI |

MAX1631 EV Kit Additional Components

| DESIGNATION | QTY | DESCRIPTION |
|--------------|-----|---|
| C4, C11 | 0 | Open |
| D2, D4 | 0 | Open |
| JU1, JU3-JU6 | 5 | 2-pin headers |
| JU5 | 1 | Shunt |
| JU10, JU11 | 2 | Short |
| L1, L2 | 2 | 10µH power inductors Sumida CDRH125-100 (shielded) or Coiltronics UP2-100 or Coilcraft DO3316P-103 |
| U1 | 1 | MAX1631 (SSOP-28) Maxim MAX1631CAI |

Component Suppliers

| SUPPLIER* | PHONE | FAX |
|-------------------------|----------------|----------------|
| AVX | (803) 946-0690 | (803) 626-3123 |
| Central Semiconductor | (516) 435-1110 | (516) 435-1824 |
| Coilcraft | (847) 639-6400 | (847) 639-1469 |
| Coiltronics | (561) 241-7876 | (561) 241-9339 |
| Dale-Vishay | (402) 564-3131 | (402) 563-6418 |
| International Rectifier | (310) 322-3331 | (310) 322-3332 |
| IRC | (512) 992-7900 | (512) 992-3377 |
| Motorola | (602) 303-5454 | (602) 994-6430 |
| Nihon | (805) 867-2555 | (805) 867-2698 |
| Sanyo | (619) 661-6835 | (619) 661-1055 |
| Siliconix | (408) 988-8000 | (408) 970-3950 |
| Sprague | (603) 224-1961 | (603) 224-1430 |
| Sprague/Sanyo | (207) 324-4140 | (207) 324-7223 |
| Sumida | (847) 956-0666 | (847) 956-0702 |
| Vishay/Vitramon | (203) 268-6261 | (203) 452-5670 |
| Transpower Technologies | (702) 831-0140 | (702) 831-3521 |

*Note: Please indicate that you are using the MAX1630/
MAX1631/MAX1632 when contacting these component
suppliers.

MAX1630/MAX1631/MAX1632 Evaluation Kits

Evaluate: MAX1630/MAX1631/MAX1632

Quick Start

The MAX1630/MAX1631/MAX1632 EV kits are 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 bench power supply (50W or better) to the VIN and GND pads at the edge of the board.
- 2) Connect voltmeters and loads (if any) to the VOUT pads.
- 3) Verify that switch SW1 positions $\overline{\text{SHDN}}$, ON5, and ON3 are on, and that the shunt is across JU5.
- 4) Turn on the power supply and verify that the output voltages are 3.3V and 5V.

Detailed Description

Output Voltage

The main output voltages come preset to 3.3V and 5V. Install resistors R6/R7 and R12/R13 for adjustable mode. **Two small PC trace jumpers, JU9 and JU7, shunt FB3 and FB5 to GND on the board. These default jumpers must be cut for adjustable-mode operation.** Refer to the MAX1630–MAX1635 data sheet for instructions on calculating R6/R7 and R12/R13. Do not operate the circuit without a jumper or resistor-divider installed, or output overvoltage will damage the IC.

In addition to the standard components, the extra pull-up and pull-down resistors listed below are used to set logic input levels. These resistors can usually be omitted in the final design.

- R6, R7 Adjustable-mode resistor-divider (not installed). $V_{OUT} = 2.5V (1 + R6 / R7)$.
- R12, R13 Adjustable-mode resistor-divider (not installed). $V_{OUT} = 2.5V (1 + R12 / R13)$.
- R1–R4 2M Ω logic pull-down resistors. Shorted out or driven by logic.
- R14 100k Ω SYNC pull-up resistor (usually shorted out). SYNC to VL.

Jumper Selection

The three 2-pin headers JU3, JU4, and JU5 select the power-up sequence mode. Table 1 lists the selectable jumper options.

The 2-pin header JU6 selects the operating frequency. Table 2 lists the selectable jumper options. The EV kit's components are selected for 300kHz operation. Component values might need to be changed if 200kHz operation is selected (refer to the *Design Procedure* section in the MAX1630–MAX1635 data sheet). Synchronize the oscillator to an external clock signal by driving the SYNC pad with a pulse train of 5V amplitude in the 240kHz to 350kHz frequency range.

Table 1. Jumper JU3, JU4, JU5 Functions

| SHUNT LOCATION | SEQ PIN | POWER-UP SEQUENCE |
|----------------|------------------|---------------------------|
| JU3 | Connected to GND | 5V before 3.3V |
| JU4 | Connected to VL | 3.3V before 5V |
| JU5 | Connected to REF | Separate ON3/ON5 controls |

Table 2. Jumper JU6 Functions

| SHUNT JU6 LOCATION | SYNC PIN | FREQUENCY (kHz) |
|--------------------|------------------|-----------------|
| On | Connected to GND | 200 |
| Off | Connected to VL | 300 |

Additional Jumpers (MAX1631 Only)

Additional jumpers on the board along with R10 and R11 are for configuring the MAX1631 for an auxiliary secondary output. R10 and R11 set the secondary feedback voltage (refer to the MAX1630–MAX1635 data sheet). Table 3 lists the MAX1631 jumper settings.

Table 3. MAX1631 Jumper Settings

| JUMPER | FUNCTION |
|--------|---|
| JU1 | Connects the secondary feedback to R10 and R11. |
| JU2 | Used in MAX1630 and MAX1632 for normal connections. |
| JU8 | Steers secondary feedback to the 3.3V SMPS. |
| JU10 | Steers secondary feedback to the 5V SMPS. |
| JU11 | Disables secondary feedback. |

MAX1630/MAX1631/MAX1632 Evaluation Kits

Evaluate: MAX1630/MAX1631/MAX1632

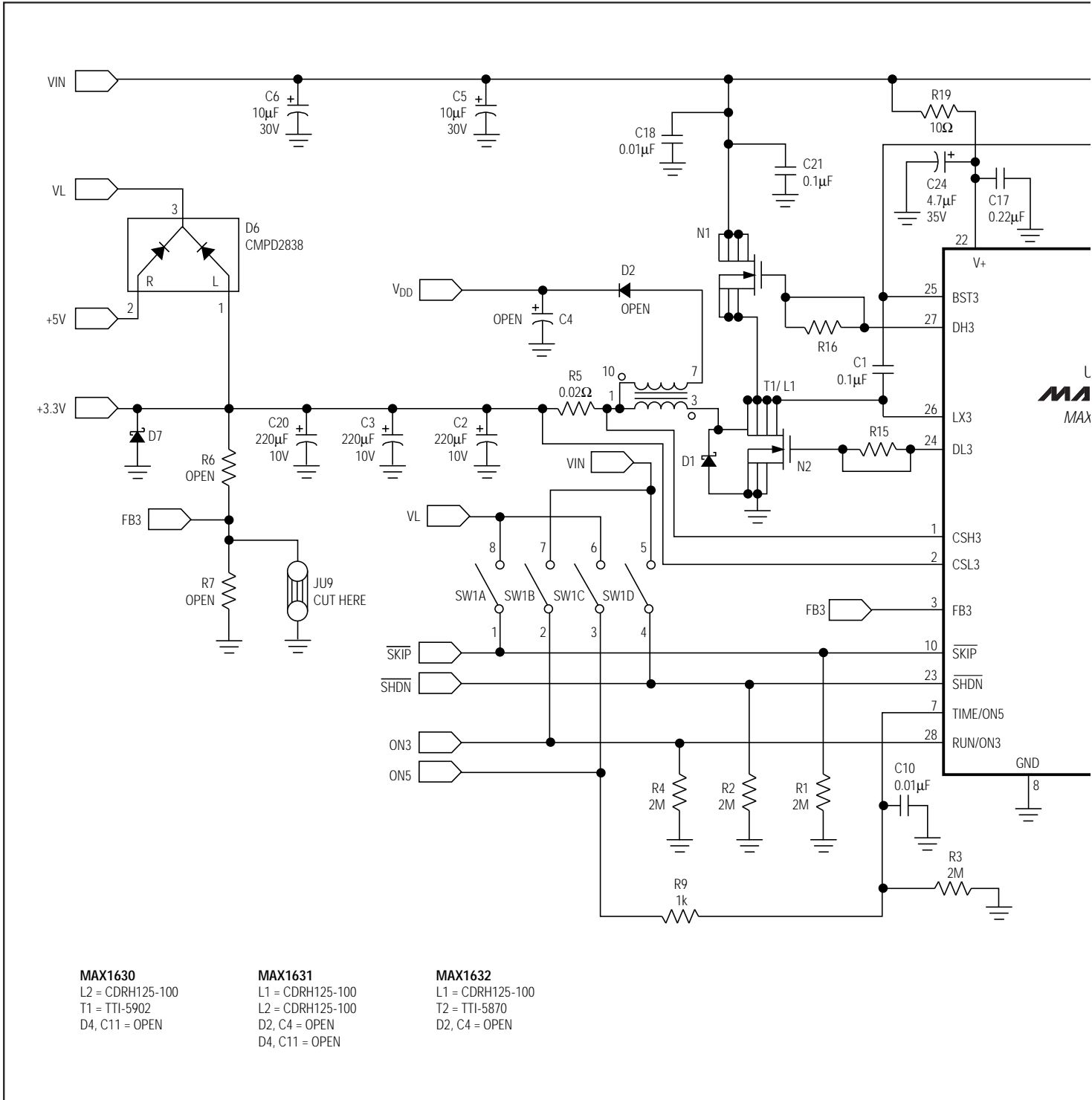
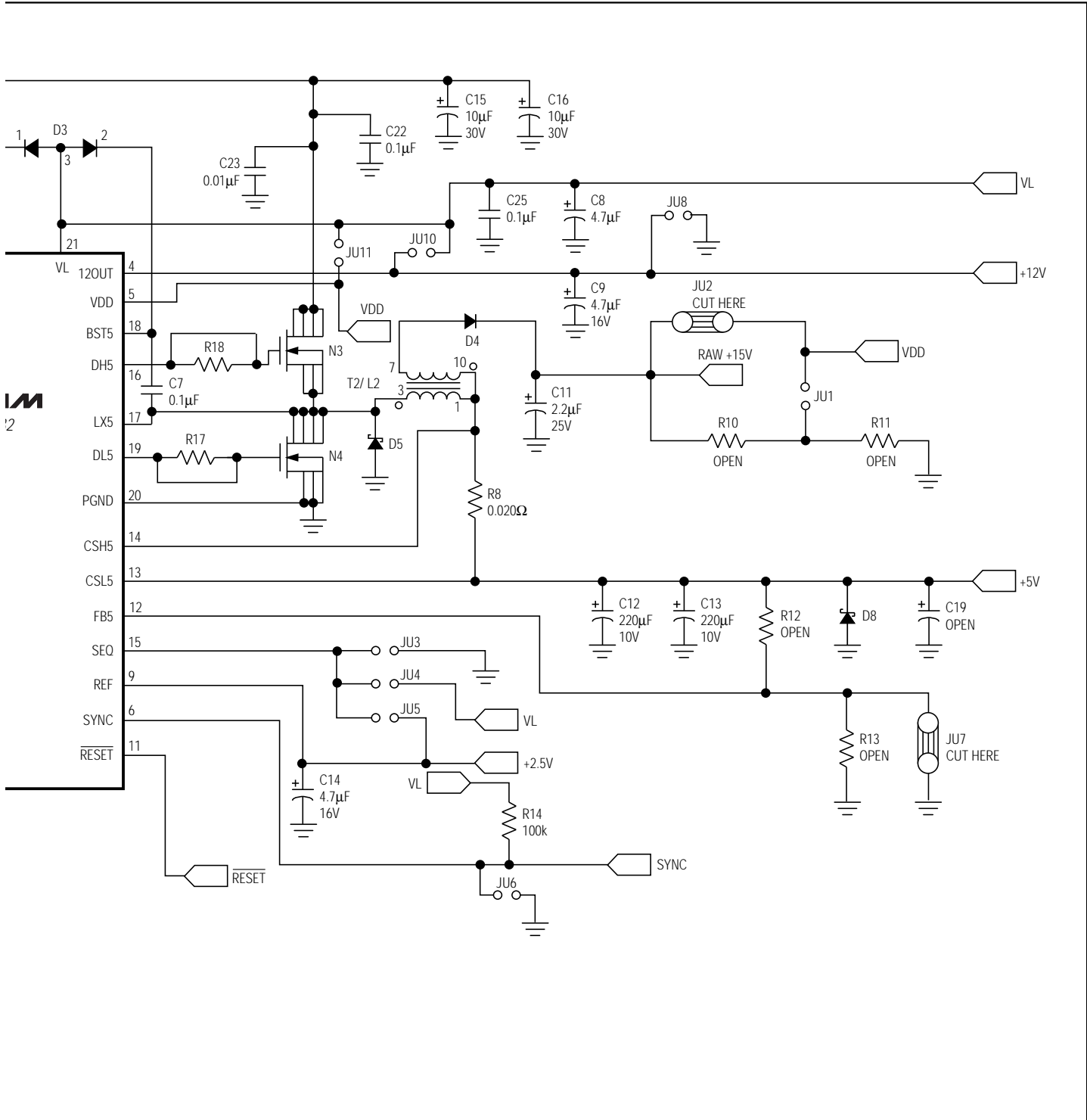


Figure 1. MAX1630/MAX1631/MAX1632 EV Kit Schematic

MAX1630/MAX1631/MAX1632 Evaluation Kits

Evaluate: MAX1630/MAX1631/MAX1632



MAX1630/MAX1631/MAX1632 Evaluation Kits

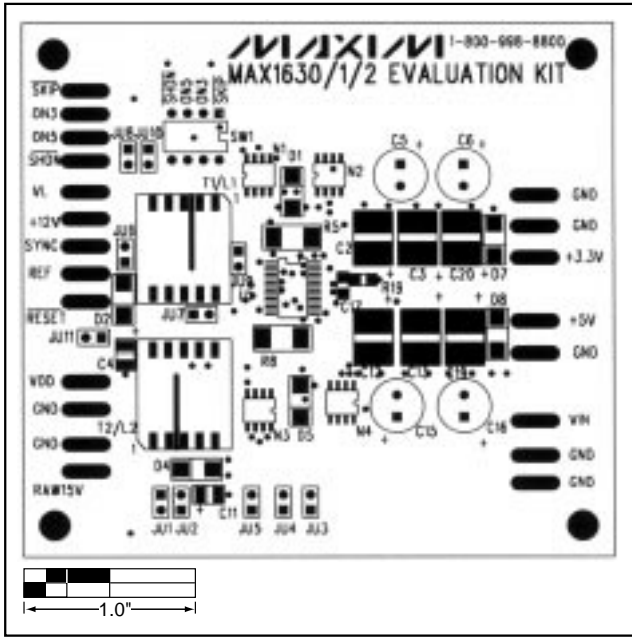


Figure 2. MAX1630/MAX1631/MAX1632 EV Kit Component Placement Guide—Component Side

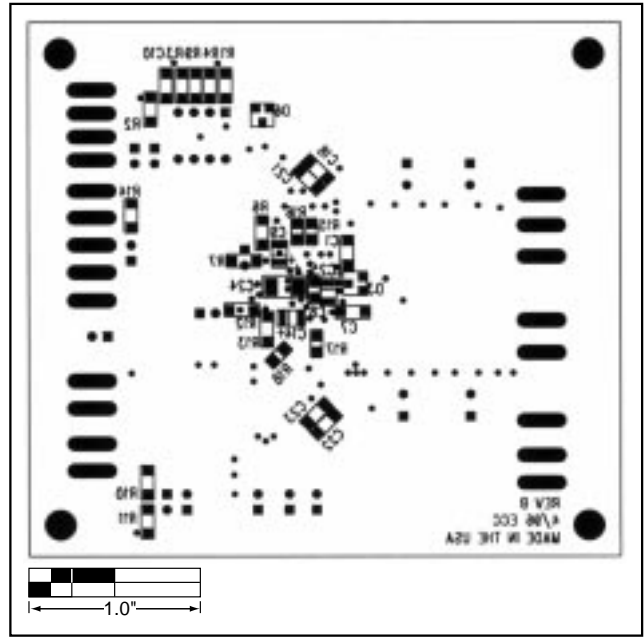


Figure 3. MAX1630/MAX1631/MAX1632 EV Kit Component Placement Guide—Solder Side

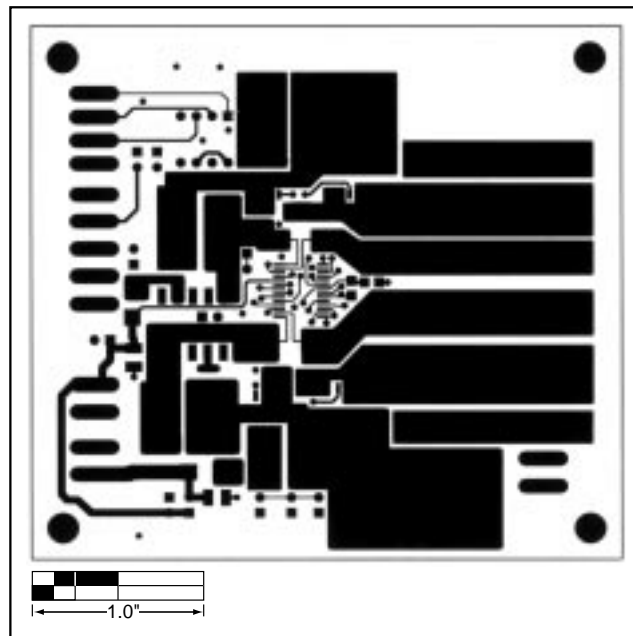


Figure 4. MAX1630/MAX1631/MAX1632 EV Kit PC Board Layout—Component Side

MAX1630/MAX1631/MAX1632 Evaluation Kits

Evaluate: MAX1630/MAX1631/MAX1632

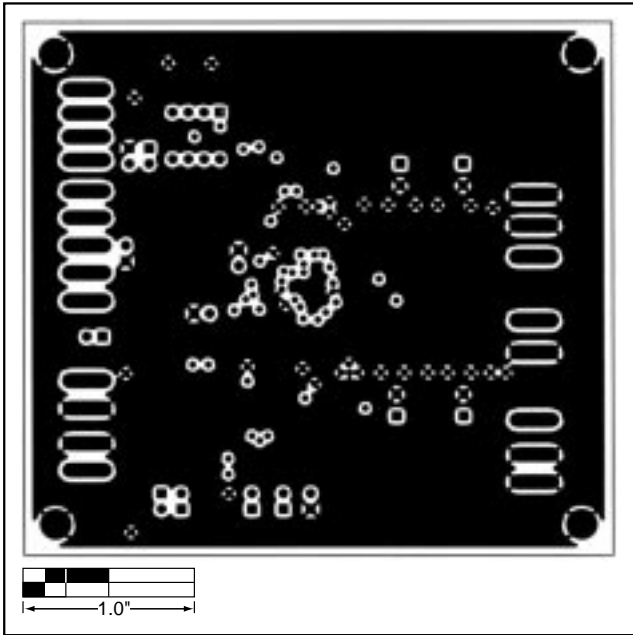


Figure 5. MAX1630/MAX1631/MAX1632 EV Kit PC Board Layout—Internal GND Plane

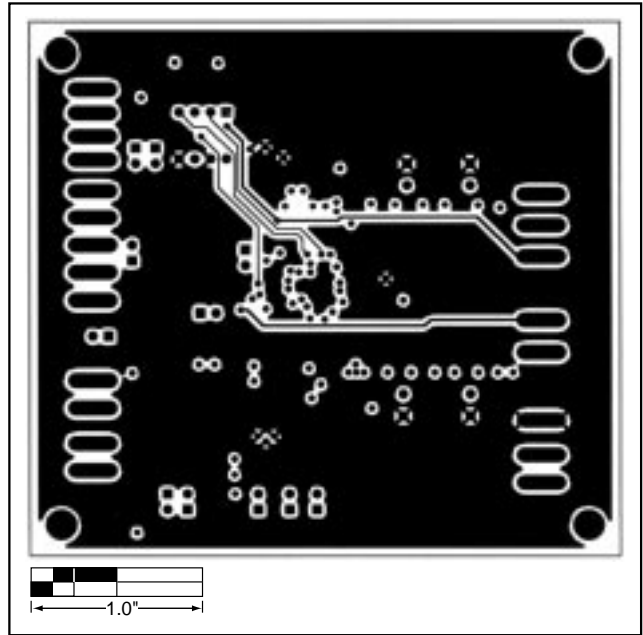


Figure 6. MAX1630/MAX1631/MAX1632 EV Kit PC Board Layout—Internal Voltage Plane

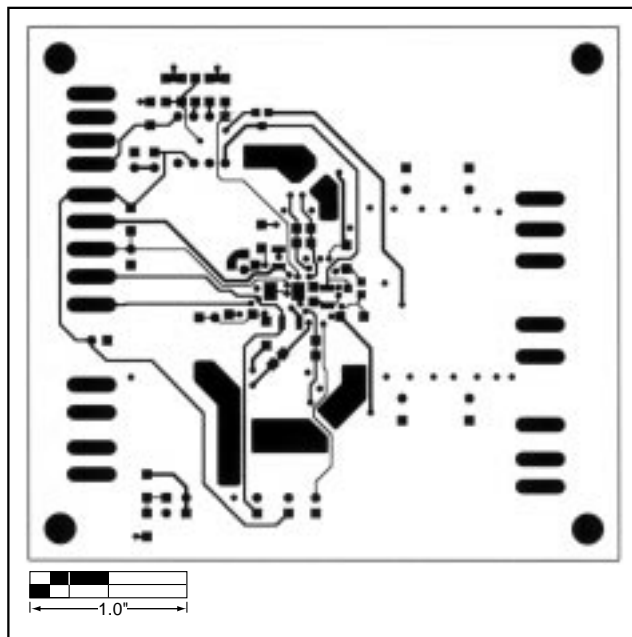


Figure 7. MAX1630/MAX1631/MAX1632 EV Kit PC Board Layout—Solder Side

MAX1630/MAX1631/MAX1632 Evaluation Kits

NOTES

Evaluate: MAX1630/MAX1631/MAX1632

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