



MAX17062 Evaluation Kit

General Description

The MAX17062 evaluation kit (EV kit) is a fully assembled and tested surface-mount PCB that provides the voltages required for active-matrix, thin-film transistor (TFT), liquid-crystal displays (LCDs). The EV kit contains a pulse-width-modulated (PWM) step-up switching regulator, a positive single-stage charge pump for the TFT gate-on supply, and a negative single-stage charge pump for the TFT gate-off supply.

The EV kit operates from a DC supply voltage of +4.5V to +5.5V and is configured to operate with a switching frequency of 1.2MHz. The step-up switching regulator is configured for a +15V output and can provide 600mA with a +4.5V input. The positive charge pump is configured for a +29V output providing 30mA. The negative charge pump is configured for a -15V output providing 30mA.

The MAX17062 EV kit features low-quiescent current and high-conversion efficiency (90%). The high switching frequency allows the use of small, surface-mount components.

Features

- ◆ 90% Efficiency
- ◆ +2.6V to +5.5V Input Range
- ◆ Output Voltage Adjustable from VIN to 20V
- ◆ Output Voltages (+4.5V to +5.5V Input)
 - +15V Output at 600mA
 - +29V Output at 30mA (Positive Charge Pump)
 - 15V Output at 30mA (Negative Charge Pump)
- ◆ 1.2MHz Switching Frequency (Selectable: 640kHz or 1.2MHz)
- ◆ Programmable Soft-Start
- ◆ 0.01μA IC Shutdown Current (typ)
- ◆ Fully Assembled and Tested

Ordering Information

PART	TYPE
MAX17062EVKIT+	EV Kit

+Denotes lead-free and RoHS compliant.

Component List

DESIGNATION	QTY	DESCRIPTION
C1, C2	2	4.7μF ±10%, 10V X5R ceramic capacitors (0603) TDK C1608X5R1A475K
C3	1	1μF ±10%, 6.3V X5R ceramic capacitor (0603) Murata GRM188R60J105K TDK C1068X7R1C105K
C4	1	0.033μF ±10%, 25V X7R ceramic capacitor (0603) Murata GRM188R71E333K TDK C1608X7R1H333K
C5	1	560pF ±5%, 50V C0G ceramic capacitor (0603) Murata GRM1885C1H561J TDK C1608C0G1H561J
C6, C13, C16, C17	0	Not installed, ceramic capacitors (0603)

DESIGNATION	QTY	DESCRIPTION
C7, C8	2	10μF ±10%, 25V X5R ceramic capacitors (1210) Murata GRM32DR61E106K TDK C3225X5R1E106K
C9	0	Not installed, ceramic capacitor (1210)
C10	0	Not installed, aluminum electrolytic capacitor (SMT: 6.3mm x 6mm)
C11, C15	2	0.22μF ±10%, 50V X7R ceramic capacitors (0805) Murata GRM21BR71H224K TDK C2012X7R1H224K
C12, C14	2	0.1μF ±10%, 50V X7R ceramic capacitors (0603) Murata GRM188R71H104K TDK C1608X7R1H104K
C18	0	Not installed, ceramic capacitor (0805)
D1	1	3A, 30V Schottky diode (M-Flat) Toshiba CMS03 (TE12L-Q) LEAD FREE

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Component List (continued)

DESIGNATION	QTY	DESCRIPTION
D2, D4	2	250mA, 90V dual ultra-fast diodes (SOT23) Central Semiconductor CMPD1001S LEAD FREE (Top Mark: L21) Diodes Inc. BAV99 (300mA, 100V)
D3	0	Not installed, diode (SOT23)
JU1	1	2-pin header (0.1in centers)
JU2	0	Not installed, 3-pin header—short (0.1in centers)
JU3	0	Not installed, 2-pin header—short (0.1in centers)
L1	1	2.7 μ H $\pm$ 20% power inductor TOKO FDV0630-2R7 (27m Ω , 4.4A) Sumida CDRH5D18BHPNP-2R7M (65m Ω , 3.9A)

DESIGNATION	QTY	DESCRIPTION
R1	1	100k Ω $\pm$ 5% resistor (0603)
R2	1	47k Ω $\pm$ 5% resistor (0603)
R3	1	20k Ω $\pm$ 1% resistor (0603)
R4	1	221k Ω $\pm$ 1% resistor (0603)
R5	1	10 Ω $\pm$ 5% resistor (0603)
R6	0	Not installed, resistor (0603)
R7	1	0 Ω $\pm$ 5% resistor (0603)
U1	1	High-performance step-up DC-DC controller (10 TDFN-EP*) Maxim MAX17062ETB+
—	1	Shunt
—	1	PCB: MAX17062 Evaluation Kit+

*EP = Exposed pad.

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Central Semiconductor	631-435-1110	www.centralsemi.com
Diodes, Inc.	805-446-4800	www.diodes.com
Murata Electronics North America, Inc.	770-436-1300	www.murata-northamerica.com
Sumida Corp.	847-545-6700	www.sumida.com
TDK Corp.	847-803-6100	www.component.tdk.com
TOKO America, Inc.	847-297-0070	www.tokoam.com

Note: Indicate that you are using the MAX17062 when contacting these component suppliers.

Quick Start

Recommended Equipment

Before beginning, the following equipment is needed:

- +4.5V to +5.5V, 5A DC power supply (VIN)
- Voltmeter

Procedure

The MAX17062 EV kit is fully assembled and tested. Follow these steps to verify board operation. **Caution: Do not turn on the power supply until all connections are completed.**

- 1) Verify that there is no shunt placed across jumper JU1 to enable the MAX17062.

- 2) Connect the positive terminal of the DC power supply to the VIN pad. Connect the negative terminal of the DC power supply to the PGND pad.
- 3) Turn on the +4.5V to +5.5V DC power supply and verify that the step-up switching regulator output (VOUT) is +15V.
- 4) Verify that the gate-on supply (VGON) is approximately +29V.
- 5) Verify that the gate-off supply (VGOFF) is approximately -15V.

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Detailed Description

The MAX17062 EV kit contains a high-efficiency, pulse-width-modulated (PWM), step-up switching regulator, a positive single-stage unregulated charge pump, and a negative single-stage unregulated charge pump. The MAX17062 features a programmable soft-start, loop-compensation pin, and an internal MOSFET switch. The EV kit operates from a +4.5V to +5.5V DC power supply.

As configured, the step-up switching regulator generates a +15V output (VOUT) and can provide 600mA with a 4.5V input. The step-up switching regulator output voltage can be adjusted from VIN to +20V by changing the values of the feedback resistors (see the *Evaluating Other Output Voltages* section).

The VGON supply consists of a single positive charge-pump stage to generate approximately twice the VOUT voltage (or approximately +29V) and provide 30mA. The VGOFF supply consists of a single negative charge-pump stage to generate approximately -VOUT (or approximately -15V) and provide 30mA.

The EV kit is configured for a +4.5V input and a 1.2MHz switching frequency. **Operation at a different input voltage, output voltage (VOUT), or switching frequency may require a different inductor, output capacitors, and compensation components.** Refer to the MAX17062 IC data sheet for detailed information on loop compensation and component selection.

Jumper Selection

Shutdown Mode ($\overline{\text{SHDN}}$)

The EV kit features a shutdown mode that reduces the MAX17062 quiescent current. JU1 selects the shutdown mode. See Table 1 for jumper JU1 functions.

Table 1. Jumper JU1 Functions

SHUNT POSITION	$\overline{\text{SHDN}}$ PIN	MAX17062 OUTPUT
Installed	Connected to GND	Shutdown mode, VOUT = VIN - V _{DIODE}
Not installed*	Connected to VIN through R1	MAX17062 enabled, VOUT = +15V

*Default position.

Switching-Frequency Selection (FREQ)

The MAX17062 EV kit provides the option to configure the switching frequency of the step-up DC-DC converter. Table 2 lists jumper JU2 settings for configuring the switching frequency. The EV kit is configured and shipped to operate at 1.2MHz. For operation at 640kHz, cut the trace between pins 1 and 2 of jumper JU2 and short pins 2 and 3. Refer to the MAX17062 data sheet for selecting the proper components.

Table 2. Jumper JU2 Functions

SHUNT POSITION	FREQ PIN	SWITCHING FREQUENCY
1-2*	Connected to VIN with a PC trace	1.2MHz
2-3	Connected to GND (cut the trace between pins 1-2 before shorting pins 2-3)	640kHz

*Default position.

Evaluating Other Output Voltages

The MAX17062 EV kit's step-up switching-regulator output (VOUT) is set to +15V by feedback resistors R3 and R4. To generate output voltages other than +15V (VIN to +20V), select different external voltage-divider resistors, R3 and R4. Select R3 in the 10k Ω to 50k Ω range. R4 is then given by:

$$R4 = R3 \times \left[\left(\frac{V_{\text{OUT}}}{V_{\text{FB}}} \right) - 1 \right]$$

where $V_{\text{FB}} = 1.24\text{V}$. Note that changing the VOUT voltage also changes the VGON and VGOFF charge-pump output voltages. For significantly different operation points, the EV kit may require a different inductor and component changes. Refer to the MAX17062 data sheet for proper component selection.

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Positive Charge-Pump Configuration

As configured, the single-stage positive charge pump generates approximately double the VOUT output voltage at VGON. The charge pump can be reconfigured as a two-stage positive charge pump, providing triple the VOUT output voltage at VGON. This is accomplished by installing capacitors C13, C16, diode D3, and removing resistor R7. See Table 3 for suggested component values.

Table 3. Two-Stage Charge-Pump Components

DESIGNATION	QTY	DESCRIPTION
C13, C16	2	0.1 μ F $\pm$ 10%, 50V X7R ceramic capacitors (0603)
D3	1	250mA, 90V dual ultra-fast diode (SOT23)
R7	0	Not installed, resistor

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Evaluates: MAX17062

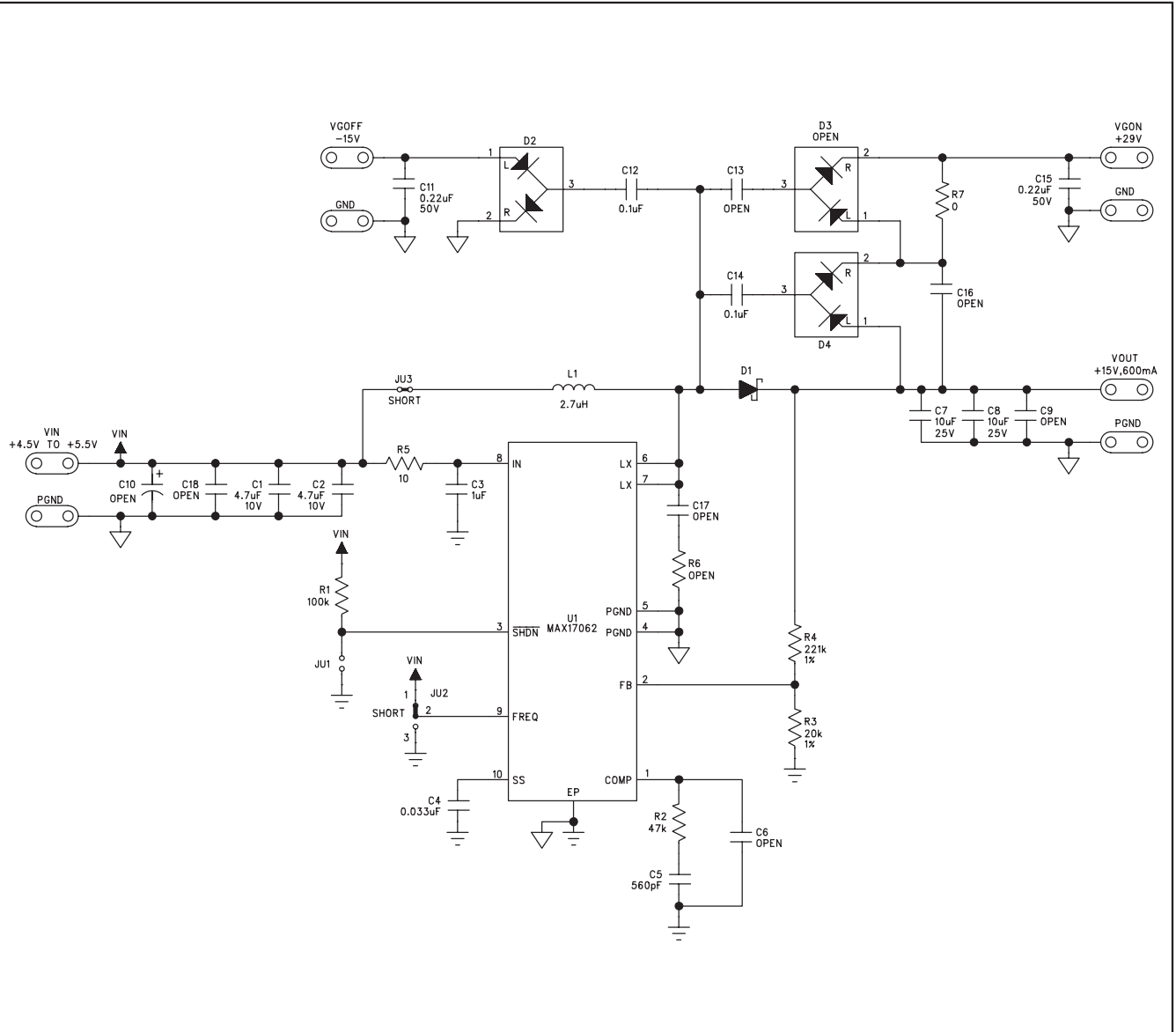


Figure 1. MAX17062 EV Kit Schematic

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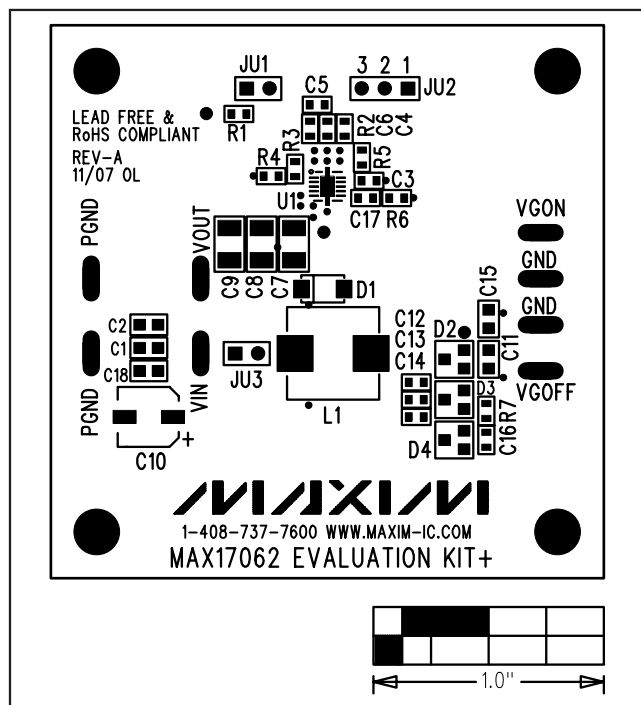


Figure 2. MAX17062 EV Kit Component Placement Guide—Component Side

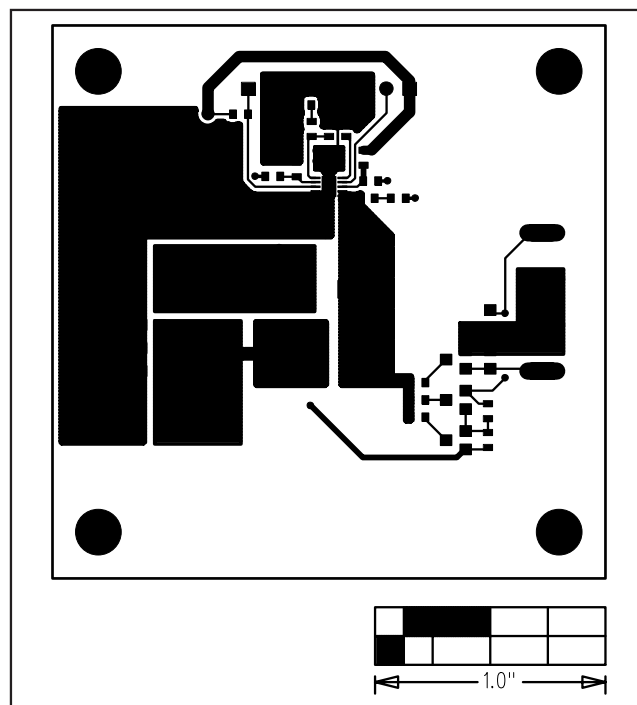


Figure 3. MAX17062 EV Kit PCB Layout—Component Side

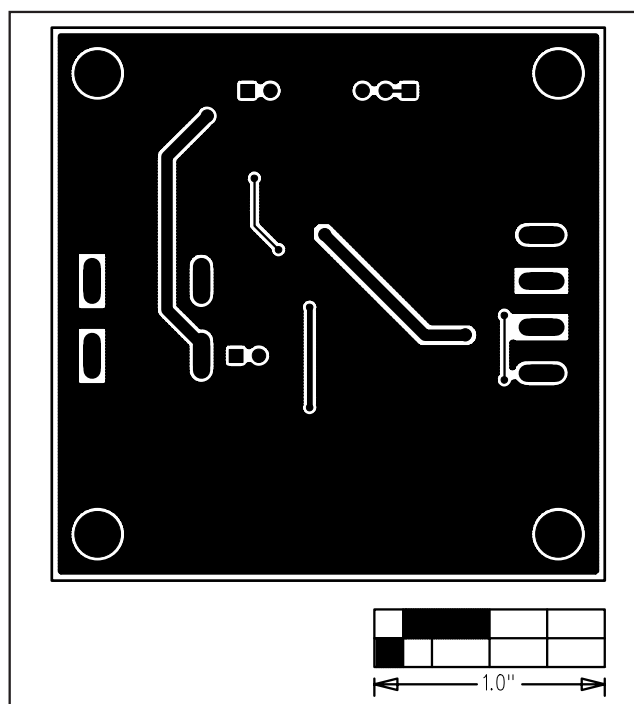


Figure 4. MAX17062 EV Kit PCB Layout—Solder Side

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Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	11/07	Initial release	—
1	6/08	Schematic changes: added EP to U1 and changed ground of C3 from PGND to AGND.	5

Evaluates: MAX17062

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