



MAX17062 Evaluation Kit

Evaluates: MAX17062

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



Maxim Integrated Products 1

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim's website at www.maxim-ic.com.

MAX17062 Evaluation Kit

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.

MAX17062 Evaluation Kit

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 - VDIODE
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.

MAX17062 Evaluation Kit

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

MAX17062 Evaluation Kit

Evaluates: MAX17062

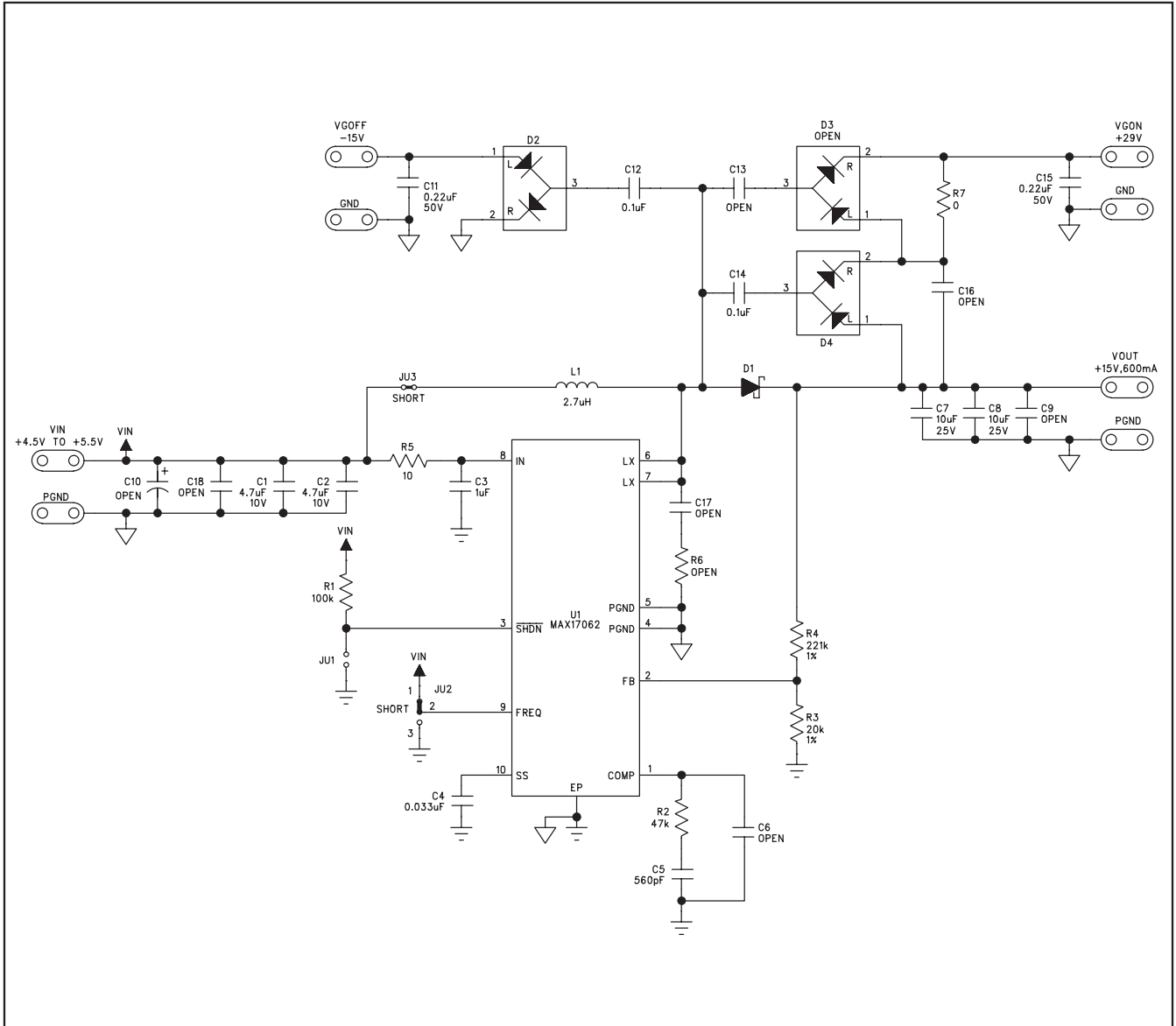


Figure 1. MAX17062 EV Kit Schematic

MAX17062 Evaluation Kit

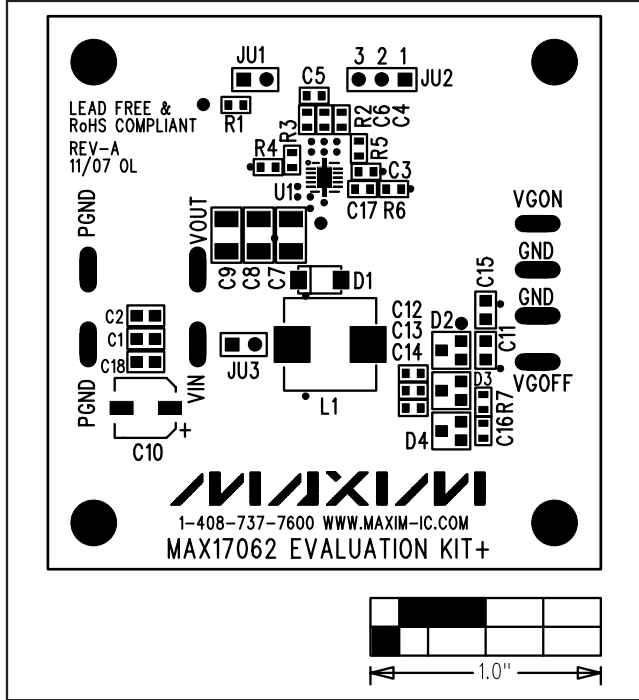


Figure 2. MAX17062 EV Kit Component Placement Guide—Component Side

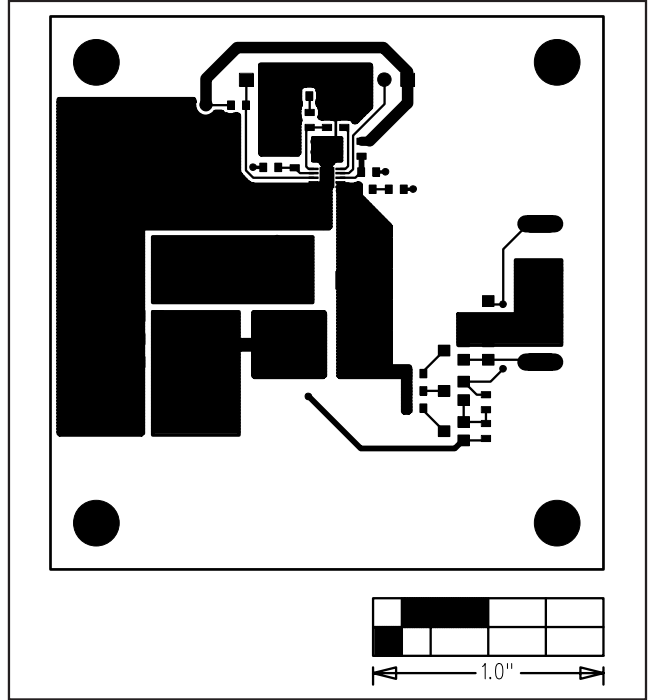


Figure 3. MAX17062 EV Kit PCB Layout—Component Side

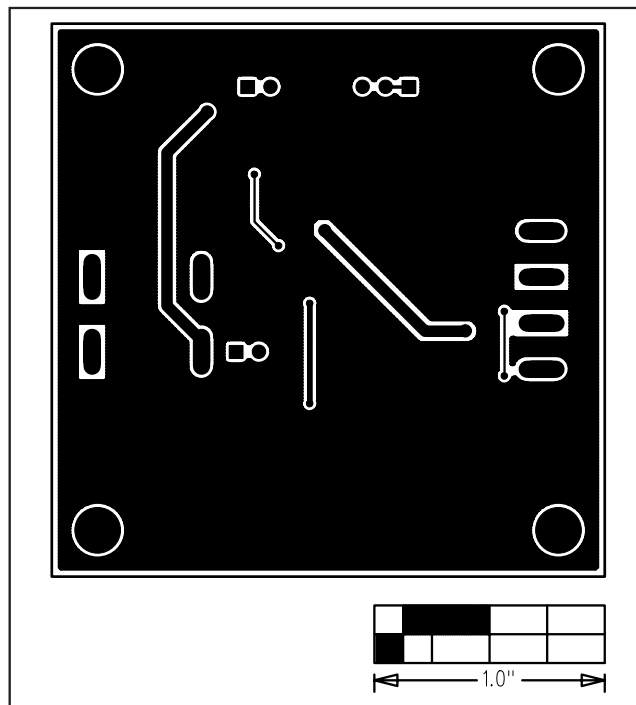


Figure 4. MAX17062 EV Kit PCB Layout—Solder Side

MAX17062 Evaluation Kit

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

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.

Maxim Integrated Products, 120 San Gabriel Drive, Sunnyvale, CA 94086 408-737-7600 _____ **7**

© 2008 Maxim Integrated Products

MAXIM is a registered trademark of Maxim Integrated Products, Inc.