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MAX8621Z Evaluation Kit

General Description

The MAX8621Z evaluation kit (EV kit) is a fully assembled and tested circuit board that evaluates the MAX8621Z dual step-down, DC-DC power-management IC for portable devices. The MAX8621Z EV kit BUCK1 and BUCK2 4MHz hysteretic step-down DC-DC converters are preset to 1.375V and 1.8V output voltages, respectively, and each can supply 500mA output current. The OUT1 and OUT2 LDOs each supply 2.6V (default EV kit setting) at 300mA. The OUT3 and OUT4 LDOs each supply 1.8V and 3V (default EV kit setting), respectively, at 150mA. Proper power sequencing is built in to the MAX8621Y/MAX8621Z. The four LDO output voltages are pin selectable by SEL1 and SEL2 for flexibility. OUT2, OUT3, and OUT4 have individual logic-controlled shutdown. A microprocessor reset output ($\overline{RESET}$) monitors V_{OUT1} and warns the system of impending power loss, allowing safe shutdown. $\overline{RESET}$ asserts during power-up, power-down, shutdown, and fault conditions when V_{OUT1} is below its regulation voltage. An additional 200mA driver output is provided to control LED backlighting or provide an open-drain connection for resistors such as in feedback networks. The MAX8621Z EV kit operates from a 2.6V to 5.5V supply voltage. The MAX8621Z EV kit can also evaluate the MAX8621Y. To evaluate the MAX8621Y, order a free sample along with this EV kit.

Features

♦ **Two 500mA Step-Down DC-DC Converters**
  Up to 4MHz Switching Frequency
  Adjustable Output from 0.6V to 3.3V

♦ **Four Low-Noise LDOs with Pin-Programmable Output Voltages**

♦ **One Open-Drain Driver**

♦ **30ms (min) Reset Timer**

♦ **Power-On/Off Control Logic and Sequencing**

♦ **4mm x 4mm x 0.8mm, 24-Pin Thin QFN**

♦ **Fully Assembled and Tested**

Ordering Information

PART	TEMP RANGE	IC PACKAGE
MAX8621ZEVKIT	0°C to +70°C	24 TQFN (4mm x 4mm)

Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	10µF ±10%, 6.3V X5R ceramic capacitor (0805) Murata GRM219R60J106K
C2, C3, C5, C10	4	4.7µF ±10%, 6.3V X5R ceramic capacitors (0603) Murata GRM188R60J475KE19
C4	1	0.01µF ±10%, 10V X5R ceramic capacitor (0402) TDK C1005X5R1A103K
C6, C8	2	150pF ±5%, 50V C0G ceramic capacitors (0402) TDK C1005C0G1H151J

DESIGNATION	QTY	DESCRIPTION
C7, C9, C11, C12	4	2.2µF ±10%, 6.3V X5R ceramic capacitors (0603) Murata GRM188R60J225KE19
JU1, JU2	2	2-pin headers
JU3–JU7	5	3-pin headers
L1, L2	2	2.2µH inductor (1210), 790mA, 0.13Ω Murata LQH32CN2R2M53
R1, R3	2	150kΩ ±1% resistors (0402)
R2	1	115kΩ ±1% resistor (0402)
R4	1	75kΩ ±1% resistor (0402)
U1	1	MAX8621ZETG
—	7	Shunts
—	1	MAX8621Z EV kit PC board

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

MAX8621Z Evaluation Kit

Component Suppliers

SUPPLIER	PART	PHONE	WEBSITE
Murata	Inductors, Capacitors	814-237-1431	www.murata.om
TDK	Capacitors	888-835-6646	www.component.tdk.com
Vishay	Resistors	402-563-6866	www.vishay.com

Note: *Indicate that you are using the MAX8621Z EV Kit when contacting these component suppliers.*

Quick Start

Recommended Equipment

- One variable DC power supply capable of supplying up to 5.5V at 2A
- Four digital multimeters (DMMs)
- Ammeter (optional)
- Various loads (optional)

Procedure

The MAX8621Z EV kit is fully assembled and tested. Follow the steps below to verify board operation:

1) Preset the variable DC power supply to 3.7V. Turn off the power supply. **Do not turn on the power supply until all connections are complete**.

2) Connect the positive lead of the power supply to the IN pad on the EV kit and connect the negative lead of the power supply to the GND pad on the EV kit.

3) To enable the MAX8621Z, verify that jumper PWRON (JU1) has a shunt across it.

4) Verify that jumper $\overline{EN2}$ (JU2) has no shunt connected to it. Verify that jumpers EN3 (JU3), EN4 (JU4), and ENDR (JU5) have shunts connecting pins 2 and 3. Verify that jumpers SEL1 (JU7) and SEL2 (JU6) have all pins open (default configuration has shunts connected to pin 1 but does not shunt other pins).

5) Connect the positive lead of a voltmeter to the BUCK1 pad on the EV kit and connect the negative lead of the voltmeter to the GND pad on the EV kit.

6) Connect the positive lead of a second voltmeter to the BUCK2 pad on the EV kit and connect the negative lead of the voltmeter to the GND pad on the EV kit.

7) Connect the positive lead of a third voltmeter to the OUT1 pad on the EV kit and connect the negative lead of the voltmeter to the GND pad on the EV kit.

8) Connect the positive lead of a fourth voltmeter to the OUT2 pad on the EV kit and connect the negative lead of the voltmeter to the GND pad on the EV kit.

9) Turn on the power supply.

10) Verify that BUCK1 voltage is near 1.375V. Connect a load, if desired, from BUCK1 to GND. See Table 1 for maximum loads.

11) Verify that BUCK2 voltage is near 1.8V. Connect a load, if desired, from BUCK2 to GND. See Table 1 for maximum loads.

12) Verify that OUT1 voltage is near 2.6V. Connect a load, if desired, from OUT1 to GND. See Table 1 for maximum loads.

13) Verify that OUT2 voltage is near 2.6V. Connect a load, if desired, from OUT2 to GND. See Table 1 for maximum loads.

14) To verify OUT3 and OUT4, move the shunt on the respective jumpers to pins 1 and 2 and use a voltmeter to verify output voltage of 1.8V and 3.0V, respectively.

15) Connect loads from outputs OUT3 and OUT4 to GND if desired. See Table 1 for maximum load currents.

Detailed Description

The MAX8621Z EV kit provides two step-down DC-DC converters with 500mA output current capability and four LDO outputs of 2.6V at OUT1, 2.6V at OUT2, 1.8V at OUT3, and 3V at OUT4. A 60ms (typ) reset and a 1.3Ω, 200mA driver are also available. Table 1 lists output voltages and maximum currents. The EV kit incorporates jumpers JU2, JU3, and JU4 to enable or disable OUT2, OUT3, and OUT4, respectively. Tables 2 and 3 detail the jumper functions. The LDO output voltages—OUT1, OUT2, OUT3, and OUT4—are programmable by the logic states of SEL1 and SEL2.

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Table 1. Default EV Kit Output Voltages and Maximum Currents

OUTPUT	VOLTAGE (V)	MAXIMUM CURRENT (mA)
BUCK1	1.375	500
BUCK2	1.8	500
OUT1	2.6	300
OUT2	2.6	300
OUT3	1.8	150
OUT4	3.0	150

Table 2. JU1 and JU2 Jumper Function

LABEL (JUMPER)	OUTPUT	SHUNT CONNECTED	SHUNT NOT CONNECTED
PWRON (JU1)	Power-On of MAX8621Z	MAX8621Z On*	MAX8621Z Off
$\overline{EN2}$ (JU2)	OUT2	OFF	ON*

*Default Position

Table 3. JU3, JU4, and JU5 Jumper Functions

LABEL (JUMPER)	OUTPUT	PINS 1 AND 2	PINS 2 AND 3
EN3 (JU3)	OUT3	ON	OFF*
EN4 (JU4)	OUT4	ON	OFF*
ENDR (JU5)	DR	DR Low	DR High Impedance*

*Default Position

Table 4. SEL1 (JU7) and SEL2 (JU6) Output Voltage Selection (MAX8621Z)

SEL1 (JU7)	SEL2 (JU6)	OUT1 (V)	OUT2 (V)	OUT3 (V)	OUT4 (V)
IN	IN	2.8	2.6	3.0	3.0
IN	OPEN	2.6	2.6	3.0	3.0
IN	GND	2.6	2.6	2.9	2.9
OPEN	IN	2.6	2.6	3.0	3.3
OPEN*	OPEN*	2.6	2.6	1.8	3.0
OPEN	GND	2.6	2.6	2.8	3.0
GND	IN	2.9	3.1	1.8	1.5
GND	OPEN	3.0	2.9	2.9	2.9
GND	GND	3.0	2.5	2.9	2.9

*Default Position

Note: Where IN is pins 1 and 2 shunted together, GND is pins 2 and 3 shunted together, and open is with no shunt on the respective jumper.

Programming LDO Output Voltages

As shown in Table 4, the LDO output voltages—OUT1, OUT2, OUT3, and OUT4—are pin programmable by the logic states of SEL1 and SEL2. SEL1 and SEL2 are tri-level inputs: IN, open, and GND. The input voltage, V_{IN}, must be greater than the selected OUT1, OUT2, OUT3, and OUT4 voltages. The logic states of SEL1 and SEL2 are to be programmed only during power-up. Once the OUT_ voltages are programmed, their values do not change by changing SEL_ unless the MAX8621Z power is cycled.

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Evaluates: MAX8621Y/MAX8621Z

Table 5. Suggested Component Values for Various Step-Down Output Voltages

OUTPUT VOLTAGE (V)	R1 (kΩ)	R2 (kΩ)	C6 (pF)
0.9	150	300	150
1.1	150	178	150
1.2	150	150	150
1.3	150	130	150
1.4	150	113	150
1.5	150	100	150
1.8	150	75	150

LDO Output Capacitor Selection

The MAX8621Z EV kit has a 4.7µF ceramic capacitor, C5 in Figure 1, between OUT1 and ground, and a second 4.7µF ceramic capacitor, C10 in Figure 1, between OUT2 and ground for 300mA applications. For 150mA applications, capacitor C5 and C10 can be decreased to 2.2µF ceramic capacitors. OUT3 and OUT4 have a 2.2µF ceramic capacitor connected between each respective output and ground, C11 and C12 in Figure 1. If an LDO output is not expected to exceed 50mA, then that respective output capacitor value can be reduced to 1µF.

Evaluating Other Step-Down Output Voltages

Select an output voltage for BUCK1 between 0.6V and 3.3V by connecting FB1 to a resistor-voltage-divider between LX1 and GND. Ensure R2 (Figure 1) provides a reasonable bias current in the resistor-divider. A wide range of resistor values is acceptable, but for ease of EV kit modification, choose R1 to be 150kΩ. Then, R2 (Figure 1) is given by:

$$R2(k\Omega) = \frac{150k\Omega \times 0.6V}{V_{OUT} - 0.6V}$$

Table 5 provides suggested component values, R1, R2, and C6 in Figure 1, for various step-down output voltages.

For BUCK2, R3 and R4 are calculated using the same method.

Reset Output ($\overline{RESET}$)

The reset circuit is active both at power-up and power-down. $\overline{RESET}$ asserts low when V_{OUT1} drops below 87% (typ) of regulation. $\overline{RESET}$ deasserts 60ms after V_{OUT1} rises above 87% (typ) of regulation. $\overline{RESET}$ is pulled up through an internal 14kΩ resistor to OUT1.

DR Driver

The MAX8621Z includes a 1.3Ω, 200mA n-channel MOSFET open-drain output that is controlled by ENDR. This output can be used to drive LEDs or allow adjustable output voltages. Refer to the MAX8621Z data sheet for more details.

Evaluating the MAX8621Y

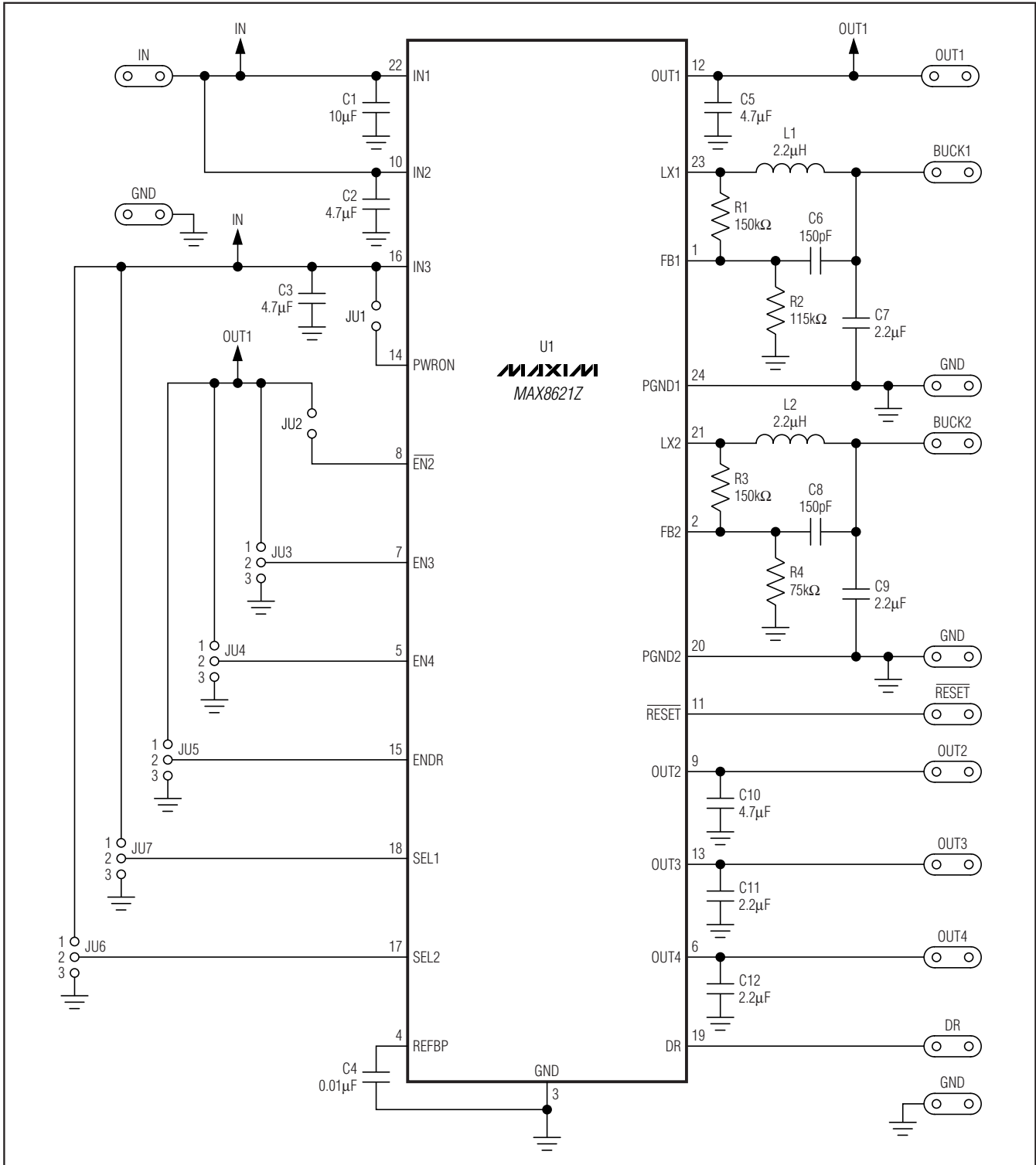For evaluating the MAX8621Y, carefully remove the MAX8621Z and install the MAX8621Y. All other components can remain the same.

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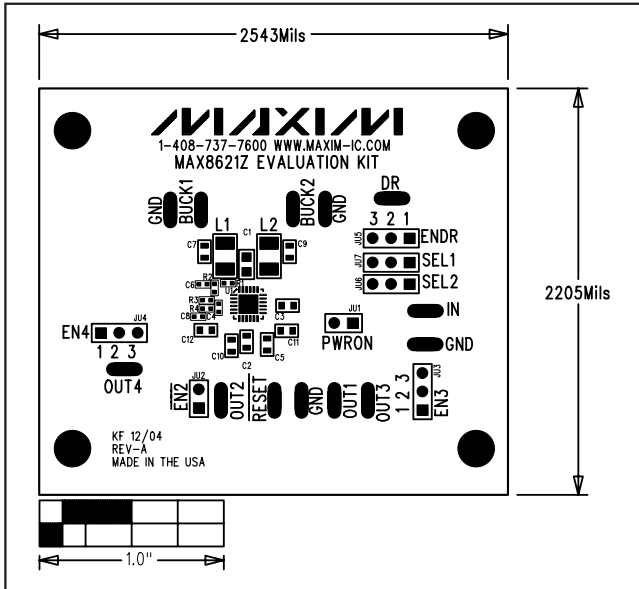*Figure 1. MAX8621Z EV Kit Schematic*

Figure 2. MAX8621Z EV Kit Component Placement Guide—
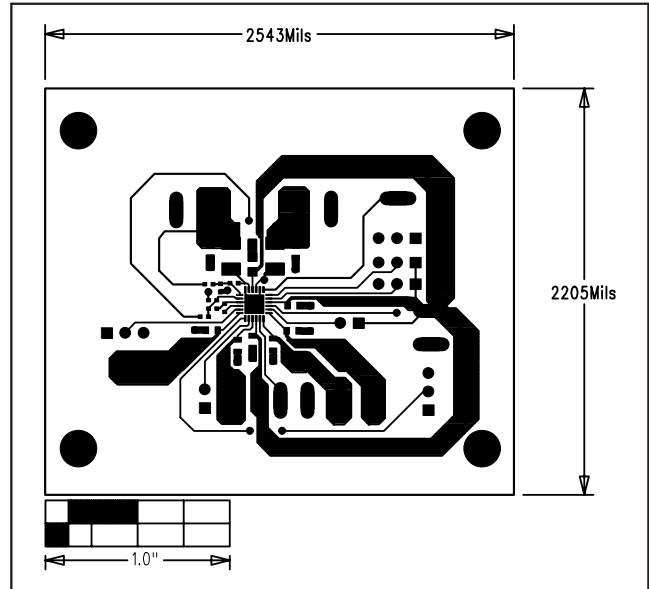Component Side

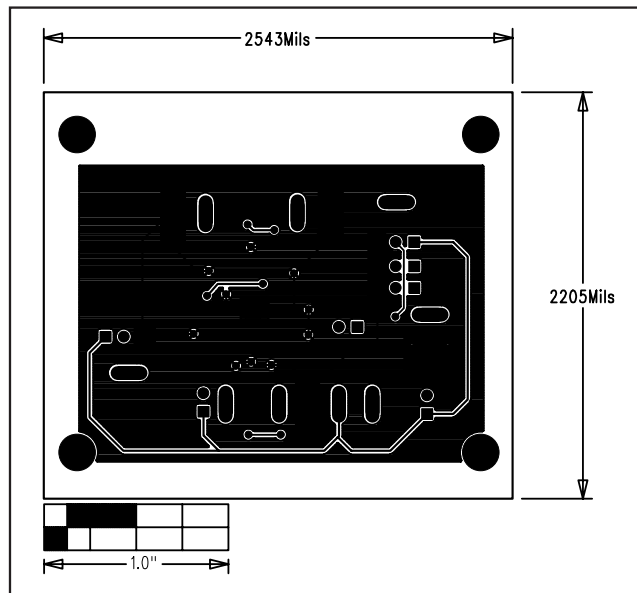Figure 3. MAX8621Z EV Kit PC Board Layout—Component Side

Figure 4. MAX8621Z EV Kit PC Board Layout—Solder Side

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