



# MAX2769 Evaluation Kit

## General Description

The MAX2769 evaluation kit (EV kit) simplifies evaluation of the MAX2769 universal GPS receiver. It enables testing of the device performance and requires no additional support circuitry. Standard 50Ω SMA connectors are included on the EV kit for the inputs and outputs to allow for quick and easy evaluation on the test bench. The evaluation kit is fully assembled and tested at the factory.

This document provides a component list, a list of equipment required to evaluate the device, a straightforward test procedure to verify functionality, a description of the EV kit circuit, the circuit schematic, and artwork for each layer of the printed-circuit board (PCB).

## Features

- ◆ Easy Evaluation of the MAX2769 IC
- ◆ +2.7V to +3.3V Single-Supply Operation
- ◆ 50Ω SMA Connector on the RF Ports and for the Baseband Outputs
- ◆ All Critical Peripheral Components Included
- ◆ Parallel Port for 3-Wire Interfacing
- ◆ PC Control Software Available Upon Request

## Ordering Information

PART	TYPE
MAX2769EVKIT+	EV Kit

+Denotes lead-free and RoHS-compliant.

## Component List

DESIGNATION	QTY	DESCRIPTION
C1–C4, C7, C16–C19, C21, C22, C23, C41–C45, C48, C49, C50, C53, C54, C55	23	0.1μF ±10% capacitors (0402) Murata GRM155R61A104K
C5, C8–C12, C14, C31, C40, C56, C67	11	100pF ±5% capacitors (0402) Murata GRM155C1H101J
C6, C61, C62	3	10μF ±10% tantalum capacitors (B case) AVX TAJB106K016
C15, C25, C27, C29, C30, C57, C58, C65	8	0.01μF ±10% capacitors (0402) Murata GRM155R71C103K
C24	1	27pF ±5% capacitor (0402) Murata GRM155C1H270J
C26, C36	2	6800pF ±10% capacitors (0402) Murata GRM155R71H682K
C28	1	470pF ±10% capacitor (0402) Murata GRM155R71H471K
C32–C35, C37, C38, C39, C58, C66, C68, C69	0	Not installed, capacitors
C46, C47, C51, C52	4	10pF ±5% capacitors (0402) Murata GRM155C1H10R0J
C59, C60, C63, C64, C70	5	1.0μF ±10% capacitors (0402) Murata GRM155R60J105K

DESIGNATION	QTY	DESCRIPTION
J1, J2, J3, J6, J7, J8, J10, J11, J12	9	SMA end-launch jack receptacles, 0.062in Johnson 142-0701-801
J9	1	2 x 5 dual inline header, 100-mil center Sullins PEC36DAAN
JDR1	1	DB25 right-angle male connector AMP 5747238-4
L2, L3	0	Not installed, inductors
R1, R26–R29, R35–R43, R56	0	Not installed, resistors
R2, R10, R17, R21, R22, R23, R31–R34, R44–R55, R57, R59, R60, R66, R67, R68, R71	29	0Ω ±5% resistors (0402)
R4, R24, R25	3	20kΩ ±5% resistors (0402)
R5–R9, R30, R61–R65, R69, R70	13	10kΩ ±1% resistors (0402)
R11, R14, R15	3	47.5Ω ±1% resistors (0402)
R12, R13, R18, R19	4	75Ω ±1% resistors (0402)
R16	1	22.1Ω ±1% resistor (0402)
R20	1	100kΩ ±1% resistor (0402)
T1, T2, T3	0	Not installed
TP1–TP5, TP10, TP11, TP15	8	PC mini-red test points Keystone 5000

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## Component List (continued)

DESIGNATION	QTY	DESCRIPTION
U1, U2	2	MAX8510EXK29+ ultra-low-noise, high PSRR, low-dropout, 120mA linear regulators
U8	1	16.368MHz TCXO Rakon IT3205BE
U10, U11, U28	0	Not installed
U12, U18	2	MAX4444ESE+ ultra-high-speed, low-distortion, differential-to-single-ended line receivers
U14	1	MAX4447ESE+ 6500V/ $\mu$ s wideband, high-output-current, single-ended-to-differential line driver
U21	1	MAX2769ET1+ low-power, single-conversion, low-IF GPS receiver

DESIGNATION	QTY	DESCRIPTION
U23	1	SN74LV07ADR hex buffer/driver with open-drain output Texas Instruments SN74LV07ADR
W1–W12, W18, W19, W20, W28	16	1 x 2 inline headers, 100-mil center Sullins PEC36SAAN
W13–W17, W23	6	1 x 3-inline headers, 100-mil center Sullins PEC36SAAN
Y2	0	Not installed
—	17	Shorting jumpers, gold finish contact (W1–W9, W13–W18, W23, W28) Sullins SSC02SYAN

## Component Suppliers

SUPPLIER	PHONE	FAX	WEBSITE
AVX Corp.	843-448-9411	843-448-7139	www.avx.com
Murata Mfg. Co., Ltd.	770-436-1300	770-436-3030	www.murata.com
Rakon Ltd.	847-490-5377	847-490-5362	www.rakon.com
Texas Instruments	800-336-5236	—	www.ti.com

**Note:** Indicate that you are using the MAX2769 when contacting these component suppliers.

## Quick Start

The MAX2769 EV kit includes two on-board MAX8510 linear regulators for powering up the MAX2769 device to a regulated supply voltage of +2.85V. When using the linear regulators, connect pins 1-2 of jumpers W16 and W17. The MAX2769 can also be powered directly through an external power supply through pin 2 of the jumpers (see the schematic diagram in Figure 1 for details).

## Required Test Equipment

This section lists the recommended test equipment to verify operation of the MAX2769. It is intended as a guide only and some substitutions are possible.

- One RF signal generator capable of delivering at least +5dBm of output power at the operating frequency (e.g., HP E4433B or equivalent)
- An RF spectrum analyzer that covers the MAX2769 operating frequency range (e.g., FSEB20 or equivalent)
- A power supply capable of up to 1A at +2.7V to +6V

- One ammeter for measuring the supply current (optional)
- 50 $\Omega$  SMA cables
- A network analyzer (e.g., HP 8753D or equivalent) to measure small-signal return loss (optional)
- A dual power supply capable of delivering up to 1A at  $\pm$ 5V
- A user-supplied IBM-compatible PC

## Connections and Setup

This section provides a step-by-step guide to operating the EV kit and testing the device functions. **Caution: Do not turn on the DC power or RF signal generators until all connections are completed.**

- 1) Connect the PC to the EV kit using the parallel cable.
- 2) Connect a DC supply set to +3V (through an ammeter if desired) to jumpers W19 and W20 on the EV kit. Do not turn on the supply. When using the on-board linear regulators to power the MAX2769, connect pins 1-2 of jumpers W16 and W17.

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- 3) Connect a DC supply set to +5V to jumper W12 on the EV kit. Connect a DC supply set to -5V to jumper W11 on the EV kit. Do not turn on the supply.
- 4) Make sure that jumpers W1–W8 and W18 are shorted for proper supply connection.
- 5) Leave jumpers W13, W14, W15, and W28 open and connect jumper W23 to ground if the MAX2769 is evaluated using a 3-wire bus.
- 6) Set the signal generator to 1575.42MHz, -110dBm. Do not turn on the generator's output. Connect the RF signal generator to either the LNA1 or LNA2 input.
- 7) Connect the output of the MAX4444 buffer on the EV kit to a spectrum analyzer.
- 8) Turn on the DC supply. The supply current should read approximately **20mA**.
- 9) Run the control software on an IBM-compatible PC. Upon device power-up, the default state should set the MAX2769 device in automatic-gain-control mode (AGCMODE = 00, PGAIEN = 1, and PGAQEN = 0). The default configuration will set the center frequency to 4.092MHz and a bandwidth of 2.5MHz. Using the control software, configure the following:
  - a) In the "Entry" page of the graphical user interface (GUI), set the reference frequency to 16.368MHz.
  - b) Set the R divider to 16.
  - c) Enable the I and Q channels by setting the IQEN = 1.
  - d) Set the "output level" to 1X = analog outputs through the "Entry" page or configuration register 2.
- 10) Activate the RF generator and observe the IF signal at 4.092MHz at an L\_OUT\_ANA SMA connector J3.
- 11) Set the "output level" to 00 = CMOS logic through the "Entry" page and observe the ADC digital output at J9A–J9D header pins.

## **Layout Issues**

A good PCB is an essential part of an RF circuit design. The EV kit PCB can serve as a guide for laying out a board using the MAX2769. Keep traces carrying RF signals as short as possible to minimize radiation and insertion loss. Use impedance control on all RF signal traces. The exposed paddle must be soldered evenly to the board's ground plane for proper operation. Use abundant vias beneath the exposed paddle and between RF traces to minimize undesired RF coupling.

To minimize coupling between different sections of the IC, each VCC pin must have a bypass capacitor with low impedance to the closest ground at the frequency of interest. Do not share ground vias among multiple connections to the PCB ground plane. Refer to the *Layout Issues* section of the MAX2769 IC data sheet for more information.



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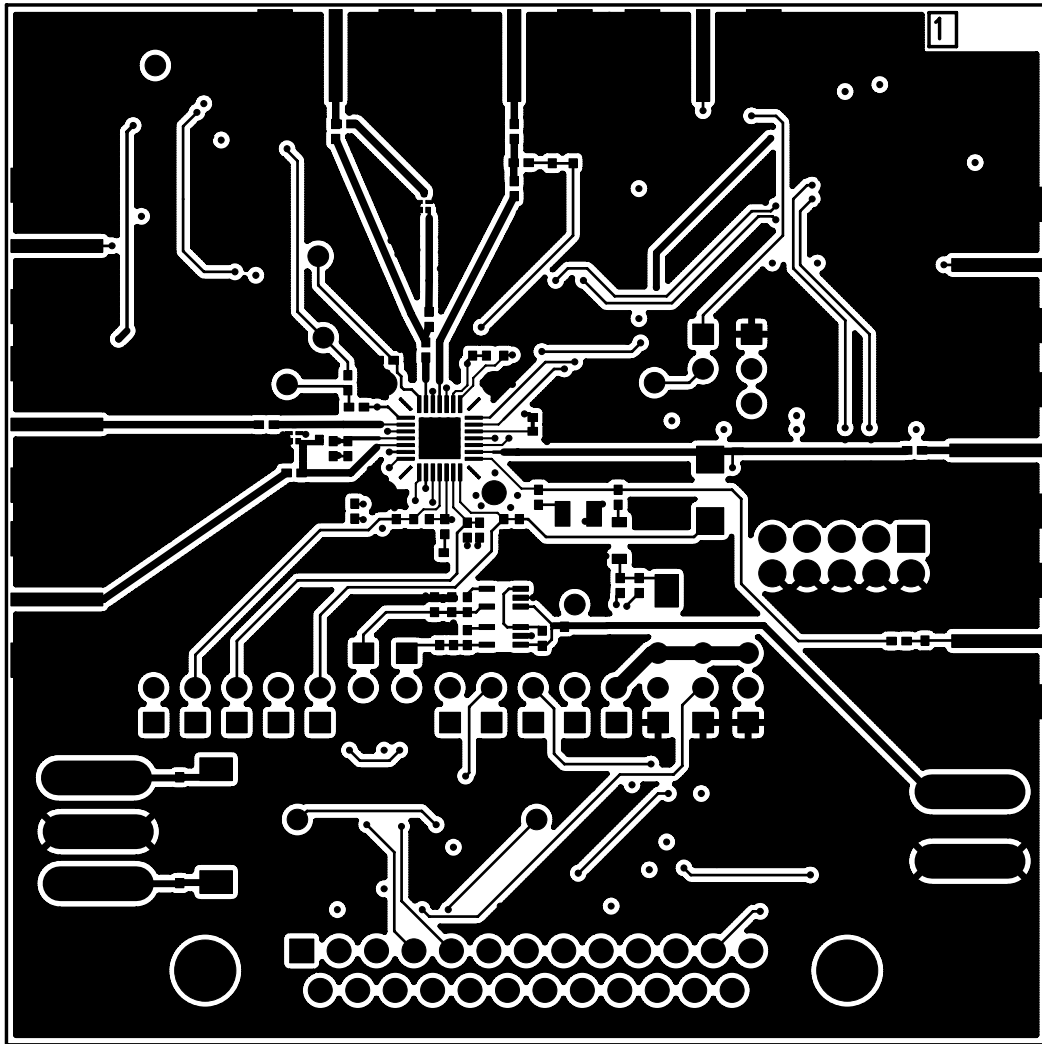


Figure 2. MAX2769 EV Kit PCB Layout—Top Layer Metal

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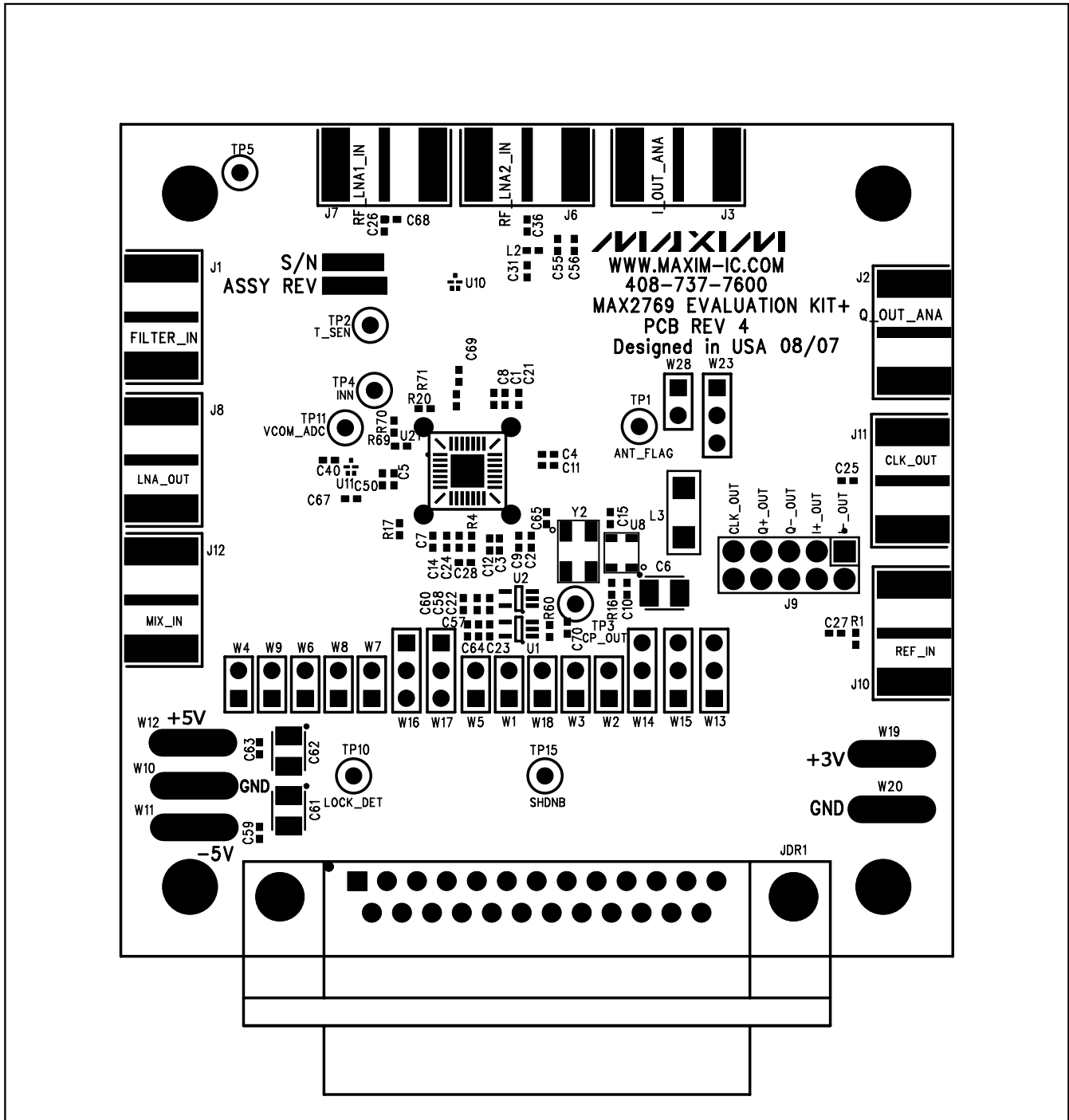


Figure 3. MAX2769 EV Kit PCB Layout—Top Silkscreen

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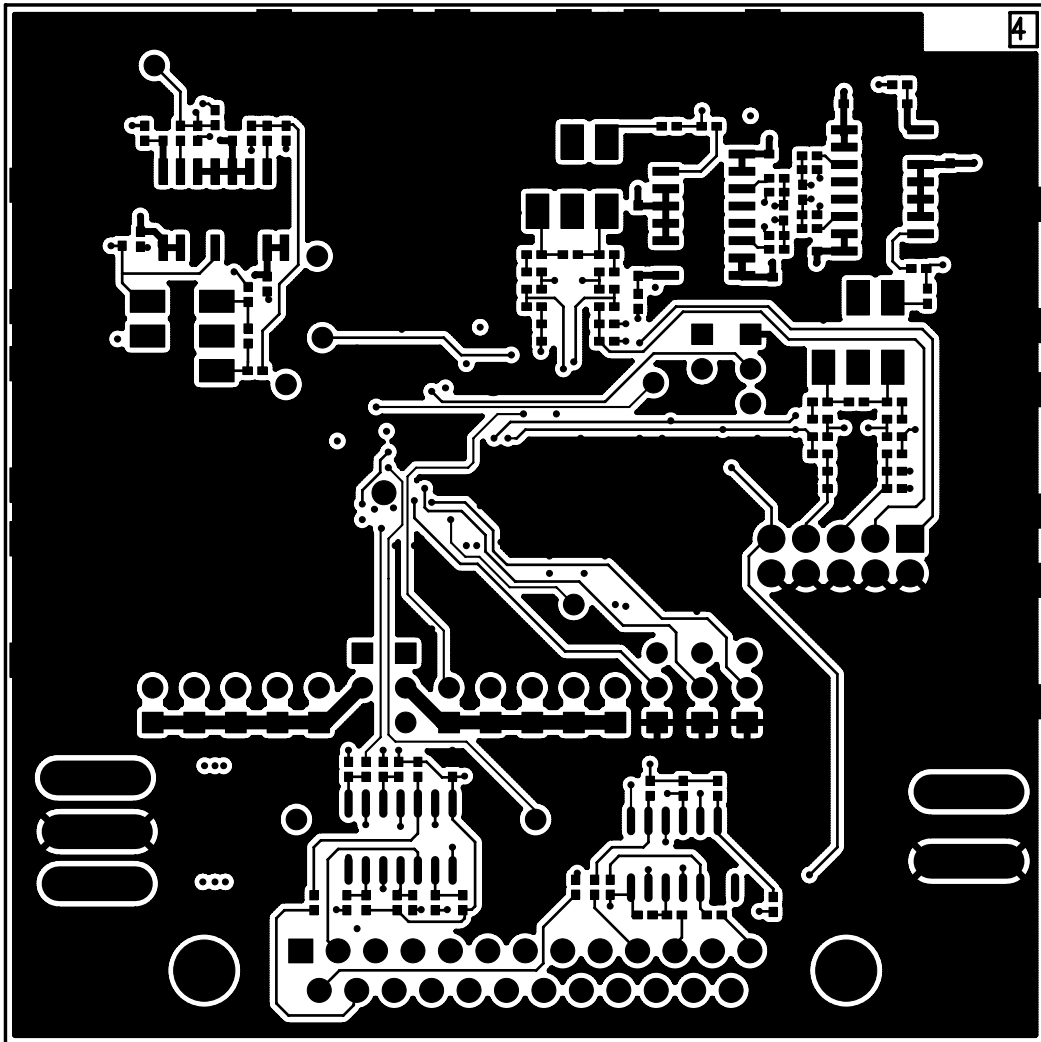


Figure 4. MAX2769 EV Kit PCB Layout—Bottom Layer Metal

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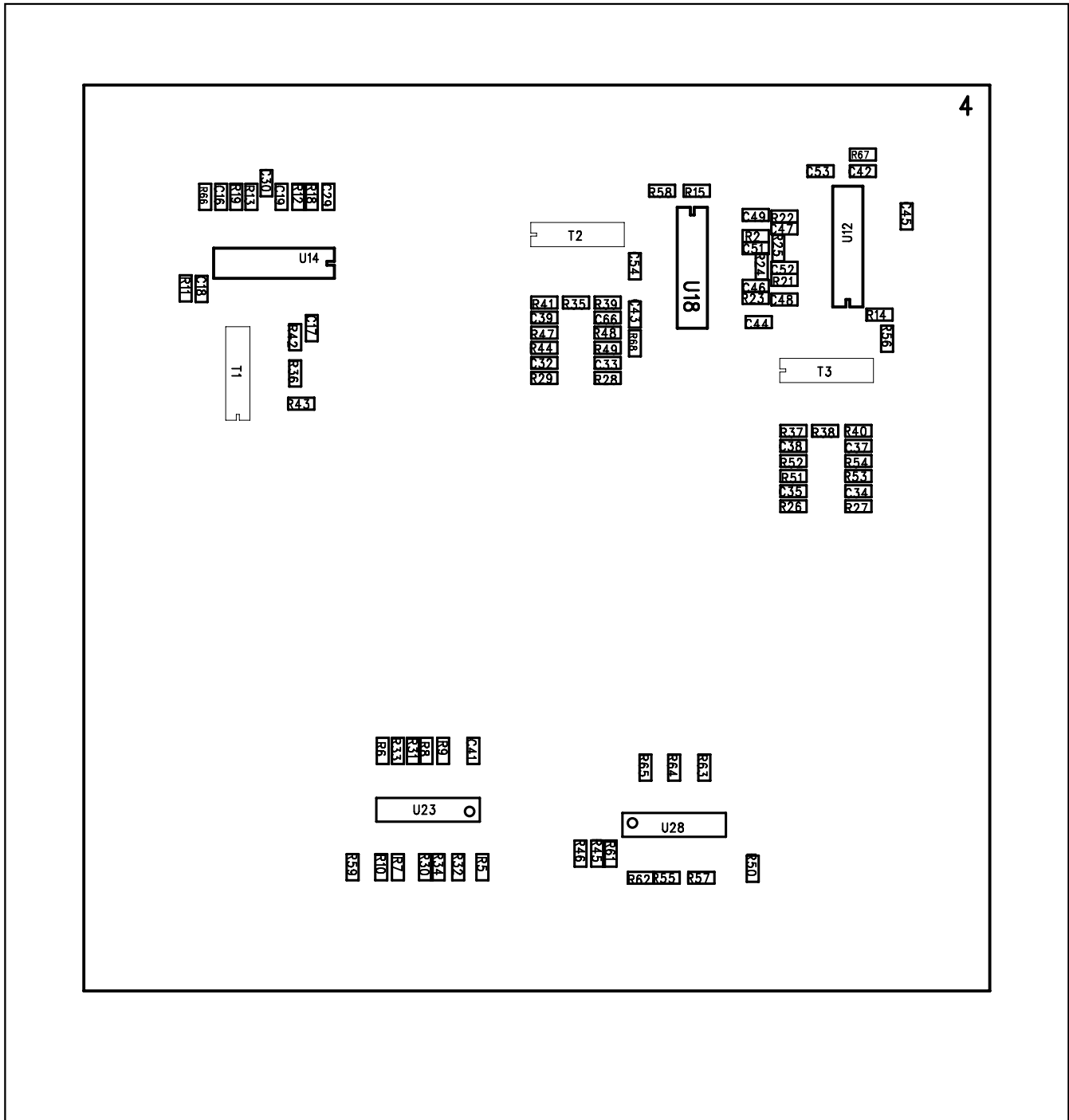


Figure 5. MAX2769 EV Kit PCB Layout—Bottom Silkscreen

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