General Description

The MAX2769C evaluation kit (EV kit) simplifies evaluation of the MAX2769C 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 MAX2769C 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
MAX2769CEVKIT#	EV Kit

#Denotes RoHS-compliant

Quick Start

The MAX2769C EV kit includes two on-board MAX8510 linear regulators for powering up the MAX2769C device to a regulated supply voltage of +2.85V. When using the linear regulators, connect pins 1-2 of jumpers W16 and W17. The MAX2769C can also be powered directly through an external power supply through pin 2 of the jumpers (see Figure 1 for details).

Required Test Equipment

This section lists the recommended test equipment to verify operation of the MAX2769C. 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 MAX2769C 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)
- 50Ω 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 ±5V
- A user-supplied IBM-compatible PC
- Oscilliscope or logic analyzer to measure digital outputs (optional)

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 INTF3000 interface board using the USB cable. On the INTF3000, remove jumper JU1, and connect a DC supply set to +3V to the VPULL connector. Connect the 25-pin connector of the INTF3000 (J4) directly to the 25-pin connector of the EV kit (JDR1).

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 MAX2769C, connect pins 1-2 of jumpers W16 and W17.

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–W9 and W18 are shorted for proper supply connection.

5) Leave jumpers W13, W14, W15, and W28 open and connect jumper W23 to ground (pins 1-2) if the MAX2769C 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 the LNA1 input.

7) Connect LNA_OUT SMA connector (J8) to the MIX_IN SMA connector (J12) on the EV kit.

8) Connect the output of the MAX4444 buffer (connector J3) on the EV kit to a spectrum analyzer.

9) Turn on the DC supply. The supply current should read approximately **20mA**.

10) Visit **HERE** to download the latest version of the EV kit software, *MAX2769C_Setup_1.0.0.exe*. Run the installation file.

11) Run the control software on an IBM-compatible PC. Load the default state by clicking Settings, then defaults, also set the $\overline{\text{SHDN}}$ and $\overline{\text{IDEL}}$ pins to 1, under "Entry" page, Hardware Control section. Upon device power-up, the default state should set the MAX2769C device in automatic-gain-control mode (AGCMODE = 00, PGAIEN = 1, and PGAQEN = 0). The default configuration will set the center frequency to 3.9MHz 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 IQ enable = 1.

   d) Set the "output level" to 1X = analog outputs through the "Entry" page or configuration register 2.

12) Activate the RF generator and observe the IF signal at 4.092MHz at an I_OUT_ANA SMA connector J3.

13) 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 devices. 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 throughputs beneath the exposed paddle and between RF traces to minimize undesired RF coupling.

To minimize coupling between different sections of the IC, each V_{CC} 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 MAX2769C IC data sheet for more information.

Component Suppliers

SUPPLIER	WEBSITE
AVX Corp.	www.avx.com
Murata Mfg. Co., Ltd.	www.murata.com
Rakon Ltd.	www.rakon.com
Texas Instruments	www.ti.com

Note: *Indicate that you are using the MAX2769C when contacting these component suppliers.*

MAX2769C Evaluation Kit Bill of Materials

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 GRM1555C1H101J
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 GRM1555C1H270J
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 GRM1555C1H10R0J
C59, C60, C63, C64, C70	5	1.0µF ±10% capacitors (0402) Murata GRM155R60J105K
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)

MAX2769C Evaluation Kit Bill of Materials (continued)

| DESIGNATION	QTY	DESCRIPTION
T1, T2, T3	0	Not installed
TP1–TP5, TP10, TP11, TP15	8	PC mini-red test points Keystone 5000
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/µs wideband, high-output-current, single-ended-to-differential line driver
U21	1	MAX2769CETI+ low-power, single-conversion, low-IF GPS receiver
U23	1	SN74LV07ADR hex buffer/driver with open-drain output Texas Instruments SN74LV 07ADR
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
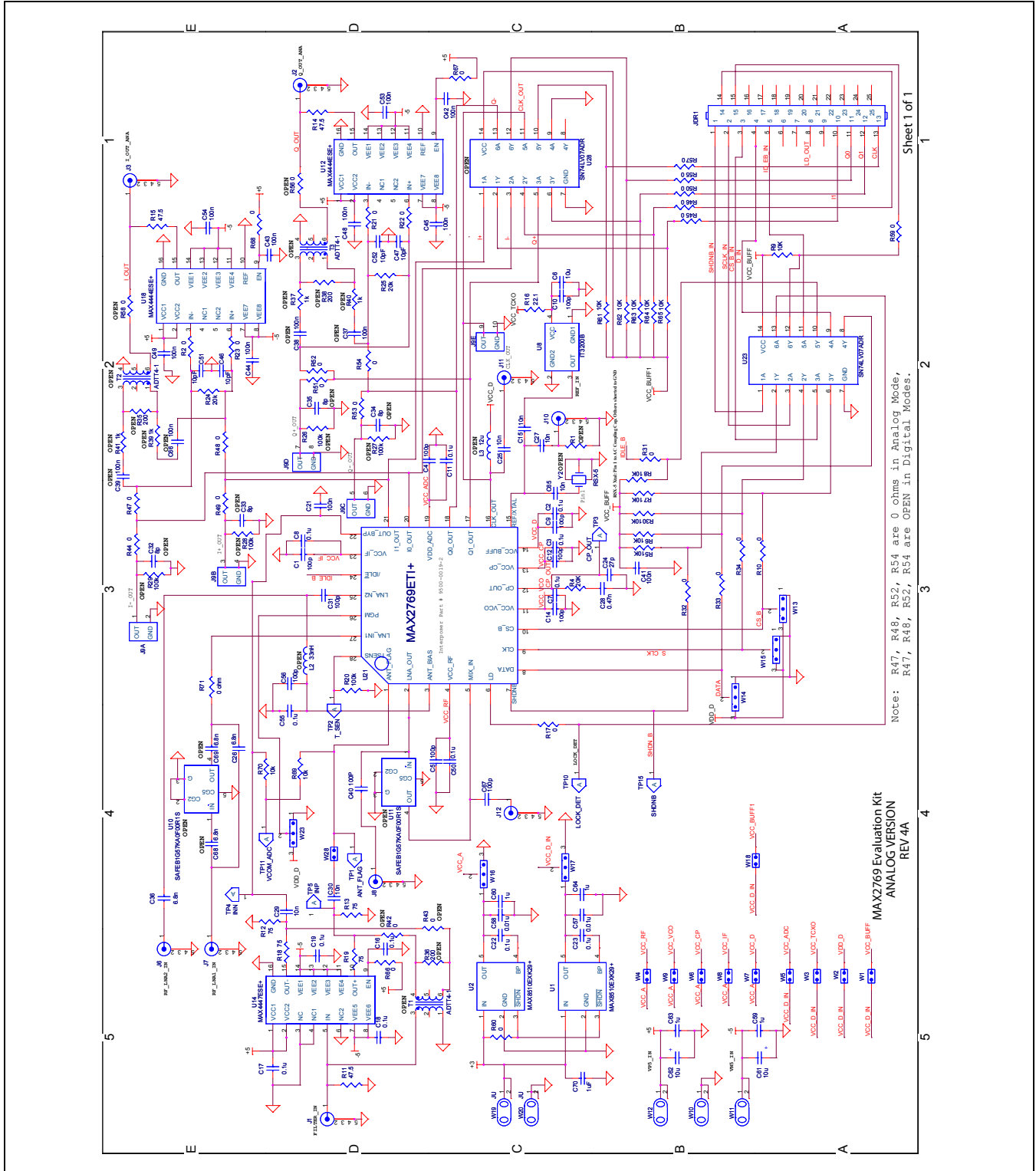
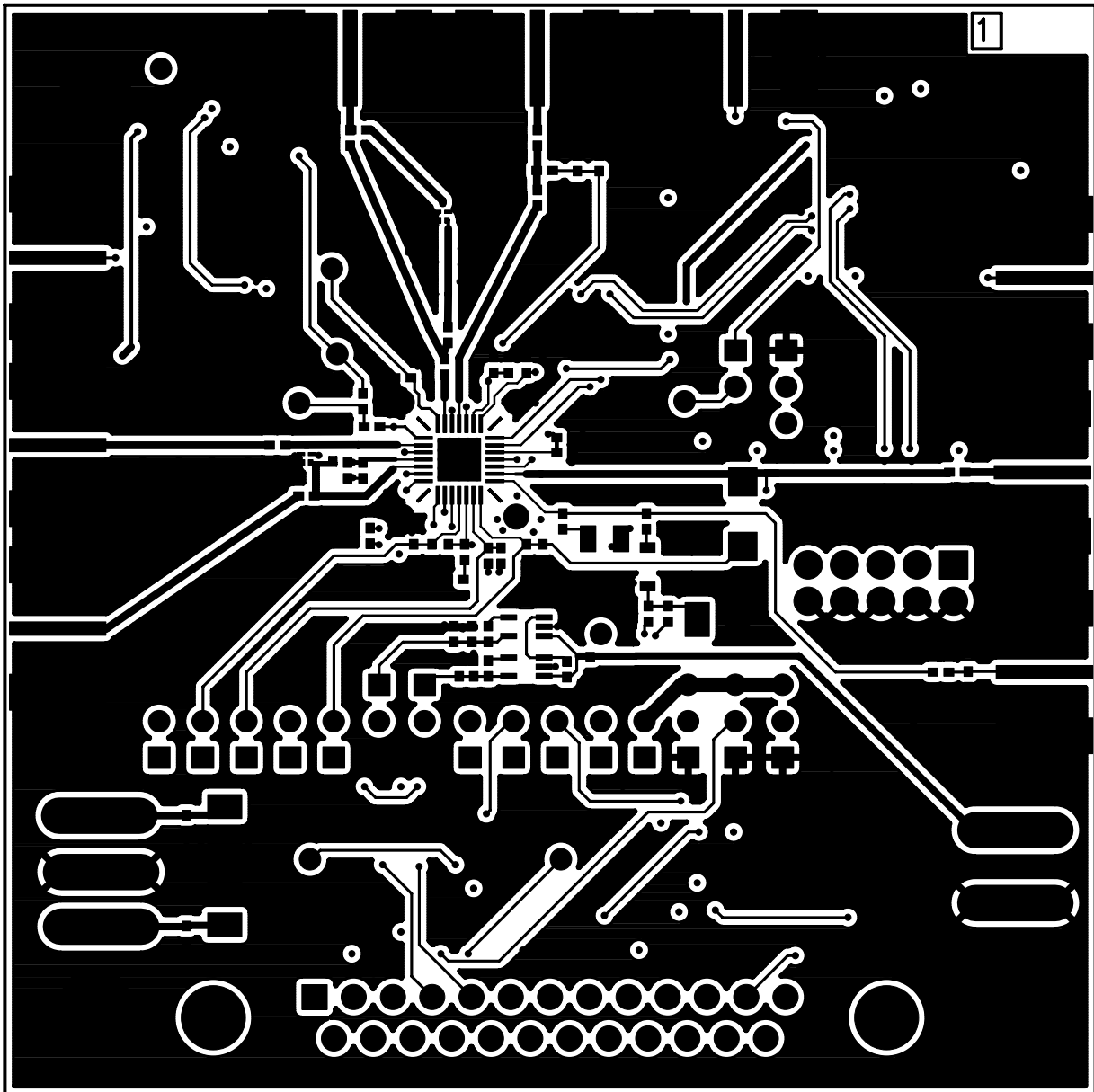Figure 1. MAX2769C EV Kit Schematic

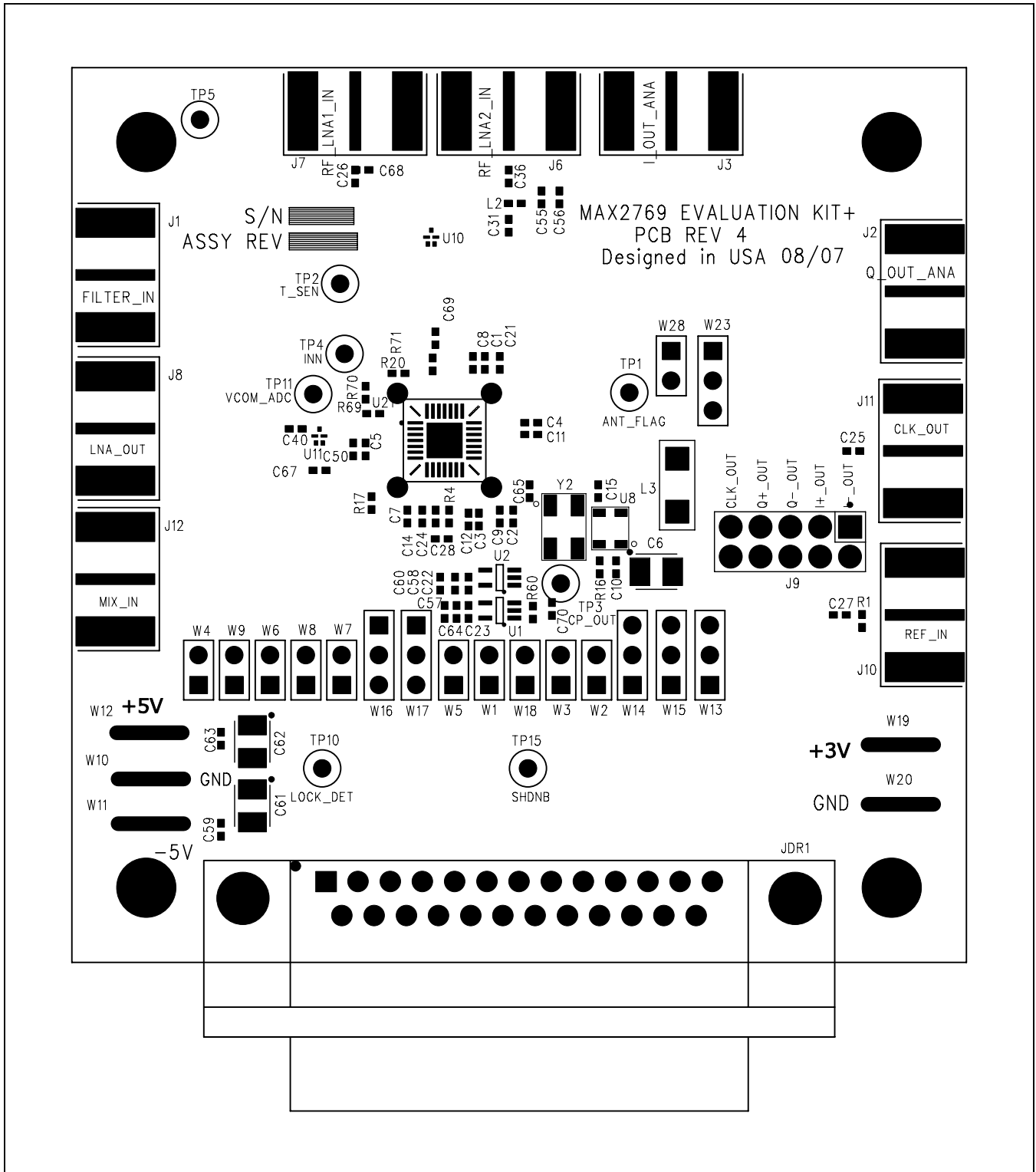Figure 2. MAX2769C EV Kit PCB Layout—Top Layer Metal

Figure 3. MAX2769C EV Kit PCB Layout—Top Silkscreen

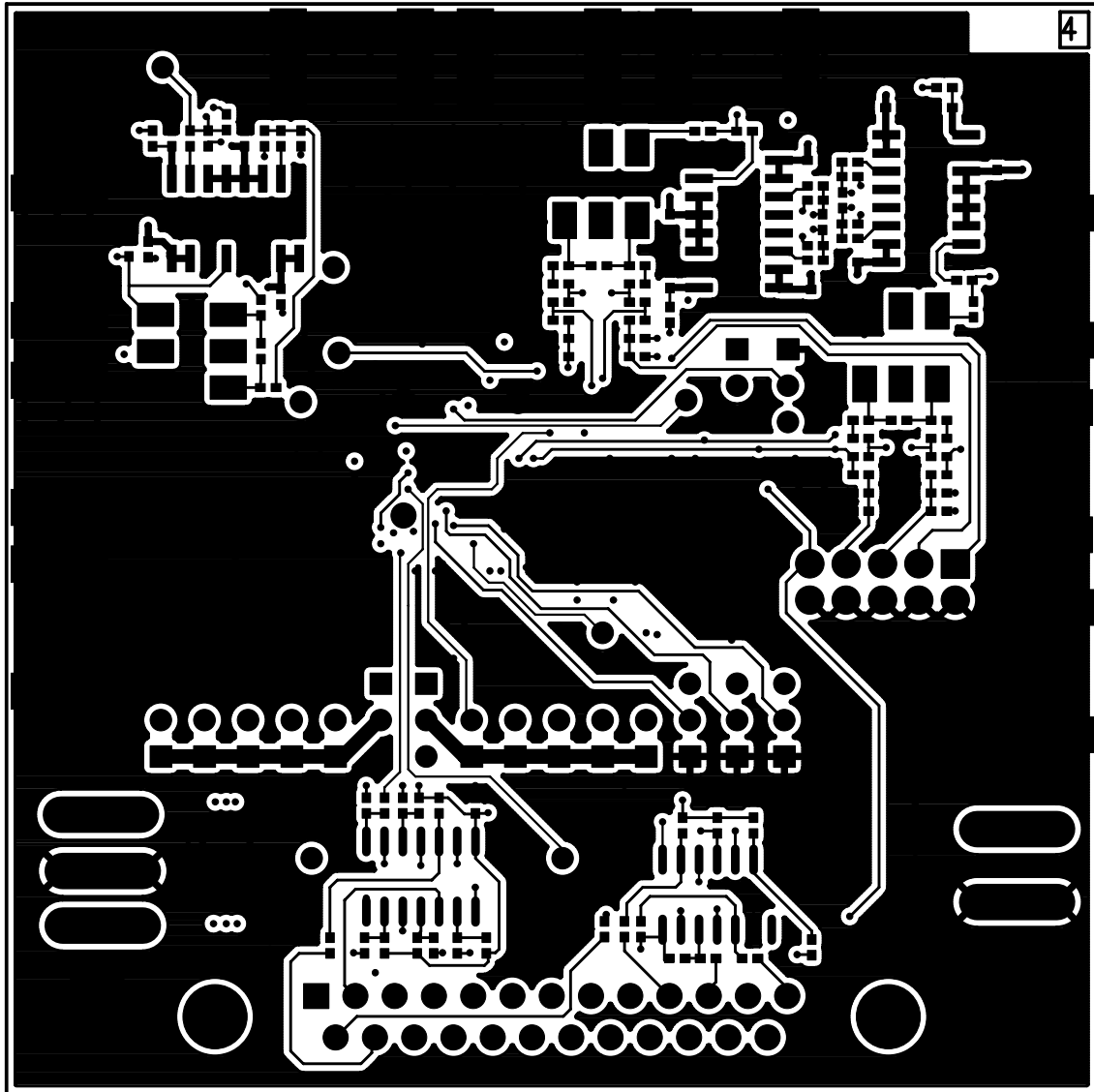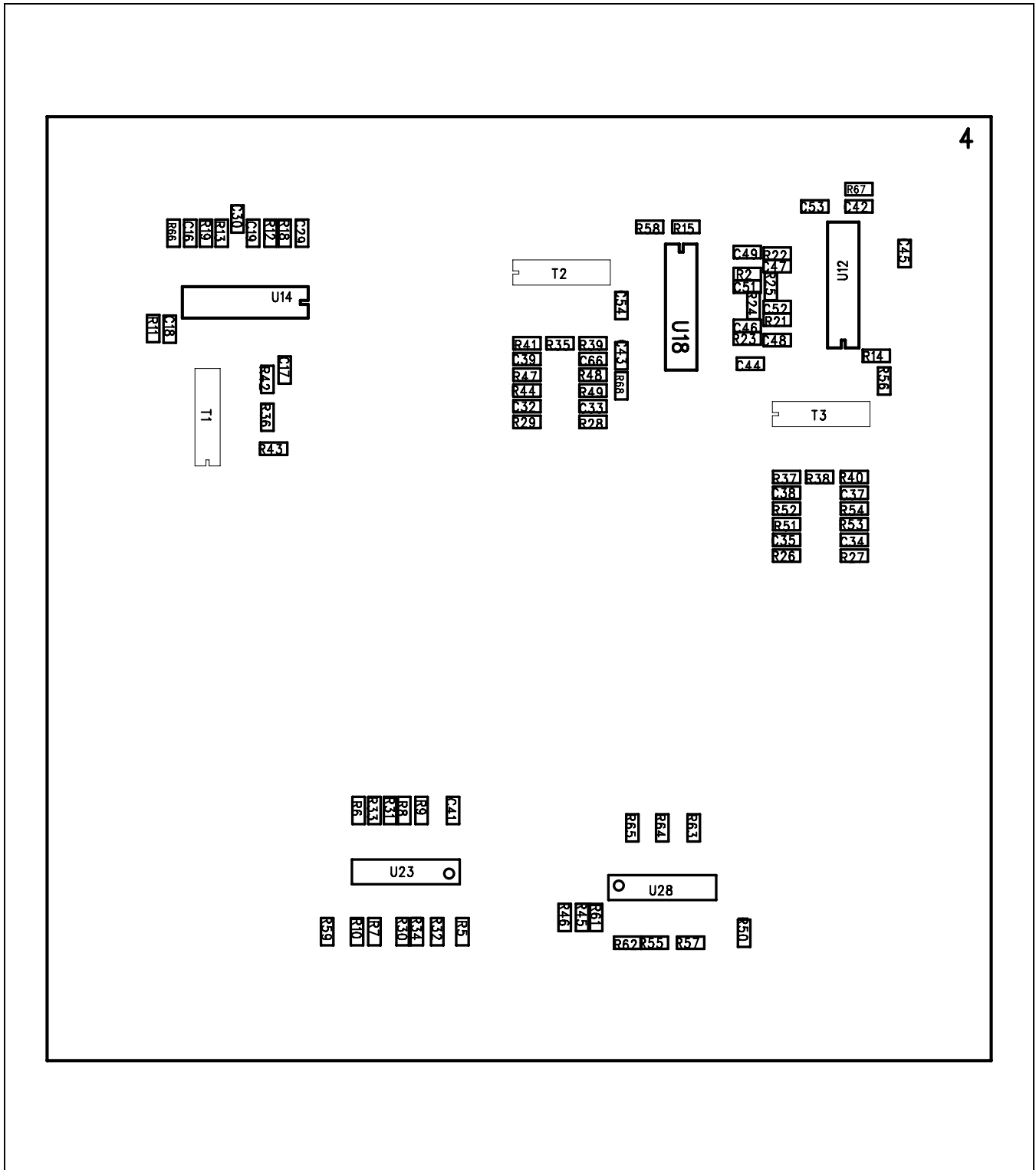*Figure 4. MAX2769C EV Kit PCB Layout—Bottom Layer Metal*

Figure 5. MAX2769C EV Kit PCB Layout—Bottom Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	9/07	Initial release	—
1	7/14	Updated step 1 in the *Connections and Setup* section	2
2	3/16	Added MAX2769B	1–9
3	8/16	Added MAX2769C part number and updated Center Frequency to 3.9MHz	1–9
4	1/17	Removed all parts except MAX2769C	1–9

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