MAX20079 Evaluation Kit

Evaluates: MAX20079

General Description

The MAX20079 evaluation kit (EV kit) provides a proven design to evaluate the MAX20079 2.1MHz/400kHz high-voltage mini-buck converter in a 20-pin Side-Wettable TQFN (SWTQFN) package. All components are rated for the automotive temperature range. Various test points and jumpers are included for evaluation.

MAX20079EVKIT# comes with MAX20079AATP/VY+ installed (5V, 2.1MHz) and can be used to evaluate any MAX20079 variant with minimal component changes.

Benefits and Features

- 3.5V to 36V Input Supply Range
- 5V or 3.3V Fixed Output Voltage, or Adjustable Between 3V and 10V
- Delivers Up to 3.5A Output Current
- Frequency Synchronization Input
- Enable Input
- Voltage-Monitoring PGOOD Output
- Proven PCB Layout
- Fully Assembled and Tested

***Ordering Information* appears at end of data sheet.**

Quick Start

Required Equipment

- MAX20079 EV kit
- Power Supply
- Voltmeter
- Electronic Load

Procedure

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

1) Verify that all jumpers are in their default positions, as shown in Table 1.
2) Connect the positive and negative terminals of the power supply to the SUP and GND test pads, respectively.
3) Connect the positive terminal of the voltmeter to OUT, and the negative terminal to GND2
4) Set the power supply to 14V and 3A current limit. Turn on the power supply.
5) The voltmeter should display an output voltage of 5V.
6) Connect an electronic load to OUT and GND2 terminals and set it to 1A.
7) Turn ON the electronic load and increase the current to 3.5A. The voltmeter should display the output voltage of 5V ±2%.

Table 1. Default Jumper Settings

JUMPER	SHUNT POSITION	FUNCTION
EN	Middle-ON	Buck controller enabled
SPS	Middle-OFF	Spread spectrum disabled
J1	Installed	PGOOD is pulled up by VBIAS when OUT is in regulation
FSYNC	Middle-FPWM	Forced-PWM mode

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Detailed Description

The MAX20079 EV kit provides a proven layout for all variants of the MAX20079 synchronous buck regulator. The device accepts input voltages as high as 36V and delivers up to 3.5A. The EV kit can handle an input-supply transient up to 40V.

Switching Frequency/ External Synchronization

The devices can operate in two modes: forced-PWM or Skip. Skip mode has better efficiency for light-load conditions. When SYNC is pulled low, the device operates in skip mode for light loads and in PWM mode for larger loads. When SYNC is pulled high, the device is forced to operate in PWM across all load conditions.

SYNC can be used to synchronize with other supplies if a clock source is present. The device is forced to operate in PWM when SYNC is connected to a clock source.

Buck Output Monitoring (PGOOD)

The EV kits provide a power-good output test point (PGOOD) to monitor the status of the buck output (OUT). PGOOD is low impedance when the output voltage is in regulation. PGOOD is high impedance when the output voltage drops below 8% (typ) of its nominal regulated voltage.

To obtain a logic signal, pull up PGOOD to V_{BIAS} by installing shunts on jumper PU.

Evaluating Other Variants

The EV kit comes installed with the fixed-output, 5V/2.1MHz variant (MAX20079AATP/VY+). The 3.3V/2.1MHz and 400kHz variants (MAX20079BATP/VY+, MAX20079DATP/VY+, and MAX20079EATP/VY+) can be installed with minimal component changes. For the 3.3V/2.1MHz variant, install the MAX20079AATP/VY+ on the EV kit (U1), while keeping all other components the same. For 400kHz parts, a 10µH inductor and an effective output capacitance of 44µF is recommended after derating is accounted for.

Setting the Output Voltage in Buck Converters

To externally adjust the output voltage, remove R6 and install a 0Ω resistor on R3. Place appropriate resistors in positions R4 and R5 according to the following equation:

$$R4 = R5\left[\left(\frac{V_{OUT1}}{V_{FB}}\right) - 1\right]$$

where V_{FB} = 1V (typ) and R5 = 50kΩ.

Ordering Information

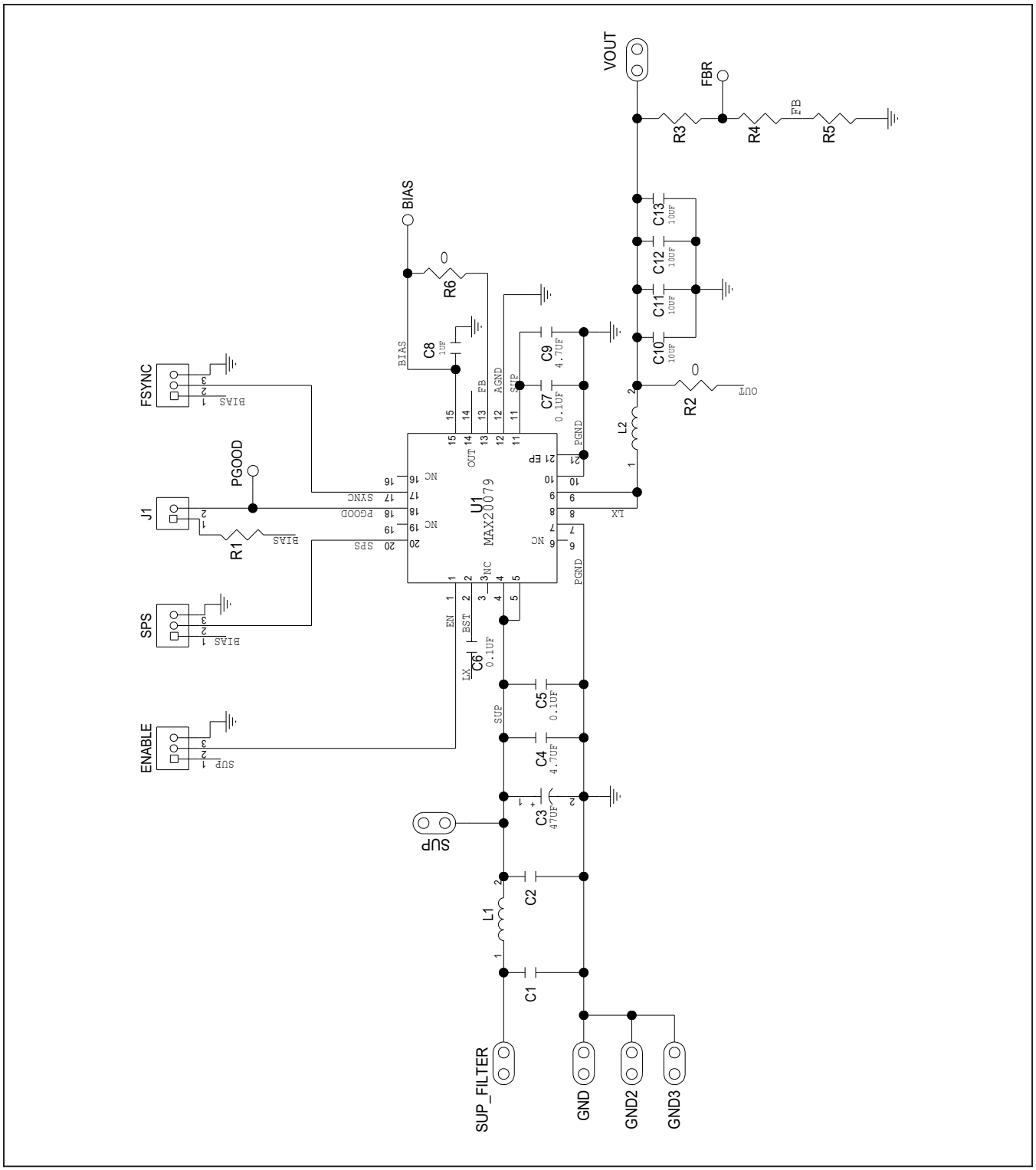
PART	TYPE
MAX20079EVKIT#	5V output, 2.1MHz EV kit

#Denotes RoHS Compliant

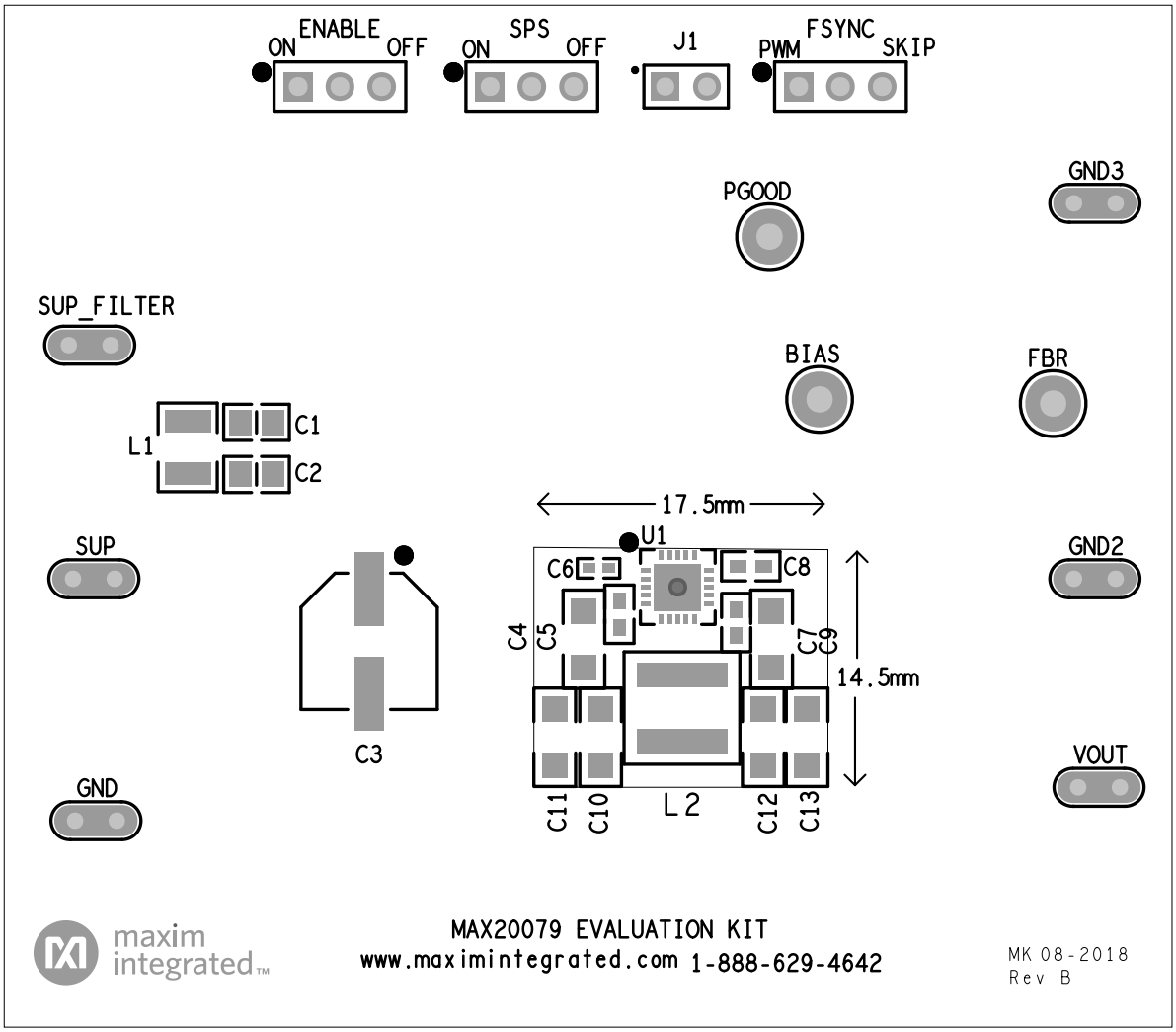
MAX20079 EV Kit Bill of Materials

PART	QTY	DESCRIPTION
C4, C9	2	4.7uF ±10%, 50V X7R ceramic capacitors (1206)
		TDK CGA5L3X7R1H475K160AE
C3	1	47uF, 50V aluminum electrolytic capacitor (8.3mm x 8.3mm)
		Panasonic EEE-FK1H470P
C10, C11, C12, C13	4	10uF ±10%, 25V X7R ceramic capacitor (1206)
		TDK CGA5L1X7R1E106M160AC
C8	1	1uF ±10%, 35V X7R ceramic capacitor (0603)
		TDK CGA3E1X7R1V105K080AC
C6	1	0.1uF ±10% 50V X7R ceramic capacitor (0402)
		TDK CGA2B3X7R1H104K
C5, C7	2	0.1uF ±10% 50V X7R ceramic capacitor (0603)
		TDK CGA3E2X7R1H104M080AE
C1, C2	2	1uF ±10% 50V X7R ceramic capacitor (0805)
		TDK CGA4J3X7R1H105M125AB
L2	1	2.2uH Power Inductor
		Coilcraft XAL6030-222
L1	1	2A Ferrite Bead (1210)
		Taiyo Yuden FBMH3225HM102NT
R2, R6	2	0Ω resistor (0402)
		Panasonic Electronic Components P0.0JCT-ND
R1	1	10kΩ ±5% resistor (0603)
		Panasonic Electronic Components ERA-2AED103X
U1	1	Automotive Mini-Buck (20-pin SW-TQFN)
		Maxim MAX20079AATP/VY+
J1	1	2-pin headers (0.1" spacing)
		Sullins PEC02SAAN
EN, SPS, FSYNC	3	3-pin headers (0.1" spacing)
		Sullins PEC03SAAN
SUP_FILTER, SUP, VOUT, GND, GND2, GND3	6	5020, Keystone
PGOOD, BIAS, FBR	3	5012, Keystone
-	4	Shunt Jumper (0.1" spacing, Black)
-	1	PCB: MAX20079 EVALUATION KIT

MAX20079 EV Kit Schematic

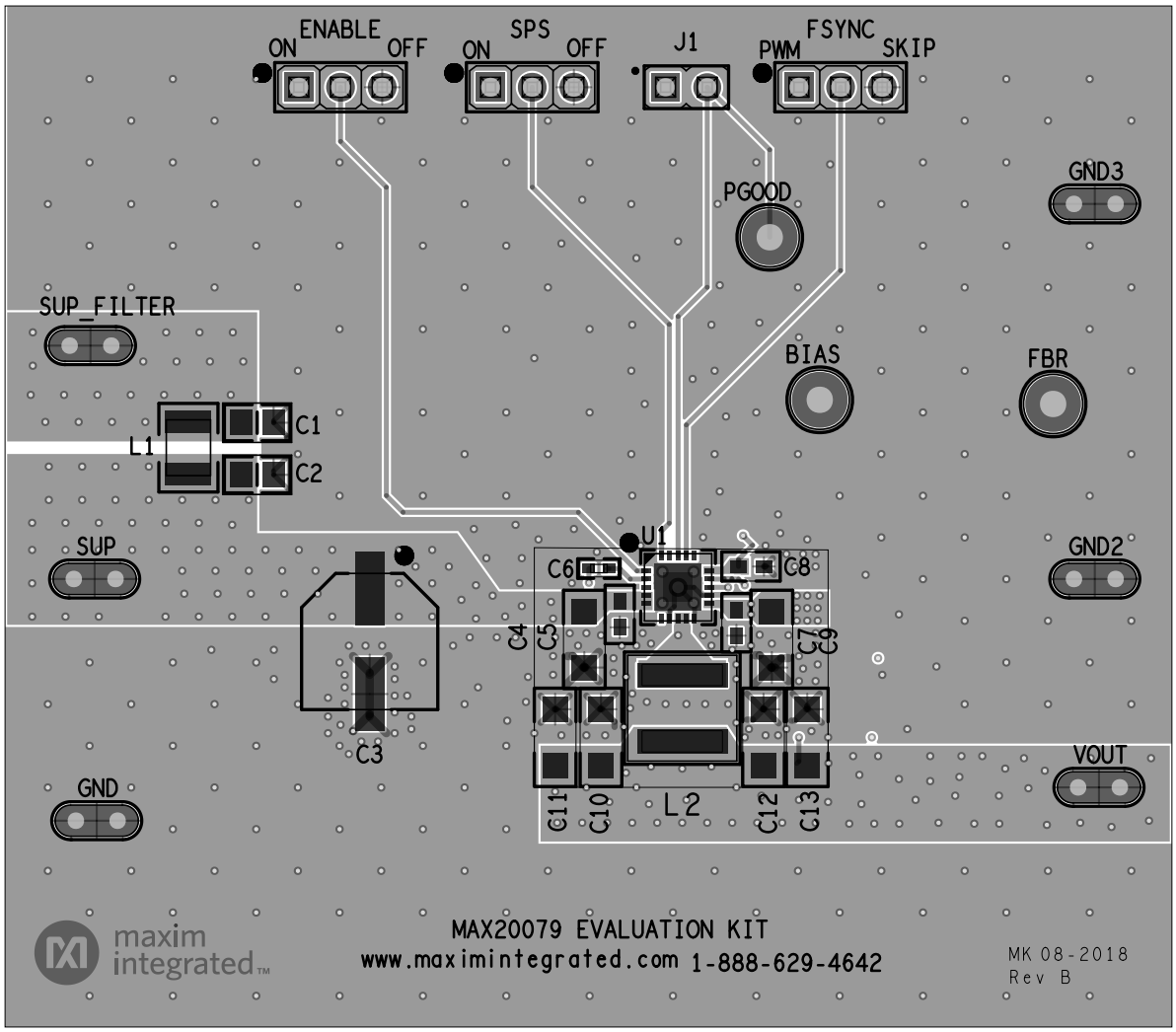


MAX20079 EV Kit PCB Layout Diagrams



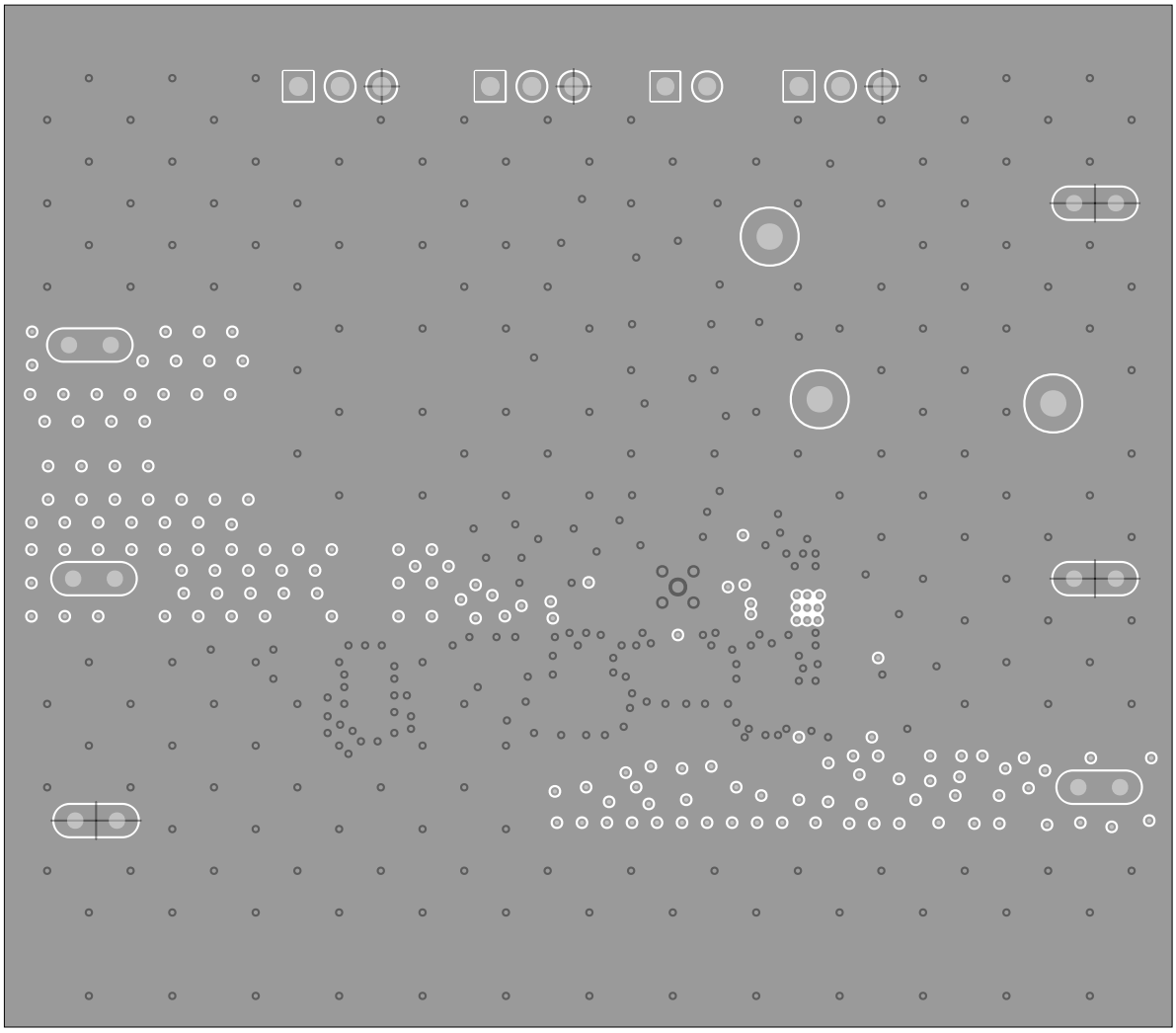
MAX20079 EVKIT Component Placement Guide Top Silk

MAX20079 EV Kit PCB Layout Diagrams (continued)



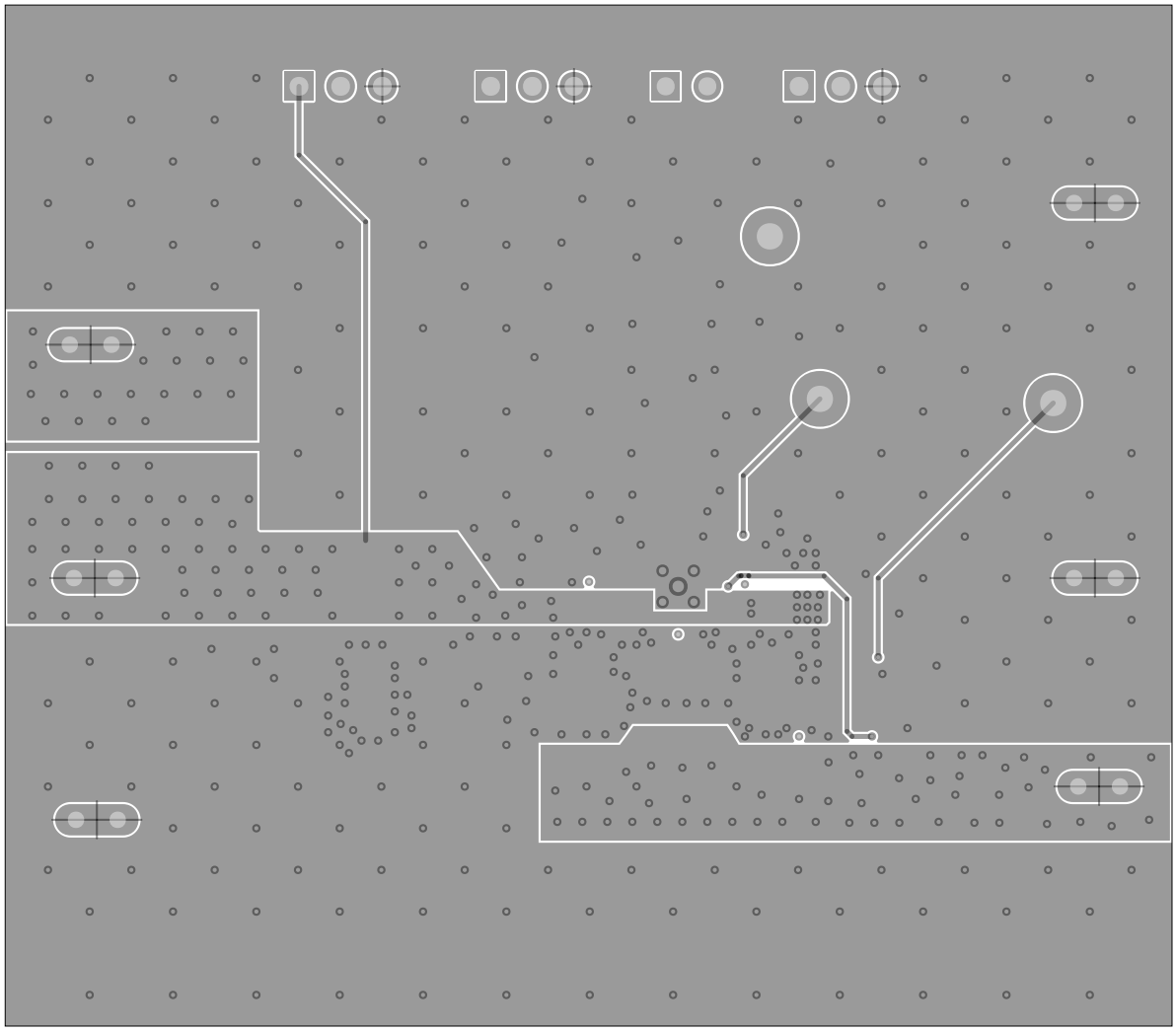
MAX20079 EVKIT Component Placement Guide Top Layer

MAX20079 EV Kit PCB Layout Diagrams (continued)



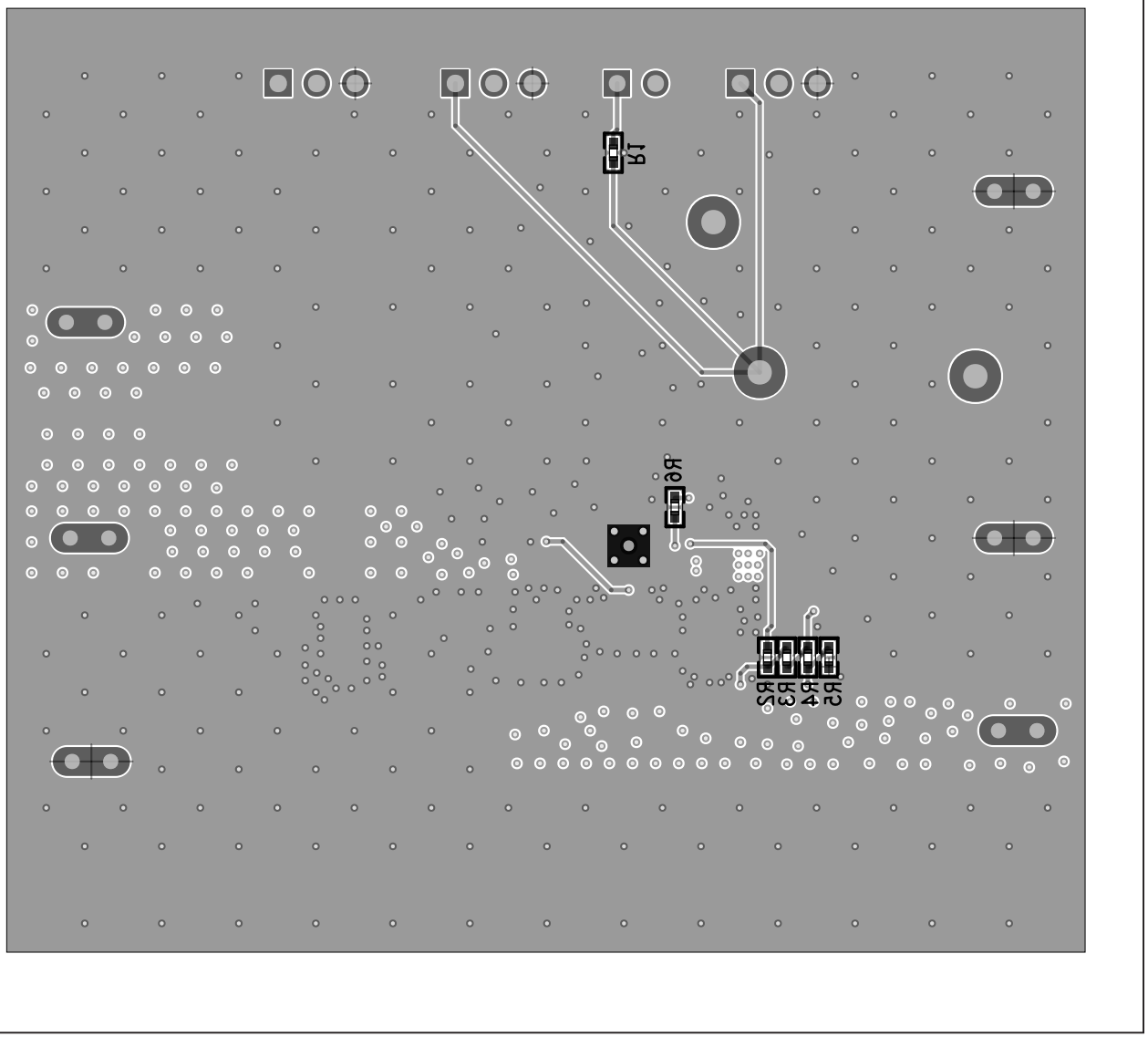
MAX20079 EVKIT Layout Internal 2

MAX20079 EV Kit PCB Layout Diagrams (continued)



MAX20079 EVKIT PCB Layout Internal 3

MAX20079 EV Kit PCB Layout Diagrams (continued)



MAX20079 EVKIT Component Placement Guide Bottom