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Evaluates: MAX25223

MAX25223 Evaluation Kit

General Description

The MAX25223 evaluation kit (EV kit) provides a proven design to evaluate the MAX25223 2.1MHz/400kHz high-voltage mini-buck converter in a 20-pin side-wettable TQFN (SW-TQFN) package. All components are rated for the automotive temperature range. Various test points and jumpers are included for evaluation.

The MAX25223 EV kit comes with the MAX25223ATPA/VY+ installed (5V, 2.1MHz) and can be used to evaluate any MAX25223 variant with minimal component changes.

Features

- 3.5V to 36V Input Supply Range
- 5V or 3.3V Fixed Output Voltage
- Delivers up to 3.5A Output Current
- Frequency Synchronization Input
- Enable Input
- Voltage-Monitoring PGOOD Output with Overvoltage Feature
- Proven PCB Layout
- Fully Assembled and Tested

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

Quick Start

Required Equipment

- MAX25223 EV kit
- Power supply
- Voltmeter
- Electronic load

Procedure

The EV kit is fully assembled and tested. Use the following steps 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 VOUT, 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 VOUT 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-PWM	Forced-PWM mode

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Detailed Description

The MAX25223 EV kit provides a proven layout for all variants of the MAX25223 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 42V.

Switching Frequency/External Synchronization

The device 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 forced-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 forced-PWM when SYNC is connected to a clock source.

Buck Output Monitoring (PGOOD)

The EV kit provides 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 VBIAS by installing shunt on jumper J1.

Evaluating Other Variants

The EV kit comes installed with the fixed-output, 5V/2.1MHz variant (MAX25223ATPA/VY+). The 3.3V/2.1MHz and 400kHz variants can be installed with minimal component changes. For the 3.3V/2.1MHz variant, install the MAX25223ATPB/VY+ on the EV kit (U1) while keeping all other components the same. For 400kHz parts, an 8.2µH inductor and an effective output capacitance of 44µF is recommended after derating is accounted for.

MAX25223 EV Kit Bill of Materials

PART	QTY	DESCRIPTION
C4, C9	2	4.7µF ±10%, 50V, X7R ceramic capacitors (1206) TDK CGA5L3X7R1H475K160AE
C3	1	47µF, 50V aluminum electrolytic capacitor (8.3mm x 8.3mm) Panasonic EEE-FK1H470P
C10, C11, C12, C13	4	10µF ±10%, 16V X7S ceramic capacitor (0805) TDK CGA4J1X7S1C106K125AE
C8	1	1µF ±10%, 35V X7R ceramic capacitor (0603) TDK CGA3E1X7R1V105K080AC
C6	1	0.1µF ±10% 50V X7R ceramic capacitor (0402) TDK CGA2B3X7R1H104K
C5, C7	2	0.1µF ±10% 50V X7R ceramic capacitor (0603) TDK CGA3E2X7R1H104M080AE
C1, C2	2	1µF ±10% 50V X7R ceramic capacitor (0805) TDK CGA4J3X7R1H105M125AB
L1	1	2A ferrite bead (1210) Taiyo Yuden FBMH3225HM102NT
L2	1	2.2µH power inductor Coilcraft XAL6030-222
R1	2	10kΩ ±5% resistor (0603) Panasonic Electronic Components ERA-2AED103X
R2	1	0Ω resistor (0402) Panasonic Electronic Components P0.0JCT-ND
U1	1	Automotive mini-buck (20-pin SW-TQFN) DNP

MAX25223 EV Kit Bill of Materials (continued)

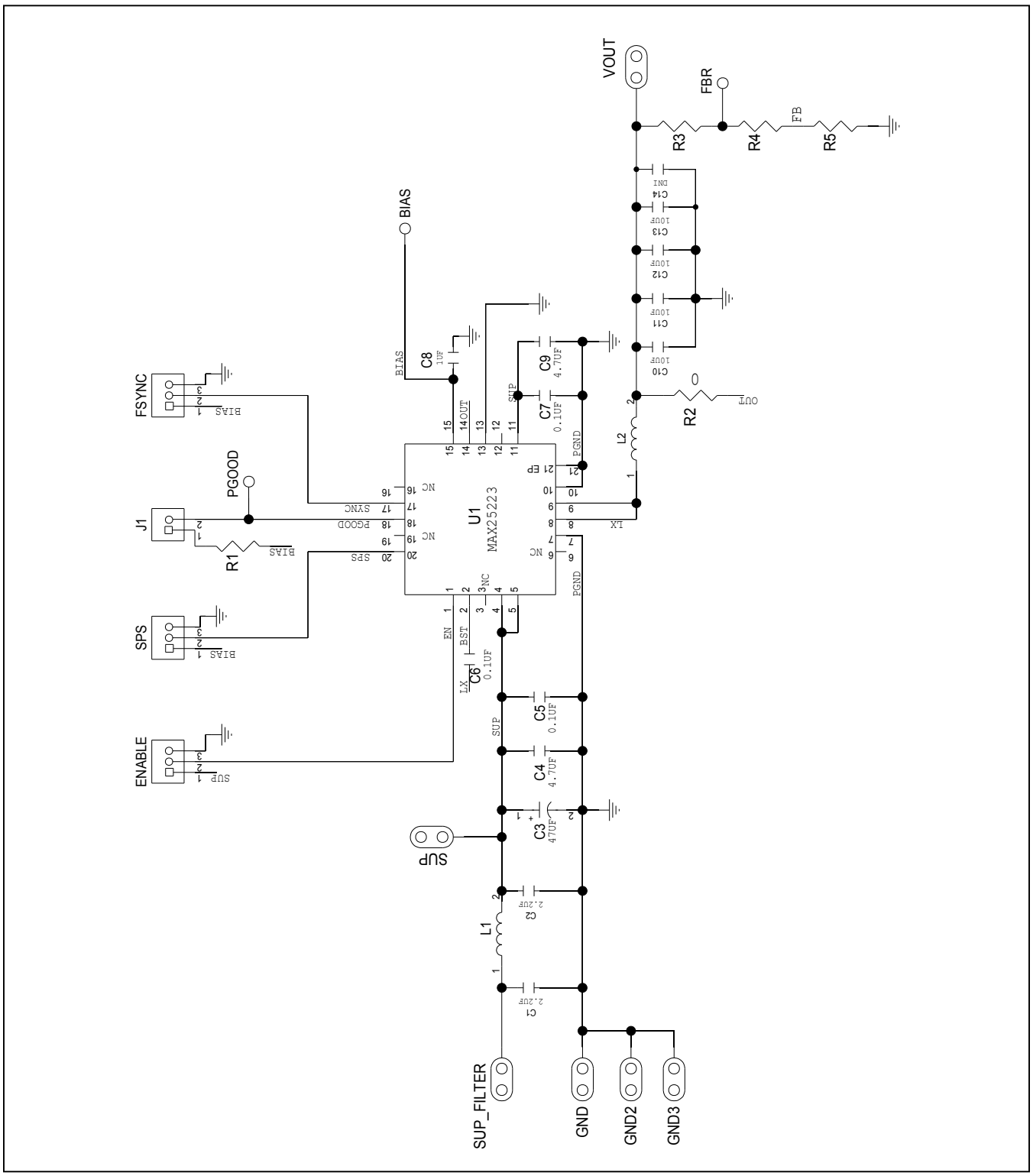
PART	QTY	DESCRIPTION
J1	1	2-pin headers (0.1in spacing) Sullins PEC02SAAN
EN, SPS, FSYNC	3	3-pin headers (0.1in spacing) Sullins PEC03SAAN
SUP_FILTER, SUP, VOUT, GND, GND2, GND3	6	5020, Keystone
PGOOD, BIAS, FBR	3	5012, Keystone
—	4	Shunt jumper (0.1in spacing, black)
—	1	PCB: MAX25223 EV kit

Ordering Information

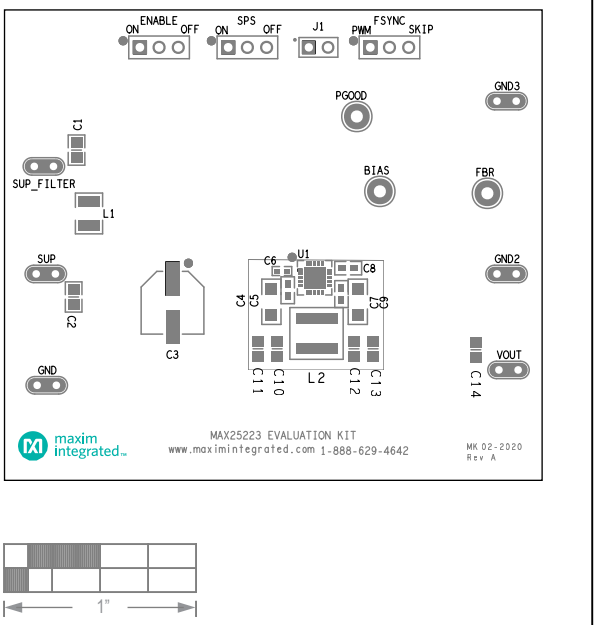
PART	TYPE
MAX25223EVKIT#	5V output, 2.1MHz EV kit

#Denotes RoHS compliance.

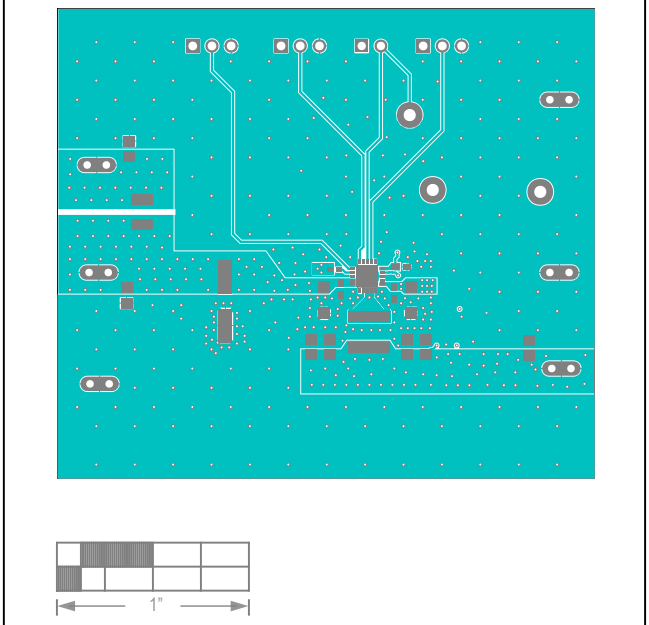
MAX25223 EV Kit Schematic



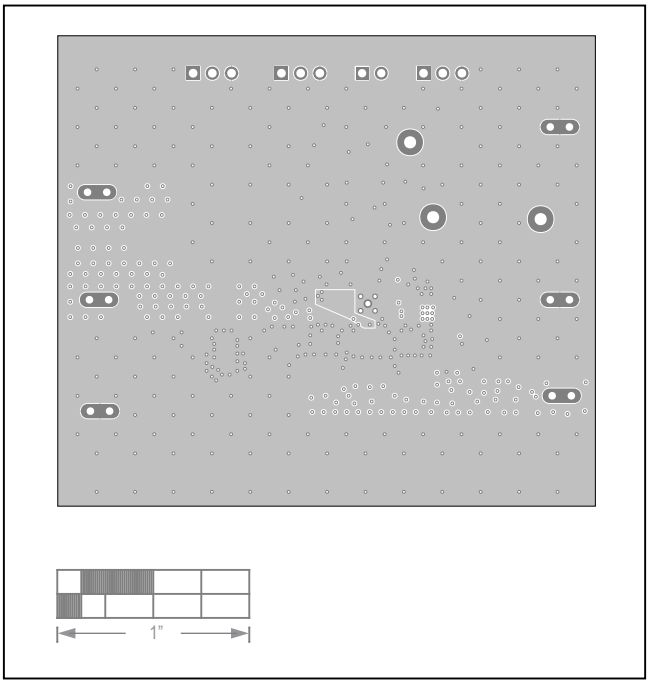
MAX25223 EV Kit PCB Layout Diagrams



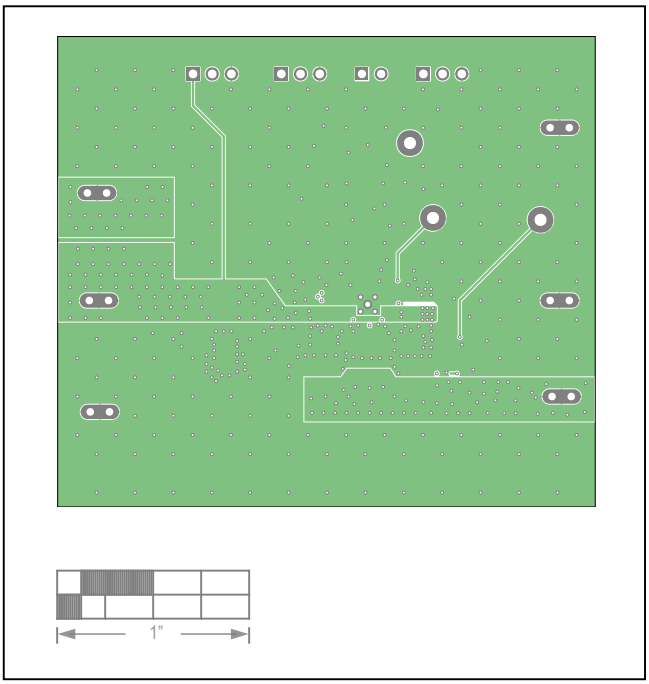
MAX25223 EV Kit Component Placement Guide—Top Silk



MAX25233 EV Kit Component Placement Guide—Top Layer

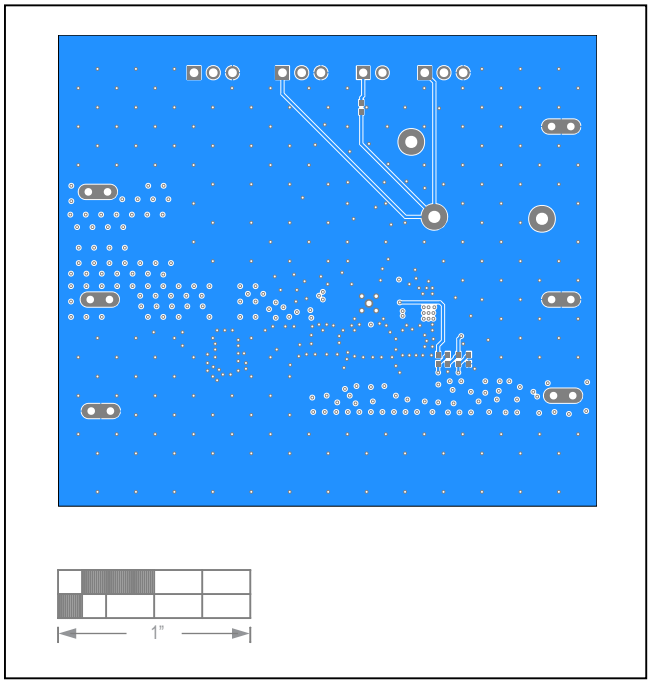


MAX25223 EV Kit PCB Layout—Internal 2

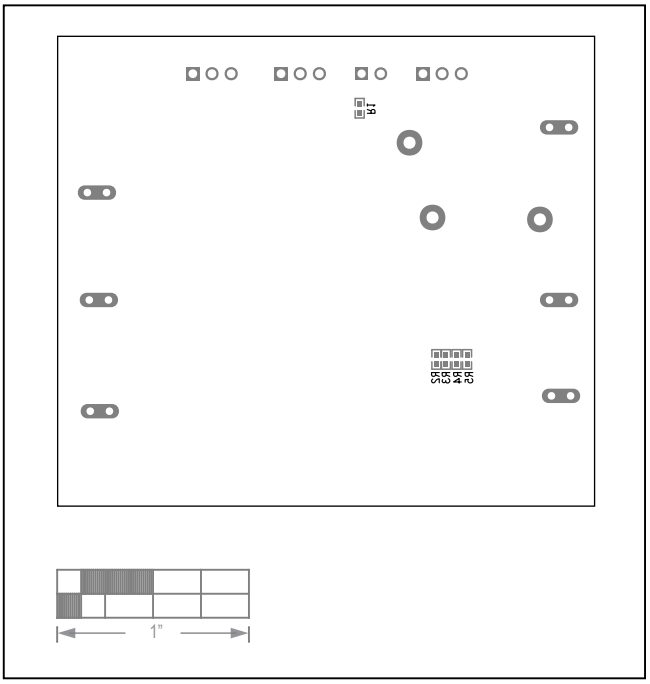


MAX25223 EV Kit PCB Layout—Internal 3

MAX25223 EV Kit PCB Layout Diagrams (continued)



MAX25223 EV Kit Component Placement Guide–Bottom Layer



MAX25223 EV Kit Component Placement—Bottom Layer

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	11/21	Initial release	—