MAX25231 Evaluation Kit

Evaluates: MAX25231

General Description

The MAX25231 evaluation kit (EV kit) provides a proven design to evaluate the MAX25231 2.1MHz high-voltage mini-buck converters in a 12-pin TDFN package. All components are rated for the automotive temperature range. Various test points and jumpers are included for evaluation.

The EV kit comes with a MAX25231ATCA/V+ installed, but can also be used to evaluate all other MAX25231 variants with minimal U1 component changes.

Features

- 3.5V to 36V Input Supply Range
- 5V or 3.3V Fixed Output Voltage, or Adjustable Between 1V and 10V
- Delivers Up to 1.2A Output Current
- Frequency-Synchronization Input
- Enable Input
- Voltage-Monitoring PGOOD Output
- Proven PCB Layout
- Fully Assembled and Tested

Quick Start

Required Equipment

- MAX25231 EV kit
- 3.5V to 36V, 2A power supply
- Voltmeter
- Electronic load

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

Procedure

The EV kit is fully assembled and tested, follow the steps below to activate the board. **Caution: Do not turn on the power supply until all connections are completed.**

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 2A current limit. Turn on the power supply.
5) With the PU and LED jumpers shorted, the green LED should light up. The voltmeter should display an output voltage of 5V.

Additional Evaluation

6) Connect the positive and negative terminals of an electronic load to OUT and GND, respectively.
7) Set the electronic load to 100mA or use an equivalent resistive load. The resistive load is calculated based on 5V output and should be approximately 50Ω. If using a resistor load, make sure it can handle 0.5W.
8) Turn on the power supply and electronic load. Verify that OUT is 5V.

Table 1. Default Jumper Settings

JUMPER	SHUNT POSITION	FUNCTION
EN	Middle-ON	Buck controller enabled
SPS	Middle-OFF	Spread spectrum disabled
PU, LED	Installed	PGOOD pulls up to V_{BIAS} when OUT is in regulation
SYNC	Middle-FPWM	Forced-PWM mode

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Detailed Description

The MAX25231 EV kit provides a proven layout for the MAX25231 2.1MHz synchronous buck regulator. The device accepts input voltages as high as 36V and delivers up to 1.2A. The EV kit can handle an input-supply transient up to 42V. Various test points are included for evaluation.

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 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 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 6.5% (typ) of its nominal regulated voltage.

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

Evaluating the Other Variants

The device is available in fixed 5V and 3.3V outputs. The EV kit comes installed with the 5V output version.

Setting the Output Voltage in Buck Converters

To externally adjust the output voltage (OUT) between 3V and 10V, remove R1 and install a 0Ω resistor on R4. Place appropriate resistors in positions R5 and R6 according to the following equation:

$$R5 = R6\left[\left(\frac{V_{OUT}}{V_{FB}}\right) - 1\right]$$

where V_{FB} = 1V (typ).

Ordering Information

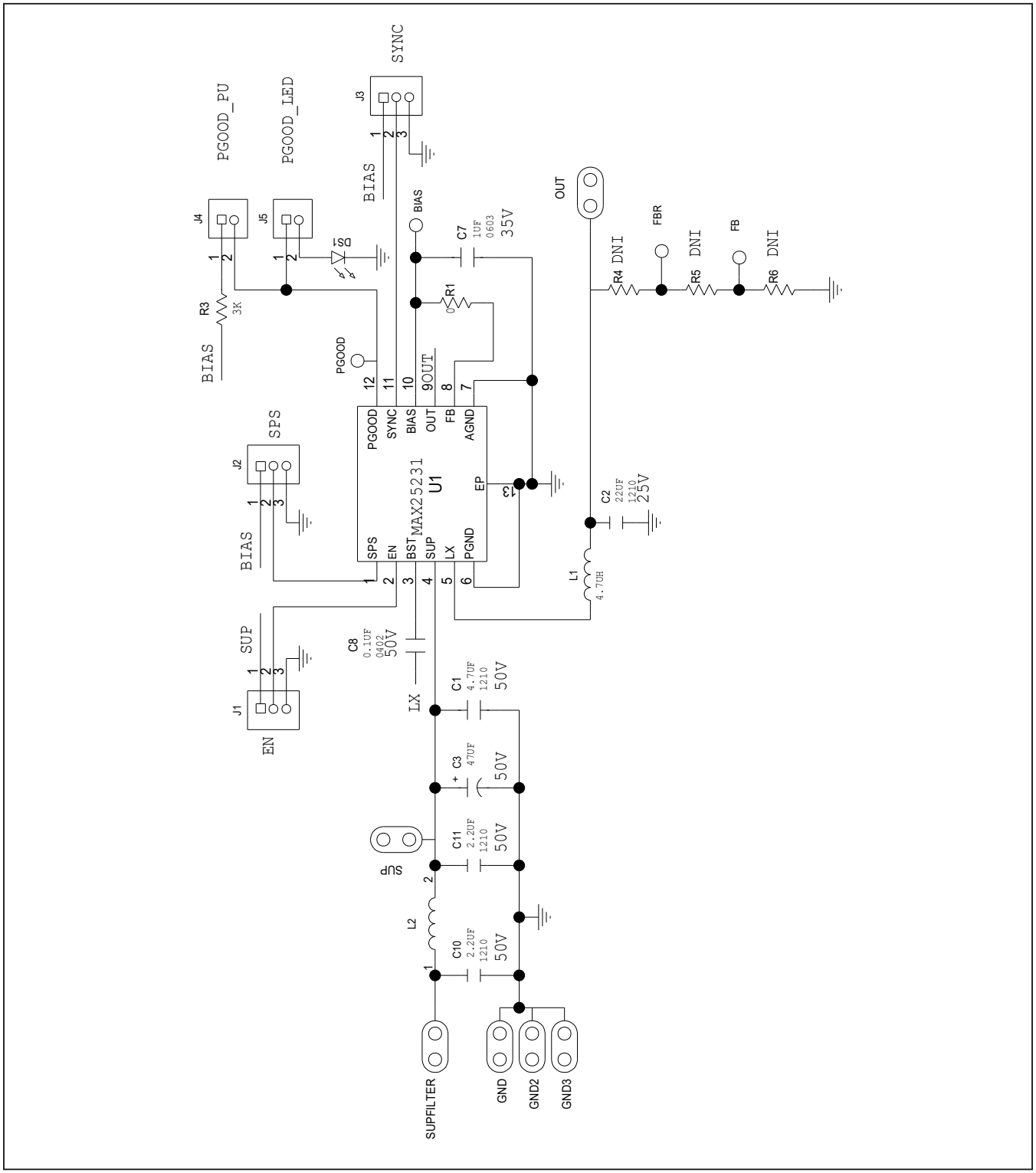
PART	TYPE
MAX25231EVKIT#	EV Kit

#Denotes RoHS compliance.

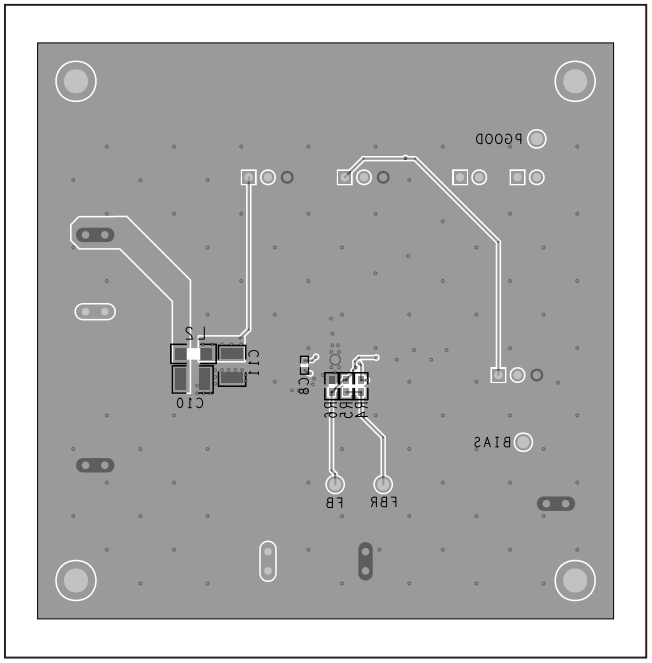
MAX25231 EV Kit Bill of Materials

DESIGNATION	QTY	DESCRIPTION
C1	1	4.7uF ±10%, 50V X7R ceramic capacitors (1210) TDK CGA6P3X7R1H475K250AB
C2	1	22uF ±10%, 25V X7R ceramic capacitor (1210) Murata GRM32ER71E226KE15L
C3	1	47uF, 50V aluminum electrolytic capacitor (8.3mm x 8.3mm) Panasonic EEE-FK1H470P
C7	1	1uF ±10%, 35V X7R ceramic capacitor (0603) TDK CGA3E1X7R1V105K080AC
C8	1	0.1uF ±10% 50V X7R ceramic capacitor (0402) TDK CGA2B3X7R1H104K
C10, C11	2	2.2uF ±10% 50V X7R ceramic capacitor (1210) TDK CGA6M3X7R1H225K200AB
DS1	1	Green LED (0603) Lite-On Electronics LTST-C191KGKT
EN, SPS, SYNC	3	3-pin headers
L1	1	4.7uH Power Inductor (R=52.2mOhms, I=2A, 4mm x 4mm) Coilcraft XFL4020-472ME
L2	1	1A Ferrite Bead (1206) Wurth 742792141
PU, LED	2	2-pin headers
R1	1	0Ω resistor (0603)
R3	4	3kΩ ±5% resistor (0603)
—	5	Shunts
U1	1	Automotive Mini-Buck (12-pin TDFN) Maxim MAX25231ATCA/V+
—	1	PCB: MAX25231 Evaluation Kit

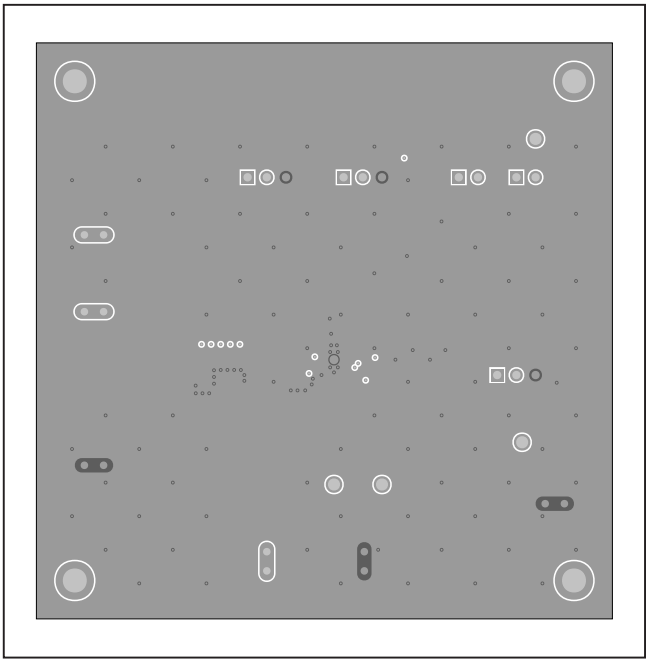
MAX25231 EV Kit Schematic



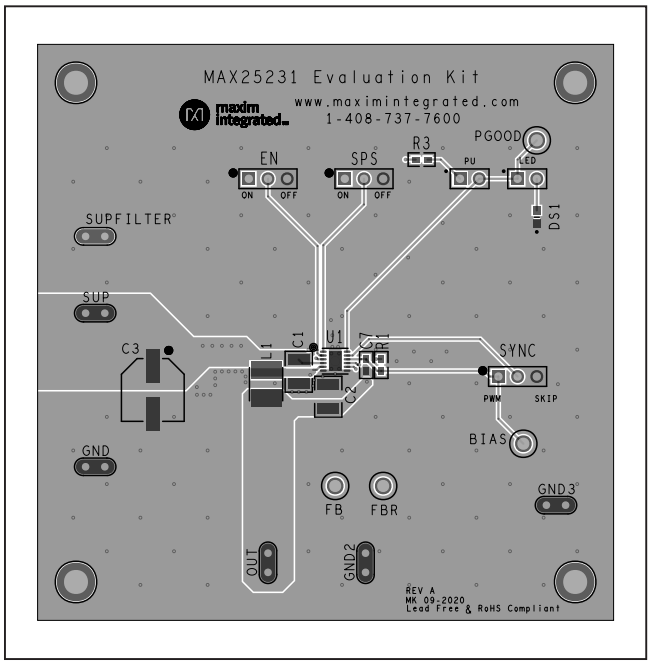
MAX25231 EV Kit PCB Layout Diagrams



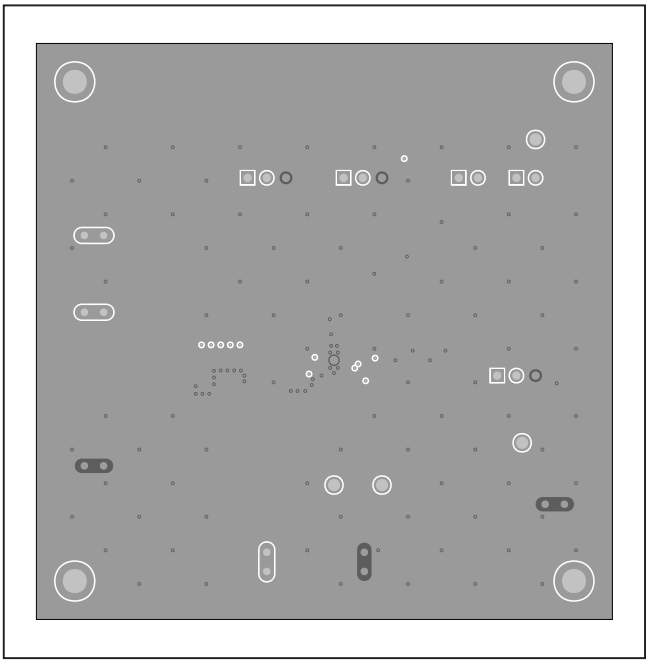
MAX25231 EV Kit Component Placement Guide—Top



MAX25231 EV Kit PCB Layout—Internal Layer 3



MAX25231 EV Kit PCB Layout—Internal Layer 2



MAX25231 EV Kit Component Placement Guide—Bottom