

***TPS62203EVM-211,  
TPS62200EVM-211***

*User's Guide*

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## **EVM WARNINGS AND RESTRICTIONS**

It is important to operate this EVM within the input voltage range of 2.5 V to 6 V.

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than 125°C. The EVM is designed to operate properly with certain components above 125°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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## Preface

# Read This First

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### ***About This Manual***

This users guide describes the characteristics, operation, and use of the TPS62200EVM-211 and TPS62203EVM-211 evaluation modules (EVM). These EVMs contain Texas Instruments high-efficiency buck converters that are configured to provide a regulated 3.3-V and 1.8-V output voltage and up to 300 mA of current. The users guide includes a schematic diagram, bill of materials (BOM), and test data.

### ***How to Use This Manual***

This document contains the following chapters:

- Chapter 1 – Introduction
- Chapter 2 – Setup
- Chapter 3 – Board Layout
- Chapter 4 – Bill of Materials and Schematics

### ***Related Documentation From Texas Instruments***

SLVS417 – TPS6220x data sheet

### ***If you need Assistance***

Contact your local TI sales representative.

### ***FCC Warning***

This equipment is intended for use in a laboratory test environment only. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to subpart J of part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment in other environments may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.



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# Introduction

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This chapter contains background information for the TPS62200EVM–211 and TPS62203EVM–211 evaluation modules.

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## 1.1 Background

This TPS6220XEVM uses a TPS6220X buck converter to step down 2.5-V or higher input voltages. This EVM operates over an input voltage range of 2.5 V to 6 V. The goal of the EVM is to demonstrate the small size of the TPS6220X power supply solution and provide flexibility in interchanging the supporting passive components.

The TPS62203EVM uses a TPS62203 fixed 3.3-V output buck converter. The TPS62200EVM uses a TPS62200 adjustable output buck converter and the appropriate feedback components to provide 1.8-V. Both EVMs include an enable jumper that allows the user to disable the device.

## 1.2 Performance Specification Summary

Table 1–1 provides a summary of the TPS6220XEVM performance specifications. All specifications are given for an ambient temperature of 25°C.

*Table 1–1. Performance Specification Summary*

Specification	Test Conditions	Min	Typ	Max	Unit
Input voltage range	TPS62200EVM	2.5		6	V
	TPS62203EVM	3.3		6	
Output voltage	TPS62200EVM		1.8		V
	TPS62203EVM		3.3		
Output current		0		300	mA

## 1.3 Modifications

Because the primary goal of the EVM was to demonstrate the small size of the TPS6220X power supply solution, capacitors and inductors with small footprints were chosen. These capacitors and inductors were carefully selected to maximize efficiency and minimize ripple. Changing components could improve or degrade EVM performance.

# Setup and Test Results

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This chapter describes how to properly connect, setup, and use the TPS6220XEVN.

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<b>2.1 Input/Output Connections .....</b>	<b>2-2</b>
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## **2.1 Input/Output Connect**

Figure 2–1 highlights the key connection points of the TPS6220XEVM. These connection points are described in the following paragraphs.

### **2.1.1 J1–Vin**

This is the positive connection to the input power supply. The leads to the input supply should be twisted and kept as short as possible.

### **2.1.2 J2–GND**

This is the return connection to the input power supply.

### **2.1.3 JP1–Enable**

This is the enable pin of the device. The enable pin is pulled up to  $V_{in}$  by an onboard pullup resistor. Placing a jumper across pins 2–3 of J1 shorts the enable pin to GND; thereby disabling the device. Placing a jumper across pins 1–2 of J1 connects the enable pin to  $V_{in}$  and enables the device.

### **2.1.4 J3–Vout**

This is the positive output for the device.

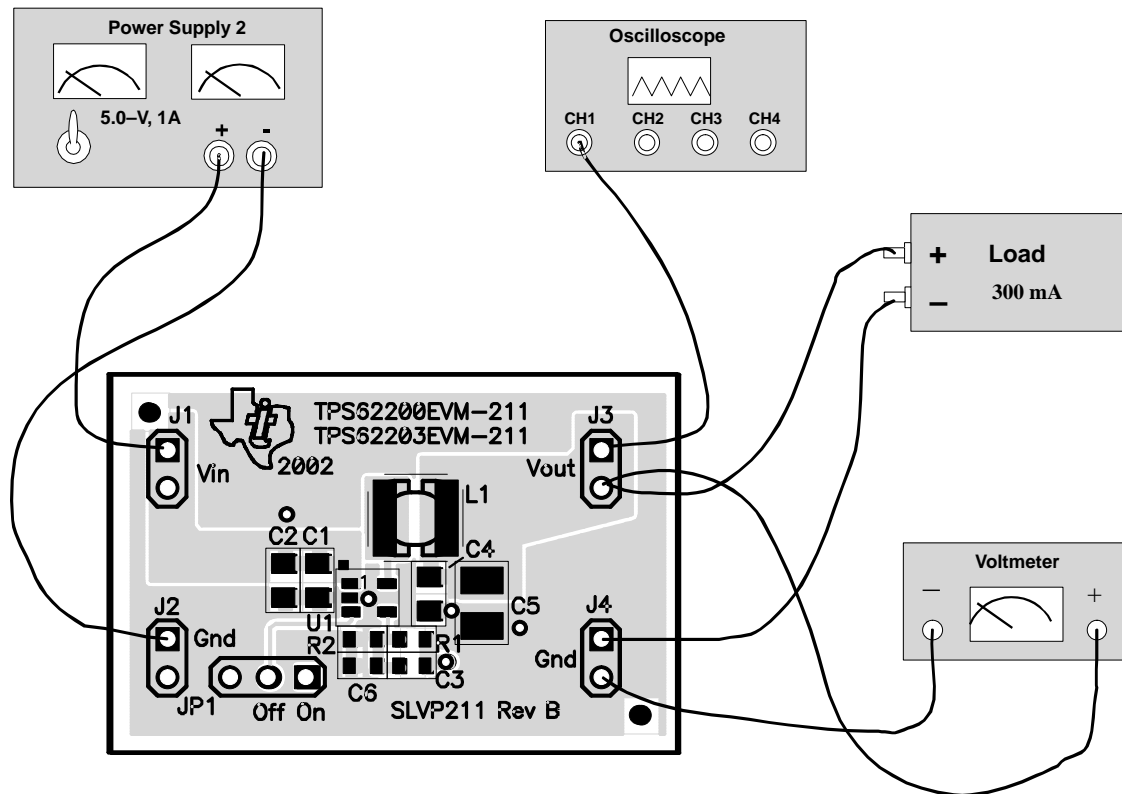
### **2.1.5 J4–GND**

This is the return connection for the load.

## 2.2 EVM Operation

As shown in Figure 2–1, an input power supply and a load must be connected to the appropriate EVM connectors in order for the EVM to operate. The absolute maximum input voltage is 7 V. The TPS6220X is designed to operate with a maximum input voltage of 6 V. Short pins 1–2 on jumper J1 (labeled ON) to enable the device. Connect a load not to exceed 300 mA to the output of the EVM.

Figure 2–1. Connection Diagram



# Board Layout



This chapter provides the TPS6220XEVm board layout and illustrations.

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### 3.1 Layout

Board layout is critical for all switch mode power supplies. Figures 3–1, 3–2, and 3–3 show the board layout for the SLVP211 PWB. The switching nodes with high frequency noise are isolated from the noise sensitive feedback circuitry and careful attention has been given to the routing of high frequency current loops. Refer to the data sheet for specific layout guidelines.

Figure 3–1. Top Assembly Layer

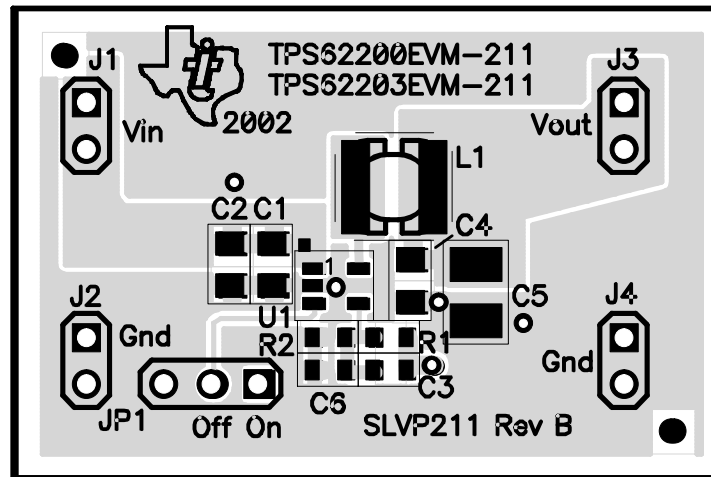


Figure 3–2. Top Layer Routing

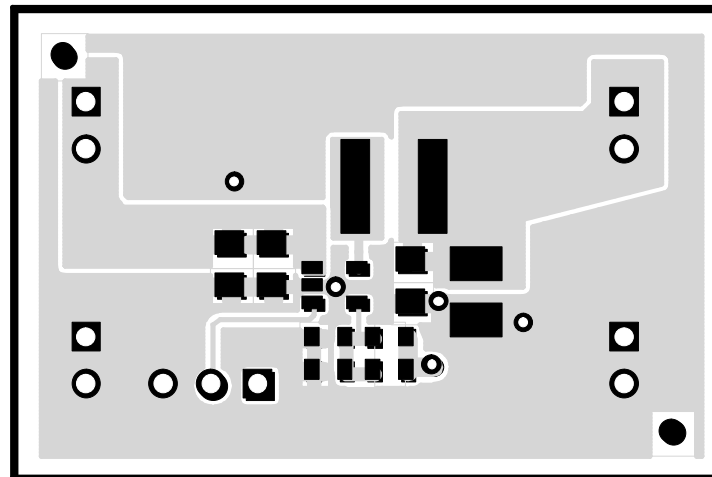
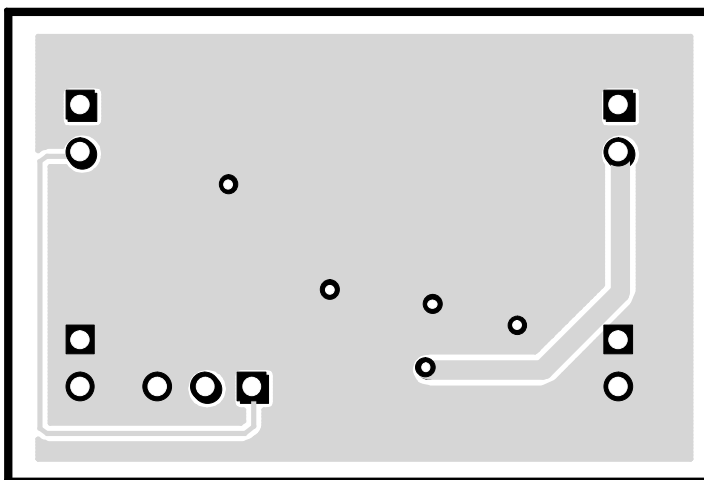


Figure 3–3. Bottom Layer Routing





# Bill of Materials and Schematics

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This chapter provides the TPS6220XEVN-211 bill of materials and schematics.

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## 4.1 Bill of Materials

Table 6–1. Bill of Materials

-001	-002	RefDes	Description	Size	MFR	Part Number
1	1	C1	Capacitor, ceramic, 4.7 $\mu$ F, 6.3 V, X5R, 20%	805	Murata	GRM21BR60J475KA11
0	0	C2	Open	805		
1		C3	Capacitor, ceramic, 33 pF, 50 V, C0G, 5%	603	Murata	GRM1885C1H330CZ01
	0		Open	603		
1	1	C4	Capacitor, ceramic, 10 $\mu$ F, 6.3 V, X5R, 20%	805	TDK	C2012X5R0J106M
0	0	C5	Open	1210		
1		C6	Capacitor, ceramic, 100 pF, 50 V, C0G, 5%	603	Murata	GRM1885C1H101CZ01
	0		Open			
4	4	J1, J2, J3, J4	Header, 2 pin, 100 mil spacing, (36-pin strip)	0.100 x 2"	Sullins	PTC36SAAN
1	1	JP1	Header, 3 pin, 100 mil spacing, (36-pin strip)	0.100 x 3"	Sullins	PTC36SAAN
1	1	L1	Inductor, SMT, 10 $\mu$ H, 1 A, 128.3 m $\Omega$	0.185x0.185	Sumida	CDRH4D28–100
	1	R1	Resistor, chip, 0 $\Omega$ , 1/16 W, 1%	603	Std	Std
1			Resistor, chip, 475 k $\Omega$ , 1/16 W, 1%	603	Std	Std
	0	R2	Open	603		
1			Resistor, Chip, 182 k $\Omega$ , 1/16 W, 1%	603	Std	Std
1		U1	IC, switching buck converter, Adj.–V, 300 mA	SOT23–5	Texas Instruments	TPS62200DBV
	1		IC, switching buck converter, 3.3 V, 300 mA	SOT23–5	Texas Instruments	TPS62203DBV
1	1	—	PCB, 1.5 In x 1 In x .062 In		Any	SLVP211
1	1	—	Shunt, 100 mil, black	0.100	3M	929950–00

## 4.2 Schematics

Figure 4–1. TPS62200 Schematic

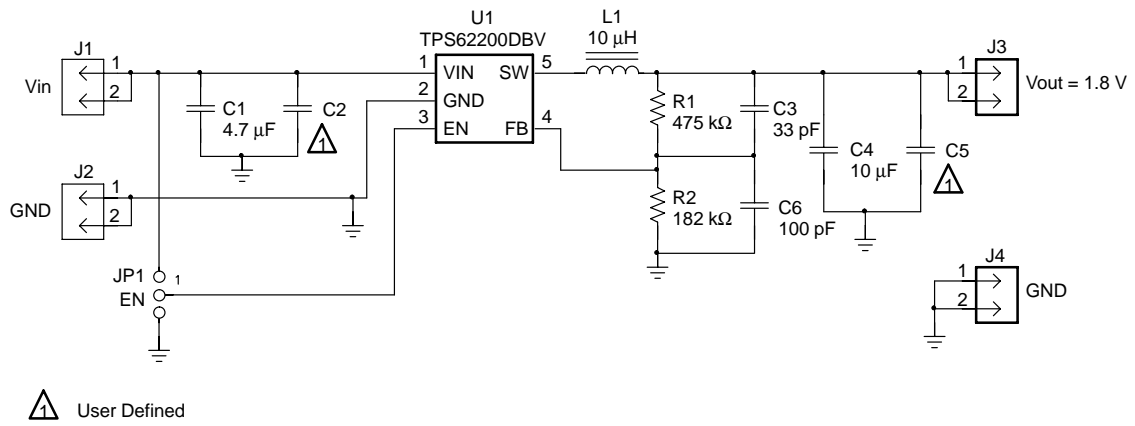


Figure 4–2. TPS62203 Schematic

