TPS6305xEVM-679

This user's guide describes the characteristics, operation, and use of the TPS6305xEVM-679 evaluation module (EVM). This EVM is designed to help the user easily evaluate and test the operation and functionality of the TPS63050 and TPS63051. The EVM converts a 2.5-V to 5.5-V input voltage to a regulated 3.3-V output voltage that delivers 500 mA. This document includes setup instructions for the hardware, a schematic diagram, a bill of materials, and printed-circuit board layout drawings for the evaluation module.

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1 Introduction

TI's TPS6305x are highly efficient, single-inductor, buck-boost converters with 1-A switches. The TPS63050 is an adjustable output voltage converter and the TPS63051 is a fixed 3.3-V output voltage converter.

1.1 Background

The TPS6305xEVM-679 uses the TPS63050 adjustable version that is programmed with an external feedback divider to an output voltage of 3.3-V. The EVM operates with an input voltage between 2.5-V and 5.5-V.

1.2 Performance Specification

Table 1 provides a summary of the TPS6305xEVM-679 performance specifications. All specifications are given for operating in a free-air environment of an ambient temperature of 25°C.

Table 1. Performance Specification Summary

Specification	Test Conditions	Min	Typ	Max	Unit
Input voltage		2.5		5.5	V
Output voltage	PWM Mode	3.267	3.3	3.33	V
Output current		0		500	mA

1.3 Modifications

The printed-circuit board (PCB) for this EVM is designed to accommodate both the fixed and adjustable versions of this integrated circuit (IC). If the fixed output voltage version (TPS63051) is installed, R1 is replaced with a 0-Ω resistor and R2 is open. If the adjustable version (TPS63050) is installed, R1 and R2 are set per the TPS6305x datasheet (SLVSAM8).

2 Setup

This section describes how to properly use the TPS6305xEVM-679.

2.1 Input/Output Connector and Header Descriptions

2.1.1 J1, Pin 1 and 2 – VIN

This header is the positive connection to the input power supply. The power supply must be connected between J1, pin 1 and 2 and J1, pin 5 and 6 (GND). The leads to the input supply should be twisted and kept as short as possible. The input voltage has to be between 2.5 V and 5.5 V.

2.1.2 J1, Pin 3 and 4 – S+/S–

Header J2 can be used to measure the input voltage directly on the input capacitor. Therefore, a 4-wire power and sense supply can be connected. The leads to the sensing connector should also be twisted.

2.1.3 J1, Pin 5 and 6 – GND

This header is the return connection to the input power supply. Connect the power supply between J1, pin 5 and 6 and J1, pin 1 and 2 (VIN). The leads to the input supply should be twisted and kept as short as possible. The input voltage has to be between 2.5 V and 5.5 V.

2.1.4 J2, Pin 1 and 2 – VOUT

This header is the positive connection of the output voltage. The load has to be connected between J2, pin 1 and 2 and pin 5 and 6 (GND).

2.1.5 J2, Pin 3 and 4 – S+/S–

Header J2, pin 3 and 4 can be used to measure the output voltage directly on the output capacitor.

2.1.6 J2, Pin 5 and 6 – GND

This header is the return connection of the output voltage. Connect the load between J2, pin 5 and 6 and J2, pin 1 and 2 (VOUT).

2.1.7 JP1 – EN

This jumper enables or disables the TPS6305x on the EVM. Place the jumper across ON and EN to enable the converter. Place the jumper across OFF and EN to disable the converter. A 1-MΩ pullup resistor is connected between VIN and EN. Removing the jumper on JP1 turns on the converter.

2.1.8 JP2 – ILIM

This jumper controls the current limit of the TPS6305x.

2.1.9 JP3 – MODE

This jumper controls the operating mode of the TPS6305x on the EVM. Place the jumper across PWM and MODE to enable forced PWM mode with a constant switching frequency. Place the jumper across PFM and MODE to enable power save mode with higher efficiency.

2.1.10 J3 – L1

This test point outputs the L1-node the TPS6305x. It features a GND connection to enable proper oscilloscope connection.

2.1.11 J4 – L2

This test point outputs the L2-node the TPS6305x. It features a GND connection to enable proper connection.

2.1.12 J6 – PG

This test point outputs the PG (power good) pin of the TPS6305x.

2.2 Setup

To operate the EVM, simply connect an input supply between J1, pin 1 and 2 (VIN) and J1, pin 5 and 6 (GND). Connect a load between J2, 1 and 2 and J2, 5 and 6. An input supply voltage of 2.5 V to 5.5 V is recommended.

3 Board Layout

This section provides the TPS63050xEVM-679 board layout and illustrations.

3.1 Layout

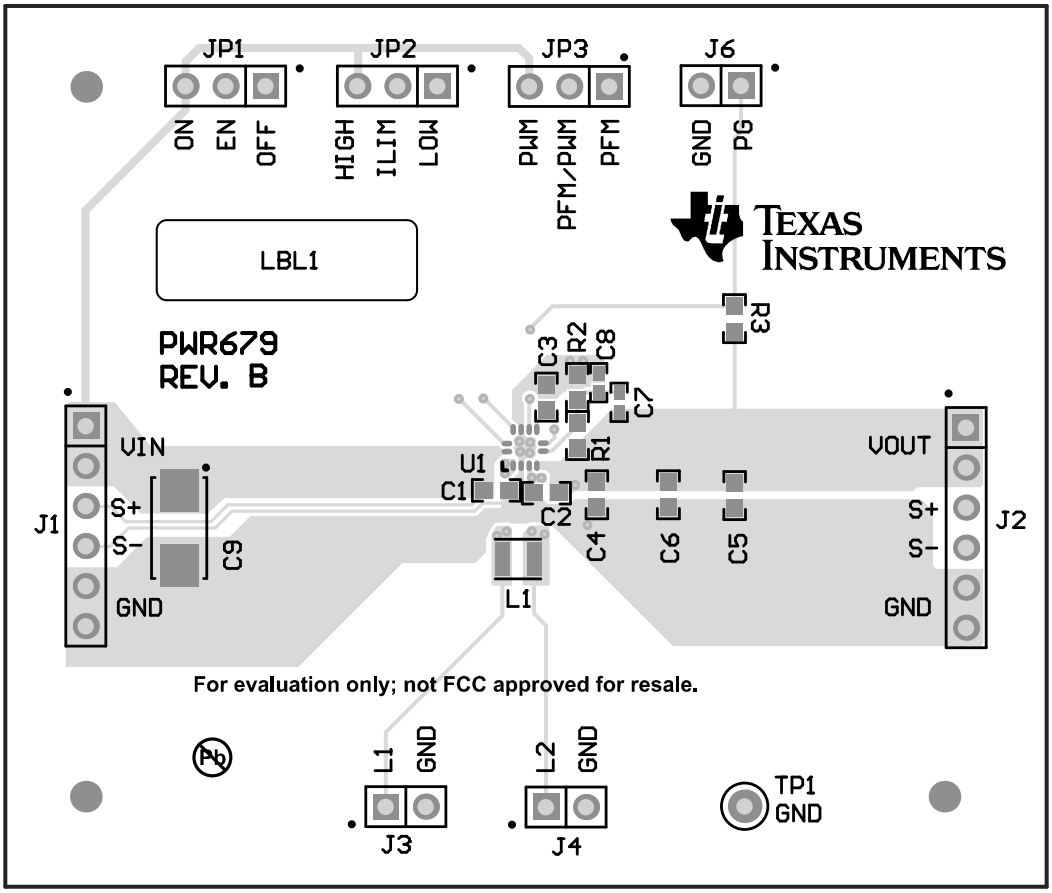

Figure 1. Assembly Layer

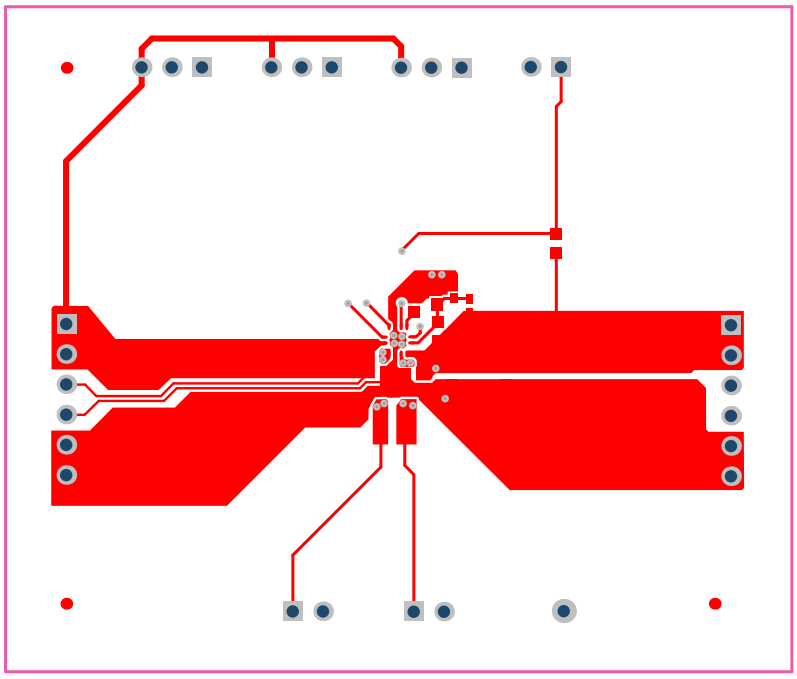

Figure 2. Top Layer Routing

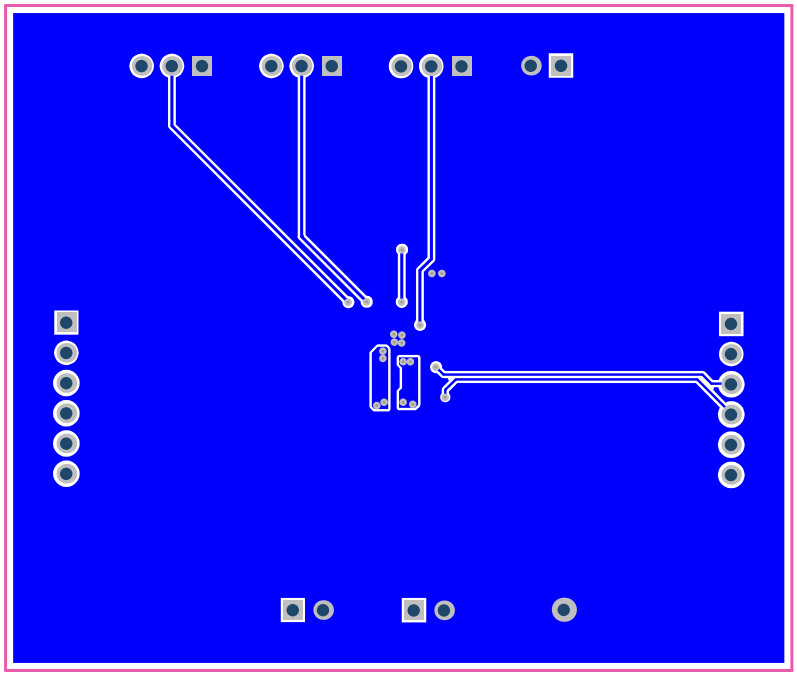

Figure 3. Bottom Layer Routing

4 Schematic and Bill of Materials

This section provides the TPS6305xEVM-679 schematic and bill of materials.

4.1 Schematic

Figure 4 illustrates the schematic for this EVM.

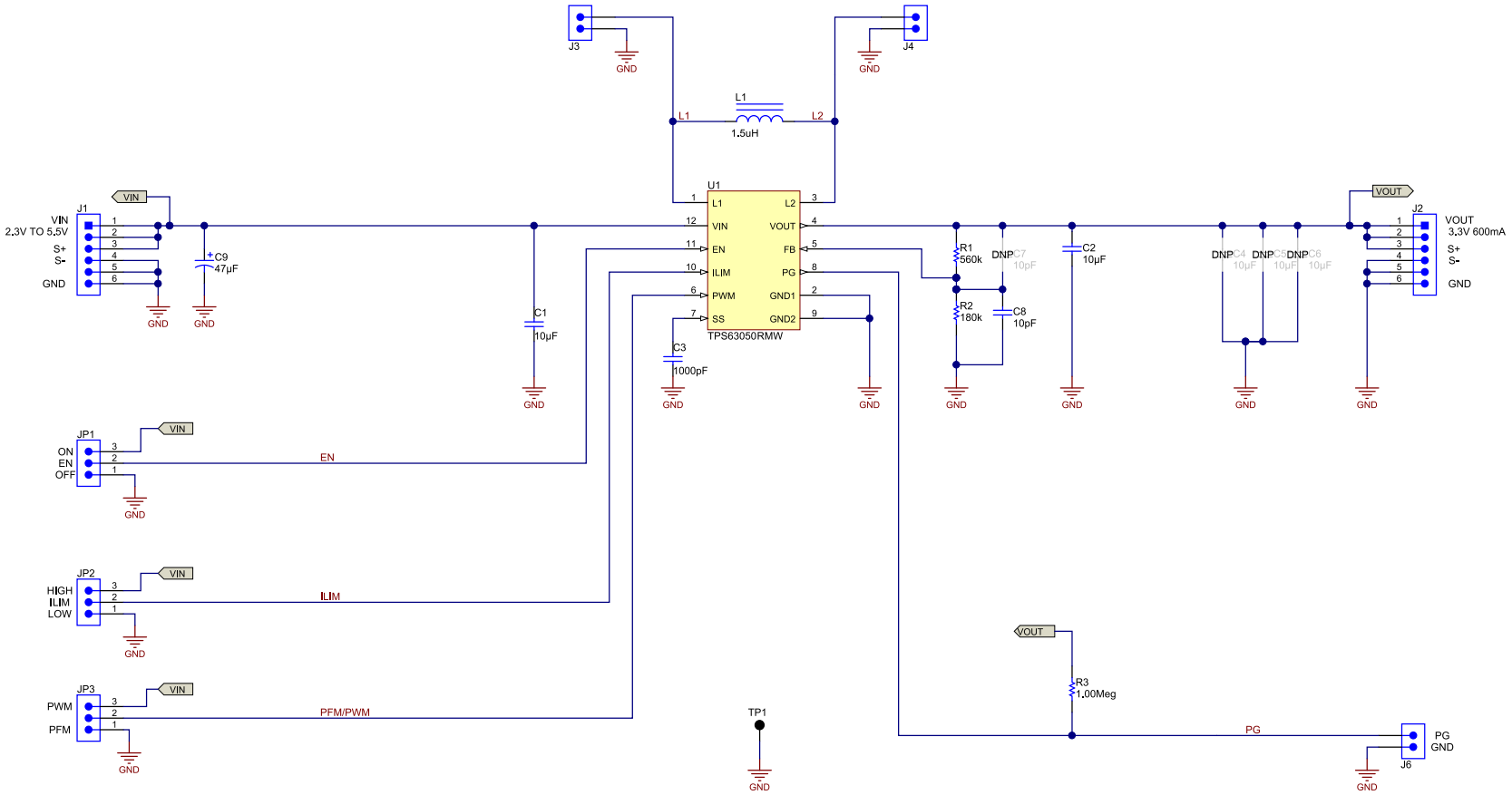

Figure 4. TPS6305xEVM-679 Schematic

4.2 Bill of Materials

Table 2 lists the TPS6305xEVM-679 BOM.

Table 2. TPS6305xEVM-679 Bill of Materials

Number	RefDes	Value	Description	Size	Part Number	MFR
2	C1-2	10uF	Capacitor, Ceramic Chip, 6.3V, ±20%, X5R	0603	GRM188R60J106ME84	Murata
1	C3	1000pF	Capacitor, Ceramic Chip, 16V, ±10%, X7R	0603	GRM188R71C102KA01D	TDK
1	C8	10pF	Capacitor, Ceramic Chip, 50V, ±5%, X5R	0402	500R07S100JV4T	Johanson Technology
1	C9	47uF	Capacitor, Tantalum, 16V, 35milliohm, 20%	6032	T495C476K016ATE350	Kemet
1	L1	1.5uH	Inductor, SMT ±30%	2520	1269AS-H-1R5M	Toko
1	R1	560k	Resistor, Chip, 1/10W, 1%	0603	STD	STD
1	R2	180k	Resistor, Chip, 1/10W, 1%	0603	STD	STD
1	R3	1M	Resistor, Chip, 1/10W, 5%	0603	STD	STD
1	U1	--	IC, SINGLE INDUCTOR BUCK-BOOST WITH 1-A SWITCHES AND ADJUSTABLE SOFT START	VQFN (12)	TPS63050YFF	TI

5 Related Documentation From Texas Instruments

Single Inductor Buck-Boost with 1-A Switches and Adjustable Soft Start datasheet (SLVSAM8).

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- *Increase the separation between the equipment and receiver.*
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