TPS25200EVM-618 Evaluation Module for TPS25200

This user's guide describes the evaluation module (EVM) for the TPS25200 (TPS25200EVM-618). TPS25200 is an adjustable current-limited power distribution switch with input overvoltage protection and output overvoltage clamp.

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1 Introduction

The TPS25200EVM-618 allows reference circuit evaluation of the TPS25200 power distribution switch with adjustable current limit, input overvoltage protection, and an output overvoltage clamp.

1.1 Features

- TPS25200 features
  - 2.5- to 6.5-V operation
  - Withstands up to 20-V input voltage
  - 7.2-V fixed input overvoltage protection
  - 5.4-V fixed output voltage clamp
  - 0.9-µs overvoltage protection response
  - 2-µs overcurrent response
  - Integrated 60-mΩ high-side MOSFET
  - Up to 2.5-A continuous load current
  - ±6% current-limit accuracy at 2.8 A
  - Reverse current blocking when disabled
  - Build-in soft start
  - Pin-to-pin compatible with TPS2553 device
- Dual input voltages with pushbutton input overvoltage test circuit
- Selectable current limits (three level)
- Selectable output capacitors (four level)
- Test point selectable I/O voltage source for EN and FAULTx

1.2 Applications

- USB ports and hubs
- Digital TV
- Set-top boxes
- VOIP phones
- USB portable devices
- Solid state drives (SSD)

2 Description

TPS25200EVM-618 enables full evaluation of the TPS25200 power distribution switch with adjustable current limit, input overvoltage protection, and an output overvoltage clamp.

Referring to the schematic shown in Figure 1, primary input power is applied at J5/J7 while J6/J7 provides the output connection to the load. C4/C5 provides input protection for the TPS25200 (U1) while C1 and the J4 selectable output capacitance provide output protection. J3 allows three levels of current limit to be selected. J2 allows selection of the EN/FAULTx pullup voltage source to come from either the IN or an external source (VCC_IO source from TP11).

The overvoltage protection feature of the TPS25200 device can be evaluated through the use of a secondary (higher voltage) source connected to TP10. The effects of this overvoltage pulse can be evaluated by using the S1 pushbutton.

3 Schematic

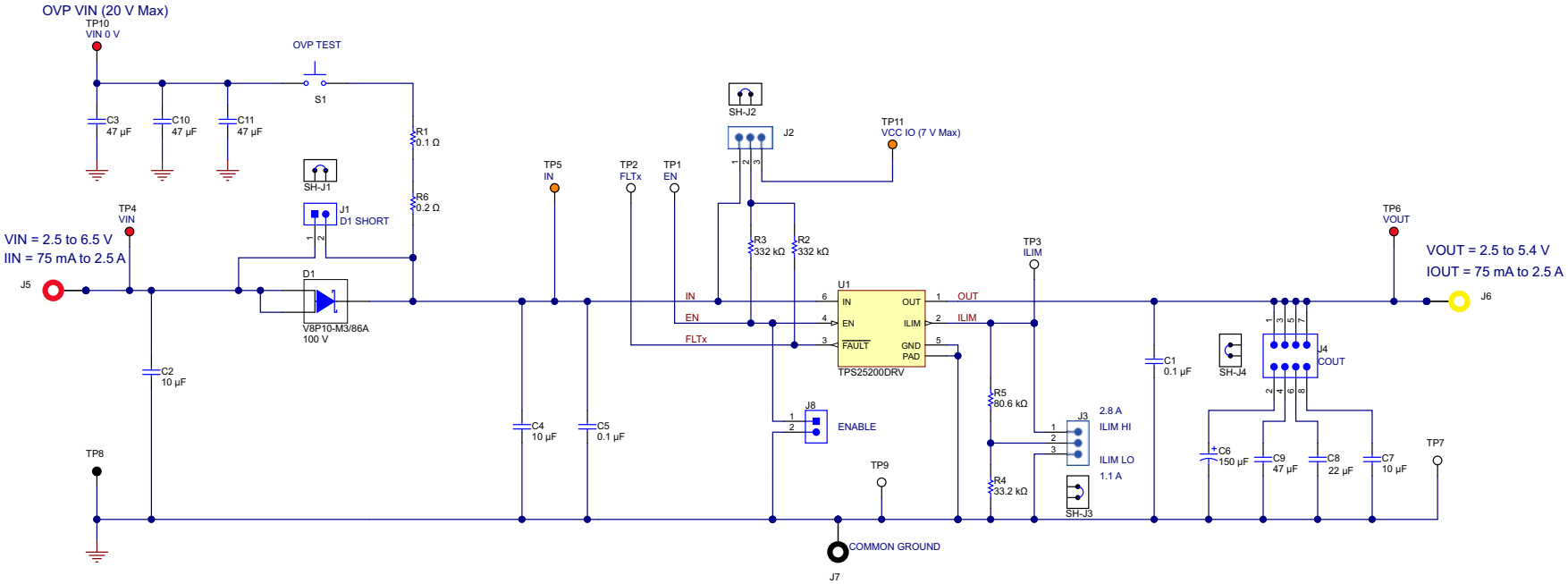

Figure 1. TPS25200EVM-618 Schematic

4 General Configuration and Description

4.1 Physical Access

Table 1 lists the TPS25200EVM-618 connector functionality, Table 2 describes the test point availability, and Table 3 describes the jumper functionality.

Table 1. Connector Functionality

Connector	Label	Description
J5/J7	VIN/GND	2.5- to 6.5-V primary input to the EVM
TP10	VIN_OV	2.5- to 20-V HV test voltage input to the EVM
J6/J7	VOUT/GND	2.5- to 5.4-V output from the EVM
S1	S1	S1 is used to pulse test the OVP feature

Table 2. Test Points

Test Point	Color	Label	Description
TP4/TP8/TP7	RED/BLK/SM	VIN/GND	2.5- to 6.5-V primary input to the EVM
TP6/TP9	RED/SM	VOUT/GND	2.5- to 5.4-V output from the EVM
TP5	ORG	IN	2.5- to 6.5-V input to the TPS25200
TP11	ORG	VCC IO	2.5- to 6.5-V pullup source for EN and FAULTx
TP1	WHT	EN	Active high enable input
TP2	WHT	FLT	Fault test point
TP3	WHT	ILIM	TPS25200 ILIM pin voltage

Table 3. Jumpers and LEDs

Jumper	Label	Description
J1	J1	Install between pins 1 and 2 to short out D1 (for normal operation). Remove when testing the OVP feature using S1.
J2	J2	Select the desired EN and FLT pullup resistor supply source using a shunt on J2 per the schematic diagram. When the shunt is in the IN position, then the pullup source is connected to the IN pin. When the shunt is in the IO position, then an external IO source should be connected between TP11 and J7 (or another GND test point). For extended high voltage pulse testing, use the IO position with a supply voltage below 7 V.
J3	ILIM	Select the desired current limit using a shunt on J3 per the schematic diagram. When the shunt is removed, the current limit is approximately 850 mA.
J4	COUT	Select the desired output capacitance using a shunt on J4 per the schematic diagram.
J8	EN	Remove the shunt to enable the TPS25200 and install the shunt to disable.

4.2 Test Setup

Figure 2 shows a typical test setup for TPS25200EVM-618. Connect J5 to the primary power supply, TP10 to the HV power supply, and J6 to the load. J7 is the common return for J5, J6, and TP10.

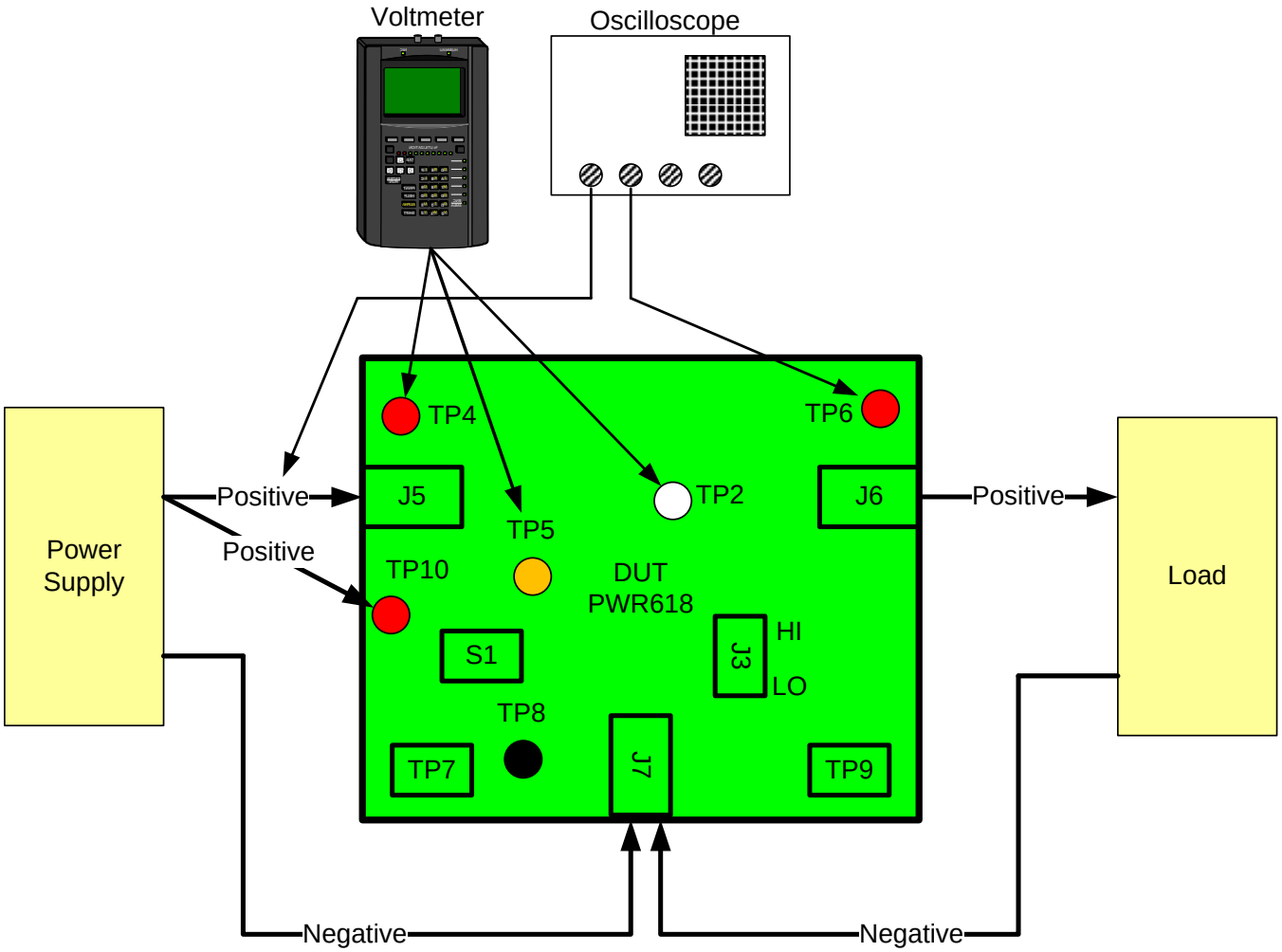

Figure 2. Typical TPS25200EVM-618 Test Setup

5 EVM Assembly Drawings and Layout Guidelines

The following PCB drawings show component placement and layout of the EVM.

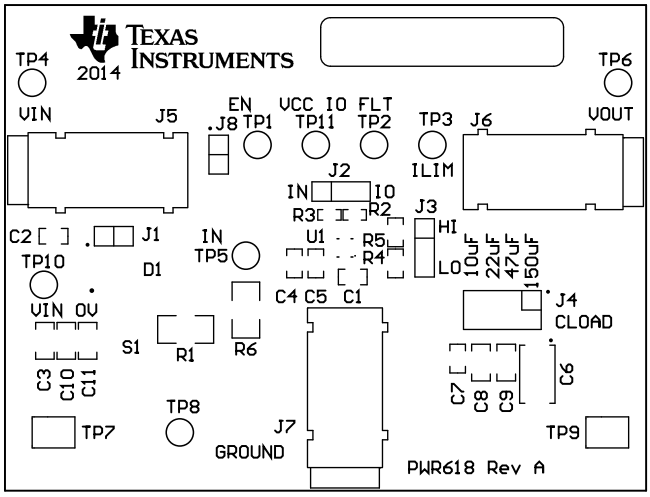

Figure 3. Top Side Placement

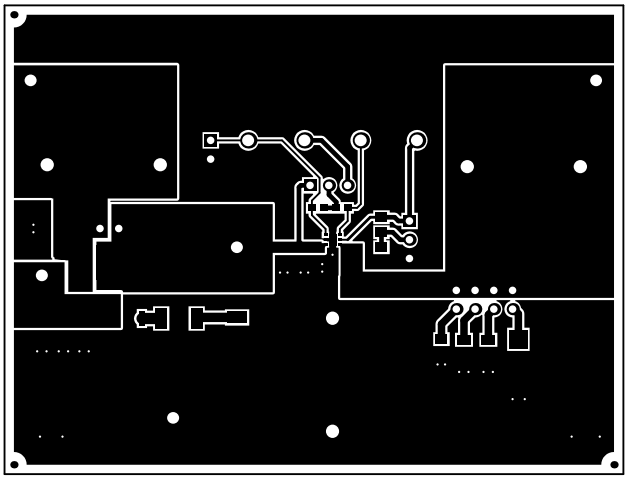

Figure 4. Top Side Routing

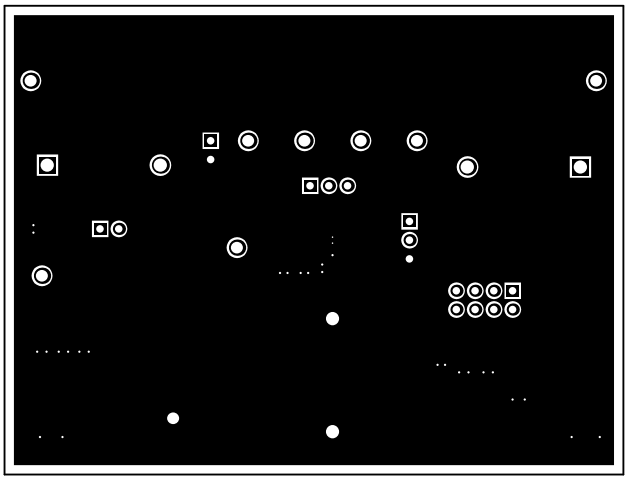

Figure 5. Bottom Side Routing

6 Bill of Materials

Table 4. TPS25200EVM-618 Bill of Materials[(1)]

Designator	QTY	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number – Manufacturer
!PCB	1		Printed Circuit Board		PWR618	Any	-
C1, C5	1	0.1uF	CAP, CERM, 0.1uF, 50V, ±10%, X7R, 0805	0805	08055C104KAT2A	AVX	
C2, C4	2	10uF	CAP, CERM, 10uF, 25V, ±10%, X5R, 0805	0805	C2012X5R1E106K 125AB	TDK	
C3, C10, C11	3	47uF	CAP, CERM, 47uF, 25V, ±20%, X5R, 1206	1206	C3216X5R1E476M 160AC	TDK	
C6	1	150uF	CAP, TA, 150uF, 16V, ±10%, 0.125 ohm, SMD	7343-31	T495D157K016AT E125	Kemet	
C7	1	10uF	CAP, CERM, 10uF, 16V, ±20%, X5R, 0805	0805	0805YD106MAT2A	AVX	
C8	1	22uF	CAP, CERM, 22uF, 16V, ±20%, X5R, 1206	1206	1206YD226MAT2A	AVX	
C9	1	47uF	CAP, CERM, 47uF, 16V, ±15%, X5R, 1206	1206	C3216X5R1C476M 160AB	TDK	
D1	1	100V	Diode, Schottky, 100V, 8A, TO-277A	TO-277A	V8P10-M3/86A	Vishay-Semiconductor	
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	Fiducial	N/A	N/A	
H1, H2, H3, H4	4		Bumpon, Cylindrical, 0.312 X 0.200, Black	Black Bumpon	SJ61A1	3M	
J1, J8	2		Header, TH, 100mil, 2x1, Gold plated, 230 mil above insulator	2x1 Header	TSW-102-07-G-S	Samtec	
J2, J3	2	1x3	Header, TH, 100mil, 1x3, Gold plated, 230 mil above insulator	PBC03SAAN	PBC03SAAN	Sullins Connector Solutions	Equivalent – Any
J4	1		Header, TH, 100mil, 4x2, Gold plated, 230 mil above insulator	4x2 Header	TSW-104-07-G-D	Samtec	
J5	1	10A	Standard Banana Jack, insulated, 10A, red	571-0500	571-0500	DEM Manufacturing	Equivalent – Any
J6	1	10A	Standard Banana Jack, insulated, 10A, yellow	571-0700	571-0700	DEM Manufacturing	Equivalent – Any
J7	1	10A	Standard Banana Jack, insulated, 10A, black	571-0100	571-0100	DEM Manufacturing	Equivalent – Any
LBL1	1		Thermal Transfer Printable Labels, 1.250" W x 0.250" H - 10,000 per roll	PCB Label 1.25"H x 0.250"W	THT-13-457-10	Brady	
R1	1	0.1	RES, 0.1 ohm, 1%, 0.5W, 2010	2010	WSL2010R1000FE A	Vishay-Dale	Equivalent – Any
R2, R3	2	332k	RES, 332k ohm, 1%, 0.1W, 0603	0603	CRCW0603332KF KEA	Vishay-Dale	
R4	1	33.2k	RES, 33.2k ohm, 1%, 0.125W, 0805	0805	CRCW080533K2F KEA	Vishay-Dale	
R5	1	80.6k	RES, 80.6k ohm, 1%, 0.125W, 0805	0805	CRCW080580K6F KEA	Vishay-Dale	
R6	1	0.2	RES, 0.2 ohm, 1%, 0.5W, 2010	2010	WSL2010R2000FE A	Vishay-Dale	
S1	1		Switch, Push Button, SMD	2.9x2x3.9mm SMD	SKRKAEE010	Alps	Equivalent – Any
SH-J1, SH-J2, SH-J3, SH-J4	4	1x2	Shunt, 100mil, Flash Gold, Black	Closed Top 100mil Shunt	SPC02SYAN	Sullins Connector Solutions	

(1) Unless otherwise noted in the Alternate Part Number – Manufacturer column, all parts may be substituted with equivalents.

Table 4. TPS25200EVM-618 Bill of Materials[(1)] (continued)

Designator	QTY	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number – Manufacturer
TP1, TP2, TP3	3	White	Test Point, TH, Multipurpose, White	Keystone5012	5012	Keystone	Equivalent – Any
TP4, TP6, TP10	3	Red	Test Point, TH, Multipurpose, Red	Keystone5010	5010	Keystone	Equivalent – Any
TP5, TP11	2	Orange	Test Point, TH, Multipurpose, Orange	Keystone5013	5013	Keystone	Equivalent – Any
TP7, TP9	2	SMT	Test Point, SMT, Compact	Testpoint_Keystone_Compact	5016	Keystone	Equivalent – Any
TP8	1	Black	Test Point, TH, Multipurpose, Black	Keystone5011	5011	Keystone	Equivalent – Any
U1	1		Precision Adjustable Current-Limited Power Distribution Switch with Overvoltage Protection, DRV0006A	DRV0006A	TPS25200DRV	Texas Instruments	None

Revision History

Changes from Original (March 2014) to A Revision	Page
• Updated C1 in Figure 1	3
• Updated C1 and C5 in Table 4	7

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- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

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Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

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2. Use EVMs only after user obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after user obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless user gives the same notice above to the transferee. Please note that if user does not follow the instructions above, user will be subject to penalties of Radio Law of Japan.

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No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have ***not*** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

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