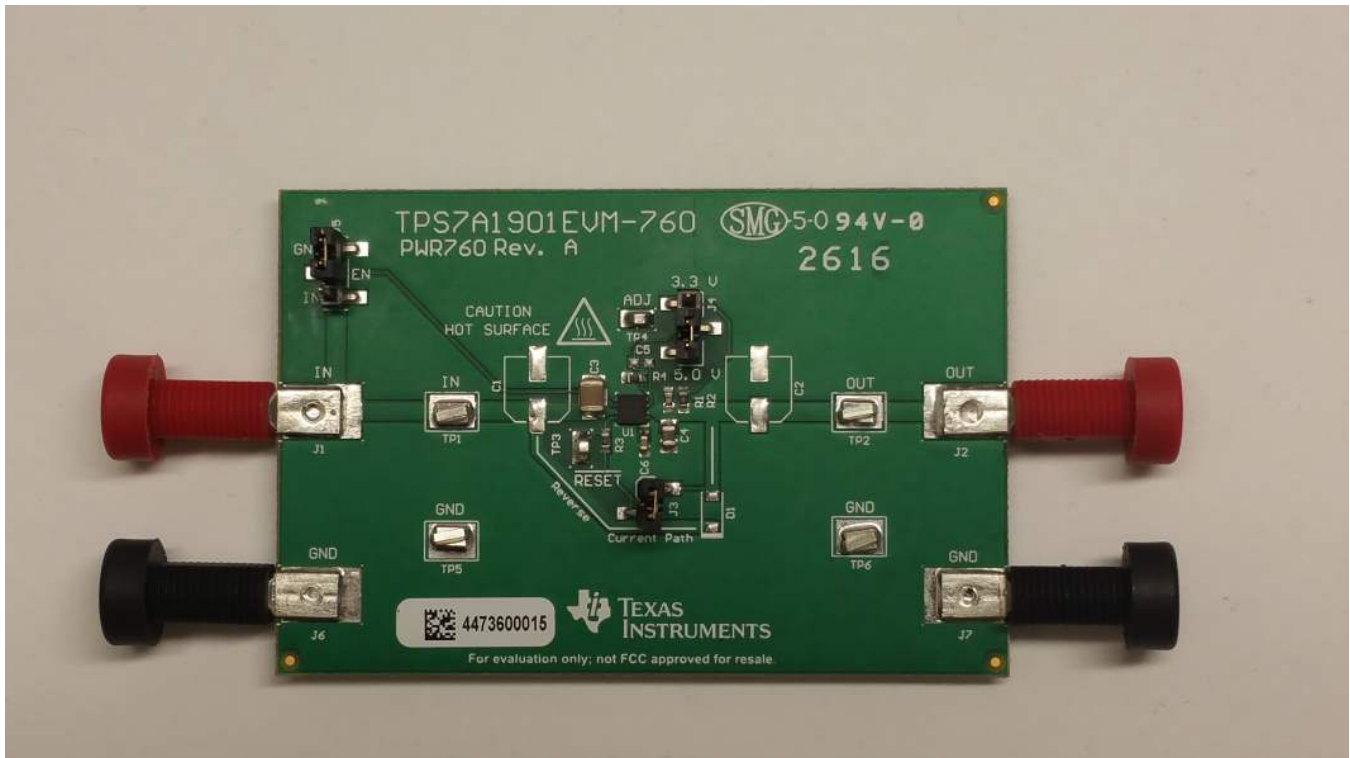


TPS7A1901EVM-760 Evaluation Module



This user's guide describes the operational use of the TPS7A1901EVM-760 evaluation module (EVM) as a reference design for engineering demonstration and evaluation of the TPS7A1901DRB, low-dropout linear regulator (LDO). Included in this user's guide are setup and operating instructions, thermal and layout guidelines, a printed circuit board (PCB) layout, a schematic diagram, and a bill of materials (BOM).

Throughout this document, the terms *demonstration kit*, *evaluation board*, and *evaluation module* are synonymous with the TPS7A1901EVM-760.

The related documents listed in [Table 1](#) are available through the Texas Instruments website at www.ti.com.

Related Documentation

Device	Literature Number
TPS7A19	SBVS256

1 Introduction

The TPS7A1901EVM-760 (made by Texas Instruments) helps design engineers evaluate the operation and performance of the TPS7A19 family of linear regulators for possible use in their own circuit application. This particular EVM configuration contains a single 40-V, low-IQ linear regulator for industrial systems. The regulator is capable of delivering up to 450 mA to the load with a wide VIN range. For stability, use a 20- μ F (or larger) output capacitor for the TPS7A19 device.

1.1 Before You Begin

The following warnings and cautions are noted for the safety of anyone using or working close to the TPS7A1901EVM-760. Observe all safety precautions.



Warning

Warning: Hot Surface. Contact may cause burns. Do not touch.

CAUTION

The circuit module may be damaged by overtemperature. To avoid damage, monitor the temperature during evaluation and provide cooling, as needed, for your system environment.

CAUTION

Some power supplies can be damaged by application of external voltages. If using more than one power supply, check your equipment requirements and use blocking diodes or other isolation techniques, as needed, to prevent damage to your equipment.

CAUTION

The circuit module is not a finished product or electrical appliance. The module does not contain current or voltage thresholds for circuit protection. It must be used by qualified personnel with additional equipment for evaluation only.

2 EVM Setup

This section describes how to properly connect and setup the TPS7A1901EVM-760, including the jumpers and connectors on the EVM board.

2.1 Input/Output Connectors and Jumper Descriptions

2.1.1 J1 – VIN

Input power-supply voltage connector. Twist together the positive input lead and ground return lead from the input power supply, and keep them as short as possible to minimize input inductance. Add additional bulk capacitance between the input supply and ground (use the C1 footprint) if the supply leads are greater than six inches. For example, an additional 47- μ F electrolytic capacitor connected from the input supply (J1) to ground can improve the transient response of the TPS7A19 device, and eliminates unwanted ringing on the input because of long wire connections.

2.1.2 J2 – VOUT

Regulated output voltage connector.

2.1.3 J3 – RESET (PG)

Pullup-voltage selector for RESET (PG). RESET on the EVM refers to the power good (PG) functionality of TPS7A19 device. This EVM is designed so that RESET (PG) can be pulled up to VOUT by shorting J3, or pulled up to another voltage by applying an external voltage to TP3.

2.1.4 J4 – Resistor Divider

For convenience, the TPS7A1901EVM-760 is designed with two prepopulated feedback resistor dividers. [Table 1](#) lists the connections for choosing between the dividers.

Table 1. J4 Connector Selections

Short Pins	Resistors (k Ω)		Nominal Output Voltage
	R _{Top}	R _{Bottom}	
1 and 2	30.9	10.0	5.0 V
2 and 3	16.9	10.0	3.3 V

2.1.5 J5 – EN

Output enable. For convenience, the TPS7A1901EVM-760 is designed to allow EN to be tied to VDD or GND. [Table 2](#) lists the connection options.

Table 2. J5 Connector Selections

Short Pins	EN Voltage	Output Condition
1 and 2	GND	Disabled
2 and 3	VIN	Enabled

2.1.6 J6– GND

Input ground return connector.

2.1.7 J7 – GND

Output ground return connector.

2.1.8 TP1 – VIN

Input test point.

2.1.9 TP2 – VOUT

Output test point.

2.1.10 TP3 – $\overline{\text{RESET}}$ (PG)

$\overline{\text{RESET}}$ (PG) test point.

2.1.11 TP4 – ADJ (FB)

ADJ (FB) test point. ADJ on the EVM refers to the feedback (FB) functionality of the TPS7A19 device.

2.1.12 TP5 – GND

Ground test point.

2.1.13 TP6 – GND

Ground test point.

2.2 Soldering Guidelines

To avoid damaging the integrated circuit (IC), use a hot-air system for any solder rework to modify the EVM for repair or for other application reasons.

2.3 Equipment Connection

1. Set the input power supply to 40 V (maximum), and turn the power supplies off.
2. Connect the positive voltage lead from the input power supply to VIN at the J1 connector of the EVM.
3. Connect the ground lead from the input power supply to GND at the J6 connector of the EVM.
4. Connect a 0-A to 450-mA load between OUT and GND.
5. Disable the output by shorting pin 1 (GND) and pin 2 (EN) of J3.

3 Operation

1. Turn on the power supply.
2. Enable the output by jumping pin 2 (EN) to pin 3 (IN) of J3.
3. Vary the respective load and input voltage as necessary for test purposes.
4. Diode D1 (not populated) can be added to provide a path for reverse current. See the TPS7A19 data sheet ([SBVS256](#)) for more information.

4 PCB Layout

Figure 1 to Figure 3 illustrate the PCB layout for this EVM.

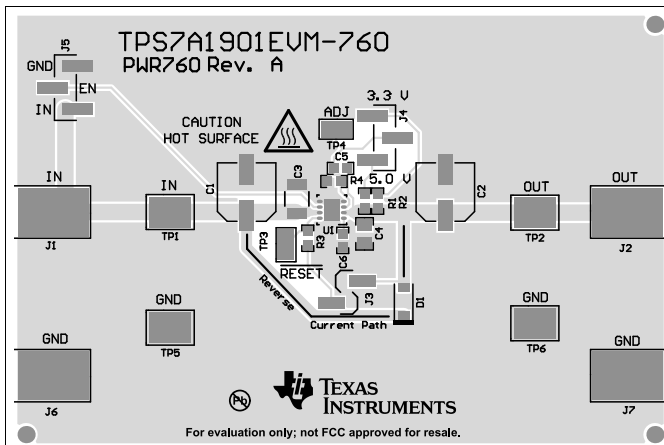


Figure 1. Assembly Layer

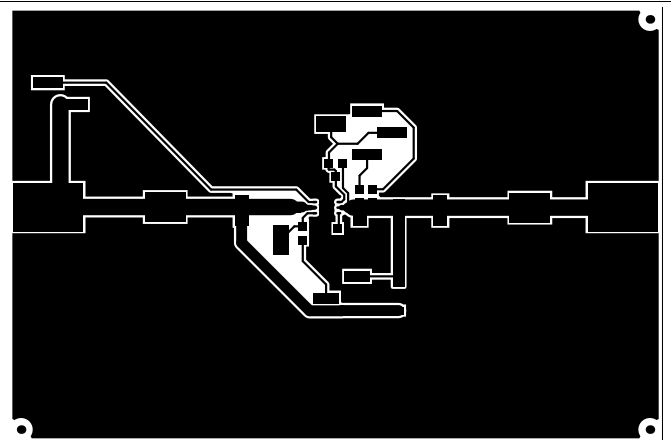


Figure 2. Top Layer Routing

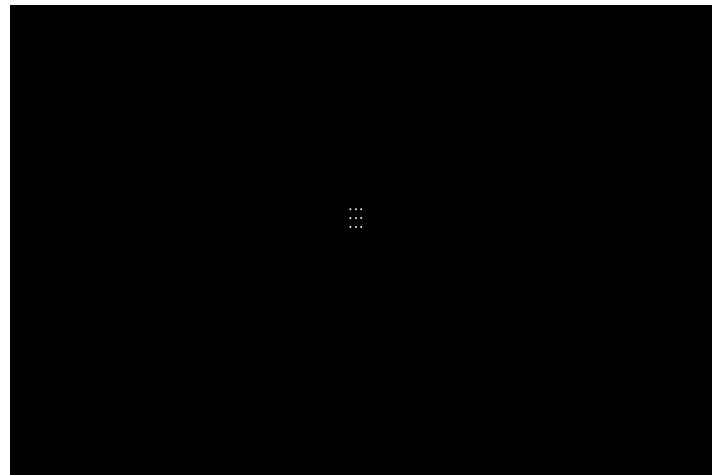
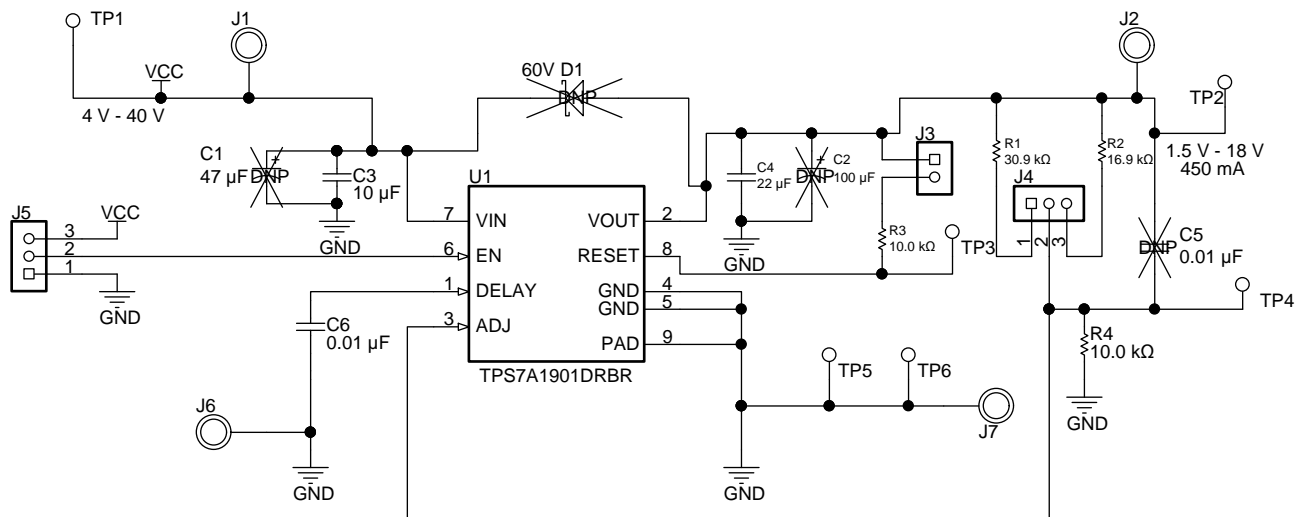


Figure 3. Bottom Layer Routing

5 Schematic

Figure 4 shows the schematic for the EVM.



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NOTE: Capacitors C1, C2 and C5 and diode D1 do not come populated.

Figure 4. TPS7A1901EVM-760 Schematic

6 Bill of Materials

Table 3 lists the Bill of Materials (BOM) for the EVM.

Table 3. TPS7A1901EVM-760 BOM⁽¹⁾⁽²⁾⁽³⁾⁽⁴⁾

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number	Alternate Manufacturer
!PCB1	1		Printed Circuit Board		PWR760	Any	-	-
C3	1	10 μ F	CAP, CERM, 10 μ F, 50 V, \pm 10%, X5R, 1210	1210	GRM32ER61H106 KA12L	MuRata		
C4	1	22 μ F	CAP, CERM, 22 μ F, 35 V, \pm 20%, X5R, 0805	0805	C2012X5R1V226M 125AC	TDK		
C6	1	0.01 μ F	CAP, CERM, 0.01 μ F, 25 V, \pm 5%, C0G/NP0, 0603	0603	C1608C0G1E103J	TDK		
J1, J2	2		Standard Banana Jack, Insulated, Red	6091	6091	Keystone		
J3	1		Header, 2.54 mm, 2 \times 1, Gold, R/A, SMT	Header, 2.54 mm, 2x1, R/A, SMT	87898-0204	Molex		
J4, J5	2		Header, 100 mil, 3 \times 1, Gold, SMT	Samtec_TSM-103-01-X-SV	TSM-103-01-L-SV	Samtec		
J6, J7	2		Standard Banana Jack, Insulated, Black	6092	6092	Keystone		
R1	1	30.9 k	RES, 30.9 k, 1%, 0.1 W, 0603	0603	CRCW060330K9F KEA	Vishay-Dale		
R2	1	16.9 k	RES, 16.9 k, 1%, 0.1 W, 0603	0603	CRCW060316K9F KEA	Vishay-Dale		
R3, R4	2	10.0 k	RES, 10.0 k, 1%, 0.1 W, 0603	0603	CRCW060310K0F KEA	Vishay-Dale		
SH-J1, SH-J2, SH-J3	3	1 \times 2	Shunt, 100 mil, Gold plated, Black	Shunt	969102-0000-DA	3M	SNT-100-BK-G	Samtec
TP1, TP2, TP5, TP6	4	SMT	Test Point, Compact, SMT	Testpoint_Keystone_Compact	5016	Keystone		

(1) These assemblies are ESD sensitive, observe ESD precautions.

(2) These assemblies must be clean and free from flux and all contaminants. Use of no-clean flux is not acceptable.

(3) These assemblies must comply with workmanship standards IPC-A-610 Class 2.

(4) Unless otherwise noted in the Alternate Part Number and/or Alternate Manufacturer columns, all parts may be substituted with equivalents.

Table 3. TPS7A1901EVM-760 BOM⁽¹⁾⁽²⁾⁽³⁾⁽⁴⁾ (continued)

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number	Alternate Manufacturer
TP3, TP4	2	SMT	Test Point, Miniature, SMT	Testpoint_Keystone_Miniature	5015	Keystone		
U1	1		40-V, 450-mA, High-Voltage, Ultra-Low IQ Low-Dropout Regulator, DRB0008B	DRB0008B	TPS7A1901DRBR	Texas Instruments	TPS7A1901DRBT	Texas Instruments
C1	0	47 μ F	CAP, AL, 47 μ F, 50 V, \pm 20%, 0.68 ohm, SMD	F80	EMZA500ADA470 MF80G	Chemi-Con		
C2	0	100 μ F	CAP, AL, 100 μ F, 25 V, \pm 20%, ohm, SMD	F80	EMVE250ADA101 MF80G	Chemi-Con		
C5	0	0.01 μ F	CAP, CERM, 0.01 μ F, 25 V, \pm 5%, C0G/NP0, 0603	0603	C1608C0G1E103J	TDK		
D1	0	60 V	Diode, Schottky, 60 V, 3 A, SOD-123	SOD-123	MBR0560-TP	Micro Commercial Components		
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	Fiducial	N/A	N/A		

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