

TPS60150EVM-359, TPS60151EVM-359

This user's guide describes the characteristics, operation, and use of the TPS60150EVM-359 and TPS60151EVM-359 evaluation modules (EVM). These EVMs have either the TPS60150 or TPS60151 ICs and supporting components configured as a charge pump that provides a 5-V output. This document includes EVM specifications, recommended test setup, test results, bill of materials (BOM), and a schematic diagram.

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1 Introduction

The Texas Instruments TPS6015XEVM-359 evaluation module uses either the TPS60150 or TPS60151 IC and supporting components configured as a charge pump that provides a 5-V output. The goal of the EVM is to facilitate evaluation of the TPS60150 or TPS60151 IC.

1.1 Performance Specification Summary

[Table 1](#) provides a summary of the TPS6015XEVM-359 performance specifications. All specifications are given for an ambient temperature of 25°C.

Table 1. Typical Performance Specification Summary

	Condition	Voltage Range (V)			Current Range (mA)		
		Min	Typ	Max	Min	Typ	Max
V _{OUT}	2.7 V ≤ V _{IN} < 3.1 V	4.8	5.0	5.2	50		
	3.1 V ≤ V _{IN} < 5.5 V				140		

1.2 Modifications

To aid user customization of the EVM, the board was designed with devices having 0603 or larger footprints. A real implementation likely occupies less total board space.

Changing components can improve or degrade EVM performance. For example, adding a larger output capacitor reduces output voltage undershoot but lengthens response time after a load transient event.

2 Input/Output Connector Descriptions

J1–VIN This header is a positive connection to the power input supply (V_{IN}).

J2–GND This header is the return connection for the bias (V_{BIAS}) supply.

J3–VOUT This header is the positive connection for the output load on V_{OUT}.

J4–GND This header is the ground return connection for the output load.

JP1– EN When this jumper is installed to ON, the enable pin (EN) is tied to VIN, thereby enabling the device. When this jumper is moved to OFF, EN is pulled to ground thereby disabling the device.

JP2– LED ON When this jumper is installed, VOUT is connected to the 5 paralleled WLEDs, pulling 75mA.

2.1 Test Setup

The absolute maximum voltage allowed on VIN is 5 V. In order to enable the device, move jumper JP1 to ON. When connecting external loads, use short, twisted leads.

2.2 Test Results

[Figure 1](#) shows the test results at T_A = 25°C using this EVM:

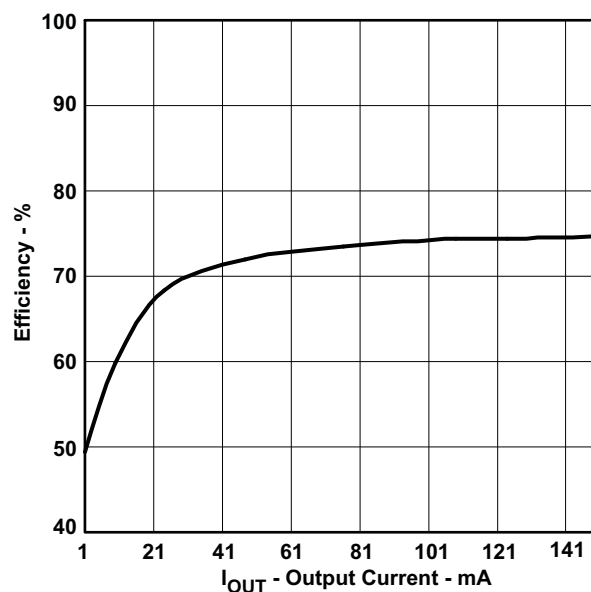


Figure 1. TPS60150 Efficiency with $V_{IN} = 3.3$ V

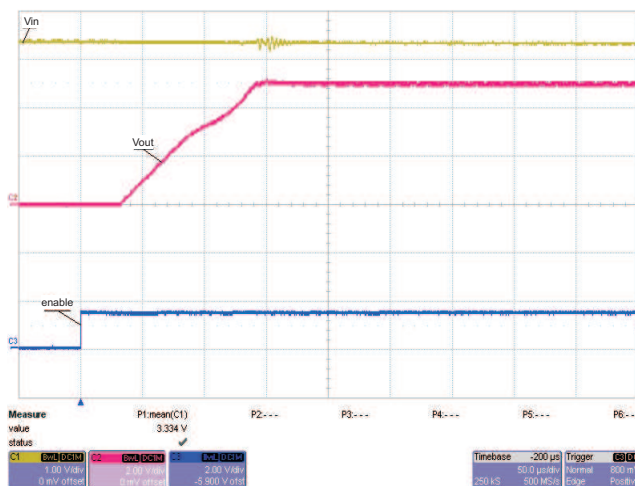


Figure 2. TPS60150 Startup with $V_{IN} = 3.3$ V and $I_{OUT} = 75$ mA

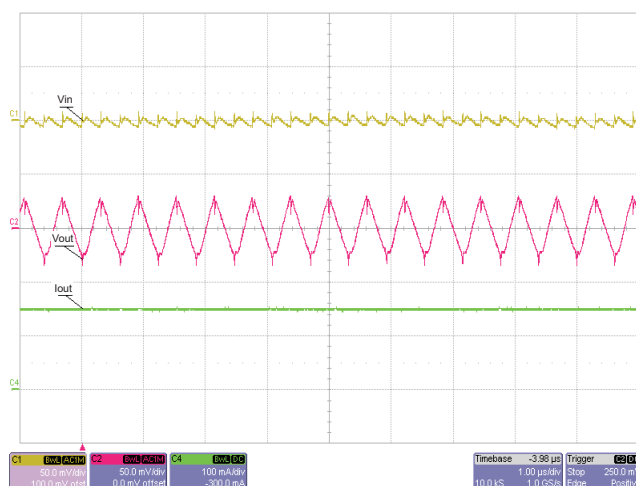


Figure 3. TPS60150 Operation with $V_{IN} = 3.3\text{ V}$ and $I_{OUT} = 150\text{ mA}$

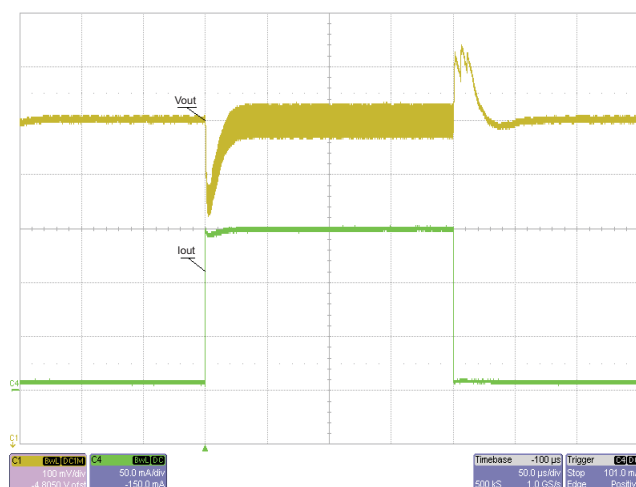


Figure 4. TPS60150 Load Transient with $V_{IN} = 3.3\text{ V}$ and $I_{OUT} = 15\text{ mA}$ to 150 mA

3 Board Layout

Figure 5, Figure 6, and Figure 7 show the board layout for the HPA359 PWB. See the data sheet ([SLVS888](#)) for more specific layout guidelines.

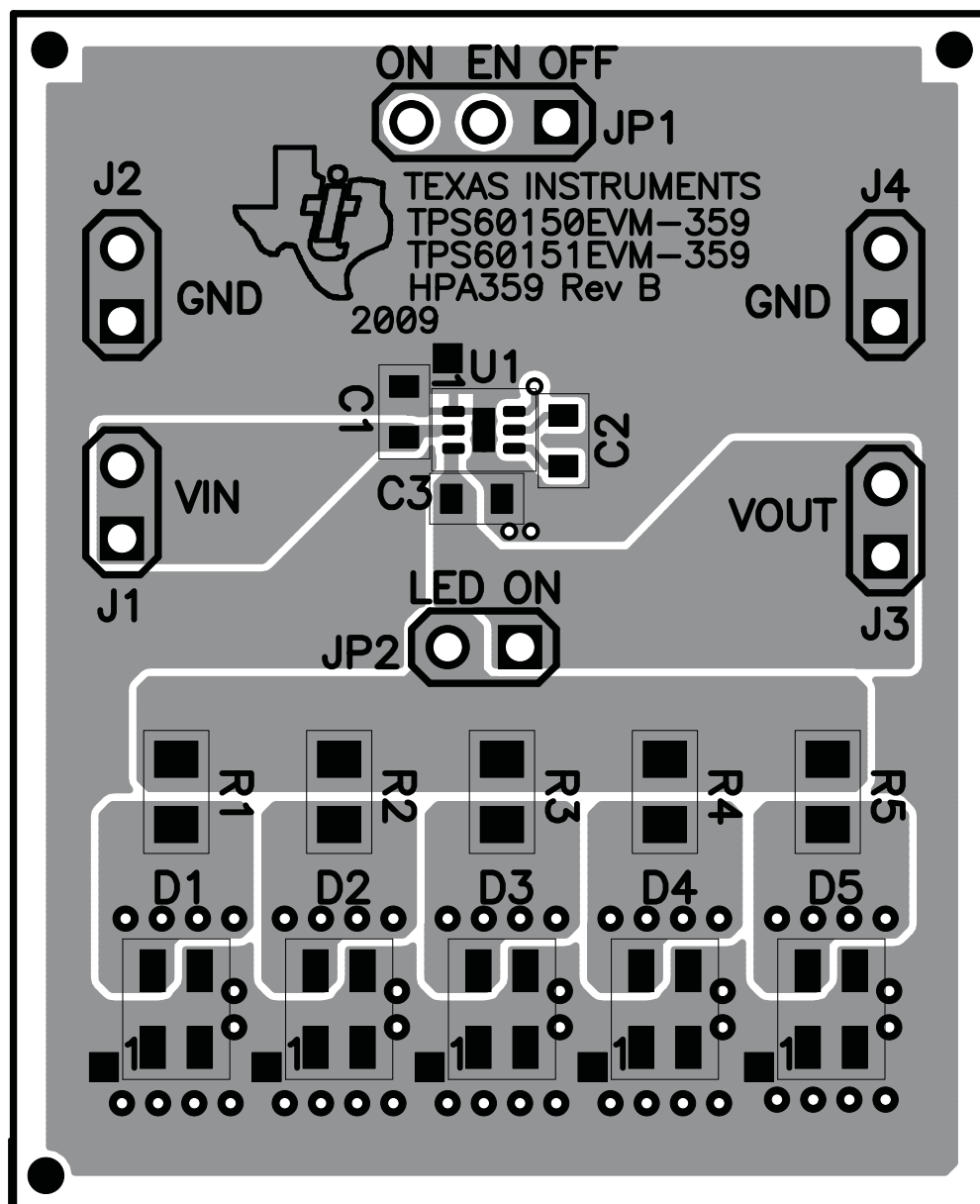


Figure 5. Top Assembly Layer

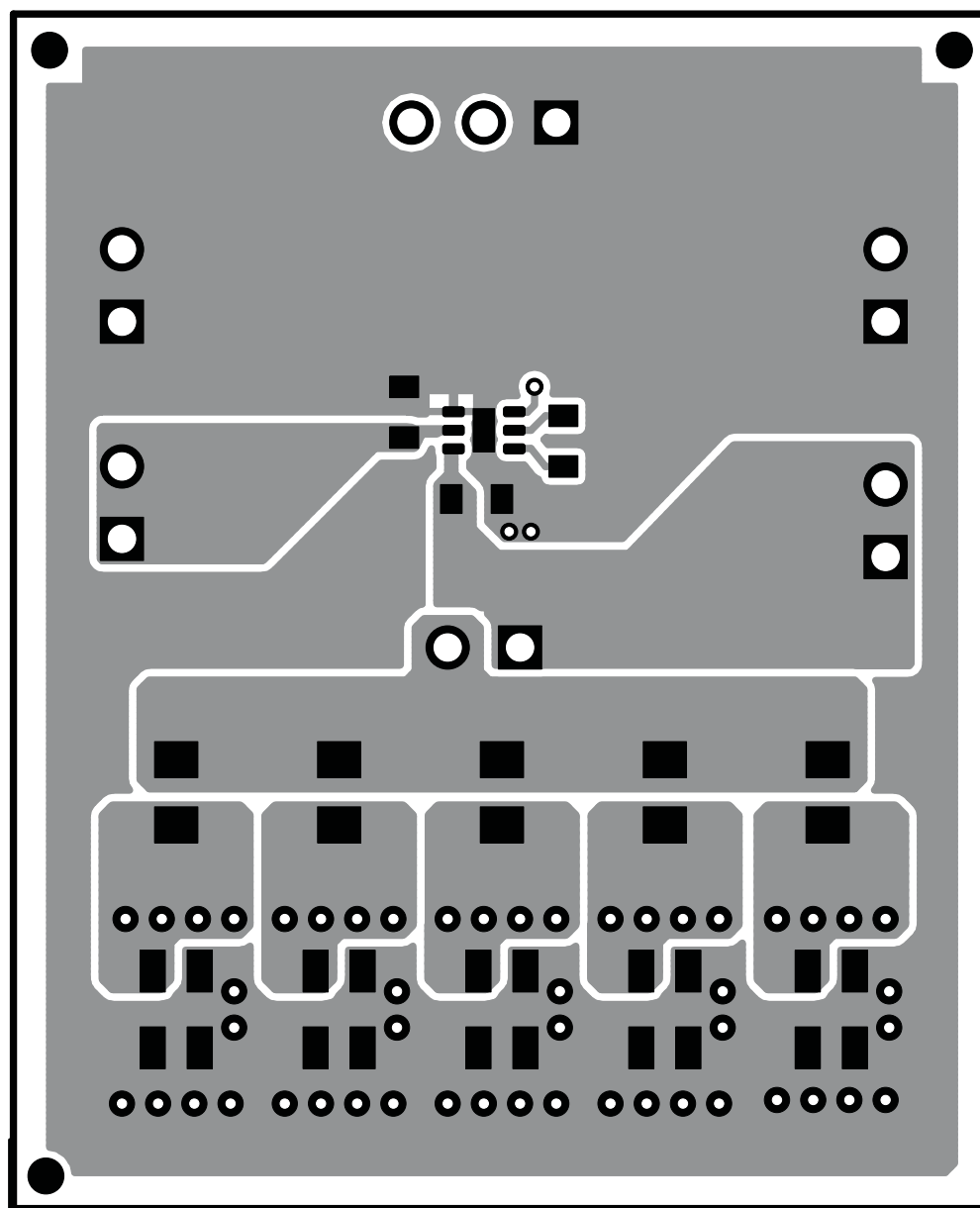


Figure 6. Top Layer

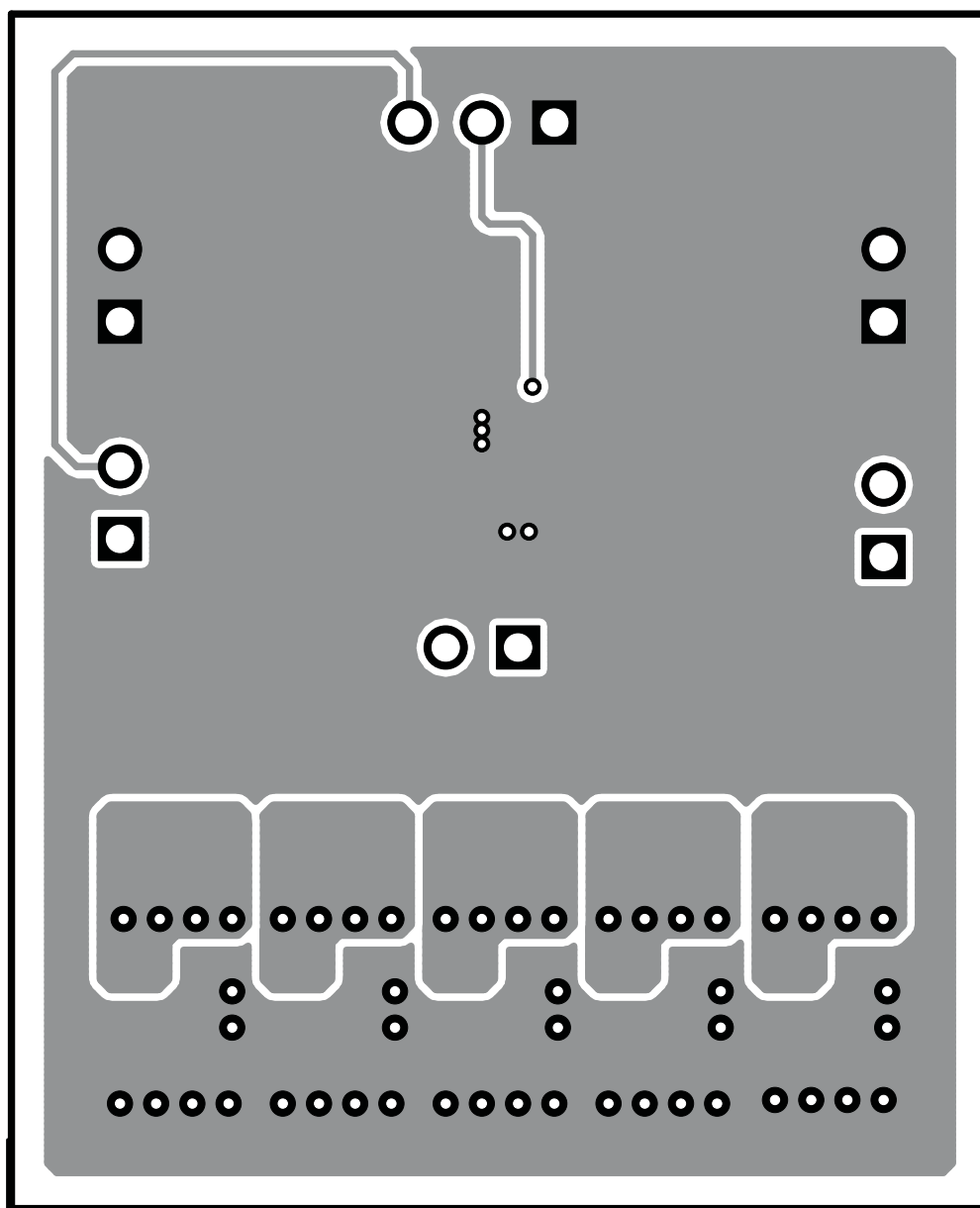


Figure 7. Bottom Layer

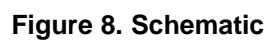
4 Bill of Materials and Schematic

4.1 Bill of Materials

Table 2. HPA359B Bill of Materials

Count							
-001	-002	RefDes	Value	Description	Size	Part Number	MFR
2	2	C1, C3	2.2 μ F	Capacitor, Ceramic, 10V, X5R, 10%	0603	STD	STD
1	1	C2	1 μ F	Capacitor, Ceramic, 10V, X5R, 10%	0603	STD	STD
0	0	D1–D5	LW E67C	Diode, LED, White, 30-mA, Common Anode	P-LCC-4	LW E67C	Osram
4	4	J1–J4	PTC02SAAN	Header, 2-pin, 100mil spacing, (36-pin strip)	0.100 inch x 2	PTC02SAAN	Sullins
1	1	JP1	PTC03SAAN	Header, 3-pin, 100mil spacing, (36-pin strip)	0.100 inch x 3	PTC03SAAN	Sullins
0	0	JP2	PTC02SAAN	Header, 2-pin, 100mil spacing, (36-pin strip)	0.100 inch x 2	PTC02SAAN	Sullins
0	0	R1–R5	Open	Resistor, Chip, 1/10W, 1%	0805	Std	Std
1	0	U1	TPS60150DRV	IC, 150mA Charge Pump	SON	TPS60150DRV	TI
0	1	U1	TPS60151DRV	IC, 150mA Charge Pump	SON	TPS60150DRV	TI
2	2	–		Shunt, 100-mil, Black	0.100	929950-00	3M
1	1			PCB, 1.65" x 1.35" x 0.062"		HPA359	Any

Figure 8 is the schematic for the TPS60150EVM-359.



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EVM Warnings and Restrictions

It is important to operate this EVM within the input voltage range of 3 V to 5 V and the output voltage range of 5 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 25°C. The EVM is designed to operate properly with certain components above 25°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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