TPS2554 and TPS2555 Evaluation Module

This user's guide describes the evaluation module (EVM) for the TPS2554 and TPS2555. TPS2554 and TPS2555 are precision-adjustable, current-limited, power-distribution switches. The document contains an operational description of the EVM, schematic, board layout, and bill of materials.

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1 Description

The TPS2554EVM-010 evaluation module allows reference circuit evaluation of the Texas Instruments TPS2554 and TPS2555 power-distribution switches.

1.1 Features

- Precision adjustable, current-limited, power-distribution switch
- Fast overcurrent response – 1 µs typical
- 80-mΩ, high-side MOSFET
- Operating range: 4.5 V to 5.5 V

1.2 Applications

- USB ports/hubs
- Notebook personal computers (PC)

2 Schematic

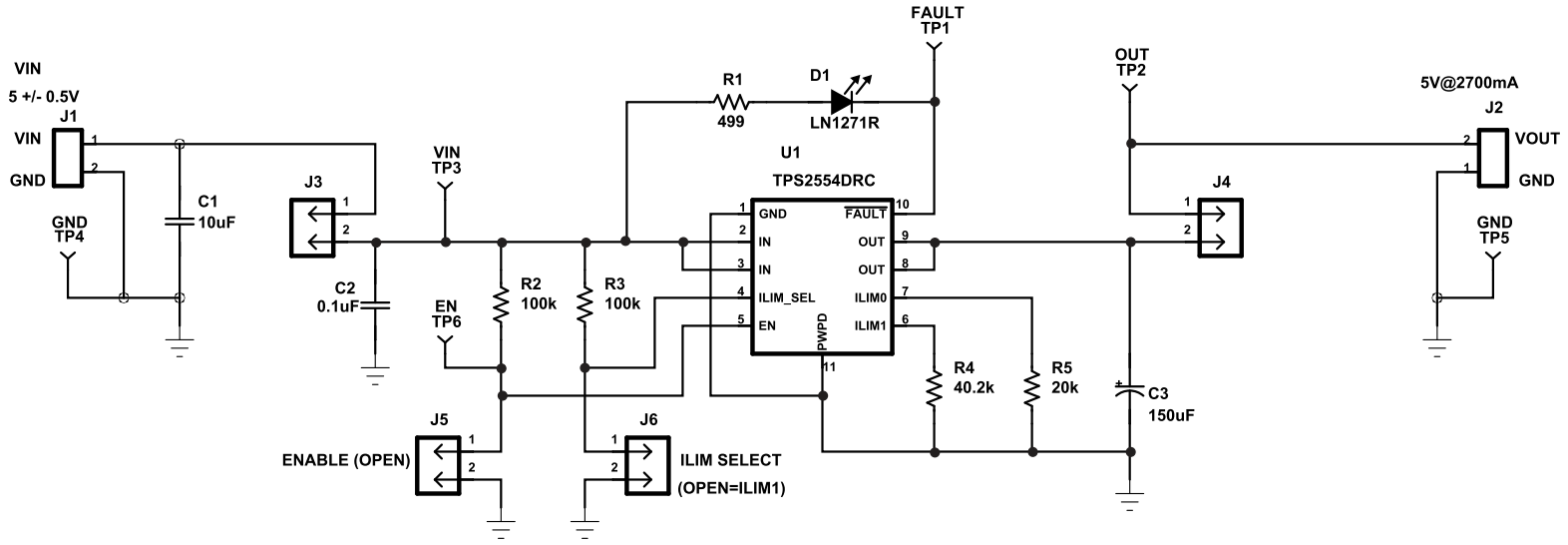

Figure 1. TPS2554/5EVM Schematic

3 General Configuration and Description

3.1 Physical Access

Table 1 lists the TPS2554/5EVM connector functionality, and Table 2 describes the test point availability.

Table 1. User Interface

Connector	Label	Description
J1	VIN	Input connector
J2	VOUT	Output connector
J3	J3	Input voltage jumper. Shunt can be removed to measure input current.
J4	J4	Output voltage jumper. Shunt can be removed to measure output current.
J5	EN	Enable jumper. Leave open to enable TPS2554 and install shunt to enable TPS2555.
J6	ILIM_SEL	Current limit select. Install shunt to select ILIM0 (2.4 A nominal), and remove shunt to select ILIM1 (1.2 A nominal).
D1 (RED)	FLT	Fault LED

Table 2. Test Points

Test Point	Color	Label	Description
TP3	RED	IN	Power switch input (IC side of J3 shunt)
TP4	BLK	GND	Power switch input ground
TP1	WHT	FLT	Fault pin output
TP2	RED	VOUT	Power switch output
TP5	BLK	GND	Power switch output ground
TP6	WHT	EN	Enable pin input

3.2 Current-Limit Setpoint

R4 and R5 configure the current-limit setpoint for ILIM0 and ILIM1, respectively (see J6 in Table 1). ILIM0 or ILIM1 setpoint can be adjusted using the following example by substituting R4 or R5 for R_{ILIMx}. In this example IOS = 2 A.

The following example is an approximation only and does not take into account the resistor tolerance or the variation of ILIM. For exact variation of ILIM, see the TPS2554/TPS2555 data sheet, SLVSAM0.

$IOS = 48000 / R_{ILIMx} = 2\ A$

$R_{ILIMx} = 48000 / IOS = 48000 / 2 = 24000\ \Omega$

Choose $R_{ILIMx} = 23.7\ k\Omega$

$IOS = 48000 / 23700 = 2.03\ A$

3.3 Test Setup

Figure 2 shows a typical test setup for TPS2554/5EVM.

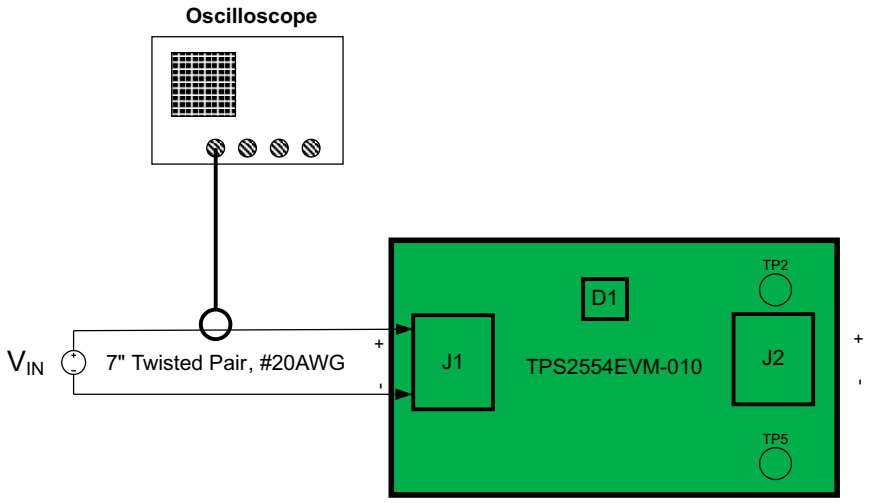

Figure 2. Typical TPS2554/5EVM Test Setup

4 EVM Assembly Drawings and Layout Guidelines

4.1 Layout Guidelines

- **TPS2554/55 placement:** Place the TPS2554/55 near the USB output connector and the 150-µF OUT pin filter capacitor. Connect the exposed pad to the GND pin and the system ground plane using a via array.
- **IN pin bypass capacitance:** Place the 100-nF bypass capacitor near the IN and GND pins, and make the connection using a low-inductance trace.
- **ILIM0 and ILIM1 pin connections:** Current-limit accuracy can be compromised by stray current leakage from a higher voltage source to the ILIM0 or ILIM1 pins. Ensure that adequate spacing exists between IN pin copper/trace and ILIM0 pin trace to prevent contaminate buildup during the PCB assembly process. If a low-current-limit setpoint is required (R_{ILIMx} > 200 kΩ), use ILIM1 for this case, as it is further away from the IN pin.

4.2 PCB Drawings

The Figure 3 through Figure 6 show component placement and layout of the EVM.

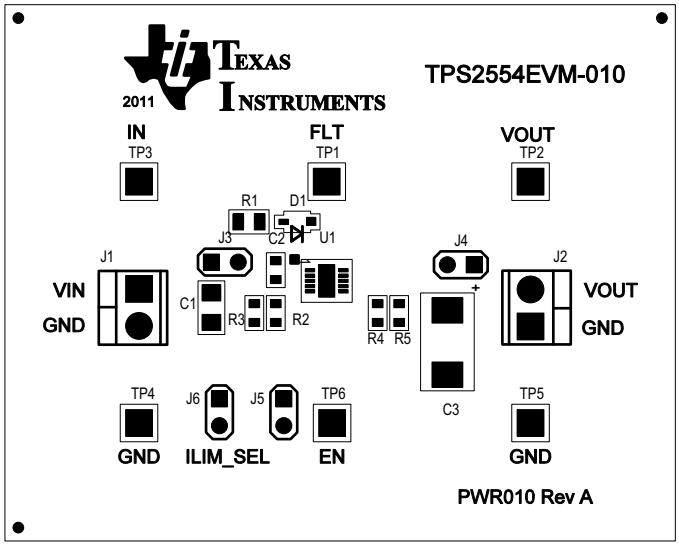

Figure 3. Top-Side Placement and Routing

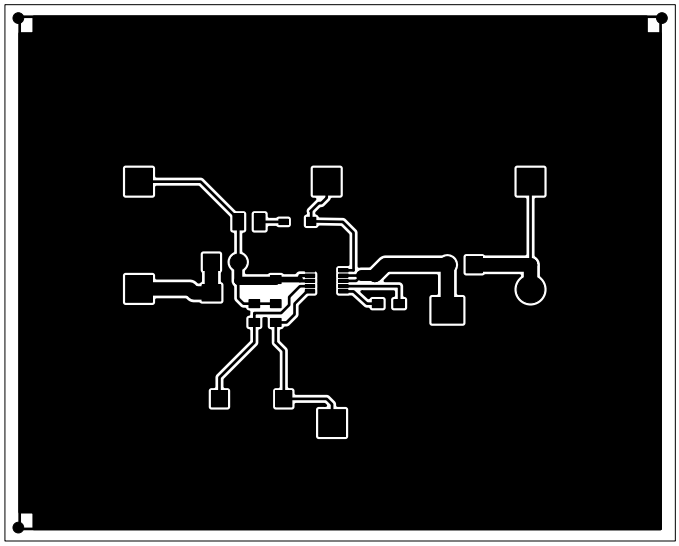

Figure 4. Layer-Two Routing

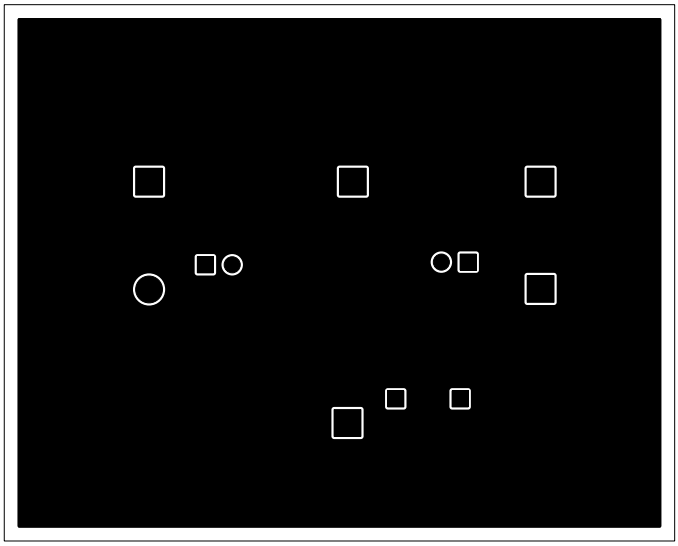

Figure 5. Layer-Three Routing

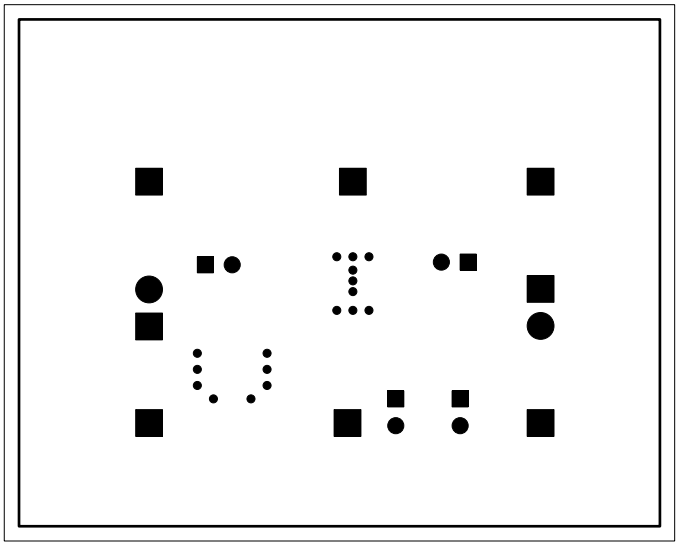

Figure 6. Bottom-Side Placement and Routing

5 Bill of Materials

Table 3. EVM Bill of Materials

Count	RefDes	Value	Description	Size	Part Number	Mfr
1	C2	0.1 µF	Capacitor, Ceramic, 16V, X7R, 10%	603	Std	Std
1	C1	10 µF	Capacitor, Ceramic, 10V, X5R, 10%	1206	Std	Std
1	C3	150 µF	Capacitor, Tant, Low ESR, 10V, ±10%	7343(D)	TPSD157K010R0100	AVX
1	D1	LN1271R	Diode, LED, Red, 20-mA, 0.9-mcd	0.068 x 0.049 inch	LN1271R	Panasonic
4	J3-6	PEC02SAAN	Header, Male 2-pin, 100mil spacing,	0.100 inch x 2	PEC02SAAN	Sullins
2	R2-3	100k	Resistor, Chip, 1/16W, 1%	603	Std	Std
1	R4	40.2k	Resistor, Chip, 1/16W, 1%	603	Std	Std
1	R5	20k	Resistor, Chip, 1/16W, 1%	603	Std	Std
1	R1	499	Resistor, Chip, 1/10W, 1%	805	Std	Std
2	J1-2	ED555/2DS	Terminal Block, 2-pin, 6-A, 3.5mm	0.27 x 0.25 inch	ED555/2DS	OST
2	TP2-3	5010	Test Point, Red, Thru Hole	0.125 x 0.125 inch	5010	Keystone
2	TP4-5	5011	Test Point, Black, Thru Hole	0.125 x 0.125 inch	5011	Keystone
2	TP1 TP6	5012	Test Point, White, Thru Hole	0.125 x 0.125 inch	5012	Keystone
1	U1	TPS2554DRC or TPS2555DRC	IC, Power-Distribution Switch, Current-Limited	SON	TPS2554DRC or TPS2555DRC	TI
4		SJ-5003	BUMPON HEMISPHERE .44X.20 BLACK		SJ-5003	3M
2			Shunt, Black	100-mil	929950-00	3M
1	—		PCB, 2.5 In x 2.0 In x 0.062 In		PWR010	Any

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EVM Warnings and Restrictions

It is important to operate this EVM within the input voltage range of 0 V to 5.5 V and the output voltage range of 0 V to 5.5 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 85°C. The EVM is designed to operate properly with certain components above 85°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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