TPS7A45xxEVM-385

This user's guide describes the characteristics, operation, and use of the TPS7A45xxEVM-385 evaluation module (EVM). This EVM demonstrates the Texas Instruments TPS7A45xx low-noise fast-transient-response 1.5-A low-dropout (LDO) voltage regulator. This user's guide includes setup instructions, a schematic diagram, a bill of materials (BOM), and PCB layout drawings for the EVM.

Topic **Page**

1 Introduction

The TPS7A45xxEVM-385 helps designers evaluate the operation and performance of the TPS7A45xx dc/dc converter. This converter is a 1.5-A low-noise fast-transient-response regulator.

1.1 Related Documentation From Texas Instruments

TPS7A45xx 1.5-A Low-Noise Fast-Transient-Response Low-Dropout Regulator in 5DDPAK/TO-263 package data sheet (SLVS720)

2 Setup

This section describes the jumpers and connectors on the EVM and how to properly connect, set up, and use the TPS7A45xxEVM-385.

2.1 Input/Output Connector Descriptions

2.1.1 J1 – INPUT (4-Wire Power/Sense Option)

This is the positive input supply voltage. Twist the leads to the input supply and keep them as short as possible to minimize EMI transmission.

2.1.2 J3 – IN_GND (4-Wire Power/Sense Option)

This is the return connection for the input power supply of the converter.

2.1.3 J2 – OUTPUT (4-Wire Power/Sense Option)

This is the positive connection from the output. Connect this pin to the positive input of the load.

2.1.4 J4 – OUT_GND (4-Wire Power/Sense Option)

This is the return connection for the output.

2.1.5 JP1 –ENABLE

This jumper enables or disables the regulator. Connecting the shorting jumper between pins 1 and 2 (VIN and EN) enables the converter. Connecting the shorting jumper between pins 2 and 3 (EN and GND) disables the converter. Do not leave this pin floating.

2.1.6 JP2 – MODE

This jumper sets the mode of the TPS7A45xx. Connecting the shorting jumper between pins 1 and 2 forces the TPS7A45xx into fixed-output mode. Use this setting with fixed-output devices only. Remove J8 shorting jumper for adjustable-output devices.

For adjustable-output devices, the output voltage may be selected using these equations:

$V_{OUT} = 1.21\ (1 + R2 / R1) + I_{ADJ} \times R2$

$I_{ADJ} = 1.21 / R1$

$R1 < 4.17\ k\Omega$

3 Operation

Connect the positive input power supply to J1. Connect the input power return (ground) to J3. The TPS7A45xx device has an absolute maximum input voltage of 20 V. The recommended maximum operating voltage is 20 V.

Connect the desired load between J2 and J4. The TPS7A45xx device can supply up to 1.5 A of output current.

Configure jumpers JP1 and JP2 as required. The functions of JP1 and JP2 are described in Section 2.1.5 and Section 2.1.6, respectively.

4 Test Results

The following figures show typical responses of the TPS7A45xx to line and load transients.

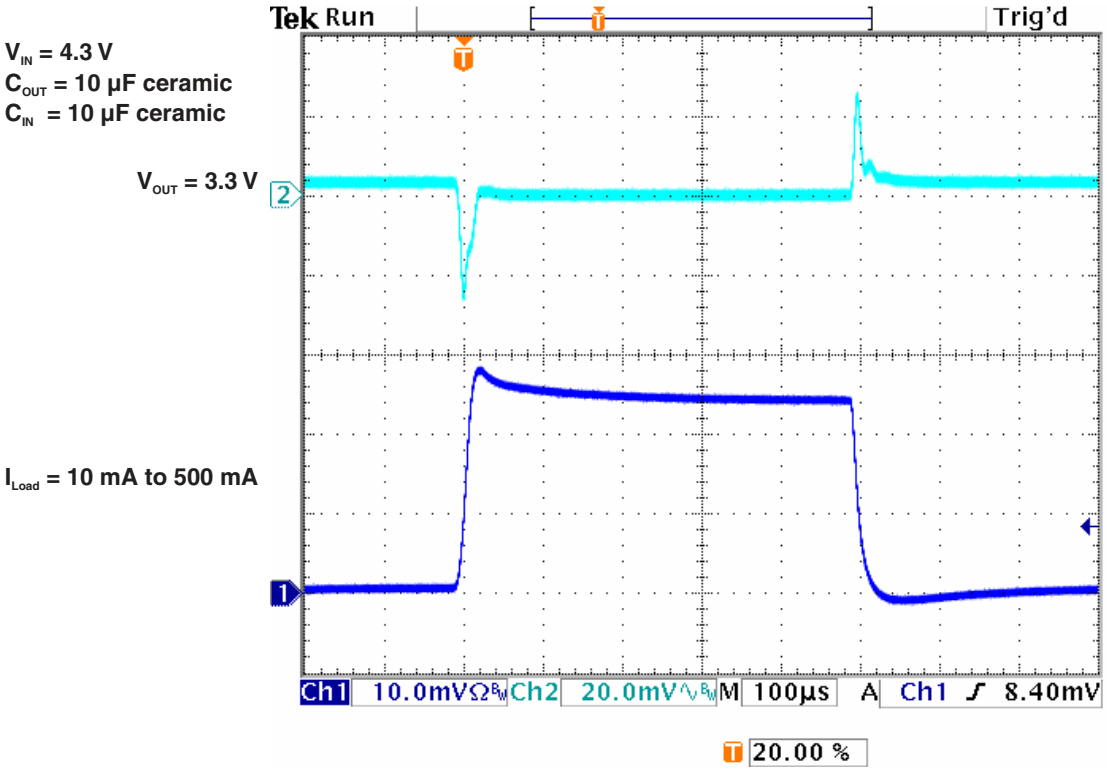

Figure 1. Load Transient Response (I_{Load} = 10 mA to 500 mA)

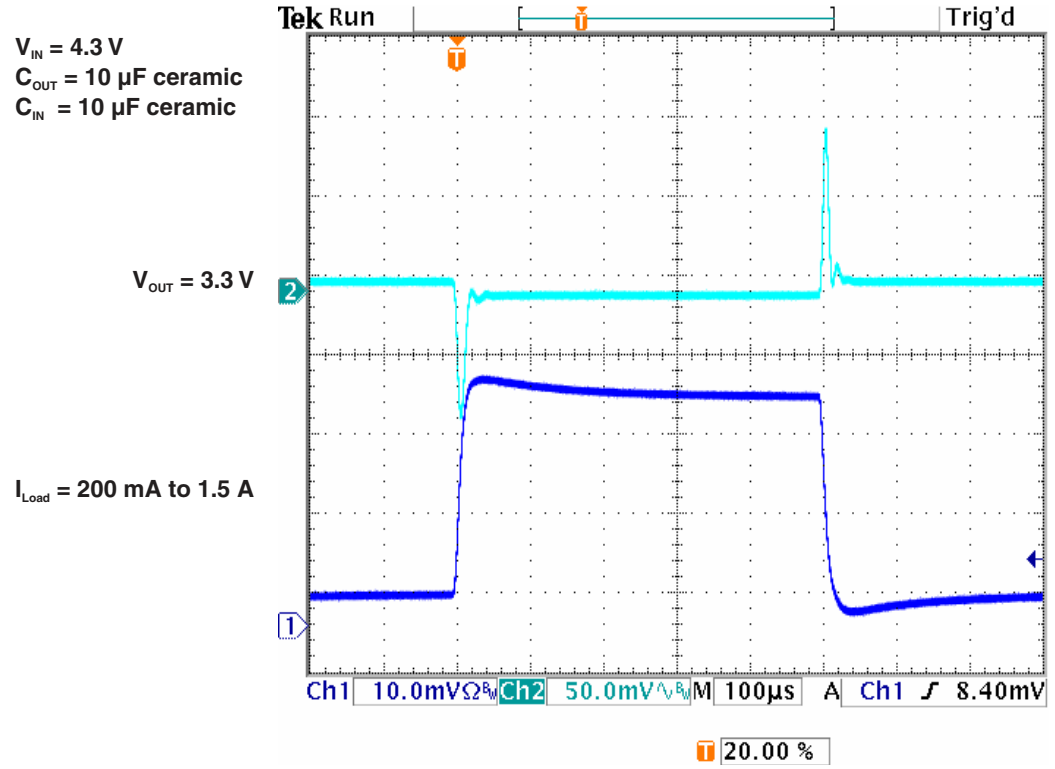

Figure 2. Load Transient Response (I_{Load} = 200 mA to 1.5 A)

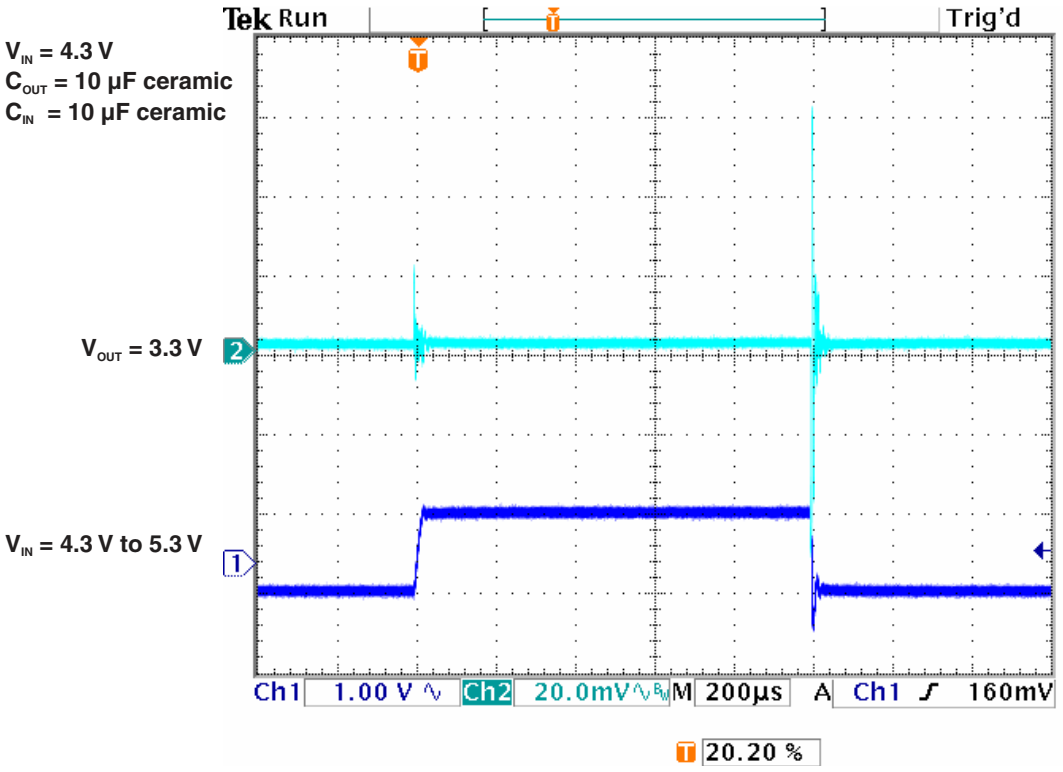

Figure 3. Line Transient Response (V_{IN} = 4.3 V to 5.3 V)

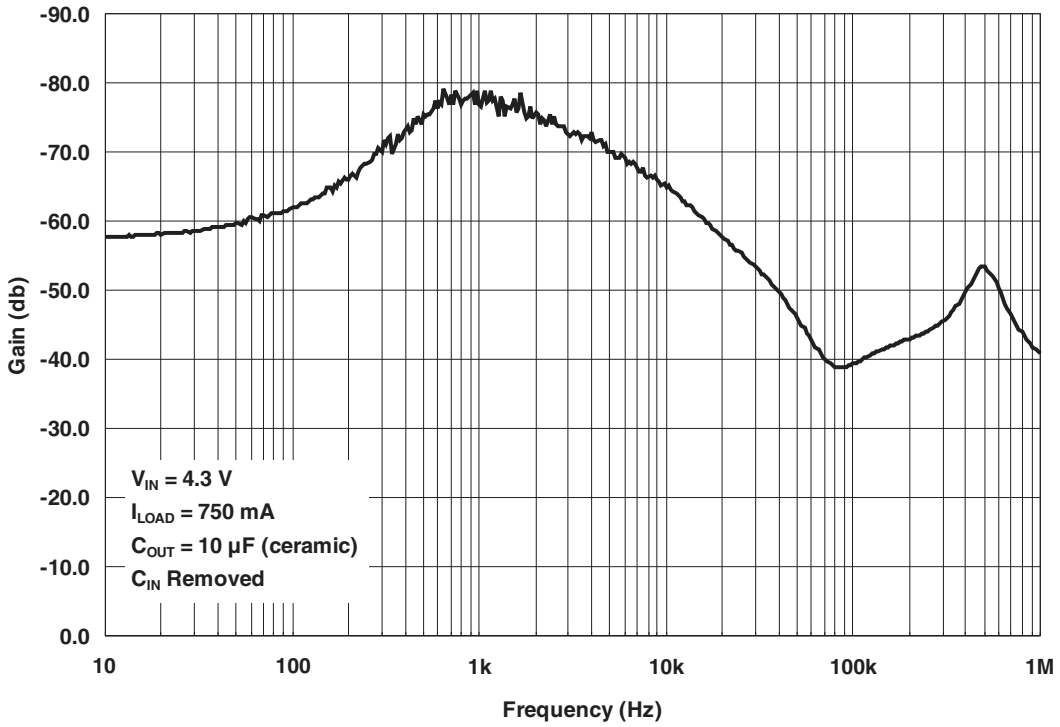

Figure 4. Power-Supply Ripple Rejection

5 Board Layout

The following figures show the board layout of the EVM.

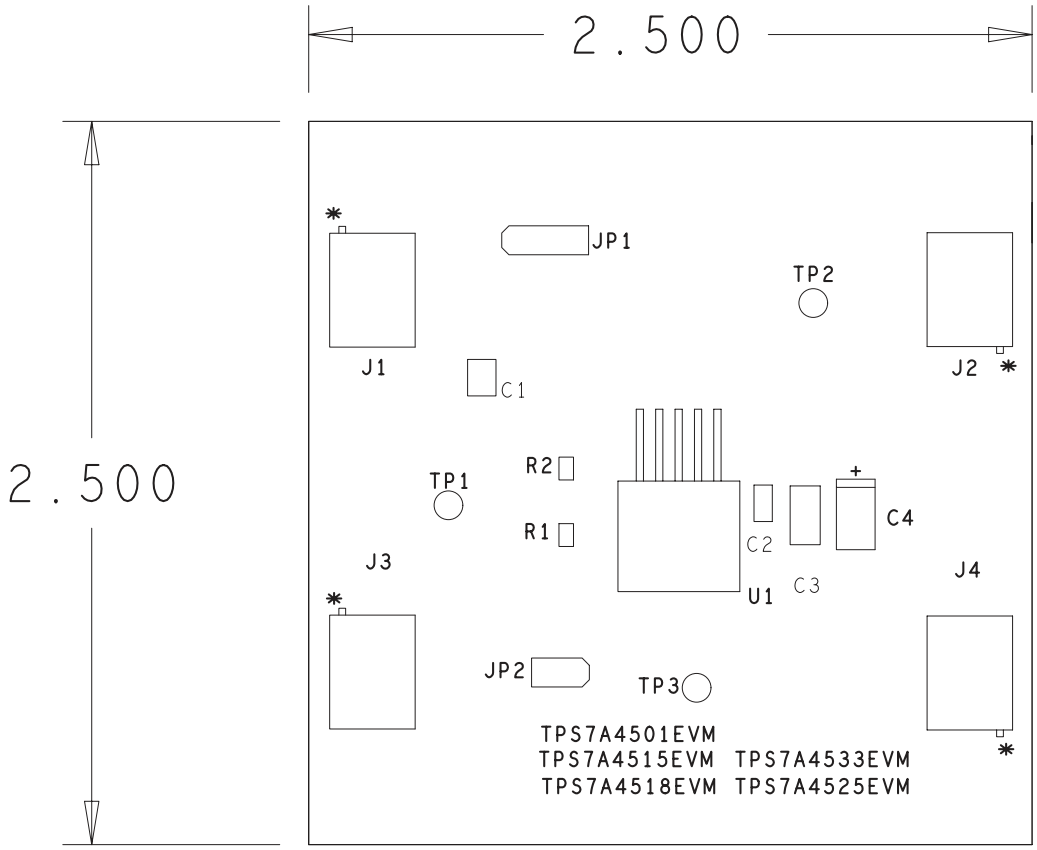

Figure 5. EVM Board Layout (1 of 4)

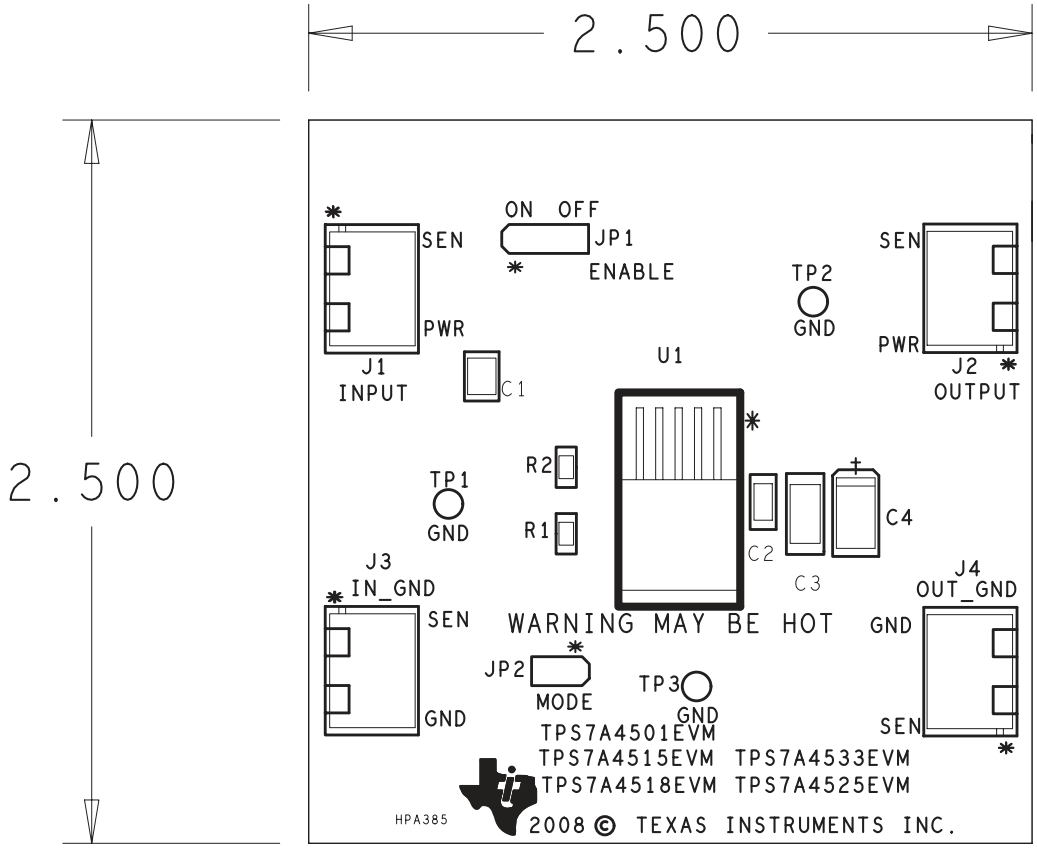

Figure 6. EVM Board Layout (2 of 4)

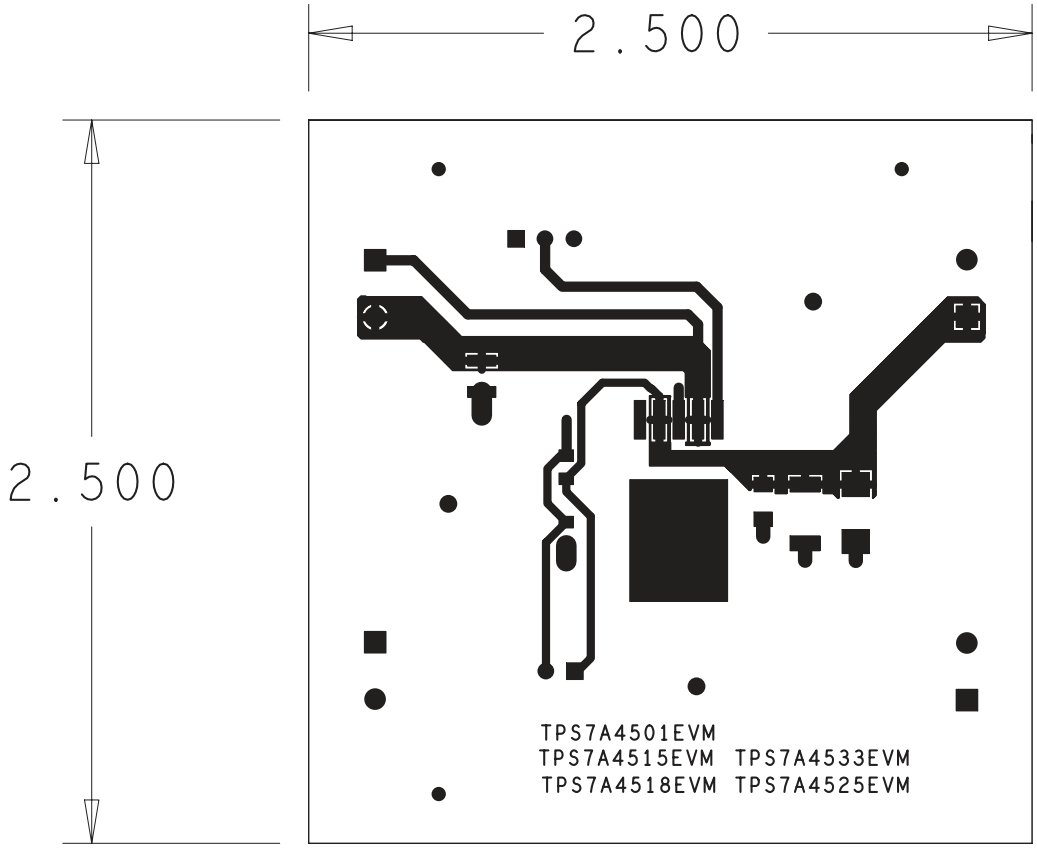

Figure 7. EVM Board Layout (3 of 4)

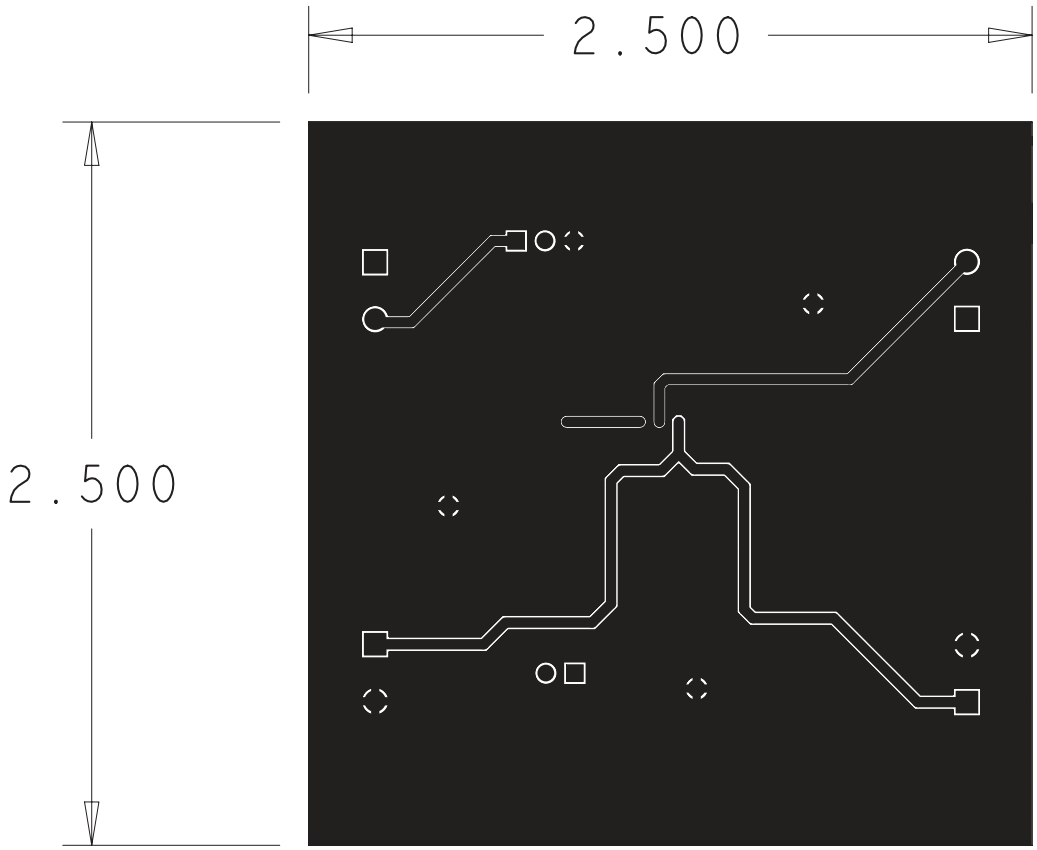

Figure 8. EVM Board Layout (4 of 4)

6 Schematic and Bill of Materials (BOM)

Figure 9 shows the EVM schematic. Table 1 shows the EVM BOM.

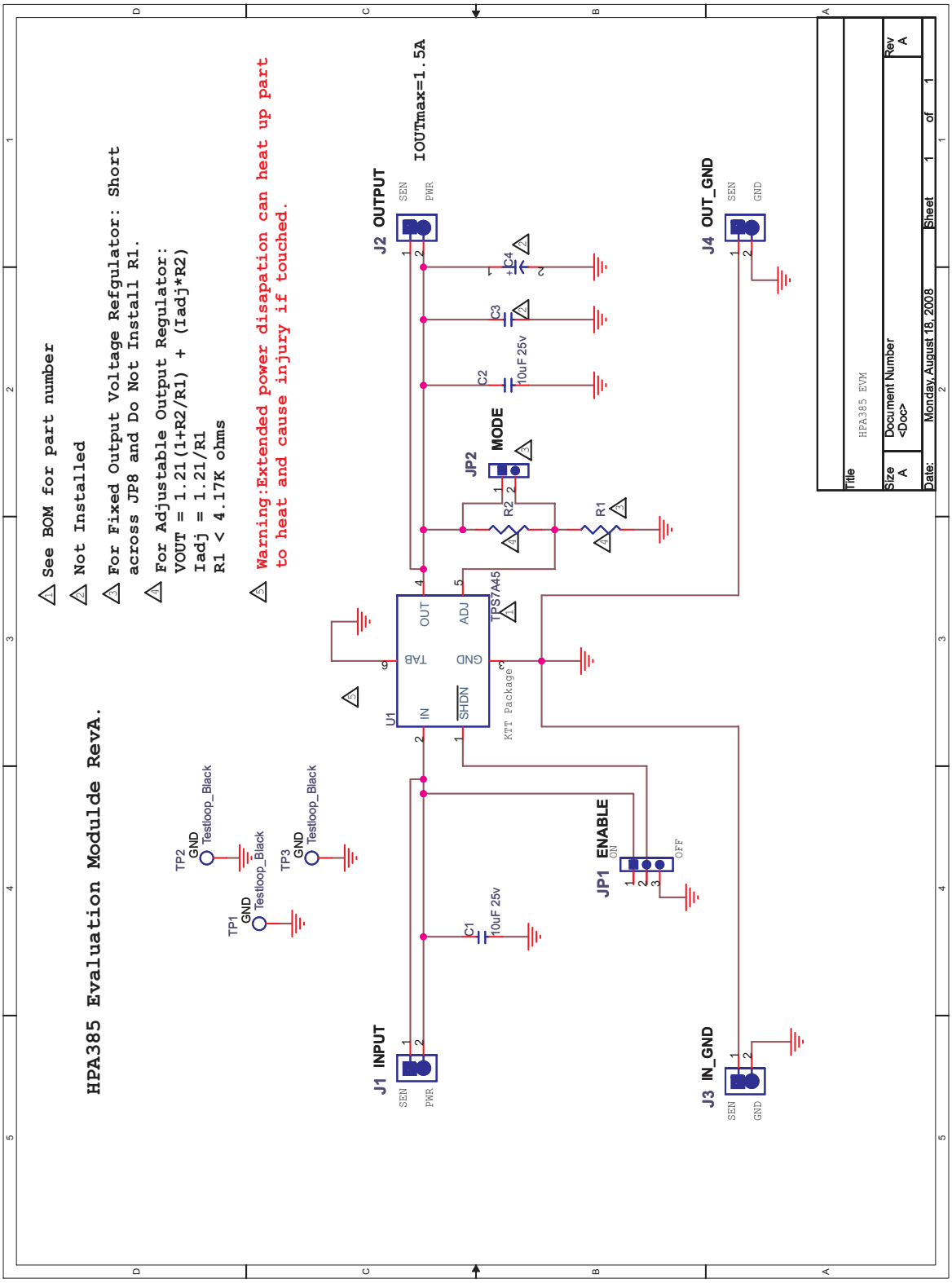

Figure 9. EVM Schematic

Table 1. HPA285 EVM Bill of Materials[(1)(2)(3)(4)]

Count					Reference Designator	Value	Description	Size	Part Number	Manu-facturer
01	02	03	04	05						
1	1	1	1	1	--	HPA385	PCB, HPA385	2.5 in x 2.5 in x 0.062 in	HPA385	Any
1	1	1	1	1	C1	10 µF	Capacitor, ceramic, 10 µF, 25 V, X5R	1210	GCM32ER71E 106KA57L	MuRata
1	1	1	1	1	C2	10 µF	Capacitor, ceramic, 10 µF, 25 V, X5R	1206	GRM31CR61E 106KA12L	MuRata
0	0	0	0	0	C3	Selected by user	Capacitor, ceramic	2010	Std	Std
0	0	0	0	0	C4	Selected by user	Capacitor, tantalum	C	Std	Std
4	4	4	4	4	J1, J2, J3, J4	MKDS 1/2-3,5BK	Connector terminal block, 1x2 pos	2POS 5MM	1711026	Phoenix
1	1	1	1	1	JP2	HMTSW-102-07-G-S-.230	Header, 2 pin, 100-mil spacing	0.100 in x 2	HMTSW-102-07-G-S-.230	Samtec
1	1	1	1	1	JP1	HMTSW-103-07-G-S-.230	Header, 3 pin, 100-mil spacing	0.100 in x 3	HMTSW-103-07-G-S-.231	Samtec
0	0	0	0	0	R1	Selected by user	Resistor, chip,value, 1/8 W, 5%	805	Std	Std
0	0	0	0	0	R2	Selected by user	Resistor, chip,value, 1/8 W, 5%	805	Std	Std
4	4	4	4	4	--	--	Hardware 1/4-in screw 4/40 handle mtg	4/40 x 0.250 in	9900	Keystone Electronics
4	4	4	4	4	SO1, SO2, SO3, SO4	--	Standoff, round, 4/40 x 0.250 in, aluminum	4/40 x 0.250 in	2025	Keystone Electronics
3	3	3	3	3	TP1, TP2, TP3	Black	Testpoint	.050 in dia	TP-105-01-00	Bisco
1	0	0	0	0	U1	TPS7A4501	IC, single chip, low noise 1.5 A, low dropout regulator, adjustable output 1.21 V to 20 V	5DDPAK/ TO263	TPS7A4501	TI
0	1	0	0	0	U1	TPS7A4515	IC, single chip, low noise 1.5 A, low dropout regulator, fixed output 1.5 V	5DDPAK/ TO263	TPS7A4515	TI
0	0	1	0	0	U1	TPS7A4518	IC, single chip, low noise 1.5A, low dropout regulator, fixed output 1.8 V	5DDPAK/ TO263	TPS7A4518	TI
0	0	0	1	0	U1	TPS7A4525	IC, single chip, low noise 1.5 A, low dropout regulator, fixed output 2.5 V	5DDPAK/ TO263	TPS7A4525	TI
0	0	0	0	1	U1	TPS7A4533	IC, single chip, low noise 1.5 A, low dropout regulator, fixed output 3.3 V	5DDPAK/ TO263	TPS7A4533	TI
4	4	4	4	4	1	NA	Shunt, 100 mil, black	0.100	929950-00	3M

(1) These assemblies are ESD sensitive, ESD precautions must observed.
(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) Reference designators marked with an asterisk (*) cannot be substituted. All other components can be substituted with equivalent manufacturers components.

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 2 V to 20 V and the output voltage range of 0.6 V to 6 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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