User's Guide

TPS552882EVM-2MHz Evaluation Module

ABSTRACT

This user's guide describes the characteristics, operation, and the use of the TPS552882EVM-2MHz evaluation module (EVM). The EVM contains the TPS552882 device, which is a high-performance, high-efficiency synchronous buck-boost converter which integrates two 16-A MOSFETs at the boost leg. The user's guide includes EVM specifications, recommended test setup, test result, schematic diagram, bill of materials, and the board layout.

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Trademarks

1 Introduction

1.1 Performance Specification

Table 1-1 provides a summary of the TPS552882 EVM performance specifications. All specifications are given for an ambient temperature of 25°C.

Table 1-1. Performance Specification Summary

Parameter	Test Condition	Value	Unit
Input Voltage	N/A	2.7 - 36	V
Output Voltage	N/A	0.8 - 20	V
Maximum Output Current	V_{IN} ≥ 4.5 V, V_{OUT} = 5 V	5	A
	V_{IN} ≥ 5 V, V_{OUT} = 9 V	3	
	V_{IN} ≥ 10 V, V_{OUT} = 15 V		
	V_{IN} ≥ 15 V, V_{OUT} = 20 V		
Default Switching Frequency	N/A	2	MHz

1.2 Modification

The printed-circuit board (PCB) for this EVM is designed to accommodate some modifications by the user. The external component can be changed according to the real application.

2 Connector, Test Point and Jumper Descriptions

This section describes how to properly connect, set up, and use the TPS552882EVM-2MHz.

2.1 Connector and Test Point Descriptions

This EVM includes I/O connectors and test points as shown in Table 2-1. The power supply must be connected to input connectors, J1 and J2. The load must be connected to output connectors, J3 and J4.

Table 2-1. Connectors and Test Points

Reference Designator	Description
J1	Input voltage positive connection
J2	Input voltage return connection
J3	Output voltage connection
J4	Output voltage return connection

2.2 Jumper Configuration

2.2.1 JP1 (ENABLE)

The JP1 jumper enables the device. By default, this jumper is set to the ON position. Put this jumper in the OFF position to disable the output.

2.2.2 JP2(SYNC)

The JP2 jumper is for the frequency dithering selection. Placing a jumper across JP2 disables the frequency dithering function. Left JP2 opens when using frequency dithering function.

3 Test Procedure

Use the following steps for the test procedure:

1. Set the power supply current limit to 10 A. Set the power supply to something around 12 V. Turn off the power supply. Connect the positive output of the power supply to J1 and the negative output to J2.
2. Connect the load to J3 for the positive connection and J4 for the negative connection.
3. Turn on the power supply.
4. Slowly increase the load while monitoring the output voltage between J3 and J4. It must remain in regulation when the load current is lower than 3 A.
5. Slowly sweep the input voltage from 5 V to 20 V. The output voltage must remain in regulation when the load current is lower than the maximum load current specified in Table 2-1.
6. Turn off the load, turn off the power supply. Then turn on the load to discharge the output capacitors.

4 Schematic, Bill of Materials, and Board Layout

This section provides the TPS552882EVM-2MHz schematic, bill of materials (BOM), and board layout.

4.1 Schematic

Figure 4-1 shows the EVM schematic.

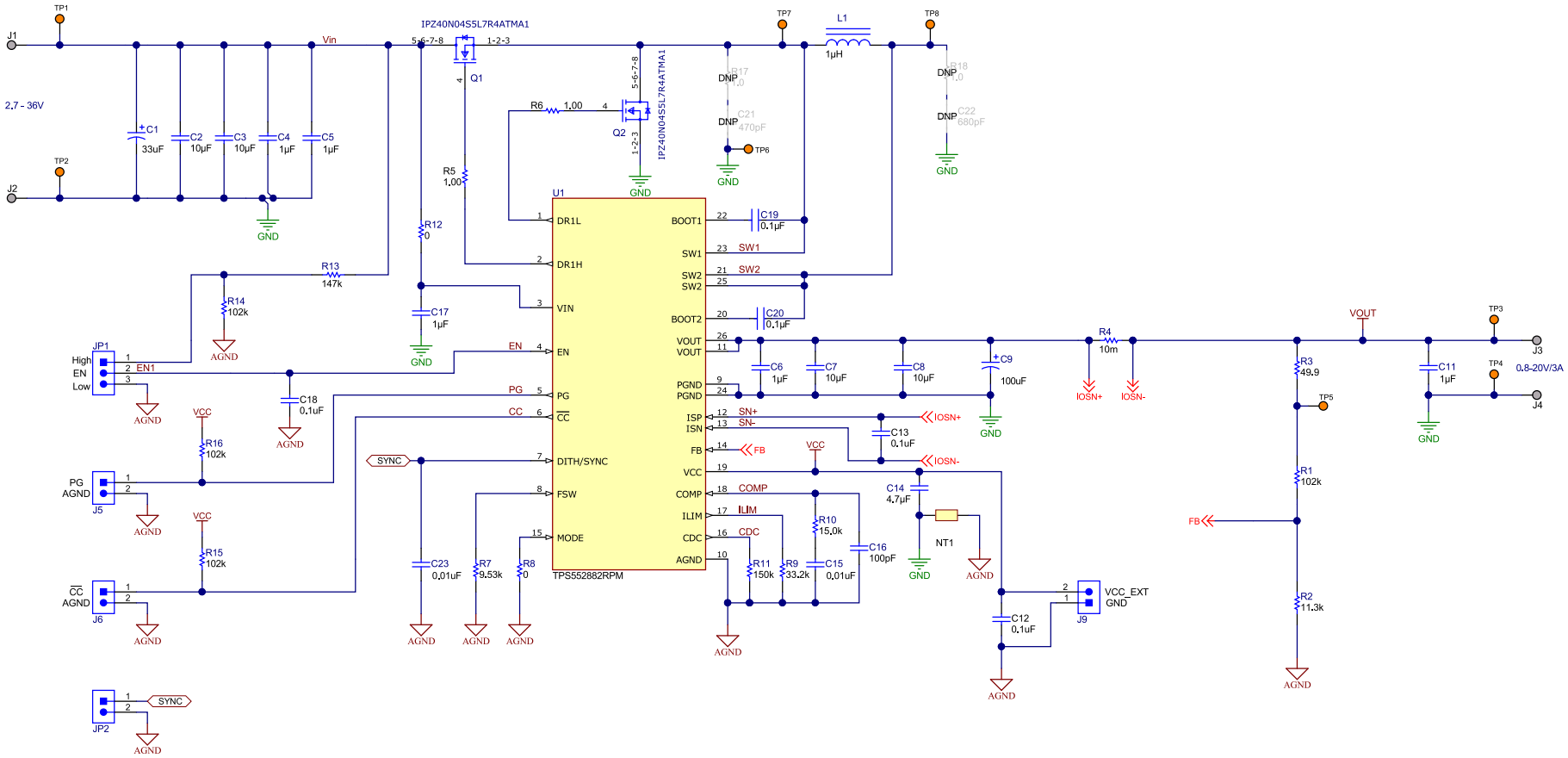

Figure 4-1. TPS552882EVM-2MHz Schematic

4.2 Bill of Materials

Table 4-1 lists the EVM bill of materials.

Table 4-1. Bill of Materials

Designator	QTY	Value	Description	Package	Part Number	Manufacturer
C1	1	33uF	CAP, Polymer Hybrid, 33 uF, 50 V, ±20%, 40 ohm, 6.3x7.7 SMD	6.3x7.7	EEHZA1H330XP	Panasonic
C2, C3	2	10uF	CAP, CERM, 10 µF, 75 V, ±20%, X7R, AEC-Q200 Grade 1, 1210	1210	CGA6P1X7R1N106M250AC	TDK
C4, C5, C6, C11, C17	5	1uF	CAP, CERM, 1 µF, 50 V, ±20%, X5R, AEC-Q200 Grade 3, 0603	0603	GRT188R61H105ME13D	MuRata
C7, C8	2	10uF	CAP, CERM, 10 µF, 50 V, ±10%, X7R, AEC-Q200 Grade 1, 1206	1206	CGA5L1X7R1H106K160AC	TDK
C9	1	100uF	CAP, Polymer Hybrid, 100 uF, 25 V, ±20%, 30 ohm, 6.3x7.7 SMD	6.3x7.7	EEHZA1E101XP	Panasonic
C12, C13, C18	3	0.1uF	CAP, CERM, 0.1 uF, 50 V, ±10%, X7R, AEC-Q200 Grade 1, 0402	0402	CGA2B3X7R1H104K050BB	TDK
C14	1	4.7uF	CAP, CERM, 4.7 µF, 16 V, ±10%, X5R, AEC-Q200 Grade 3, 0603	0603	GRT188R61C475KE13D	MuRata
C15, C23	2	0.01uF	CAP, CERM, 0.01 uF, 50 V, ±10%, X7R, AEC-Q200 Grade 1, 0402	0402	CGA2B3X7R1H103K050BB	TDK
C16	1	100pF	CAP, CERM, 100 pF, 50 V, ±5%, C0G/NP0, AEC-Q200 Grade 1, 0402	0402	CGA2B2C0G1H101J050BA	TDK
C19, C20	2		0.1µF ±10% 50V Ceramic Capacitor X8L 0603 (1608 Metric)	0603	GCM188L81H104KA57D	Murata Electronics North America
J1, J2, J3, J4	4		Terminal, Turret, TH, Double	Keystone1502-2	1502-2	Keystone
J5, J6, J9, JP2	4		Header, 100mil, 2x1, Tin, TH	Header, 2 PIN, 100mil, Tin	PEC02SAAN	Sullins Connector Solutions
JP1	1		Header, 100mil, 3x1, Tin, TH	Header, 3 PIN, 100mil, Tin	PEC03SAAN	Sullins Connector Solutions
L1	1	1uH	Inductor, Shielded, Composite, 1 µH, 18 A, 0.00618 ohm, AEC-Q200 Grade 1, SMD	IND_6.4x3.1x6.6	XAL6030-102MEB	Coilcraft
Q1, Q2	2		NPN LO RA 150 MM PGTL M12	TSDSON-8	IPZ40N04S5L7R4ATMA1	Infineon
R1, R14, R15, R16	4	102k	RES, 102 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402102KFKED	Vishay-Dale
R2	1	11.3k	RES, 11.3 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040211K3FKED	Vishay-Dale
R3	1	49.9	RES, 49.9, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040249R9FKED	Vishay-Dale
R4	1		10 mOhms ±1% 1W Chip Resistor 1206 (3216 Metric) Automotive AEC-Q200, Current Sense, Moisture Resistant Metal Element	1206	CRF1206-FZ-R010ELF	Bourns
R5, R6	2	1.00	RES, 1.00, 1%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	CRCW06031R00FKEA	Vishay-Dale
R7	1	9.53k	RES, 9.53 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW04029K53FKED	Vishay-Dale
R8	1	0	RES, 0, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW04020000Z0ED	Vishay-Dale
R9	1	33.2k	RES, 33.2 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040233K2FKED	Vishay-Dale
R10	1	15.0k	RES, 15.0 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040215K0FKED	Vishay-Dale
R11	1	150k	RES, 150 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402150KFKED	Vishay-Dale
R12	1	0	RES, 0, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	CRCW06030000Z0EA	Vishay-Dale

Table 4-1. Bill of Materials (continued)

Designator	QTY	Value	Description	Package	Part Number	Manufacturer
R13	1	147k	RES, 147 k, 1%, 0.1 W, 0603	0603	RC0603FR-07147KL	Yageo
TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8	8	Orange	Test Point, Miniature, Orange, TH	Orange Miniature Testpoint	5003	Keystone
U1	1		36-V, 16-A Buck-boost Converter	VQFN-HR26	TPS552882RPM	Texas Instruments
C21	0		Multilayer Ceramic Capacitors MLCC - 470pF 100V 0603	0603	GRT1885C2A471JA02D	Murata
C22	0		680pF ±5% 100V Ceramic Capacitor C0G,0603 (1608 Metric)	0603	GRT1885C2A681JA02D	Murata
R17, R18	0	1.0	RES, 1.0, 5%, 0.5 W, 1206	1206	CRM1206-JW-1R0ELF	Bourns

4.3 Board Layout

Figure 4-2 through Figure 4-5 illustrate the EVM board layouts.

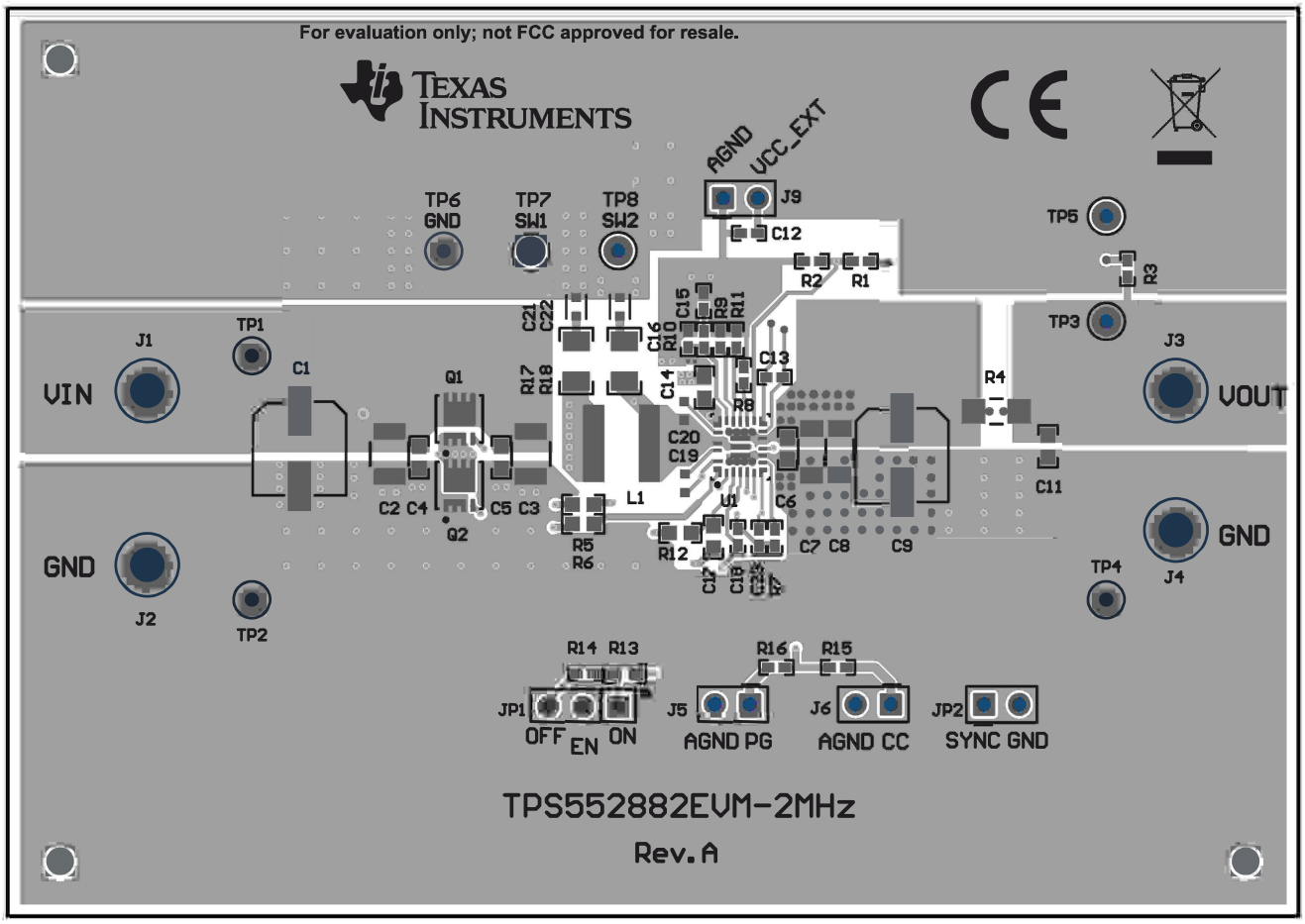

Figure 4-2. TPS552882EVM-2MHz Top-Side Layout

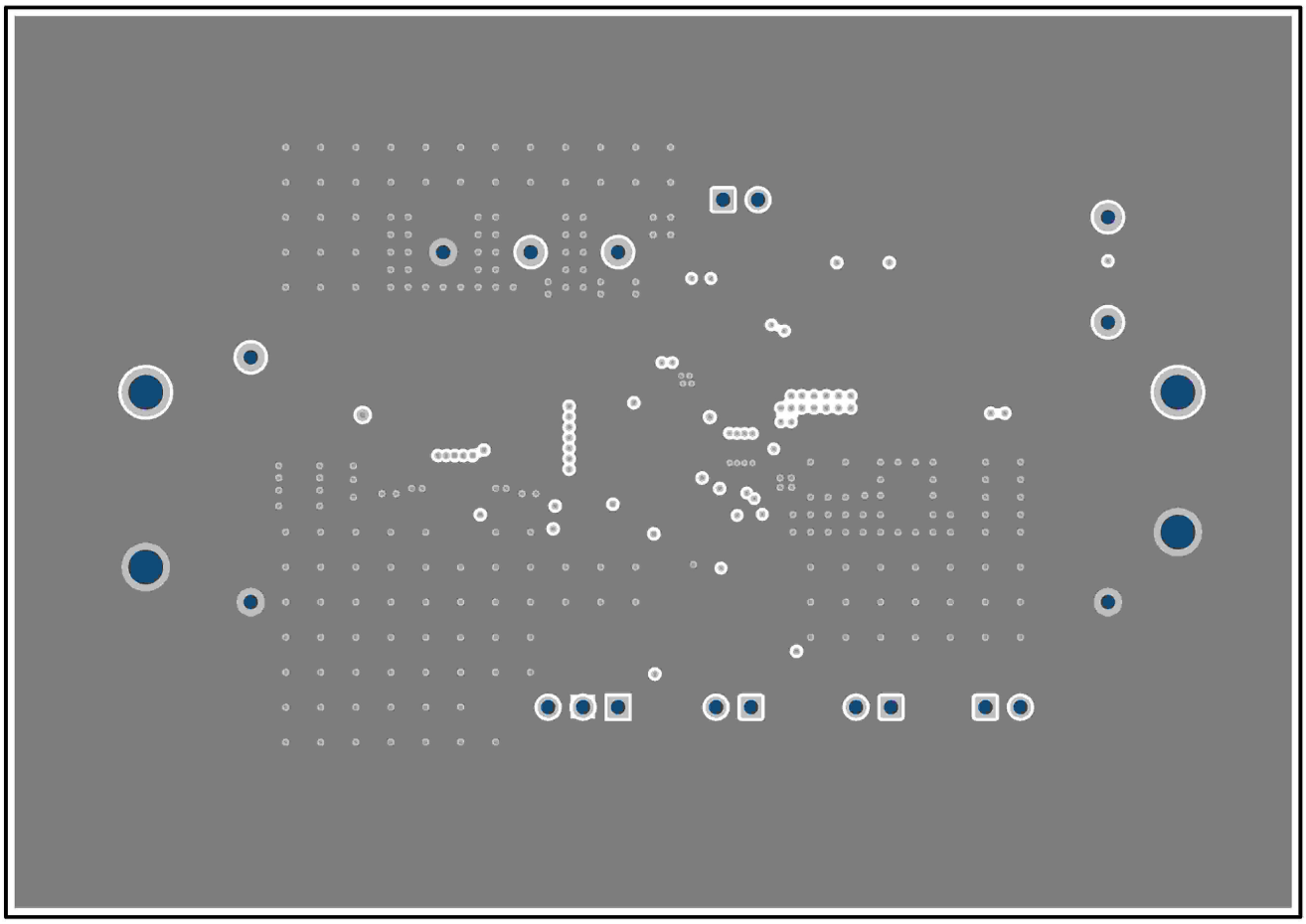

Figure 4-3. TPS552882EVM-2MHz Inner Layer1

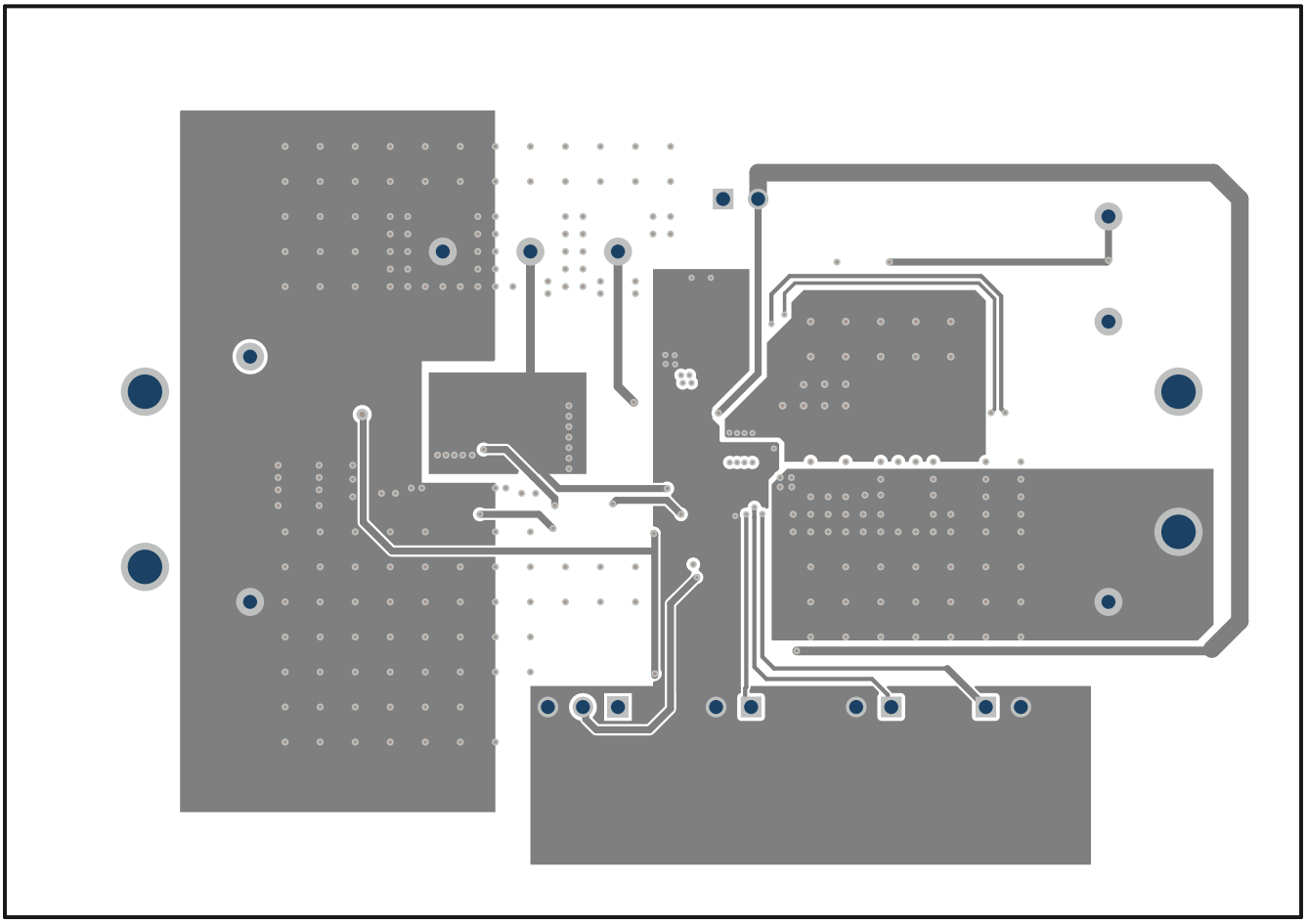

Figure 4-4. TPS552882EVM-2MHz Inner Layer2

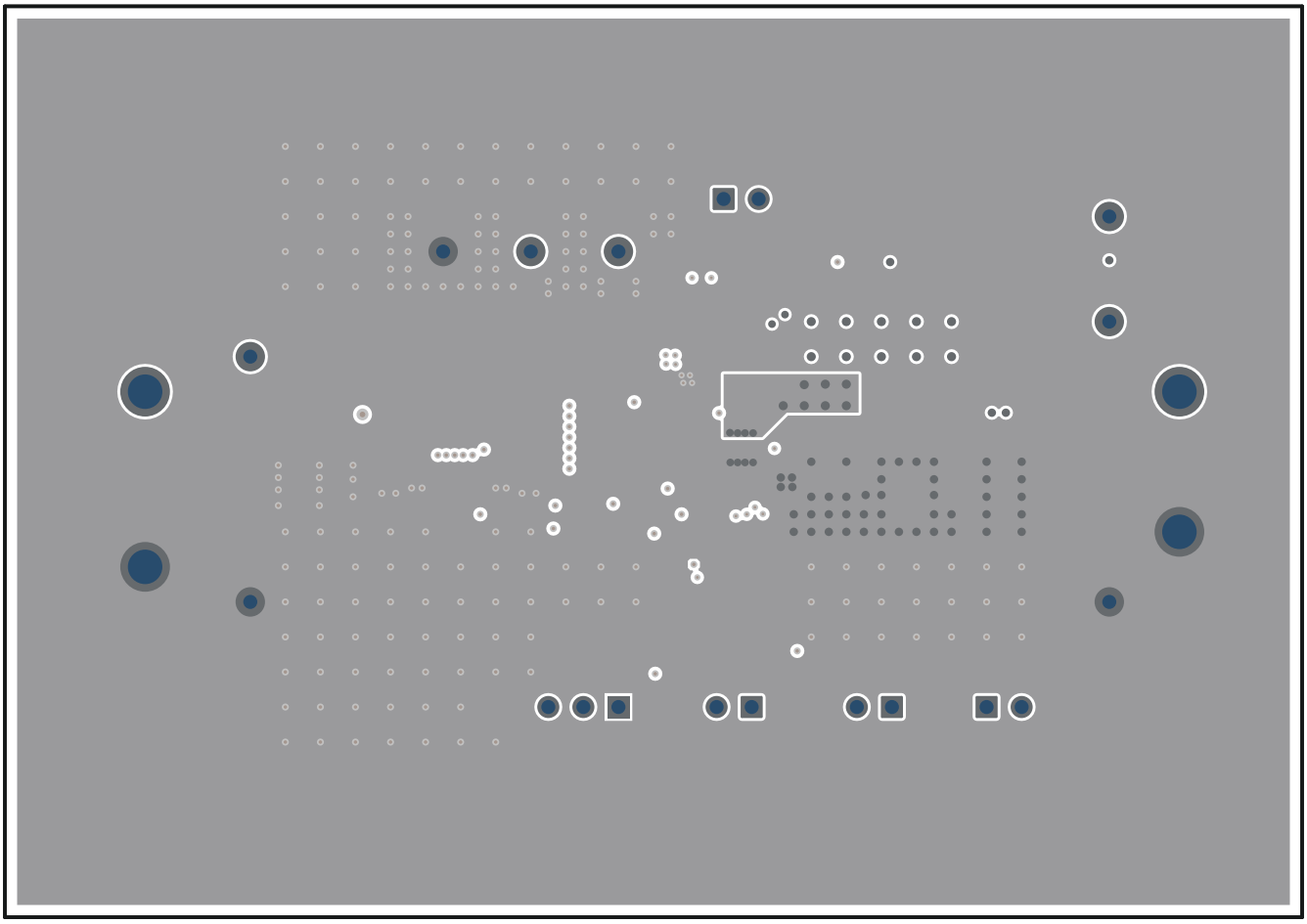

Figure 4-5. TPS552882EVM-2MHz Bottom-Side Layout

5 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision * (December 2020) to Revision A (October 2020)	Page
• Updated the numbering format for tables, figures, and cross-references throughout the document	2
• Changed all images in the Board Layout section	7

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