



## 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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## 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      | $V_{IN} \geq 4.5 \text{ V}, V_{OUT} = 5 \text{ V}$ | 5        | A    |
|                             | $V_{IN} \geq 5 \text{ V}, V_{OUT} = 9 \text{ V}$   | 3        |      |
|                             | $V_{IN} \geq 10 \text{ V}, V_{OUT} = 15 \text{ V}$ |          |      |
|                             | $V_{IN} \geq 15 \text{ V}, V_{OUT} = 20 \text{ V}$ |          |      |
| 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.

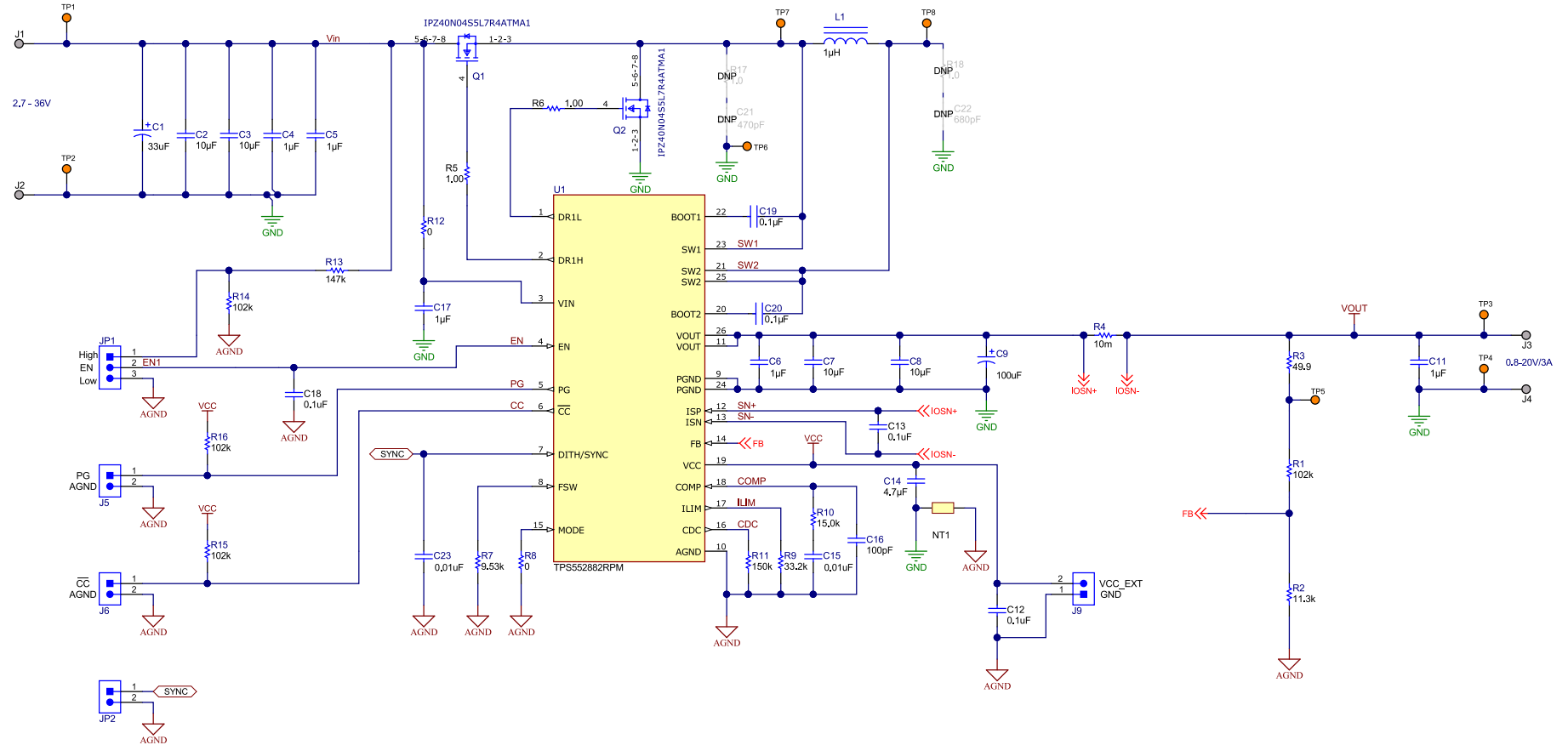


Figure 4-1. TPS552882EVM-2MHz Schematic

## 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,<br>TP5, TP6, TP7, TP8 | 8   | Orange | Test Point, Miniature, Orange, TH                       | Orange<br>Miniature<br>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.

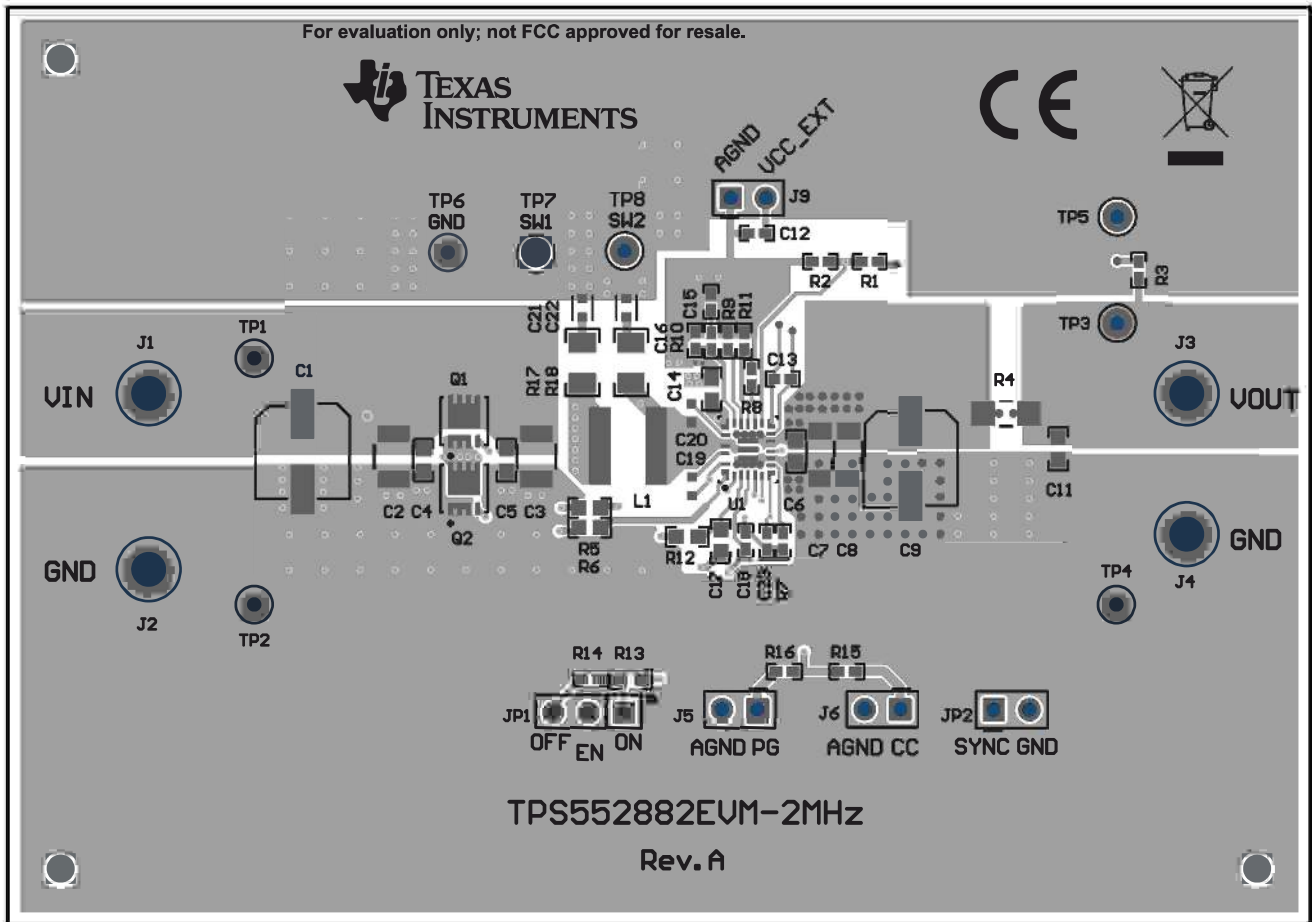


Figure 4-2. TPS552882EVM-2MHz Top-Side Layout

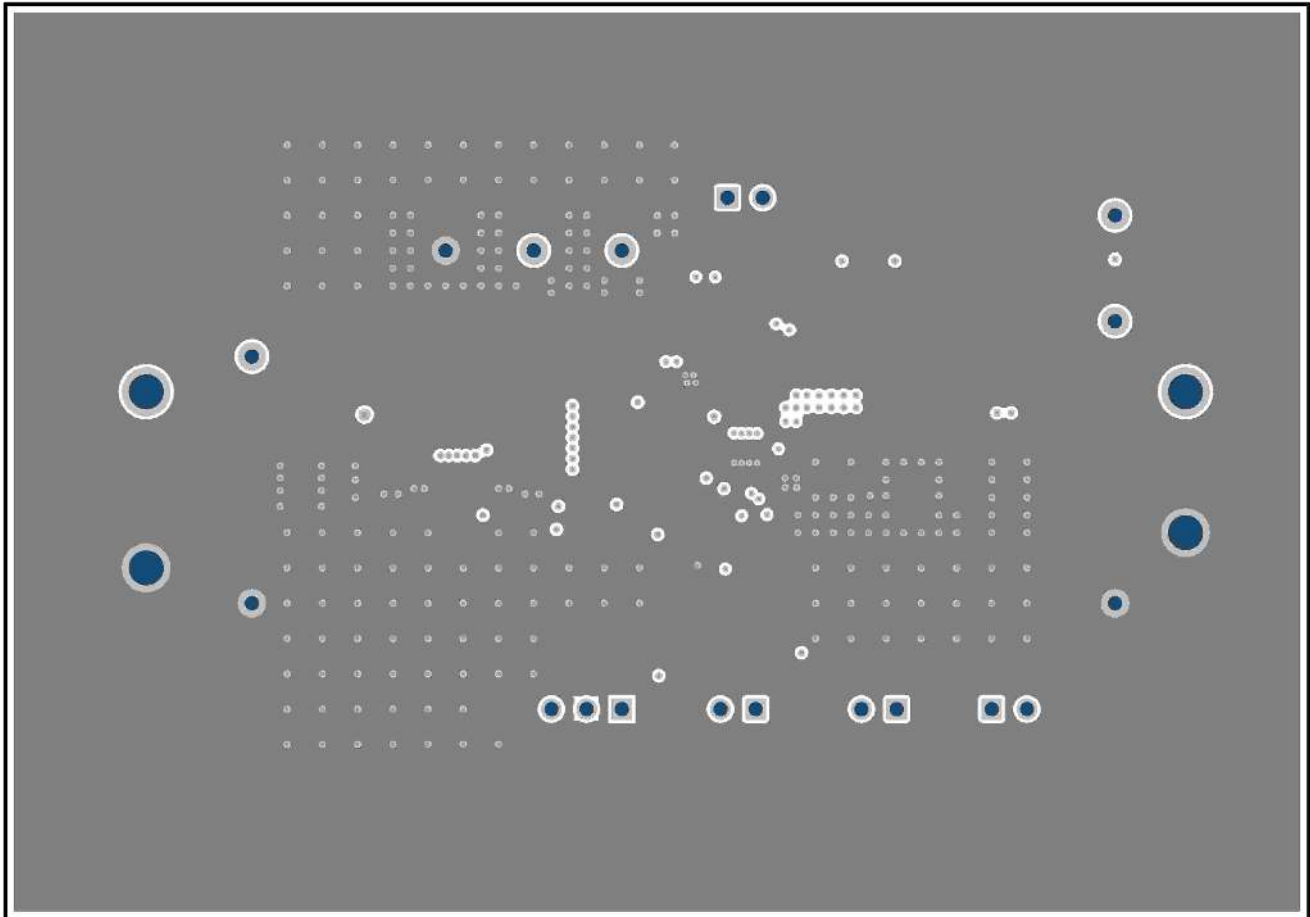
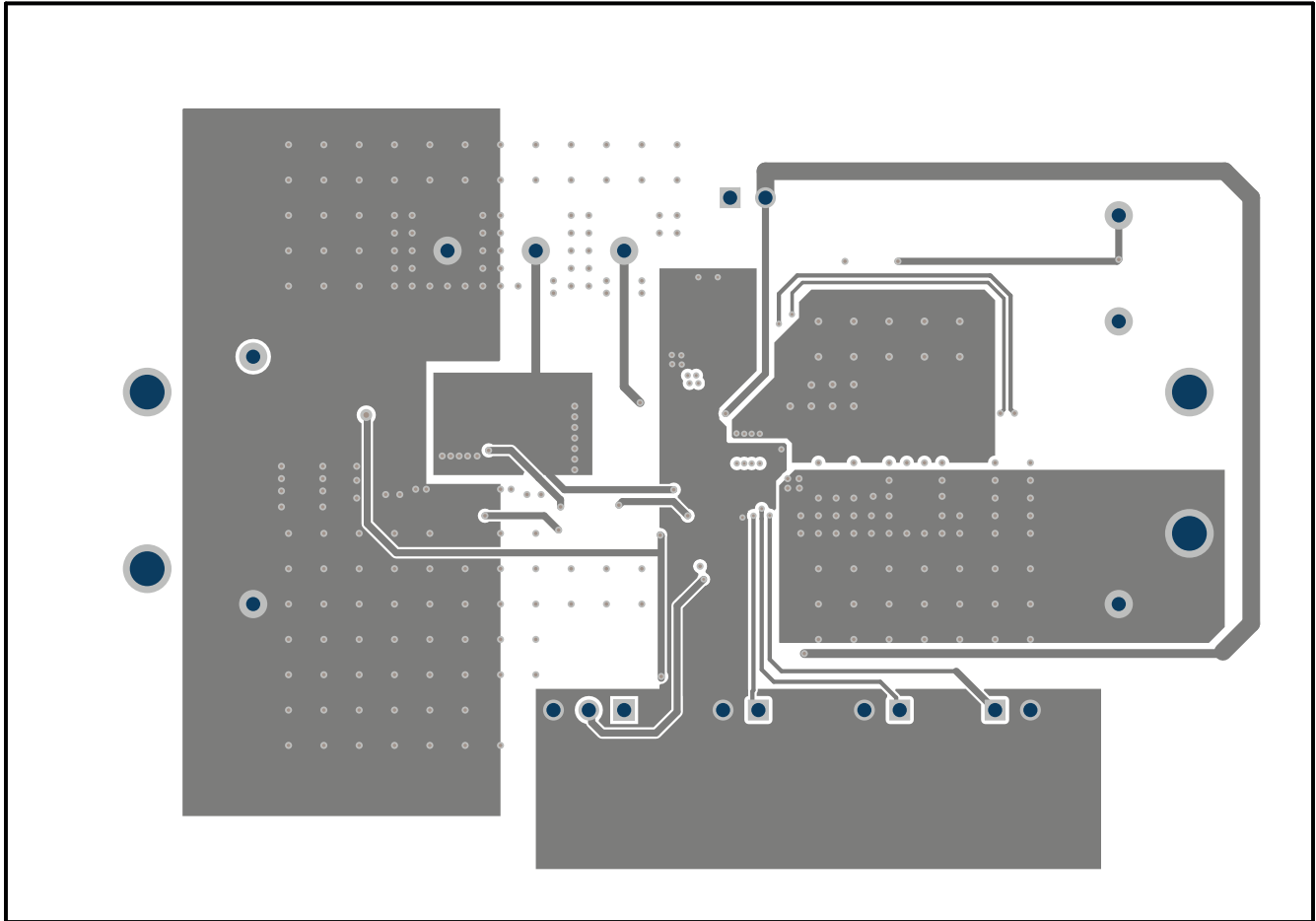
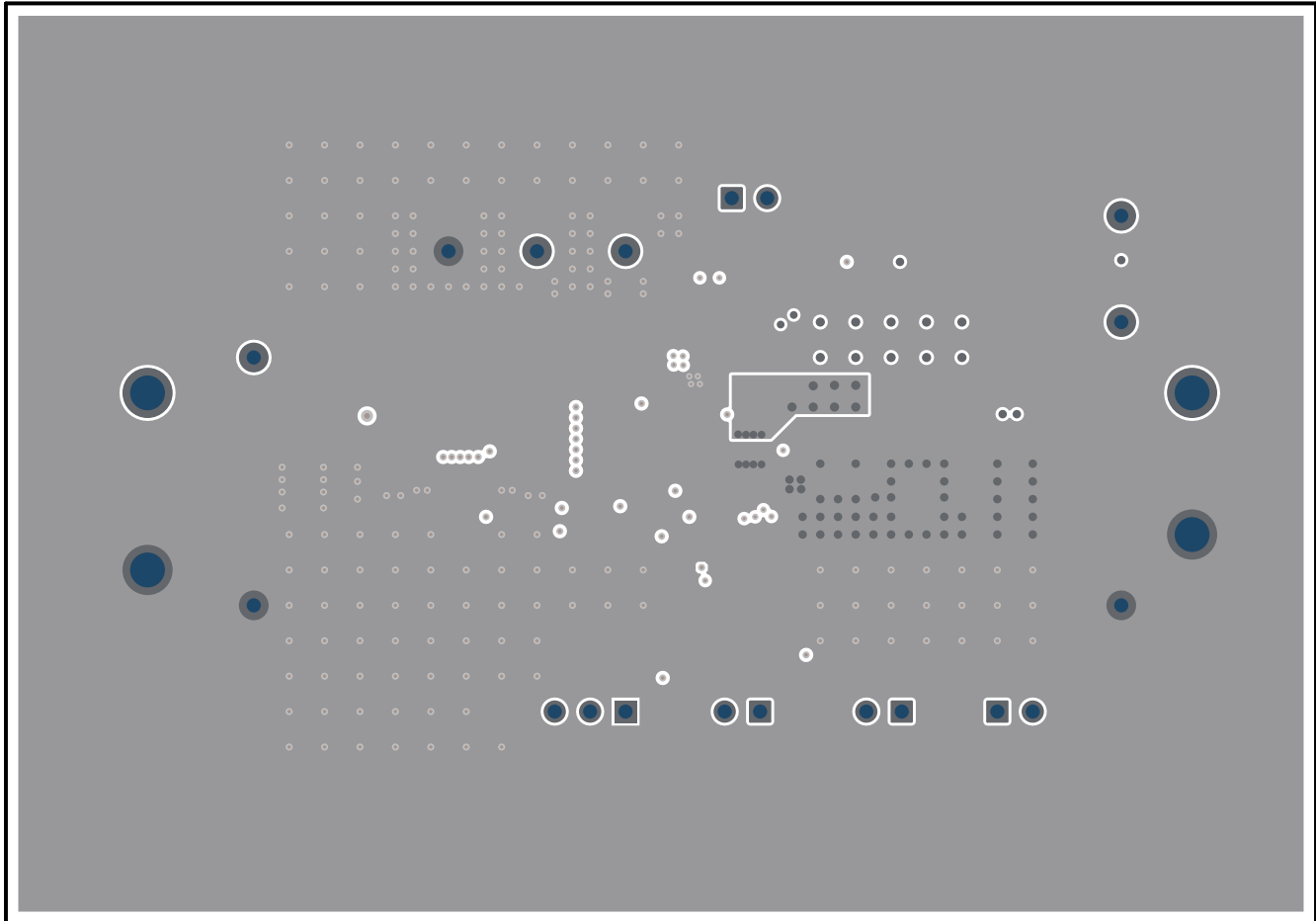


Figure 4-3. TPS552882EVM-2MHz Inner Layer1





**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.

| <b>Changes from Revision * (December 2020) to Revision A (October 2020)</b>                           | <b>Page</b>       |
|---|-------------------|
| • Updated the numbering format for tables, figures, and cross-references throughout the document..... | <a href="#">2</a> |
| • Changed all images in the Board Layout section.....   | <a href="#">7</a> |

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