# EV8772C-Q-00A

## 12A, Wide 3V to 17V Input, 700kHz, Synchronous Step-Down Converter with FCCM Evaluation Board

## DESCRIPTION

The EV8772C-Q-00A is an evaluation board designed to demonstrate the capabilities of the MP8772C, a fully integrated, high-frequency, synchronous, rectified, step-down, switch-mode converter with internal power MOSFETs. The MP8772C offers a very compact solution that achieves up to 12A of continuous output current ($I_{OUT}$), with excellent load and line regulation across a wide input voltage ($V_{IN}$) range. The converter uses synchronous mode operation for a higher efficiency across the $I_{OUT}$ load range.

Constant-on-time (COT) control operation provides very fast transient response, easy loop design, and very tight output regulation.

Full protection features include short-circuit protection (SCP), over-current protection (OCP), under-voltage protection (UVP), and thermal shutdown.

The MP8772C requires a minimal number of readily available, standard external components, and is available in a space-saving QFN-16 (3mmx3mm) package.

## PERFORMANCE SUMMARY

Specifications are at $T_A$ = 25°C, unless otherwise noted.

| Parameters | Conditions | Value |
|---|---|---|
| Input voltage ($V_{IN}$) range | | 3V to 17V |
| Output voltage ($V_{OUT}$) | $V_{IN}$ = 3V to 17V, $I_{OUT}$ = 0A to 12A | $V_{OUT}$ = 1V |
| Maximum output current ($I_{OUT}$) | $V_{IN}$ = 3V to 17V | 12A |
| Typical efficiency | $V_{IN}$ = 12V, $V_{OUT}$ = 1V, $I_{OUT}$ = 12A | 84.9% |
| Peak efficiency | $V_{IN}$ = 5V, $V_{OUT}$ = 1V, $I_{OUT}$ = 2A | 93.1% |
| Switching frequency ($f_{SW}$) | | 700kHz |


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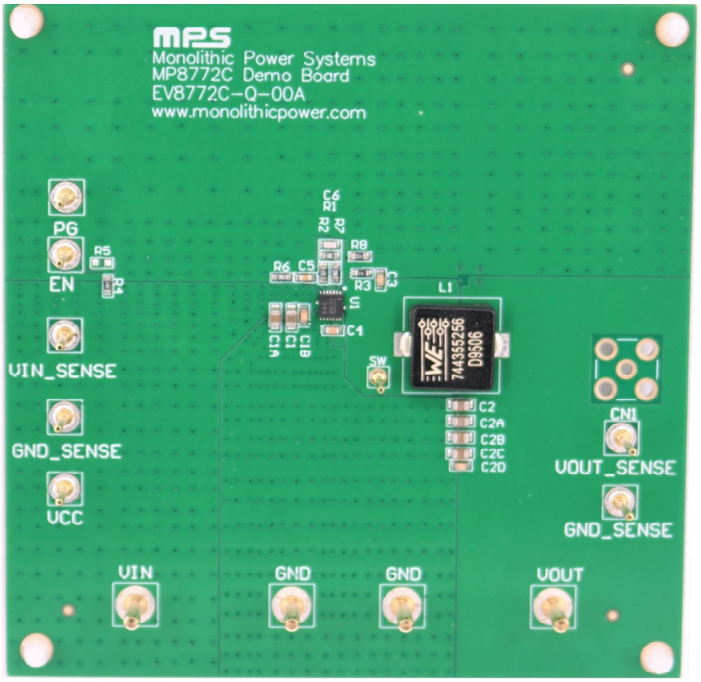
## EVALUATION BOARD




**LxWxH (8.5cmx8.5cmx1.3cm)**

| Board Number | MPS IC Number |
|---|---|
| EV8772C-Q-00A | MP8772CGQ |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## QUICK START GUIDE

The EV8772C-Q-00A evaluation board is easy to set up and use to evaluate the performance of the MP8772C. For proper measurement equipment set-up, refer to Figure 1 and follow the steps below:

1. Preset the power supply to 12V, then turn off the power supply. (1)
2. Connect the power supply terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
3. Connect the load terminals to:
   a. Positive (+): VOUT
   b. Negative (-): GND
4. After making the connections, turn on the power supply. The board should start up automatically.
5. Check for the proper output voltage ($V_{OUT}$) between the VOUT_SENSE and GND_SENSE terminals. Once the proper $V_{OUT}$ is established, adjust the load within the operating range, then measure the efficiency, $V_{OUT}$ ripple, and other parameters.

**Note:**

1) Ensure that $V_{IN}$ does not exceed 17V.

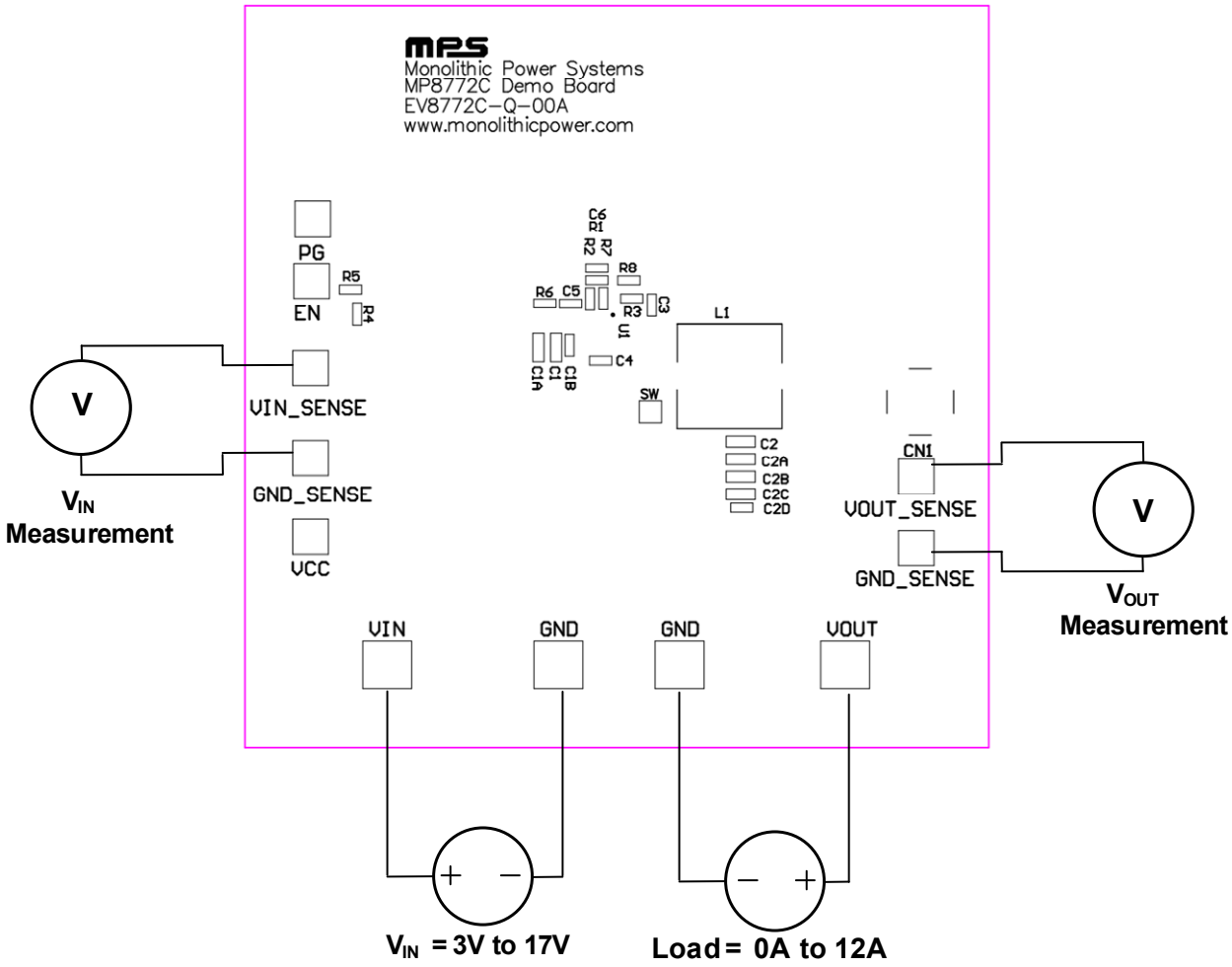


**Figure 1: Measurement Equipment Set-Up**


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# EVALUATION BOARD SCHEMATIC

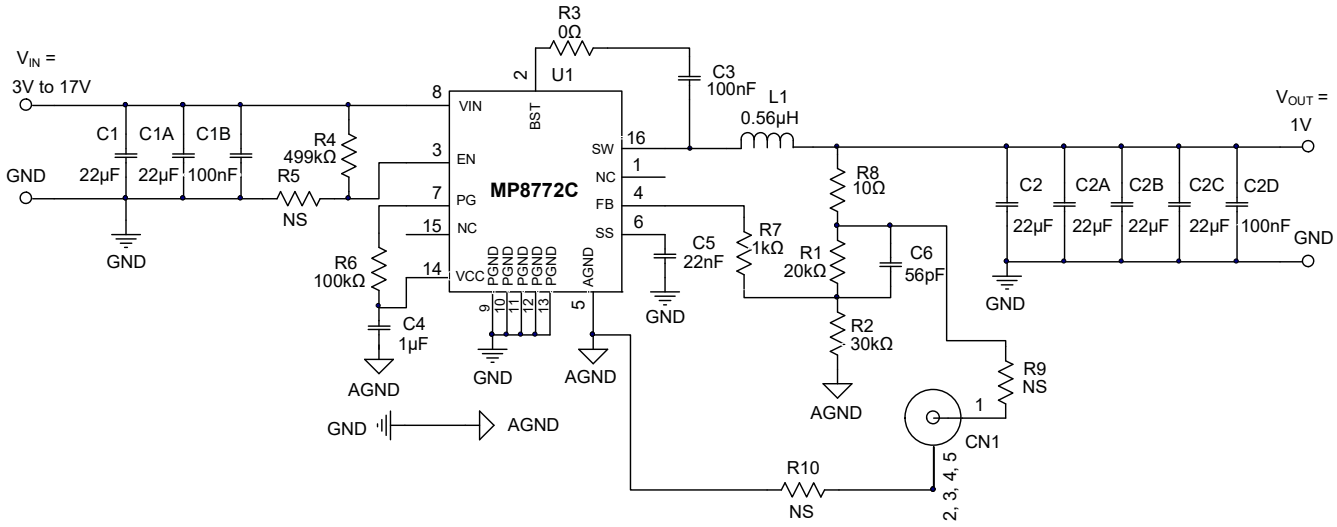


**Figure 2: Evaluation Board Schematic**


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## EV8772C-Q-00A BILL OF MATERIALS

| Qty | Ref | Value | Description | Package | Manufacturer | Part Number |
|---|---|---|---|---|---|---|
| 6 | C1, C1A, C2, C2A, C2B, C2C | 22µF | Ceramic capacitor, 25V, X5R | 0805 | Murata | GRM21BR61E226ME44L |
| 3 | C1B, C2DC3 | 0.1µF | Ceramic capacitor, 25V, X7R | 0603 | Murata | GRM188R71E104KA01D |
| 1 | C4 | 1µF | Ceramic capacitor, 25V, X7R | 0603 | Murata | GRM188R71E105KA12D |
| 1 | C5 | 22nF | Ceramic capacitor, 16V, X7R | 0603 | Murata | GRM188R71C223KA01D |
| 1 | C6 | 56pF | Ceramic capacitor, 50V, C0G | 0603 | Murata | GRM1885C1H560JA01D |
| 1 | R1 | 20kΩ | Thick film resistor, 1% | 0603 | Yageo | RC0603FR-0720KL |
| 1 | R2 | 30kΩ | Thick film resistor, 1% | 0603 | Yageo | RC0603FR-0730KL |
| 1 | R3 | 0Ω | Thick film resistor, 1% | 0603 | Yageo | RC0603FR-070RL |
| 1 | R4 | 499kΩ | Thick film resistor, 1% | 0603 | Yageo | RC0603FR-07499KL |
| 0 | R5, R9, R10 | NS | | 0603 | | |
| 1 | R6 | 100kΩ | Thick film resistor, 1% | 0603 | Yageo | RC0603FR-07100KL |
| 1 | R7 | 1kΩ | Thick film resistor, 1% | 0603 | Yageo | RC0603FR-071KL |
| 1 | R8 | 10Ω | Thick film resistor, 1% | 0603 | Yageo | RC0603JR-0710RL |
| 1 | L1 | 0.56µH | Inductor, DCR = 1.5mΩ, $I_S$ = 30A | SMD | Wurth | 744355256 |
| 1 | U1 | MP8772C | 17V, 12A, integrated, high-frequency, synchronous, rectified, step-down, switch-mode converter | QFN-16 (3mmx 3mm) | MPS | MP8772CGQ |


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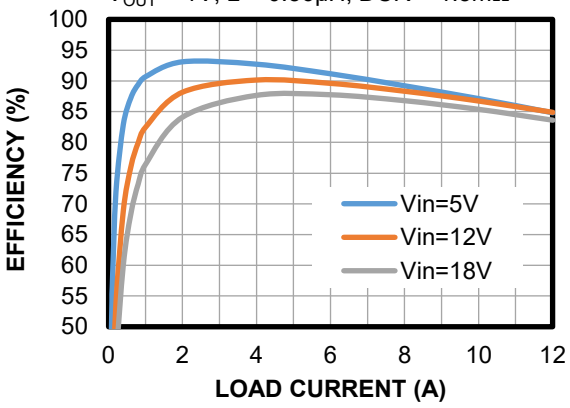
## EVB TEST RESULTS

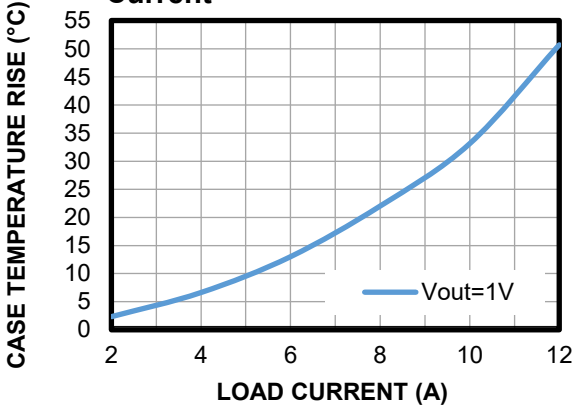
**$V_{IN}$ = 12V, $V_{OUT}$ = 1V, L = 0.56µH, $f_{SW}$ = 700kHz, $T_A$ = 25°C, unless otherwise noted.**

**Efficiency vs. Load Current**

$V_{OUT}$ = 1V, L = 0.56µH, DCR = 1.5mΩ




**Case Temperature Rise vs. Load Current**





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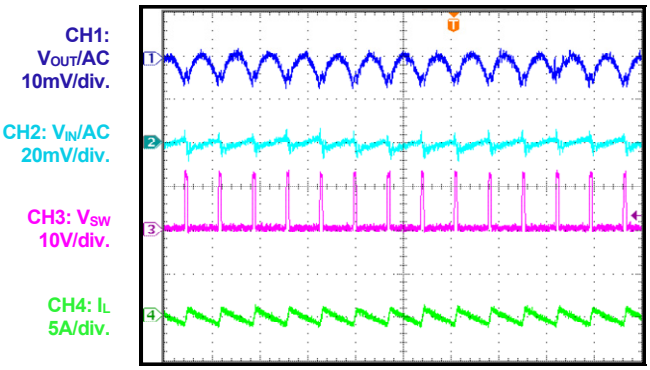
## EVB TEST RESULTS *(continued)*

**$V_{IN}$ = 12V, $V_{OUT}$ = 1V, L = 0.56µH, $f_{SW}$ = 700kHz, $T_A$ = 25°C, unless otherwise noted.**

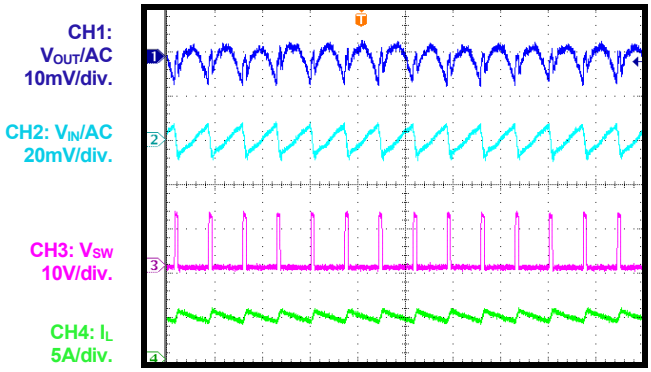
### Input and Output Voltage Ripple

$I_{OUT}$ = 0A



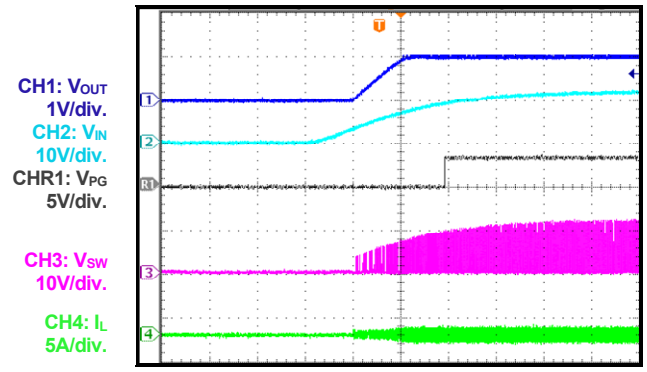

### Input and Output Voltage Ripple

$I_{OUT}$ = 12A



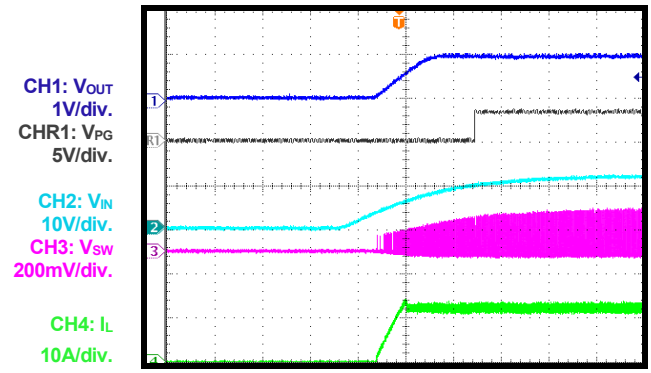

### Start-Up through VIN

$I_{OUT}$ = 0A



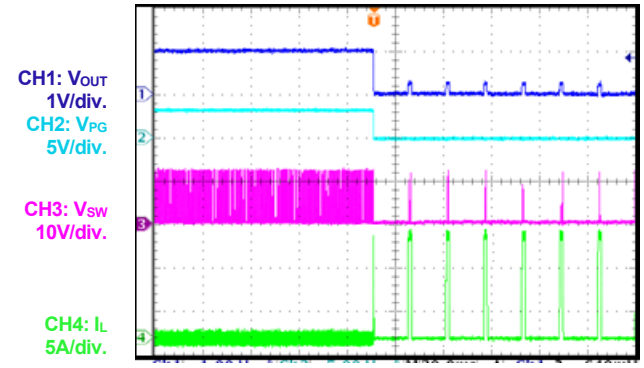

### Start-Up through VIN

$I_{OUT}$ = 12A



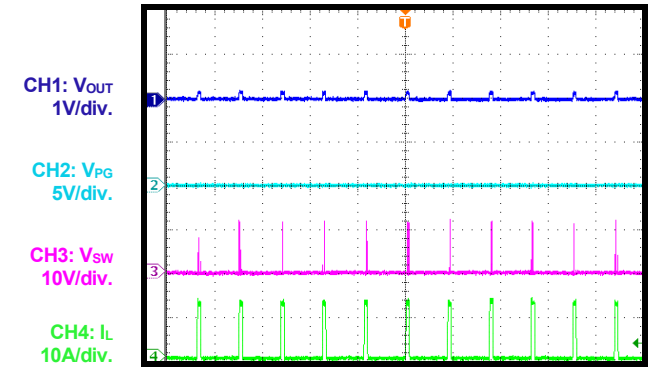

### SCP Entry

$I_{OUT}$ = 0A




### SCP Steady State

Short output to GND





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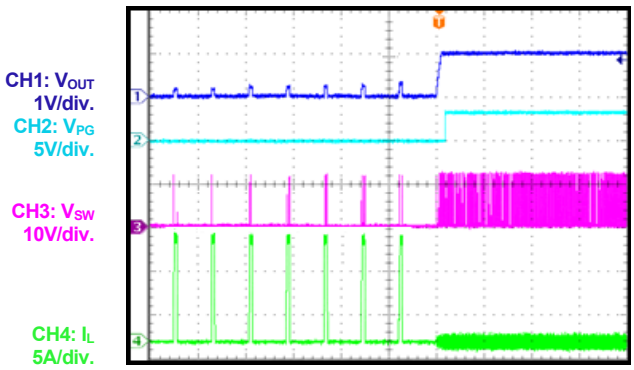
## EVB TEST RESULTS *(continued)*

**$V_{IN}$ = 12V, $V_{OUT}$ = 1V, L = 0.56µH, $f_{SW}$ = 700kHz, $T_A$ = 25°C, unless otherwise noted.**

### SCP Recovery

$I_{OUT}$ = 0A





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# PCB LAYOUT

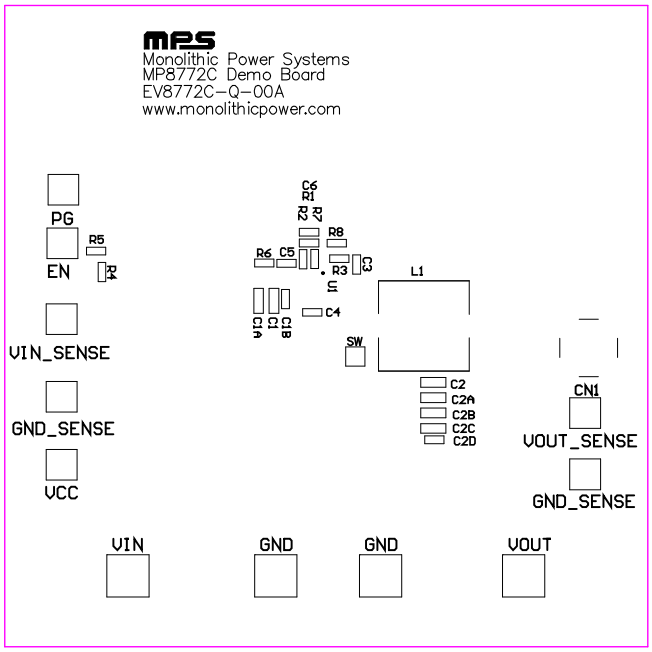


**Figure 3: Top Silk**

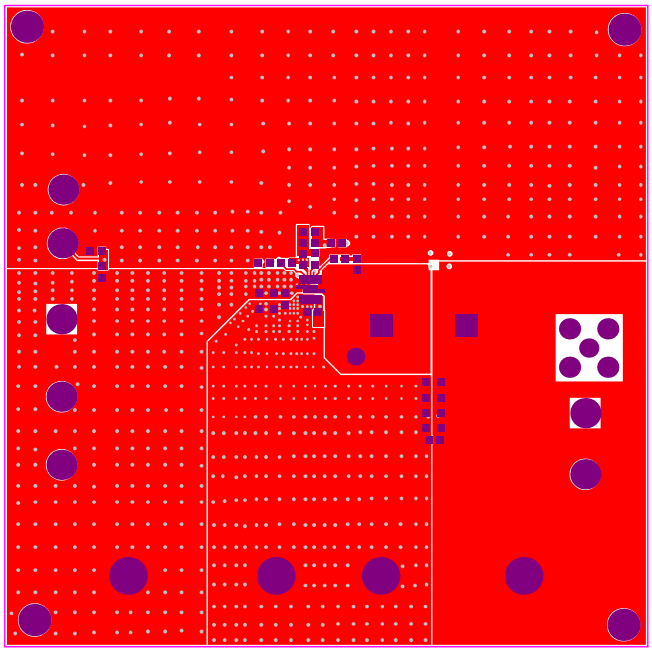

**Figure 4: Top Layer**

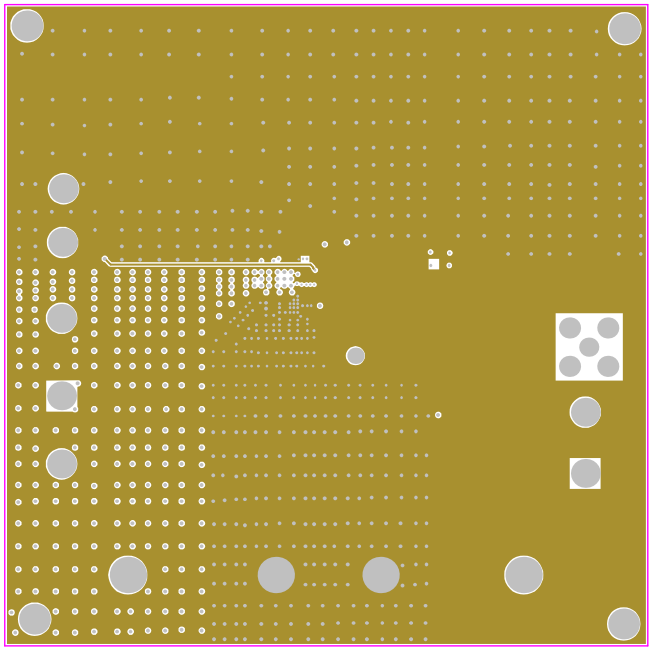

**Figure 5: Mid-Layer 1**

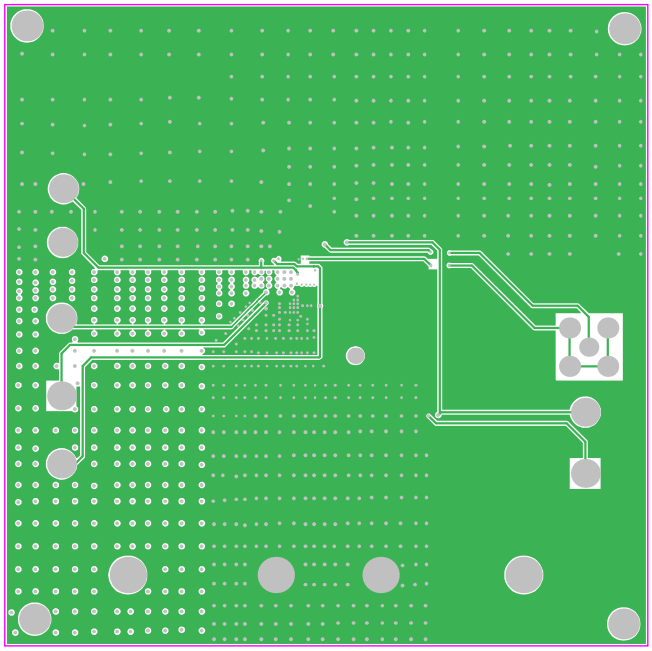

**Figure 6: Mid-Layer 2**


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## PCB LAYOUT *(continued)*

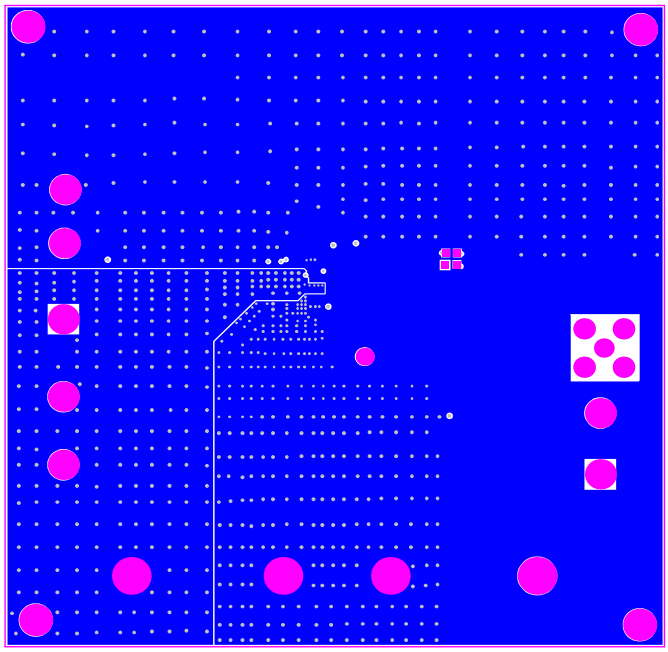

**Figure 7: Bottom Layer**

**Figure 8: Bottom Silk**


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## REVISION HISTORY

| Revision # | Revision Date | Description | Pages Updated |
|---|---|---|---|
| 1.0 | 7/18/2024 | Initial Release | - |

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