# EVMPC1100A-54-00A

## High-Efficiency, Non-Isolated Fixed Ratio, 300W, Digital DC/DC Power Module Evaluation Board

## DESCRIPTION

The EVMPC1100A-54-00A is an evaluation board designed to demonstrate the capabilities of the MPC1100A-54-0000, a high-efficiency, monolithic, non-isolated LLC/DCX power card module with a fixed 10:1 transformer turn ratio.

The evaluation board can deliver 60A of continuous load current across a wide operating input range. High efficiency can be achieved across a wide output current load range.

The MPC1100A-54-0000 employs MPS's MP2981 (a digital LLC controller) and MP8500 (a smart synchronous rectifier).

The MPC1100A-54-0000 is available in a surface-mount (27mmx18mmx6mm) package.

## ELECTRICAL SPECIFICATIONS

| Parameter | Symbol | Value | Units |
|---|---|---|---|
| Input voltage | $V_{IN}$ | 40 to 60 | V |
| Output voltage | $V_{OUT}$ | 4 to 6 | V |
| Output current | $I_{OUT}$ | 60 | A |

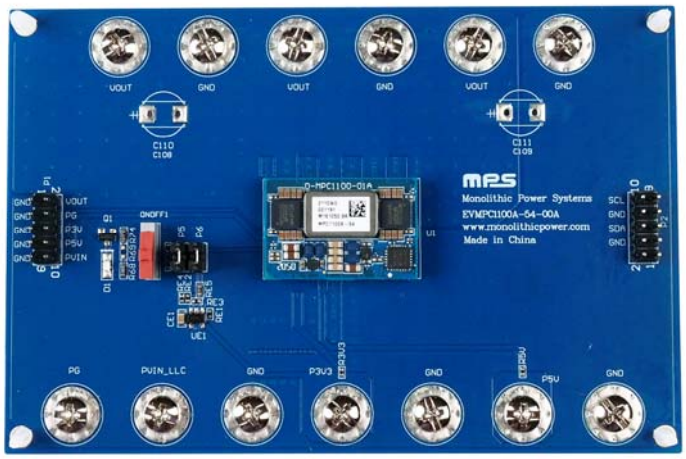
## FEATURES

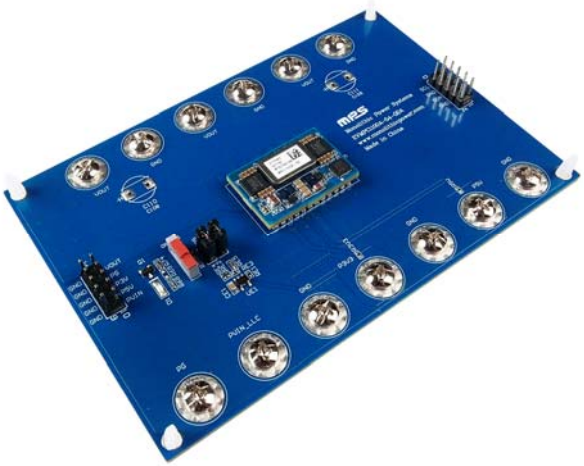
- Up to 60A Continuous Secondary Current
- PMBus/I$^2$C Compliant
- Built-In MPT to Store Custom Configurations
- Input Voltage, Output Voltage, Output Current, Output Power, and Temperature Monitoring
- $V_{IN}$ Under-Voltage Lockout (UVLO), Output Over-Voltage Protection (OVP) and Under-Voltage Protection (UVP), OCP_TDC/OCP_SPIKE Protections, and Over-Temperature Protection (OTP)
- Available in a Surface-Mount (27mmx18mmx6mm) Package

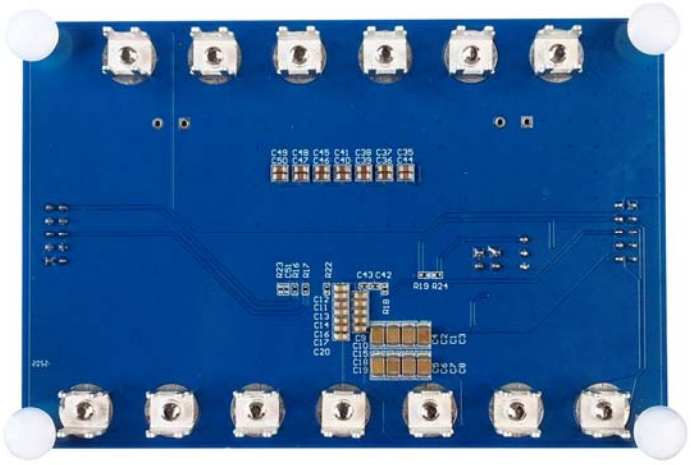
## APPLICATIONS

- Datacenters
- DC Power Distribution
- High-End Computing Systems

# EVMPC1100A-54-00A EVALUATION BOARD





**(LxW) 120mmx80mm**

| Board Number | MPS IC Number |
|---|---|
| EVMPC1100A-54-00A | MPC1100A-54-0000 |

# QUICK START GUIDE

The evaluation board has a 40V to 60V input voltage. Follow the steps below to turn the evaluation board on and off.

### Turning the Evaluation Board On

1. Test the impedance from the input (PVIN_LLC) to GND, power supply (P5V, P3V3) to GND, and the output (VOUT) to GND. Ensure that they are not shorted to GND.
2. Ensure that there is a shorted jumper on P5.
3. Turn EN_SW off.
4. Turn the VIN, 5V, and 3.3V DC supplies off. Set the e-load of the output to “No Load.”
5. Connect the VIN supply (40V to 60V) to PVIN_LLC and GND.
6. Connect the 5V supply to P5V and GND. Connect the 3.3V supply to P3V3 and GND.
7. Connect the e-load to the VOUT and GND connectors.
8. Complete the power-on sequence using the steps below:
    a. Turn the 5V supply on.
    b. Turn the 3.3V supply on.
    c. Turn the VIN supply on.
9. Turn EN_SW on. The board should start up automatically.

### Turning the Evaluation Board Off

1. Set the e-load to “No Load.”
2. Switch EN_SW to the off state.
3. Turn the VIN supply, 5V supply, then the 3.3V supply off. The MPC1100A-54-0000 should shut down automatically.

# EVALUATION BOARD SCHEMATIC

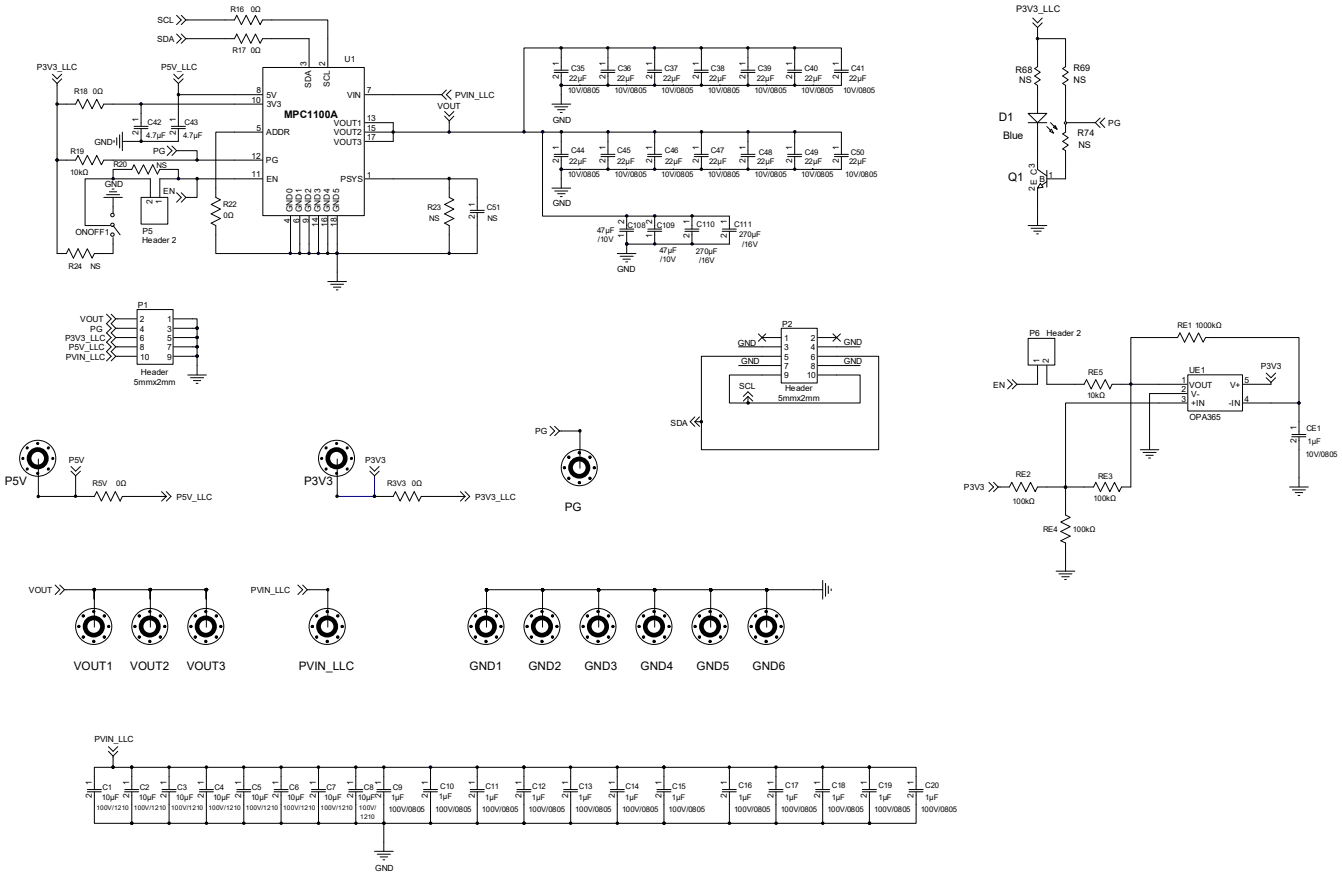



**Figure 1: Evaluation Board Schematic**

## EVMPC1100A-54-00A BILL OF MATERIALS

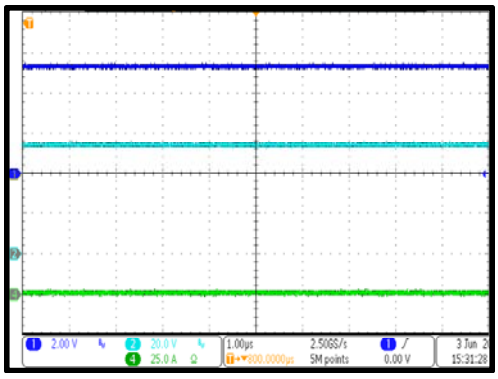
| Qty | Ref | Value | Description | Package | Manufacturer | Manufacturer PN |
|---|---|---|---|---|---|---|
| 12 | C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20 | 1µF | Ceramic capacitor, 100V, X7S | 0805 | Murata | GRM21BC72A105KE01L |
| 8 | C1, C2, C3, C4, C5, C6, C7, C8 | 10µF | Ceramic capacitor, 100V, X7S | 1210 | Murata | GRM32EC72A106KE05L |
| 14 | C35, C36, C37, C38, C39, C40, C41, C44, C45, C46, C47, C48, C49, C50 | 22µF | Ceramic capacitor, 10V, X7S | 0805 | TDK | C2012X7S1A226M |
| 1 | CE1 | 1µF | Ceramic Capacitor, 10V, X7R | 0805 | Murata | GRM21BR71A105KA01L |
| 2 | C42, C43 | 2.2µF | Capacity, 10V, X6S | 0402 | Murata | GRM155C81A225ME44D |
| 1 | D1 | Blue | LED | 0805 | Honglitronic | HL-PSC-2012H203BC |
| 1 | ONOFF1 | 12V | 3-pin jumper switch | DIP | Wurth | 450301014042 |
| 2 | P1, P2 | 2.54mm | Header, 5-pin, dual row | 12.7mmx 5.08mm | Wurth | 61301021121 |
| 2 | P5, P6 | 2.54mm | Header, 2-pin | 5.08mmx 2.54mm | Wurth | 61300411121 |
| 1 | Q1 | 40V | Transistor | SOT23 | On Semi | MMBT3904LT1G |
| 6 | R3V3, R5V, R16, R17, R18, R22 | 0Ω | Resistor, 1%, 1/16W | 0402 | Yageo | RC0402FR-070RL |
| 2 | R19, R24 | 10kΩ | Resistor, 1%, 1/16W | 0402 | Yageo | RC0402FR-0710KL |
| 3 | RE2, RE3, RE4 | 100kΩ | Resistor, 5%, 1/16W | 0402 | BDY | 0402-J0104TCE |
| 1 | RE1 | 1000kΩ | Resistor, 5%, 1/16W | 0402 | Yageo | RC0402JR-071ML |
| 1 | RE5 | 10kΩ | Resistor, 5% | 0603 | Yageo | RC0603JR-0710K |
| 1 | R68 | 2kΩ | Resistor, 1%, 1/16W | 0603 | Yageo | RC0603FR-072KL |
| 1 | R74 | 240kΩ | Resistor, 1%, 1/16W | 0603 | Yageo | RC0603FR-07240KL |
| 1 | UE1 | 4.6mA | Operational amplifier | SOT23-5 | TI | OPA365AIDBVR |
| 1 | U1 | MPC1100A | High-efficiency, non-isolated LLC/DCX power card module | Surface-mount (27mmx 18mmx 6mm) | MPS | MPC1100A-54-0000 |

## EVB TEST RESULTS

**Performance waveforms are tested on the EVMPC1100A-54-00A evaluation board. $V_{IN}$ = 54V, $V_{OUT}$ = 5.4V, $T_A$ = 25°C, unless otherwise noted.**

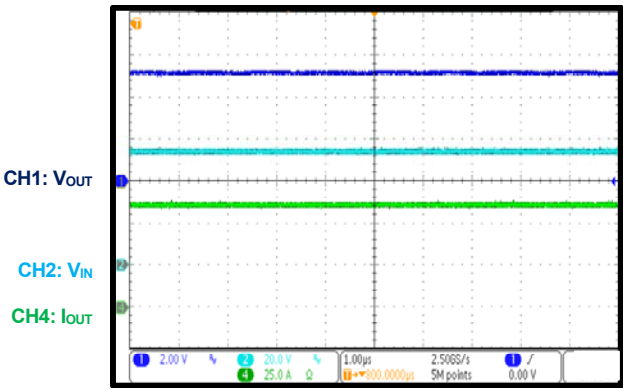
### Steady State

$V_{IN}$ = 54V, $I_{OUT}$ = 0A



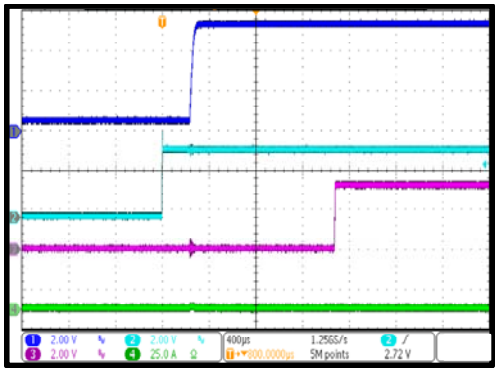

### Steady State

$V_{IN}$ = 54V, $I_{OUT}$ = 60A



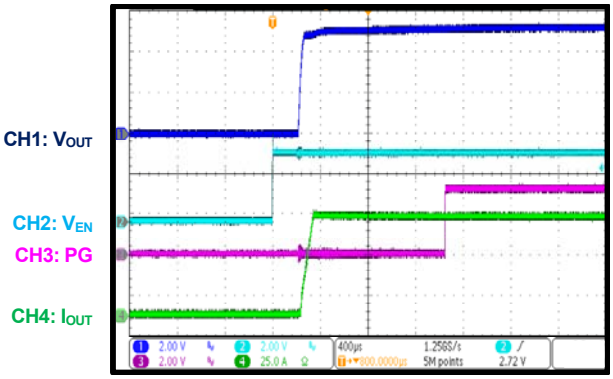

### Start-Up through EN

$V_{IN}$ = 54V, $I_{OUT}$ = 0A




### Start-Up through EN

$V_{IN}$ = 54V, $I_{OUT}$ = 60A



# PCB LAYOUT

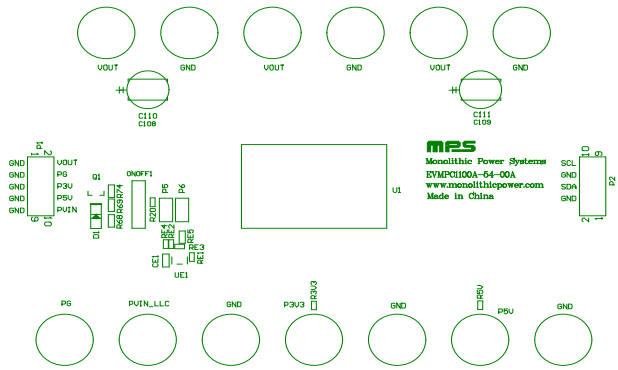



Figure 2: Top Silk

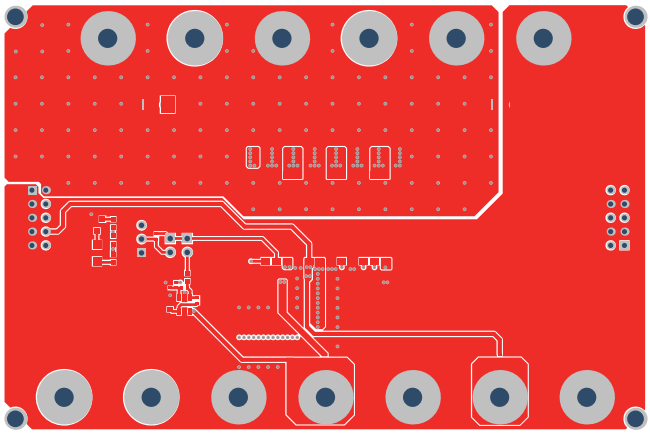


Figure 3: Top Layer

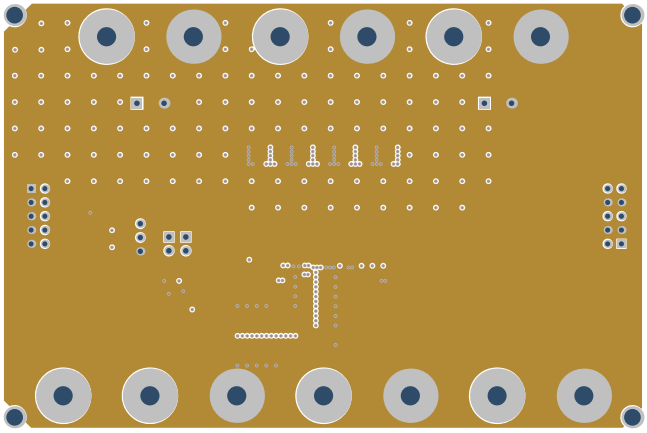


Figure 4: Mid-Layer 1

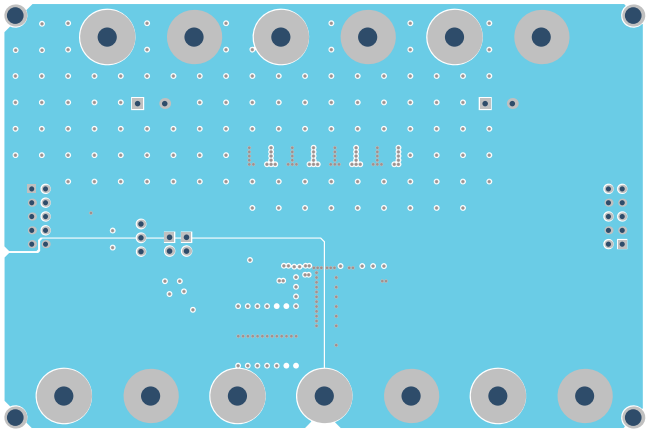


Figure 5: Mid-Layer 2

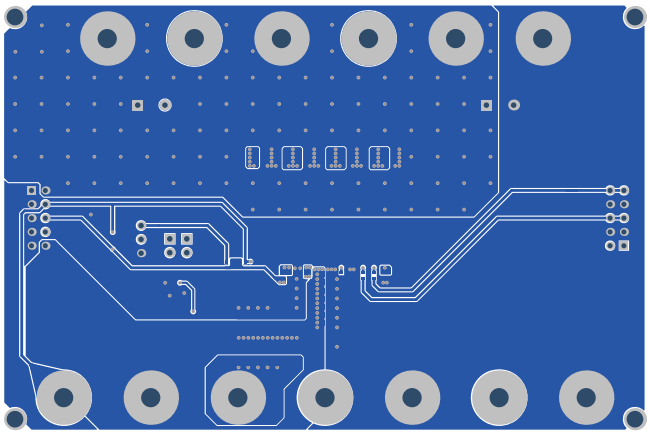


Figure 6: Bottom Layer

## REVISION HISTORY

| Revision # | Revision Date | Description | Pages Updated |
|---|---|---|---|
| 1.0 | 06/10/2021 | Initial Release | - |