



EVMPC1100C-54-00A

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

DESCRIPTION

The EVMPC1100C-54-00A is an evaluation board designed to demonstrate the capabilities of the MPC1100C-54-0002, 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.

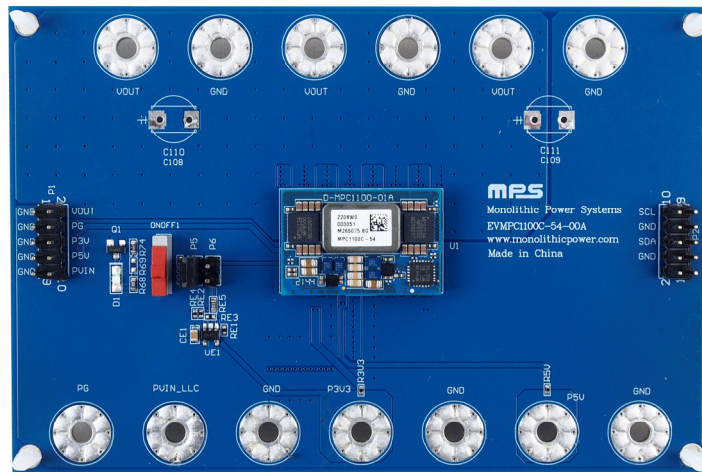
The MPC1100C-54-0002 is available in a surface-mount (27mmx18mmx6mm) package.

PERFORMANCE SUMMARY

Specifications are at $T_A = 25^\circ\text{C}$, unless otherwise noted.

Parameters	Conditions	Value
Input voltage (V_{IN}) range		40V to 60V
Output voltage (V_{OUT})	$V_{IN} = 40\text{V to }60\text{V}$	$V_{OUT} = 4\text{V to }6\text{V}$
Maximum output current (I_{OUT})	$V_{IN} = 40\text{V to }60\text{V}$	60A
Typical efficiency	$V_{IN} = 54\text{V}, V_{OUT} = 5.4\text{V}, I_{OUT} = 60\text{A}$	95.51%
Peak efficiency	$V_{IN} = 54\text{V}, V_{OUT} = 5.4\text{V}, I_{OUT} = 23\text{A}$	97.08%
Switching frequency		813kHz

EVMPC1100C-54-00A EVALUATION BOARD



LxW (120mmx80mm)

Board Number	MPS IC Number
EVMPC1100C-54-00A	MPC1100C-54-0002

QUICK START GUIDE

The EVMP1100C-54-00A evaluation board is easy to set up and use to evaluate the MPC1100C-54-0002's performance. The MPC1100C-54-0002 has a 40V to 60V input voltage (V_{IN}). For proper measurement equipment set-up, refer to Figure 1 and follow the steps below:

Turning the Evaluation Board On

1. Test the impedance from the input (PVIN_LLCC) to GND, power supply (P5V, P3V3) to GND, and the output (VOUT) to GND. Ensure that none are shorted to GND.
2. Ensure that there is a shorted jumper on P5.
3. Turn EN_SW off.
4. Turn the V_{IN} , 5V, and 3.3V DC supplies off. Set the output's e-load to "No Load."
5. Connect the V_{IN} supply (40V to 60V) to PVIN_LLCC 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 on the 5V supply.
 - b. Turn on the 3.3V supply.
 - c. Turn on the V_{IN} supply.
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 off the V_{IN} supply, 5V supply, then the 3.3V supply. The MPC1100C-54-0002 should shut down automatically.

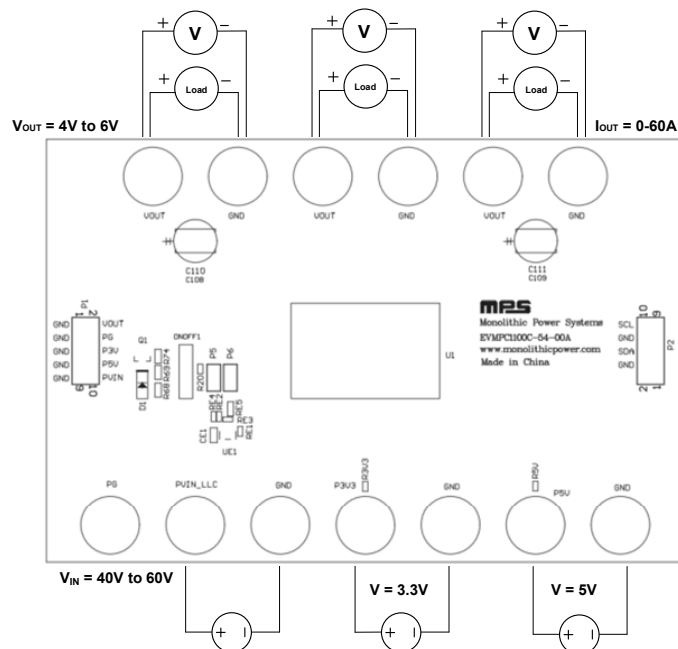


Figure 1: Measurement Equipment Set-Up

EVALUATION BOARD SCHEMATIC

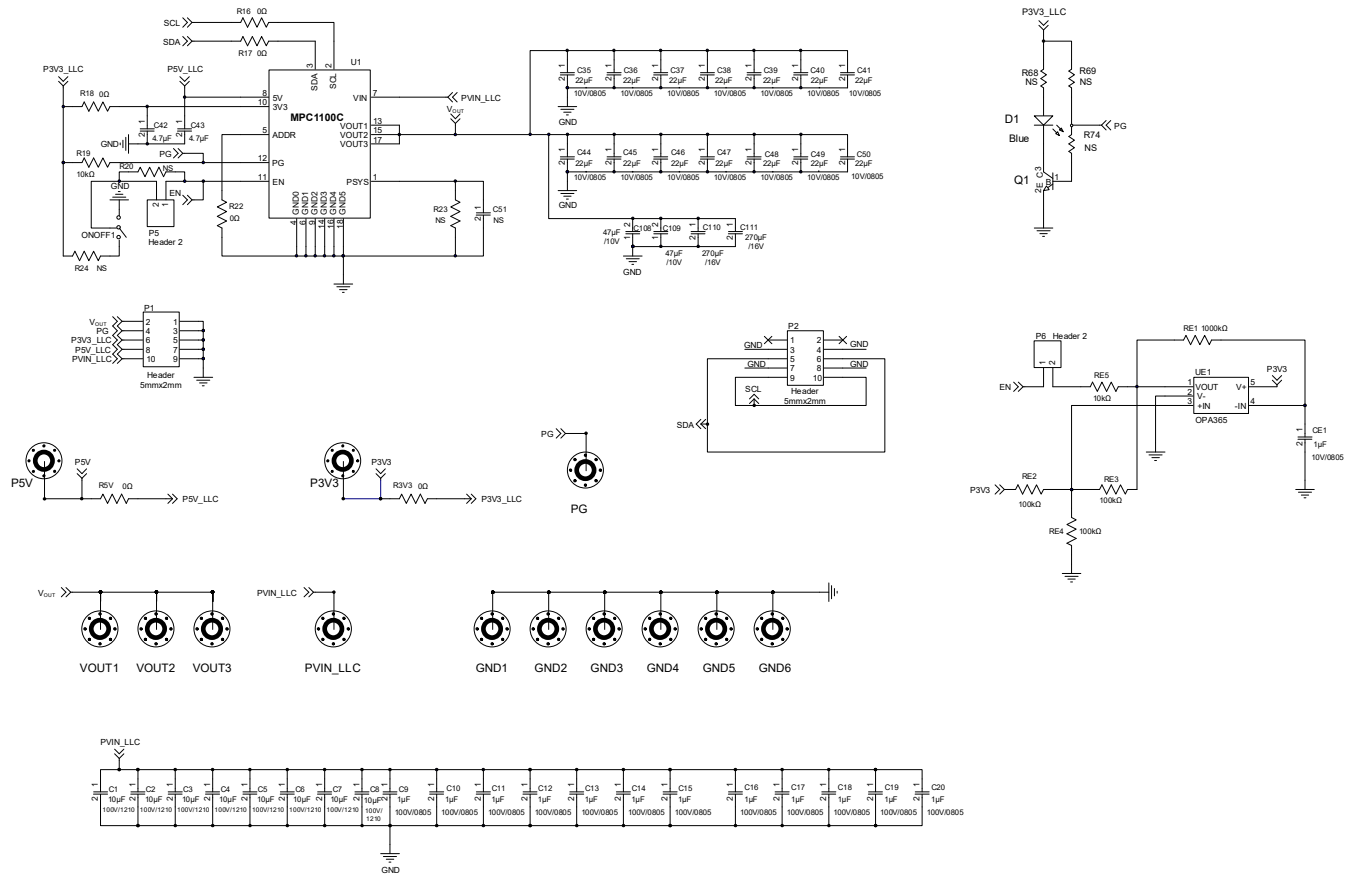


Figure 2: Evaluation Board Schematic

EVMP1100C-54-00A BILL OF MATERIALS

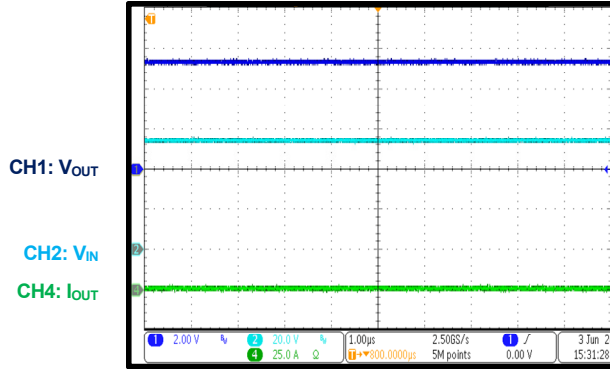
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
12	C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20	1 μ F	Ceramic capacitor, 100V, X7S	0805	Murata	GRM21BC72A105KE01L
8	C1, C2, C3, C4, C5, C6, C7, C8	10 μ F	Ceramic capacitor, 100V, X7S	1210	Murata	GRM32EC72A106KE05L
14	C35, C36, C37, C38, C39, C40, C41, C44, C45, C46, C47, C48, C49, C50	22 μ F	Ceramic capacitor, 10V, X7S	0805	TDK	C2012X7S1A226M
1	CE1	1 μ F	Ceramic capacitor, 10V, X7R	0805	Murata	GRM21BR71A105KA01L
2	C42, C43	2.2 μ F	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	12.7mmx5.08mm	Wurth	61301021121
2	P5, P6	2.54mm	Header, 2-pin	5.08mmx2.54mm	Wurth	61300411121
1	Q1	40V	Transistor	SOT23	onsemi	MMBT3904LT1G
6	R3V3, R5V, R16, R17, R18, R22	0 Ω	Resistor, 1%, 1/16W	0402	Yageo	RC0402FR-070RL
2	R19, R24	10k Ω	Resistor, 1%, 1/16W	0402	Yageo	RC0402FR-0710KL
3	RE2, RE3, RE4	100k Ω	Resistor, 5%, 1/16W	0402	BDY	0402-J0104TCE
1	RE1	1000k Ω	Resistor, 5%, 1/16W	0402	Yageo	RC0402JR-071ML
1	RE5	10k Ω	Resistor, 5%	0603	Yageo	RC0603JR-0710K
1	R68	2k Ω	Resistor, 1%, 1/16W	0603	Yageo	RC0603FR-072KL
1	R74	240k Ω	Resistor, 1%, 1/16W	0603	Yageo	RC0603FR-07240KL
1	UE1	4.6mA	Operational amplifier	SOT23-5	TI	OPA365AIDBVR
1	U1	MPC1100C	High-efficiency, non-isolated LLC/DCX power card module	Surface-mount (27mmx18mmx6.1mm)	MPS	MPC1100C-54-0002

EV1 TEST RESULTS

Performance waveforms are tested on the EVMP1100C-54-00A evaluation board. $V_{IN} = 54V$, $V_{OUT} = 5.4V$, $T_A = 25^{\circ}C$, unless otherwise noted.

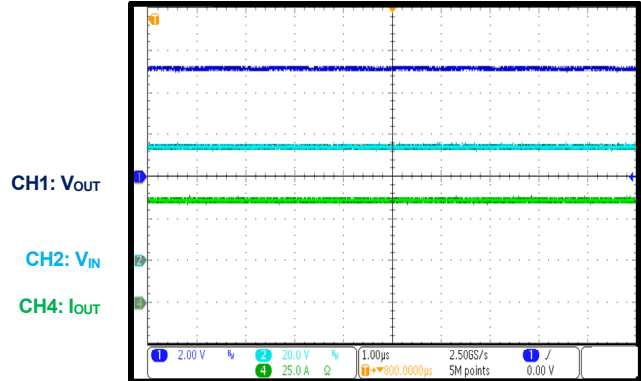
Steady State

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



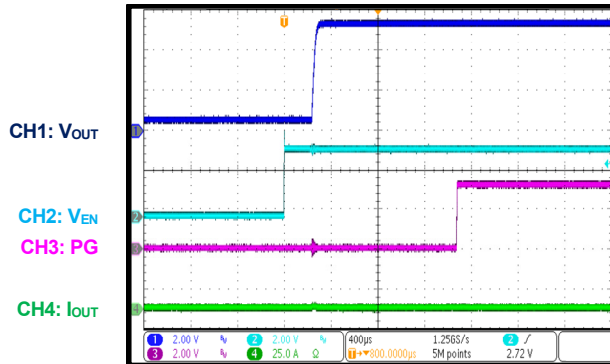
Steady State

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



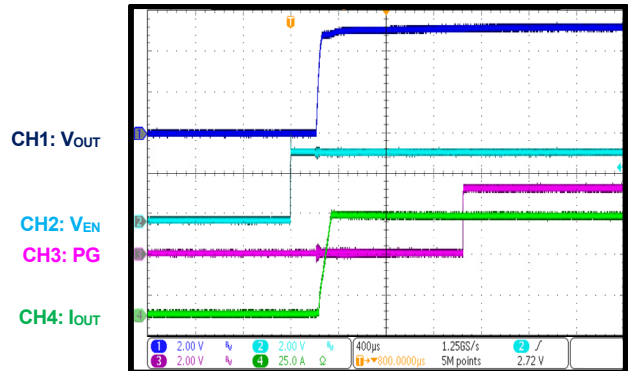
Start-Up through EN

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



Start-Up through EN

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



PCB LAYOUT

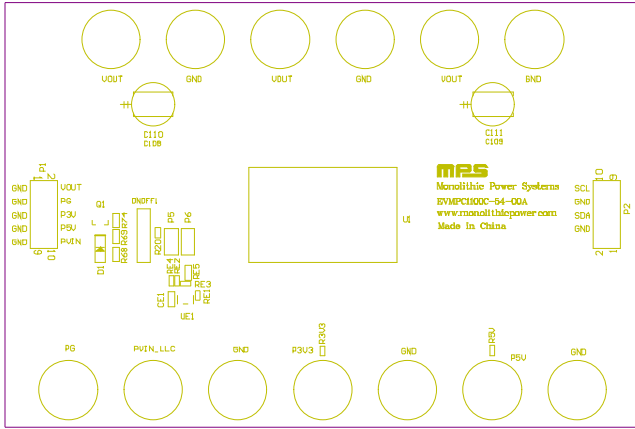


Figure 3: Top Silk

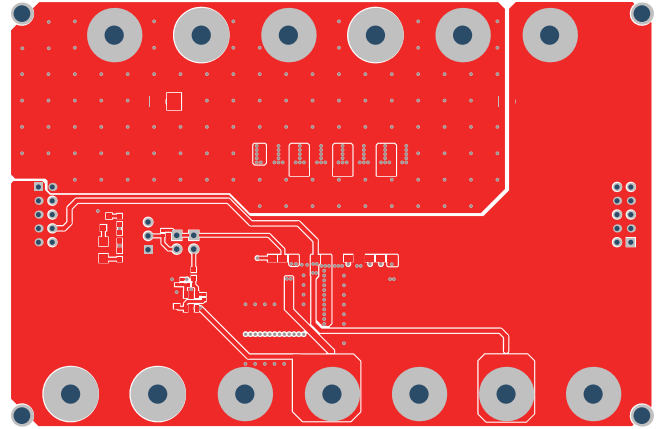


Figure 4: Top Layer

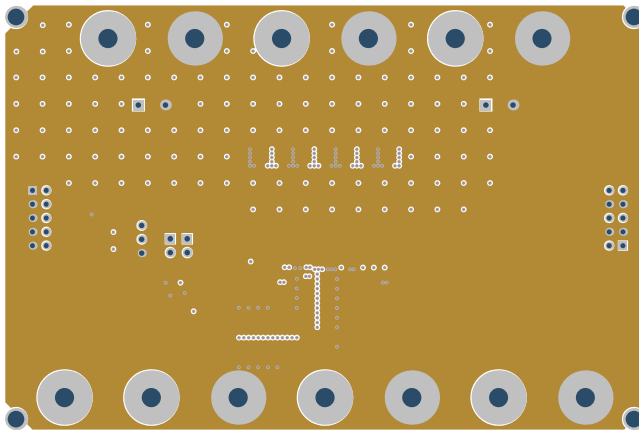


Figure 5: Mid-Layer 1

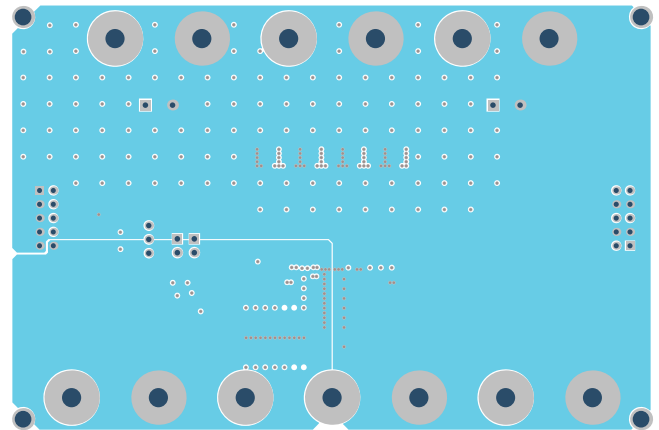


Figure 6: Mid-Layer 2

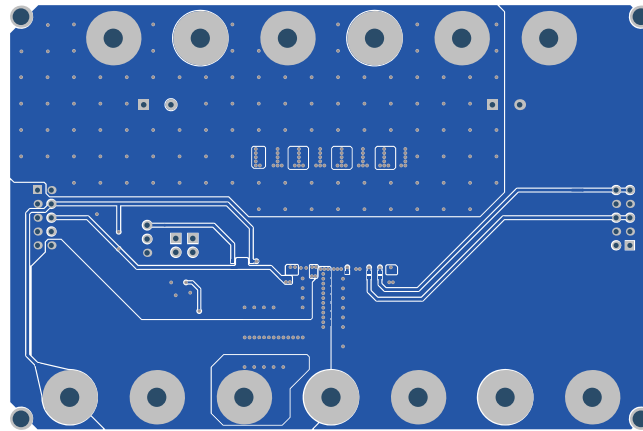


Figure 7: Bottom Layer



REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	6/21/2023	Initial Release	-

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