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.

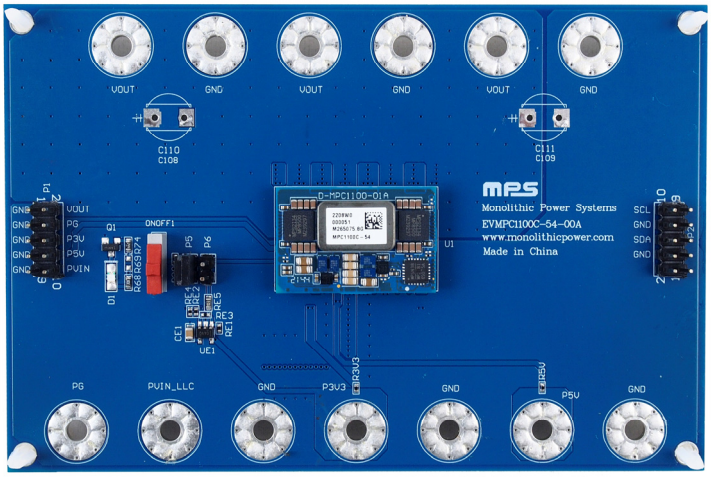
The MPC1100C-54-0002 is available in a surface-mount (27mmx18mmx6mm) package.

PERFORMANCE SUMMARY

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

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

EVMPC1100C-54-00A EVALUATION BOARD



LxW (120mmx80mm)

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

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QUICK START GUIDE

The EVMPC1100C-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_LLC) 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 VIN, 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_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 on the 5V supply.
   b. Turn on the 3.3V supply.
   c. Turn on the VIN 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.

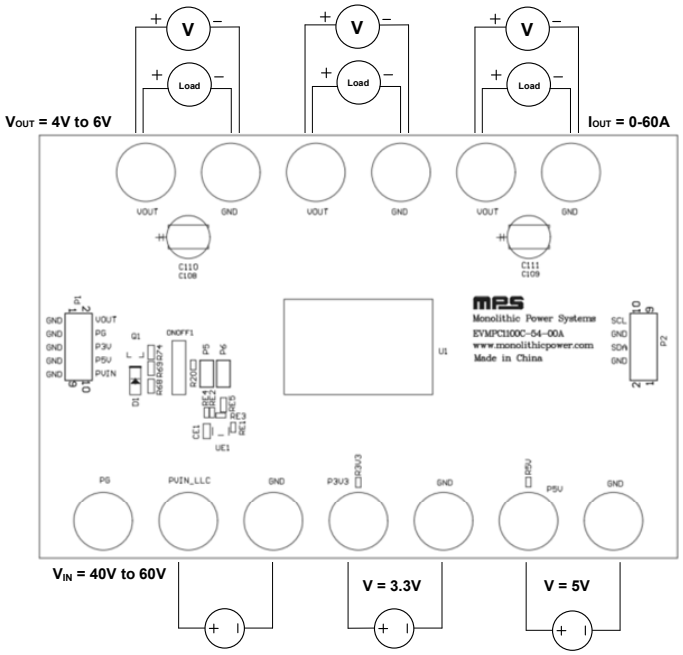

Figure 1: Measurement Equipment Set-Up

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EVALUATION BOARD SCHEMATIC

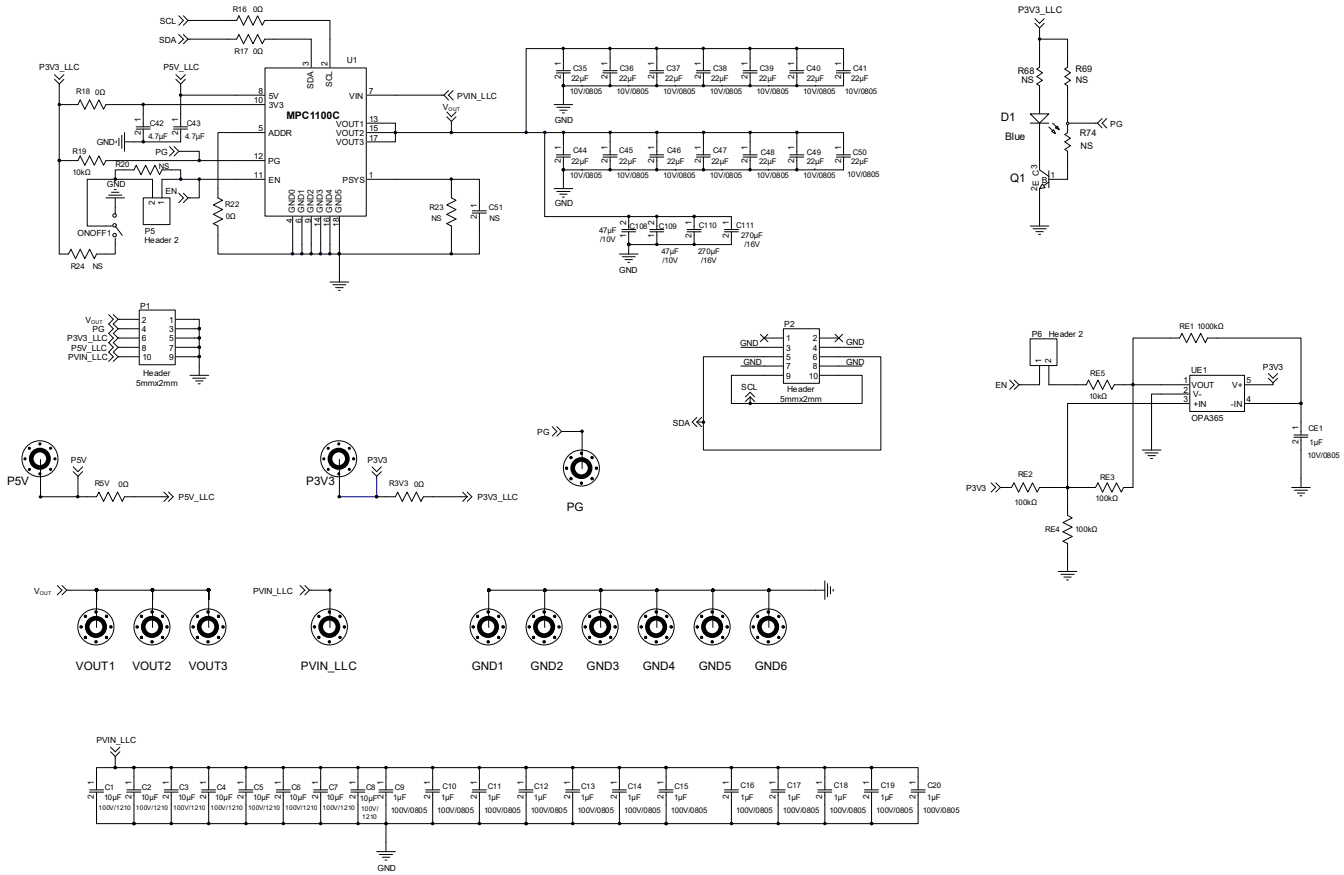

Figure 2: Evaluation Board Schematic

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EVMPC1100C-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	onsemi	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	MPC1100C	High-efficiency, non-isolated LLC/DCX power card module	Surface-mount (27mmx 18mmx 6.1mm)	MPS	MPC1100C-54-0002

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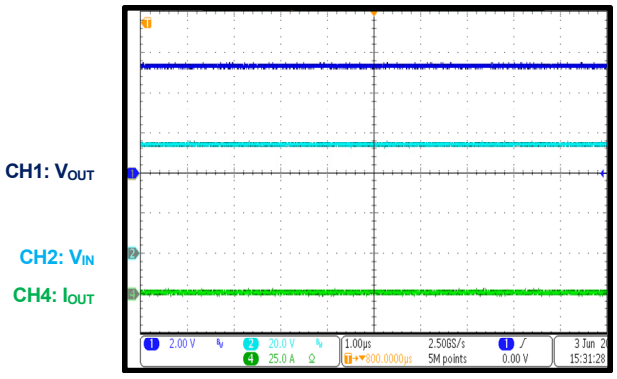
EVB TEST RESULTS

Performance waveforms are tested on the EVMPC1100C-54-00A evaluation board. V_{IN} = 54V, V_{OUT} = 5.4V, T_A = 25°C, unless otherwise noted.

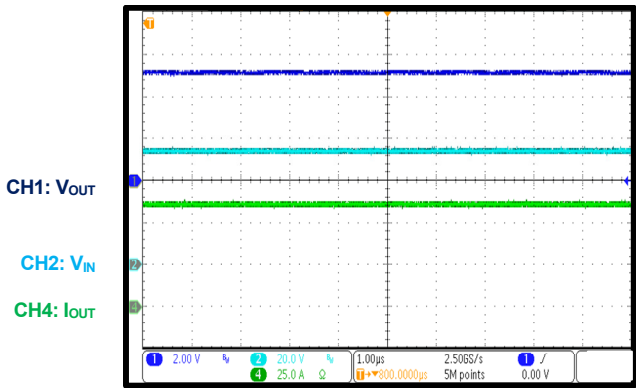
Steady State

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



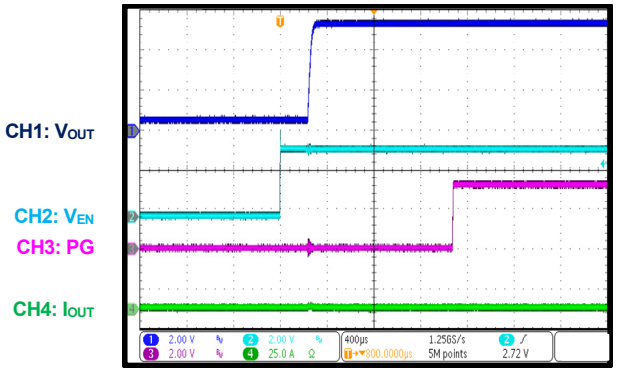
Steady State

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



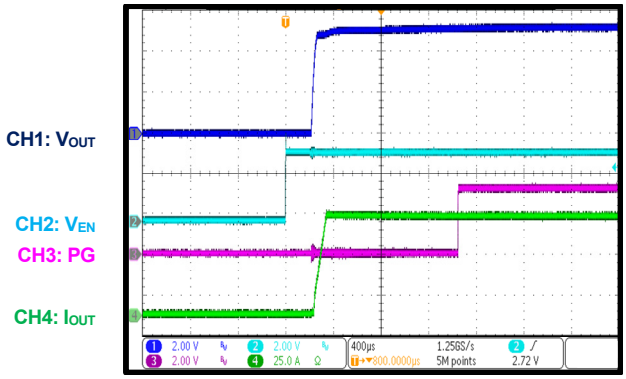
Start-Up through EN

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



Start-Up through EN

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



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PCB LAYOUT

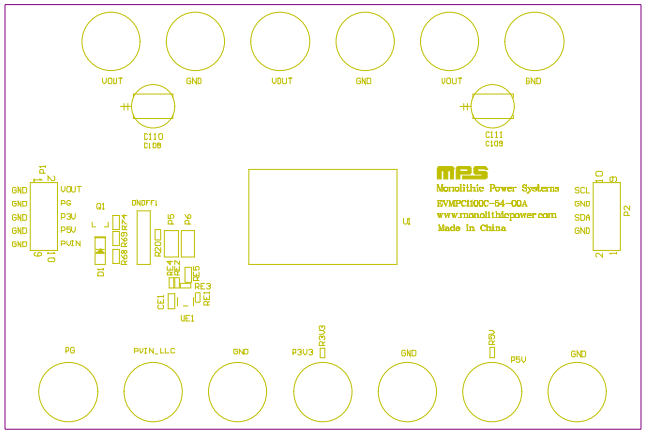

Figure 3: Top Silk

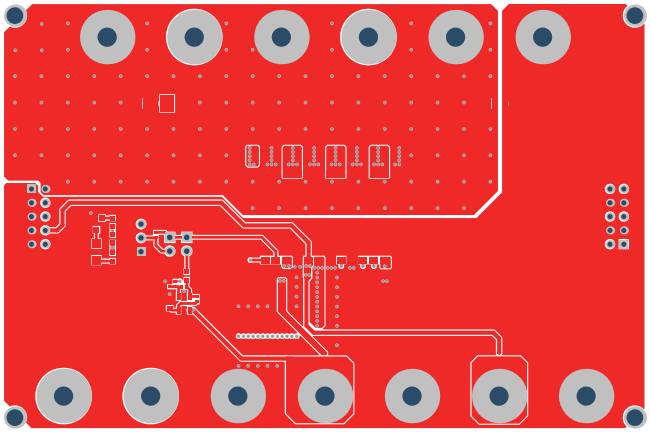

Figure 4: Top Layer

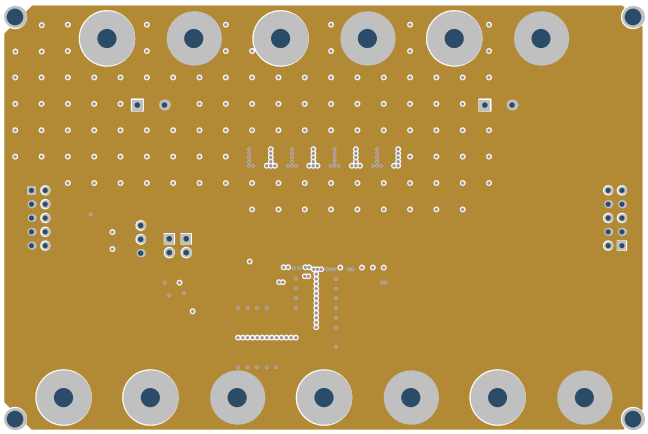

Figure 5: Mid-Layer 1

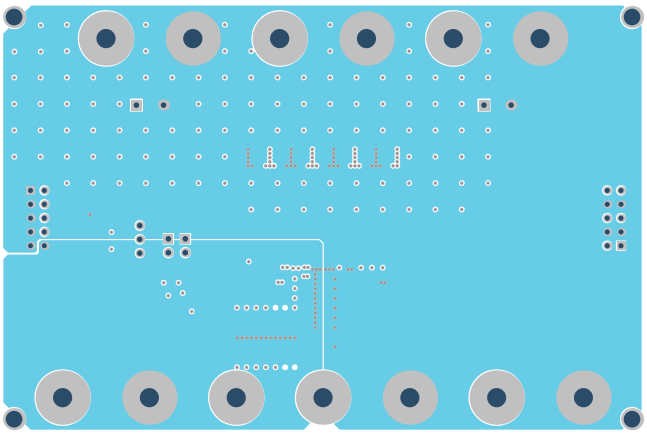

Figure 6: Mid-Layer 2

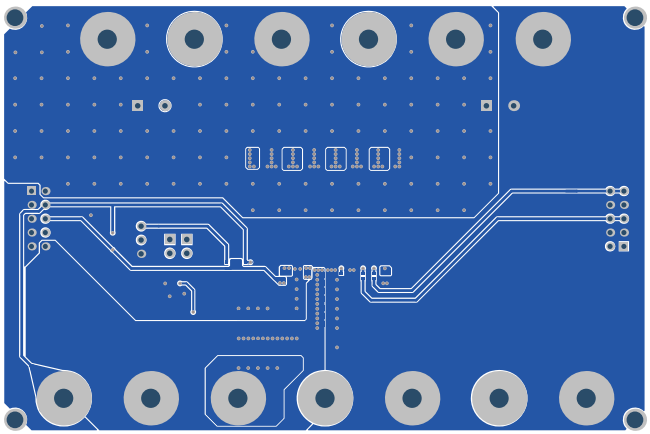

Figure 7: Bottom Layer

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REVISION HISTORY

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

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