



EVMPC22164-2891-Split-02A

130A, Two-Phase Intelli-Module
with Quiet Switcher™ Technology
Evaluation Board

DESCRIPTION

The EVMPC22164-2891-Split-02A is an evaluation board designed for the MPC22164-130, a 130A, 2-phase Intelli-Module with Quiet Switcher™ Technology.

The evaluation board can deliver 130A of load current across a wide operating input voltage (V_{IN}) range, and it can achieve high efficiency across a wide output current (I_{OUT}) load range.

The evaluation board employs one MP2891 device and two MPC22164-130 devices. The MP2018-33, a low-power linear regulator, is also integrated because it provides a stable

3.3V power supply for the MP2981 and MPC22164-130. There are two power supply rails that can run independently.

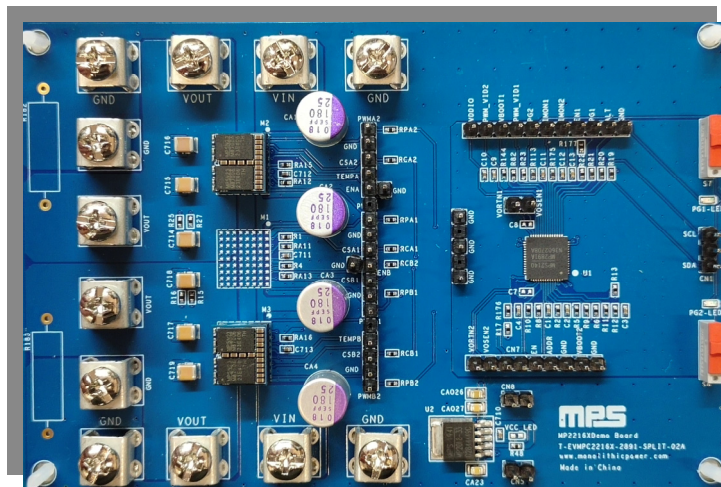
The EVMPC22164-2891-Split-02A can monitor the MPC22164-130's V_{IN} , output voltage (V_{OUT}), I_{OUT} , and temperature. The EVMPC22164-2891-Split-02A provides configurable V_{IN} under-voltage lockout (UVLO) protection, V_{OUT} over-voltage protection (OVP), under-voltage protection (UVP), over-current limiting (OCL), and over-current protection (OCP).

PERFORMANCE SUMMARY

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

Parameters	Conditions	Value
Input voltage (V_{IN}) range		10V to 16V
Output voltage (V_{OUT})	$V_{IN} = 10\text{V to }16\text{V}$, $I_{OUT} = 0\text{A to }130\text{A}$	$V_{OUT} = 0.8\text{V}$
Maximum output current (I_{OUT})	$V_{IN} = 10\text{V to }16\text{V}$	130A
Switching frequency (f_{sw})		500kHz

EVMPC22164-2891-SPLIT-02A EVALUATION BOARD



LxWxH (12cmx8cmx2cm)

Board Number	MPS IC Number
EVMPC22164-2891-Split-02A	MPC22164-130
	MP2891
	MP2018-33

QUICK START GUIDE

The EVMPC22164-2891-Split-02A has a 10V to 16V input voltage (V_{IN}) range. For proper measurement equipment set-up, refer to Figure 1. The EVMPC22164-2891-Split-02A has a start-up and shutdown sequence, described below.

Start-Up Sequence

1. Set the input voltage (V_{IN}) between 10 and 16V.
2. Turn on the mechanical EN switches S7 and S6 (for rail A and rail B, respectively).
3. Turn on the EN commands in the GUI, and VOUT1 and VOUT2 (for rail A and rail B, respectively).

Shutdown Sequence ⁽¹⁾

1. Set V_{IN} to be below 10V or above 16V.
2. Turn off the EN switches (S7 and S6), or turn off the EN commands in the GUI.

Note:

- 1) The evaluation board can also be shut down due to V_{IN} over-voltage protection (OVP) and under-voltage protection (UVP), V_{OUT} OVP and UVP, over-current protection (OCP), or over-temperature protection (OTP). If a protection is triggered, the output can be recovered by cycling the power on the VIN or EN switches.

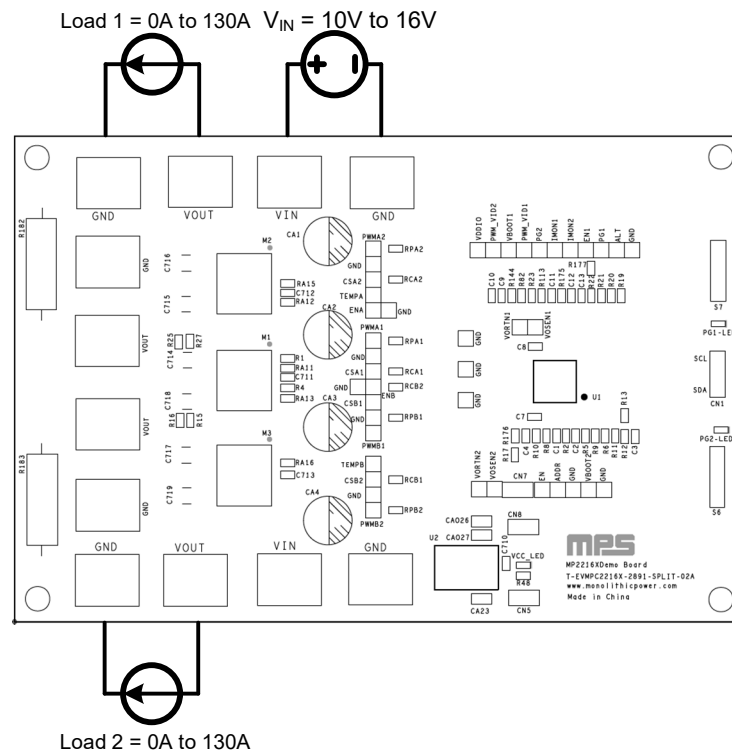


Figure 1: Measurement Equipment Set-Up

EVALUATION BOARD SCHEMATICS

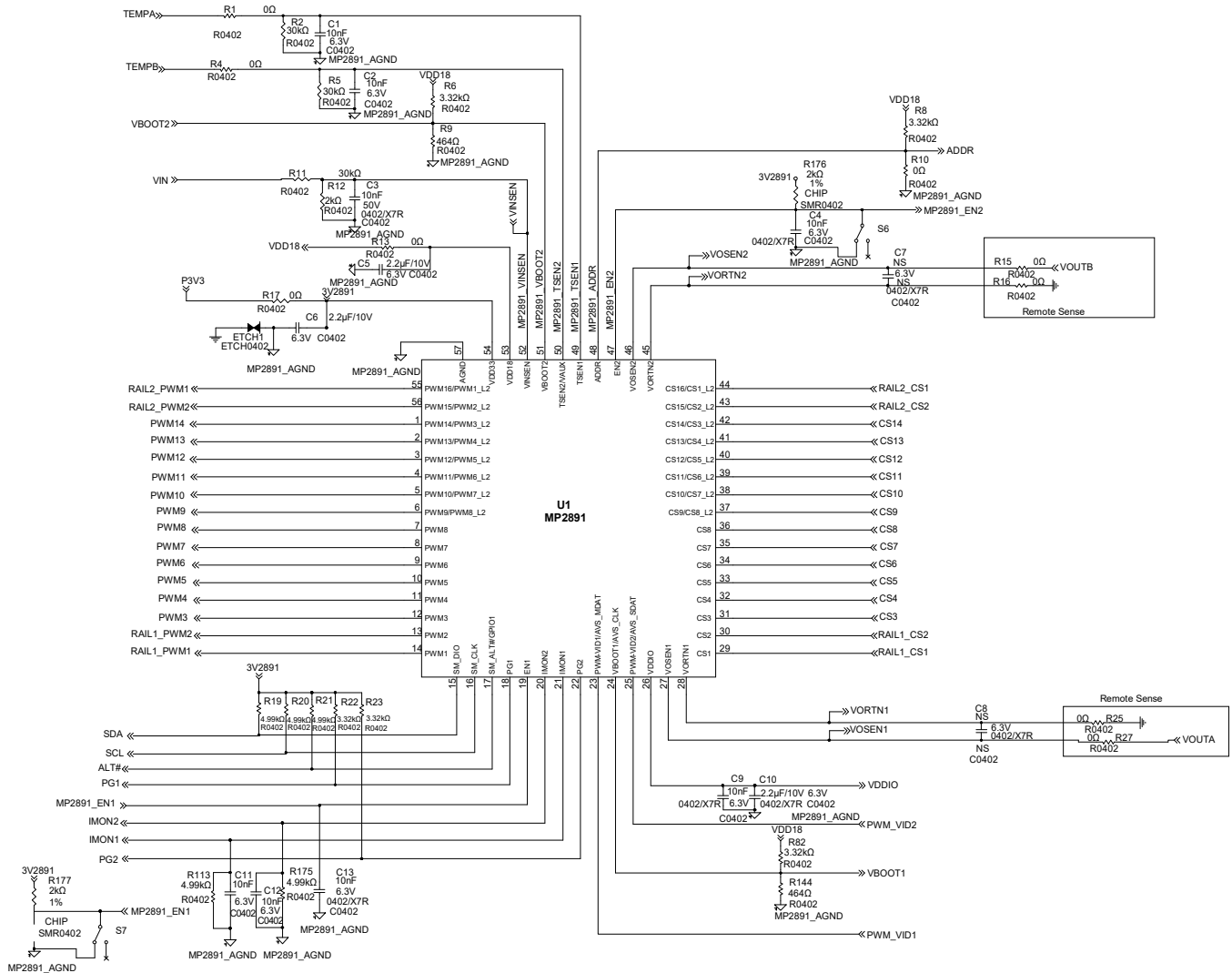


Figure 2: Evaluation Board Schematic (MP2891)

EVALUATION BOARD SCHEMATICS (continued)

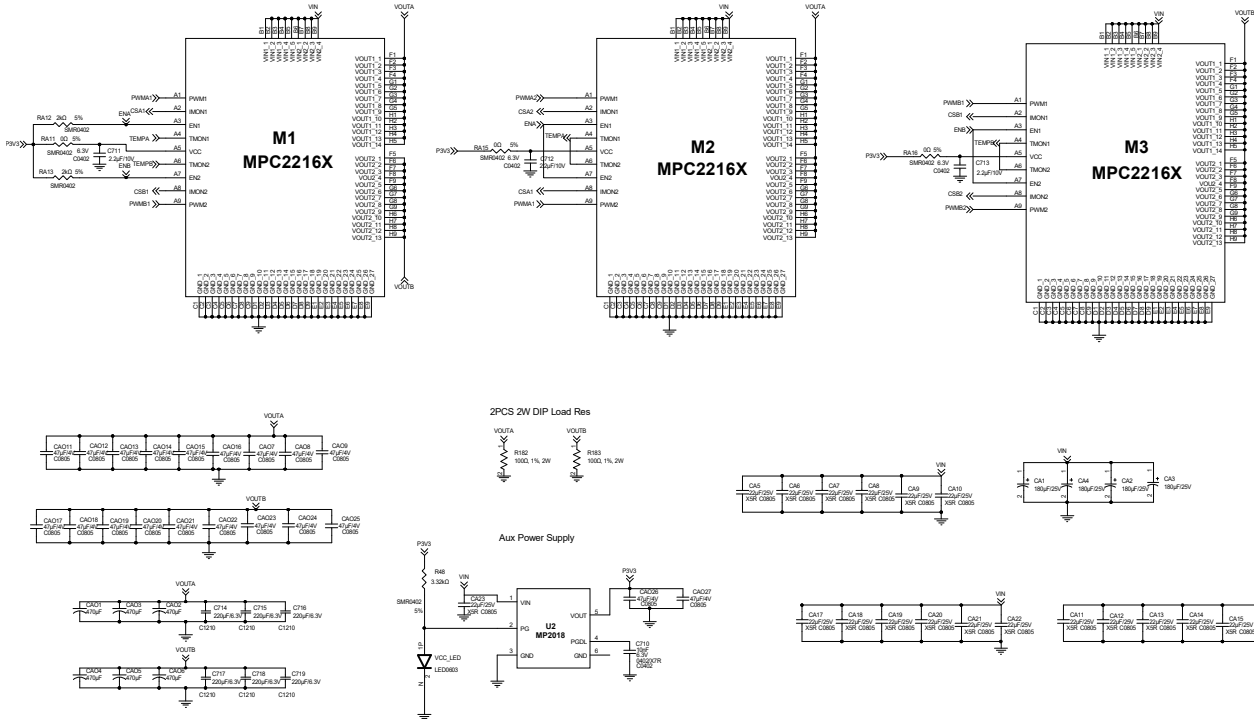


Figure 3: Evaluation Board Schematic (MPC2216x and Aux Power Supply)

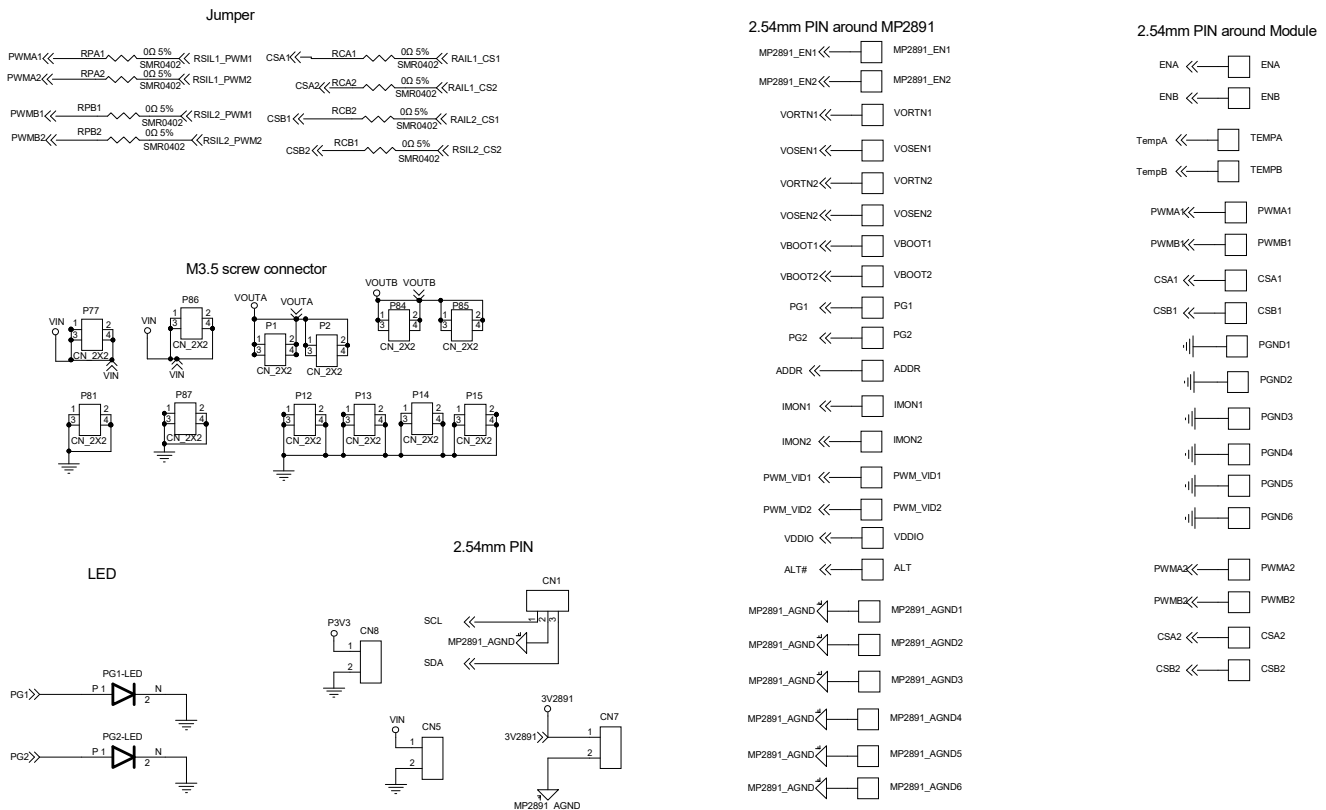


Figure 4: Evaluation Board Schematic (Connectors)

EVMP22164-2891-02A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
4	CA1, CA2, CA3, CA4	180µF	Electrolytic capacitor, 180µF/25V, DIP8X11.3	DIP	Panasonic	25SEPF180M
6	CA01, CA02, CA03, CA04, CA05, CA06	470µF	POS capacitor, 470µF/2.5V	7343	Panasonic	EEFGX0E471R
19	CA5, CA6, CA7, CA8, CA9, CA10, CA11, CA12, CA13, CA14, CA15, CA16, CA17, CA18, CA19, CA20, CA21, CA22, CA23	22µF	MLCC capacitor, 22µF/25V, X5R, 0805	0805	Murata	GRM21BR61E226ME44
20	CA07, CA08, CA09, CA011, CA012, CA013, CA014, CA015, CA016, CA017, CA018, CA019, CA020, CA021, CA022, CA023, CA024, CA025, CA026, CA027	47µF	MLCC capacitor, 47µF/4V, X6S, 0805	0805	Murata	GRM21BC80G476ME15
9	C1, C2, C3, C4, C9, C11, C12, C13, C710	10nF	MLCC capacitor, 10nF/50V, X7R, 0402	0402	Murata	GRM155R71H103KA88
6	C5, C6, C10, C711, C712, C713	2.2µF	MLCC capacitor, 2.2µF/10V, X6S, 0402	0402	Murata	GRM155C81A225ME44
2	C7, C8	NS	Ceramic capacitor, 220pF, 6.3V, 10%, X7R, CAP0402	0402		
6	C714, C715, C716, C717, C718, C719	220µF	MLCC capacitor, 220µF/6.3V, X5R, 1210	1210	Murata	GRM32ER60J227ME05
20	RPB1, RPA1, RCB1, RCA1, R1, RPB2, RPA2, RCB2, RCA2, R4, R10, RA11, R13, RA15, R15, RA16, R16, R17, R25, R27	0Ω	Resistor, 1/16W ±5% (0402)	0402	Yageo	RC0402FR-070RL
5	RA12, R12, RA13, R176, R177	2kΩ	Resistor, 1/16W, ±1% (0402)	0402	Yageo	RC0402FR-072KL
3	R2, R5, R11	30kΩ	Resistor, 1/16W, ±1% (0402)	0402	Yageo	RC0402FR-0730KL
6	R6, R8, R22, R23, R48, R82	3.32kΩ	Resistor, 1/16W, ±1% (0402)	0402	Yageo	RC0402FR-073K32L

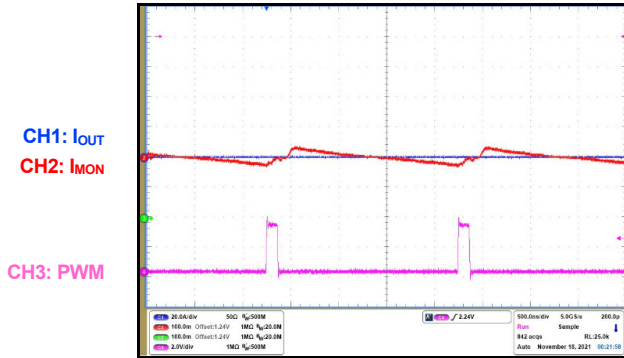
EVMP22164-2891-02A BILL OF MATERIALS (continued)

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
2	R9, R144	464Ω	Resistor, 1/16W, ±1% (0402)	0402	Yageo	RC0402FR-07464RL
5	R19, R20, R21, R113, R175	4.99kΩ	Resistor, 1/16W, ±1% (0402)	0402	Yageo	RC0402FR-074K99L
2	R182, R183	NS	Resistor, 1/16W, ±1% (0402)	DIP		
2	S6, S7	10mmx2mm	Switch	DIP	Any	
3	PG1-LED, PG2-LED, 12V_LED	0.2W	Green LED	0603	BaiHong	BL-HGE36A-AV-TRB
12	P1, P2, P12, P13, P14, P15, P77, P81, P84, P85, P86, P87	6-32 screw size	Screw connector, 4-pin	DIP	Keystone Electronics	8191K-ND
45	VOSEN1, VORTN1, VBOOT1, PWM_VID1, PWMB1, PWMA1, PGND1, PG1, IMON1, CSB1, CSA1, VOSEN2, VORTN2, VBOOT2, PWM_VID2, PWMB2, PWMA2, PGND2, PG2, IMON2, CSB2, CSA2, PGND3, PGND4, PGND5, PGND6, EN1, EN2, AGND1, AGND2, AGND3, AGND4, AGND5, AGND6, VDDIO, TEMPB, TEMPB, ENB, ENA, ALT, ADDR, CN1, CN5, CN7, CN8	2.54mm	Pin header, single row	DIP	Any	
2	M2, M3	MPC22164-130	Power block	LGA-72 (9mmx10mmx9.65mm)	MPS	MPC22164-130
1	M1	NS	Power block			
1	U1	MP2891	16-phase digital controller	QFN-56 (7mmx7mm)	MPS	MP2891GQN
1	U2	MP2018-33	16V input, 3.3V output, 500mA, linear regulator	TO252-5	MPS	MP2018GZD-33

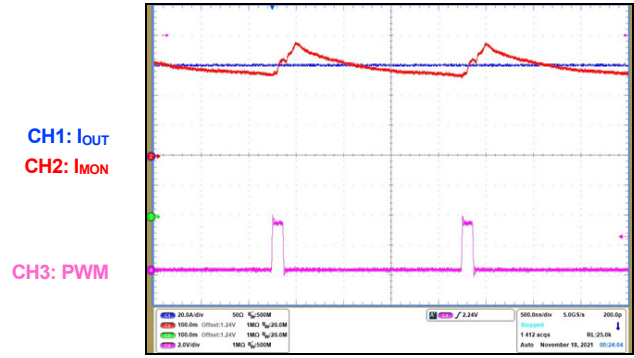
EVb TEST RESULTS

Performance curves and waveforms are tested on the evaluation board. $V_{IN} = 12V$, $V_{OUT} = 0.8V$, $T_A = 25^\circ C$, unless otherwise noted.

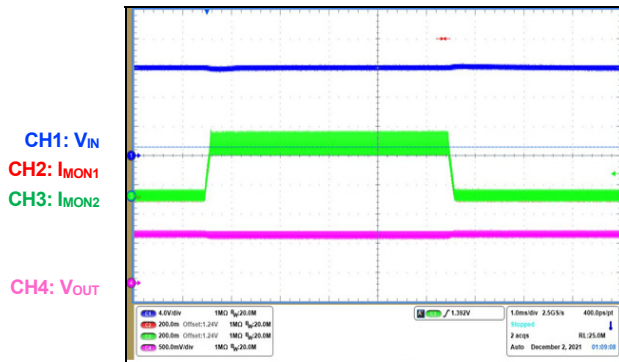
Steady State (IMON Reporting)
1-phase, $I_{OUT} = 0A$



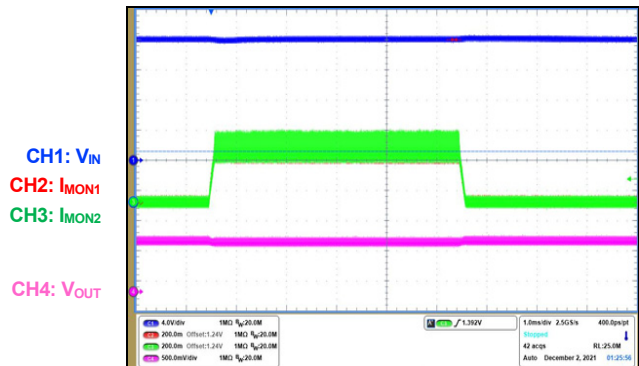
Steady State (IMON Reporting)
1-phase, $I_{OUT} = 60A$



Load Transient Response
2 phases (interleaved), $V_{IN} = 12V$,
 $I_{OUT} = 0A$ to $130A$ to $0A$



Load Transient Response
2 phases (interleaved), $V_{IN} = 16V$,
 $I_{OUT} = 0A$ to $130A$ to $0A$



PCB LAYOUT

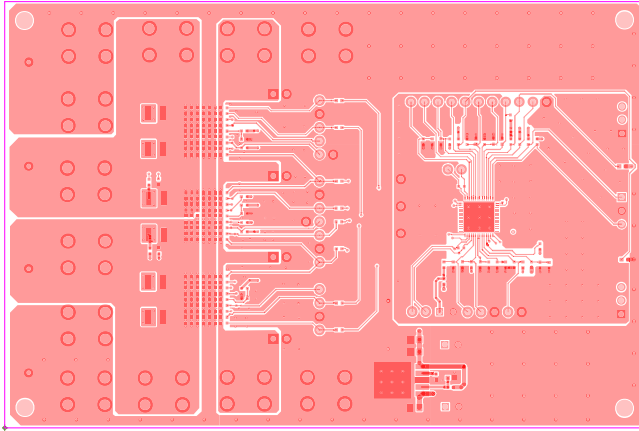


Figure 5: Top Layer

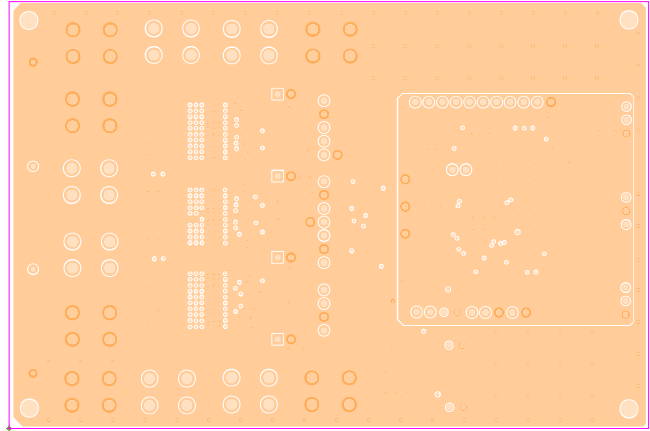


Figure 6: Mid-Layer 1

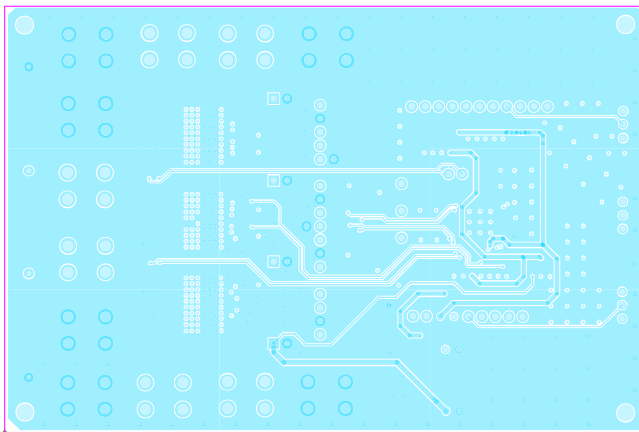


Figure 7: Mid-Layer 2

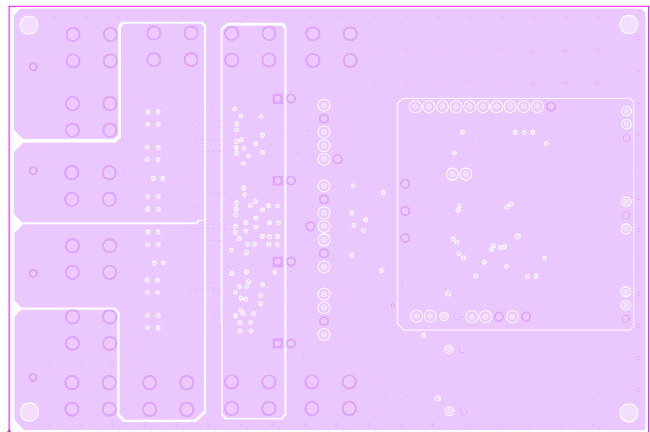


Figure 8: Mid-Layer 3

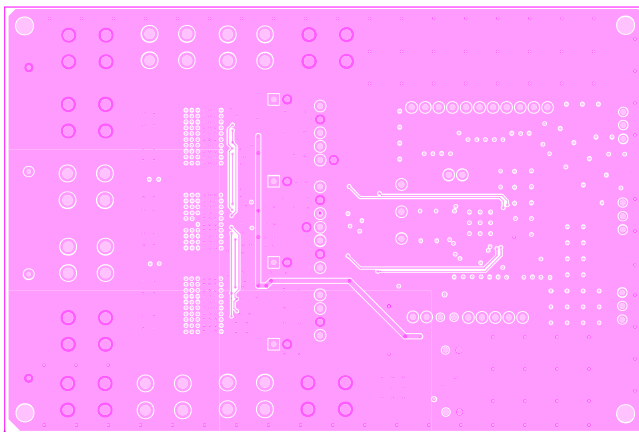


Figure 9: Mid-Layer 4

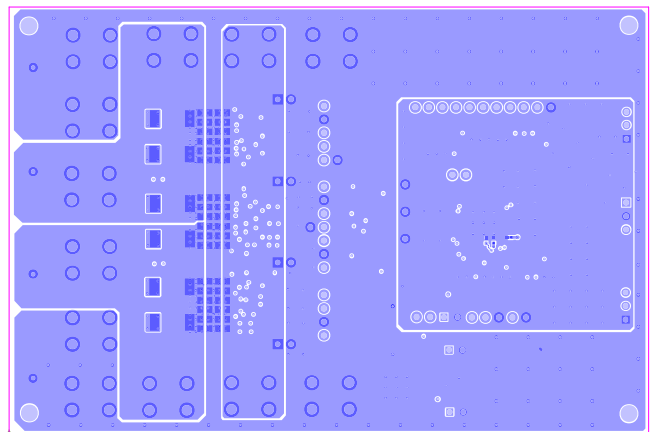


Figure 10: Bottom Layer



REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	2/8/2023	Initial Release	-

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