EV2702-RP-00A

26V, 1A, Linear Charger with Configurable JEITA and EN Control Evaluation Board

DESCRIPTION

The EV2702-RP-00A is an evaluation board designed to demonstrate the capabilities of the MP2702, a 26V, 1A, highly integrated linear charger for Li-ion and Li-polymer batteries.

The MP2702 has a dedicated ISET pin to set the charge current (I_{CC}) by connecting a resistor from this pin to ground. The USBM pin sets the input current limit (I_{IN_LIM}) prior to setting I_{CC}. The MP2702 also has a minimum input voltage limit (V_{IN_LIM}) to reduce I_{CC} when the input power is overloaded.

The MP2702 has a dedicated EN pin to enable or disable charging. After charging is disabled, the quiescent current in either the IN or BATT pin is minimized.

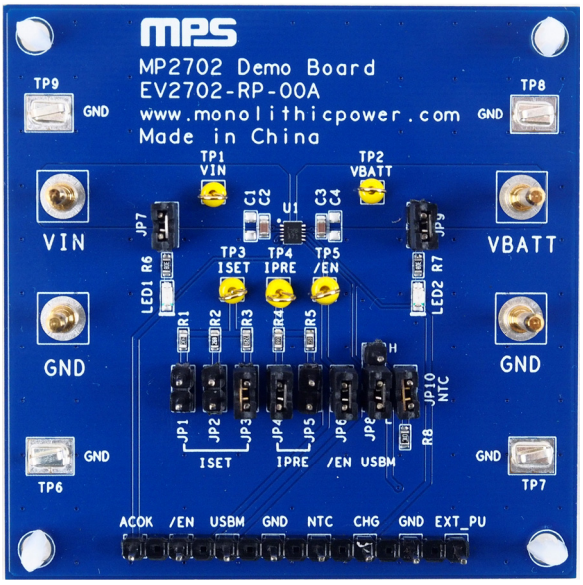
The MP2702 supports a fully customizable JEITA profile with configurable temperature windows and actions.

The EV2702-RP-00A supports an operating voltage up to 6V, and its absolute maximum input voltage (V_{IN}) can be up to 26V.

PERFORMANCE SUMMARY

Parameters	Conditions	Value
Input voltage (V_{IN}) range		4V to 6V
Battery charge regulation voltage (V_{BATT_REG})	V_{IN} = 5V	4.2V
Charge current (I_{CC})	V_{BATT} = 4V	0.02A to 1A

EVALUATION BOARD



LxWxH (6.3cmx6.3cmx1.3cm)

Board Number	MPS IC Number
EV2702-RP-00A	MP2702GRP

QUICK START GUIDE

The EV2702-RP-00A evaluation board is designed for the MP2702 as a single-cell linear charger. Its layout accommodates most commonly used capacitors. The charge-full voltage is preset to 4.2V.

Table 1 lists the jumper set-ups for the EV2702-RP-00A.

Table 1: Jumper Installations

Jumper	Description	Factory Setting
JP1	ISET resistor selection 1: I_{CC} = 20mA	Off
JP2	ISET resistor selection 2: I_{CC} = 300mA	Off
JP3	ISET resistor selection 3: I_{CC} = 1A	On
JP4	IPRE resistor selection 1: I_{PRE} = 10% of I_{CC}	On
JP5	IPRE resistor selection 2: I_{PRE} = 20% of I_{CC}	Off
JP6	External /EN pin control: pull low or float to enable charging	On
JP7	/ACOK pull-up	On
JP8	External USBM pin control	Low
JP9	/CHG pull-up	On
JP10	NTC setting: fixed 10kΩ pull-down	On

Start-Up Procedure

To set up the EV2702-RP-00A, refer to Figure 1 on page 3 and follow the guidelines below:

1. Set the battery simulator output to be between 0V and 4.2V with a current limit at 3A, then turn off the battery simulator output.
2. Set the DC power source to 5V with an output current limit set to 2A, then turn off the DC power source.
3. Connect the battery simulator terminals to:
   a. Positive (+): VBATT
   b. Negative (-): GND
4. Connect the DC power source terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
5. Set the fast charge current using JP1, JP2, and JP3.
6. Set the pre-charge current using JP4 and JP5.
7. Set the input current limit (I_{IN_LIM}) using JP8 (USBM). Connect JP8 to logic low to follow the ISET setting. Connect JP8 to logic high to set I_{IN_LIM} to 500mA. Float JP8 to set I_{IN_LIM} to 100mA. If connecting JP8 to high logic, an external 3V pull-up voltage must be connected between EXT_PU and GND on the board.
8. Turn on the battery simulator.
9. Turn on the DC power source. The IC should start up automatically.

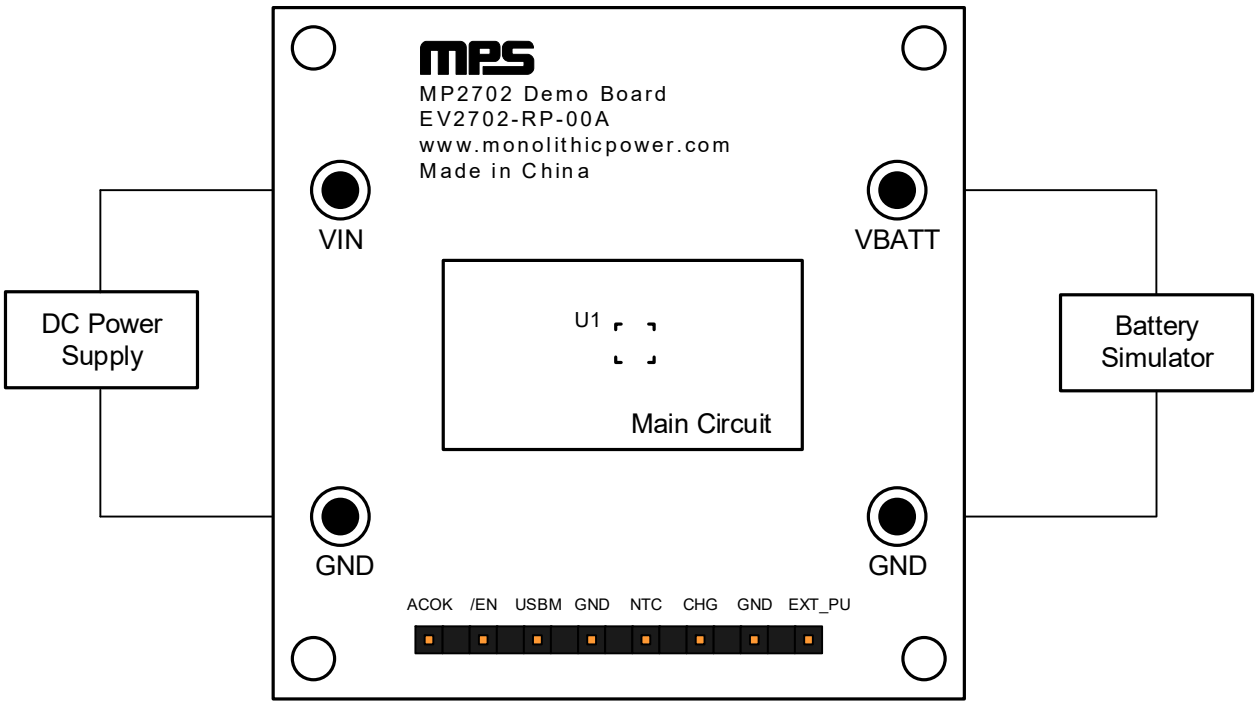


Figure 1: Test Set-Up for the MP2702

EVALUATION BOARD SCHEMATIC

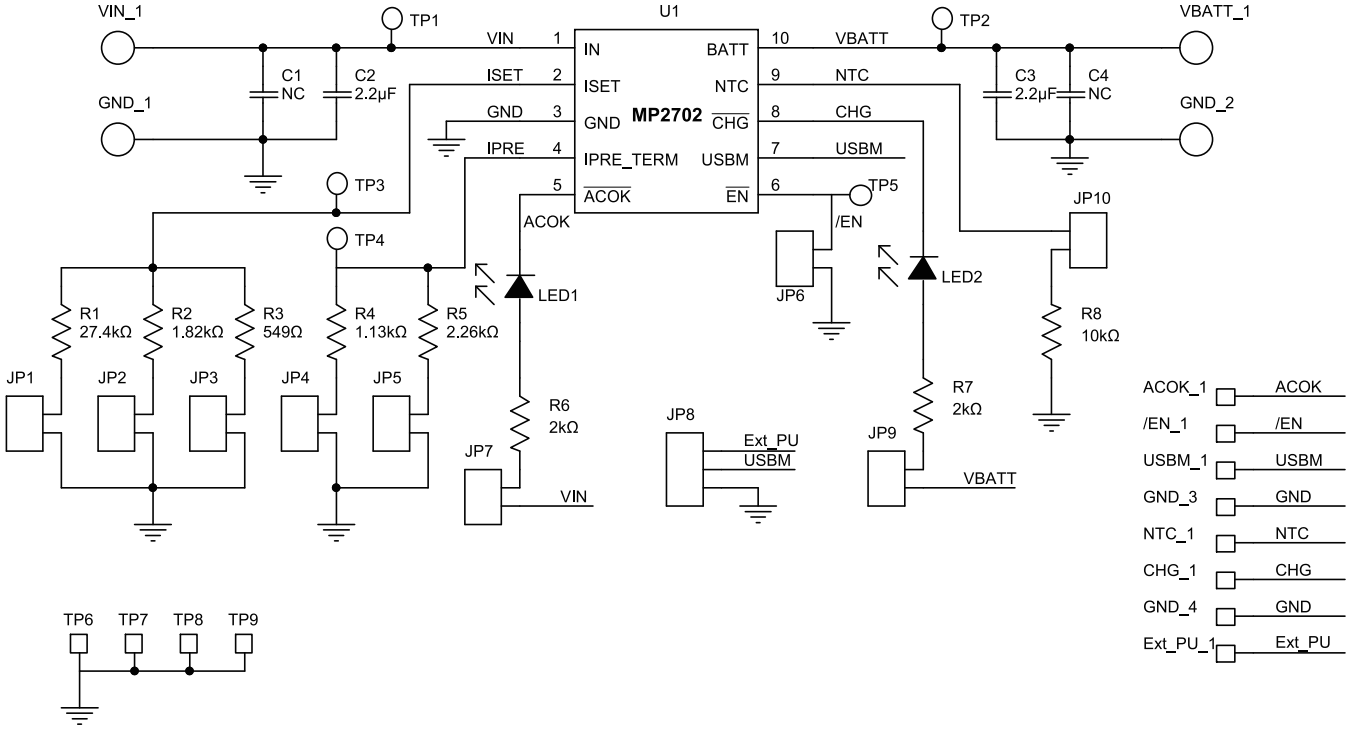


Figure 2: Evaluation Board Schematic

EV2702-RP-00A BILL OF MATERIALS

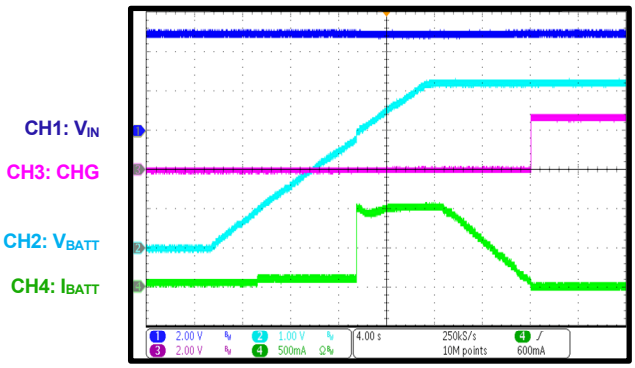
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
2	C1, C4	NC	Ceramic capacitor, 50V, X5R	0805		
2	C2, C3	2.2μF	Ceramic capacitor, 50V, X5R	0603	Murata	GRM188R61H225KE11D
1	R1	27.4kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0727K4L
1	R2	1.82kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-071K82L
1	R3	549Ω	Film resistor, 1%	0603	Yageo	RC0603FR-07549RL
1	R4	1.13kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-071K13L
1	R5	2.26kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-072K26L
2	R6, R7	2kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-072KL
1	R8	10kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0710KL
1	LED1	50mW	Red LED	0805	Baihong	BL-HUE35A-AV-TRB
1	LED2	50mW	Green LED	0805	Baihong	BL-HGE35A-AV-TRB
4	VIN_1, VBATT_1, GND_1, GND_2	2mm	Connector	DIP	Any	
9	JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP9, JP10	2.54mm	Row connector	DIP	Any	
1	JP8	2.54mm	Row connector	DIP	Any	
7	JP3, JP4, JP6, JP7, JP8, JP9, JP10	2.54mm	Shunt connector	DIP	Any	
8	USBM_1, NTC_1, Ext_PU_1, CHG_1, ACOK_1, /EN_1, GND_3, GND_4	2.54mm	Row connector	DIP	Any	
5	TP1, TP2, TP3, TP4, TP5	1mm	Test point yellow	DIP	Any	
4	TP6, TP7, TP8, TP9	2.8mmx 3.8mm	Test point ground	SMD	Any	
1	U1	MP2702	26V, 1A, linear charger	QFN-10 (2.0mmx 2.5mm)	MPS	MP2702GRP

EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 5V, V_{BATT} = 0V to 4.2V, I_{CC} = 1A, V_{IN_LIM} = 4.5V, T_A = 25°C, unless otherwise noted.

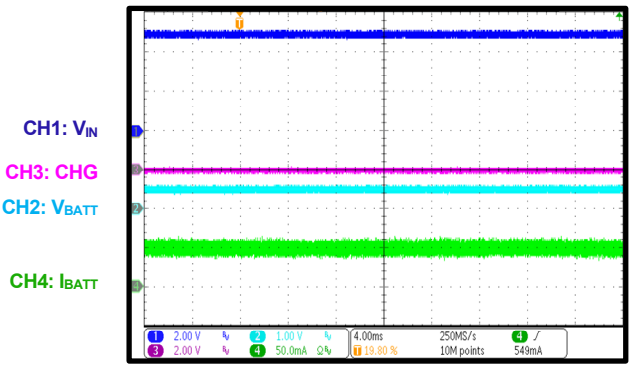
Battery Charge Profile

V_{IN} = 5V, I_{PRE} = 10% of I_{CC}, I_{CC} = 1A



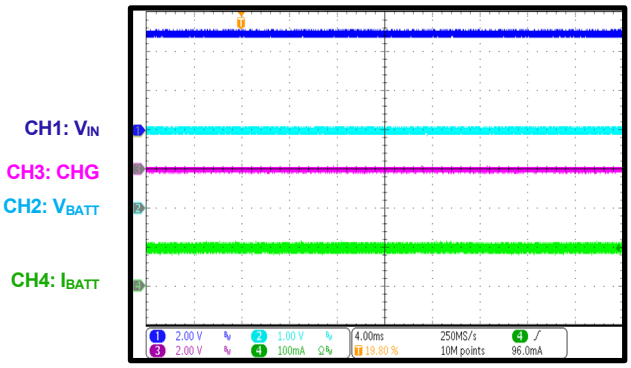
Trickle Charge

V_{IN} = 5V, V_{BATT} = 0.5V, I_{TC} = 50mA



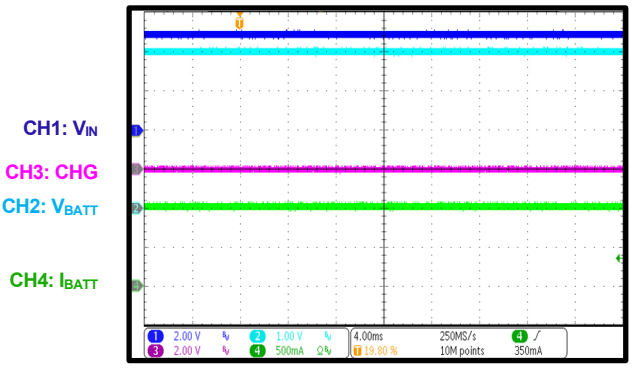
Pre-Charge

V_{IN} = 5V, V_{BATT} = 2V, I_{PRE} = 100mA



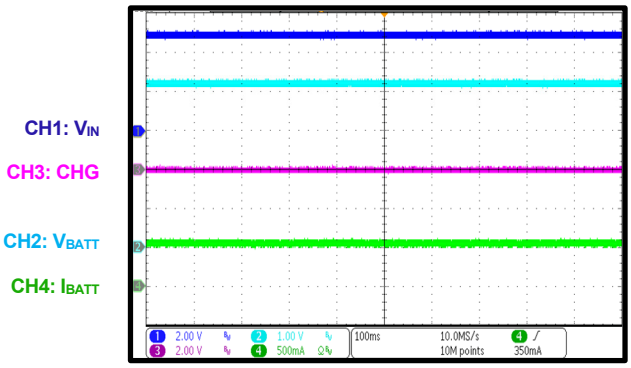
Constant Current Charge

V_{IN} = 5V, V_{BATT} = 4V, I_{CC} = 1A



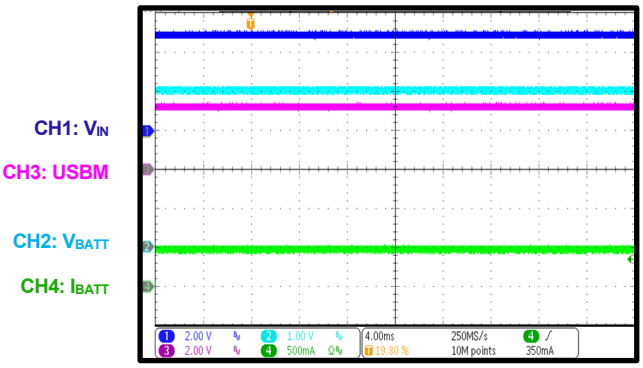
Constant Voltage Charge

V_{IN} = 5V, V_{BATT} = 4.185V, I_{CC} = 1A



Input Current Limit

V_{IN} = 5V, V_{BATT} = 4V, I_{CC} = 1A, USBM = high

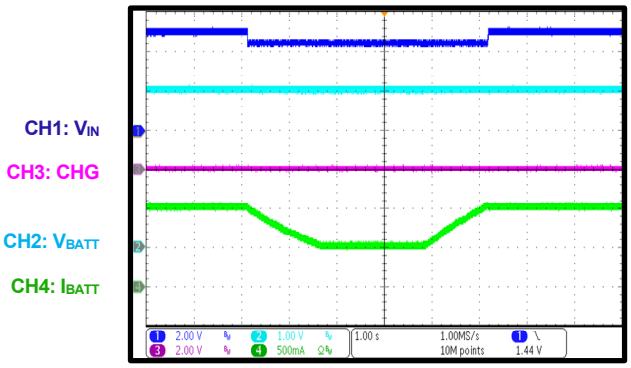


EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board. V_{IN} = 5V, V_{BATT} = 0V to 4.2V, I_{CC} = 1A, V_{IN_LIM} = 4.5V, T_A = 25°C, unless otherwise noted.

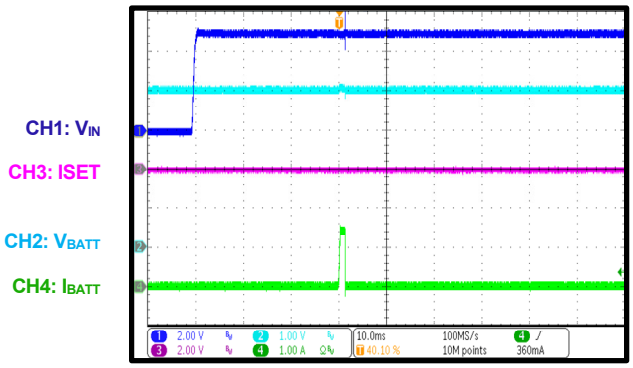
Input Voltage Limit

V_{IN} = 5V (1A to 0.5A to 1A), V_{IN_LIM} = 4.5V, V_{BATT} = 4V, I_{CC} = 1A



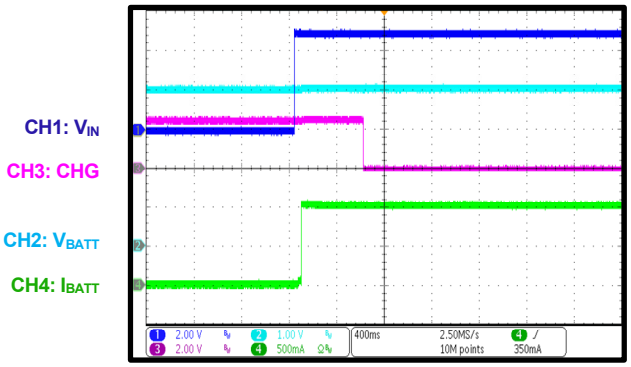
Start-Up with ISET Short

V_{IN} = 5V, V_{BATT} = 4V, ISET short



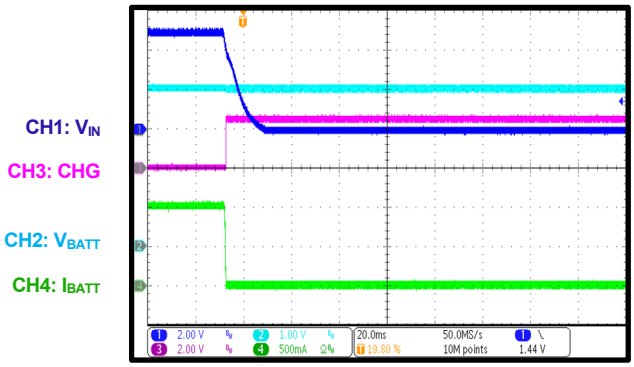
Start-Up

V_{IN} = 5V, V_{BATT} = 4V, I_{CC} = 1A



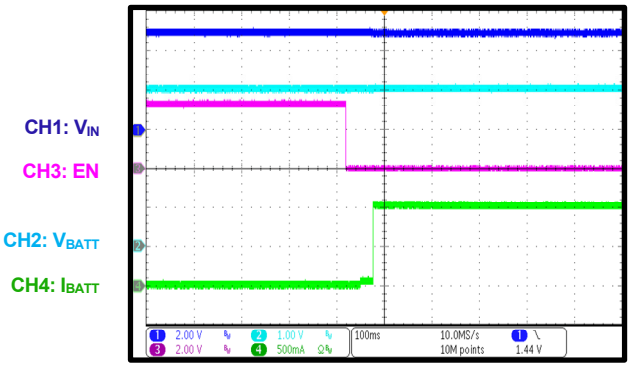
Shutdown

V_{IN} = 5V, V_{BATT} = 4V, I_{CC} = 1A



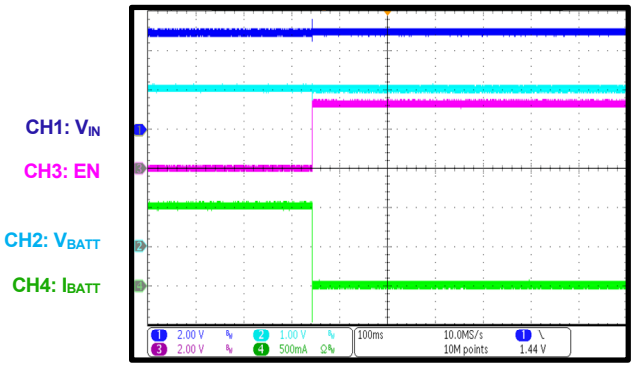
Charge Enabled by EN

V_{IN} = 5V, V_{BATT} = 4V, I_{CC} = 1A



Charge Disabled by EN

V_{IN} = 5V, V_{BATT} = 4V, I_{CC} = 1A



PCB LAYOUT

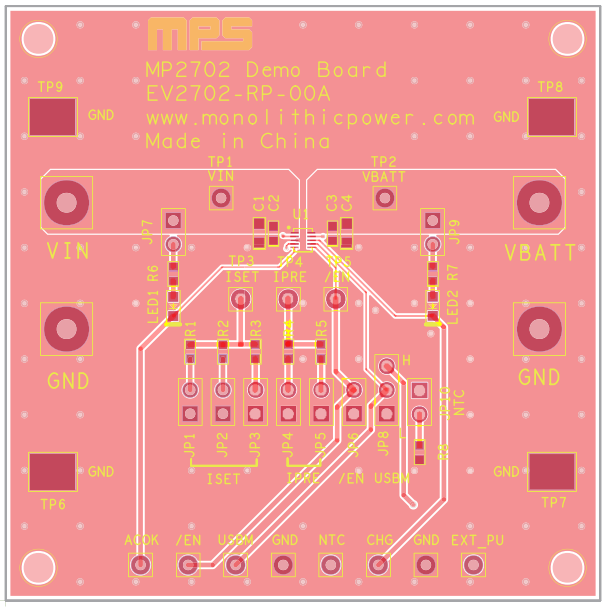


Figure 3: Top Layer

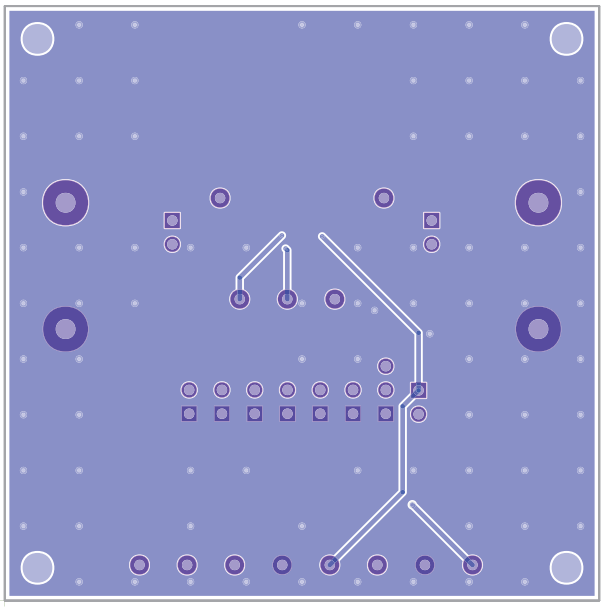


Figure 4: Bottom Layer

REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	2/23/2023	Initial Release	-