EV2696B-Q-00A

Single-Cell Switch-Mode Charger with Power-Path Management Evaluation Board

DESCRIPTION

The EV2696B-Q-00A is an evaluation board designed to demonstrate the capabilities of the MP2696B, a highly integrated, flexible, single-cell switch-mode battery charger system with power path management.

The MP2696B has three operation modes: charge mode, boost mode, and sleep mode.

In charge mode, the MP2696B can achieve up to 3.6A of charge current with a 5V input source.

In boost mode, the MP2696B can achieve up to 6.5A of peak inductor current to deliver a 5V system power output (SYS).

The MP2696B's parameters and controls can be easily configured via the I²C interface.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input voltage	V_{IN}	4 to 11	V
Input current limit [1]	I_{IN_LIMIT}	0.5	A
Charge regulation voltage [1]	V_{BATT_REG}	4.2	V
Charge current [1]	I_{CC}	1	A
Output voltage [1]	V_{SYS}	5.15	V
Output current limit [1]	I_{OUT_LIMIT}	3	A
Output power	P_{OUT}	Up to 20	W

Note:

1) Configurable via the I²C interface.

FEATURES

- 4V to 11V Operating Input Range
- Up to 16V Sustainable Input Voltage
- 500mA to 3.5A Configurable Input Current Limit
- 500mA to 3.6A Configurable Charge Current
- 3.6V to 4.45V Configurable Charge Regulation Voltage
- Minimum Input Voltage Loop for Maximum Adapter Power Tracking
- Boost Converter with Up to 4A Output Current:
  - Configurable Output Current Limit Loop
  - Configurable Boost Output Voltage
  - USB Output Cable Compensation
  - Configurable Peak Inductor Current
- Comprehensive Safety Features
  - Fully Customizable JEITA Profile
  - Charge Safety Timer
  - Input Over-Voltage Protection (OVP)
  - Thermal Shutdown
  - System Power Output (SYS) Over-Current Protection (OCP) and Short-Circuit Protection (SCP)
- Analog Voltage Output IB Pin for Battery Current Monitoring
- SYS Plug-In Detection
- SYS No-Load Detection
- SYS DP/DM Interface for BC1.2 and Non-Standard Adapters
- Status Monitoring and Fault Monitoring

APPLICATIONS

- Sub-Battery Applications
- Power Bank Applications

EV2696B-Q-00A EVALUATION BOARD

LxWxH (6.35cmx6.35cmx1.2cm)

Board Number	MPS IC Number
EV2696B-Q-00A	MP2696BGQ-0000

QUICK START GUIDE

1. Install the USB I^{2}C communication interface driver on the computer.

2. Connect the I^{2}C communication interface to the SCL/GND/SDA communication lines on the evaluation board.

3. Connect the battery terminals to:

    a. Positive (+): TP1/BATT

    b. Negative (-): TP2/GND

4. If using a battery simulator, preset the battery simulator to 3.8V/5A, then turn the battery simulator off. Then connect the battery simulator terminals to:

    a. Positive (+): TP1/BATT

    b. Negative (-): TP2/GND

5. After making the connections to the battery simulator, turn the battery simulator output on.

6. Connect the input terminals to:

    a. Positive (+): TP3/VIN

    b. Negative (-): TP4/GND

7. Ensure that the USB I^{2}C communication interface has connected the MP2696B to the computer. There should not be any warnings shown at the bottom of the GUI software screen. [2]

8. Configure the charge and boost parameters via the GUI I^{2}C interface. [2]

Note:

2) The GUI software can be downloaded from the MPS website.

CONNECTIONS

Table 1: Connectors

Connectors	Description
TP1/BATT	Connect TP1/BATT to the positive battery pack terminal.
TP2/GND	Connect TP2/GND to the negative battery pack terminal.
TP3/VIN	Connect TP3/VIN to the positive input source terminal.
TP4/GND	Connect TP4/GND to the negative input source terminal.
TP5/SYS	Power bank positive output terminal.
TP6/GND	Power bank negative output terminal.
P1/USB Type-A power output	Power bank USB output receptacle.
P2/micro-USB power input	Connect P2/micro-USB power input to the input power adapter.
SCL/SDA/GND/INT	I²C connector.
NTC	Connect NTC to the external thermistor.

Table 2: Jumpers and Shunts

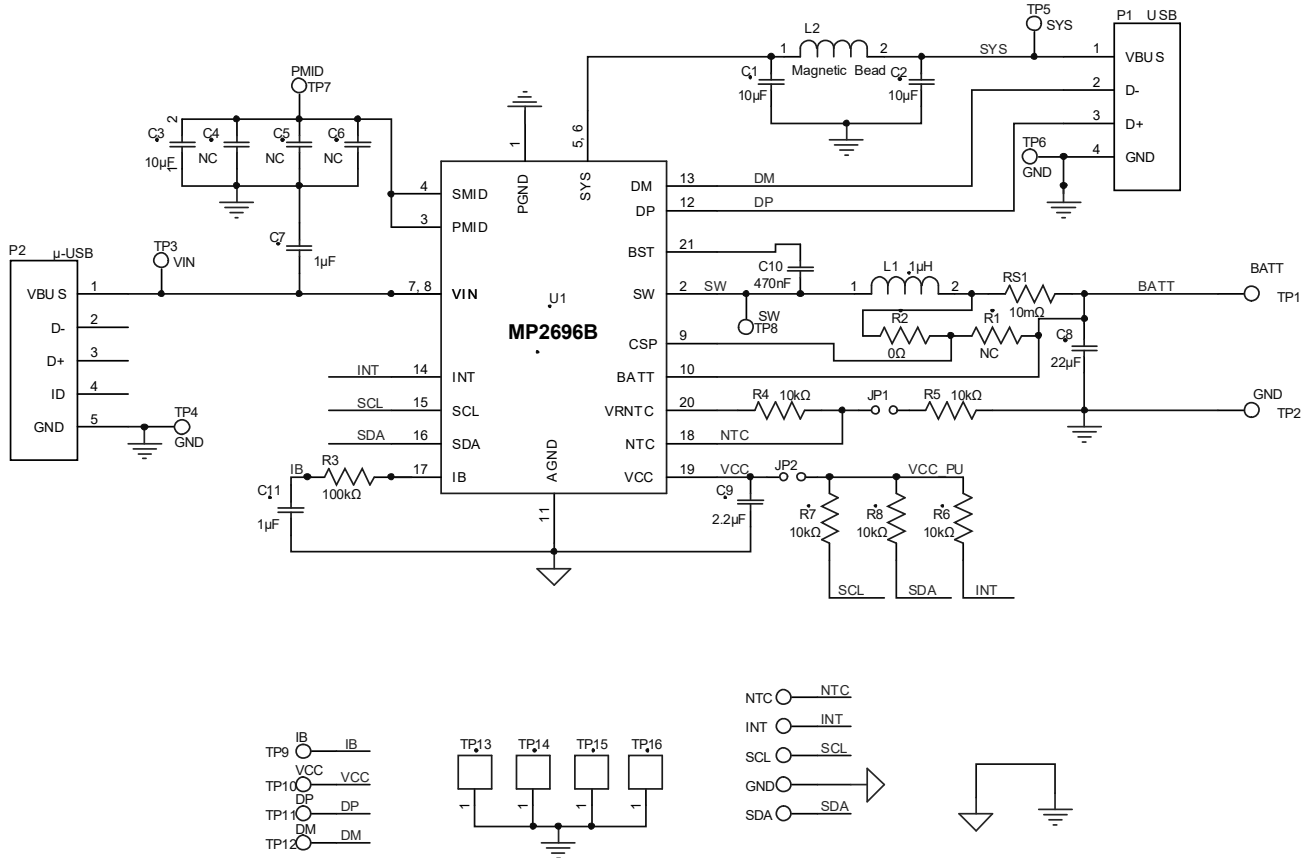| Jumpers	Description	Default
JP1	Connect the on-board NTC divider.	Install
JP2	Connect the 10kΩ pull-up resistors from SCL/SDA/INT to VCC.	Install

EVALUATION BOARD SCHEMATIC

Figure 1: Evaluation Board Schematic

EV2696B-Q-00A BILL OF MATERIALS

| Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
2	C1, C2	10μF	Capacitor, 16V, X5R	0805	Murata	GRM21BR61C106KE15L
1	C3	10μF	Capacitor, 16V, X5R	1206	Murata	GRM319R60J106KE19
3	C4, C5, C6	NC	Capacitor, 16V, X5R	0805	Murata	GRM21BR61C106KE15L
1	C7	1μF	Capacitor, 16V, X5R	0805	Murata	GRM21BR71C105KA01
1	C8	22μF	Capacitor, 10V, X7S	0805	TDK	C2012X7S1A226M
1	C9	2.2μF	Ceramic capacitor, 10V, X5R	0603	Murata	GRM188R71A225KE15D
1	C10	470nF	Ceramic capacitor, 25V, X7R	0603	TDK	C1608X7R1E474K
1	C11	1μF	Ceramic capacitor, 10V, X7R	0603	Lion	0603B105K100T
6	TP1, TP2, TP3, TP4, TP5, TP6	2mm	Connector	DIP	Any	
6	TP7, TP8 TP9, TP10, TP11, TP12		Test point	DIP	Any	
5	GND, INT, NTC, SCL, SDA	2.54mm	Connector	DIP	Any	
2	JP1, JP2		Jumper	DIP	Any	
4	TP13, TP14, TP15, TP16		Connector, GND	SMT	Any	
1	L1	1μH	Inductor, 1μH, 6.8A	SMD	Wurth	744777001
1	L2	3A	Magnetic bead	0805	Wurth	742792063
1	P1		USB Type-A	DIP	Any	
1	P2		Micro-USB	DIP	Any	
1	R1	NC	Film resistor	NC	NC	NC
1	R2	0	Film resistor, 5%	0603	Yageo	RC0603JR-070RL
1	R3	100kΩ	Film resistor 5%	0603	Yageo	RC0603JR-07100KL
2	R4, R5	10kΩ	Film resistor 1%	0603	Yageo	RC0603FR-0710KL
1	RS1	10mΩ	Film resistor, 1%, 1/4W	1206	Yageo	RL1206FR-070R01L
1	U1	MP2696B	Single-cell SW charger with power path management and boost output	QFN-21 (3mmx3mm)	MPS	MP2696BGQ-0000

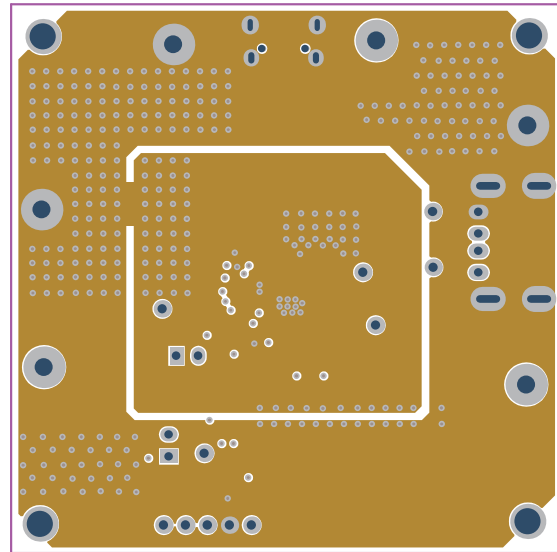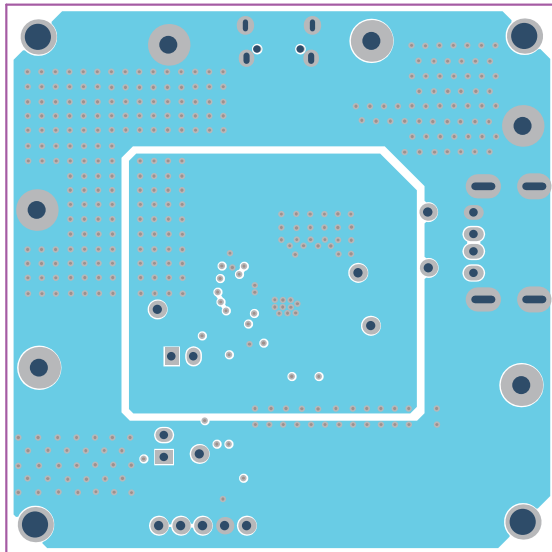## PCB LAYOUT
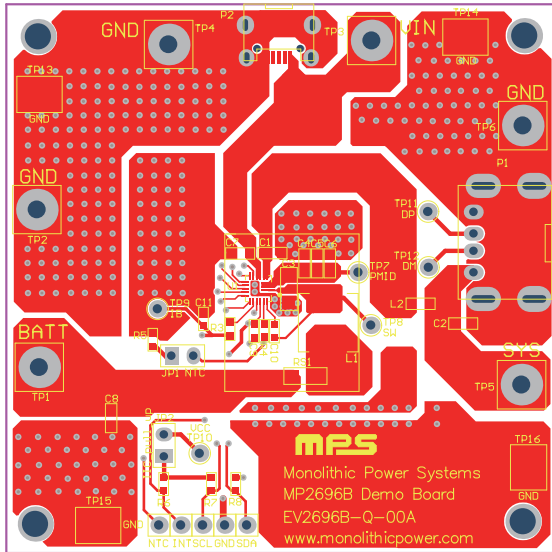
Figure 2: Top Layer
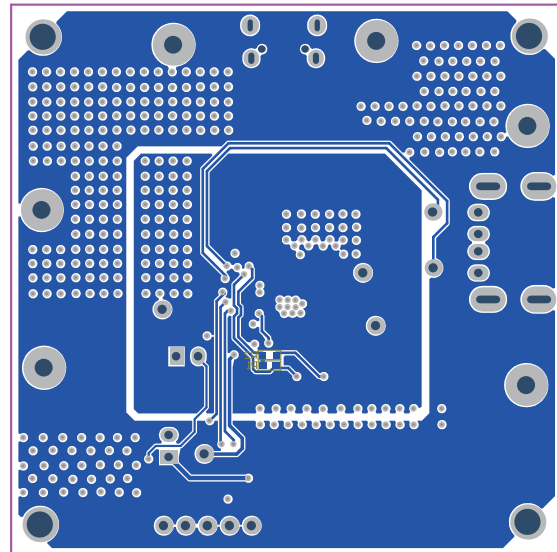

Figure 3: Mid-Layer 1

Figure 4: Mid-Layer 2

Figure 5: Bottom Layer

REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	3/29/2021	Initial Release	-