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.

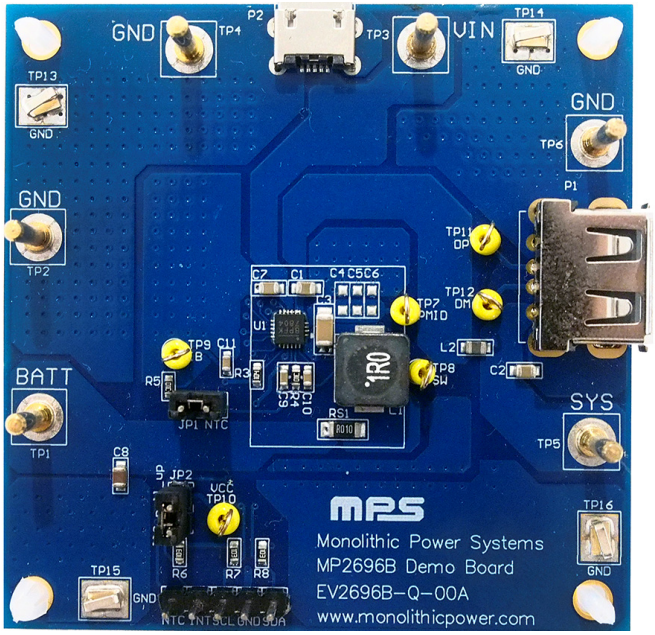
FEATURES

- 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 I²C communication interface driver on the computer.
2. Connect the I²C 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 I²C 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 I²C 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	I^2C 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

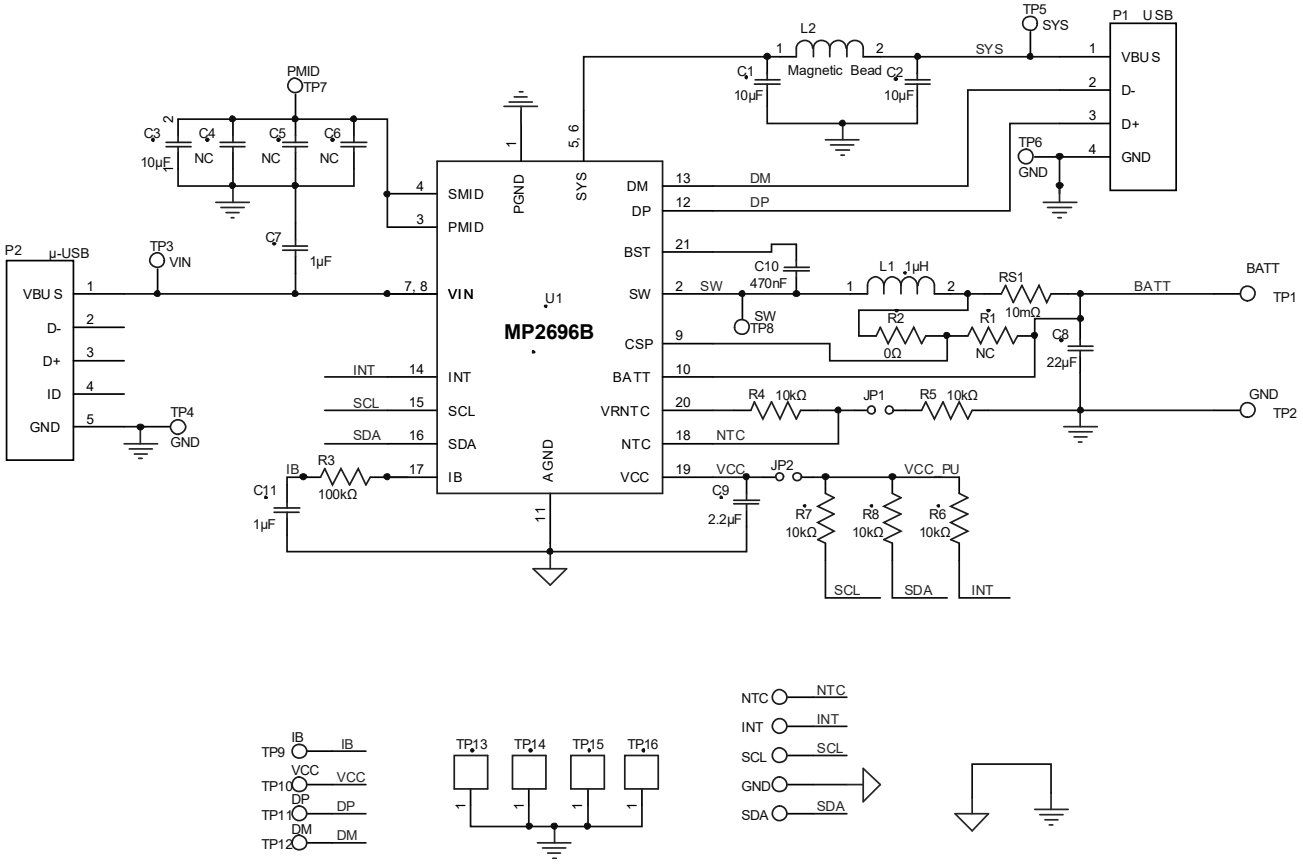


Figure 1: Evaluation Board Schematic

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

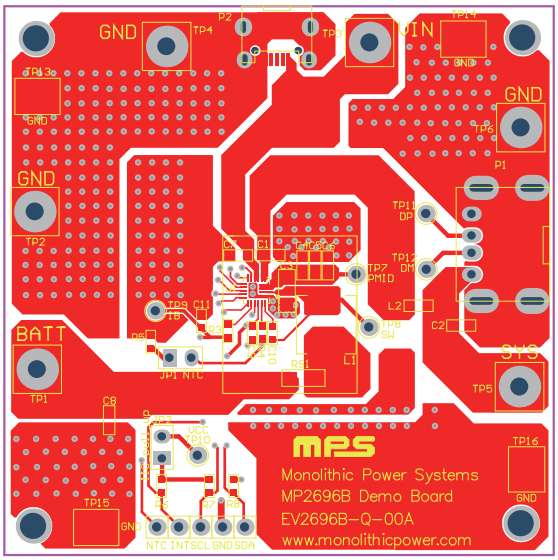


Figure 2: Top Layer

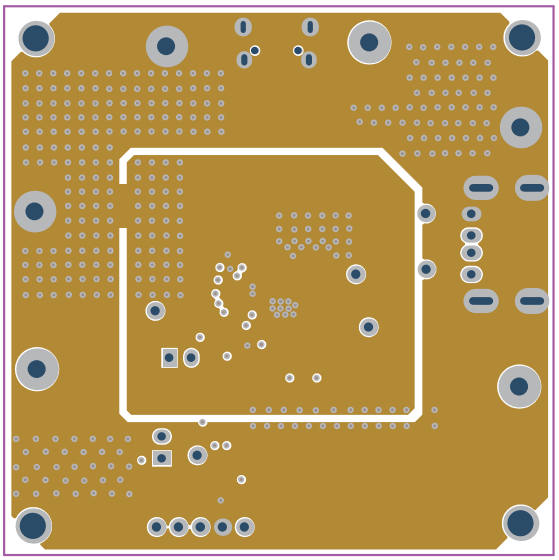


Figure 3: Mid-Layer 1

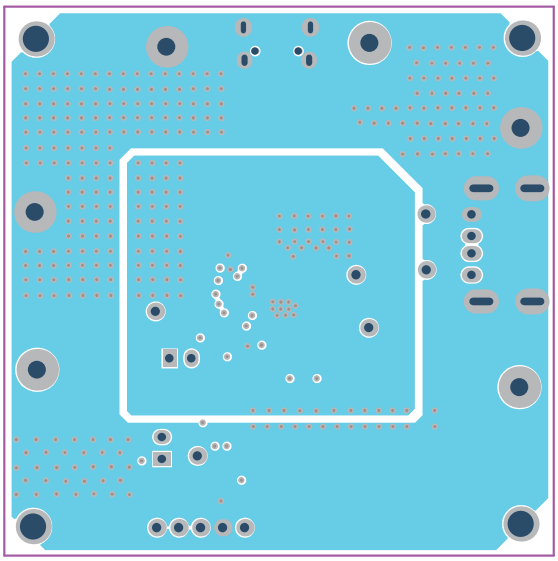


Figure 4: Mid-Layer 2

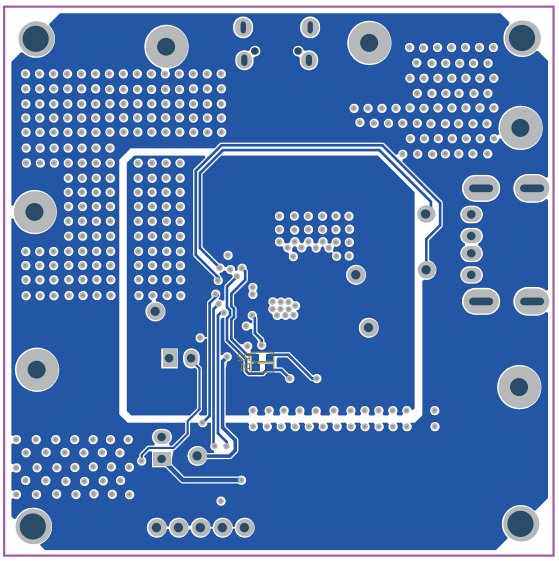


Figure 5: Bottom Layer

REVISION HISTORY

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