



# MEZS7-SharedPowerBank

## I<sup>2</sup>C Controlled, Single-Cell Switching Charger with Power-Path Management and 3.6A Boost Output Solution Module

### DESCRIPTION

The MEZS7-SharedPowerBank is a complete solution module using the MP2696A buck charger with boost output, LED state-of-charge indicator, and an MCU to achieve a turn-key solution for shared power bank applications. The MP2696A is a highly integrated, flexible, switch-mode battery charge management and system power path management device.

The MP2696A has three operation modes: charge mode, boost mode, and sleep mode.

In charge mode, the solution module achieves up to 3.6A of charge current from a 5V micro USB input source.

In boost mode, the solution module delivers up to 3.6A to a regulated 5V USB-A output for charging external devices such as smartphones. All the parameters and controls can be easily accessed via the I<sup>2</sup>C interface.

### ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input voltage	V <sub>IN</sub>	4 to 6	V
Input current limit	I <sub>IN</sub>	0.1 to 3.0, programmable	A
Charge voltage regulation	V <sub>BATT_REG</sub>	3.6 to 4.45, programmable	V
Charge current	I <sub>CC</sub>	Up to 3.6, programmable	A
Output voltage	V <sub>SYS</sub>	5.05 to 5.25, programmable	V
Output current limit	I <sub>OLIM</sub>	2.1 to 3.6, programmable	A
Output power	P <sub>OUT</sub>	Up to 18	W

### FEATURES

- 4V to 6V Operation Voltage Range
- Up to 16V Sustainable Input Voltage
- 500mA to 3.6A Programmable Charge Current
- 3.6V to 4.45V Programmable Charge Regulation Voltage
- 100mA to 3A Programmable Input Current Limit
- Minimum Input Voltage Loop for Maximum Adapter Power Tracking
- Boost Converter with Up to 3.6A Output Current:
  - Programmable Output Current Limit Loop
  - Programmable Boost Output Voltage
  - USB Output Cable Compensation
  - Programmable Inductor Peak Current
- Comprehensive Safety Features:
  - Fully Customizable JEITA Profile
  - Charge Safety Timer
  - Input Over-Voltage Protection
  - Thermal Shutdown
  - SYS Over-Current and Short Protection
- Analog Voltage Output IB Pin for Battery Current Monitor
- SYS Plug-In Detection
- SYS No-Load Detection
- SYS DP/DM Interface for BC1.2 and Non-Standard Adapters
- Status and Fault Monitoring

### APPLICATIONS

- Shared Power Banks
- Micro-USB and USB Type-A Power Banks
- Battery Backup Applications

All MPS parts are lead-free, halogen-free, and adhere to the RoHS directive. For MPS green status, please visit the MPS website under Quality Assurance. "MPS", the MPS logo, and "Simple, Easy Solutions" are trademarks of Monolithic Power Systems, Inc. or its subsidiaries.

**MEZS7-SHAREDPowerBANK SOLUTION MODULE**



(LxWxH) 6.35cmx6.35cmx1.2cm

Board Number	MPS IC Number
MEZS7-SharedPowerBank	MP2696AGQ-0000

## QUICK START GUIDE

### MCU Mode:

1. Connect the battery pack to the BATT (TP1) and GND (TP2) connectors. Ensure the battery positive/negative terminals are not reverse connected.
2. If using a battery emulator, preset the battery emulator to 3.8V/5A and turn off the emulator. Connect to BATT (TP1) and GND (TP2), then turn on the emulator output.
3. Plug in the input adapter to the micro-USB port (P2), or connect the input power source (5V/3A) to the VIN (TP3) and GND (TP4) terminals. The MP2696A should start charging the battery.
4. To test the boost output, plug in the load USB cable to the USB-A (P1) port, or add the load on the SYS (TP5) and GND (TP6) terminals. The boost should start automatically.
5. Pressing the SW1 button also activates the SYS output.
6. If no load is present at the SYS output after 32 seconds, the MP2696A turns off boost mode and enters sleep mode automatically.
7. Charge first to avoid BATT\_UVLO lockout.
8. Contact MPS for information regarding the MCU code.

### I<sup>2</sup>C Communication Interface Mode:

1. Install the USB communication interface driver on the computer, and connect the communication interface to the SCL/GND/SDA connector on the board.
2. Remove the shunts on JP2 and JP3.
3. Connect the battery pack to the BATT (TP1) and GND (TP2) connectors. Ensure the battery positive/negative terminals are not reverse connected.
4. If using a battery emulator, preset the battery emulator to 3.8V/5A and turn off the emulator. Connect to BATT (TP1) and GND (TP2), then turn on the emulator output.
5. Verify that the USB communication interface connects the MP2696A to the computer successfully (the GUI will show no warning notification of unsuccessful connection).
6. The charging and boost parameters can be controlled by the GUI interface.

# SOLUTION MODULE SCHEMATIC

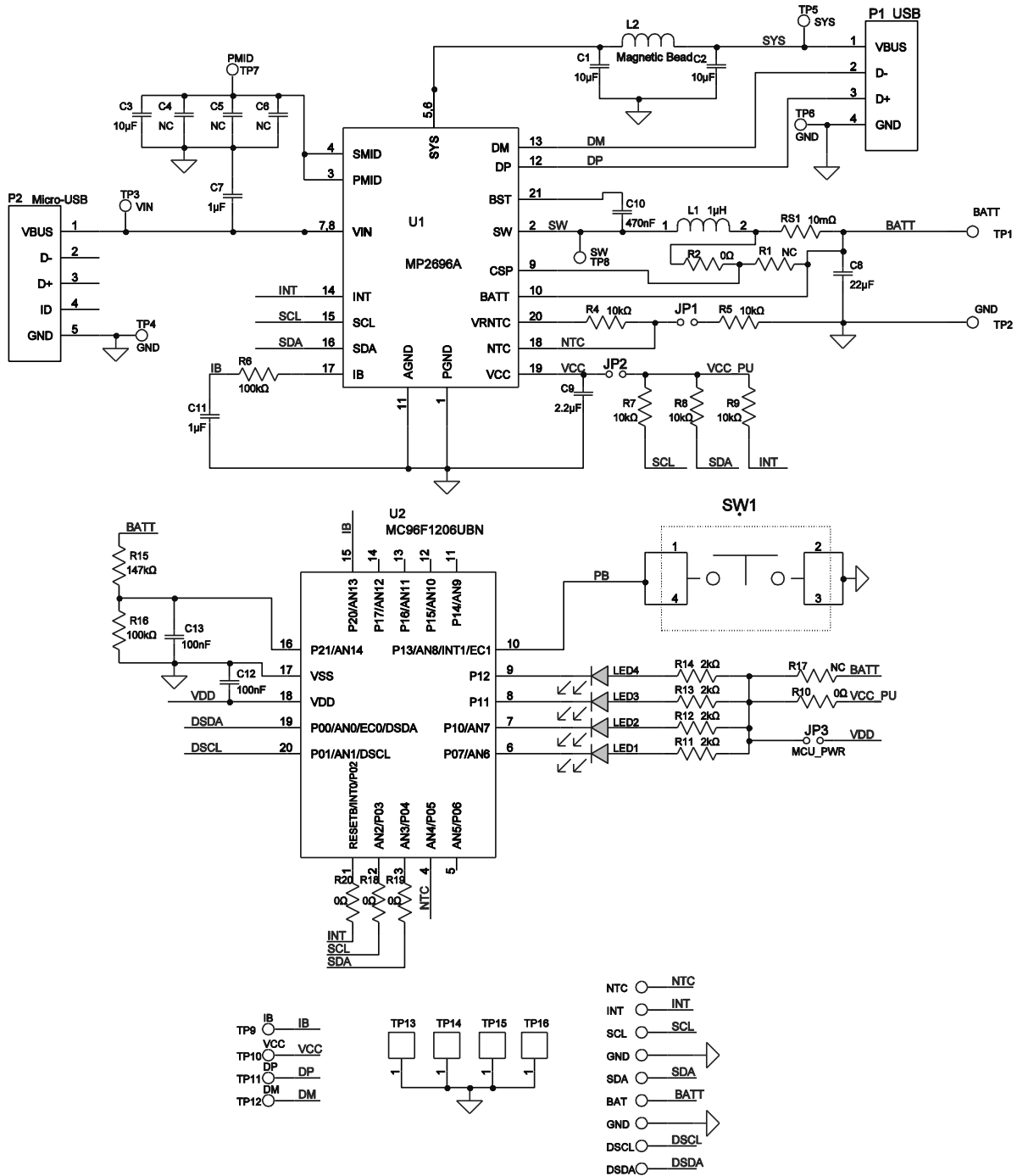


Figure 1: Solution Module Schematic

## CONNECTIONS

**Table 1: Connectors**

Connectors	Description
TP1/BATT	Connect to the battery pack positive terminal.
TP2/GND	Connect to the battery pack negative terminal.
TP3/VIN	Connect to the input source positive terminal.
TP4/GND	Connect to the input source negative terminal.
P2/micro-USB power input	Connect to the input power adapter.
TP5/SYS	Power bank output positive terminal.
TP6/GND	Power bank output negative terminal.
P1/USB-A power output	Power bank output USB receptacle.
SCL/SDA/GND/INT	I <sup>2</sup> C connector.
NTC	Connect to the external thermistor.
DSCL/DSDA/GND	MCU programming terminal.

**Table 2: Jumpers and Shunts**

Jumpers	Description	MCU Mode Default	I <sup>2</sup> C Communication Interface Mode Default
JP1	Connect to the on-board NTC divider.	Installed	Installed
JP2	Connect the 10k $\Omega$ pull-up resistors to VCC, for SCL, SDA, and INT.	Installed	Uninstalled
JP3	MCU power from BATT.	Installed	Uninstalled

**MEZS7-SHAREDPowerBANK BILL OF MATERIALS**

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
2	C1, C2	10µF	Capacitor, 16V, X5R	0805	Murata	GRM21BR61C106K E15L
1	C3	10µF	Capacitor, 16V, X5R	1206	Murata	GRM319R60J106K E19
3	C4,C5, C6	NC	Capacitor, 16V, X5R	0805	Murata	GRM21BR61C106K E15L
1	C7	1µF	Capacitor, 16V, X5R	0805	Murata	GRM21BR71C105K A01
1	C8	22µF	Capacitor, 10V, X7S	0805	TDK	C2012X7S1A226M
1	C9	2.2µF	Ceramic capacitor, 10V, X5R	0603	Murata	GRM188R71A225K E15D
1	C10	470nF	Ceramic capacitor, 25V, X7R, 0603	0603	TDK	C1608X7R1E474K
1	C11	1µF	Ceramic capacitor, 10V, X7R, 0603	0603	LION	0603B105K100T
2	C12,C13	100nF	Capacitor, 16V, X7R, 0603, 100nF	0603		GCM188R71C104K A37D
6	TP1, TP2, TP3, TP4, TP5, TP6		Connector, 2.0mm	DIP		
2	TP7, TP8		Test point, orange	DIP		
4	TP9, TP10, TP11, TP12		Test point, white	DIP		
9	DSCL, DSDA, GND, GND, INT, NTC, SCL, SDA,BAT		Connector	DIP		
3	JP1, JP2, JP3		Jumper	DIP		
4	TP13, TP14, TP15, TP16		Connector, GND	SMT		
1	L1	1µH	Inductor, 1µH, 10A	SMD	Würth	74437349010
1	L2	Bead	Magnetic bead, 3A	805	Würth	742792063
4	LED1, LED2, LED3, LED4	LED	Red LED	0805		BL-HUF35A-TRB
1	P1		USB-A			
1	P2		Micro-USB			
2	R1, R17	NC	Film resistor			
5	R2, R10, R18, R19, R20	0Ω	Film resistor, 5%	0603	Yageo	RC0603JR-070RL
2	R4, R5	10kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0710KL
1	R6	100kΩ	Film resistor, 5%	0603	Yageo	RC0603JR-07100KL
3	R7, R8, R9	10kΩ	Film resistor, 5%	0603	Yageo	RC0603JR-0710K
4	R11, R12, R13, R14	2kΩ	Film resistor, 5%, 1/10W	0603	LIZ Electronics	CR0603JA0202G

**MEZS7-SHAREDPOWERBANK BILL OF MATERIALS (continued)**

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
1	R15	147kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-07147KL
1	R16	100kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-07100KL
1	RS1	10mΩ	Film resistor, 1%, 1/4W	1206	Yageo	RL1206FR-070R01L
1	SW1	Button	Push button, SM 4mmx10mmx1.5mm			
1	U1	MP2696A	Single-cell switching charger	QFN-21 (3mmx3mm)	MPS	MP2696AGQ-0000
1	U2	MCU	Microcontroller	QFN (3mmx3mm)	ABOV Semiconductor	MC96F1206UBN

PCB LAYOUT

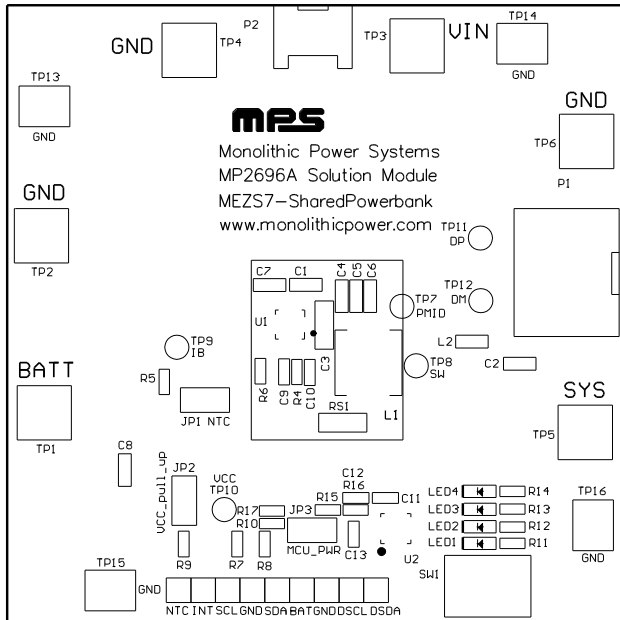


Figure 2: Top Silk Layer

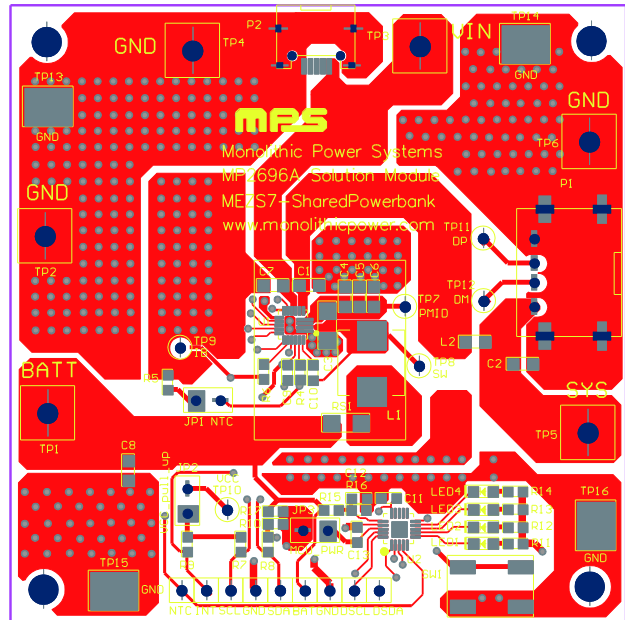


Figure 3: Top Layer

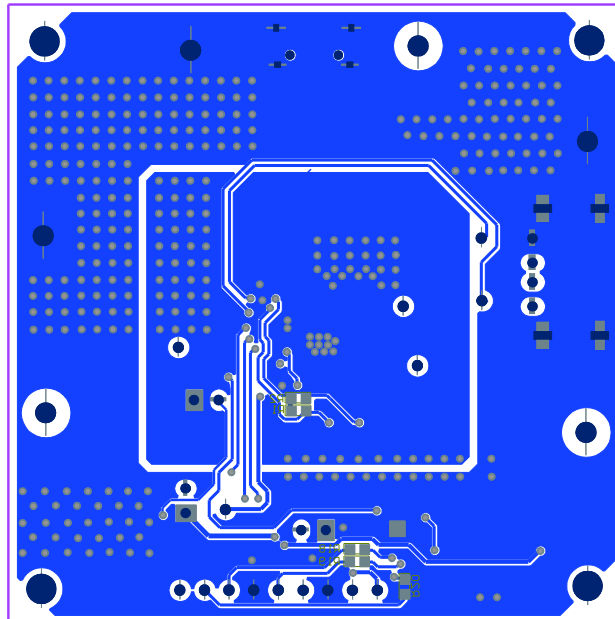


Figure 4: Bottom Layer



## Revision History

Revision #	Revision Date	Description	Pages Updated
1.0	6/17/2020	Initial Release	-

**Notice:** The information in this document is subject to change without notice. Please contact MPS for current specifications. Users should warrant and guarantee that third-party Intellectual Property rights are not infringed upon when integrating MPS products into any application. MPS will not assume any legal responsibility for any said applications.