



MEZS7-SharedPowerBank

I²C 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 I²C interface.

ELECTRICAL SPECIFICATIONS

| Parameter | Symbol | Value | Units |
|---------------------------|-----------------------|----------------------------|-------|
| Input voltage | V _{IN} | 4 to 6 | V |
| Input current limit | I _{IN} | 0.1 to 3.0, programmable | A |
| Charge voltage regulation | V _{BATT_REG} | 3.6 to 4.45, programmable | V |
| Charge current | I _{CC} | Up to 3.6, programmable | A |
| Output voltage | V _{SYS} | 5.05 to 5.25, programmable | V |
| Output current limit | I _{OLIM} | 2.1 to 3.6, programmable | A |
| Output power | P _{OUT} | 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.

I²C 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

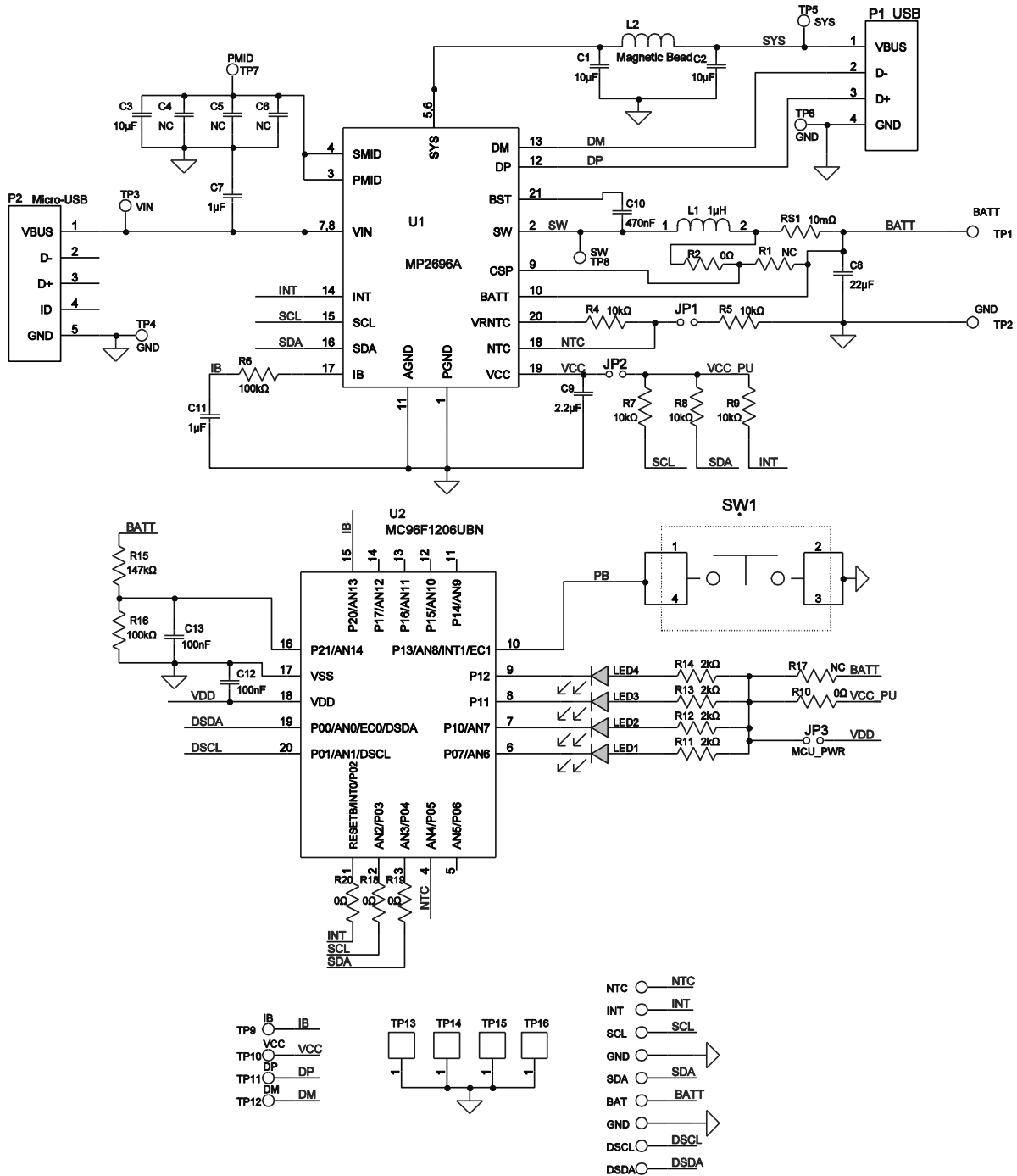


Figure 1: Solution Module Schematic

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 ² 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 ² C Communication Interface Mode Default |
|---------|---|------------------|---|
| JP1 | Connect to the on-board NTC divider. | Installed | Installed |
| JP2 | Connect the 10k Ω 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

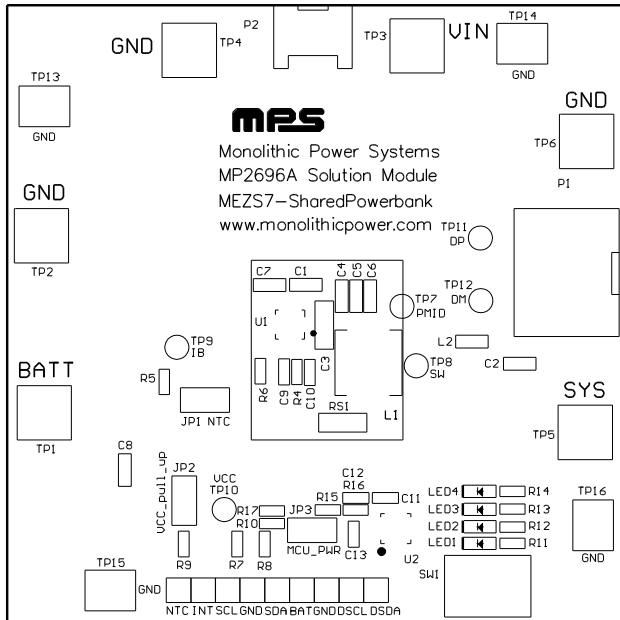


Figure 2: Top Silk Layer

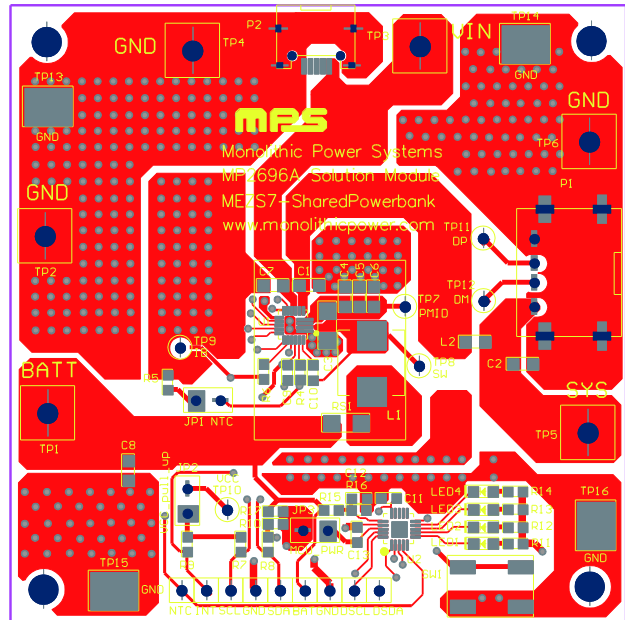


Figure 3: Top Layer

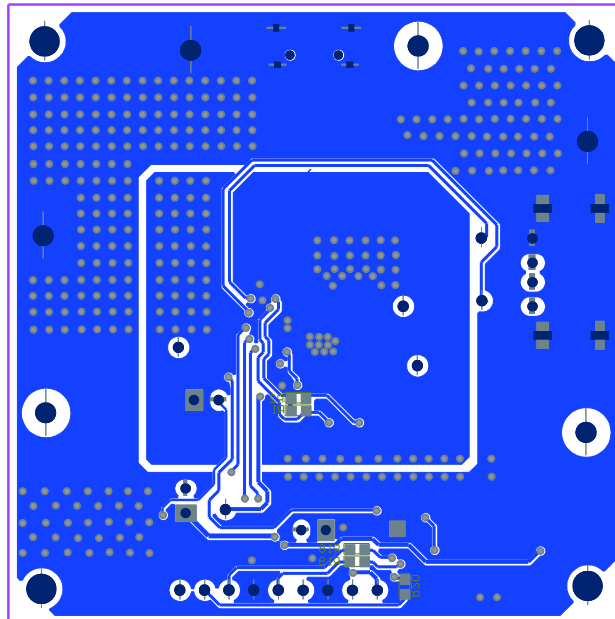


Figure 4: Bottom Layer

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.