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	А
Charge voltage regulation	V _{BATT_REG}	3.6 to 4.45, programmable	V
Charge current	Icc	Up to 3.6, programmable	Α
Output voltage	Vsys	5.05 to 5.25, programmable	V
Output current limit	I _{OLIM}	2.1 to 3.6, programmable	Α
Output power	Роит	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

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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

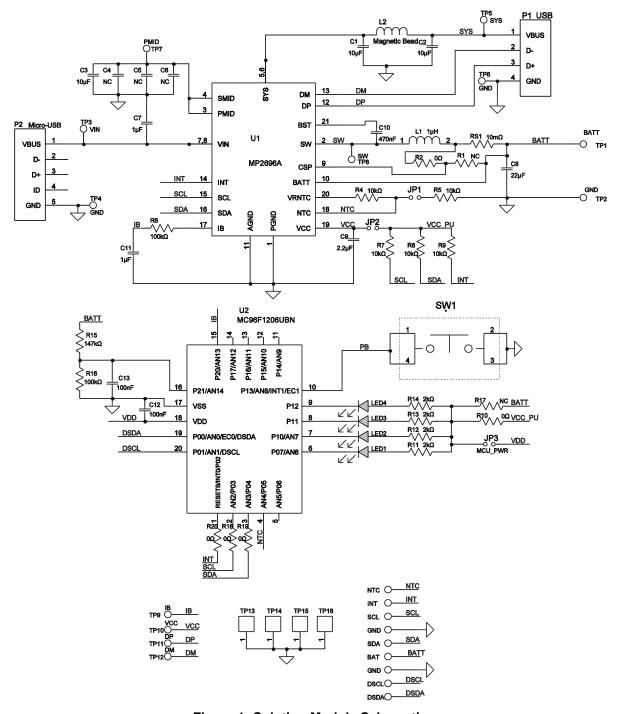


Figure 1: Solution Module Schematic



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 $10k\Omega$ 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	Wurth	74437349010
1	L2	Bead	Magnetic bead, 3A	805	Wurth	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

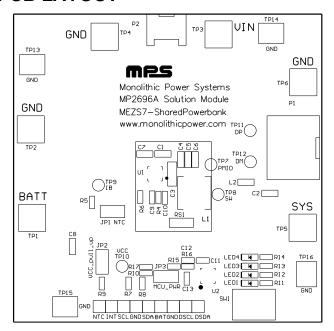


MEZS7-SHAREDPOWERBANK BILL OF MATERIALS (continued)

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



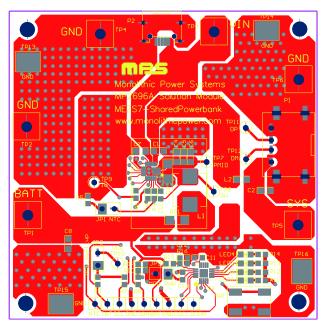


Figure 2: Top Silk Layer

Figure 3: Top Layer

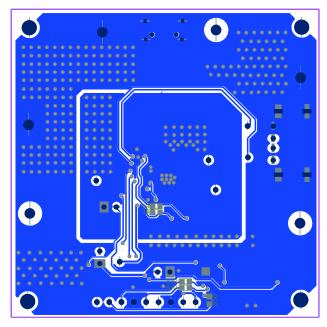


Figure 4: Bottom Layer





Revision History

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

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