EV2678EG-00A

Single-Cell, Li-Ion Battery Charger Protection Circuit with Low-Dropout Mode Evaluation Board

The Future of Analog IC Technology

DESCRIPTION

The EV2678EG-00A is an evaluation board designed to demonstrate the capabilities of the MP2678, a high-performance, single-cell Li-ion and Li-polymer battery charger protection circuit with low-dropout mode. Its regulated 5V output is maintained at input voltages up to the over-voltage protection (OVP) threshold (10.4V).

The device operates similar to a linear regulator, and provides fault indication to indicate when a fault event occurs (e.g. an input over-voltage [OV] event, battery OV event, or over-current event).

Full protection features include input OVP, battery OVP, and over-current protection (OCP). The MP2678 also monitors its internal temperature and provides over-temperature protection (OTP).

The MP2678 is available in a QFN-8 (2mmx2mm) package.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input voltage	V_{IN}	6	V
Input over voltage protection	V_{OVP}	10.4	V
Limit current	I_{LIM}	1.5	A

FEATURES

- Input Surge Up to 30V
- 5V Regulated Output
- Input Over Voltage Protection (OVP)
- MPS Proprietary Battery OVP
- Output Short-Circuit Protection (SCP)
- Soft-Stop to Prevent Voltage Spikes
- Up to 1.7A Load Current
- Thermal Monitoring
- Thermal Shutdown
- Enable (EN) Function
- Fault Indication

APPLICATIONS

- Cell Phones
- Smartphones
- Personal Digital Assistants (PDAs)
- MP3 Players
- Digital Cameras
- Low-Power Handheld Devices

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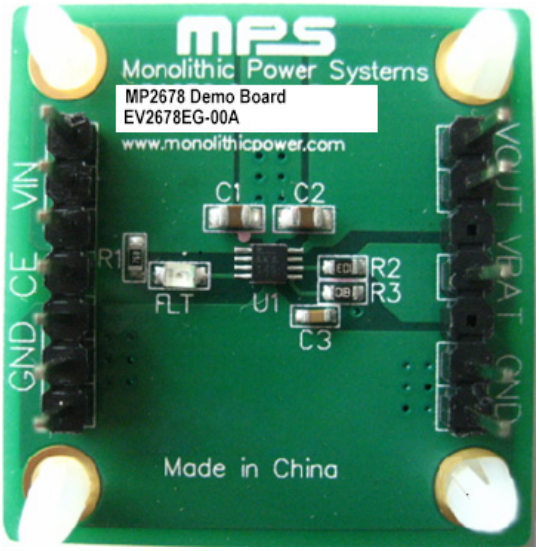
EV2678EG-00A EVALUATION BOARD



LxWxH (2.7cmx2.6cmx1.1cm)

Board Number	MPS IC Number
EV2678EG-00A	MP2678EG

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QUICK START GUIDE

This evaluation board is designed to evaluate the MP2678EG. The board layout accommodates most commonly used capacitors and resistors.

1. Preset the power supply to 2.6V, then turn off the power supply.
2. Connect the output terminals to:
   a. Positive (+): VOUT
   b. Negative (-): GND
3. Connect the input (30V max) terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
4. After making the connections, turn on the power supply.
5. Drive the VIN pin above 2.6V to turn the board on; drive VIN below 2.4V to turn it off.
6. If the input voltage (V_{IN}) exceeds 10.4V, then an input OVP is triggered, and the connection between the VIN and VOUT pins is disconnected.
7. The VBATT pin monitors the battery voltage to detect any over-voltage events. If VBATT's voltage (V_{BATT}) exceeds 4.35V, battery OVP is triggered, and the connection between the VIN and VOUT pins is disconnected.
8. The VB resistor (R_{VB}) limits the sink current to the IC. It is recommended that R_{VB} between 200kΩ and 1MΩ.
9. The IC's current limit is set internally to 1.5A. If the input current (I_{IN}) exceeds 1.5A, then over-current protection (OCP) is triggered, and VOUT's voltage (V_{OUT}) drops to 0V.
10. An over-temperature (OT) fault may occur during a large power loss, which results in a large difference between V_{IN} and V_{OUT}. For example, if V_{IN} = 7V, V_{OUT} = 5V, I_{IN} = I_{OUT} = 1A, then the power loss difference can be calculated with Equation (1):

$$P_{LOSS} = (V_{IN} - V_{OUT}) \times I_{IN} \quad (1)$$

    For a QFN-8 (2mmx2mm) package, θ_{JA} is 80°C/W. 2W of power are dissipated when 1A of I_{IN} flows through the IC while V_{IN} is 7V and V_{OUT} is 5V. This produces a rise in the die temperature for 2W x 80°C / W = 160°C. The sum of the 160°C and room temperature (e.g. 25°C) exceeds the thermal shutdown threshold (typically 140°C), therefore causing an over-temperature (OT) fault.
11. If a fault event occurs, the $\overline{FLT}$ pin goes low.

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EVALUATION BOARD SCHEMATIC

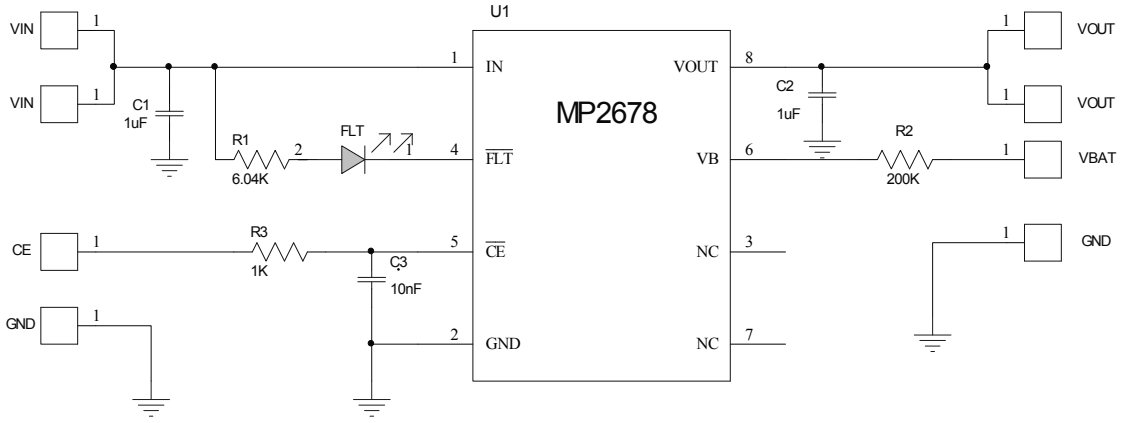

Figure 1: Evaluation Board Schematic

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EV2678EG-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
2	C1, C2	1μF	Ceramic capacitor, 50V, X7R	0805	Murata	GRM21BR71H105KA12L
1	C3	10nF	Ceramic capacitor, 50V, X7R	0603	Murata	GRM188R71H103KA01D
1	R1	6.04kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-076K04L
1	R2	200kΩ	Film resistor, 5%	0603	Yageo	RC0603JR-07200KL
1	R3	1kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-071KL
1	FLT	Red	Red LED	0805	Bright LED	BL-HUF35A-TRB
1	U1	MP2678	Li-ion battery charger protection IC with low-dropout mode	QFN-8 (2mmx 2mm)	MPS	MP2678EG

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PCB LAYOUT

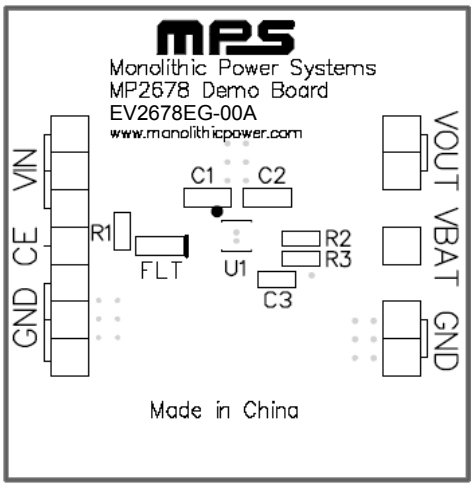

Figure 2: Top Silk

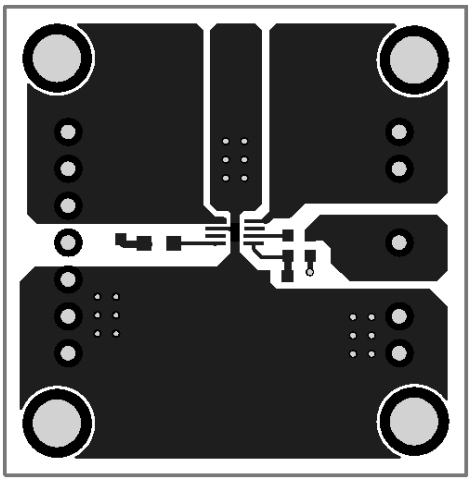

Figure 3: Top Layer

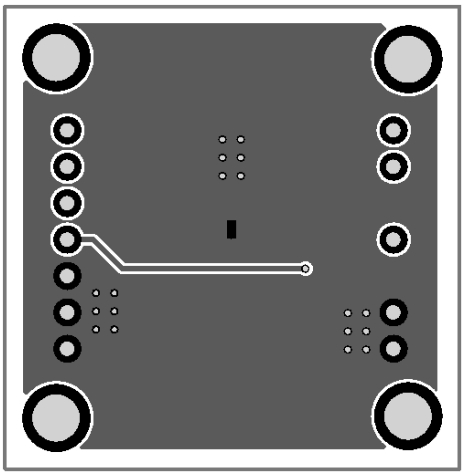

Figure 4: Bottom Layer

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REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	1/5/2011	Initial Release	-
1.1	7/9/2021	Updated the Description section and Features section	1
		Removed package dimensions in inches from the EV2678EG-00A Evaluation Board section; updated the IC part number from “MP2678EG-104” to “MP2678EG”	2
		Updated the Quick Start Guide section; labeled the equation as “Equation 1”	3
		Grammatical, formatting, and clerical updates; updated figure titles; updated pagination; updated EVB part number from “EV2678EG-104-00A” to “EV2678EG-00A”; updated IC part number from “MP2678EG-104” to “MP2678”	All

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