

bq294502 Voltage Protector for 2-Series or 3-Series Cell Li-Ion Batteries EVM

The bq294502 EVM is a complete evaluation system for the bq2945xy family of second-level protectors. The EVM includes one bq294502-based circuit module.

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1 Features

- bq294502-based circuit module
- [Link to support documentation](#)

1.1 Ordering Information

Table 1. Ordering Information

EVM Part Number	Chemistry	Configuration	Capacity
bq294502EVM-001	Li-Ion	2-Series or 3-Series Cell	Any

2 bq294502-Based Circuit Module

The bq294502-based circuit module is a complete and compact example solution of a bq294502 second-level voltage protector. The circuit module includes one bq294502 IC, fuse blow circuitry, a fuse blow delay capacitor, and all other onboard components necessary to use and interface with the protector. The circuit module connects directly across the cells in a battery.

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2.1 Circuit Module Connections

Contacts on the circuit module provide the following connections:

- Direct connection to the cells: VSS, VC1, VC2, VC3
- The system load and charger connect across PACK+ and PACK–

2.2 Pin Descriptions

PIN NAME	DESCRIPTION
VSS	–ve connection of first (bottom) cell
VC1	+ve connection of first (bottom) cell
VC2	+ve connection of second cell
VC3	+ve connection of third cell
PACK–	Pack negative terminal
PACK+	Pack positive terminal

3 bq294502 Circuit Module Schematic

This section contains information on the schematic for the bq294502 implementation.

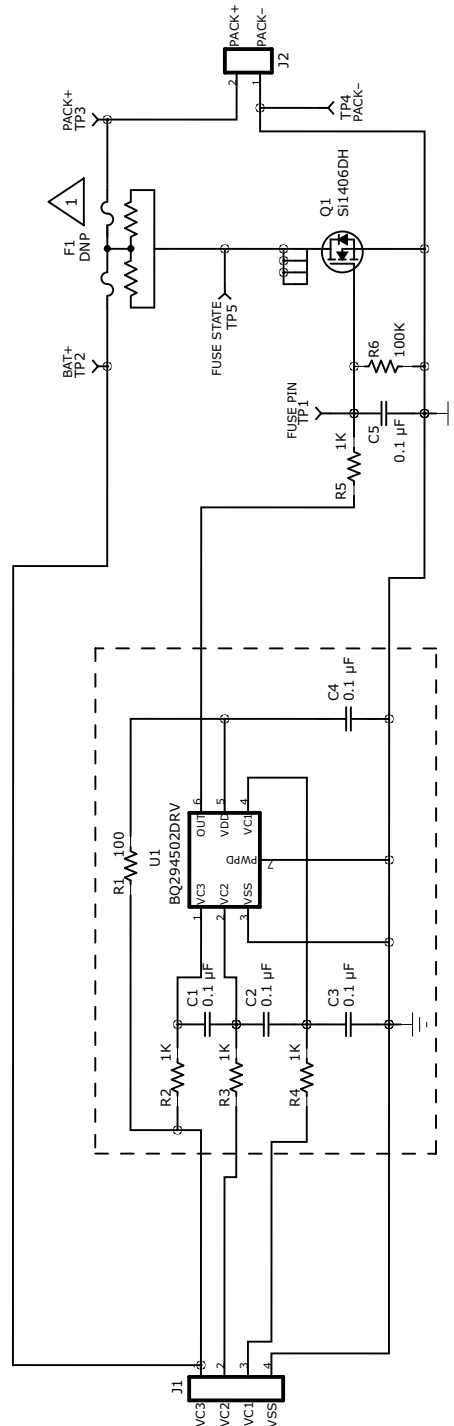


Figure 1. bq294502 Schematic

3.1 Testing Fuse-Blowing Circuit

To prevent the loss of board functionality during the fuse-blowing test, the actual chemical fuse is not provided in the circuit. The OUT pin of the bq294502 drives TP1 high if a fuse-blow condition occurs; therefore, monitoring TP1 can be used to test this condition. There is a footprint for the fuse on the board in case fuse-blow testing is desired.

4 Circuit Module Physical Layouts and Bill of Materials

This section contains the board layout, bill of materials, and assembly drawings for the bq294502 circuit module.

4.1 Board Layout

This section shows the dimensions, PCB layers, and assembly drawing for the bq294502 module.

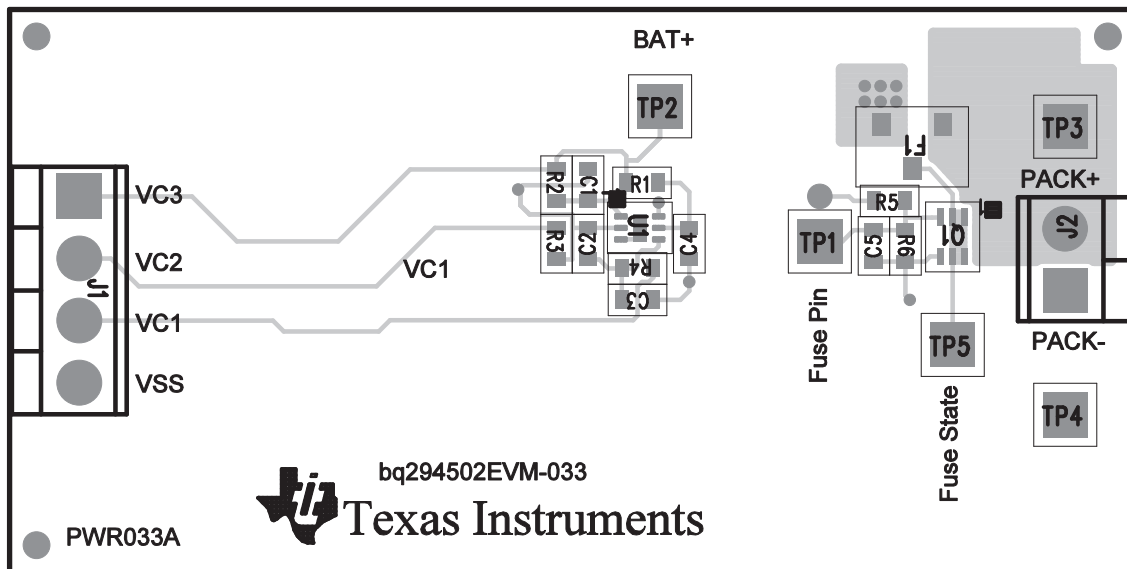


Figure 2. bq294502 Top Layer

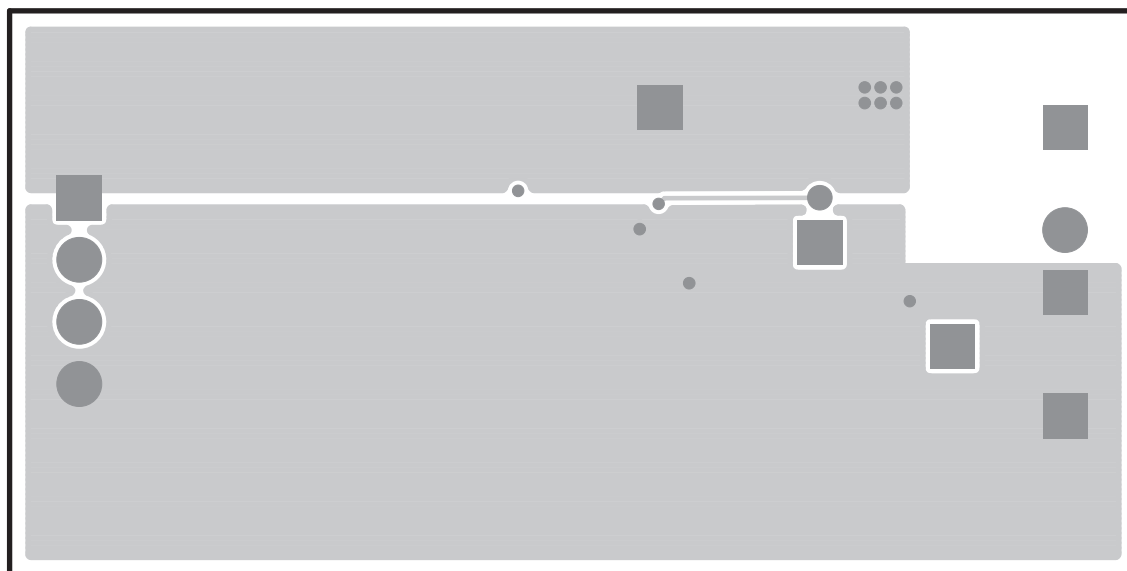


Figure 3. Bottom Layer

4.2 Bill of Materials

Table 2. Bill of Materials

Count	Reference Design	Value	Description	Size	Part Number	Manufacturer
5	C1-5	0.1 μ F	Capacitor, Ceramic, 50 V, X7R, 20%	0603	STD	Any
0	F1	DNP	Fuse, Slo-Blo Ceramic, xxA, yyyV	SFDxxx	SFDxxxx	Sony
1	J1	ED555/4DS	Terminal Block, 4-pin, 6-A, 3.5 mm	0.55 x 0.25 inch	ED555/4DS	OST
1	J2	ED555/2DS	Terminal Block, 2-pin, 6-A, 3.5 mm	0.27 x 0.25 inch	ED555/2DS	OST
1	Q1	Si1406DH	MOSFET, Nch, 20 V, 3.9 A, 65 m Ω	SC-70	Si1406DH	Vishay
1	R1	100	Resistor, Chip, 1/16 W, 1%	0603	STD	Any
4	R2-5	1K	Resistor, Chip, 1/16 W, 1%	0603	STD	Any
1	R6	100K	Resistor, Chip, 1/16 W, 1%	0603	STD	Any
5	TP1-5	5012	Test Point, White, Thru Hole	0.125 x 0.125 inch	5012	Keystone
1	U1	BQ294502DRV	IC, Overvoltage Protection Devices for 2-Series to 4-Series Cell Li-Ion Batteries	WSON	BQ294502DRV	TI
1		—	PCB		PWR033	Any

4.3 bq294502 Circuit Module Performance Specification Summary

This section summarizes the performance specifications of the bq294502 circuit module.

Table 3. Performance Specification Summary

Specification	Min	Typ	Max	Units
Input voltage Pack+ to Pack-	5	12	18	V
Charge and discharge current	0	2	5	A

5 EVM Hardware and Software Setup

This section describes how to connect the different components of the bq294502 EVM. [Figure 4](#) shows how to connect the bq294502 circuit module to the cells and system load/charger. The cells must be connected in the following order:

1. 3-Cell Pack: VSS (bottom of stack), VC1, VC2, then VC3 (see [Section 2.2](#) for definitions).
2. 2-Cell Pack: VSS (bottom of stack), VC1, and then connect VC2 and VC3 together.

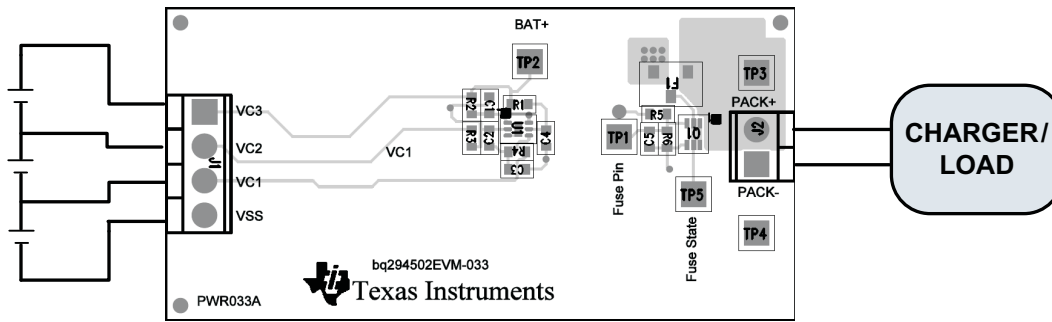


Figure 4. bq294502 Circuit Module Connection to Cells and System Load/Charger

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EVM Warnings and Restrictions

It is important to operate this EVM within the input voltage range of 0 V to 18 V and the output voltage range of (N/A).

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than 60°C. The EVM is designed to operate properly with certain components above 60°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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