

Two Series Cell Li-Ion Pack Supervisor Module

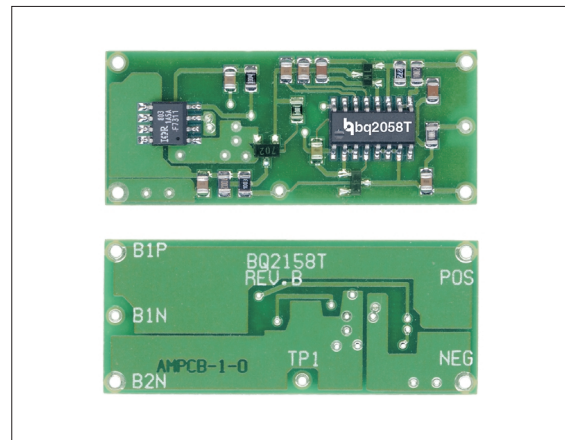
Features

- Complete and compact lithium-ion pack supervisor
- Provides overvoltage, undervoltage, and overcurrent protection for two series Li-Ion cells
- Combines bq2058T with charge/discharge control FETs
- Low side low on-resistance FETs
- Designed for battery pack integration
 - Direct connection for series battery terminals
 - Measures 1.70 X 0.70 inches
- Low standby and operating currents

General Description

The bq2158T provides a complete solution for the supervision of two series Li-Ion cells. Designed for battery pack integration, the bq2158T incorporates a bq2058T Pack Supervisor, two FETs, and all other components required to monitor overvoltage, undervoltage, and overcurrent conditions. The board provides direct connections for the negative and positive terminals of each cell. See Figure 1. Please refer to the bq2058T data sheet for specific information on the operation of the bq2058T.

Unitrode configures the bq2158T based on the information in Table 1.



Pin Descriptions

B1P	Battery 1 positive input
B1N	Battery 1 negative input
B2N	Battery 2 negative input
POS	Pack positive
NEG	Pack negative

Table 1. bq2158T Module Configuration

Customer Name:	_____
Contact:	_____ Phone: _____
Address:	_____ _____
Sales Contact:	_____ Phone: _____
Overvoltage threshold (4.25V)	_____
Charge current (3.8A max.)	_____
Discharge current (3.8A max.)	_____
FAE approval:	_____ Date: _____

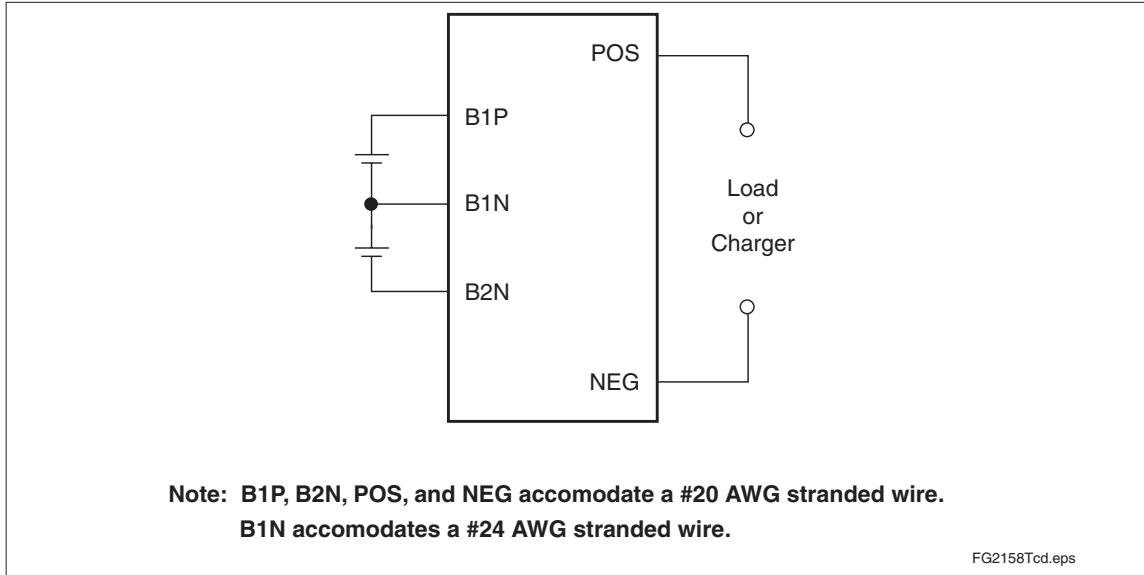


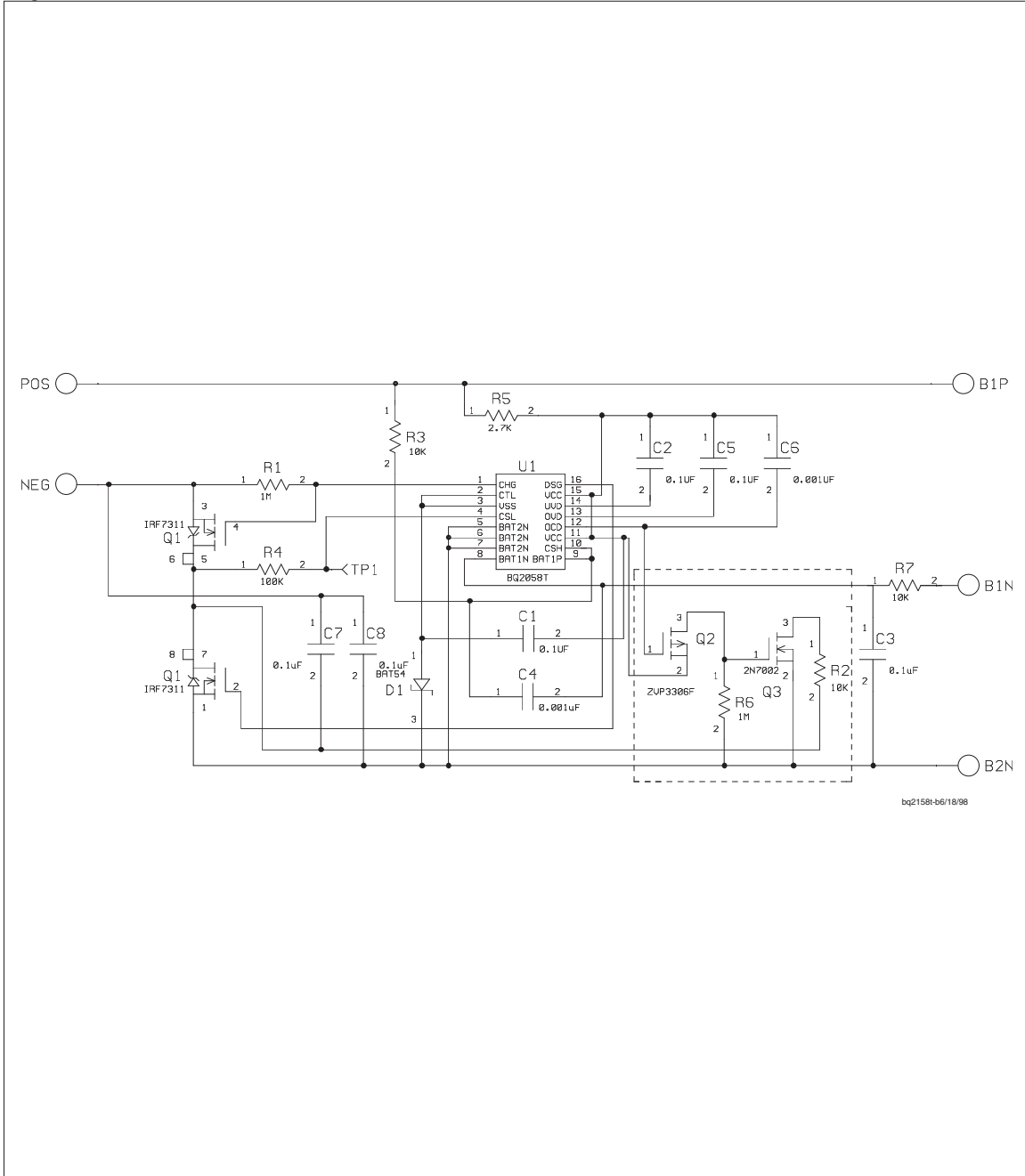
Figure 1. Module Connection Diagram

Operation

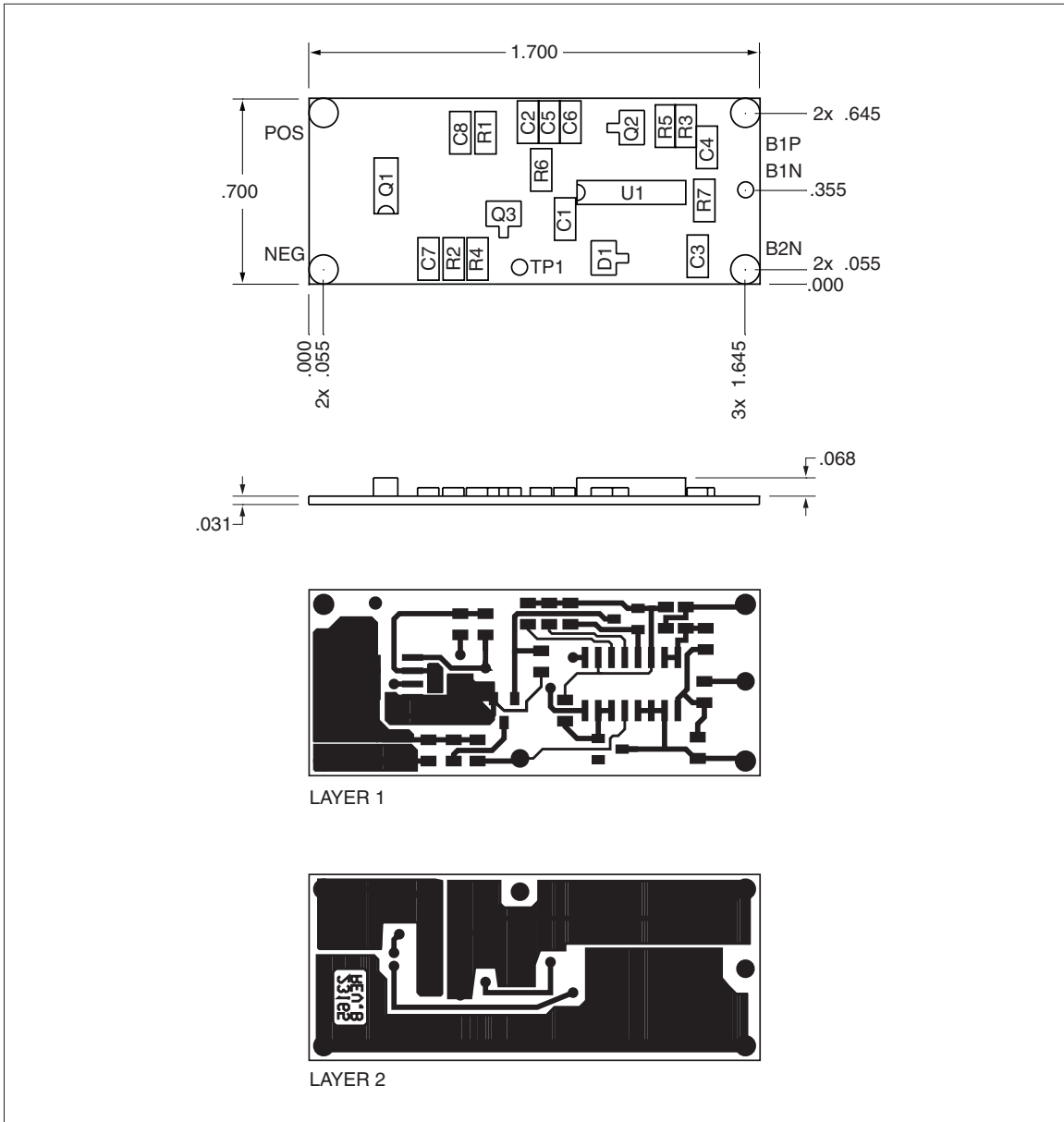
The bq2158T monitors each series element for under-voltage, over-voltage, and over-current conditions. If a cell falls below V_{UV} for t_{UVD} , the bq2158T enters into sleep mode. The bq2158T wakes up and enables discharge if a voltage, V_{CD} higher than the battery voltage, is applied across POS and NEG. Charging is disabled if a cell exceeds V_{OV} for t_{OVD} , and can resume when the cell falls below the V_{CE} threshold. The bq2158T turns the discharge FET off if the steady state load current exceeds I_{OC} for t_{OCD} and turns it back on if the load is removed.

bq2158T Preliminary

bq2158T Schematic



bq2158T Board



Absolute Maximum Ratings

Symbol	Parameter	Value	Unit	Conditions
V _{OP}	Supply voltage (B1P to B2N)	12	V	DC
V _{TR}	Maximum transient voltage (B1P to B2N)	32	V	Maximum duration = 1.5μs
V _{CHG}	Charging voltage (POS to NEG)	12	V	
I _{CHG}	Continuous charge/discharge current	3.8	A	V _{OP} > 4V T _A = 25°C
T _{OPR}	Operating temperature	-30 to +70	°C	
T _{STG}	Storage temperature	-55 to +125	°C	

Note: Permanent device damage may occur if **Absolute Maximum Ratings** are exceeded. Functional operation should be limited to the Recommended DC Operating Conditions detailed in this data sheet. Exposure to conditions beyond the operational limits for extended periods of time may affect device reliability.

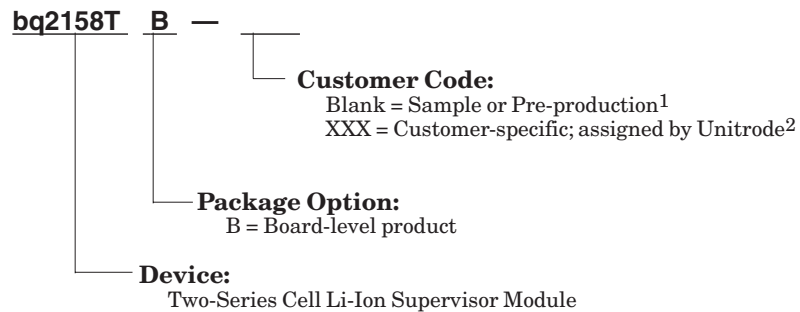
DC Electrical Characteristics (T_A = T_{OPR})

Symbol	Parameter	Minimum	Typical	Maximum	Unit	Conditions/Notes
V _{OP}	Operating voltage, B1P to B2N	4.0	-	12	V	
I _{CCA}	Operating current	-	26	43	μA	
I _{CCS}	Sleep current	-	0.7	1.5	μA	No load across POS and NEG
R _{ON}	On resistance, B2N to NEG	-	-	100	mΩ	T _A = 25°C V _{OP} = 4.5V

DC Thresholds (TA = TOPR)

Symbol	Parameter	Value	Tolerance	Unit	Notes
VOV	Overvoltage threshold	4.25	± 50mV	V	
VCE	Charge enable voltage	VOV - 100mV	± 50mV	V	
VUV	Undervoltage limit	2.25	± 100mV	V	
IOC	Overcurrent limit	3.3		A	TA = 25°C
		3		A	TA = 60°C
tUVD	Undervoltage delay	950	±50%	ms	TA = 30°C
VCD	Charge detect threshold	70	-60, +80	mV	
tOVD	Overvoltage delay	950	±50%	ms	TA = 30°C
tOCD	Overcurrent delay	12	±60%	ms	TA = 30°C

Ordering Information



- Notes:**
1. Requires configuration sheet (Table 1)
 2. Example production part number: bq2158TB-001

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