



Automated test solutions for the entire product lifecycle



# BMS Manufacturing Test System

## *Ensures functionality before final assembly*

The Battery Management System (BMS) Manufacturing Test System performs functional testing of product during end-of-line manufacturing. The system hardware includes all instrumentation to test a BMS, including multiple cell simulators, a mass interconnect for quick product transition, and bed-of-nails fixtures to ensure less downtime, higher throughput, and easy maintenance. The system application easily integrates into manufacturing processes, provides a method to test multiple product types, and optimizes tests to ensure only good product is released from manufacturing.

## APPLICATIONS

- End-of-line manufacturing test of BMS master and modules
- Autoloading of BMS software
- Calibration of cell monitors
- RMA testing
- Factory recalibration

## FEATURES

- Cell simulation via Battery Simulator 1200
  - 12 cells per module
  - 0 to 5V programmable range
  - Sink and source 500 mA of current
  - 1,000 VDC isolation
- Thermistor and RTD temperature simulation
- CANbus, RS-232, and RS-485 communications
- Mass interconnect for quick product transition
- Fault insertion and auxiliary system measurements
- Operator-friendly test management software based on NI TestStand and LabVIEW
- Barcode scanner, safety integration
- Optional high-voltage pack simulation power supply

Trying to validate a BMS?

Inquire about Bloomy's *FLEX BMS™* Validation System.

## MANUFACTURING INTEGRATION

The BMS Manufacturing Test System is a modular design that includes all necessary instrumentation and manufacturing necessities such as the Battery Simulator 1200, the EFT Module for TestStand, a barcode scanner, and safety integration. A robust Virginia Panel mass interconnect provides a method for interchangeable fixtures to connect to the instrumentation to test a wide range of BMS models. Custom bed-of-nails or cabled fixtures can be developed for your BMS.

The EFT Module for TestStand is Bloomy's own test management software enabling easy creation of test sequences and interfaces, based on National Instruments TestStand and LabVIEW. Optimized for manufacturing, the EFT Module for TestStand configures system tests, controls instruments, communicates to the BMS, and executes test profiles. Typical BMS tests include connector opens and shorts, cell voltage and current sensing, temperature sensing, pack current sensing, cell balancing, over voltage, under voltage, over current, and over temp alarms and interlocks; output relays, CAN or serial communications.

- Auto fixture and product identification
- Barcode scanning
- Firmware loading
- Test optimization
- Highly automated BMS test sequences
- Operator-friendly interface
- Calibration of cell monitors and temperature sensors
- Customized reports and travelers
- Database integration

## HARDWARE SPECIFICATIONS

The following specifications are standard. Systems can be customized to accommodate specific requirements.

CELL CHANNEL SIMULATION		CURRENT SENSOR SIMULATION		AUXILIARY MEASUREMENTS	
Number of Channels	12 / module	Typical Signal Type	Analog voltage	Number of Channels	32
Max number of Modules	20 (240 channels @ 4.2V)	Number of Channels	2 channel	Type	7.5 Digit DMM (voltage, current, resistance)
Channel Type	Sink and Source	Range	±10V	Voltage	±10 nV to 1000 VDC
Voltage Range per cell	0.0 to 5.0V	Resolution	16 bit	Current	8 DC current ranges with sensitivity down to 1 pA
Voltage Resolution	0.1 mV	Accuracy	±0.5%	Resistance	10 µΩ to 5 GΩ
Voltage Accuracy	±3 mV	Additional Signal Types	CAN communications	Common Mode Isolation	±500 VDC/Vrms
Current Range	±500.0 mA	TEMPERATURE SENSOR SIMULATION			
Current Resolution	0.1 mA	Typical Signal Type	Voltage Resistance		
Current Accuracy	±4 mA	Number of Channels	4 to 64		
Current Limiting Accuracy	±10 mA	Range	±10V 2.5Ω – 1.5MΩ		
Common Mode Isolation	1000 VDC	Resolution	<1 mV 2Ω		
CELL CHANNEL READBACK		Accuracy (typical)	0.03% 0.2%		
Voltage Resolution	0.1 mV	BMS CONTROL I/O			
Voltage Accuracy	±3 mV	Number of Channels	Up to 32 input / 32 output		
Current Resolution	0.1 mA	Voltage Range	0 to 30V		
Current Accuracy	±4 mA	Current Drive	Up to 150 mA		
<i>Higher accuracies can be achieved with a custom relay matrix and an integrated 7.5 digit DMM.</i>		Common Mode Isolation	30V bank-to-bank		
COMMUNICATION PROTOCOLS		FAULT INSERTION			
Standard Protocol	High-speed CAN	Number of Channels	24		
Number of Ports	2	Type	Relays		
Baud Rate	40 kbits/s to 1Mbit/s	Voltage Range	0 to 500V		
Additional Protocols	LIN, SPI, RS232, Modbus			PACK VOLTAGE SIMULATION	
				Number of Channels	1 to 10
				Voltage Range	Up to 1000 VDC
				Output Power	5W 30W 1500W
				Resolution	0.1V 0.1V 0.003V
				Accuracy (typical)	1-2% 1-2% 0.075%
				BMS BUS VOLTAGE SIMULATION	
				Number of Channels	2 channel
				Voltage Range	0 to 60V
				Current Range	0 to 20A
				Power Range	850W

### OPTIONAL

#### PACK VOLTAGE SIMULATION

Number of Channels	1 to 10
Voltage Range	Up to 1000 VDC
Output Power	5W 30W 1500W
Resolution	0.1V 0.1V 0.003V
Accuracy (typical)	1-2% 1-2% 0.075%

#### BMS BUS VOLTAGE SIMULATION

Number of Channels	2 channel
Voltage Range	0 to 60V
Current Range	0 to 20A
Power Range	850W

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