



Smart Battery Testing Solutions

The Arbin BT-Smart series is a smart battery testing system which contains main I/V channels to charge/discharge a smart battery pack, an SMB input board to interact with the pack's SMBus, and auxiliary temperature channels. Main I/V and SMB inputs are integrated into a single connector eliminating the tangle of wires required for connecting to smart batteries.

BT-SMART

MODEL	VOLTAGE	CURRENT
BT-SMART 12	2V to 25V	10A/5A
BT-SMART 24	2V to 25V	10A/5A

Arbin's Smart Battery Testing Systems allows users to log data from their smart battery and compare it to the external data provided by the Arbin Testing System. Testing procedures can be influenced by the data that the Arbin Testing System acquires, or by the SMBus register values.

Arbin's testing software is also capable of manipulating SMBus registers during testing. All data specified in the SMBus 2.0 or 1.1 data specifications are stored in a database during testing and can be imported into Excel format for easy data manipulation.

- Independent Programmable control of current, voltage, load and power; providing constant, linear ramp, staircase and other control profiles generated by a specified formula
- High accuracy of 0.05% FSR control and reading of current and voltage on linear circuitry
- Fast current rise time of 100us with linear circuitry
- Single, fully integrated connector for smart batteries
- Synchronized data acquisition through Ethernet TCP/IP communication for SMB board to synchronize data acquisition with the main I/V channels
- Independent voltage clamp is a powerful hardware control to prevent voltage overshoot, which is particularly critical for Li-batteries. It allows the independent control of voltage clamp for each channel.
- Sliding racks designed for customers to accommodate 12 ~24 packs for convenient mounting/dismounting of the packs. Very Customized design to fit desired requirement

Key Features



BT-SMART

Model Number: BT-SMART 12
BT-SMART 24

Smart Battery Features

- Our MITS Pro Software for Smart Battery integrates the capability to view/read, write, control or program information from the Smart Battery Register. The software provides advanced test scheduling options by allowing SMBus registers to be used as limit control and offers many programmable features.
- Smart Battery Channel View GUI is a uniquely designed window that allows users to display or access both main I/V channel parameters and SMBus registered data. The software provides advanced test scheduling options by allowing SMBus registers to be used as limit control and offers many programmable features.
- Limited control of SMBus register functions displayed as meta-variables that can be used to end or re-direct testing sequences. Smart Battery values may be selected as control limits within test protocols, much in the same way as using parameters from the I/V channel.
- This system is tested with most of the commonly employed gas gauge ICs, such as Texas Instruments, BQ 2000 series: BQ2060, BQ2083, BQ2040, and Power Smart, PS401, etc.

System Specifications

MODEL NUMBER	BT-SMART 12	BT-SMART 24
Arbin Software	MITS Pro 4.0	
Standard Types of Control	Current and voltage control via constant, ramp, staircase, or user-defined formula Constant power, constant load	
End Conditions	Time, Voltage, Current, Capacity, Energy, ΔV , DV/dt , Formula, Meta-Variables, and other combinations	
Data Logging Rate	Current, voltage, or power simulation, response in seconds	40-150 data points per second, per PC
Simulation for Non-Formulated Profile	n/a	Current, voltage, or power simulation, response in seconds
Network Capabilities	TCP/IP access for networking provided	
Data Result File	Imported into Microsoft Excel; Arbin's Excel Data Pro macro included for easy data manipulation	

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Hardware Specifications

MODEL NUMBER	BT-SMART 12	BT-SMART 24
Number of Channels	12 Channels	24 Channels
Chassis Size	30" X 30" X 45"	30" X 30" X 77"
Voltage Range (max./min)	2V to 25V	
Voltage Accuracy (0.05% FSR)	±25mV	
Voltage Resolution	16 bit or 0.0015%	
Current Ranges and Accuracy (0.05% FSR)	10A ± 10mA 5A ± 5mA	
Minimum V at Maximum Current	2V @ 10A	
Voltage Input Impedance	~10Ω	
Current Rise Time	100μS	
Current and Voltage Resolution	14 Bit or 0.006%	
Voltage Clamp	Individual channel-based Voltage Clamp	
Number of Auxiliary Temperature Channels	n/a	24 with Type K thermocouple sensors
Max Continuous Power per Channel	250W	
Internal Board Circuitry	Arbin 2243-2 bipolar board	
Ventilation Method	Air cooled	
Room Operating Temperature	10 to 35 degrees C	
Connection for Computer	TCP/IP	
Computer Specifications	PC with 22" flat-screen monitor is included, preloaded with our MITS Pro testing software	
Smart Battery Supported Chips (Texas Instruments, Renesas and Maxim)	TI BQ2060; TI two-chips: BQ20894 & BQ20Z70, TI one-chip: BQ20Z45, Renesas one-chip and two-chip, and Maxim one-chip.*	

* If your chip(s) is not listed, please consult with your Arbin Sales Engineer.



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Auxiliary Options & Accessories

Arbin Instruments provides a wide variety of auxiliary modules for expanding the capability of the main I, V control circuitry.

- Optional Auxiliary Voltage:** Can be used to measure and verify the cell voltage; These auxiliary channels can be assigned flexibly to the main I/V channels, including one-to-one map or one-to-many map.
- Optional Auxiliary Temperature:** Can be used to measure and verify the cell temperature; These auxiliary channels can be assigned flexibly to the main I/V channels, including one-to-one map or one-to-many map.
- Optional Thermal Chamber** Allows user to program different temperatures testing condition with thermal chamber to simulate environment testing conditions.
- Controller Interface:** simulate environment testing conditions.
- Optional External Charger in Main I/V Channel:** Built-in constant voltage external charger - Some SMB packs require an external charger with a constant DC voltage supply. This option provides this capability without an additional power supply.

External Charging connection - A selected external charging connection allows SMB battery charged by any external charger. During external charging, Arbin tester functions as a recorder to log in the testing data, voltage, current, etc. Either built-in charger or externally connected charger is integrated in MITS Pro Software and programmable.

Automatic on/off of charger - The charge/discharge power will be physically disconnected while discharging/charging respectively to guarantees no interference.

- Optional High Speed Pulse Capability:** Allows users to run a sub-second single or repeated pulse profile. This option provides the capability to run GSM, CDMA, TDMA or other custom designed pulses.

For more information please visit: www.arbin.com/products/accessories/auxiliaries.htm

Safety & UPS Features

Several safety provisions are provided in every Arbin system. There are three levels of fusing provided inside the system for further protection at the channel, board, and power supply levels. The software also has several safety functions with which the user can avoid over charging the cells, over discharging, overheating, etc.

- Smart UPS:** This option uses a very small Smart UPS to back up power to the computer only. It allows users to enable the auto-resume option to all or specific channels whenever tests have stopped due to power interruption. Provision is made for the user to intervene if required before the channels resume after power failure. This option is almost a must for facilities with unreliable power sources, unless the entire facility is under backup power.

BT-SMART

Model Number: **BT-SMART 12**

BT-SMART 24

Latest Register Functions in MITS – Smart Pro Software. Based on TI BQ 2060

Variable	SMBus Comm Code		SMBus Access	Units
	SMBus	HDQ16		
ManufacturerAccess	0x00	0x00	Read/write/control/program	n/a
RemainCapacityAlarm	0x01	0x01	Read/write/program	mAh, 10mWh
RemainTimeAlarm	0x02	0x02	Read/write/program	Minutes
BatteryMode	0x03	0x03	Read/write/program	n/a
AtRate	0x04	0x04	Read/write/program	mAh, 10mWh
AtRateTimeToFull	0x05	0x05	Read	minutes
AtRateTimeToEmpty	0x06	0x06	Read	minutes
AtRateOK	0x07	0x07	Read	Boolean
Temperature	0x08	0x08	Read/control	0.1°K/0.1°C
Voltage	0x09	0x09	Read/control	mV
Current	0x0a	0x0a	Read/control	mA
AverageCurrent	0x0b	0x0b	Read	mA
MaxError	0x0c	0x0c	Read	percent
RelativeStateOfCharge	0x0d	0x0d	Read/control	percent
AbsoluteStateOfCharge	0x0e	0x0e	Read/control	percent
RemainCapacity	0x0f	0x0f	Read/control	mAh, 10mWh
FullChargeCapacity	0x10	0x10	Read/control	mAh, 10mWh
RunTimeToEmpty	0x11	0x11	Read	minutes
AverageTimeToEmpty	0x12	0x12	Read	minutes
AverageTimeToFull	0x13	0x13	Read	Minutes
ChargingCurrent	0x14	0x14	Read/control	mA
ChargingVoltage	0x15	0x15	Read/control	mV
BatteryStatus	0x16	0x16	Read	n/a
CycleCount	0x17	0x17	Read/control	cycles

BT-SMART

Model Number: BT-SMART 12

BT-SMART 24

Latest Register Functions in MITS – Smart Pro Software. Based on TI BQ 2060

Variable	SMBus Comm Code		SMBus Access	Units
	SMBus	HDQ16		
DesignCapacity	0x18	0x18	Read	mAh, 10mWh
DesignVoltage	0x19	0x19	Read	mV
SpecificationInfo	0x1a	0x1a	Read	n/a
Manufacturerdate	0x1b	0x1b	Read	n/a
SerialNumber	0x1c	0x1c	Read/control	integer
Reserved*	0x1d-0x1f	0x1d-0x1f	Read/write/program	— -
ManufacturerName	0x20	0x20-0x25	Read	string
DeviceName	0x21	0x28-0x2b	Read/write	string
DeviceChemistry	0x22	0x30-0x32	Read	string
ManufacturerData	0x23	0x38-0x3b	Read/write	string
Pack Status	0x2f (LSB)	0x2f (LSB)	Read/write	n/a
Pack Configuration	0x2f (MSB)	0x2f (MSB)	Read/write	n/a
VCELL4	0x3c	0x3c	Read/control	mV
VCELL3	0x3d	0x3d	Read/control	mV
VCELL2	0x3e	0x3e	Read/control	mV
VCELL1	0x3f	0x3f	Read/control	mV

