High Speed Pulse Testing Solutions

BT11

Model	Voltage	Power
BT11-5V-5A	0V to 5V	5A/1A/100mA
BT11-10V-500mA	0 to 10V	500mA/50mA/100µA
BT11-10V-100mA	-10 to 10V	100mA/50mA/100µA

The BT11 is a High Speed Pulse tester with 1 microcontroller and 1 DC power supply per channel. It is designed to perform sub-millisecond pulses on batteries or super capacitors, which are common in wireless or telecommunication applications.

Arbin's pulse capability covers a broad range of sub-millisecond communication profiles, which can handle multi-stage pulses as fast as 100 microseconds per stage and up to 10 stages per pulse. The pulses have a maximum length of 2700 seconds.

The BT11 integrates the digital controller and power supply circuitry in a small footprint as a powerful and completely independent channel. The channel independence allows users to perform channel calibration while allowing other channels to continue uninterrupted testing.

Each channel of the system functions as an independent potentiostat/galvanostat. Commonly used charge/discharge functions such as ramps, staircases and constant current, voltage, power, and load functions may be used independently on all channels at the same time. The BT11 allows the user to run independent pulse and simulation profiles on each channel simultaneously.

The circuit is a bipolar design that affords tremendous flexibility by ensuring cross-zero linearity with no switching time. Our MITS Pro Software further enhances all these capabilities, which according to customer feedback is a step above all other software in the industry.

Key Features

- Multiple, independent channels for pulse or simulation
- Minimum pulse stage width of 100µs
- Rise times as fast as 10µs
- Ability to calibrate individual channels without interrupting testing on other channels
- Simultaneous pulse generation and data logging
- Other custom user-defined pulse profiles with 2-10 stages
- Multiple current ranges per channel available
- Windows 7 based software
- Many input auxiliaries available such as temperature and/or voltage
- Voltage clamp to help protect from over or under charge or discharge

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Primary Applications

- Lithium Battery Testing
- Single Cell Recharge-ability
- Testing application for cellular phones and other smart communication devices
- Cover various standard pulse-testing applications such as GSM, CDMA, iDEN, GPRS, etc.

Hardware Specifications

MODEL	5V-5A	10V-500mA	10V-100mA
Number of Micro Controller (MC)	One Micro Controller per main channel		
Voltage Range (min/max)	0V to 5V	0V to 10V	(-10V) to 10V
Accuracy of Voltage Control & Reading	± 5mV 0.05% Full Scale Accuracy	± 10mV 0.05% Full Scale Accuracy	± 10mV 0.05% Full Scale Accuracy
Minimum V at Maximum Current	0V @ 5A	0V @ 500mA	(-10V) @ 100mA
Voltage Measurements Input Impedance	~ 100GΩ		
Current Ranges (0.05% FSR)	High: 5A ± 5mA Medium: 1A ± 1mA Low: 100mA ± 100µA	High: 500mA ± 500µA Medium: 50mA ± 50µA Low: 1mA ± 1µA	High: 100mA ± 100µA Medium: 1mA ± 1µA Low: 100µA ± 100nA
Maximum Continuous Power Output per channel	25W	5W	1W
Current Rise Time[1]	10-15uS		
Current and Voltage Resolution	16 Bit		
Voltage Clamp[2]	Individual / Channel Based Voltage Clamp		
5U Chassis 12.5" X 25" X 10.5"	4 channels	8 channels	8 channels
	110VAC-10A with 20A circuit breaker		
11U Chassis 15" X 30" X 25"	16 channels		
	110VAC with 30A circuit breaker	110VAC with 20A circuit breaker	
Connection for batteries	Standard 6ft. Cables with alligator clips. Arbin also provides battery holder system on the side of the chassis to provide easy engagement system to the battery tester.		
Connection to Computer	TCP-IP		
Ventilation Method	Air-cooled, front-to-rear airflow		
Room Operating Temperature	10 to 35 degrees C		

[1] Time required for current output to get from 10% to 90% of requested value.

[2] For BT11-HSP, the voltage clamp accuracy tolerance is 0.2% FSR.

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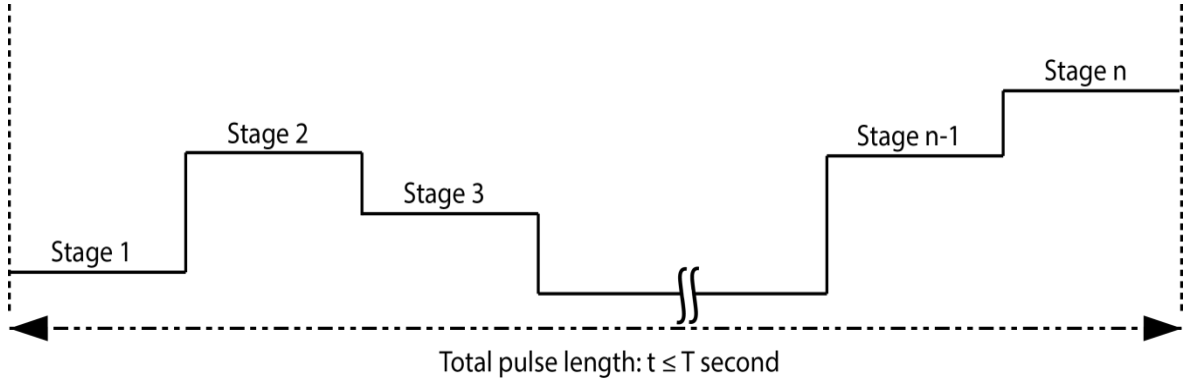
Pulse Characteristics



Pulse Independency	One Pulse Profile per Channel
Maximum Total Pulse Stage (n)[3]	10
Minimum Pulse Stage Width	100 *microsecond*
Pulse Stage Increment Width	20 *microsecond*
Maximum Total Pulse Length (T)	2700 seconds
Control Type	Current
Standard Pulse Data Logging Characteristics	
Data Logging	All channels can log simultaneously
Maximum number of logged data points per stage	2 samplings: near the beginning and end of each stage
Standard pulse data logging interval	1 second[4]
Burst Pulse Mode Data Logging Characteristics	
Data Logging	All channels can log simultaneously
Maximum Total Pulse Stage (n)	10
Maximum number points logged per stage	298
Maximum number points logged per pulse	300
Minimum logging interval range	50uS
Pulse Stage Increment Width	10uS
Interval between Pulses	1 second

[3] Pulse must contain at least two stages with minimum pulse width.

[4] Software will always log first and last data points.

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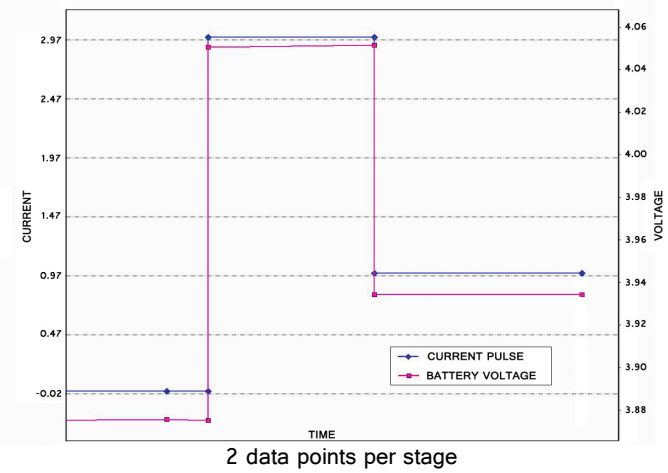
Burst Pulse Mode

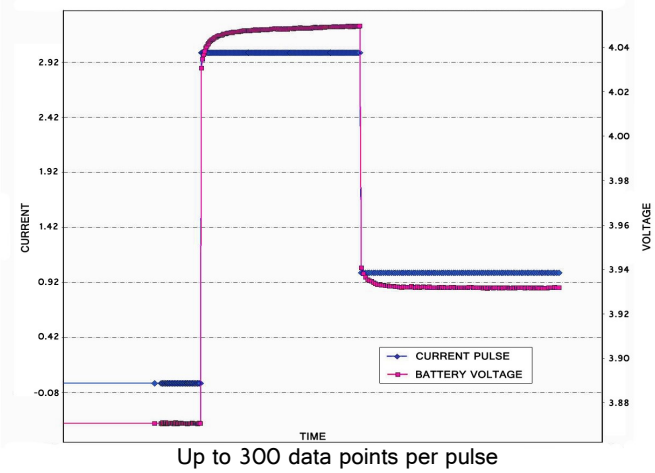
Burst mode operation allows user to log data at a very high rate for a maximum time of 500 milliseconds. Up to 300 points per pulse can be logged across a maximum of 10 stages per single pulse. This application can be useful in instances where fast data logging is required to catch voltage and/or current data during a transition. By capturing more data, the pulse profile can be more accurately defined, especially during the charge/discharge transition period (see software screen below). This helps to identify transition in the charge/discharge process of the objects being tested.

Single Pulse Profile—Standard Data Logging



2 data points per stage

Single Pulse Profile—Pulse Burst Data Logging



Up to 300 data points per pulse

Software Control Specifications

Current (A)	Outputs constant current to the cell or battery at the value specified. Positive current refers to charge, and negative current refers to discharge.
Voltage (V)	Outputs constant voltage to the cell or battery at the value specified
C-Rate	C-Rate is common method for indicating the discharge as well as the charge current of a battery. It can be expressed as I=M*C where I=current A; C=battery capacity; M is the C-rate value
Rest	The battery is disconnected from the charge/discharge circuit but remains connected to the voltage measurement circuit to enable open-circuit voltage measurement
Power (W)	Outputs constant power to the cell of battery at the value specified.

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Software Control Specifications (*continued*)

Load (Ohm)	Applies a constant resistance load to the battery at the value specified. The load control type will always produce a negative current.
Set Variable(s)	Change test related variables including channel capacity, energy, and all test counter variables
Current Ramp	Generates a current ramp with a positive scan rate for increasing current and a negative scan rate to generate decreasing current ramp
Voltage Ramp	Generates a voltage ramp with a positive scan rate that increases the voltage ramp, and negative scan rate generates decreasing voltage ramp
Current Staircase	Generates a current staircase with increasing current, and negative decreasing current staircase with adjustable step amplitude
Voltage Staircase	Positive dV/stair generates increasing voltage staircase, and negative dV/stair generates decreasing voltage staircase
Current Pulse	Applies a predefined or custom current profile to the cell or battery pack under test
Current and Power Simulation	Non-standard time-domain functions may be input from external sources such as ASCII data streams and used as control parameters for repetitive tests
DC Internal Resistance	This function applies a 10-pulse train with 100µs pulse width of the specified magnitude following a constant-current charge or discharge step
CC-CV	Combine constant current control and constant voltage control into one step “CC-CV”
Formula	Equips the user to control and limit schedule steps according to dynamic mathematical equations in addition to constants or instantaneous channel data
End Conditions	Time, Voltage, Current, Capacity, Energy, ΔV, DV/dt, formula, meta-variables, and other combinations
Network Capabilities	Provide TCP/IP access for networking
Data Result File	Imported into Microsoft Excel; Arbin’s Excel Data Pro macro included for easy data manipulation
Data File Content	Channel data: test time, step time, voltage, current, capacity, energy, first/second derivative of I or V, auxiliary input data (optional). Statistical data: Cycle #, Cycle Capacity/Energy, Maximum voltage, etc

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Auxiliary Options &

Arbin Instruments provides a wide variety of auxiliary modules for expanding the capability of the main I, V control circuitry. Each module plugs securely to the bus board. These auxiliary modules are classified as input, input/output, and control modules.

Input Modules: Auxiliary inputs can be used to record desired data as well as to terminate or regulate charge and discharge processes based upon measured conditions. Selectable inputs are of V (voltage), T (temperature), and P (pressure).

Input / Output Modules: Digital I/O is an integrated peripheral on/off control. The output commonly is used to control valves and switches. The input allows an external control signal to control testing procedure.

Control Modules: Arbin provides control modules for Auto-Calibration, Smart Battery Testing, External Charger, Temperature Chamber Interface and AC Impedance Measurement.

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 multiple 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: (optional) This option uses a small Smart UPS to back up power to the computer only. This allows the system to automatically resume tests after a stop due to brief power interruption. There is provision for the user to intervene if desired before the channels resume. This is an essential component for any user with an unreliable power source unless the entire facility is on backup power.