DATA SHEET

N6783A-BAT Battery Charge/Discharge Module for the N6700 Modular Power System



Introduction

Accurately validate the battery for your battery powered device design

- 2-quadrant operation for use as a power supply to charge or as an electronic load to discharge batteries
- High-speed digitized measurements to capture/view the voltage and current of the battery up to every 20 µs with built-in 50 kHz digitizer

Battery Validation is Critical to the End-User Experience of Mobile Devices

During the research and development of a battery-powered (mobile) device it is critical to properly qualify the battery that will be used in the final design, especially if the design calls for the battery to be permanently installed in the device. Many different batteries should be evaluated to make sure the best possible battery, providing the best possible operating time, is chosen.

The battery manufacturer's data sheet is a good place to get an idea of the characteristics of a particular battery. However, the conditions under which the data is gathered is not always consistent with the real-world conditions in which the battery will be used. For example, the temperature at which a battery is charged/discharged or if the charge/discharge is done continuously or with pauses will affect the performance of the battery. Also, the same battery made at two different manufacturing facilities may exhibit different behavior. Thus, as battery users, it is critical for mobile device designers to do their own testing to validate a battery's performance and determine whether or not it is the best choice for a particular application/device. In order to perform this testing, the ability to both charge and discharge a battery while taking measurements of voltage and current is required.

KEYSIGHT TECHNOLOGIES

2-Quadrant Operation and Built-In Digitizer

The Keysight Technologies, Inc. N6783A-BAT battery charge/discharge module is a basic, 2-quadrant DC power module designed to be used by mobile device designers. The N6783A-BAT's 2-quadrant operation allows it to act as a programmable power supply to charge the battery or as a programmable electronic load to discharge the battery, all in one instrument. (see Figure 1). When used as a power supply (quadrant I), the N6783A-BAT module can be programmed to perform constant-current/constant-voltage charge (CC/CV). When used as an electronic load (quadrant II), the N6783A-BAT module can be programmed to perform CC discharge.

The N6783A-BAT also has a built-in, digitizing measurement system. This system allows accurate measurements over the short and long-term. When used in the Keysight N6705B DC power analyzer mainframe, short- and long-term measurements for battery validation are made easy. The N6705B mainframe enables easy setup of the test and analysis of the results.

N6783A-BAT key features

- 2-quadrant operation – use as a power supply to charge or as an electronic load to discharge batteries
- High-speed digitized measurements – capture/view the voltage and current of the battery up to every 20 µs with built-in 50 kHz digitizer
- Easy to use and setup when installed in the Keysight N6705B DC power analyzer mainframe

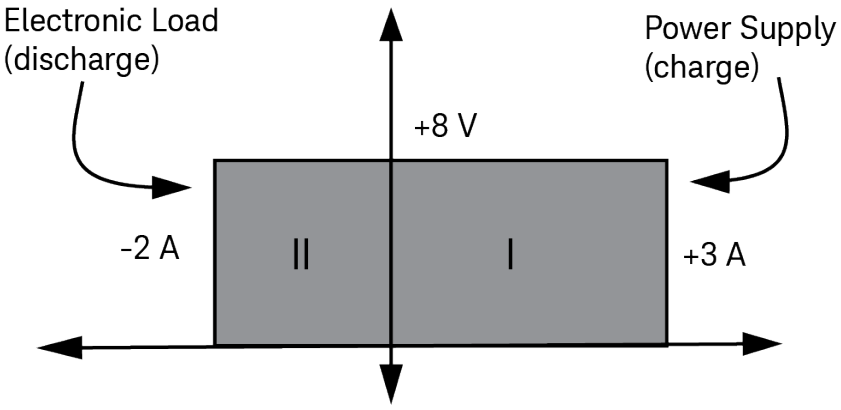

Figure 1. 2-Quadrant operation enables charge and discharge in one instrument.

Battery conditioning

Once the R&D engineer makes a final decision on which battery to use in a design, the N6783A-BAT can be used to condition batteries for test in mobile devices. Battery conditioning is the process of charging/discharging a battery to a specific level in order to see how the device performs under specific conditions. This allows R&D engineers to understand real-world operation of their designs during different levels of charge. For example, as a battery's voltage decreases its current increases. By conditioning a battery to be almost fully discharged, the device can be tested to understand its operation at higher currents.

Advanced battery testing, battery drain analysis

The N6783A-BAT can be used for battery charge/discharge only. For advanced battery testing, battery drain analysis, or battery emulation use the Keysight N6781A 2-quadrant source/measure unit for battery drain analysis. For additional details visit: www.keysight.com/find/n6781

Part of the N6700 modular power system family

The new N6783A-BAT is a part of the N6700 modular power system family, which consists of the N6700 low-profile mainframes for automated test environments and the N6705 DC power analyzer mainframes for R&D. The product family has four mainframes and over 25 DC power modules, providing a complete spectrum of solutions, from R&D through design validation and manufacturing.
For more information visit: www.keysight.com/find/n6700

Performance Specifications and Characteristics

This is an abbreviated list of the specification and characteristics. For the full list of specifications and characteristics, please see the N6700 Module Power System Specifications Guide, literature number N6700-90001.

N6783A-BAT specifications

DC Output ratings	
Voltage	8 V
Current[1]	-2 to +3 A
Power	24 W
Output ripple and noise (PARD) (from 20 Hz to 20 kHz)	
CV peak-to-peak	8 mV
CV rms	1.5 mV
Load effect (regulation) (for any output load change, with a maximum load-lead drop of 0.5V/lead)	
Voltage	6 mV
Current	2 mA
Source effect (regulation)	
Voltage	2 mV
Current	1 mA

Programming accuracy (@ 23 °C ±5 °C after a 30 minute warm-up)	
Voltage	0.1% + 10 mV
Positive current	0.1% + 1.8 mA
Negative current @ -2 A	0.2% + 1.8 mA
Measurement accuracy (@ 23 ºC ±5 ºC)	
Voltage[2]	0.05% + 5 mV
Current high range[2]	0.1% + 600 µA
Current low range (≤ 150 mA)[2]	0.1% + 75 µA
Load transient recovery (Time to recover to within settling band for a load change from 0.15 A to 1.5 A and from 1.5 A to 0.15 A at 6 V output.)	
Voltage setting[3]	± 75 mV
Time[3]	< 45 µs

1. Output current is derated 1% per °C above 40°C.
2. Applies when measuring the default value of 1024 data points.
3. When relay Option 761 is installed, the settling band is ± 90 mV. The time is < 75 µs.

Supplemental Characteristics

N6783A-BAT characteristics

Programming ranges	
Voltage	15 mV to 8.16 V
Positive current	5 mA to 3.06 A
Negative current	– 5 mA to – 2 A
Programming resolution	
Voltage	2.5 mV
Positive current	1 mA
Negative current	1.5 mV
Measurement resolution	
Voltage	300 µV
Current high range	100 µA
Current low range (≤ 0.150 A)	5 µA

Programming temperature coefficient per °C	
Voltage	25 ppm + 50 µV
Current	25 ppm + 10 µA
Measurement temperature coefficient per °C	
Voltage	25 ppm + 40 µV
Current high range	25 ppm + 2.5 µA
Current low range (≤0.150 A)	25 ppm + 1.5 µA
Maximum up-programming and down-programming time with full resistive load (time from 10% to 90% of total voltage excursion)	
Voltage Settling from 0V to Full Scale	4.0 ms
Voltage Settling from Full Scale to 0V	4.0 ms
Maximum up-programming and down-programming settling time with full resistive load (time from start of voltage change until voltage settles within 0.1% of the full-scale voltage of its final value)	
Voltage Settling from 0V to Full Scale	20 ms
Voltage Settling from Full Scale to 0V	20 ms
Over-voltage protection	
Accuracy without disconnect relays	0.25% + 75 mV
Accuracy with disconnect relays	0.25% + 275 mV
Nominal range	0 – 10 V
Programmable delay time	60 µs – 5 ms (from occurrence of over-voltage condition to start of output shutdown)
Over-Current protection	
Programmable delay time	0 – 255 ms
Nominal Range	5 mA – 3.06 A
Output ripple and noise (PARD)	
CC rms	4 mA
Common mode noise (from 20 Hz – 20 MHz; from either output to chassis)	
Rms	1 mA
Peak-to-peak	6 mA

N6783A-BAT characteristics

Remote sense capability	
	Outputs can maintain DC specifications with up to a 0.5-volt drop per load lead. Maximum sense lead resistance is limited to 300mΩ/lead.
Series and parallel operation	
	Identically rated outputs can be operated directly in parallel. N6783A modules cannot be used in series with other N6783A modules or any other N67xx module. Auto-series and auto-parallel operation is not available.
Down-programming capability	
Continuous power	12 W
Continuous current (applies above 0.50 V output)	2 A

Ordering information

Model number: N6783A-BAT

Description: Battery Charge/Discharge Module

Web resources

Visit our web sites for additional product information and literature.

N6783A-BAT Battery Charge/Discharge Module
www.keysight.com/find/N6783a-bat

N6705B DC Power Analyzer Mainframe
www.keysight.com/find/n6705

14585A Control and Analysis Software for the DC Power Analyzer
www.keysight.com/find/14585

N6700B Low-Profile Modular Power System Mainframe
www.keysight.com/find/n6700b

N6781A 2-Quadrant Source/Measure Unit for Battery Drain Analysis
www.keysight.com/find/n6781

Related literature

- *Keysight DC Power Analyzer Product Overview*, literature number 5989-6319EN
- *Keysight N6705 DC Power Analyzer User's Guide*, literature number N6705-90001
- *Keysight N6705 DC Power Analyzer Service Guide*, literature number N6705-90010
- *Keysight N6700 MPS Low-Profile Modular Power System Product Overview,* literature number 5989-1411EN
- *N6700 Modular Power System Specifications Guide*, literature number N6700-90001

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

This information is subject to change without notice. © Keysight Technologies, 2011-2019, Published in USA, October 22, 2019, 5990-8662EN