DATA SHEET

EL30000 Series

Bench DC Electronic Loads

Measure, Capture and Display

The EL30000 Series bench DC electronic loads provide superior performance in compact bench form factor. A single and dual-channel model is available with up to 600 W – ideal for design verification of consumer power supplies, batteries, battery modules, solar panels, LED drivers, and power converters. You can easily characterize wide-bandgap semiconductor components such as MOSFET and IGBT.

- Keysight EL34143A single-input DC electronic load: 150 V, 60 A, 350 W
- Keysight EL34243A dual-input DC electronic load: 150 V, 60 A, 300 W; total 600 W

The EL30000 Series bench DC electronic loads are fully SCPI programmable with built-in USB, LAN, and optional GPIB interfaces. Advance features include scope view, data logging, sequencing, and more, enabling you to measure, capture and quickly display your results.

Measure voltage and current accurately

Each EL30000 Series bench DC electronic loads have a fully integrated voltmeter and ammeter to simultaneously measure the voltage and current for the device under test (DUT). Eliminating external shunt resistors and cables give you accurate voltage, current, and energy measurements.

To further reduce cabling error, the EL30000 Series bench DC electronic loads have remote sense technology to eliminate voltage drops caused by cables connecting to the DUT. All settings and measurements appear on a large 4.3-inch color display.

Capture measurements over time with the built-in data logger

The EL30000 Series bench DC electronic loads can continuously log voltage, current and energy to a data file. The sample rate is adjustable from 20 microseconds to 60 seconds. Store the data file on the internal non-volatile RAM or save externally on a USB memory device as a .CSV file.

KEYSIGHT TECHNOLOGIES

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Create, capture and display fast transients

Test the transient response of your power source with a dynamic load profile. The built-in scope feature digitizes the voltage and current and displays the results – just like an oscilloscope. The built-in scope function eliminates the need for external current shunts or current probes. This feature greatly reduces measurement set up complexity and provides accurate and fully specified measurements.

Features

Table 1. Choose a single or dual-input model

	EL34143A	EL34243A	
Channel	1	1	2
Input power	350 W	300 W	300 W
DC input voltage	150 V	150 V	150 V
DC input current	60 A	60 A	60 A
DC input current (parallel)		120 A	

Measures accurately

- integrated voltmeter and ammeter
- precise programming / readback accuracy
- built-in 2-wire and 4-wire remote sense technology

Figure 1. EL34143A 350 W bench electronic load 150 V, 60 A

Captures, stores, and transfers dynamic waveforms

- data logger that is configurable
- log voltage, current and energy
- internal or external memory storage
- export to .CSV for post analysis

Figure 2. EL34243A 600 W dual input bench electronic load 150 V, 60 A

Displays like an oscilloscope for precise analysis

- performs precise transient analysis with a scope function
- digitizes voltage and current
- displays results on a 4.3-inch color LCD screen

Advanced characterization

- use operating modes: constant current (CC), constant voltage (CV), constant resistance (CR), constant power (CP)
- improve measurements with low current range
- dynamic load profiles with List (continuous, pulse, or toggle)
- adjust transient steps with programmable slew rate
- modern connectivity: LAN (LXI-core), USB and GPIB (optional)

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Measurements at a glance with large color display

Meter view – default

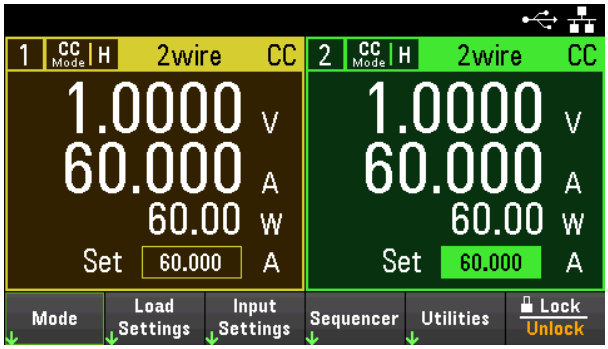

Figure 3. Default view on the EL34243A dual-input DC electronic load display both inputs

Meter view – single input

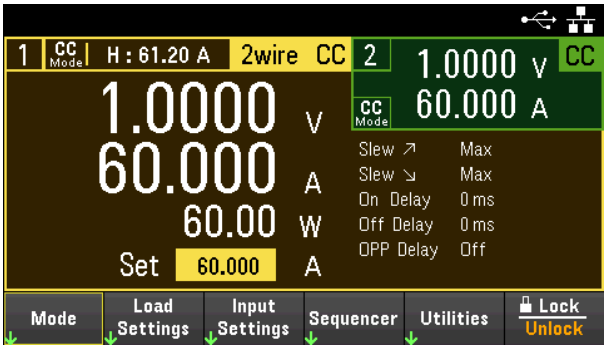

Figure 4. Display more details of the desired channel by selecting single view on the EL34243A dual-input DC electronic load

Scope view function

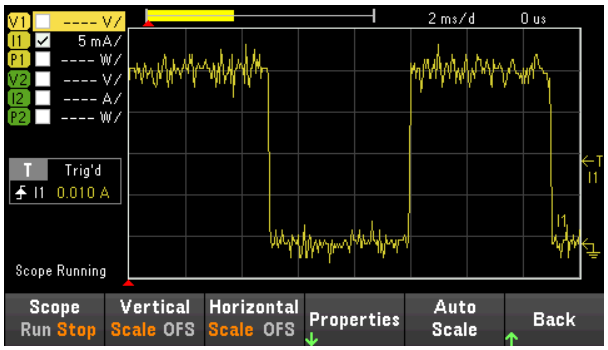

Figure 5. Capture voltage and current waveforms with a 200 kHz digitizer, up to 256k samples

Data logger function

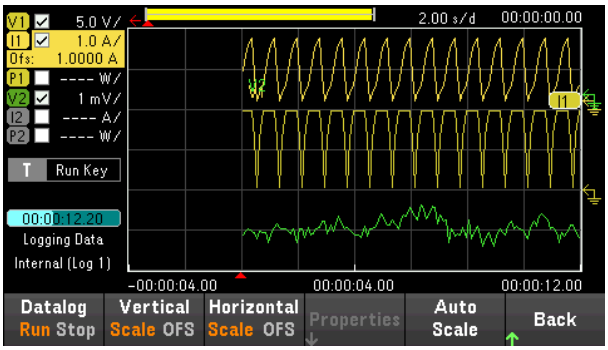

Figure 6. Log data with sample interval 20 us to 60 s, for up to 10,000 hours or 5 MB of data

Input-independent mode

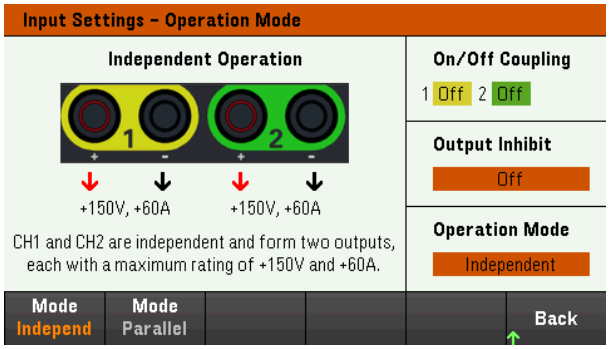

Figure 7. Two electronically isolated inputs allow independent operation like two individual units

Input-parallel mode

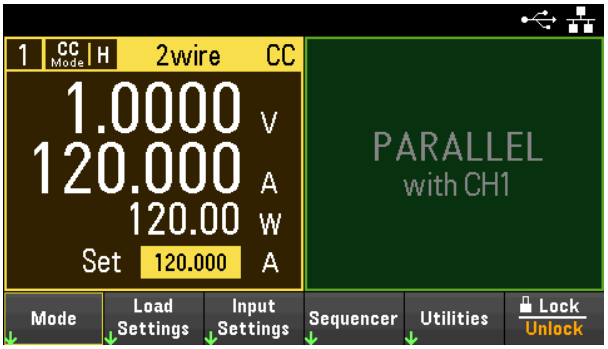

Figure 8. Input-parallel mode enables higher current up to 120 A or power up to 600 W

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Input-coupling

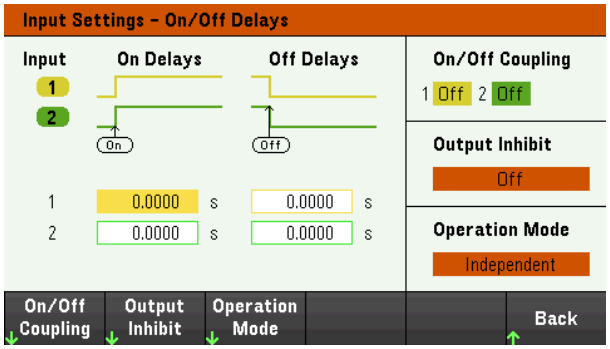

Figure 9. Synchronize the turning on/off the inputs of the EL34243A dual-input DC electronic load

Programmable slew rate

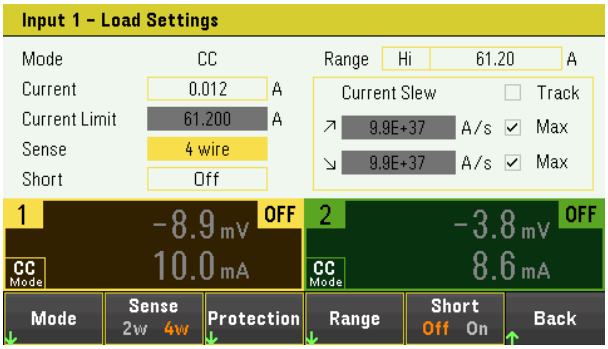

Figure 10. Programmable slew rate controls the rise and fall rate of both voltage and current

Transient *List*

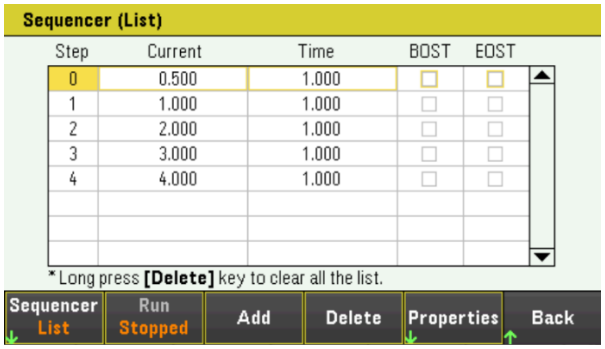

Figure 11. A *List* generates a complex sequence of changes with rapid and precise timing input

Transient continuous

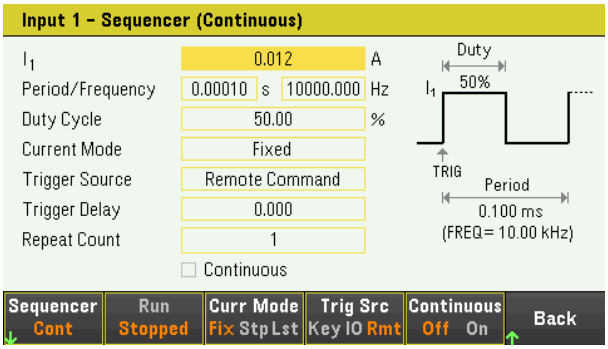

Figure 12. *Continuous mode* generates a repetitive pulse stream that toggles between two load levels

Transient pulse

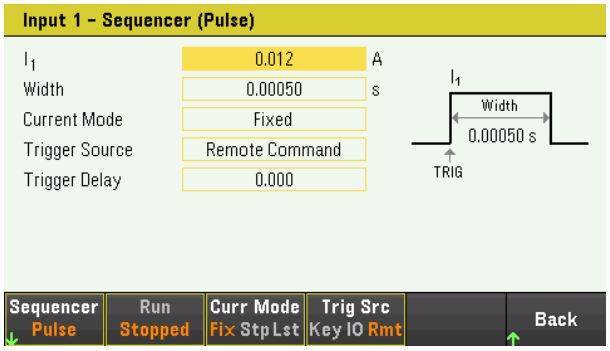

Figure 13. *Pulse mode* generates a load change that returns its original state over time

Transient toggle

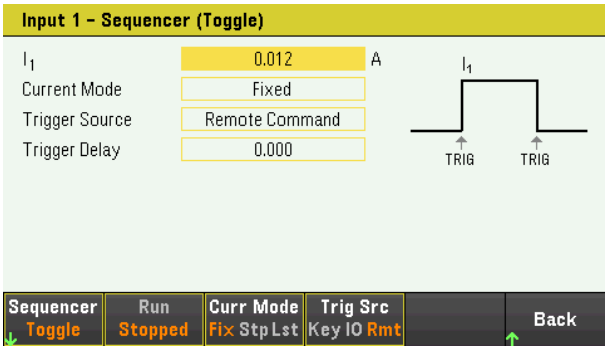

Figure 14. *Toggle mode* generates a pulse that toggles between two load levels with a controlled trigger signal

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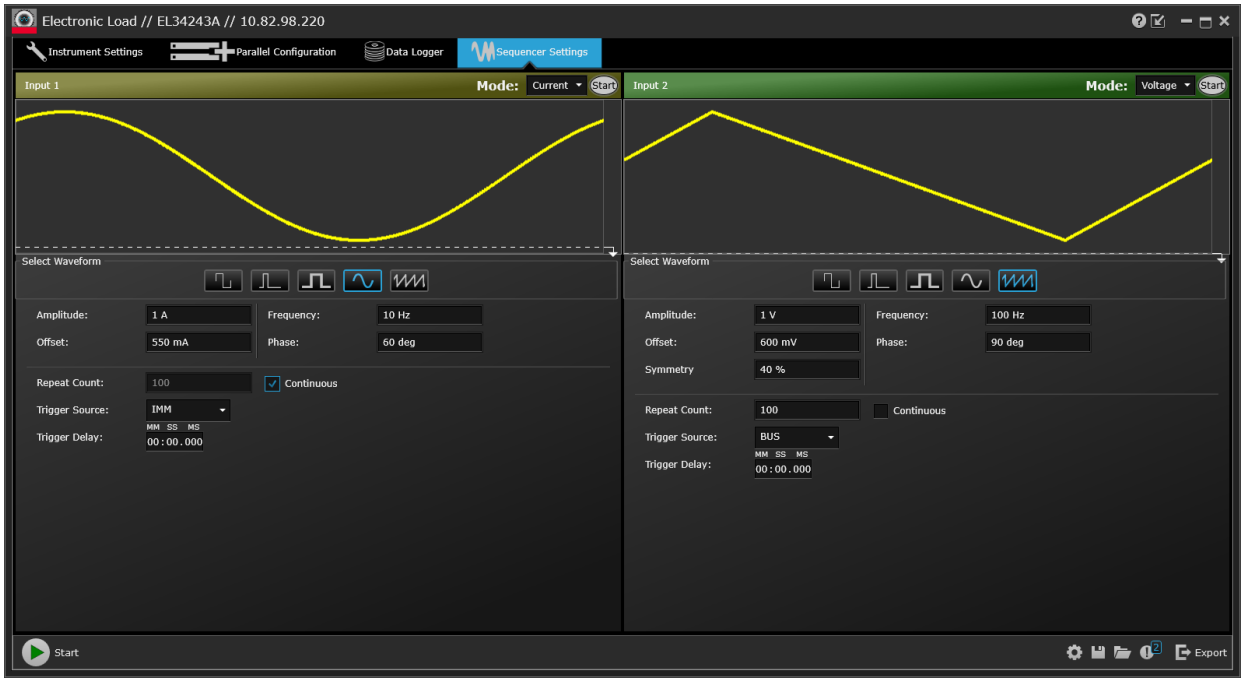
Operate remotely

Keysight's Pathwave BenchVue software for the PC or a soft front panel via a web interface allows uses to operate the electronic load remotely, execute test sequences, log data, and integrate with other test instruments.



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Specifications

Performance Specifications (23 °C ± 5 °C)		EL34143A	EL34243A	
Input Power		350 W	300 W	300 W
Channel		1	1	2
Input Ratings (0 to 40 ºC)		0 to 150 V	0 to 150 V	0 to 150 V
		0 to 60 A	0 to 60 A	0 to 60 A
Parallel Mode Current [1]		NA	120 A	
Programming Accuracy ± (% of output + offset)				
Constant current mode	Low, 0.6 A	0.04% + 130 µA		
	Medium, 6 A	0.04% + 2 mA		
	High, 60 A	0.04% + 12 mA		
Constant voltage mode	Low, 15 V	0.02% + 3 mV		
	High, 150 V	0.02% + 15 mV		
Constant resistance mode [2]	Low, 0.05 Ω to 30 Ω	0.1% + 230 mS		
	Medium, 10 Ω to 1.25 kΩ	0.1% + 18 mS		
	High, 100 Ω to 4 kΩ	0.1% + 3.5 mS		
	Ultra-high, 250 Ω to 100 kΩ	0.1% + 400 uS		
Constant power mode	Low, 0.02 W – 8 W [3] / 7 W [4]	0.06% + 4 mW		
	Medium, 0.3 W – 35 W [3] / 30 W [4]	0.06% + 260 mW		
	High, 2 W – 350 W [3] / 300 W [4]	0.06% + 1.6 W		
Readback Accuracy ± (% of output + offset)				
Current	Low, 0.6 A	0.04% + 120 µA		
	Medium, 6 A	0.04% + 1.8 mA		
	High, 60 A	0.04% + 9.6 mA		
Voltage	Low, 15 V	0.02% + 3 mV		
	High, 150 V	0.02% + 15 mV		
Power	Low, 0.02 W – 8 W [3] / 7 W [4]	0.06% + 3 mW		
	Medium, 0.3 W – 35 W [3] / 30 W [4]	0.06% + 260 mW		
	High, 2 W – 350 W [3] / 300 W [4]	0.06% + 1.5 W		

1. Do not connect the dual inputs on EL34243A in series, only use parallel mode in CC, CR and CP modes
2. Does not apply to current setting <0.05% of full-scale current, minimum voltage = 0.5 V
   Low range – full scale current = 60 A, maximum voltage = 15 V, maximum power = 350 W [3]/ 300 W [4]
   Medium range – full scale current = 60 A, maximum voltage = 150 V, maximum power = 350 W [3]/ 300 W [4]
   High range – full scale current = 6 A, maximum voltage = 150 V, maximum power = 350 W [3]/ 300 W [4]
   Ultra-high range – full scale current = 0.6 A, maximum voltage = 150 V, maximum power = 35 W [3]/ 30 W [4]
3. Power range of E34143A.
4. Power range of E34243A.

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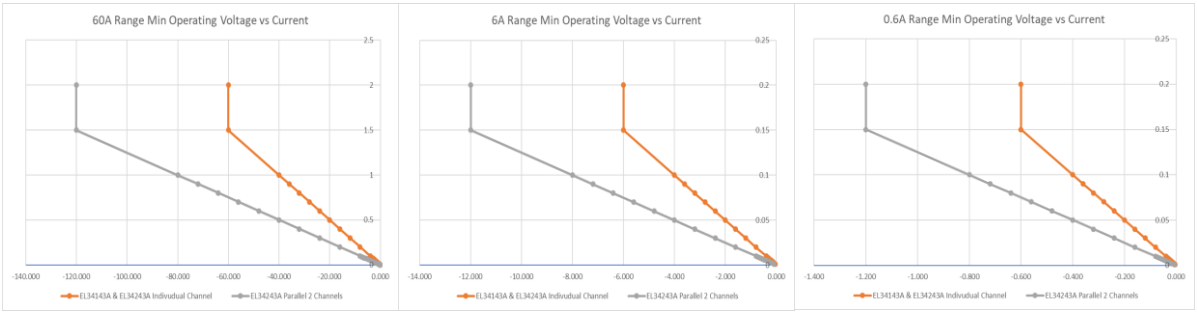
Typical Characteristics	EL34143A	EL34243A	
Channel	1	1	2
Input Characteristic [1]			



Typical Minimum Operating Voltage at Full Scale Current and for Full Dynamic		
Current range	Low, 0.6 A	0.15 V
	Medium, 6 A	0.15 V
	High, 60 A	1.5 V
Programming Resolution		
Constant current mode	Low, 0.6 A	7 µA
	Medium, 6 A	70 µA
	High, 60 A	700 uA
Constant voltage mode	Low, 15 V	0.17 mV
	High, 150 V	1.7 mV
Constant resistance mode	Low, 0.05 Ω to 30 Ω	700 µS
	Medium, 10 Ω to 1.25 kΩ	700 µS
	High, 100 Ω to 4 kΩ	70 µS
	Ultra-high, 250 Ω to 100 kΩ	7 µS
Constant power mode	Low, 0.02 W – 8 W [2] / 7 W [3]	105 µW
	Medium, 0.3 W – 35 W [2] / 30 W [3]	10.5 mW
	High, 2 W – 350 W [2] / 300 W [3]	105 mW
Readback Resolution		
Current	Low, 0.6 A	15 µA
	Medium, 6 A	100 µA
	High, 60 A	1 mA
Voltage	Low, 15 V	0.27 mV
	High, 150 V	2.7 mV

1. Below the typical minimum operating voltage of 1.5 V at constant current both high range and medium range current decreases linearly base on the rate of its minimum operating resistance 0.025 Ω.
   Below the typical minimum operating voltage of 0.15 V at constant current, the low range current decreases linearly base on the rate of its minimum operating resistance 0.25 Ω.
2. Power range of E34143A
3. Power range of E34243A

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Typical Characteristics		EL34143A	EL34243A	
Channel		1	1	2
Slew Rates [1]				
Constant current mode	Low, 0.6 A	40 kA/s		
	Medium, 6 A	400 kA/s		
	High, 60 A	4.8 MA/s		
Constant voltage mode	Low, 15 V	79 kV/s		
	High, 150 V	310 kV/s		
Minimum Programmable Operating Point				
Constant current mode	Low, 0.6 A	200 µA		
	Medium, 6 A	2 mA		
	High, 60 A	12 mA		
Constant voltage mode	Low, 15 V	3 mV		
	High, 150 V	15 mV		
Constant resistance mode	Low, 0.05 Ω to 30 Ω	0.05 Ω		
	Medium, 10 Ω to 1.25 kΩ	10 Ω		
	High, 100 Ω to 4 kΩ	100 Ω		
	Ultra-high, 250 Ω to 100 kΩ	250 Ω		
Constant power mode	Low, 0.02 W – 8 W [2] / 7 W [3]	0.02 W		
	Medium, 0.3 W – 35 W [2] / 30 W [3]	0.3 W		
	High, 2 W – 350 W [2] / 300 W [3]	2 W		
Maximum Programmable Power Operating Point				
Constant power mode	Low, 0.02 W – 8 W [2] / 7 W [3]	8.16 W	7.14 W	
	Medium, 0.3 W – 35 W [2] / 30 W [3]	35.7 W	30.6 W	
	High, 2 W – 350 W [2] / 300 W [3]	357 W	306 W	
Programmable Short / Open				
Programmable short		25 mΩ (6 A/ 60 A) / 250 mΩ (0.6 A)		
Input off impedance		824 kΩ		
Measurement Small Signal Bandwidth (-3 dB typical)				
Voltage / Current		30 kHz		
Measurement Small Signal Bandwidth (-1 dB typical)				
Voltage / Current		17.5 kHz		
Command Processing Time				
		< 10 ms		

1. Typical maximum current slew rate changes in time from 10% to 90% or 90% to 10%.
2 Power range of E34143A.
3 Power range of E34243A.

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Typical Characteristics		EL34143A	EL34243A	
Channel		1	1	2
Temperature Coefficients - Programming / Readback				
Constant current mode	Low, 0.6 A	0.008%/°C + 3 µA/°C		
	Medium, 6 A	0.008%/°C + 30 µA/°C		
	High, 60 A	0.008%/°C + 300 µA/°C		
Constant voltage mode	Low, 15 V	0.004%/°C + 100 µV/°C		
	High, 150 V	0.004%/°C + 600 µV/°C		
Constant resistance mode [1]	Low, 0.05 Ω to 30 Ω	0.01%/°C + 6 mS/°C		
	Medium, 10 Ω to 1.25 kΩ	0.01%/°C + 320 µS/°C		
	High, 100 Ω to 4 kΩ	0.01%/°C + 35 µS/°C		
	Ultra-high, 250 Ω to 100 kΩ	0.01%/°C + 6 µS/°C		
Constant power mode	Low, 0.02 W – 8 W [2] / 7 W [3]	0.012%/°C + 1 mW/°C		
	Medium, 0.3 W – 35 W [2] / 30 W [3]	0.012%/°C + 5 mW/°C		
	High, 2 W – 350 W [2] / 300 W [3]	0.012%/°C + 40 mW/°C		
Protection				
Fixed OCP	Low, 0.6 A	0.65 A ± 0.004 A		
	Medium, 6 A	6.5 A ± 0.04 A		
	High, 60 A	63 A ± 0.2 A		
Programming OCP [1]	Low, 0.6 A	0.2% + 0.007 A		
	Medium, 6 A	0.2% + 0.07 A		
	High, 60 A	0.2% + 0.1 A		
OVP	Low, 15 V	16.5 V ± 0.06 V		
	High, 150 V	165 V ± 0.35 V		
OPP	Low, 0.02 W – 8 W [2] / 7 W [3]	8.8 W	7.7 W	
	Medium, 0.3 W – 35 W [2] / 30 W [3]	38.5 W	33 W	
	High, 2 W – 350 W [2] / 300 W [3]	385 W	330 W	
Protection Activation Time				
INH input		< 5 µs		
Fault on coupled output		< 10 µs		
Mainframe Oscilloscope Measurement Accuracy				
Constant current mode	Low, 0.6 A	0.04% + 1 mA		
	Medium, 6 A	0.04% + 4 mA		
	High, 60 A	0.04% + 15 mA		
Constant voltage mode	Low, 15 V	0.02% + 15 mV		
	High, 150 V	0.02% + 40 mV		

1. CV mode only.
2 Power range of E34143A.
3 Power range of E34243A.

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Environmental Conditions		
Operating environment	Indoor use, installation category II (for AC input), pollution degree 2	
Operating temperature range	0 °C to 40 °C	
Storage temperature	–40 to 70 °C	
Relative humidity	Up to 85% RH at temperature up to 40 °C (non-condensing)	
Altitude	Up to 2000 meters	
Electromagnetic compatibility	Compliant with EMC Directive (2014/30/EU)	
	IEC 61326-1:2012/EN 61326-1:2013 Group 1 Class A	
	Canada: ICES-001:2004	
	Australia/New Zealand: AS/NZS	
	South Korea KC mark	
Safety	UL 61010-1 3rd edition, CAN/CSA-C22.2 No. 61010-1-12, IEC 61010-1:2010 3rd edition	
Acoustic noise declaration	Sound pressure Lp < 65 dB(A) at operator position, Lp < 70 dB(A) at bystander position	
	Sound power, Lw < 70 dB(A)	
AC input	100 VAC to 240 VAC (± 10%), 50/60 Hz	
Interface Capabilities		
GPIB	SCPI-1999, IEEE 488.2 compliant interface	
LXI compliance	Class C	
USB 2.0	Requires Keysight IO Library version 17.2.208 and up	
10/100 LAN	Requires Keysight IO Library version 17.2.208 and up	
Digital Control Characteristics		
Maximum voltage ratings	+16.5 VDC/ -5 VDC between pins (pin 4 internally connected to chassis ground)	
Pins 1 and 2 as fault output	Maximum low-level output voltage = 0.5 V @ 4 mA	
	Maximum low-level sink current = 4 mA	
	Typical high-level leakage current = 1 mA @ 16.5 VDC	
Pins 1 - 3 as digital/trigger outputs (pin 4 = common)	Maximum low-level sink current = 100 mA	
	Typical high-level leakage current = 0.8 mA @ 16.5 VDC	
Pins 1 - 3 as digital/trigger inputs and pin 3 as inhibit input (pin 4 = common)	Maximum low-level input voltage = 0.8 V	
	Maximum high-level input voltage = 2 V	
	Typical low-level leakage current = 2 mA @ 0 V (internal 2.2k pull-up)	
	Typical high-level leakage current = 0.12 mA @ 16.5 VDC	
Weight and Dimensions		
Model	EL34143A	EL34243A
Weight, kg	6.50	8.42
Overall dimension, mm (H x W x D)	144.85 x 215.90 x 476.01	
Net dimension (without feet, strap handle and GPIB module), mm (H x W x D)	132.51 x 212.80 x 458.48	

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Ordering Information

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- EL34143A Single-input DC electronic load: 150 V, 60 A, 350 W
- EL34243A Dual-input DC electronic load: 150 V, 60 A, 300 W; total 600 W

Standard Shipped Accessory

- AC power cord
- Connectors and quantity:

Description	EL34143A	EL34243A
10 A, 3.5 mm female 4-pin terminal I/O block connector	1	1
8 A, 3.5 mm 2-pin terminal sense block connector	1	2
85 A, 12 mm 2-pin input connector	1	2

Options

- Option SEC NISPOM and file security
- Option UK6 Commercial calibration with test result data

Keysight GPIB module and rackmount kits

- EL34GPBU GPIB user-installable interface module
- 1CM104A Rack mount flange kit with two flange brackets
- 1CM105A Rack mount flange kit without handles and two flange brackets
- 1CM116A Rack mount flange kit with one flange bracket, one half-module bracket
- 1CN107A Handle kit with two front handles
- 1CP108A Rack mount flange and handle kit with two brackets and front handles

www.keysight.com/find/el30000

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