E36150 Series

Autoranging bench DC power supply

Power Your Next Insight

For more than 50 years, Keysight Technologies, Inc. DC power supplies have been changing the way how engineers prove their design, understand the issues, and ensure product quality. The E36150 Series continues to innovate, providing even more power on the bench with an 800W output and exciting new features that will power your next insights as you design, test, and optimize your electronic products.

800W power bench solution

- Plenty of usable power, safe and easy to use.
- Affordable while providing immense value to meet your high-power testing requirements.
- Built for performance and packed with advanced characterization capabilities in one box test solution.

KEYSIGHT

At a Glance

The E36150A Series is an extension of Keysight's popular bench DC power supplies that offer great performance at an affordable price. It comprises two models with 800W power on a single channel output that can supply up to 60V or 80A.

Wide range of applications

These general-purpose power supplies are designed for versatility and are perfect for various applications, including R&D, design validation, reliability, and quality testing across all types of industries. Both models feature an Autoranging architecture and Peak Power Handling capabilities allowing you to meet your various test requirements with plenty of usable power and flexibility.

Safe and easy to use

The E36150 Series brings in a new key innovation – a detachable front binding post that supports high current up to 80A. The detachable binding post allows easy access to the power outputs allowing for seamless wire connections to your DUTs. More importantly, the front binding post has a built-in auto-protection mechanism to ensure your own safety as well as your devices.

Figure 1. Detachable high current front binding post.

Best-in-class features

As technology keeps advancing, so does the complexity of your electronics design and testing requirements. The new series does more than just powering your devices; it also includes advanced characterization tools such as data logging, an optional scope view, and arbitrary waveform generation. This enables in-depth analysis and precise output modulation for power simulation applications, allowing you to accelerate development projects without compromising quality.

All these features work together to provide a one-box solution that eliminates the typical requirements of multiple instruments, therefore, helping you to save time without complex setups as well as reducing your test costs.

The advanced capabilities can be further augmented by pairing with the BenchVue BV9200B/BV9201B and BV0003B software application. The software provides convenient access to the advanced features of your power supplies with a familiar PC control interface, plus additional features, analysis tools, and automation, without requiring you to write even a single line of programming.

Models

E36154A: Autoranging 30V, 80A, 800W

E36155A: Autoranging 60V, 40A, 800W

Features

- **Plenty of usable power**
  - Autoranging
  - Peak power handling up to 3X max power rating
- **Safe, clean, and reliable power**
  - Low output ripple and noise
  - Excellent line/load regulation
  - 2-wire or 4-wire remote sense
  - Detachable high current front binding post
  - Over-voltage, over-current, and over-temperature protection
- **Convenient benchtop capabilities and intuitive interfaces**
  - Thermal-control fan speed for minimal acoustic noise
  - 4-wire front output terminal including sense and ground
  - 4.3-inch LCD color display
  - Individual knobs for voltage and current
  - LAN/LXI, USB and GPIB (upgrade option) interfaces
- **Advanced characterization**
  - Built-in voltage and current measurements
  - Data logging
  - Output sequencing and syncing with digital I/O
  - LIST mode programming
  - Low range current measurement
  - Adjustable voltage slew rate
  - Scope View (upgrade option)
  - Arbitrary waveform generator (AWG) (upgrade option)
- **Application Software and Automation**
  - BV0003B Pathwave BenchVue Power Supply App
  - BV9200B/BV9201B BenchVue Advanced Power Control and Analysis

Plenty of Usable Power with Autoranging

Get the most out of your power supplies with autoranging architecture. Autoranging power supplies, as opposed to single- or dual-range power supplies, allow for much more voltage and current combinations within the maximum power output, providing you with greater use case coverage.

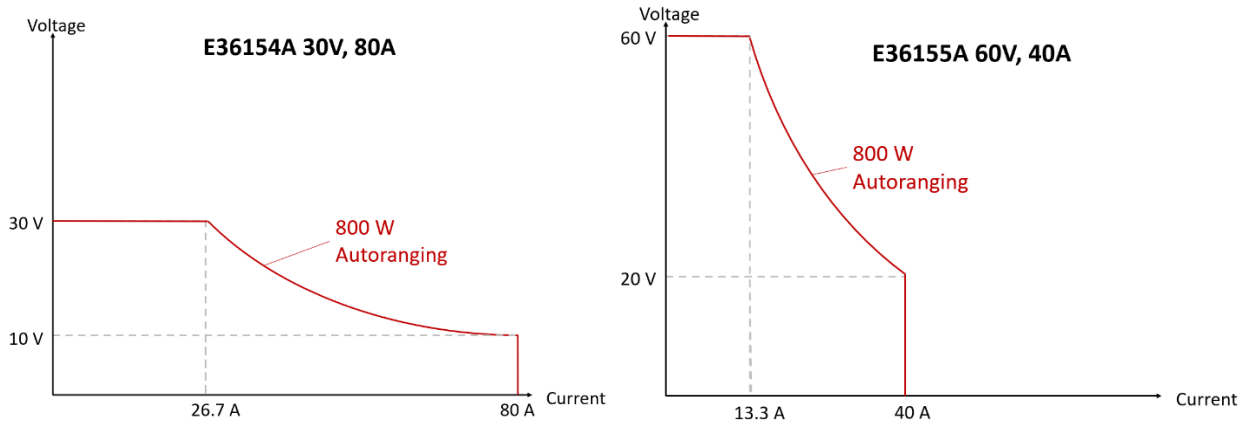

Figure 2. Greater flexibility with autoranging architecture.

Peak power handling

Certain applications, especially those with electromechanical components such as motors, actuators, and pumps, typically require a much higher start-up current to boot. This start-up current may be two or three times higher than its operating current, but only for a short period of time. The E36150 Series is built for such applications with peak power handling capability that can accommodate a short burst of load spikes from your DUTs for up to three times the maximum power rating at 2400W.

Click here for the Application Note on E36150 Series peak power handling feature.

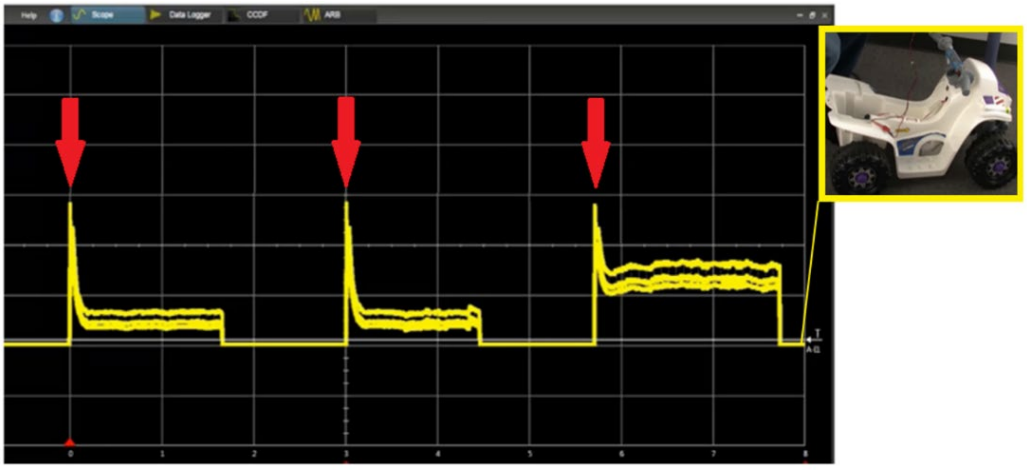

Figure 3. Example of a typical peak power surge waveform. The start-up current spikes as indicated by the red arrows each time the acceleration pedal on a toy electric vehicle (figure subset) is applied.

Confidently Supply your DUT with Clean and Reliable Power

Making meaningful measurements starts with powering your device correctly. The E36150 Series provides clean power with less than 5 mVrms ripple and noise. Precise output control allows voltage set with 0.03% accuracy and current set with 0.1% accuracy. Load and line regulation better than 0.01% ensures a steady output when power line and load changes occur, giving you better peace of mind.

Improve measurement accuracy with 4-wire remote sensing

To further enhance the voltage regulation and measurement accuracy of the DC outputs, the E36150 Series includes 4-wire remote sensing, in addition to the convenience of 2-wire local sensing. Remote sensing uses a second set of leads to monitor the voltage at the test device terminal and automatically and continuously adjust the output to compensate for the voltage drops in the power leads. Internal relays enable the switching between 2-wire local sensing and 4-wire remote sensing with just a push of a button, thus eliminating the need for shorting bars or jumpers.

Connect to your DUT safely

Your safety is of paramount importance, and Keysight takes top priority to ensure that. The E36150 series features a new detachable front binding connection that can withstand its maximum current output of 80A while fully complying with the IEC 61010 safety requirements. The design includes proper insulation and well-thought-out mechanical aspects that prevent potential hazardous contacts when you are making connections. In addition, a thermal sensor auto protection mechanism is built-in to detect the abnormal temperature at the busbar that may be due to, for example, loose or incorrect cable connections. If that does occur, the power supply will immediately shut down its current output automatically until the issue has been resolved.

The front binding post is detachable from the instrument to allow easy access to the downward-facing power output ports without the need of tilting the instrument. The detachable post also includes an error-proof Poka-yoke mounting fixture to ensure correct orientation connection every time.

As additional layers of protection, the E36150 Series includes over-voltage protection (OVP), over-temperature protection (OTP), and over-current protection (OCP) with configurable settings to limit the output values or threshold period according to the sensitivity of your devices to prevent potential damages.

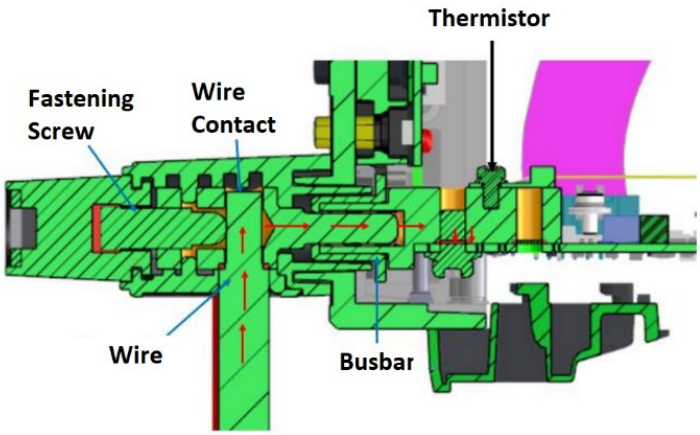

Figure 4. Built-in auto-protection mechanism in the high current binding post.

Convenient benchtop capabilities

Working on a bench would mean being very physically close to your instruments. The E36150 Series is impressively quiet for an 800W output power supply. It automatically adjusts the cooling fan speed depending on the load conditions and ambience temperature to minimize annoying acoustic noise through a thermal control circuit. It operates at a typical noise level of less than 36 dBA under no-load conditions and typically peaks less than 63 dBA under full load conditions. This allows you to work in an undisturbed environment. The smart thermal control would also allow another notch of the cooling fan speed to kick in if needed when your surrounding temperature suddenly increases to prevent the instrument from reaching the over-temperature protection level too quickly.

The built dimension at 3U, half-rack is great as standalone on the bench or mountable on a rack. A selection of unique rack mount kits is also available to provide suitable weight distribution, adequate heat management, and routing wires for optimum use of your bench spaces.

The units are optimized for front panel operation with a sharp 4.3-inch color LCD display and furnished with many soft key buttons. There are also dedicated knobs for voltage and current controls to enable easy navigation through the menus and settings. All four-wire terminals, including sensing as well as a ground port, are all available on the front panel for greater convenience, which means you do not need to route your wiring to the back panel.

All models support operation via SCPI (standard commands for programmable instruments) programming language, IVI (interchangeable virtual instruments) driver, web browser or PathWave. As for connectivity, LAN and USB come as standard whereas GPIB is also available as an add-on option

Figure 5. Front view without the detachable front binding post (left) and rear view (right).

Figure 6. Side view. Side is equipped with a strap handle.

Advanced Characterization Features

Voltmeter/ammeter: meter view

The E36150 Series has a fully integrated voltmeter and ammeter to measure the source of actual voltage and current out of the DC output into your DUT. Because this voltmeter/ammeter function is built-in, it is easy to make measurements, eliminating the requirement of additional DMM instrument and the added complexity of wiring. Another advantage is that the current readback can cover the full range of the power supply output rating up to 80A, which is way beyond the typical range of a DMM.

The voltage and current readback accuracies are up to 0.04% and 0.1%, respectively, for the full ranges. Low range current mode support 0 – 1% of Max A range enables enhanced resolution at the front panel current readback by 10-fold. This feature allows pinpoint measurements even at very low power consumption ranges when the DUT is in idle/sleep mode.

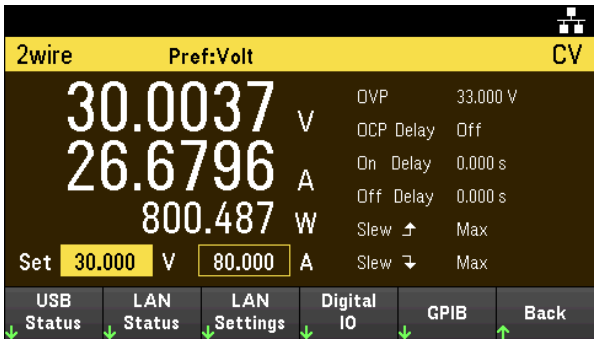

Figure 7. Meter View and low current measurement.

Data logger view

The data logging feature in E36150 Series allows the current and voltage traces to be continuously recorded and stored for further analysis. Datalogging can be configured to a specific time interval up to as frequently as 10ms, or as long as 10,000 hours with 1 min sampling interval. These are useful for various applications, including reliability testing and long-term power consumption analysis.

The E36150 Series stores the data file in the built-in memory, and it allows for easy expansion with an external USB drive. You can easily export the time-stamped data as a .CSV file or screenshots in .PNG or .BMP format to perform detailed analysis or create reports and documentation.

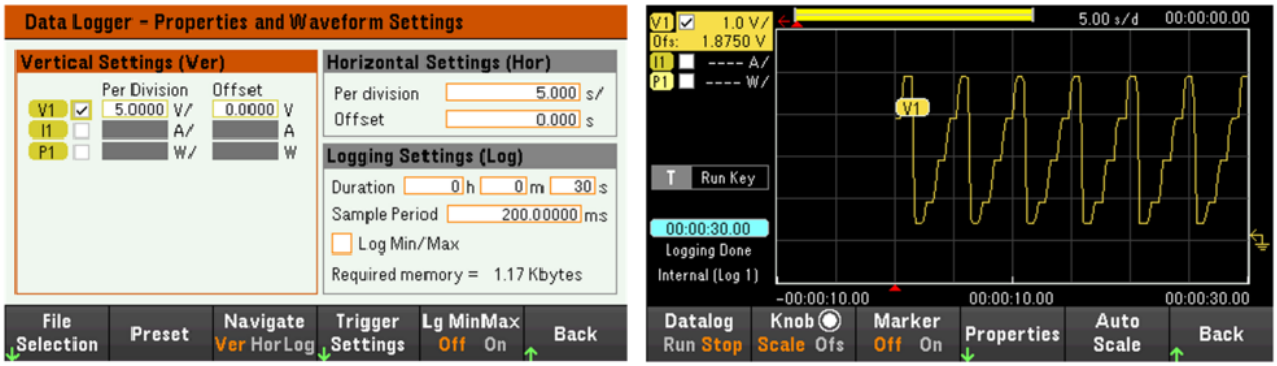

Figure 8. Data logging setting interface (left) and data logger view (right).

LIST mode programming

You can simulate various power problems or specific operating conditions with either sequencing or LIST mode. Generate complex sequences of output operations with rapid, precise timing synchronized with internal or external signals by using LIST mode.

For some applications, like inrush limiting or powering rate-sensitive devices, it is necessary to slow down and control the speed of the DC output to maintain a specific voltage slew rate. The E36150 Series provides a programmable voltage slew rate so that you can easily control the speed at which the output slews from one voltage to another. You can set the speed of a voltage change anywhere from its maximum up/down programming speed to its slowest change of up to 15,000 seconds.

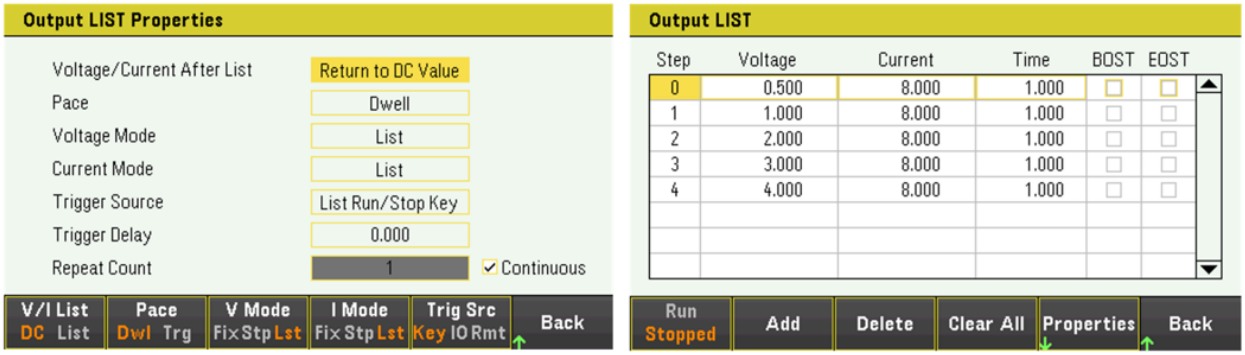

Figure 9. LIST mode output programming user interfaces.

Oscilloscope: Scope view (Requires E36150ADVU upgrade option)

The E36150 Series offers an upgrade option E36150ADVU to provide scope view features that function as a built-in oscilloscope. The scope view is a great tool to capture the in-depth details of current, voltage and power waveforms in the time domain. This enables precise analysis of dynamic transient behaviors, including pulses of current loading, peak demands, dropouts, rise times, and other DC transients and disturbances in your DUT.

The scope view utilizes a high-speed digitizer that supports up to 10 us / 100 kHz sampling rate and 256K samples. The system can be set to turn on automatically when the current or voltage user-set threshold configuration is met, or it can be programmed into your specific output sequence. For example, to make an in-rush current measurement on your DUT, you can set the scope to trigger on the DC output's on/off key, set the trigger mode to single shot, and then turn on the DC output. This will show right away how much current is coming out of the DC module and into the DUT, giving a picture of the DUT's in-rush current. Thus, it provides an integrated functionality that can reduce setup time and complexity.

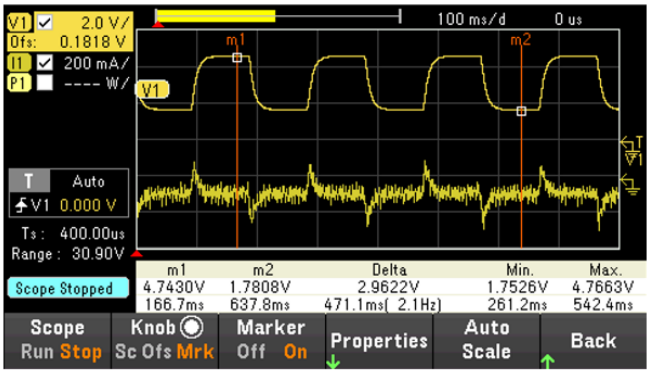

Figure 10. Scope View.

Arbitrary waveform generator (Requires E36150ADVU upgrade option)

The arbitrary waveform generator (AWG) is included in the E36150ADVU upgrade option that enhances the LIST mode programming functionality from 100 to 512 setpoints as well as allowing arbitrary waveform output. The users can precisely modulate the DC power output by defining each point of the voltage or current waveforms. You can define up to 512 setpoints with configurable dwell time, thus allowing you to simulate or emulate specific application scenarios easily.

AWG builder includes a user interface with pre-configured waveform patterns that you can select, such as sine, step, ramp, pulse, trapezoid, etc. You can also select user-defined voltage or current to form your own arbitrary waveform sequences. Once you have selected the waveform pattern, you can then configure the various parameters. You can also import user-defined waveforms from a .CSV file for convenient playback of a specific scenario previously recorded.

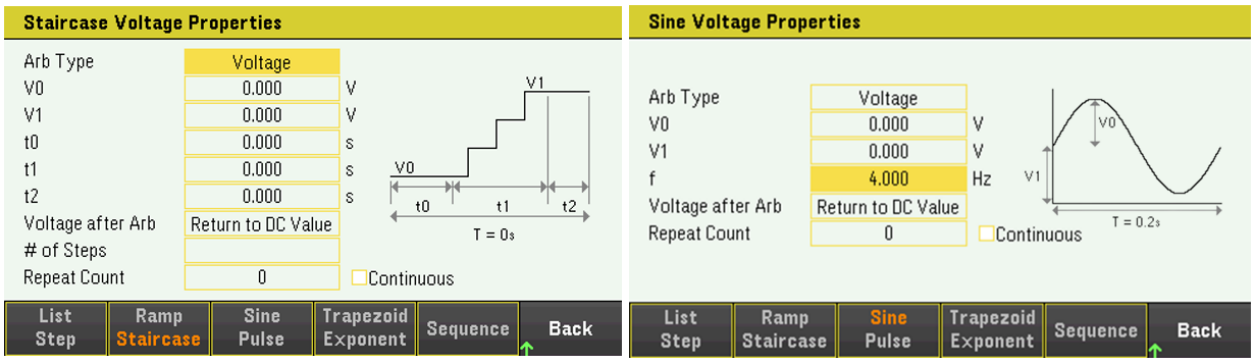

Figure 11. Arbitrary waveform generator user interfaces.

Application Software and Automation

BV0003B PathWave BenchVue power supply app

The E36150 Series is also supported by the familiar BV0003B software application that makes it simple to connect, control, and view your Keysight power supplies simultaneously with other Keysight bench instruments on a PC without programming.

- Visualize the output of multiple power supplies simultaneously
- Log data, capture screenshots, and save a system's state
- Recall a past state of your bench to replicate results
- Export measurement data in desired format fast
- Quickly access manuals, drivers, FAQs, and videos
- Monitor and control your bench from mobile devices

Pathwave BV9200B/BV9201B advance power control and analysis

Take full advantage of the features and capabilities built-in to your E36150 Series power supply with the Pathwave BV9200B/BV9201B. The software provides advanced tools to perform four main operations, *i.e.*, data logging, AWG, scope, and CCDF statical analysis.

The software is ideal for use cases in R&D that require creating complex waveforms to stimulate or load a DUT, capture the waveforms, and then "playing" them back to perform detailed analysis with the ease of advanced marker readouts (P2P, min, avg, max, RMS, charge/energy) to understand the complex dynamic behavior of their DUT power characterization in order to optimize your design and development work.

Overcome the limitations of front panel operations with an intuitive and user-friendly user interface via a PC with all available tools, layouts, operation tabs to easily control, automate and display without any programming. If required, you can customize and run your own programming via the automation programming interface (API).

For further details on BV9200B visit www.keysight.com/find/BV9200

Figure 12. BV9201B user interfaces.

Specifications

Model Power Output	E36154A 800W	E36155A 800W
No. of Channel	1	1
DC Output Rating (0 to 40 °C)	0 to 30 V	0 to 60 V
	0 to 80 A	0 to 40 A
Load Regulation ± (% of output + offset)		
Voltage	< 0.01% + 2 mV	
Current	< 0.1% + 2 mA	
Line Regulation ± (% of output + offset)		
Voltage	< 0.01% + 2 mV	
Current	< 0.1% + 2 mA	
Output Ripple and Noise (at approximately 23 °C)		
Normal mode voltage, *V*pp (20 Hz to 20 MHz)	< 75 mV	
Normal mode voltage, *V*rms (20 Hz to 10 MHz)	< 5 mV	
Programming Accuracy ± (% of output + offset) at 23 °C ± 5 °C for 12 months.		
Voltage	0.03% + 6 mV	0.03% + 10 mV
Current	0.1% + 20 mA	0.1% + 10 mA
Readback Accuracy ± (% of output + offset) at 23 °C ± 5 °C for 12 months.		
Voltage	0.04% + 6 mV	0.04% + 10 mV
Current	0.1% + 20 mA	0.1% + 10 mA
Low Range Current[1]	0.1% + 5 mA	0.1% + 4 mA
Load Transient Recovery Time (Time to recover within the settling band following a load change from 50% to 100%; and from 100% to 50% of full load)		
Voltage Settling Band	75 mV	150 mV
Time	< 1 ms	

1. Low Range Current 0 to 1% max A.

Typical Characteristics

Supplementary characteristics

Model	E36154A	E36155A
Programming Resolution (Remote)		
Voltage	2 mV	4 mV
Current	5 mA	3 mA
Readback Resolution (Remote)		
Voltage	1 mV	2 mV
Current	3 mA	2 mA
Low Range Current[1]	50 µA	30 µA
Programming Resolution (Front Panel)		
Voltage	1 mV	
Current	1 mA	
Readback Resolution (Front Panel)		
Voltage	1 mV	
Current	1 mA	
Low Range Current[1]	100 µA	
Output Ripple and Noise (20 Hz to 10 MHz)		
Normal Mode Current	< 1 mArms	
Overvoltage Protection (OVP) ± (% of output + offset)		
Programming Accuracy	0.2% + 0.4 V	
Activation Time (Average time for the output to start dropping after OVP and OCP condition occurs)		
Overvoltage (OVP)	< 5 ms	
Overcurrent (OCP)	< 5 ms	
Command Processing Time		
< 10 ms		
Programming Temperature Coefficient per °C (% of output + offset)		
Voltage	0.005% + 0.5 mV	
Current	0.01% + 1 mA	
Readback Temperature Coefficient per °C (% of output + offset)		
Voltage	0.005% + 0.5 mV	
Current	0.01% + 1 mA	

1. Low Range Current 0 to 1% max A.

Supplementary characteristics continued

Model	E36154A	E36155A
Remote Sense (Maximum voltage in load lead)		
	0.7 V	
Up/Down Programming Settling Time to Within % of the Total Excursion		
Up, Full Load	< 12 ms (10% of total excursion) < 30 ms (1% of total excursion)	< 12 ms (10% of total excursion) < 30 ms (1% of total excursion)
Up, No Load	< 12 ms (10% of total excursion) < 30 ms (1% of total excursion)	< 12 ms (10% of total excursion) < 30 ms (1% of total excursion)
Down, Full Load	< 12 ms (10% of total excursion) < 30 ms (1% of total excursion)	< 12 ms (10% of total excursion) < 30 ms (1% of total excursion)
Down, No Load	< 12 ms (10% of total excursion) < 30 ms (1% of total excursion)	< 20 ms (10% of total excursion) < 30 ms (1% of total excursion)
Connectivity		
	USB, LAN and GPIB (Optional)	

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 or newer
10/100 LAN	Requires Keysight IO Library version 17.2.208 or newer

Digital control characteristics

Digital Control Characteristics	
Maximum voltage ratings	+16.5 VDC/−5 VDC between pins (pin 4 is 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 output voltage = 0.5 V @ 4 mA; 1 V @ 50 mA; 1.75 V @ 100 mA 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 Minimum 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

Feature characteristics

Feature Characteristics	
Data logger function	Measurement interval from 10 ms to 60 sec with a maximum duration of 10,000 hours
Adjustable voltage slew rate	Control from 20 ms to 15,000 sec for 0 to max V transition
LIST mode programming	Up to 100 points with adjustable dwell time *(Without E36150ADVU Option)* Up to 512 points with adjustable dwell time *(With E36150ADVU Option)*
Scope View *(Requires E36150ADVU Option)*	Number of traces – three for voltage, current and power. Fastest sample rate at 10 µs / 100 kHz and up to 256K samples (maximum buffer size per trace or bandwidth)
AWG *(Requires E36150ADVU Option)*	Up to 512 points with adjustable dwell time.
Peak Power Handling	Up to 2400W for at least 7 ms

Environmental conditions

Environmental Conditions	
Operating environment	Indoor use, installation category II (for AC input), pollution degree 2
Operating temperature range	0 to 40 °C
Storage temperature	–20 to 70 °C
Relative humidity	80% RH at temperature up to 40 °C, non-condensing
Altitude	Up to 2000 meters
Electromagnetic compatibility	Compliant with EMC Directive (2004/108/EC) 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 Sound pressure *L*p <70dB(A) at operator position Normal operation according to EN 27779
AC input	~100 - 230 VAC (±10%), 50/60 Hz, <1300VA

Physical characteristics

Model	E36154A	E36155A
Overall dimension, mm (H x W x D)	145 X 216 x 495	
Net body dimension (without safety cover, strap handle, feet, and front binding post), mm (H x W x D)	133 x 213 x 359	
Net weight	6.64 kg	

Ordering information

Keysight E36150 Series Power Supplies

- E36154A Autoranging DC power supply 30V, 80A, 800W
- E36155A Autoranging DC power supply 60V, 40A, 800W

Standard shipped accessory

- AC power cord (based on destination country)
- Detachable front binding post

Ordering options

- Option SEC NISPOM and file security
- Option UK6 Commercial calibration with test result data
- Option 1A7 ISO17025 Cal with uncertainty

Upgradeable options (available post-purchase)

- E363GPBU GPIB user installable interface module
- E36150ADVU Advance features of Scope View and AWG capabilities

Rackmount kits

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

Product Jump Stations

www.keysight.com/find/e36150

www.keysight.com/find/e36154a

www.keysight.com/find/e36155a

www.keysight.com/find/e36150firmware

www.keysight.com/find/e36150manuals

For more information on Keysight Technologies' products, applications, or services, please visit: www.keysight.com