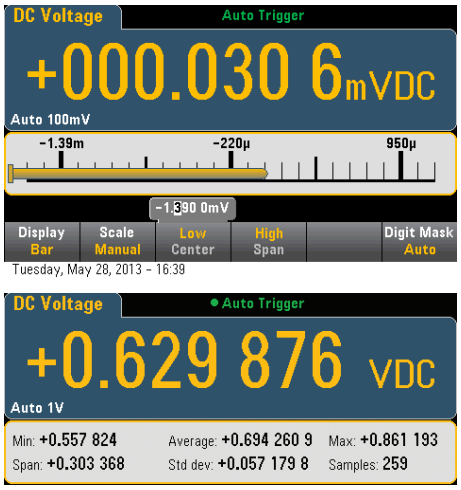
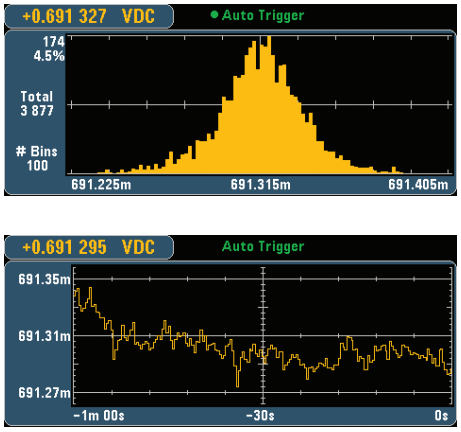
Keysight 34461A/34460A
Digital Multimeters



Discover the next generation of bench/system DMMs from Keysight

- Display DMM results in ways you never have before
- Measure with unquestioned Truevolt confidence
- Move to the next generation 34401A DMM with 100% assurance



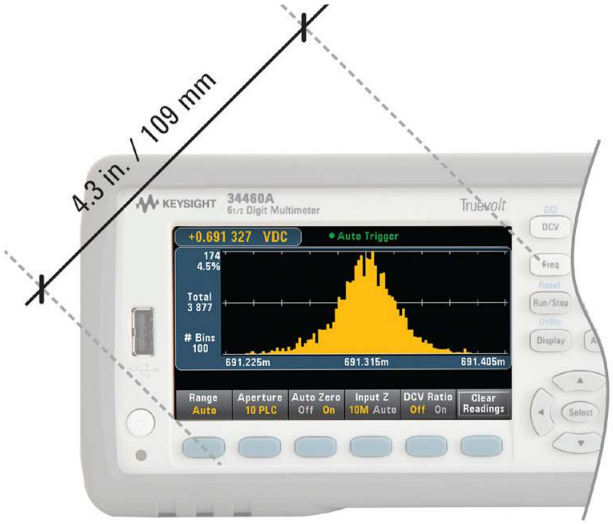
KEYSIGHT TECHNOLOGIES

Display DMM results in ways you never have before

Easily display, save and document your measurement results

Easily set up and see your results and get actionable information faster

- See your results clearly on a bright, 4.3-inch (109 mm), high-resolution, color graphical display. Get answers faster using the intuitive, menu-driven interface. If you have questions about a key or functionality, press and hold the key to display built-in help on the subject.
- Customize display operation to meet your needs. Configure your preferences and pull them up automatically at the next instrument start-up.
- Add customized labels to describe the instrument's measurement your way.
- Get quick insight with graphical views of your measurement results: View readings, long-term trends (34461A only) and measurement histograms for a statistical view.

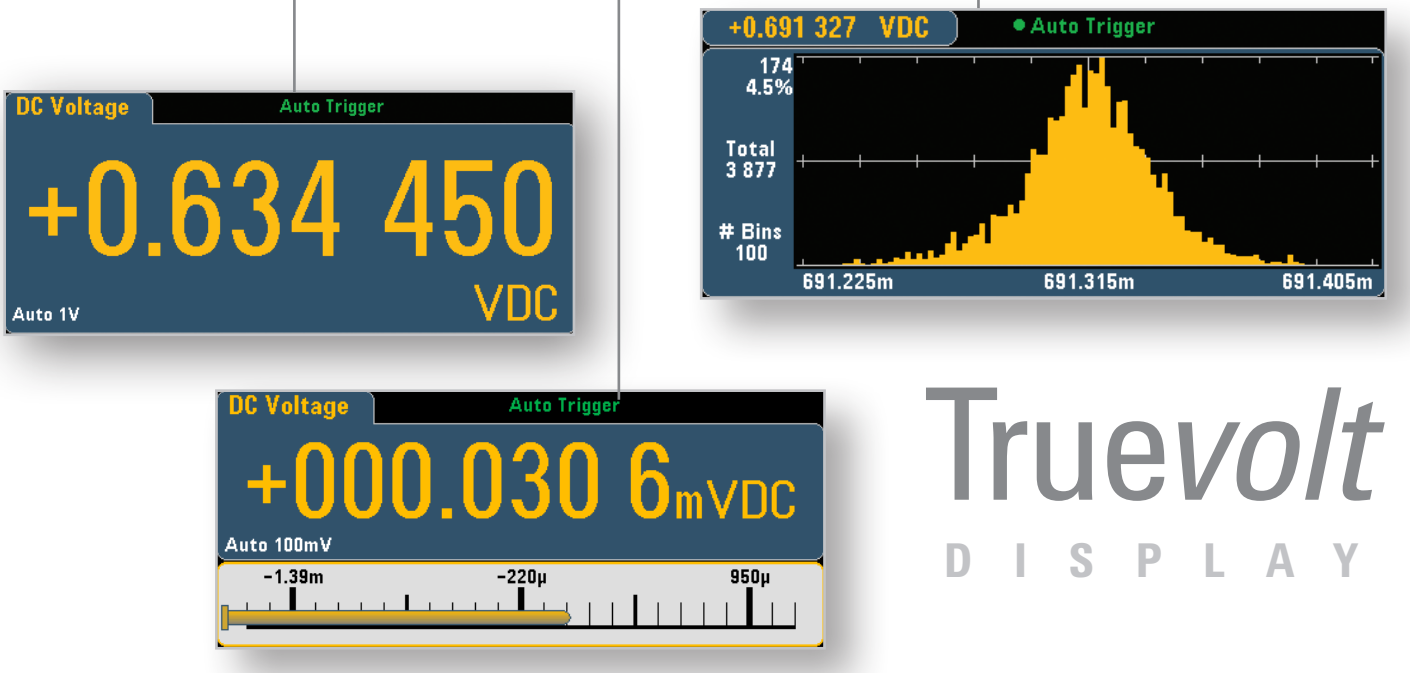


The bright, 4.3" high-resolution monitor is a prominent feature of Keysight's new Truevolt multimeter family.

Bar meter mode provides the number display along with an analog meter to provide a visual view of your measurements.

Number mode provides the traditional "digits" view of measurements.

Histogram mode gives you a statistical view of your measurements.

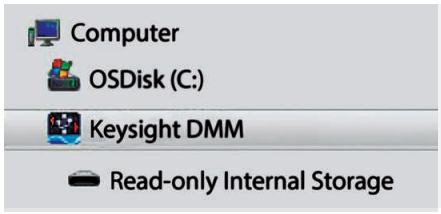


Truevolt DISPLAY

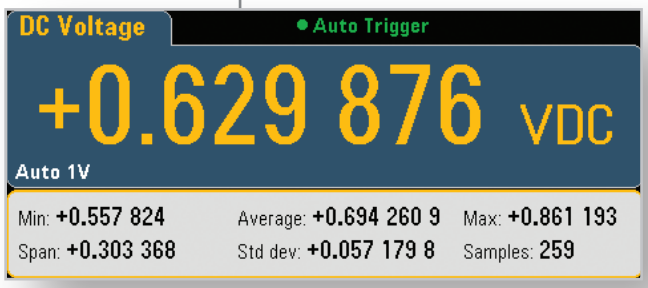
Display DMM results in ways you never have before

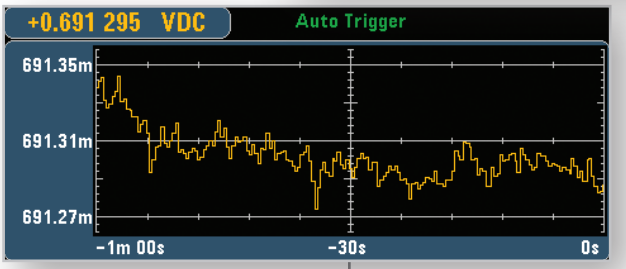
Save and document your DMM's data to your PC or mobile device using your preferred I/O:

- Control, capture and view your DMM's data on your PC with a single click using the Digital Multimeter Connectivity Utility via USB, GPIB, LAN, or RS-232 (for older generation Keysight DMMs).
- Easily access the files on your DMM using drag-and-drop to transfer files via USB – no software required.
- Choose the I/O that works best for you: USB, LAN/LXI Core (optional on 34460A), GPIB (optional on 34460A & 34461A).
- Easily access the front-panel USB memory connector.



Test result screens allow you to show measurement statistics on the display.





Trend chart mode (34461A only) displays your measurements over time.

The free DMM Connectivity Utility helps you get your job done faster

Capture and export data to your PC with drag and drop ease. Capture a digitized record, log measurements for longer periods under PC control or upload data captured directly from the instrument. Export data from a single DMM, or multiple DMMs with time alignment, to popular tools such as Microsoft Excel, Microsoft Word and MATLAB. Simplify test documentation and data analysis without the hassles of programming.

Visualize multiple DMM outputs at once. Display single measurements, charts, or histograms from a single instrument or up to four DMMs simultaneously. See what's happening on your bench, all on one display—to spot correlated trends you might otherwise miss.

Simplify instrument configuration. Instrument controls provide easy measurement setup and instrument state management. Reduce set-up times and quickly reconfigure for new tests.

Speed up instrument discovery and connection for a broad range of Keysight DMMs. With one-click access to Keysight IO Libraries Suite, connect to DMMs via USB, GPIB, LAN or RS-232. Spend your valuable time testing your designs rather than setting up, connecting, and troubleshooting software.

Access and control tests on your DMM remotely on your mobile device. With a companion app available, DMM Mobile Utility, as a free download from the Apple App Store, view and control your LAN-enabled instrument wherever you go and receive email alerts when problems occur. Remotely remedy problems on long running tests to minimize project delays.

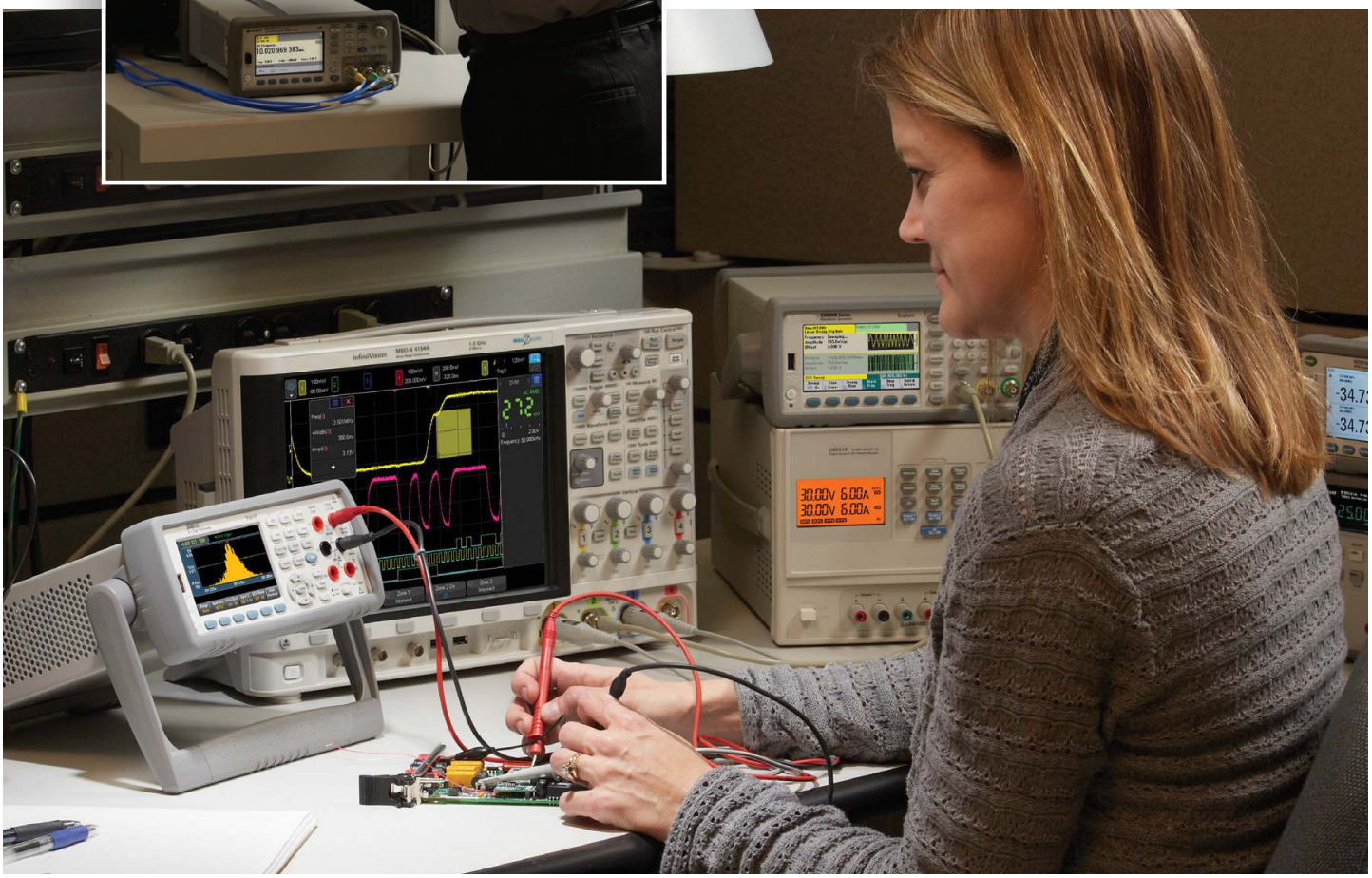
Download the DMM Connectivity Utility:
www.keysight.com/find/DMMutilitysoftware

Measure with unquestioned Truevolt confidence

Worry about the quality of your design, not the quality of your measurements

In a rack or on a bench real-world signals are never flat. They have some level of AC signal riding on top from power line noise, other environmental noise, or injected current from the meter itself. How well your meter deals with these extraneous factors and eliminates them from the true measurement makes a big difference to your accuracy. Behind the scenes, Keysight's Truevolt technology accounts for measurement errors created by these real-world factors so you can be confident in your measurements and it is only available on Keysight DMMs.

Truevolt technology starts with an analog-to-digital converter that enables a patented metrology-grade architecture. Using this architecture, Keysight delivers a good balance of measurement resolution, linearity, accuracy, and speed at a value price, all derived and guaranteed per ISO/IEC 17025 industry standards.

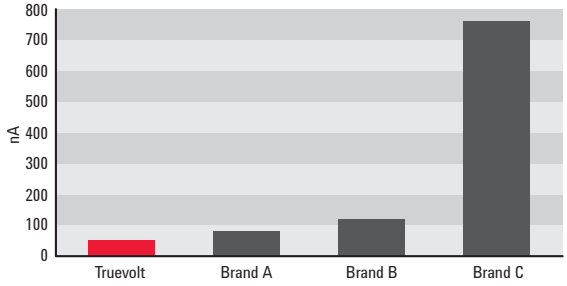


Measure with unquestioned Truevolt confidence

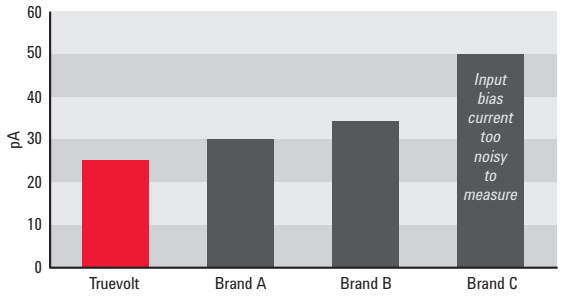
What Truevolt technology means to you:

You can measure your real-world signals, not instrument error

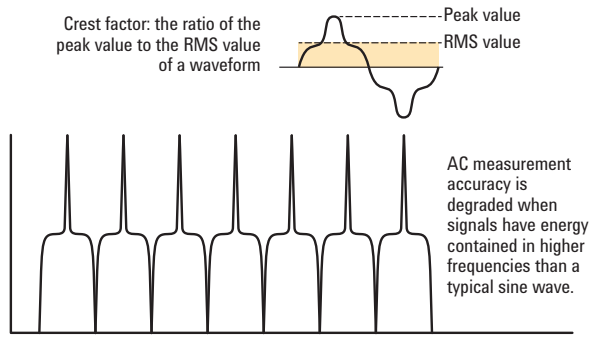
Noise and injected current: Keysight Truevolt DMMs contribute less than 30% of the injected current than alternatives. Compared to some lower cost alternatives, Truevolt DMMs offer almost 100% less noise.



Input bias current: Ideally, no current flows into the measurement terminals of your DMM. In real measurement situations, there are always input currents creating additional measurement errors. Truevolt DMMs take care of input bias current. Some alternative DMMs offer 20% to infinitely poorer performance (some are too noisy to measure).



Digital AC rms measurements: For meters in this class, only Keysight uses digital direct sampling techniques to make AC rms measurements. This results in a true rms calculation technique that avoids the slower response of analog RMS converters used in all other vendor's 6½ digit DMMs. This allows for crest factors up to 10 without additional error terms. This is a unique, patented technique – only used by Keysight.



You can measure your real-world signals with confidence

All Truevolt DMM specifications are tested and guaranteed for compliance with ISO/IEC 17025 standards so you can prove the effectiveness of your lab or production line's quality management system. Many lower-cost DMMs in this class do not carry a guarantee of their measurement specifications.

You can take advantage of expanded measurement functionality

Compared to the 34401A DMM, Truevolt DMMs offer expanded current ranges from 100 µA to 10 A. We have also added a temperature measurement function (RTD/PT100, 5 kΩ thermistor). Additionally, diode measurement capability has been expanded to allow a larger full-scale voltage to be measured (5 V) to enable the measurement of more diode types such as LEDs.

Move to the next-generation 34401A DMM with 100% assurance

Migrate with confidence: Everything you depend on with the 34401A and more

Like most 34401A DMM owners, you rely on your DMM and you trust the answers it gives you. Now, with the Keysight Truevolt 34461A DMM, you can get all of the advantages of the 34401A and more. Now you can get faster answers and have even more confidence in your results.

The best news of all? You can migrate from the 34401A to the 34461A without a hassle. No need to rewrite your software programs or spend hours learning a brand-new, complicated interface.

Use your existing programs: The 34461A DMM is the industry's only 100% drop-in, SCPI-compatible replacement for the 34401A DMM. Other DMMs may claim 34401A SCPI compatibility, but only a subset of SCPI commands are implemented.

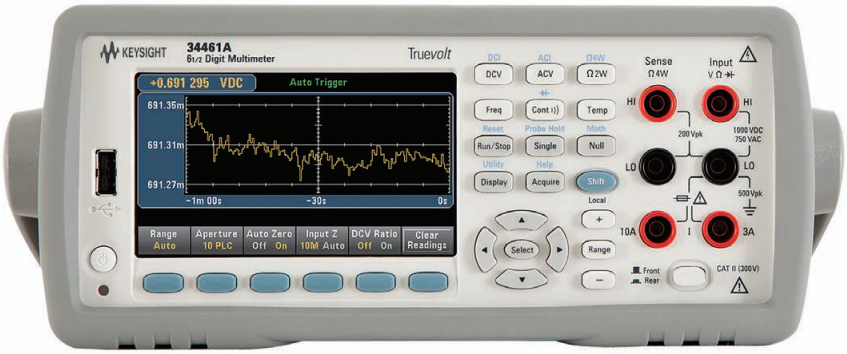
No long learning curve: The Truevolt DMMs were designed by the same team that created the 34401A. The team kept 34401A measurements, reliability and familiarity in mind as they created the Truevolt family of DMMs. So you can use it without spending hours learning how.

The 34461A represents everything you have known and trusted with your Keysight DMM measurements for decades – it just keeps getting stronger.

MIGRATION Q&A	QUESTION	ANSWER
Program compatibility	Will my existing programs still work if I switch to the 34461A?	**YES**
Measurements	Will I have the same performance so it doesn't affect the results on my line?	**YES**
Cost	Will it cost the same to buy, use, maintain, and repair?	**YES** *(and potentially less since the DMMs now include a 3-year standard warranty)*
Reliability	My 34401A never breaks. Are the Truevolt DMMs going to be as good?	**YES** *That's why we can offer a 3-year standard warranty*
Use	Will we be able to use it easily? Quickly?	**YES**

34461A: The industry's only 100% drop-in, SCPI-compatible replacement for the 34401A DMM

Truevolt



Move to the next-generation 34401A DMM with 100% assurance

WHICH MODEL IS RIGHT FOR YOU?	34460A	34461A	34401A
Resolution	6½ digits	6½ digits	6½ digits
Input terminals	Front	Front and rear	Front and rear
1-year DCV accuracy ±(% of reading + % of range)	0.0075 + 0.0005	0.0035 + 0.0005	0.0035 + 0.0005
Measurement speed – 4½ digits	300 readings/s	1000 readings/s	1000 readings/s
Measurements			
DCV, ACV, resistance, frequency, period, continuity	Same as 34401A baseline	Same as 34401A baseline	34401A baseline
Diode	5 V	5 V	1 V
Current	100 µA – 3 A	100 µA – 10 A	10 mA – 3 A
Temperature	RTD/PT100, thermistor	RTD/PT100, thermistor	N/A
Internal memory	1,000 readings	10,000 readings	512 readings
Graphical display	Number, histogram, bar meter	Number, histogram, bar meter, trend	Number
I/O connectivity	USB (LAN, GPIB optional)	USB, LAN (GPIB optional)	GPIB, RS-232

OPTIONS	34460A	34461A	34401A
3446ACCU: Accessory kit for 34460A *Documentation CDs, test leads, USB cable*	**OPTIONAL**	**INCLUDED STANDARD**	**INCLUDED STANDARD**
3446GPBU *GPIB user installable interface module*	**OPTIONAL**	**OPTIONAL**	**INCLUDED STANDARD**
3446LANU *Enable rear panel LAN/LXI web interface, external triggering for 34460A*	**OPTIONAL**	**INCLUDED STANDARD**	**N/A**
3446SECU *Enable NISPOM and file security*	**OPTIONAL**	**OPTIONAL**	**N/A**

Specifications 34460A

34460A accuracy specifications: ± (% of reading + % of range) [1]

These specification are compliant to ISO/IEC 17025 for K = 2

Range [2] / frequency	24 hour [3] T_{CAL} ± 1 °C	90 day T_{CAL} ± 5 °C	1 year T_{CAL} ± 5 °C	2 year T_{CAL} ± 5 °C	Temperature coefficient/°C [4]
DC voltage					
100 mV	0.0040 + 0.0060	0.0070 + 0.0065	0.0090 + 0.0065	0.0115 + 0.0065	0.0005 + 0.0005
1 V	0.0030 + 0.0009	0.0060 + 0.0010	0.0080 + 0.0010	0.0105 + 0.0010	0.0005 + 0.0001
10 V	0.0025 + 0.0004	0.0050 + 0.0005	0.0075 + 0.0005	0.0100 + 0.0005	0.0005 + 0.0001
100 V	0.0030 + 0.0006	0.0065 + 0.0006	0.0085 + 0.0006	0.0110 + 0.0006	0.0005 + 0.0001
1000 V	0.0030 + 0.0006	0.0065 + 0.0010	0.0085 + 0.0010	0.0110 + 0.0010	0.0005 + 0.0001
True RMS AC voltage [2, 5, 6] 100 mV, 1 V, 10 V, 100 V, and 750 V ranges					
3 – 5 Hz	1.00 + 0.02	1.00 + 0.03	1.00 + 0.03	1.00 + 0.03	0.100 + 0.003
5 – 10 Hz	0.38 + 0.02	0.38 + 0.03	0.38 + 0.03	0.38 + 0.03	0.035 + 0.003
10 Hz – 20 kHz	0.07 + 0.02	0.08 + 0.03	0.09 + 0.03	0.10 + 0.03	0.005 + 0.003
20 – 50 kHz	0.13 + 0.04	0.14 + 0.05	0.15 + 0.05	0.16 + 0.05	0.011 + 0.005
50 – 100 kHz	0.58 + 0.08	0.63 + 0.08	0.63 + 0.08	0.63 + 0.08	0.060 + 0.008
100 – 300 kHz	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.200 + 0.020

Resistance [7]	Test current					
100 Ω	1 mA	0.0040 + 0.0060	0.011 + 0.007	0.014 + 0.007	0.017 + 0.007	0.0006 + 0.0005
1 kΩ	1 mA	0.0030 + 0.0008	0.011 + 0.001	0.014 + 0.001	0.017 + 0.001	0.0006 + 0.0001
10 kΩ	100 µA	0.0030 + 0.0005	0.011 + 0.001	0.014 + 0.001	0.017 + 0.001	0.0006 + 0.0001
100 kΩ	10 µA	0.0030 + 0.0005	0.011 + 0.001	0.014 + 0.001	0.017 + 0.001	0.0006 + 0.0001
1 MΩ	5 µA	0.0030 + 0.0010	0.011 + 0.001	0.014 + 0.001	0.017 + 0.001	0.0010 + 0.0002
10 MΩ	500 nA	0.015 + 0.001	0.020 + 0.001	0.040 + 0.001	0.060 + 0.001	0.0030 + 0.0004
100 MΩ	500 nA || 10 MΩ	0.300 + 0.010	0.800 + 0.010	0.800 + 0.010	0.800 + 0.010	0.1500 + 0.0002

DC current	Burden voltage					
100 µA	<0.011 V	0.010 + 0.020	0.040 + 0.025	0.050 + 0.025	0.060 + 0.025	0.0020 + 0.0030
1 mA	<0.11 V	0.007 + 0.006	0.030 + 0.006	0.050 + 0.006	0.060 + 0.006	0.0020 + 0.0005
10 mA	<0.05 V	0.007 + 0.020	0.030 + 0.020	0.050 + 0.020	0.060 + 0.020	0.0020 + 0.0020
100 mA	<0.5 V	0.010 + 0.004	0.030 + 0.005	0.050 + 0.005	0.060 + 0.005	0.0020 + 0.0005
1 A	<0.7 V	0.050 + 0.006	0.080 + 0.010	0.100 + 0.010	0.120 + 0.010	0.0050 + 0.0010
3 A	<2.0 V	0.180 + 0.020	0.200 + 0.020	0.200 + 0.020	0.230 + 0.020	0.0050 + 0.0020

Specifications 34460A

Range [2]/frequency		24 hour [3] T_{CAL} ± 1 °C	90 day T_{CAL} ± 5 °C	1 year T_{CAL} ± 5 °C	2 year T_{CAL} ± 5 °C	Temperature coefficient/°C [4]
True RMS AC current [2, 6, 8]	**Burden voltage**					
100 µA, 1 mA, 10 mA, and 100 mA ranges	<0.011, <0.11, < 0.05, <0.5 V					
3 Hz – 5 kHz		0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.015 + 0.006
5 – 10 kHz [9]		0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.030 + 0.006
1 A range	<0.7 V					
3 Hz – 5 kHz		0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.015 + 0.006
5 – 10 kHz [9]		0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.030 + 0.006
3 A range	<2.0 V					
3 Hz – 5 kHz		0.23 + 0.04	0.23 + 0.04	0.23 + 0.04	0.23 + 0.04	0.015 + 0.006
5 – 10 kHz [9]		0.23 + 0.04	0.23 + 0.04	0.23 + 0.04	0.23 + 0.04	0.030 + 0.006

Continuity					
1 kΩ	0.002 + 0.030	0.008 + 0.030	0.010 + 0.030	0.012 + 0.030	0.0010 + 0.0020

Diode test [10]					
5 V	0.002 + 0.030	0.008 + 0.030	0.010 + 0.030	0.012 + 0.030	0.0010 + 0.0020

DC ratio [11]	
	(normalized input accuracy) + (normalized reference accuracy)

Temperature [12]	
PT100 (DIN/ IEC 751)	Probe accuracy + 0.05 °C
5 kΩ thermistor	Probe accuracy + 0.1 °C

Frequency: specification ± (% of reading) [13, 14] 100 mV, 1 V, 10 V, 100 V, and 750 V ranges [15]					
3 – 10 Hz	0.100	0.100	0.100	0.100	0.0002
10 – 100 Hz	0.030	0.030	0.030	0.035	0.0002
100 Hz – 1 kHz	0.003	0.010	0.012	0.017	0.0002
1 – 300 kHz	0.002	0.008	0.012	0.017	0.0002
Square wave [16]	0.001	0.008	0.012	0.017	0.0002

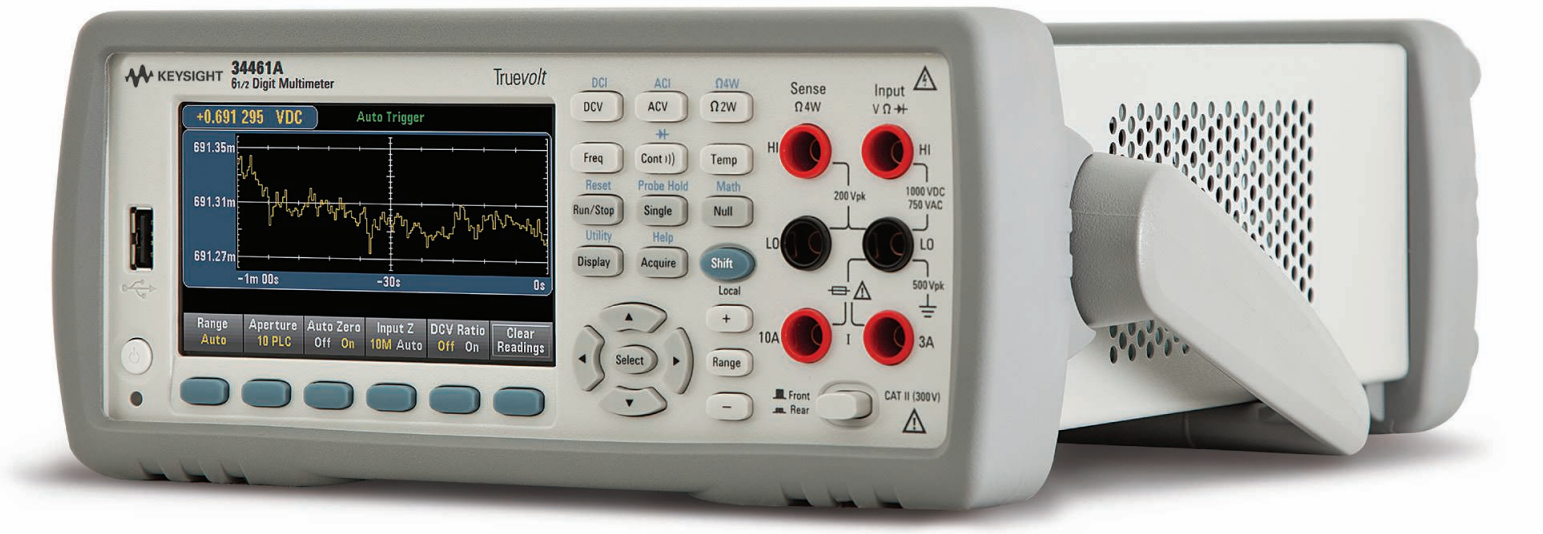
Additional gate time errors ± (% of reading) [14]			
Frequency	**1 second**	**0.1 second**	**0.01 second**
3 – 40 Hz	0	0.200	0.200
40 – 100 Hz	0	0.060	0.200
100 Hz – 1 kHz	0	0.020	0.200
1 – 300 kHz	0	0.004	0.030
Square wave [16]	0	0	0

1. For DC: Specifications are for 60-minute warm-up, aperture of 10 or 100 NPLC, and auto zero on.
   For AC: Specifications are for 60-minute warm-up, slow AC filter, sine wave.
2. 20% overrange on all ranges, except 1000 DCV, 750 ACV, 3 A AC, and diode test.
3. Relative to calibration standards.
4. Add this for each °C outside T_{CAL} ± 5 °C.
5. Specifications are for sine wave input > 0.3% of range and > 1 mVrms.
   750 ACV range limited to 8 x 10^7 Volt–Hz.
6. Low-frequency performance: three filter settings are available: 3 Hz, 20 Hz, 200 Hz.
   Frequencies greater than these filter settings are specified with no additional errors.
7. Specifications are for 4–wire ohms function or 2–wire ohms using math null for offset. Without math null, add 0.2 Ω additional error in 2-wire ohms function.
8. Specifications are for sinewave input >1% of range and > 10 µA AC.
9. AC current specifications > 5 kHz are typical.
10. Specifications are for the voltage measured at the input terminals. The 1 mA test current
    is typical. Variation in the current source will create some variation in the voltage drop across a diode junction.
11. These specifications are for typical performance.
12. Actual measurement range and probe errors will be limited by the selected probe.
    Probe accuracy adder includes all measurement and ITS-90 temperature conversion errors PT100 R_0 settable to 100 Ω ± 5 Ω to remove the initial probe error.
13. Specifications are for 60-minute warm-up and sine wave input unless stated otherwise. Specifications are for 1-second gate time (7 digits).
14. Applies to sine and square inputs ≥ 100 mV.
    For 10 mV to < 100 mV inputs, multiply % of reading error x10.
15. Amplitude 10% –120% of range and less than 750 ACV.
16. Square wave input specified for 10 Hz – 300 kHz.

Specifications 34461A

34461A accuracy specifications: ± (% of reading + % of range) [1]

These specification are compliant to ISO/IEC 17025 for K = 2



Range [2]/frequency	24 hour [3] T_{CAL} ± 1 °C	90 day T_{CAL} ± 5 °C	1 year T_{CAL} ± 5 °C	2 year T_{CAL} ± 5 °C	Temperature coefficient/°C [4]
DC voltage					
100 mV	0.0030 + 0.0030	0.0040 + 0.0035	0.0050 + 0.0035	0.0065 + 0.0035	0.0005 + 0.0005
1 V	0.0020 + 0.0006	0.0030 + 0.0007	0.0040 + 0.0007	0.0055 + 0.0007	0.0005 + 0.0001
10 V	0.0015 + 0.0004	0.0020 + 0.0005	0.0035 + 0.0005	0.0050 + 0.0005	0.0005 + 0.0001
100 V	0.0020 + 0.0006	0.0035 + 0.0006	0.0045 + 0.0006	0.0060 + 0.0006	0.0005 + 0.0001
1000 V	0.0020 + 0.0006	0.0035 + 0.0010	0.0045 + 0.0010	0.0060 + 0.0010	0.0005 + 0.0001
True RMS AC voltage [2, 5, 6] 100 mV, 1 V, 10 V, 100 V, and 750 V ranges					
3 – 5 Hz	1.00 + 0.02	1.00 + 0.03	1.00 + 0.03	1.00 + 0.03	0.100 + 0.003
5 – 10 Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003
10 Hz – 20 kHz	0.04 + 0.02	0.05 + 0.03	0.06 + 0.03	0.07 + 0.03	0.005 + 0.003
20 – 50 kHz	0.10 + 0.04	0.11 + 0.05	0.12 + 0.05	0.13 + 0.05	0.011 + 0.005
50 – 100 kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008
100 – 300 kHz	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.200 + 0.020

Resistance [7]	Test current					
100 Ω	1 mA	0.0030 + 0.0030	0.008 + 0.004	0.010 + 0.004	0.012 + 0.004	0.0006 + 0.0005
1 kΩ	1 mA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.012 + 0.001	0.0006 + 0.0001
10 kΩ	100 µA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.012 + 0.001	0.0006 + 0.0001
100 kΩ	10 µA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.012 + 0.001	0.0006 + 0.0001
1 MΩ	5 µA	0.002 + 0.001	0.008 + 0.001	0.010 + 0.001	0.012 + 0.001	0.0010 + 0.0002
10 MΩ	500 nA	0.015 + 0.001	0.020 + 0.001	0.040 + 0.001	0.060 + 0.001	0.0030 + 0.0004
100 MΩ	500 nA || 10 MΩ	0.300 + 0.010	0.800 + 0.010	0.800 + 0.010	0.800 + 0.010	0.1500 + 0.0002

DC current	Burden voltage					
100 µA	<0.011 V	0.010 + 0.020	0.040 + 0.025	0.050 + 0.025	0.060 + 0.025	0.0020 + 0.0030
1 mA	<0.11 V	0.007 + 0.006	0.030 + 0.006	0.050 + 0.006	0.060 + 0.006	0.0020 + 0.0005
10 mA	<0.05 V	0.007 + 0.020	0.030 + 0.020	0.050 + 0.020	0.060 + 0.020	0.0020 + 0.0020
100 mA	<0.5 V	0.010 + 0.004	0.030 + 0.005	0.050 + 0.005	0.060 + 0.005	0.0020 + 0.0005
1 A	<0.7 V	0.050 + 0.006	0.080 + 0.010	0.100 + 0.010	0.120 + 0.010	0.0050 + 0.0010
3 A	<2.0 V	0.180 + 0.020	0.200 + 0.020	0.200 + 0.020	0.230 + 0.020	0.0050 + 0.0020
10 A	<0.5 V	0.050 + 0.010	0.120 + 0.010	0.120 + 0.010	0.150 + 0.010	0.0050 + 0.0010

Specifications 34461A

Range [2]/frequency		24 hour [3] T_{CAL} ± 1 °C	90 day T_{CAL} ± 5 °C	1 year T_{CAL} ± 5 °C	2 year T_{CAL} ± 5 °C	Temperature coefficient/°C [4]
True RMS AC current [2, 6, 8]	**Burden voltage**					
100 µA, 1 mA, 10 mA, and 100 mA ranges	<0.011, <0.11, <0.05, <0.5 V					
3 Hz – 5 kHz		0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.015 + 0.006
5 – 10 kHz [9]		0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.030 + 0.006
1 A range	<0.7 V					
3 Hz – 5 kHz		0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.015 + 0.006
5 – 10 kHz [9]		0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.030 + 0.006
3 A range	<2.0 V					
3 Hz – 5 kHz		0.23 + 0.04	0.23 + 0.04	0.23 + 0.04	0.23 + 0.04	0.015 + 0.006
5 – 10 kHz [9]		0.23 + 0.04	0.23 + 0.04	0.23 + 0.04	0.23 + 0.04	0.030 + 0.006
10 A range	<0.5 V					
3 Hz – 5 kHz		0.15 + 0.04	0.15 + 0.04	0.15 + 0.04	0.15 + 0.04	0.015 + 0.006
5 – 10 kHz [9]		0.15 + 0.04	0.15 + 0.04	0.15 + 0.04	0.15 + 0.04	0.030 + 0.006

Continuity					
1 kΩ	0.002 + 0.030	0.008 + 0.030	0.010 + 0.030	0.012 + 0.030	0.0010 + 0.0020

Diode test [10]					
5 V	0.002 + 0.030	0.008 + 0.030	0.010 + 0.030	0.012 + 0.030	0.0010 + 0.0020

DC ratio [11]	
	(normalized input accuracy) + (normalized reference accuracy)

Temperature [12]	
PT100 (DIN/ IEC 751)	Probe accuracy + 0.05 °C
5 kΩ thermistor	Probe accuracy + 0.1 °C

Frequency: specification ± (% of reading) [13, 14] 100 mV, 1 V, 10 V, 100 V, and 750 V ranges [15]					
3 – 10 Hz	0.100	0.100	0.100	0.100	0.0002
10 – 100 Hz	0.030	0.030	0.030	0.035	0.0002
100 Hz – 1 kHz	0.003	0.008	0.010	0.015	0.0002
1 – 300 kHz	0.002	0.006	0.010	0.015	0.0002
Square wave [16]	0.001	0.006	0.010	0.015	0.0002

Additional gate time errors ± (% of reading) [14]			
Frequency	**1 second**	**0.1 second**	**0.01 second**
3 – 40 Hz	0	0.200	0.200
40 – 100 Hz	0	0.060	0.200
100 Hz – 1 kHz	0	0.020	0.200
1 – 300 kHz	0	0.004	0.030
Square wave [16]	0	0	0

1. For DC: Specifications are for 60-minute warm-up, aperture of 10 or 100 NPLC, and auto zero on.
   For AC: Specifications are for 60-minute warm-up, slow AC filter, sine wave.
2. 20% over range on all ranges, except 1000 DCV, 750 ACV, 10 A DC, 3 A AC, 10 A AC,
   and diode test.
3. Relative to calibration standards.
4. Add this for each °C outside T_{CAL} ± 5 °C.
5. Specifications are for sinewave input >0.3% of range and > 1 mVrms.
   750 ACV range limited to 8 x 10^7 Volt–Hz.
6. Low-frequency performance: three filter settings are available: 3 Hz, 20 Hz, 200 Hz.
   Frequencies greater than these filter settings are specified with no additional errors.
7. Specifications are for 4-wire ohms function or 2-wire ohms using math null for offset. Without math null, add 0.2 Ω additional error in 2-wire ohms function.
8. Specifications are for sinewave input > 1% of range and > 10 µA AC. The 10 A range is only available on a separate front-panel connector.
9. AC current specifications > 5 kHz are typical.
10. Specifications are for the voltage measured at the input terminals. The 1 mA test current
    is typical. Variation in the current source will create some variation in the voltage drop
    across a diode junction.
11. These specifications are for typical performance.
12. Actual measurement range and probe errors will be limited by the selected probe.
    Probe accuracy adder includes all measurement and ITS-90 temperature conversion errors. PT100 R_0 settable to 100 Ω ±5 Ω to remove the initial probe error.
13. Specifications are for 60-minute warm-up and sine wave input unless stated otherwise. Specifications are for 1-second gate time (7-digits).
14. Applies to sine and square inputs ≥ 100 mV.
    For 10 mV to < 100 mV inputs, multiply % of reading error x10.
15. Amplitude 10%–120% of range and less than 750 ACV.
16. Square wave input specified for 10 Hz – 300 kHz.

Measurement characteristics

DC voltage	
Measurement method:	Keysight patented continuously integrating multi-slope IV A/D converter
A/D linearity:	0.0002% of reading + 0.0001% of range
Input resistance:	
0.1 V, 1 V, 10 V range	Selectable 10 MΩ or >10 GΩ
100 V, 1000 V range	10 MΩ ± 1%
Input bias current:	<30 pA at 25 °C
Input terminals:	Copper alloy
Input protection:	1000 V on all ranges

True RMS AC voltage	
Measurement type:	AC–coupled True RMS. Measures the AC component of the input.
Measurement method:	Digital sampling with anti-alias filter
Maximum input:	400 DCV, 1100 Vpeak
Input impedance:	1 MΩ ±1%, in parallel with <100 pF
Input protection:	750 Vrms all ranges

DC and True RMS AC current	
AC measurement type:	Directly coupled to the fuse and shunt. AC True RMS measurement (measures the AC component only).
AC measurement method:	Digital sampling with anti-alias filter
Input protection 3 A:	Externally accessible 3.15 A, 500 V fuse (Replacement part number 2110-1547 3.15 A external fuse) Internal 11 A, 1000 V fuse (Replacement part number 2110-1402 11 A external fuse)
Input protection 10 A: (34461A only)	Internal 11 A, 1000 V fuse (Replacement part number 2110-1402 11 A external fuse)

AC crest factor and peak input	
Crest factor:	10:1 maximum crest factor, (3:1 at full-scale). Measurement bandwidth limited to 300 kHz for signal plus harmonics.
Peak input:	300% of range or maximum input
Overload ranging :	Will select higher range if peak input overload is detected during auto range. Overload is reported in manual ranging.

Resistance	
Measurement method:	Selectable 4-wire or 2-wire ohms. Current source referenced to LO input.
Maximum lead resistance (4-wire ohms):	10% of range per lead for 100 Ω, 1 kΩ ranges. 1 kΩ per lead on all other ranges.
Input protection:	1000 V on all ranges

Continuity/diode test	
Response time:	300 samples/s with audible tone
Continuity threshold:	Fixed at 10 Ω

DC ratio	
Measurement method:	Input HI-LO/reference (sense) HI-LO
Input HI-LO:	100 mV to 1000 V ranges
Reference (sense) HI-Input LO:	100 mV to 10 V ranges (autoranged)
Input to reference (sense):	HI and LO reference (sense) terminals reference to LO input <12 V

Temperature
PT100 platinum RTD sensor, α= 0.00385Ω/Ω/°C; DIN/IEC 751. Measurement conversions limited to -200 to 600 °C.
5 kΩ thermistor β= 3891; YSI 44007 or equivalent. Measurement conversions limited to -80 to 150 °C.

Measurement noise rejection	
60 Hz (50 Hz) for 1 kΩ LO lead unbalance (± 500 V peak maximum) DVC CMRR: 140 dB AVC CMRR: 70 dB	
Integration time	**Normal mode rejection**[1]
100 PLC/1.67 s (2 s)	60 dB [2]
10 PLC/167 ms (200 ms)	60 dB [2]
1 PLC/16.7 ms (20 ms)	60 dB [2]
0.2 PLC/3 ms (3 ms)	0 dB
0.02 PLC/400 µs (400 µs)	0 dB

Frequency and period	
Measurement method:	Reciprocal-counting technique. Measurement is AC-coupled using AC measurement functions.
Voltage ranges:	100 mVrms full scale to 750 Vrms. Auto or manual ranging.
Gate time:	10 ms, 100 ms, or 1 s
Measurement considerations	All frequency counters are susceptible to error when measuring low-voltage, low-frequency signals. Shielding inputs from external noise pickup is critical for minimizing measurement errors.

Autozero OFF operation
Following instrument warm–up at a stable ambient temperature ±1 °C and <10 minutes.
Add 0.0002% of range + 5 µV for DCV or + 5 mΩ for resistance.

Measurement settling considerations

ACV, ACI, Frequency, Period

Default delays are selected to give first reading right for most measurements. Errors will occur when attempting to measure the frequency or period of an input following a DC offset voltage change. The input blocking RC time constant must be allowed to fully settle (up to 1 second) before the most accurate measurements are possible.

Applying >300 V ACrms or >1 Arms will cause self-heating in signal-conditioning components. These errors are included in the instrument specifications. Internal temperature changes due to self-heating may cause additional error on other functions or ranges. The additional error will generally dissipate within a few minutes.

DCV, DCI, Resistance

Applying >1 A DC will cause self-heating in signal-conditioning components. These errors are included in the instrument specifications. Internal temperature changes due to self-heating may cause additional error on other functions or ranges. The additional error will generally dissipate within a few minutes.

Reading settling times are affected by source impedance, cable dielectric characteristics, and input signal changes. Keysight recommends the use of PTFE or other high-impedance, low-dielectric absorption wire insulation for these measurements.

1. For power-line frequency ± 0.1%
2. For power-line frequency ± 1%, the NMR is 40 dB For ± 3%, use 30 dB

Performance versus measurement speed

For DC voltage, DC current, and resistance [1]

	34460A		34461A		
Integration time	**Digits**	**Readings/s**	**Digits**	**Readings/s**	**Additional noise error**
100 PLC/1.67 s (2 s)	6½	0.6 (0.5)	6½	0.6 (0.5)	0% of range
10 PLC/167 ms (200 ms)	6½	6 (5)	6½	6 (5)	0% of range
1 PLC/16.7 ms (20 ms)	5½	60 (50)	5½	60 (50)	0.001% of range
0.2 PLC/3 ms (3 ms)	5½	100	5½	300	0.001% of range [2]
0.02 PLC/400 µs (400 µs)	3½	300	4½	1000	0.01% of range [2]

AC voltage, AC current [3, 4]	**Digits**	**ACV**	**ACI**	**AC filter**
	6½	.4/s	.6/s	Slow
	6½	1.6/s	4/s	Medium
	6½	40/s	40/s	Fast
	6½	50/s [5]	50/s [5]	Fast

Frequency, period	**Aperture**	**Digits**	**Readings**
	1 Second	7	1
	0.1 Second	6	10
	0.01 Second	5	80

1. Reading speeds for 60 Hz (and 50 Hz) operation, autozero off, fixed range.
2. Add 20 µV for DCV and 20 mΩ for resistance.
   Add 0.2 µA for DC current + 10x the above range error for the 10 mA range.
3. Maximum reading rates for 0.01% of AC step additional error.
   Additional settling delay required when input DC level varies.
4. For external trigger or remote operation using default settling delay (Delay Auto).
5. Maximum useful limit with default settling delays defeated.

34460A DMM rear panel with GPIB option installed.

34461A DMM rear panel with GPIB option installed.

System Speeds (average)

DC voltage, DC current, resistance [1, 2]	**34460A**	**34461A**
Autorange time [3]	<30 ms	<30 ms
Maximum internal trigger rate	300/s	1000/s
Maximum external trigger rate	300/s	1000/s
ASCII readings to bus	300/s	1000/s
Single reading transaction rate [4]	50/s	150/s
AC voltage, AC current [5]		
Autorange time [3]	10/s	10/s
Maximum internal trigger rate	50/s	50/s
Maximum external trigger rate	50/s	50/s
ASCII readings to bus	50/s	50/s
Single reading transaction rate [4]	50/s	50/s [5]
Frequency, period [6]		
Autorange time [3]	10/s	10/s
Maximum internal trigger rate	80/s	80/s
Maximum external trigger rate	80/s	80/s
ASCII readings to bus	80/s	80/s
Single reading transaction rate [4]	50/s	50/s

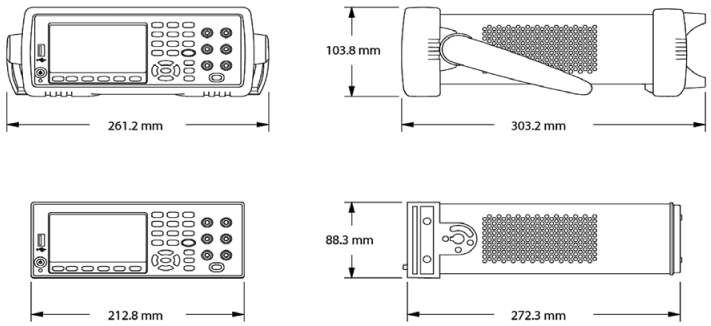
1. 0.02 NPLC, delay 0, autozero off, math off, and display off.
2. These rates apply to all I/O interfaces.
3. Time to automatically change one range and be ready for new measurement, ≤10 V, ≤10 MΩ.
4. Includes measurement and IO time (assumes connection via SOCKETS. VXI-11 connections may be slower).
5. Fast AC filter, delay 0, math off, and display off.
6. 10 ms aperture, fast AC filter, delay 0, math off, and display off.

General characteristics

Line power	
Power supply:	100/120 (127)/ 220 (230)/240 VAC ± 10%, CAT II
Power line frequency:	50/60/400 Hz ± 10%
Power consumption:	25 VA

Environment	
Operating environment:	Full accuracy for 0 to 55 °C Full accuracy to 80% R.H. at 40 °C non–condensing
Operating altitude:	Up to 3000 m
Storage temperature:	-40 to 70 °C

Mechanical	
Rack dimensions:	(W x H x D): 212.8 mm x 88.3 mm x 272.3 mm
Bench dimensions:	(W x H x D): 261.2 mm x 103.8 mm x 303.2 mm
Weight:	34460A: 3.68 kg (8.1 lb) 34461A: 3.76 kg (8.3 lb)



Regulatory	
Safety	EN 61010-1:2010 (3rd Edition)
	ANSI/ISA-61010-1 (82.02.01) Third Edition
	ANSI/UL 61010-1 Third Edition
	CAN/CSA-C22.2 No. 61010-1 Third Edition
	EN 61010-2-030:2010 (1st Edition)
	ANSI/ISA-61010-2-030 (82.02.03) First Edition
	ANSI/UL 61010-2-030 First Edition
	CAN/CSA-C22.2 No. 61010-2-030 First Edition
	Refer to Declaration of Conformity for current revisions
	Measurement Category II to 300 V
	Other non MAINS circuits to 1000 Vpk
	Pollution Degree 2
EMC	IEC 61326
	EN 61326
	CISPR
	ICES-001
	AS/NZS 2064.1
	Refer to Declaration of Conformity for current revisions
	Acoustic noise (nominal) 45 dBA
Acoustic noise (nominal)	45 dBA

Triggering conditions	
External input	Low–power TTL compatible input programmable edge triggered
Delay:	<1 µs
Jitter:	<1 µs
Minimum pulse width:	1 µs
Maximum rate:	Up to 1 kHz (34461A), up to 300 Hz (34460A)
Voltmeter complete output	3.3 V logic output
Polarity:	Programmable edge pulse
Pulse width:	Approximately 2 µs

Computer interfaces	
LXI (rev 1.4)	10/100Base-T Ethernet (Sockets, VXI-11 protocol, Web user interface) (Optional on 34460A)
USB	USB 2.0 (USB-TMC488 & MTP protocol)
GPIB	Optional GPIB IEEE-488
Language	SCPI-1999, IEEE-488.2, 34401A compatible

Front-panel USB host port
Supports USB 2.0 high-speed mass storage (MSC) class devices
Capability: import/export instrument configuration files, save volatile readings and screen captures

System speeds (averages)				
Benchmark	**GPIB**	**USB 2.0**	**VXI-11**	**Sockets**
Function change [1]	50/s	50/s	50/s	50/s
Range change [2]	100/s	100/s	100/s	100/s

1. Rate to change from 2-wire resistance to any other function
2. Rate to change from one range to the next higher range, ≤ 10 V, ≤ 10 MΩ

Triggering and memory	
Samples per trigger	1 to 1,000,000
Trigger delay	0 to 3600 sec (~1 µs step size)
External trigger delay	<10 µs
External trigger jitter	<1 µs (DC fixed range)
Volatile reading memory	10,000 (34461A), 1,000 (34460A)

Probe hold
Capture and navigate stable list of readings

Internal flash file system
80 MB total capacity Save reading memory to non-volatile memory in CSV format Store and recall user-defined states, power-off state,[1] and preference files Save screen captures in BMP or PNG formats

1. Power-off state only when power-down is initiated via front-panel power switch.

Math functions
Per function null, min/max/avg/Sdev, dB, dBm, span, count, limit test, histogram

Display
4.3" color TFT WQVGA (480x272) with LED backlight Supports: basic number, bar meter, trend chart (34461A only), histogram views User-defined power-on message, display label, and selectable screen colors Integrated, context-sensitive system help through press-and-hold buttons

Real-time clock/calendar
Set and read, year, month, day, hour, minute, seconds (Note: seconds not settable) Battery CR-2032 coin-type, replaceable, >10-year life (typ)

Software available
IO Libraries: **www.Keysight.com/find/IOLibraries** DMM Connectivity Utility software: **www.Keysight.com/find/DMMutilitysoftwareSystem**

Options

34460A Digital multimeter, 6½ digit, basic Truevolt DMM	
LAN	Rear panel LAN/LXI web interface, external triggering for 34460A – factory enabled
SEC	NISPOM and file security for Truevolt Series DMMs – factory enabled
Z54	Certificate of calibration – ANSI/NCSL Z540.3-2006, printed
GPB	GPIB interface module for Truevolt Series DMMs – factory installed
ACC	Accessory kit for 34460A – documentation CDs, test leads, USB cable; shipped with unit from factory

34461A Digital multimeter, 6½ digit, 34401A replacement, Truevolt DMM	
SEC	NISPOM and file security for Truevolt Series DMMs – factory enabled
Z54	Certificate of calibration – ANSI/NCSL Z540.3-2006, printed
GPB	GPIB interface module for Truevolt Series DMMs – factory installed

Accessories

Accessories included	
34460A:	Power cord Calibration certificate
34461A:	34138A test lead set with probes, fine tip probes, SMT grabbers and mini grabber attachments Power cord Documentation CD IO Libraries CD USB cable Calibration certificate
Accessories available	
11059A	Kelvin probe set
11060A	Surface-mount device probe
11062A	Kelvin clip set
34131A	Transit case
34133A	Precision electronic test leads
34134A	DC-coupled current probe
34136A	High-voltage probe
34138A	Test lead set
34151A	Three Signal Wedge Probe Kit
34152A	PT100/RTD 4-Wire Class A Sensor Kit
34153A	PT100/RTD 4-Wire Class Sensor Elements
34162A	Accessory pouch
34171B	Input terminal block
34172B	Calibration short
34308A	Thermistor kit
34330A	30-A current shunt
E2308A	Thermistor temperature probe
Y1133A	Low-thermal external digital multimeter scanning kit

Standalone product numbers

Ordered as standalone to be installed by the distributor or customer	
3446LANU	**Upgrade:** Enable rear panel LAN/LXI web interface, external triggering for 34460A
3446SECU	**Upgrade:** Enable NISPOM and file security for Truevolt Series DMMs
3446GPBU	**Upgrade:** GPIB user-installable interface module for Truevolt Series DMMs
3446ACCU	**Accessory kit for 34460A:** Documentation CDs, test leads, USB cable

Rack mount kits

34190A	**Rackmount kit:** Use for mounting one 2U instrument by itself, without another instrument laterally next to it. Includes one rack flange and one combination rack flange-filler panel.
34191A	**2U dual flange kit:** Use for mounting two 2U instruments side-by-side. Includes two standard rack flanges. *Note: Mounting two instruments side-by-side will require the 34194A dual-lock link kit and a shelf for the instruments to sit on.*
34194A	**Dual lock link kit:** For side-by-side combinations of instruments and includes links for instruments of different depths.

Definitions

Specification (spec)

The warranted performance of a calibrated instrument that has been stored for a minimum of 2 hours within the operating temperature range of 0 – 55 °C and after a 60-minute warm up period. All specifications include measurement uncertainty and were created in compliance with ISO-17025 methods. Data published in this document are specifications (spec) only where specifically indicated.

Typical (typ)

The characteristic performance, which 80% or more of manufactured instruments will meet. This data is not warranted, does not include measurement uncertainty, and is valid only at room temperature (approximately 23 °C).

Nominal (nom)

The mean or average characteristic performance, or the value of an attribute that is determined by design such as a connector type, physical dimension, or operating speed. This data is not warranted and is measured at room temperature (approximately 23 °C).

Measured (meas)

An attribute measured during development for purposes of communicating the expected performance. This data is not warranted and is measured at room temperature (approximately 23 °C).

T_{CAL}

The temperature at which the instrument was calibrated.

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A personalized view into the information most relevant to you.

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www.lxistandard.org
LAN eXtensions for Instruments puts the power of Ethernet and the Web inside your test systems. Keysight is a founding member of the LXI consortium.

www.pxisa.org
PCI eXtensions for Instrumentation (PXI) modular instrumentation delivers a rugged, PC-based high-performance measurement and automation system.

Three-Year Warranty
www.keysight.com/find/ThreeYearWarranty
Keysight's commitment to superior product quality and lower total cost of ownership. The only test and measurement company with three-year warranty standard on all instruments, worldwide.

Keysight Assurance Plans
www.keysight.com/find/AssurancePlans
Up to five years of protection and no budgetary surprises to ensure your instruments are operating to specification so you can rely on accurate measurements.

www.keysight.com/quality
Keysight Technologies, Inc.
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Quality Management System

Keysight Channel Partners
www.keysight.com/find/channelpartners
Get the best of both worlds: Keysight's measurement expertise and product breadth, combined with channel partner convenience.

www.keysight.com/find/truevolt

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www.keysight.com/find/contactus

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Mexico	001 800 254 2440
United States	(800) 829 4444

Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 6375 8100

Europe & Middle East

Austria	0800 001122
Belgium	0800 58580
Finland	0800 523252
France	0805 980333
Germany	0800 6270999
Ireland	1800 832700
Israel	1 809 343051
Italy	800 599100
Luxembourg	+32 800 58580
Netherlands	0800 0233200
Russia	8800 5009286
Spain	0800 000154
Sweden	0200 882255
Switzerland	0800 805353 Opt. 1 (DE) Opt. 2 (FR) Opt. 3 (IT)
United Kingdom	0800 0260637

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