DATA SHEET

EDU34450A 5½-Digit Dual-Display Digital Multimeter

KEYSIGHT TECHNOLOGIES

EDU34450A Provides Industry-Grade Measurement Capabilities

The Keysight EDU34450A is a modern digital multimeter (DMM) designed for bench applications. It measures a broad range of input signals. It features 5½ digits of resolution and up to 110 readings/s measuring rate for speed-critical tests. It includes generous internal memory, allowing prolonged data logging of up to 5,000 data points.

With the EDU34450A, you get the benefits of Keysight measurement performance in a low-cost, compact package.

Combination of hard and soft keys for more intuitive front-panel operation

For easy access to the most frequently used measurement functions, the EDU34450A retains all the function keys found on a traditional DMM. The function key lights up when pressed to provide a clear indication of the parameter you are measuring. The intuitive soft keys allow more advanced configuration when the need arises. Combining these hard and soft keys allows you to quickly set up and begin your measuring tasks without a steep learning curve.

Standard connectivity to the PC

The DMM has built-in gigabit LAN and USB. The remote connectivity allows you to connect to the PathWave BenchVue DMM software for more advanced data logging and export logged data. You can also use the software to retrieve the data saved in the non-volatile memory. Software drivers are available if you prefer to write your own program, with SCPI commands to control the DMM and automate your test.

Signature 7-inch dual-measurement color display

The EDU34450A comes with a 7-inch, dual-measurement color display. With this innovation, you can view your measurement setup, instrument status, reading, and statistics all at once, without flipping through several screens.

It features a secondary display where you can view primary and secondary components of your input signal at the same time to help you better understand your device under test.

With the large display, you can set up data logging and view the logged data easily.

USB flash drive adds convenience

The EDU34450A also features a built-in USB memory port, so you can use a USB flash drive to store your DMM setup. This feature will help you install the same setup in all the DMMs in your lab.

Robust design

We know you can’t afford instrument downtime caused by hardware failures and unscheduled maintenance. That’s why our engineers designed reliability into the EDU34450A: a rugged enclosure; state-of-the-art, surface-mount construction throughout; reduced part counts; and rigorous and thorough testing of all aspects of the product.

Key features

- Measures 11 input signals:
  - DC voltage, DC current, true RMS AC voltage, AC Current, two- and four-wire resistance, frequency, continuity, diode test, temperature, and capacitance
- Signature 7-inch dual-measurement color display
- Fast reading rate of up to 110 readings/s for speed-critical measurements
- 5,000 points logging memory for recording more data and perform analysis
- Standard USB and LAN for flexible PC connectivity
- USB flash drive support to copy / load configuration for repeated test setup
- Includes PathWave BenchVue DMM software for remote control and data logging

Simplify Data Gathering and Analysis with PathWave BenchVue DMM Software

PathWave BenchVue software for the PC makes it simple to connect, control, capture, and view Keysight DMMs with no additional programming.

- Easily log data, screenshots, and system state. Rapidly prototype custom test sequences.
- Recall the past state of your bench to replicate results.
- Quickly export measurement data in the desired format.
- Quickly access manuals, drivers, FAQs, and videos.

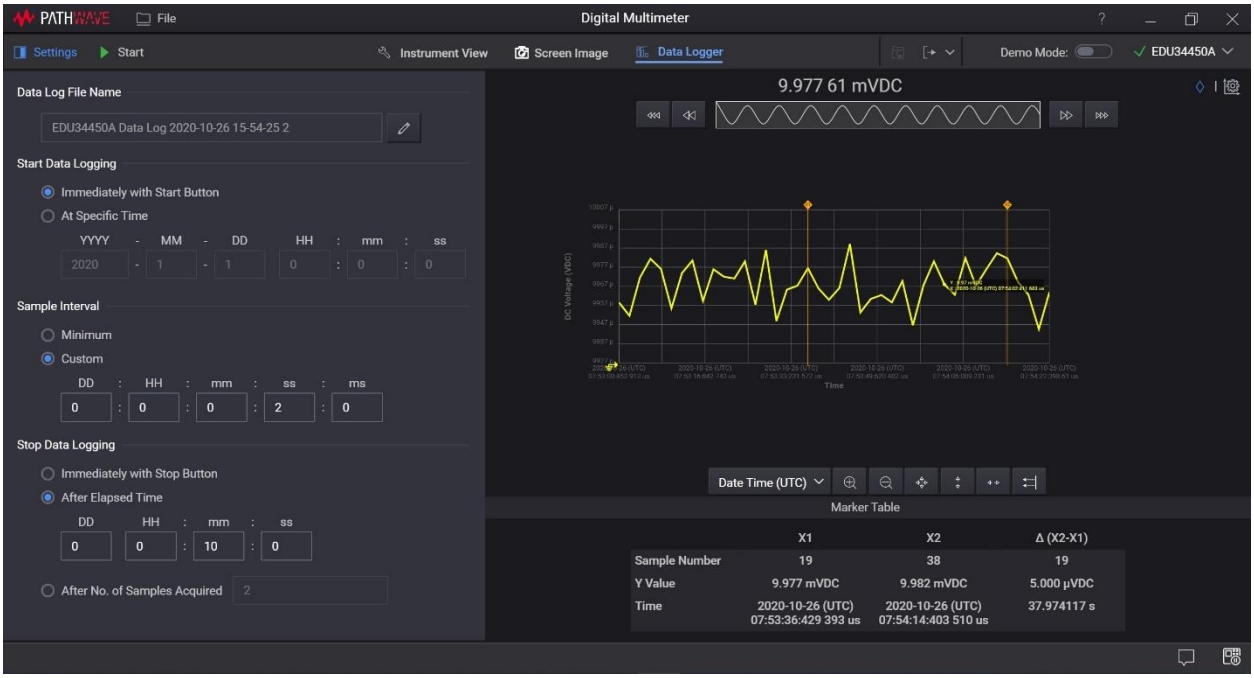
The DMM app in BenchVue allows you to control DMMs to visualize measurements and perform unrestricted data logging and statistical analysis. The software comes with your EDU34450A purchase.

Record measurements and export results in a few clicks

Quickly log and export data to Microsoft Excel for documentation or further analysis.

Remotely control your DMM via LAN

You can change your instrument settings and perform measurements remotely with built-in LAN connectivity.



Intuitive front panel

Label	Description
1	On/off switch
2	Display
3	USB host
4	Measurement function keys
5	Soft keys
6	Range change keys
7	Input terminals
8	Fuse

Spec Interpretation Guide

The following pages list the technical specifications for the Keysight EDU34450A DMM. The following explanations and examples are helpful in understanding how to interpret these specifications:

- Measurement accuracy is specified as the percentage of reading plus the percentage of range, where reading is the actual measured value and range is the name of the scale (1 V, 10 V, and so on) — not the full-scale value (1.2 V, 12 V, and so on).
- Accuracies are listed as one-year specifications. This refers to the length of time since the instrument's last calibration.

Example 1: Basic DC voltage accuracy

Calculate the accuracy of the following measurement: 9 V DC input, 10 V DC range, one-year accuracy specifications, standard operating temperature (18 – 28 °C).

From the following page, the one-year accuracy is 0.025% of reading + 0.005% or range.

It translates to this: (0.025/100 x 9 V) + (0.005/100 x 10 V) = 2.75 mV

Total accuracy is **2.75 mV/9 V = 0.0306%**.

Example 2: Extreme operating temperature

When the EDU34450A operates outside of its 18 – 28 °C temperature range, you need to consider additional temperature drift errors. Assume the same conditions in Example 1 but at a 35 °C operating temperature.

The basic accuracy is again 0.025% of reading + 0.005% of range = 2.75 mV.

Now, multiply the 10 V temperature coefficient from the DC voltage specifications table by the number of degrees outside of operating range for additional error:

(0.0020% reading + 0.0008% range) / °C x (35 – 28 °C)

= (0.0020% reading + 0.0008% range) / °C x 7 °C

= 0.014% reading + 0.0056% range = 1.82 mV

Total error is **2.75 mV + 1.82 mV = 4.57 mV or 0.0508%**.

Example 3: AC voltage accuracy

The AC voltage function measures the true RMS value of the input waveform, regardless of waveshape. Listed accuracies assume a sine-wave input. To adjust accuracies for non-sinusoids, use the listed crest factor adder.

For this example, assume a ± 1 V square wave input with a 50% duty cycle and a 1 kHz frequency.

Accuracy for 1 V, 1 kHz sinusoid is **0.2% reading + 0.1% range = 3 mV or 0.3%**.

EDU34450A Accuracy Specifications

Specifications are for 90-minute warm-up time, slow mode, NULL function enabled, and calibration temperature within 18 – 28 °C (unless stated otherwise).

DC specifications

Accuracy ± (% of reading + % of range):

Function	Range [1]	Test current or burden voltage	Input impedance	1 year 23 °C ± 5 °C	Temperature coefficient / °C 0 °C – 18 °C 28 °C – 55 °C
DC voltage	100.000 mV	-	10 MΩ or > 10 GΩ	0.018 + 0.008	0.0020 + 0.0008
	1.00000 V	-	10 MΩ or > 10 GΩ	0.015 + 0.005	0.0015 + 0.0008
	10.0000 V	-	10 MΩ	0.025 + 0.005	0.0020 + 0.0008
	100.000 V	-	10 MΩ	0.025 + 0.005	0.0020 + 0.0008
	1000.00 V	-	10 MΩ	0.027 + 0.005	0.0020 + 0.0008
Resistance [2]	100.000 Ω	1 mA	-	0.065 + 0.010	0.0080 + 0.0008
	1.00000 kΩ	500 µA	-	0.065 + 0.008	0.0080 + 0.0005
	10.0000 kΩ	100 µA	-	0.065 + 0.005	0.0080 + 0.0005
	100.000 kΩ	10 µA	-	0.065 0.005	0.0080 + 0.0005
	1.00000 MΩ	1 µA	-	0.065 + 0.005	0.0080 + 0.0005
	10.0000 MΩ	100 nA	-	0.300 + 0.005	0.0250 + 0.0005
	100.000 MΩ	100 nA / 10 MΩ	-	2.000 + 0.005	0.3000 + 0.0005
DC current [3]	10.0000 mA	< 0.02 V	-	0.10 + 0.015	0.008 + 0.0015
	100.000 mA	< 0.2 V	-	0.10 + 0.007	0.008 + 0.0010
	1.00000 A	< 0.3V	-	0.30 + 0.015	0.019 + 0.0015
	3.00000 A	< 0.9 V	-	0.30 + 0.007	0.019 + 0.0010
Continuity [4]	1000 Ω	0.5 mA	-	0.1 + 0.1	0.009 + 0.005
Diode test [5]	1.0000 V	0.5 mA	-	0.05 + 0.10	0.005 + 0.005

1. 20% over range on all ranges except 1,000 VDC and 3 A range.
2. Specifications are for four-wire Ω or two-wire Ω using NULL function. If without NULL function, add 0.2 Ω additional error. For 1 MΩ, 10 MΩ and 100 MΩ ranges, accuracy may be degraded when humidity is > 60% RH.
3. For 10 mA and 100 mA ranges, allow internal current sense resistor to cool after measuring > 1 A for more than 15 mins.
4. Typical specification. Continuity threshold is fixed at less than 10 Ω. Available in fast mode only.
5. Typical specification. Specifications are for the voltage measured at the input terminals only. Available in fast mode only.

AC specifications

Accuracy ± (% of reading + % of range):

Function	Range [1]	Frequency	1 year 23 °C ± 5 °C	Temperature coefficient / °C 0 °C – 18 °C 28 °C – 55 °C
True RMS AC voltage [2]	100.000 mV	20 Hz – 45 Hz	1.0 + 0.1	0.02 + 0.02
		45 Hz – 10 kHz	0.2 + 0.1	0.02 + 0.02
		10 kHz – 30 kHz	1.5 + 0.3	0.05 + 0.02
		30 kHz – 100 kHz [3]	6.0 + 0.3	-
	1.00000V to 750.00 V	20 Hz – 45 Hz	1.0 + 0.1 [4]	0.02 + 0.02
		45 Hz – 10 kHz	0.2 + 0.1	0.02 + 0.02
		10 kHz – 30 kHz	1.5 + 0.3	0.05 + 0.02
		30 kHz – 100 kHz [3]	3.0 + 0.3 [5]	0.10 + 0.02
True RMS AC current [2]	10.0000 mA to 3.00000A [6]	20 Hz – 45 Hz	1.5 + 0.1	0.02 + 0.02
		45 Hz – 1 kHz	0.5 + 0.1	0.02 + 0.02
		1 kHz – 10 kHz [7]	2.0 + 0.2	0.02 + 0.02

1. 20% over range on all ranges except ACV 750 V and ACI 3 A.
2. Specifications are for sine-wave inputs more than 5% of the range, except the 750 V range. Input signal must be more than 50 Vrms for the 750 V range. Maximum crest factor of 3 at full scale. Input impedance is at least 1.1 MΩ in parallel with capacitance less than 100 pF, AC couple with up to 400 DCV.
3. Typical specification for 100 mV range. Additional error to be added as frequency > 30 kHz and signal input < 10% of range. 30 kHz to 100 kHz: 0.003% of full scale per 4 kHz
4. For input < 200 V rms.
5. For input < 300 V rms. 4.5% of reading + 0.3 % of range for 750 V range (typical specification).
6. For 10 mA and 100 mA ranges, allow internal current sense resistor to cool if applied > 1 A for more than 15 mins.
7. Frequencies > 5 kHz are typical for 1 A and 3 A ranges.

Frequency accuracy ± (% of reading + 3 counts):

Function	Range [1]	Frequency	1 year 23 °C ± 5 °C	Temperature coefficient / °C 0 °C – 18 °C 28 °C – 55 °C
Frequency	100.000 mV to 750.00 V	20 Hz – 300 kHz [2]	0.025 + 3	0.005
	10.0000 mA to 3.0000 A	20 Hz – 10 kHz [3]	0.025 + 3	0.005

1. The frequency can be measured up to 1 MHz as 0.5 V signal to 100 mV/1 V ranges.
2. 10% of range to full-scale input on all ranges, except where noted. 100 mV range specifications are for full-scale or greater inputs. For inputs from 10 mV to 100 mV in 100 mV range, multiply the total percentage of reading error by 10.
3. 10% of range to full-scale input on all ranges, except where noted. 10 mA range specifications are for full-scale or greater inputs. For inputs from 1 mA to 10 mA in 10 mA range, multiply the total percentage of reading error by 10.

Frequency resolution:

Function	Range	Frequency	Resolution
Frequency	100.000 mV to 750.00 V [1]	0.01200 Hz - 119.999 Hz	0.001 Hz
		0.12000 Hz - 1.19999 Hz	0.00001 kHz
		1.2000 Hz - 11.9999 kHz	0.0001 kHz
		12.000 kHz - 119.999 kHz	0.001 kHz
		0.12000 MHz - 1.19999	0.00001 MHz

1. The frequency can be measured up to 1 MHz as 0.5 V signal to 100 mV/1 V ranges.

Temperature and capacitance specifications

Accuracy ± (% of reading + % of range):

Function	Range [1]	Probe type or test current	1 year 23 °C ± 5 °C	Temperature coefficient / °C 0 °C – 18 °C 28 °C – 55 °C
Temperature [2]	-80.0 °C to 150 °C	5 kΩ thermistor probe	Probe accuracy + 0.2 °C	0.0002 °C
	-110.0 °F to 300.0 °F	5 kΩ thermistor probe	Probe accuracy + 0.4 °F	0.0036 °F
Capacitance	1.000 nF	100 nA	-	-
	10.00 nF2	100 nA	1 + 1.5	0.04 + 0.015
	100.0 nF	1.0 µA	1 + 0.5	0.02 + 0.001
	1.000 µF	1.0 µA	1 + 0.5	0.02 + 0.001
	10.00 µF	10 µA	1 + 0.5	0.02 + 0.001
	100.0 µF	100 µA	1 + 0.5	0.02 + 0.001
	1.000 mF	0.5 mA	1 + 0.5	0.02 + 0.001
	10.00 mF	1.0 mA	2 + 0.5	0.001

1. 20% over range on all ranges.
2. Typical specification.

System characteristics

System specifications on single display (typical):

Function	Resolution (digit)	Function change (sec) [1]	Range change (sec) [2]	Auto range (sec) [3]	Reading rate / sec [4] (USB)	Reading rate / sec [4] (LAN)
ACV	Slow (5.5)	2.6	2.5	4.6	1.9	1.9
	Medium (4.5)	1.2	1.2	1.5	19	19
	Fast (4.5)	1.1	1.1	1.2	90	43
DCV	Slow (5.5)	1.4	1.4	1.6	1.3	1.3
	Medium (4.5)	0.6	0.7	0.8	49	36
	Fast (4.5)	0.6	0.7	0.7	110	48
2-wire Ω	Slow (5.5)	1.3	2.6	1.6	1.4	1.4
	Medium (4.5)	0.7	1.0	0.6	49	36
	Fast (4.5)	0.7	1.0	0.5	110	46
4-wire Ω	Slow (5.5)	1.8	1.4	1.9	1	1
	Medium (4.5)	1.1	0.6	1.1	5.2	5.0
	Fast (4.5)	1.1	0.6	1	5.9	5.4
Frequency [5]	Slow (5.5)	2.1	2.1	2.6	0.9	0.9
	Medium (4.5)	1.2	1.2	1.7	9.0	9.0
	Fast (4.5)	-	-	-	-	-
ACI	Slow (5.5)	2.6	2.6	6.2	1.9	1.9
	Medium (4.5)	1.2	1.2	1.7	19	19
	Fast (4.5)	1.1	1.2	1.3	90	45
DCI	Slow (5.5)	1.3	1.3	1.9	1.7	1.7
	Medium (4.5)	0.6	0.7	0.9	49	42
	Fast (4.5)	0.6	0.7	0.7	110	48
Diode test	4.5	0.1	-	-	110	48
Continuity	4.5	0.6	-	-	110	47
Temperature	4.5	1.8	-	-	4.5	4.2
Capacitance	4.5	-	-	-	-	-

1. Time to change from two-wire resistance to this specified function and to take at least one reading using SCPI "FUNC" and "READ?" commands.
2. Time to change from one range to the next higher range and to take at least one reading using SCPI "RANGE" and "READ?" commands.
3. Time to automatically change one range and to take at least one reading using SCPI "CONF AUTO" and "READ?" commands.
4. Number of measurements using SCPI "READ?" command when the front-panel display is off using "DISP OFF" command.
5. Reading rate depends on signal frequency ≥ 20 Hz.

Supplemental measurement characteristics

Measurement		Characteristic
DC voltage	Measurement method	
	Input resistance	> 10 GΩ (selectable 100 mV, 1 V ranges) 10 MΩ (typical)
	Input protection	1,000 V on all ranges (HI terminal)
Resistance	Measurement method	2-wire or 4-wire ohms
	Open circuit voltage	Limited to < 2.8 V
	Input protection	1,000 V on all ranges (HI terminal)
DC current	Shunt resistance	1 Ω for 10 mA, 100 mA 0.1 Ω for 1 A, 3A
	Input protection	Externally accessible at front panel 4 A, 600 V fuse for I terminal
Continuity / diode test	Measurement method	Uses 0.5 mA constant current source
	Response time	Continuity: 121 samples/second with audible tone Diode: 124 samples/second with audible tone
	Continuity threshold	10 Ω fixed
	Input protection	1000 V (HI terminal)
Temperature	Measurement method	2-wire ohms measurement of 5 kΩ thermistor sensor (YSI 4407) with a 25 ˚C / 125 ˚C ratio of 29.26 Auto-ranging measurement, no manual range selection
	Input protection	1000 V (HI terminal)
Measurement noise rejection	CMR (common mode rejection) For 1 kΩ unbalance LO lead	DC 140 dB AC 70 dB
	NMR (normal mode rejection) For 60 Hz (50 Hz) ± 0.1%	Slow mode 5½ digits, medium mode: 4½ digits, 60 dB Fast mode: 4½ digits, 0 dB
AC voltage	Measurement method	AC coupled True-RMS – measures the AC component with up to 400 VDC bias any range
	Crest factor	Maximum 3:1 at full scale
	Input impedance	> 1.1 MΩ in parallel with < 100 pF of all ranges
	Input protection	750 V rms on all ranges (HI terminal)
AC current	Measurement method	DC coupled to the fuse and current shunt; AC coupled true-RMS measurement (measures the AC component only)
	Shunt resistance	1 Ω for 10 mA, 100 mA 0.1 Ω for 1 A, 3 A
	Input protection	Externally accessible at front panel 4 A, 600 V fuse for I terminal

Supplemental measurement characteristics (continued)

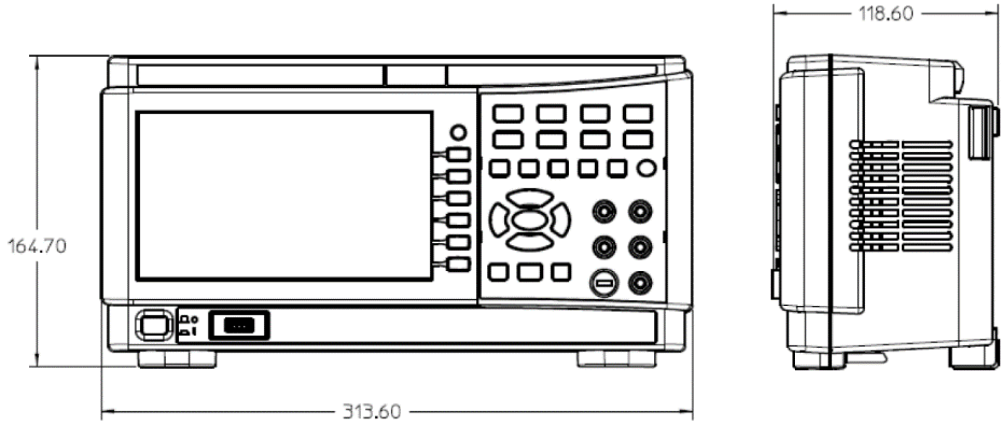
Measurement		Characteristic
Frequency	Measurement method	Reciprocal counting technique; AC coupled input using AC voltage function
	Signal level	10% of range to full-scale input on ranges except where noted. Auto or manual range selection
	Gate time	0.1 second or 1 second gate time
	Input protection	750 V rms on all ranges (HI terminal)
Math functions	Null, dBm, dB, Min/Max/Avg, hold limit test	
Data log	Info, list	
Triggering and memory	Samples per trigger Trigger delay	1 to 5,000 (typical) 0 to 3,600 sec (100 µs step size)
Non-volatile memory	5,000 readings	
Sample timer	Range	Up to 3,600 sec in 100 µs steps
Remote interface	USB, LAN standard	
Programming language	SCPI-1994.0, IEEE-488.2	

Rear Panel at a Glance

General characteristics

Characteristics	
Power supply	100 V / 120 V / (127 V) / 220 V / (230 V) / 240 V ± 10%
Power consumption	13 VA maximum, < 6.6 W average
Operating environment	Full accuracy to 80% RH for 0 ºC to 30 ºC (non-condensing)
	Full accuracy to 40% RH for 30 ºC to 55 ºC (non-condensing)
	Altitude up to 3,000 meters
Operating temperature	Full accuracy for 0 ºC to 55 ºC
Storage temperature	- 40 ºC to 70 ºC
Safety compliance	IEC 61010-1 / EN 61010-1 Canada: CAN / CSA-C22.2 No. 61010 -1 USA: ANSI / UL std No. 61010-1
Measurement category	CAT II, 300 V: CAT I 1000 Vdc 750 Vac rms, 2,500 Vpk transient over-voltages, pollution degree 2
EMC compliance	Compliant to EMC directive (2014/30/EU) Certified to IEC61326-1 / EN61326-1 Group 1 Class A Canada: ICES / NMB-001 Australia / New Zealand: AS / NZS CISPR 11 South Korea KC mark, class A
Shock and vibration	Tested to IEC/EN 60086-2
Dimensions (HxWxD)	165 mm x 314 mm x 119 mm (6.5 in x 12.6 in x 4.7 in)
Weight	3.35 kg
Warm-up time	90 minutes

Dimensions (mm)



Ordering Information

Digital multimeter

EDU34450A	5½-digit DMM

Standard shipped items

Power cord, test leads

Keysight optional accessories

EDU190A	Instrument stacking kit (to use with other education series instruments)
34138A	Test lead set
E2308A	Thermistor temperature probe
34330A	30 A current shunt

Other education series products

EDU33211A	Waveform generator, 20 MHz, one channel
EDU33212A	Waveform generator, 20 MHz, two channels
EDU36311A	DC power supply, triple output
EDUX1052A	InfiniiVision 1000 X-Series oscilloscope, 50 MHz, analog channels
EDUX1052G	InfiniiVision 1000 X-Series oscilloscope, 50 MHz, analog channels, with a built-in waveform generator

To learn more, please visit:

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