

# Data Sheet



Ihr Ansprechpartner /  
Your Partner:

dataTec AG  
E-Mail: [info@datatec.eu](mailto:info@datatec.eu)  
>>> [www.datatec.eu](http://www.datatec.eu)

Mess- und Prüftechnik. Die Experten.

## Digital Multimeters

5½ & 6½ Digit  
5490C Series

**BK PRECISION**



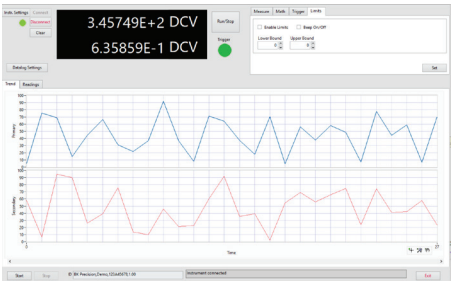
\* GPIB model option

The 5490C Series 5½ and 6½-digit bench multimeters are designed for accuracy, repeatability and ease-of-use. A wide measurement range with speeds up to 1000 readings per second, and a basic DCV accuracy up to 35 ppm deliver stable measurement results quickly and accurately. These general purpose meters are well suited for demanding engineering, production and service applications.

The multimeters feature simple and intuitive switching between the 12 measurement functions and display modes for a variety of test setups. Display modes include bar meter, trend chart, and histogram which can be combined with statistics or math functions. The dual measurement feature enables the simultaneous display of 2 measurements, e.g. AC voltage and frequency. Additionally, Limit mode and Probe hold mode allow users to conveniently verify and compare readings.

For remote communication, this series includes standard LAN, USB (USBTMC-compliant) and RS232 interfaces, as well as a GPIB option. A LabVIEW™ driver is provided to simplify system integration and instrument control. The front panel USB host port can be used for transferring screen captures and measurement data, logged with date and time stamp, from the multimeter's internal memory to a computer.

### Operating software



The provided operating software supports remote instrument control, live measurement monitoring, and data logging.

### Features and benefits

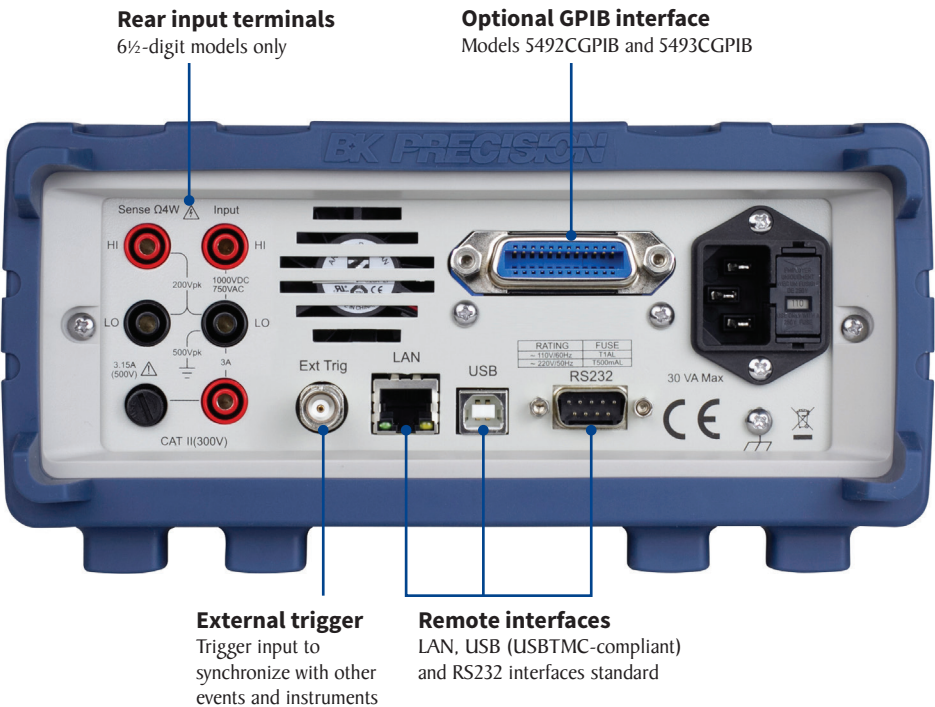
- 12 measurement functions: DCV, ACV, DCI, ACI, 2 and 4-wire resistance, capacitance, frequency, diode, temperature, continuity test, DCV Ratio
- High-contrast 4.3-inch full color LCD
- Histogram, bar meter, and trend chart offer a variety of data analysis options
- Accurate frequency measurements to 1 MHz
- Display Min, Max, Peak-Peak, Average, Standard Deviation statistics simultaneously
- Null, dB, dBm, %, mx+b, and run/stop math functions
- Internal storage buffer holds 10,000 readings
- Measurement speed up to 1000 readings/s
- 35 ppm basic DC voltage accuracy
- 2-wire and 4-wire resistance measurements down to 10 Ω
- Dual measurement display
- Temperature measurement capability using a Pt100 or 5 kΩ thermistor probe
- Rack mount kit option (RK2US)
- Rear input terminals for rack use (6½-digit model only)
- Standard USB (USBTMC-compliant), RS232, and LAN interfaces, GPIB option
- Real-time clock/calendar to set/read time and date

| Model                     | 5492C            | 5492CGPIB | 5493C            | 5493CGPIB |
|---------------------------|------------------|-----------|------------------|-----------|
| Displayed Digits          | 5½               |           | 6½               |           |
| DC Voltage basic accuracy | 0.010% (100 ppm) |           | 0.0035% (35 ppm) |           |
| Rear input terminals      | --               |           | ✓                |           |

Front panel



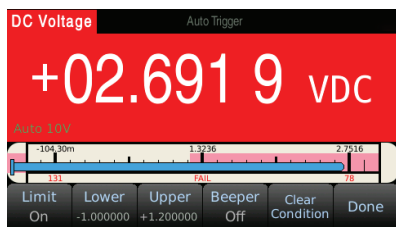
Rear panel



## Powerful measurement tools

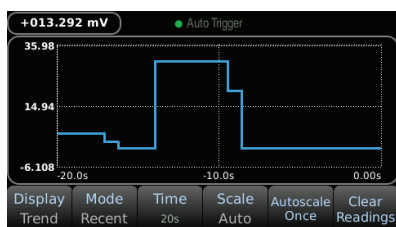
### Multiple measurement and display options

#### Bar meter with limit mode



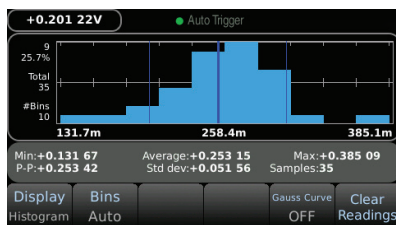
Set upper and lower limit levels with PASS/FAIL counter and indicators.

#### Trend chart



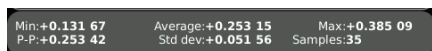
Trend chart displays live data in graphical form.

#### Histogram with statistics



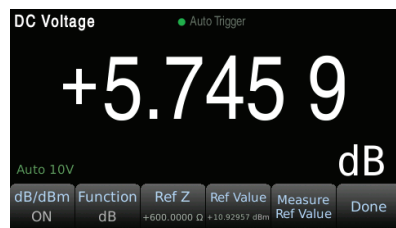
Histogram display mode to view distribution of measurement data.

#### Statistics display



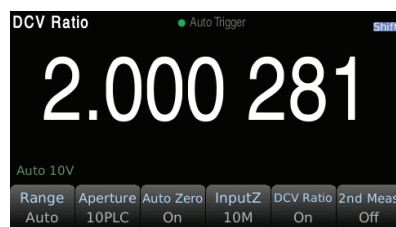
- Minimum, maximum, peak-to-peak, average, standard deviation
- Reading buffer holds 10,000 data samples

### Versatile math functions



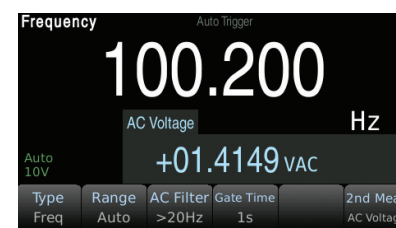
In addition to statistical data and limit test mode, this series is capable of Null, dB, dBm, mX+b, run/stop, and percent calculation functions.

### DC voltage ratio measurement



Displays the ratio between two separate DC voltage measurements within  $\pm 12$  Volts. This function is useful to quickly verify the difference between input and output magnitudes of low voltage circuits.

### Dual measurement display



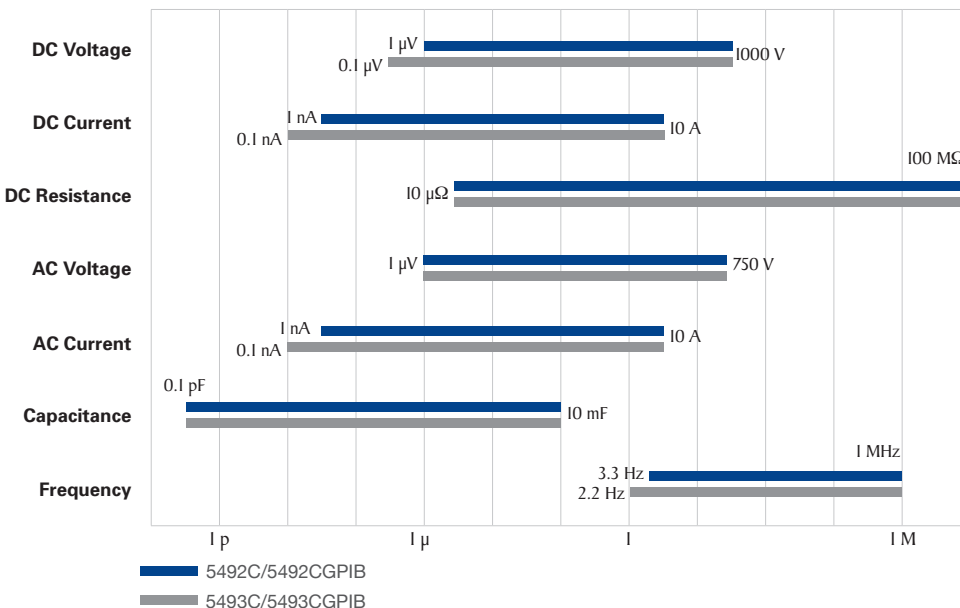
Simultaneously display multiple measurements such as frequency and AC voltage.

### Probe hold mode



Use probe hold mode to quickly compare a series of readings. Stable readings are captured and added to a list of up to eight measurements.

### Min/Max measurement capabilities



## Specifications - 5492C / 5492CGPIB

### Specifications are based on the following conditions:

- One year calibration cycle
- Calibration temperature  $T_{CAL} = 23\text{ }^{\circ}\text{C}$
- Accuracy specifications:  $\pm$  (% of reading + % of range), valid for  $T_{CAL} \pm 5\text{ }^{\circ}\text{C}$
- For DC: The technical specifications are valid after a warm-up time of 60 minutes, with the integration time set to 10 or 100 NPLC, and auto zero enabled.
- For AC: The technical specifications are valid after a warm-up time of 60 minutes, slow AC filtering enabled, using a sine wave input signal.

### DC Voltage

| Range <sup>(1)</sup> | Resolution        | Full Scale Reading | Accuracy (1 year) |
|----------------------|-------------------|--------------------|-------------------|
| 100 mV               | 1 $\mu\text{V}$   | 119.999 mV         | 0.012 + 0.008     |
| 1 V                  | 10 $\mu\text{V}$  | 1.19999 V          | 0.010 + 0.005     |
| 10 V                 | 100 $\mu\text{V}$ | 11.9999 V          | 0.010 + 0.005     |
| 100 V                | 1 mV              | 119.999 V          | 0.010 + 0.005     |
| 1000 V               | 10 mV             | 1050.00 V          | 0.010 + 0.005     |

(1) 20% overrange on all ranges except 1000 V can only test 5% overrange.

### DC Current

| Range             | Burden Voltage | Resolution        | Full Scale Reading    | Accuracy (1 year) |
|-------------------|----------------|-------------------|-----------------------|-------------------|
| 100 $\mu\text{A}$ | < 0.011 V      | 1 nA              | 119.999 $\mu\text{A}$ | 0.050 + 0.008     |
| 1 mA              | < 0.11 V       | 10 nA             | 1.19999 mA            | 0.050 + 0.005     |
| 10 mA             | < 0.05 V       | 0.1 $\mu\text{A}$ | 11.9999 mA            | 0.050 + 0.008     |
| 100 mA            | < 0.5 V        | 1 $\mu\text{A}$   | 119.999 mA            | 0.050 + 0.005     |
| 1 A               | < 0.7 V        | 10 $\mu\text{A}$  | 1.19999 A             | 0.100 + 0.010     |
| 3 A               | < 2.0 V        | 10 $\mu\text{A}$  | 3.1500 A              | 0.150 + 0.020     |
| 10 A              | < 0.5 V        | 100 $\mu\text{A}$ | 11.9999 A             | 0.200 + 0.010     |

### DC Resistance<sup>(2)</sup>

| Range <sup>(3)</sup>          | Test Current            | Resolution     | Full Scale Reading | Accuracy (1 year) |
|-------------------------------|-------------------------|----------------|--------------------|-------------------|
| 10 $\Omega$                   | 10 mA                   | 0.1 m $\Omega$ | 11.9999 $\Omega$   | 0.050 + 0.008     |
| 100 $\Omega$                  | 10 mA                   | 1 m $\Omega$   | 119.999 $\Omega$   | 0.040 + 0.005     |
| 1 k $\Omega$                  | 1 mA                    | 10 m $\Omega$  | 1.19999 k $\Omega$ | 0.030 + 0.004     |
| 10 k $\Omega$                 | 100 $\mu\text{A}$       | 0.1 m $\Omega$ | 11.9999 k $\Omega$ | 0.030 + 0.004     |
| 100 k $\Omega$ <sup>(4)</sup> | 50 $\mu\text{A}$        | 1 $\Omega$     | 119.999 k $\Omega$ | 0.030 + 0.004     |
| 1 M $\Omega$                  | 5 $\mu\text{A}$         | 10 $\Omega$    | 1.19999 M $\Omega$ | 0.030 + 0.004     |
| 10 M $\Omega$                 | 500 nA                  | 100 $\Omega$   | 11.9999 M $\Omega$ | 0.100 + 0.004     |
| 100 M $\Omega$                | 500 nA    10 M $\Omega$ | 1 k $\Omega$   | 119.999 M $\Omega$ | 1.000 + 0.010     |

(2) Specifications apply to 2-wire and 4-wire resistance measurements using NULL for offset. Without NULL, add 0.2  $\Omega$  additional error for 2-wire measurements.

(3) 20% overrange on all ranges

(4) To eliminate noise interference, it is recommended to use shielded test cables for resistance measurements above 100 k $\Omega$ .

### Capacitance

| Range <sup>(5)</sup> | Test Current      | Full Scale Reading    | Accuracy (1 year) |
|----------------------|-------------------|-----------------------|-------------------|
| 1 nF                 | 10 $\mu\text{A}$  | 1.19999 nF            | 2.0 + 0.5         |
| 10 nF                | 10 $\mu\text{A}$  | 11.9999 nF            | 0.5 + 0.1         |
| 100 nF               | 10 $\mu\text{A}$  | 119.999 nF            | 0.5 + 0.1         |
| 1 $\mu\text{F}$      | 100 $\mu\text{A}$ | 1.19999 $\mu\text{F}$ | 0.5 + 0.1         |
| 10 $\mu\text{F}$     | 100 $\mu\text{A}$ | 11.9999 $\mu\text{F}$ | 0.5 + 0.1         |
| 100 $\mu\text{F}$    | 1 mA              | 119.999 $\mu\text{F}$ | 0.5 + 0.1         |
| 1 mF                 | 10 mA             | 1.19999 mF            | 0.5 + 0.1         |
| 10 mF                | 10 mA             | 11.9999 mF            | 1.0 + 0.50        |

(5) 20% overrange on all ranges.

### Frequency<sup>(6)(7)</sup>

| Frequency Range                 | Resolution         | Full Scale Reading | Accuracy (1 year) |
|---------------------------------|--------------------|--------------------|-------------------|
| 3 Hz to 10 Hz                   | 10 $\mu\text{Hz}$  | 9.99999 Hz         | 0.050 + 50        |
| 10 Hz to 100 Hz                 | 100 $\mu\text{Hz}$ | 99.9999 Hz         | 0.010 + 10        |
| 100 Hz to 1 kHz                 | 1 mHz              | 999.999 Hz         | 0.005 + 2         |
| 1 kHz to 10 kHz                 | 10 mHz             | 9.99999 kHz        | 0.005 + 2         |
| 10 kHz to 100 kHz               | 0.1 Hz             | 99.9999 kHz        | 0.005 + 2         |
| 100 kHz to 300 kHz              | 1 Hz               | 300.000 kHz        | 0.005 + 2         |
| 300 kHz to 1 MHz <sup>(8)</sup> | 1 Hz               | 999.999 kHz        | 0.005 + 2         |

(6) Applies to sine wave input and gate time set to 1 second.

(7) For sine wave input larger than 100 mV. For a 10 mV to 100 mV input, multiply the % of reading error by 10.

(8) For frequency measurements greater than 750 kHz, use manual ranges for best accuracy.

## Specifications - 5492C / 5492CGPIB

### True RMS AC Voltage<sup>(1)(2)</sup>

100 mV, 1 V, 10 V, 100 V, and 750 V ranges

| Frequency          | Accuracy (1 Year) |
|--------------------|-------------------|
| 3 Hz to 5 Hz       | 1.00 + 0.03       |
| 5 Hz to 20 Hz      | 0.38 + 0.03       |
| 20 Hz to 20 kHz    | 0.10 + 0.03       |
| 20 kHz to 50 kHz   | 0.15 + 0.05       |
| 50 kHz to 100 kHz  | 0.63 + 0.08       |
| 100 kHz to 300 kHz | 4.00 + 0.50       |

| Range <sup>(3)</sup> | Resolution  | Full Scale Reading |
|----------------------|-------------|--------------------|
| 100 mV               | 1 $\mu$ V   | 119.999 mV         |
| 1 V                  | 10 $\mu$ V  | 1.19999 V          |
| 10 V                 | 100 $\mu$ V | 11.9999 V          |
| 100 V                | 1 mV        | 119.999 V          |
| 750 V <sup>(4)</sup> | 10 mV       | 787.50 V           |

(1) Valid for sine wave input > 0.3% of range and greater than 1 mVrms.

(2) Three filters are available for low-frequency performance: 3 Hz, 20 Hz, and 200 Hz. No additional errors will occur for frequencies above these filter settings.

(3) 20% overrange on all ranges except 750 V range can only test 5% overrange.

(4) 750 V range is limited to  $8 \times 10^7$  Volt-Hz.

### True RMS AC Current<sup>(5)(6)</sup>

| Range <sup>(7)</sup> | Burden Voltage | Resolution  | Full Scale Reading | Accuracy (1 year) |               |                 |
|----------------------|----------------|-------------|--------------------|-------------------|---------------|-----------------|
|                      |                |             |                    | 3 Hz to 5 Hz      | 5 Hz to 20 Hz | 20 Hz to 10 kHz |
| 100 $\mu$ A          | < 0.011 V      | 1 nA        | 119.999 $\mu$ A    | 1.00 + 0.03       | 0.5 + 0.03    | 0.20 + 0.04     |
| 1 mA                 | < 0.11 V       | 10 nA       | 1.19999 mA         | 1.00 + 0.03       | 0.5 + 0.03    | 0.20 + 0.04     |
| 10 mA                | < 0.05 V       | 0.1 $\mu$ A | 11.9999 mA         | 1.00 + 0.03       | 0.5 + 0.03    | 0.20 + 0.04     |
| 100 mA               | < 0.5 V        | 1 $\mu$ A   | 119.999 mA         | 1.00 + 0.03       | 0.5 + 0.03    | 0.20 + 0.04     |
| 1 A                  | < 0.7 V        | 10 $\mu$ A  | 1.19999 A          | 1.00 + 0.03       | 0.5 + 0.03    | 0.20 + 0.04     |
| 3 A                  | < 2.0 V        | 10 $\mu$ A  | 3.1500 A           | 1.00 + 0.03       | 0.5 + 0.03    | 0.25 + 0.04     |
| 10 A <sup>(8)</sup>  | < 0.5 V        | 100 $\mu$ A | 11.9999 A          | 1.00 + 0.03       | 0.5 + 0.03    | 0.30 + 0.05     |

(5) Three filters are available for low-frequency performance: 3 Hz, 20 Hz, and 200 Hz. No additional errors will occur for frequencies above these filter settings.

(6) Valid for sinewave input > 1% of range and greater than 10  $\mu$ A AC.

(7) 20% overrange on all ranges except 3 A range can only test 5% overrange.

(8) 10 A range available on front panel only.

### Continuity

| Range        | Test Current | Accuracy (1 year) | Temperature Coefficient / °C |
|--------------|--------------|-------------------|------------------------------|
| 1 k $\Omega$ | 1 mA         | 0.030 + 0.004     | 0.0010 + 0.0020              |

### Temperature

| Type                    | Accuracy                 |
|-------------------------|--------------------------|
| Pt100 (DIN / IEC 751)   | Probe accuracy + 0.05 °C |
| 5 k $\Omega$ thermistor | Probe accuracy + 0.10 °C |

### Diode<sup>(9)</sup>

| Range | Test Current | Accuracy (1 year)             | Temperature Coefficient / °C |
|-------|--------------|-------------------------------|------------------------------|
| 5 V   | 1 mA         | 0.010 + 0.005 <sup>(10)</sup> | 0.0010 + 0.0020              |

(9) Applicable to the voltage measured at the input terminal. A 1 mA test current is typical. Changes in the current source will cause variations in voltage drop across the diode junction.

## Specifications - 5493C / 5493CGPIB

### Specifications are based on the following conditions:

- One year calibration cycle
- Calibration temperature  $T_{CAL} = 23\text{ }^{\circ}\text{C}$
- Accuracy specifications:  $\pm$  (% of reading + % of range), valid for  $T_{CAL} \pm 5\text{ }^{\circ}\text{C}$
- All 24 hours accuracy specifications are typical
- Add temperature coefficient for every  $^{\circ}\text{C}$  outside  $T_{CAL} \pm 5\text{ }^{\circ}\text{C}$
- For DC: The technical specifications are valid after a warm-up time of 60 minutes, with the integration time set to 10 or 100 NPLC, and auto zero enabled.
- For AC: The technical specifications are valid after a warm-up time of 60 minutes, slow AC filtering enabled, using a sine wave input signal.

### DC Voltage

| Range <sup>(1)</sup> | Resolution        | Full Scale Reading | Accuracy                                                           |                                                    |                                                   | Temperature Coefficient / $^{\circ}\text{C}$ |
|----------------------|-------------------|--------------------|--------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------|----------------------------------------------|
|                      |                   |                    | 24 Hours <sup>(2)</sup><br>$T_{CAL} \pm 1\text{ }^{\circ}\text{C}$ | 90 Days<br>$T_{CAL} \pm 5\text{ }^{\circ}\text{C}$ | 1 Year<br>$T_{CAL} \pm 5\text{ }^{\circ}\text{C}$ |                                              |
| 100 mV               | 0.1 $\mu\text{V}$ | 119.9999 mV        | 0.0030 + 0.0030                                                    | 0.0040 + 0.0035                                    | 0.0050 + 0.0035                                   | 0.0005 + 0.0005                              |
| 1 V                  | 1 $\mu\text{V}$   | 1.199999 V         | 0.0020 + 0.0006                                                    | 0.0030 + 0.0007                                    | 0.0040 + 0.0007                                   | 0.0005 + 0.0001                              |
| 10 V                 | 10 $\mu\text{V}$  | 11.99999 V         | 0.0015 + 0.0004                                                    | 0.0020 + 0.0005                                    | 0.0035 + 0.0005                                   | 0.0005 + 0.0001                              |
| 100 V                | 100 $\mu\text{V}$ | 119.9999 V         | 0.0020 + 0.0006                                                    | 0.0035 + 0.0006                                    | 0.0045 + 0.0006                                   | 0.0005 + 0.0001                              |
| 1000 V               | 1 mV              | 1050.000 V         | 0.0020 + 0.0006                                                    | 0.0035 + 0.0010                                    | 0.0045 + 0.0010                                   | 0.0005 + 0.0001                              |

(1) 20% overrange on all ranges except 1000 V range which can only test 5% overrange.

(2) Relative to calibration standards.

### DC Current

| Range               | Burden Voltage | Resolution        | Full Scale Reading     | Accuracy                                            |                                                    |                                                   | Temperature Coefficient / $^{\circ}\text{C}$ |
|---------------------|----------------|-------------------|------------------------|-----------------------------------------------------|----------------------------------------------------|---------------------------------------------------|----------------------------------------------|
|                     |                |                   |                        | 24 Hours<br>$T_{CAL} \pm 1\text{ }^{\circ}\text{C}$ | 90 Days<br>$T_{CAL} \pm 5\text{ }^{\circ}\text{C}$ | 1 Year<br>$T_{CAL} \pm 5\text{ }^{\circ}\text{C}$ |                                              |
| 100 $\mu\text{A}$   | < 0.011 V      | 0.1 nA            | 119.9999 $\mu\text{A}$ | 0.010 + 0.020                                       | 0.040 + 0.025                                      | 0.050 + 0.025                                     | 0.0020 + 0.0030                              |
| 1 mA                | < 0.11 V       | 1 nA              | 1.199999 mA            | 0.010 + 0.006                                       | 0.030 + 0.006                                      | 0.050 + 0.006                                     | 0.0020 + 0.0005                              |
| 10 mA               | < 0.05 V       | 10 nA             | 11.99999 mA            | 0.010 + 0.020                                       | 0.030 + 0.020                                      | 0.050 + 0.020                                     | 0.0020 + 0.0020                              |
| 100 mA              | < 0.5 V        | 0.1 $\mu\text{A}$ | 119.9999 mA            | 0.010 + 0.004                                       | 0.030 + 0.005                                      | 0.050 + 0.005                                     | 0.0020 + 0.0005                              |
| 1 A                 | < 0.7 V        | 1 $\mu\text{A}$   | 1.199999 A             | 0.050 + 0.006                                       | 0.080 + 0.010                                      | 0.100 + 0.010                                     | 0.0050 + 0.0010                              |
| 3 A                 | < 2.0 V        | 1 $\mu\text{A}$   | 3.15000 A              | 0.180 + 0.020                                       | 0.200 + 0.020                                      | 0.200 + 0.020                                     | 0.0050 + 0.0020                              |
| 10 A <sup>(3)</sup> | < 0.5 V        | 10 $\mu\text{A}$  | 11.99999 A             | 0.050 + 0.010                                       | 0.120 + 0.010                                      | 0.120 + 0.010                                     | 0.0050 + 0.0010                              |

(3) 10 A range available on front panel only.

### DC Resistance<sup>(4)</sup>

| Range <sup>(5)</sup>          | Test Current            | Resolution     | Full Scale Reading  | Accuracy                                            |                                                    |                                                   | Temperature Coefficient / $^{\circ}\text{C}$ |
|-------------------------------|-------------------------|----------------|---------------------|-----------------------------------------------------|----------------------------------------------------|---------------------------------------------------|----------------------------------------------|
|                               |                         |                |                     | 24 Hours<br>$T_{CAL} \pm 1\text{ }^{\circ}\text{C}$ | 90 Days<br>$T_{CAL} \pm 5\text{ }^{\circ}\text{C}$ | 1 Year<br>$T_{CAL} \pm 5\text{ }^{\circ}\text{C}$ |                                              |
| 10 $\Omega$                   | 10 mA                   | 10 $\mu\Omega$ | 11.99999 $\Omega$   | 0.0050 + 0.0040                                     | 0.0080 + 0.0060                                    | 0.0100 + 0.0080                                   | 0.0006 + 0.0008                              |
| 100 $\Omega$                  | 10 mA                   | 0.1 m $\Omega$ | 119.9999 $\Omega$   | 0.0030 + 0.0020                                     | 0.0080 + 0.0030                                    | 0.0100 + 0.0040                                   | 0.0006 + 0.0005                              |
| 1 k $\Omega$                  | 1 mA                    | 1 m $\Omega$   | 1.199999 k $\Omega$ | 0.0020 + 0.0005                                     | 0.0080 + 0.0010                                    | 0.0100 + 0.0010                                   | 0.0006 + 0.0001                              |
| 10 k $\Omega$                 | 100 $\mu\text{A}$       | 10 m $\Omega$  | 11.99999 k $\Omega$ | 0.0020 + 0.0005                                     | 0.0080 + 0.0010                                    | 0.0100 + 0.0010                                   | 0.0006 + 0.0001                              |
| 100 k $\Omega$ <sup>(6)</sup> | 50 $\mu\text{A}$        | 100 m $\Omega$ | 119.9999 k $\Omega$ | 0.0020 + 0.0005                                     | 0.0080 + 0.0010                                    | 0.0100 + 0.0010                                   | 0.0006 + 0.0001                              |
| 1 M $\Omega$                  | 5 $\mu\text{A}$         | 1 $\Omega$     | 1.199999 M $\Omega$ | 0.0020 + 0.0010                                     | 0.0080 + 0.0010                                    | 0.0100 + 0.0010                                   | 0.0010 + 0.0002                              |
| 10 M $\Omega$                 | 500 nA                  | 10 $\Omega$    | 11.99999 M $\Omega$ | 0.0150 + 0.0010                                     | 0.0200 + 0.0010                                    | 0.0400 + 0.0010                                   | 0.0030 + 0.0004                              |
| 100 M $\Omega$                | 500 nA    10 M $\Omega$ | 100 $\Omega$   | 119.9999 M $\Omega$ | 0.3000 + 0.0100                                     | 0.8000 + 0.0100                                    | 0.8000 + 0.0100                                   | 0.1500 + 0.0002                              |

(4) Specifications apply to 2-wire and 4-wire resistance measurements using NULL for offset. Without NULL, add 0.2  $\Omega$  additional error for 2-wire measurements.

(5) 20% overrange on all ranges

(6) To eliminate noise interference, it is recommended to use shielded test cables for resistance measurements above 100 k $\Omega$ .

## Specifications - 5493C / 5493CGPIB

### Capacitance

| Range <sup>(1)</sup> | Full Scale Reading | Accuracy                             |                                     |                                    | Temperature Coefficient / °C |
|----------------------|--------------------|--------------------------------------|-------------------------------------|------------------------------------|------------------------------|
|                      |                    | 24 Hours<br>$T_{CAL} \pm 1^{\circ}C$ | 90 Days<br>$T_{CAL} \pm 5^{\circ}C$ | 1 Year<br>$T_{CAL} \pm 5^{\circ}C$ |                              |
| 1 nF                 | 1.199999 nF        | 0.5 + 0.10                           | 0.5 + 0.40                          | 2.0 + 0.50                         | 0.02 + 0.001                 |
| 10 nF                | 11.99999 nF        | 0.2 + 0.05                           | 0.5 + 0.10                          | 1.0 + 0.10                         | 0.02 + 0.001                 |
| 100 nF               | 119.9999 nF        | 0.2 + 0.05                           | 0.5 + 0.10                          | 1.0 + 0.10                         | 0.02 + 0.001                 |
| 1 µF                 | 1.199999 µF        | 0.2 + 0.05                           | 0.5 + 0.05                          | 1.0 + 0.10                         | 0.02 + 0.001                 |
| 10 µF                | 11.99999 µF        | 0.2 + 0.05                           | 0.5 + 0.05                          | 1.0 + 0.10                         | 0.02 + 0.001                 |
| 100 µF               | 119.9999 µF        | 0.2 + 0.05                           | 0.5 + 0.05                          | 1.0 + 0.10                         | 0.02 + 0.001                 |
| 1 mF                 | 1.199999 mF        | 0.2 + 0.05                           | 0.5 + 0.05                          | 1.0 + 0.20                         | 0.02 + 0.001                 |
| 10 mF                | 11.99999 mF        | 0.5 + 0.20                           | 0.5 + 0.30                          | 1.0 + 0.50                         | 0.02 + 0.001                 |

(1) 20% overrange on all ranges.

### True RMS AC Voltage<sup>(2)(3)</sup>

100 mV, 1 V, 10 V, 100 V, and 750 V ranges

| Frequency          | 24 Hours<br>$T_{CAL} \pm 1^{\circ}C$ | 90 Days<br>$T_{CAL} \pm 5^{\circ}C$ | 1 Year<br>$T_{CAL} \pm 5^{\circ}C$ | Temperature Coefficient / °C |
|--------------------|--------------------------------------|-------------------------------------|------------------------------------|------------------------------|
| 3 Hz to 5 Hz       | 1.00 + 0.02                          | 1.00 + 0.02                         | 1.00 + 0.03                        | 1.00 + 0.03                  |
| 5 Hz to 10 Hz      | 0.35 + 0.04                          | 0.35 + 0.05                         | 0.35 + 0.06                        | 0.35 + 0.03                  |
| 10 Hz to 20 kHz    | 0.04 + 0.04                          | 0.05 + 0.05                         | 0.06 + 0.06                        | 0.07 + 0.03                  |
| 20 kHz to 50 kHz   | 0.10 + 0.04                          | 0.11 + 0.05                         | 0.12 + 0.05                        | 0.13 + 0.05                  |
| 50 kHz to 100 kHz  | 0.55 + 0.08                          | 0.60 + 0.08                         | 0.60 + 0.09                        | 0.60 + 0.08                  |
| 100 kHz to 300 kHz | 4.00 + 0.50                          | 4.00 + 0.51                         | 4.00 + 0.52                        | 4.00 + 0.50                  |

| Range <sup>(4)</sup> | Resolution | Full Scale Reading |
|----------------------|------------|--------------------|
| 100 mV               | 1 µV       | 119.9999 mV        |
| 1 V                  | 10 µV      | 1.199999 V         |
| 10 V                 | 100 µV     | 11.99999 V         |
| 100 V                | 1 mV       | 119.9999 V         |
| 750 V <sup>(5)</sup> | 10 mV      | 787.500 V          |

(2) Valid for sine wave input > 0.3% of range and greater than 1 mVrms.

(3) Three filters are available for low-frequency performance: 3 Hz, 20 Hz, and 200 Hz. No additional errors will occur for frequencies above these filter settings.

(4) 20% overrange on all ranges except 750 V range which can only test 5% overrange.

(5) 750 V range is limited to  $8 \times 10^7$  Volt-Hz.

### Continuity

| Range | Test Current | Accuracy                             |                                     |                                    | Temperature Coefficient / °C |
|-------|--------------|--------------------------------------|-------------------------------------|------------------------------------|------------------------------|
|       |              | 24 Hours<br>$T_{CAL} \pm 1^{\circ}C$ | 90 Days<br>$T_{CAL} \pm 5^{\circ}C$ | 1 year<br>$T_{CAL} \pm 5^{\circ}C$ |                              |
| 1 kΩ  | 1 mA         | 0.002 + 0.030                        | 0.008 + 0.030                       | 0.010 + 0.030                      | 0.0010 + 0.0020              |

### Diode<sup>(6)</sup>

| Range | Test Current | Accuracy                             |                                     |                                    | Temperature Coefficient / °C |
|-------|--------------|--------------------------------------|-------------------------------------|------------------------------------|------------------------------|
|       |              | 24 Hours<br>$T_{CAL} \pm 1^{\circ}C$ | 90 Days<br>$T_{CAL} \pm 5^{\circ}C$ | 1 year<br>$T_{CAL} \pm 5^{\circ}C$ |                              |
| 5 V   | 1 mA         | 0.002 + 0.030                        | 0.008 + 0.030                       | 0.010 + 0.030                      | 0.0010 + 0.0020              |

(6) Applicable to the voltage measured at the input terminal. A 1 mA test current is typical. Changes in the current source will cause variations in voltage drop across the diode junction.

## Specifications - 5493C / 5493CGPIB

### True RMS AC Current<sup>(1)(2)</sup>

| Range <sup>(3)</sup> , Burden Voltage                                           | Frequency       | Accuracy                             |                                     |                                    | Temperature Coefficient / °C |
|---------------------------------------------------------------------------------|-----------------|--------------------------------------|-------------------------------------|------------------------------------|------------------------------|
|                                                                                 |                 | 24 Hours<br>$T_{CAL} \pm 1^{\circ}C$ | 90 Days<br>$T_{CAL} \pm 5^{\circ}C$ | 1 Year<br>$T_{CAL} \pm 5^{\circ}C$ |                              |
| 100 $\mu A$ , < 0.011 V<br>1 mA, < 0.11 V<br>10 mA, < 0.05 V<br>100 mA, < 0.5 V | 3 Hz to 5 Hz    | 1.00 + 0.02                          | 1.00 + 0.02                         | 1.00 + 0.04                        | 0.100 + 0.006                |
|                                                                                 | 5 Hz to 10 Hz   | 0.30 + 0.02                          | 0.30 + 0.03                         | 0.30 + 0.04                        | 0.035 + 0.006                |
|                                                                                 | 10 Hz to 5 kHz  | 0.10 + 0.04                          | 0.10 + 0.04                         | 0.10 + 0.04                        | 0.015 + 0.006                |
|                                                                                 | 5 kHz to 10 kHz | 0.10 + 0.04                          | 0.10 + 0.04                         | 0.10 + 0.04                        | 0.030 + 0.006                |
| 1 A, < 0.7 V                                                                    | 3 Hz to 5 Hz    | 1.00 + 0.02                          | 1.00 + 0.02                         | 1.00 + 0.04                        | 0.100 + 0.006                |
|                                                                                 | 5 Hz to 10 Hz   | 0.30 + 0.02                          | 0.30 + 0.03                         | 0.30 + 0.04                        | 0.035 + 0.006                |
|                                                                                 | 10 Hz to 5 kHz  | 0.10 + 0.04                          | 0.10 + 0.04                         | 0.10 + 0.04                        | 0.015 + 0.006                |
|                                                                                 | 5 kHz to 10 kHz | 0.30 + 0.04                          | 0.30 + 0.04                         | 0.30 + 0.04                        | 0.030 + 0.006                |
| 3 A, < 2.0 V                                                                    | 3 Hz to 5 Hz    | 1.00 + 0.02                          | 1.00 + 0.02                         | 1.00 + 0.04                        | 0.100 + 0.006                |
|                                                                                 | 5 Hz to 10 Hz   | 0.35 + 0.02                          | 0.35 + 0.03                         | 0.35 + 0.04                        | 0.035 + 0.006                |
|                                                                                 | 10 Hz to 5 kHz  | 0.23 + 0.04                          | 0.23 + 0.04                         | 0.23 + 0.04                        | 0.015 + 0.006                |
|                                                                                 | 5 kHz to 10 kHz | 0.30 + 0.04                          | 0.30 + 0.04                         | 0.30 + 0.04                        | 0.030 + 0.006                |
| 10 A <sup>(4)</sup> , < 0.5 V                                                   | 3 Hz to 5 Hz    | 1.00 + 0.02                          | 1.00 + 0.02                         | 1.00 + 0.04                        | 0.100 + 0.006                |
|                                                                                 | 5 Hz to 10 Hz   | 0.30 + 0.02                          | 0.35 + 0.03                         | 0.30 + 0.04                        | 0.035 + 0.006                |
|                                                                                 | 10 Hz to 5 kHz  | 0.15 + 0.04                          | 0.15 + 0.04                         | 0.2 + 0.08                         | 0.015 + 0.006                |
|                                                                                 | 5 kHz to 10 kHz | 0.15 + 0.04                          | 0.15 + 0.04                         | 0.2 + 0.08                         | 0.030 + 0.006                |

(1) Three filters are available for low-frequency performance: 3 Hz, 20 Hz, and 200 Hz. No additional errors will occur for frequencies above these filter settings.

(2) Valid for sine wave input > 1% of range and greater than 10  $\mu A$  AC.

(3) 20% overrange on all ranges except 3 A range which can only test 5% overrange.

(4) 10 A range available on front panel only.

### Frequency $\pm$ (% of reading)<sup>(5)(6)</sup>

100 mV, 1 V, 10 V, 100 V, and 750 V ranges

| Frequency Range                 | Accuracy                             |                                     |                                    | Temperature Coefficient / °C |
|---------------------------------|--------------------------------------|-------------------------------------|------------------------------------|------------------------------|
|                                 | 24 Hours<br>$T_{CAL} \pm 1^{\circ}C$ | 90 Days<br>$T_{CAL} \pm 5^{\circ}C$ | 1 Year<br>$T_{CAL} \pm 5^{\circ}C$ |                              |
| 2 Hz to 10 Hz                   | 0.1                                  | 0.100                               | 0.100                              | 0.0002                       |
| 10 Hz to 100 Hz                 | 0.030                                | 0.030                               | 0.030                              | 0.0002                       |
| 100 Hz to 1 kHz                 | 0.003                                | 0.008                               | 0.010                              | 0.0002                       |
| 1 kHz to 300 kHz                | 0.002                                | 0.006                               | 0.010                              | 0.0002                       |
| 300 kHz to 1 MHz <sup>(7)</sup> | 0.002                                | 0.006                               | 0.010                              | 0.0002                       |
| Square wave <sup>(8)</sup>      | 0.001                                | 0.006                               | 0.010                              | 0.0002                       |

(5) Applies for sine wave input and gate time set to 1 second.

(6) For sine and square wave input larger than 100 mV. For a 10 mV to 100 mV input, multiply the % reading error by 10.

(7) For frequency measurements greater than 750 kHz, use manual ranges for best accuracy.

(8) Square input specified for 10 Hz to 300 kHz.

### Additional gate time errors $\pm$ (% of reading)

| Frequency                  | 1 second | 0.1 second | 0.01 second |
|----------------------------|----------|------------|-------------|
| 3 Hz to 40 Hz              | 0        | 0.200      | 0.200       |
| 40 Hz to 100 Hz            | 0        | 0.060      | 0.200       |
| 100 Hz to 1 kHz            | 0        | 0.020      | 0.200       |
| 1 kHz to 300 kHz           | 0        | 0.004      | 0.030       |
| Square wave <sup>(8)</sup> | 0        | 0          | 0           |

### Temperature

| Type                    | Accuracy                 |
|-------------------------|--------------------------|
| Pt100 (DIN / IEC 751)   | Probe accuracy + 0.05 °C |
| 5 k $\Omega$ thermistor | Probe accuracy + 0.10 °C |

## Specifications

| General                       |           |                                                                                                                                                                  |
|-------------------------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC Input                      |           | 110 V/220 V $\pm 10\%$ , 50/60 Hz                                                                                                                                |
| Power Consumption             |           | $\leq 30$ VA                                                                                                                                                     |
| I/O Interface                 |           | RS232, USB host, USB (USBTMC-compliant) device, LAN, GPIB (5492CGPIB and 5493CGPIB only)                                                                         |
| Temperature                   | Operating | 32 °F to 104 °F (0 °C to 40 °C)                                                                                                                                  |
|                               | Storage   | -40 °F to 158 °F (-40 °C to 70 °C)                                                                                                                               |
| Humidity                      |           | Indoor use, $\leq 95\%$                                                                                                                                          |
| Safety                        |           | EN 6110-1:2010, Low Voltage Directive (LVD) 2014/35/EU                                                                                                           |
| Electromagnetic Compatibility |           | EN 61326-1:2013, EMC directive 2014/30/EU                                                                                                                        |
| Dimensions (W x H x D)        |           | 8.85" x 3.93" x 13.97" (225 mm x 100 mm x 355 mm)                                                                                                                |
| Weight                        |           | 5.51 lbs (2.5 kg)                                                                                                                                                |
| Warranty                      |           | 3 years                                                                                                                                                          |
| Standard Accessories          |           | Power cord, USB cable, test leads, spare fuses, test report and certificate of calibration                                                                       |
| Optional Accessories          |           | Rack mount kit (RK2US), high performance bench DMM accessory kit (TL500B), general purpose DMM kit (TLI30B), Maxi-Pro DMM kit (TL50B), replacement probes (TL37) |

## About B&K Precision

For more than 70 years, B&K Precision has provided reliable and value-priced test and measurement instruments worldwide.

Our headquarters in Yorba Linda, California houses our administrative and executive functions as well as sales and marketing, design, service, and repair. Our European customers are most familiar with B&K through our French subsidiary, Sefram. Engineers in Asia know us through our B+K Precision Taiwan operation. The independent service centers in Singapore and Brasil service customers in Singapore, Malaysia, Vietnam, Indonesia and South America, respectively.



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B&K Precision Corporation is an ISO9001 registered company employing traceable quality management practices for all processes including product development, service, and calibration.

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