4808 Uncertainty Specifications Relative to Calibration Standards.

4808 DC Voltage Relative Uncertainty – (ppm OUTPUT + µV Floor)[1]

Range	24Hr Stability [2]	90 Days Tcert[3] – 1 C	180 Days Tcert[3] – 5 C	365 Days Tcert[3] – 5 C	Temperature Coefficient[4]
100mV	0.4 + 0.3	3 + 0.4	4.5 + 0.5	7 + 0.5	1
1V	0.3 + 0.5	2 + 0.8	3.5 + 1	5 + 1	0.5
10V	0.3 + 1	1 + 3	2 + 3	3 + 3	0.15
100V	0.5 + 20	2 + 50	3.5 + 50	5 + 50	0.5
1000V	0.5 + 200	3 + 500	5 + 500	7 + 500	0.5

Scale Length: 0 to –200% of range (100mV to 100V ranges); 0 to –110% of range (1000V range).

Settling Time: <1s to 10ppm of step size.
Settling Resolution: 0.1ppm or 10nV

Maximum Load : 25mA on 1V to 1000V ranges.
Output Impedance 100W on 100mV to 100mV ranges.

4808 AC Voltage Relative Uncertainty – (ppm OUTPUT + µV Floor)[1]

Range	Frequency Band	24Hr Stability [2]	90 Days Tcert[3] – 1 C		180 Days Tcert[3] – 5 C		365 Days Tcert[3] – 5 C		Temperature Coefficient[4]
			Spot Freq	Broadband	Spot Freq	Broadband	Spot Freq	Broadband	
100mV[5]	10 - 31	60 + 6	90 + 5	90 + 9	95 + 5	110 + 9	100 + 5	120 + 9	5
	32 - 330	30 + 6	40 + 5	40 + 9	45 + 5	60 + 9	50 + 5	70 + 9	5
	300 - 10k	20 + 6	30 + 5	30 + 9	35 + 5	50 + 9	40 + 5	60 + 9	5
	10k - 33k	20 + 6	40 + 5	40 + 9	45 + 5	60 + 9	50 + 5	70 + 9	5
	30k - 100k	30 + 6	60 + 5	280 + 9	70 + 5	290 + 9	80 + 5	300 + 9	5
	100k - 330k	80 + 15	280 + 5	750 + 20	300 + 5	850 + 20	350 + 5	0.1% + 20	20
	300k - 1M	130 + 30	850 + 5	0.15% + 120	980 + 5	0.17% + 120	0.1% + 5	0.2% + 120	50
1V	10 - 31	30 + 20	70	80 + 30	85	85 + 30	80	90 + 30	1.5
	32 - 330	10 + 10	20	40 + 20	25	45 + 20	30	50 + 20	1.5
	300 - 33k	7 + 5	15	30 + 10	18	35 + 10	20	40 + 10	1.5
	30k - 100k	15 + 10	35	60 + 20	40	70 + 20	50	80 + 20	1.5
	100k - 330k	30 + 20	120	385 + 100	130	395 + 100	150	405 + 100	10
	300k - 1M	100 + 20	800	0.21% + 400	900	0.22% + 400	0.1%	0.24% + 400	50
10V	10 - 31	30 + 200	75	80 + 300	78	85 + 300	80	90 + 300	1.5
	32 - 330	10 + 100	25	25 + 200	28	45 + 200	30	50 + 200	1.5
	300 - 33k	7 + 50	20	20 + 100	23	35 + 100	25	40 + 100	1.5
	30k - 100k	15 + 100	35	60 + 200	40	70 + 200	50	80 + 200	1.5
	100k - 330k	30 + 200	120	120 + 1 mV	130	215 + 1 mV	150	250 + 1 mV	10
	300k - 1M	100 + 200	760	800 + 5 mV	900	0.13% + 5 mV	0.1%	0.15% + 5 mV	50
100V	10 - 31	30 + 2 mV	75	90 + 3 mV	78	95 + 3 mV	80	100 + 3 mV	3
	32 - 330	10 + 1 mV	25	50 + 2 mV	28	55 + 2 mV	30	60 + 2 mV	3
	300 - 10k	10 + 400	25	40 + 1 mV	28	45 + 1 mV	30	50 + 1 mV	3
	10k - 33k	10 + 400	35	50 + 1 mV	38	55 + 1 mV	40	60 + 1 mV	3
	30k - 100k	15 + 1 mV	45	90 + 3 mV	50	105 + 3 mV	60	120 + 3 mV	5
	100k - 330k	30 + 2 mV	230	530 + 50 mV[6]	300	615 + 50 mV[6]	400	700 + 50 mV[6]	30
	330k - 1M	600 + 15 mV	0.57%	0.8% + 130 mV[6]	0.60%	0.9% + 130 mV[6]	0.72%	1% + 130 mV[6]	90
1000V	10 - 31	20 + 10 mV	120	130 + 20 mV	125	140 + 20 mV	130	150 + 20 mV	5
	32 -330	20 + 4 mV	80	90 + 20 mV	85	95 + 20 mV	90	100 + 20 mV	5
	330 - 3.3k	20 + 4 mV	80	90 + 20 mV	85	95 + 20 mV	90	100 + 20 mV	5
	3k - 10k	20 + 4 mV	80	130 + 20 mV	85	135 + 20 mV	90	140 + 20 mV	5
	10k - 33k	30 + 4 mV	120	130 + 20 mV	125	135 + 20 mV	130	140 + 20 mV	5
	30k - 100k	50 + 20 mV	170	750 + 40 mV[6]	180	875 + 40 mV[6]	200	0.11% + 40 mV[6]	7

Scale Length: 9% to 200% of range (1mV to 100V ranges); 9% to 110% of range (1000V range).
Settling Time (to 100ppm of step size):
< 10s from 10Hz to 32Hz; < 3s from 33Hz to 330Hz; < 1s above 330Hz. These figures x2 for range changes.

Max Resistive Load: Output Impedance 30W on 1mV to 100mV ranges; 50mA rms on 1V range; 60mA rms on 10V range; 120mA rms on 100V range; 15mA rms on 1000V range, < 3kHz; 65mA rms on 1000V range, > 3kHz.

Setting Resolution: 1ppm or 100nV
Max Capacitive Load: 1000pF (1V to 100V ranges); 300pF (1000V range).
Frequency Uncertainty: <– 100ppm for life

4808 DC Current Relative Uncertainty – (ppm OUTPUT + μA Floor)[1]

Range	24Hr Stability [2]	90 Days Tcert[3] – 1 C	180 Days Tcert[3] – 5 C	365 Days Tcert[3] – 5 C	Temperature Coefficient[4]
100mA	7 + 2 nA	50 + 2 nA	75 + 2 nA	100 + 2 nA	15
1mA	3 + 8 nA	20 + 10 nA	30 + 10 nA	40 + 10 nA	6
10mA	3 + 80 nA	20 + 0.1	30 + 0.1	40 + 0.1	6
100mA	3 + 0.8	20 + 1	30 + 1	40 + 1	6
1A	7 + 20	50 + 20	75 + 20	100 + 20	15
10A[7]	15 + 20	50 + 500	100 + 500	150 + 500	15

Scale Length: 0 to –200% of range (100mA to 1A ranges): 0 to –100% of range (10A range).

Settling Time: < 1s to full specification (100mA to 1A ranges): < 1s to 40ppm of step size (10A range).
Settling Resolution: 1ppm

Compliance Voltage: 3V on 100mA to 1A ranges; 2V on 10A range.

4808 AC Current Relative Uncertainty – (ppm OUTPUT + μA Floor)[1]

Range	Frequency Band	24Hr Stability [2]	90 Days Tcert[3] – 1 C		180 Days Tcert[3] – 5 C		365 Days Tcert[3] – 5 C		Temperature Coefficient[4]
			Spot Freq	Broadband	Spot Freq	Broadband	Spot freq	Broadband	
100mA	10 - 1k	50 + 4 nA	100	120 + 6 nA	125	135 + 10 nA	130	150 + 10 nA	10
	1k - 5k	70 + 6 nA	180	250 + 8 nA	200	270 + 14 nA	220	300 + 14 nA	20
1mA	10 - 1k	30 + 20 nA	60	70 + 60 nA	80	85 + 0.1	90	100 + 0.1	10
	1k - 5k	40 + 20 nA	100	120 + 60 nA	150	160 + 0.1	160	200 + 0.1	10
10mA	10 - 1k	30 + 0.2	60	70 + 0.6	80	85 + 1	90	100 + 1	10
	1k - 5k	40 + 0.2	100	120 + 0.6	150	160 + 1	160	200 + 1	10
100mA	10 - 1k	30 + 2	60	70 + 6	80	85 + 10	90	100 + 10	10
	1k - 5k	40 + 2	100	120 + 6	150	160 + 10	160	200 + 10	10
1A	10 -1k	50 + 40	170	250 + 60	200	275 + 100	200	300 + 100	20
	1k - 5k	70 + 60	270	400 + 80	300	425 + 140	320	450 + 140	25
10A[7]	10 - 1k	40 + 400	210	300 + 1.2 mA	250	350 + 1.3 mA	270	400 + 1.3 mA	13
	1k - 5k	75 + 600	300	750 + 1.5 mA	400	800 + 1.6 mA	480	850 + 1.6mA	28
	5k - 10k	400 + 1.2 mA	0.11%	0.15% + 6 mA	0.13%	0.18% + 6 mA	0.14%	0.22% + 6 mA	50
	10k - 20k	0.2% + 3 mA	0.4%	0.54% + 32 mA	0.45%	0.63% + 32 mA	0.5%	0.72% + 32 mA	50

Scale Length: 9% to 200% of range (100mA to 1A ranges); 9% to 110% of range (10A range).
Settling Time: As AC Voltage.

Frequency Uncertainty: As AC Voltage.
Max Reactive Load: 10nF, 1mH (time constant <1ms).

Settling Resolution: 1ppm
Compliance Voltage: 3V rms on 100mA to 1A ranges; 2V rms on 10A range.

4808 Resistance Relative Uncertainty – (ppm OUTPUT)

Range	24Hr Stability [2]	90 Days Tcert[3] – 1 C	180 Days Tcert[3] – 5 C	365 Days Tcert[3] – 5 C	Temperature Coefficient[4]
10 Ohm	2	10	18	25	6
100 Ohm	1	3	6	9	2
1k Ohm	1	3	6	9	2
10k Ohm	1	3	6	9	2
100k Ohm	1	3	7	10	2
1M Ohm	2	10	18	25	6
10M Ohm	2	25	38	50	10
100M Ohm	3	30	50	70	20

Display Resolution: 0.1ppm

Connections: Programmable 2-wire/4-wire sense. Programmable remote/local guard.

Fuse Protection: to 120V rms

[1] All Relative Uncertainty specifications calculated to a 99% confidence level. Methods of combining uncertainty of calibration standards should comply with the requirements defined in documents ISO TAG4 and NIST Technical Note 1297.
[2] 24Hr Stability are relative to calibration standards for same conditions between 18 C and 28 C
[3] Tcert = temperature at certification. Factory Calibration Temperature = 23 C
[4] Temperature Coefficient (ppm/ C) applies outside –5 Tcert bands.
[5] For 1 mV and 10 mV ac voltage ranges multiply the floor value by 0.6 for frequencies below 300 kHz and 0.2 for frequencies > 300 kHz.
[6] For loads >50mA add $\frac{F(kHz) \times [I(mA)-5]}{75}$ ppm.
[7] Requires Option 60 Transconductance amplifier.

Option 60 Transconductance Amplifier Specifications

Uncertainty Relative to Calibration Standards

Function	Range (A)	Frequency (Hz)	Uncertainty – (ppm OUTPUT + ppm FS)			Calibration Uncertainty (ppm)	Temperature Coefficient 3 C to 13 C 33 C to 43 C (– ppm OUTPUT/ C)	Total Harmonic Distortion (%)	Impedance	Compliance
			24-hour 23 C – 1 C	90-day 23 C – 1 C	1-year 23 C – 10 C					
DC Current	0 - 11.00000	—	30 + 25	50 + 25	150 + 25	30	14	—	>100kW	>2
AC Current	0.9 - 11.00000	10 - 1k	150 + 55	200 + 55	300 + 60	130	20	0.2	>2kW	>2Vrms
		1k - 5k	650 + 70	700 + 70	800 + 80	280	20	0.5	>2kW	>2Vrms

General Specifications

Outputs

DC Current

Range: Zero to –11A

Settling Time: 1 second to 40ppm of step size.

AC Current

Range: 0.9A to 11A

Settling Time (to 100ppm of step size):

10Hz to 32Hz	<10 seconds
32Hz to 330Hz	<3 seconds
>330Hz	<1second

Protection

Isolation: 100V peak between I- and chassis.

Output Protection: fully protected against open and short circuits.

Inputs

Input Impedance: 300kW //100pF

Input Protection: 240Vrms continuous.

Environment

Temperature

Operating: 0 C to +50 C

Storage: -40 C to +70 C

Humidity (non condensing)

Operating: <90% over 5 C to +30 C; <75% over 30 C to 40 C

Storage: <95% over 0 C to 50 C

Warm-up Period

2 hours.

Power

Voltage: 110/120/220/240V – 10%, 48Hz to 62Hz

Consumption: 200W

Dimensions

Height: 89mm (3.5 in.)

Width: 455mm (17.9 in.)

Depth: 420mm (16.5 in.)

Weight: 10kg (22lbs)

Safety

Designed to UL1244, IEC348, IEC1010, BS4743 requirements.

Warranty

1-year

General Specifications Model 4800A and Model 4808

Environment

Temperature

Operating: 0 C to +50 C

Storage: -40 C to +70 C

Humidity (non condensing)

Operating: <90% over 5 C to +30 C; <75% over 30 C to 40 C

Storage: <95% over 0 C to 50 C

Warm-up Period

2 hours.

Power

Voltage: 110/120/220/240V – 10%, 48Hz to 62Hz

Consumption: 660VA maximum (370VA typical under normal operation).

Dimensions

Height: 178mm (7 in.)

Width: 455mm (17.9 in.)

Depth: 563mm (22.2 in.)

Weight: 36kg (80lbs)

Safety

Designed to UL1244, IEC348, IEC1010, BS4743 requirements.

EMC (including options)

Emissions :

EN 50081-1:1992

EN 5022 class B

EN 55014

EN 60555-2

EN 60555-3

Immunity :

EN50082-1:1992

IEC 801-2

IEC 801-3

IEC 801-4

CE Marked

Warranty

1-year

Ordering Information

Model 4800A

Model 4800A Multifunction Calibrator

Option 60	Model 4600 Transconductance Amplifier for DC Current and/or AC Current up to 11A, complete with all connecting leads
Option 70	Wideband source to extend frequency coverage of AC Voltage to 30 MHz at voltages up to 3.5V
Option 90	Rack mounting kit

Model 4808

Model 4808	Multifunction Calibrator
Option 10	DC Voltage from zero to –200V
Option 20	AC Voltage from 90mV to 200V
Option 30	Integral high voltage amplifier for DC Voltage and/or AC Voltage up to 1100 V (requires Option 10 for DC Voltage or Option 20 for AC Voltage)
Option 40	DC Current from zero to –2A and AC Current from 9mA to 2A (requires Option 10 for DC Current or Option 20 for AC Current)
Option 50	Resistance from zero to 100MW
Option 60	Model 4600 Transconductance Amplifier for DC Current and/or AC Current up to 11A, complete with all connecting leads (requires Option 40)
Option 70	Wideband source to extend frequency coverage of AC Voltage to 30 MHz at voltages up to 3.5V (requires Option 20)
Option 90	Rack mounting kit

System Compatible Components

Model 1516 4800-Series compatible general-purpose (DC/AC/Ohms) analog output lead-set comprising two 0.5-metre lengths of screened 2-core PTFE cable, terminated in a shrouded terminal box at one end and five 4-mm shrouded Banana plugs at the other end.

Model 4950 Multifunction Transfer Standard for on-site calibrator support (see separate Model 4950 brochure)

Portocal-II Automated calibration and inventory management software (see separate Portocal-II brochure)