

Uncertainty: $\pm(0.004\%$ of setting +0.001% of range +5 μV) for all ranges, for 6 months, 20°C to 30°C ambient, non-override; $\pm(0.005\%$ of setting +0.2 mV) for divider override mode

Temperature Coefficient: Above 30°C and below 20°C, $\pm(5$ ppm of setting +1 ppm of range +1 $\mu\text{V})/^\circ\text{C}$ to 200V, $\pm(5$ ppm of setting +2 ppm of range)/°C, 200V to 1100V

Short Term Stability: (For 10 minutes from 0°C to 50°C) $\pm(10$ ppm of setting +2 ppm of range +5 μV) to 500V; ± 25 ppm of setting, 500V to 1100V

Load Regulation: External Sense, ± 10 ppm from 2V to 1100V, no-load to full-load; Internal, Sense same as external except full-load is 400 Ω

Alternating Voltage

Range*	Resolution	Maximum Load	Total Harmonic Distortion and Noise
20 mV	0.1 μV	Limited by 50 Ω output resistance	Bandwidth of 10 Hz to 200 kHz, Distortion, line interference + noise including random spikes 20V and Higher 50 Hz to 10 kHz: 0.08% of output rms Below 20V 50 Hz to 10 kHz: (0.05% of output + 10 μV) rms 10 kHz to 50 kHz: (0.08% of output + 20 μV) rms
200 mV	1 μV		
2V	10 μV	2 k Ω / 1000 pF	
20V	100 μV	25 mA/ 1000 pF	
200V	1 mV	10 mA/ 400 pF	
1100V	10 mV	6 mA/ 400 pF**	

* Can be set in dBm where 0 dBm + 1 mW in 6008 + 0.7746V

**200 mA/1500 pF with 5205A, Y5000 and Y5001

Uncertainty: $\pm(0.035\%$ of setting +0.005% of range +50 μV) from 50 Hz to 10 kHz and $\pm(0.06\%$ of setting +0.008% of range +50 μV) from 10 kHz to 50 kHz for 6 months, 20°C to 30°C ambient

Frequencies Available (Hz): 50, 60, 70, 80, 90, 100, 200, 300, 400, 500, 600, 700, 800, and 900 for all voltage ranges

Frequencies Available (kHz):

Voltage Range	1	2	3	4	5	6	7	8	9	10	20	30	40	50
110V to 1100V	•	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
20V to 110V	•	•	•	•	•	•	•	•	•	•	•	Δ	Δ	Δ
1 mV to 20V	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Δ With 5205A, Y5000, and Y5001

Frequency Uncertainty: $\pm 3\%$

Temperature Coefficient: Above 30°C and below 20°C $\pm(20$ ppm of setting +2 ppm of range)/°C for amplitude, $\pm 0.1\%/^\circ\text{C}$ for frequency

Short Term Stability: $\pm(0.01\%$ of range +10 μV) for 10 minutes from 0°C to 50°C

Load Regulation: External Sense, ± 200 ppm from 0.2V to 1100V, no-load to full-load; Internal Sense, same as external except regulation for voltages <0.2V is expressed as an output impedance of 50 Ω

Direct Current

Range	Resolution	Compliance Voltage	Ripple and Noise
200 μA	1 nA	0 to 10V	(0.05% of output +0.01 μA) rms Measured with 10 Hz to 10 kHz bandwidth including random spikes
2 mA	10 nA		
20 mA	100 nA		
200 mA	1 μA		
2A*	10 μA	0 to 2.1V	

*20A with 5220A, Y5000, and Y5002

Uncertainty: $\pm 0.015\%$ of setting +0.002% of range +0.01 μA for compliance voltage up to 1V. Add 0.002% of setting per volt above 1V rms, applies for 6 months and 20°C to 30°C ambient

Temperature Coefficient: Above 30°C and below 20°C $\pm(10$ ppm of setting +2 ppm of range)/°C

Short Term Stability: $\pm(50$ ppm of setting +5 ppm of range +0.002 μA) for 10 minutes from 0°C to 50°C

Load Regulation: ± 20 ppm/volt for change in output voltage from 1 volt to maximum compliance voltage

Alternating Current

Range	Resolution	Compliance Voltage	Total Harmonic Distortion & Noise
200 μA	1 nA	0 to 7V	(0.05% of output +0.01 μA) rms Measured with 10 Hz to 10 kHz bandwidth including random spikes
2 mA	10 nA		
20 mA	100 nA		
200 mA	1 μA		
2A*	10 μA	0 to 1.4V	

*20A with 5220A, Y5000, and Y5002

Uncertainty: $\pm 0.05\%$ of setting +0.005% of range +0.02 μA for compliance voltage up to 1V rms (50 Hz to 1 kHz). Add 0.005% of setting per volt above 1V rms. Applies for 6 months in 20°C to 30°C ambient.

Temperature Coefficient: Above 30°C and below 20°C $\pm(25$ ppm of setting +10 ppm of range +0.2 nA)/°C for amplitude, $\pm 0.1\%/^\circ\text{C}$ for frequency

Short Term Stability: $\pm(0.014\%$ of setting +0.002% of range +0.4 μA) for 10 minutes from 0°C to 50°C

Load Regulation: $\pm(50$ ppm +20 nA)/volt for change in output voltage from 1 volt to maximum compliance voltage

Resistance

Range: 1 Ω to 10 M Ω in decade steps
Uncertainty: $\pm 0.003\%$, except $\pm 0.015\%$ (1 Ω), $\pm 0.010\%$ (10 Ω and 1 M Ω), and $\pm 0.030\%$ (10 M Ω) assumes 4 terminal below 100 k Ω , applies for 6 months 20°C to 30°C ambient

Power Dissipation: 1W maximum except 100 mW max (1 M Ω) and 10 mW max (10 M Ω)

Temperature Coefficient: Above 30°C and below 20°C, ± 5 ppm/°C except ± 10 ppm/°C (1 Ω and 10 Ω), ± 10 ppm/°C up to 40°C (10 M Ω), and ± 50 ppm/°C above 40°C (10 M Ω)

Option Specifications

Wideband aV Option (-03)

Option -03 is an accurate, low-noise, flat alternating voltage source that allows the 5100B Series to be used for calibrating wideband voltmeters. Frequency coverage expands to 10 Hz-10 MHz. A dedicated front panel BNC connector provides ac output from 300 μV (-57.5 dBm) to 3.1623V (+23 dBm) into 50 Ω impedance. The output is programmable from the front panel or I/O interface in volts or in dBm (where 0 dBm equals 1 mW into 50 Ω). Using a simple formula for calculation of a correction factor and the new REF feature, the wideband output can be directly programmed for dBm referenced to other impedances.

Range: 10 Hz to 10 MHz

Amplitude Uncertainty, at 1 kHz, Terminated in 50 Ω *

Voltage Range	Approx dBm Range	$\pm(\%$ of Setting + % of Range)
1V-3.1623V	+13 to +23	0.25 + 0.25
0.31624V-0.99999V	+3 to +13	0.5 + 0.25
0.1V-0.31623V	-7 to +3	0.75 + 0.25
31.624mV-99.999mV	-17 to -7	1.0 + 0.25
10mV-31.623mV	-27 to -17	1.25 + 0.25
3.1624mV-9.9999mV	-37 to -27	1.5 + 0.25
1mV-3.1623mV	-47 to -37	1.75 + 0.25
300 μV -0.99999 mV	-57.5 to -47	2.0 + 0.25

*For 6 months, 20°C to 30°C ambient

Amplitude Flatness*

10 Hz to 30 Hz: $\pm 0.3\%$
30 Hz to 1 MHz: $\pm 0.25\%$
1 MHz to 5 MHz: $\pm 0.25\%$ above 1 mV, $\pm 0.6\%$ ≤ 1 mV
5 MHz to 10 MHz: $\pm 0.6\%$

*Using 1 foot of RG 58U cable terminated in 50 Ω

Temperature Coefficient: Above 30°C and below 20°C $\pm(0.1$ times basic accuracy)/°C for amplitude; $\pm 0.25\%/^\circ\text{C}$ for frequency

Harmonics: -40 dB or lower relative to fundamental for each frequency except -32 dB above 5 MHz