

DC ELECTRONIC LOADS

Specifications and Dimensions

Specifications (Data Subject to Change)

| | 0-60 A | 0-10 A | 0-30 A | 0-120 A |
|-------------------------------------|--|--|--|---|
| Amperes | 0-60 A | 0-10 A | 0-30 A | 0-120 A |
| Volts | 3-60 V | 3-240 V | 3-60 V | 3-60 V |
| Maximum Power (at 40°C) | 300 W | 250 W | 150 W | 600 W |
| Hewlett-Packard Model | HP 6060A, 60502A | HP 6063A, 60503A | HP 60501A | HP 60504A |
| Constant current mode Ranges | 0-6 A, 0-60 A | 0-1 A, 0-10 A | 0-3 A, 0-30 A | 0-12 A, 0-120 A |
| Accuracy | 0.1% ± 75 mA | ± 0.15 ± 10 mA | 0.1% ± 40 mA | 0.12% ± 130 mA |
| Resolution | 60 A range: 16 mA 6 A range: 1.6 mA | 10 A range: 2.6 mA 1 A range: 0.26 mA | 30 A range: 8 mA 3 A range: 0.8 mA | 120 A range: 32 mA 12 A range: 3.2 mA |
| Temperature coefficient | 100 ppm/°C ± 5 mA/°C | 150 ppm/°C ± 1 mA/°C | 100 ppm/°C ± 3 mA/°C | 120 ppm/°C ± 8 mA/°C |
| Regulation | ± 10 mA | ± 8 mA | ± 10 mA | ± 10 mA |
| Constant voltage mode Accuracy | 0.1% ± 50 mV | ± 0.12% ± 120 mV | 0.1% ± 50 mV | 0.1% ± 50 mV |
| Resolution | 16 mV | 64 mV | 16 mV | 16 mV |
| Regulation | ± 10 mV | ± 10 mV | ± 5 mV | ± 20 mV |
| Temperature coefficient | 100 ppm/°C ± 5 mV/°C | 120 ppm/°C ± 10 mA/°C | 100 ppm/°C ± 5 mV/°C | 100 ppm ± 5 mV/°C |
| Constant resistance mode Ranges | 0.033 - 1.0 Ω 1 Ω - 1KΩ 10 Ω - 10 KΩ | 0.20 - 24.0 ohm 24 - 1000Ω 240 - 5000Ω | 0.067 - 2 Ω 2 Ω - 2 K Ω 20 Ω - 10 KΩ | 0.017 - 0.5 Ω 0.5 Ω - 500 Ω 5 Ω - 5 KΩ |
| Accuracy | 1 Ω: 0.8% ± 8 mΩ (with ≥ 6A at input) 1 K Ω: 0.3% ± 8 mS (with ≥ 6V at input) 10 K Ω: 0.3% ± 8 mS (with ≥ 6V at input) | 240: 0.8% ± 200 mΩ (with ≥ 1A at input) 10 KΩ: 0.3% ± 0.3 mS (with ≥ 24V at input) 50 KΩ: 0.3% ± 0.3 mS (with ≥ 24V at input) | 2 Ω: 0.8%, ± 16 mΩ (with ≥ 3A at input) 2 KΩ: 0.3% ± 5 mS (with ≥ 6V at input) 10 KΩ: 0.3% ± 5 mS (with ≥ 6V at input) | 0.5 Ω: 0.8% ± 5 mΩ (with ≥ 12A at input) 500 Ω: 0.3% ± 16 mS (with ≥ 6V at input) 5 KΩ: 0.3% ± 16 mS (with ≥ 6V at input) |
| Resolution | 1 Ω: 0.27 mΩ 1 KΩ: 0.27 mS 10 KΩ: 0.027 mS | 240: 6 mΩ 10 KΩ: 0.011 mS 50 KΩ: 0.001 mS | 2 Ω: 0.54 mΩ 2 KΩ: 0.14 mS 10 KΩ: 0.014 mS | 5 Ω: 0.14 mΩ 500 Ω: 0.54 mS 5 KΩ: 0.094 mS |
| Regulation | 1 Ω: 10 mV 1 KΩ: 10 mA 10 KΩ: 10 mA | 240: 10 mV 10 KΩ: 8 mA 50 KΩ: 8 mA | 2 Ω: 10 mV 2 KΩ: 10 mA 10 KΩ: 10 mA | 5 Ω: 20 mV 500 Ω: 10 mA 5 KΩ: 10 mA |
| Temperature coefficient | 1 Ω: 800 ppm/°C ± 0.4 mΩ/°C 1 KΩ: 300 ppm/°C ± 0.6 mS/°C 10 KΩ: 300 ppm/°C ± 0.6 mS/°C | 24 Ω: 800 ppm/°C 800 ppm/°C ± 10 mΩ/°C 10 KΩ: 300 ppm/°C 300 ppm/°C ± 0.03 mS/°C 50 KΩ: 300 ppm/°C 300 ppm/°C / -0.03 mS/°C | 2 Ω: 800 ppm/°C ± 0.8 mΩ/°C 2 KΩ: 300 ppm/°C ± 0.5 mS/°C 10 KΩ: 300 ppm/°C ± 0.5 mS/°C | 0.5 Ω: 800 ppm/°C ± 0.2 mΩ/°C 500 Ω: 300 ppm/°C ± 1.2 mS/°C 5 KΩ: 300 ppm/°C ± 1.2 mS/°C |
| Transient generator Frequency range | 0.25 Hz - 10 kHz | 0.25 Hz - 10 kHz | 0.25 Hz - 10 kHz | 0.25 Hz - 10 kHz |
| Resolution | 4% or less | 4% or less | 4% or less | 4% or less |
| Accuracy | 3% | 3% | 3% | 3% |
| Duty cycle range | 3 - 97% (0.25 Hz - 1 kHz) 6 - 94% (1 kHz - 10 kHz) | 3% - 97% (0.25 Hz - 1 kHz) 6 - 94% (1 kHz - 10 kHz) | 3 - 97% (0.25 Hz - 1 kHz) 6 - 94% (1 kHz - 10 kHz) | 3 - 97% (0.25 Hz - 1 kHz) 6 - 94% (1 kHz - 10 kHz) |
| Resolution | 4% | 4% | 4% | 4% |
| Accuracy | 6% of setting ± 2% | 6% of setting ± 2% | 6% of setting ± 2% | 6% of setting ± 2% |
| Current level high range Resolution | 60 A range: 260 mA | 10 A range: 43 mA | 30 A range: 130 mA | 120 A range: 520 mA |
| Accuracy | 0.1% ± 350 mA | 0.18% ± 50 mA | 0.1% ± 200 mA | 0.15% ± 700 mA |
| Current level low range Resolution | 6 A range: 26 mA | 1 A range: 4 mA | 3 A range: 13 mA | 12 A range: 52 mA |
| Accuracy | 0.1% ± 80 mA | 0.18% ± 13 mA | 0.1% ± 40 mA | 0.15% ± 160 mA |
| Current temperature coefficient | 100 ppm/°C ± 7 mA/°C | 180 ppm/°C ± 1.2 mA/°C | 100 ppm ± 5 mA/°C | 150 ppm/°C ± 10 mA/°C |
| Voltage level | 3 to 60 V | 3 - 240 V | 3 to 60 V | 3 to 60 V |
| Voltage level resolution | 260 mV | 1 V | 260 mV | 260 mV |
| Voltage level accuracy | 0.1% ± 300 mV | 0.15% ± 1.1 V | 0.1% ± 300 mV | 0.15% ± 300 mV |
| Net weight (approx.) | 6060A: 6.4 kg (14 lb) 60502A: 3.2 kg (7 lb) | 6063A: 6.4 kg (14 lb) 60503A: 3.2 kg (7 lb) | 3.2 kg (7 lb) | 5.9 kg (13 lb) |
| Shipping weight | 6060A: 7.5 kg (17 lb) 60502A: 4.5 kg (10 lb) | 6063A: 7.5 kg (17 lb) 60503A: 4.5 kg (10 lb) | 4.5 kg (10 lb) | 7.3 kg (16 lb) |

HP 6050A, 6051A weight

Net Weight: 6050A: 9.5 kg (21 lb)

6051A: 5.5 kg (12 lb)

Shipping Weight: 6050A: 13.6 kg (30 lb)

6051A: 7.5 kg (17 lb)

HP-IB interface capabilities

The following HP-IB functions are implemented: SH1, AH1, L4, SR1, DC1, DT1, and RL1

Safety agency compliance

Hewlett-Packard Electronic Loads are designed to comply with the following regulatory standards: IEC 348, VDE 0411, UL 1244, and CSA Electrical Bulletin 556B

Specifications - continued

| Hewlett-Packard Model | HP 6060A, 60502A | HP 6063A, 60503A | HP 60501A | HP 60504A |
|--|--|--|---|--|
| Transient generator (continued) | | | | |
| Voltage temperature coefficient | 150 ppm/°C ± 5 mV/°C | 120 ppm/°C ± 10 mV/°C | 150 ppm/°C ± 5 mV/°C | 150 ppm/°C ± 5 mV/°C |
| Programmable slew rate | 60 A range: 1 A/ms - 5 A/μs 6 A range: 0.1 A/ms - 0.5 A/μs | 10 A Range: 0.17 A/ms - 0.83 A/μs 1 A range: 17 A/s - 83 A/ms | 30 A range: 0.5 A/ms - 2.5 A/μs 3 A range: 0.05 A/ms - 0.25 A/μs | 120 A range: 2 A/ms - 10A/μs 12 A range: 200 A/s - 1 A/μs |
| Rise/fall time | 12 μs to 8 ms | 16 μs to 8 ms | 12 μs - 8 ms | 12 μs - 8 ms |
| Analog programming bandwidth | 10 kHz (-3 db freq.) | 10 kHz (-3 db freq.) | 10 kHz (-3 db freq.) | 10 kHz (-3 db freq.) |
| Analog programming accuracy | | | | |
| Current (low range) | 4.5% ± 75 mA | 3% ± 8 mA | 4.5% ± 40 mA | 4% ± 200 mA |
| Current (high range) | 4.5% ± 250 mA | 3% ± 12 mA | 4.5% ± 130 mA | 4% ± 400 mA |
| Temperature coefficient | 100 ppm/°C ± 6 mA/°C | 150 ppm/°C ± 1 mA/°C | 100 ppm/°C ± 3 mA/°C | 100 ppm/°C ± 12 mA/°C |
| Voltage | 0.8% ± 200 mV | 0.5% ± 150 mV | 0.8% ± 200 mV | 0.8% ± 200 mV |
| Temperature coefficient | 100 ppm/°C ± 1 mV/°C | 120 ppm/°C ± 10 mV/°C | 100 ppm/°C ± 1 mV/°C | 100 ppm/°C ± 1 mV/°C |
| Analog programming voltage | 0-10 V | 0-10 V | 0-10 V | 0-10 V |
| Readback specifications | | | | |
| current readback resolution | 17 mA (via HP-IB) 20 mA (front panel) | 2.7 mA (via HP-IB) 10 mA (front panel) | 9 mA (via HP-IB) 10 mA (front panel) | 32 mA (via HP-IB) 100 mA (front panel) |
| Current readback accuracy | 0.05% ± 65 mA | 0.12% ± 10 mA | 0.06% ± 40 mA | 0.1% ± 110 mA |
| Temperature coefficient | 50 ppm/°C ± 5 mA/°C | 100 ppm/°C ± 1 mA/°C | 65 ppm/°C ± 3 mA/°C | 100 ppm/°C ± 8 mA/°C |
| Voltage readback resolution | 17 mV (via HP-IB) 20 mV (front panel) | 67 mV (via HP-IB) 100 mV (front panel) | 17 mV (via HP-IB) 20 mV (front panel) | 16 mV (via HP-IB) 20 mV (front panel) |
| Voltage readback accuracy | 0.05% ± 45 mV | 0.1% ± 150 mV | 0.05% ± 45 mV | 0.1% ± 45 mV |
| Temperature coefficient | 50 ppm/°C ± 1.2 mV/°C | 100 ppm/°C ± 8 mV/°C | 50 ppm/°C ± 1.2 mV/°C | 100 ppm/°C ± 2 mV/°C |
| Power readback accuracy | 0.2% ± 4 W | 0.2% ± 3 mV | 0.2% ± 2 W | 0.2% ± 8 W |
| Analog monitor accuracy | | | | |
| Current monitor (0 to 10 V out) | 4% ± 85 mA | 3% ± 10 mA | 4% ± 40 mA | 4% ± 170 mA |
| Temperature coefficient | 50 ppm/°C ± 6 mA/°C | 100 ppm/°C ± 1 mA/°C | 60 ppm/°C ± 3 mA/°C | 100 ppm/°C ± 10 mA/°C |
| Voltage monitor (0 to 10 V out) | 0.25% ± 40 mV | 0.4% ± 240 mV | 0.25% ± 40 mV | 0.4% ± 60 mV |
| Temperature coefficient | 50 ppm/°C ± 0.2 mV/°C | 70 ppm/°C ± 1.2 mV/°C | 50 ppm/°C ± 0.2 mV/°C | 100 ppm/°C ± 2 mV/°C |
| Remote sensing | 5 Vdc maximum between sense and load input | | | |
| Minimum operating voltage | 2 volts (typical 1.2 V) | 2 volts (typical 1.2 V) | 2 volts (typical 1.2 V) | 2 volts (typical 1.4 V) |
| Programmable short | 0.033 Ω (0.020 typical) | 0.20 Ω (0.10 typical) | 0.066 Ω (0.040 typical) | 0.017 Ω (0.012 typical) |
| Programmable open (typical) | 20 KΩ (typical) | 80 KΩ (typical) | 20 KΩ (typical) | 20 KΩ (typical) |
| Drift (over 8 hour interval) | | | | |
| Current | 0.03% ± 10 mA | 0.03% ± 15 mA | 0.03% ± 5 mA | 0.03% ± 20 mA |
| Voltage | 0.01% ± 10 mV | 0.01% ± 20 mV | 0.01% ± 10 mV | 0.01% ± 10 mV |
| PARD (20 Hz to 10 MHz noise) | | | | |
| Current | 4 mA rms 40 mA peak-peak | 1 mA rms 10 mA peak-peak | 2 mA rms 20 mA peak-peak | 6 mA rms 60 mA peak-peak |
| Voltage | 6 mV rms | 6 mV rms | 5 mV rms | 8 mV rms |
| dc solution voltage | ±240 Vdc, between any input and chassis ground | | | |
| Digital inputs | V _{IL} = 0.9 V max at I _{IL} = -1 mA V _{IH} = 3.15 V min (pull-up resistor on input) | | | |
| Digital outputs | V _{OL} = 0.72 V max at I _{OL} = 1 mA V _{OH} = 4.4 V min at I _{OH} = -20 μA | | | |

- Notes:
 1. Operating temperature range is 0 to 55°C. All specifications apply for 25°C ± 5°C, except as noted.
 2. Maximum continuous power available is derated linearly from 40°C to 75% of maximum at 55°C.
 3. dc current accuracy specifications apply 30 seconds after input is applied.

Ordering Information

| Model | Price | Options | | | | | | | |
|-----------|---------|--------------------|--------------------|---------|---------|---------------|--------|--------|---------------|
| | | Front Panel Inputs | ac Input | | | Rackmount Kit | | | Extra Manuals |
| | | | 100 VAC Japan Only | 220 VAC | 240 VAC | 800 | 908 | 909 | |
| HP 6050A | \$1,920 | - | \$0* | \$0* | - | +\$37† | +\$98† | +\$52* | |
| HP 6051A | \$1,700 | - | \$0* | \$0* | +\$67† | +\$67† | - | +\$50* | |
| HP 6060A | \$2,100 | +\$82* | \$0* | \$0* | - | +\$32* | +\$75* | +\$35* | |
| HP 6063A | \$2,500 | +\$82* | \$0* | \$0* | - | +\$32* | +\$75* | +\$35* | |
| HP 60501A | \$1,315 | - | - | - | - | - | - | +\$32* | |
| HP 60502A | \$1,620 | - | - | - | - | - | - | +\$32* | |
| HP 60503A | \$1,950 | - | - | - | - | - | - | +\$32* | |
| HP 60504A | \$2,275 | - | - | - | - | - | - | +\$32* | |

† Option 908 and 909 for the HP 6050A, and Option 800 and 908 for the HP 6051A, require either the slide kit (P/N 1494-0059) or slide rails to support the weight of the load mainframe. Slide kits can be purchased using the above part number.
 * This feature is available as an option.
 - This feature is not available.

Option Descriptions

- Opt 020** Front panel inputs.
- Opt 100** 87-106 Vac, 47-66 Hz (for Japan only).
- Opt 220** 191-233 Vac, 47-66 Hz.
- Opt 240** 209-250 Vac, 47-66 Hz.
- Opt 800** Rackmounting kit for two units mounted side-by-side. (HP part numbers 5062-3994 and 5062-3978).
- Opt 908** Rackmounting kit includes (HP P/N 5062-3978 with an HP 6050A, HP P/N 5062-3960 with HP 6051A, and HP P/N 5062-3974 with an HP 6060A).
- Opt 909** Rackmounting kit with handles (HP P/N 5062-3984 when mounting an HP 6050A and HP P/N 5062-3975 when mounting an HP 6060A).
- Opt 910** Extra manual set, including one each of the Operating Manual, Programming Reference Manual, and Service Manual. The Programming Manual is available with the Mainframe, and therefore not individual modules. (Operating Manuals and Programming Manuals only are shipped with standard units).