

Agilent 6650A Series Single-Output, 500 W DC Power Supplies, GPIB

Data Sheet

Speed and accuracy for test optimization



- Fast, low-noise outputs
- Analog control of output voltage and current
- Fan-speed control to minimize acoustic noise
- Built-in measurements and advanced programmable features
- Protection features to ensure DUT safety

This series of 500 W linear-regulated DC power supplies is designed to maximize the throughput of DUTs through the manufacturing test process with fast up and down programming time.

Valuable assemblies can be destroyed by a minor component failure that causes a surge of current to flow into the DUT. Fast protection features, including fast crowbar, mode crossover protection, and the ability to connect the protection circuitry of multiple power supplies can increase production yield.

Programming of the DC output and the protection features can be done either from the front panel or using industry standard SCPI commands, via the GPIB. Using the serial link, up to 16 power supplies can be connected through one GPIB address. Test system integration can be further simplified by using the *VXIplug&play* drivers. The output voltage and current can also be controlled with analog signals. This is helpful for certain types of noisy environments, and also immediate reactions to process changes.

Lab bench use is enhanced by the fan speed control, which helps to minimize acoustic noise.



Agilent Technologies

Specifications

| Specifications (at 0 ° to 55 °C unless otherwise specified) | 6651A | 6652A | 6653A | 6654A | 6655A | 6651A-J05 Special order option |
|---|---|---------------|---------------|--------------|--------------|--|
| Number of outputs | 1 | 1 | 1 | 1 | 1 | 1 |
| GPIB | Yes | Yes | Yes | Yes | Yes | Yes |
| Output ratings | | | | | | |
| Output voltage | 0 to 8 V | 0 to 20 V | 0 to 35 V | 0 to 60 V | 0 to 120 V | 10 V |
| Output current (40 °C) | 0 to 50 A | 0 to 25 A | 0 to 15 A | 0 to 9 A | 0 to 4 A | 50 A |
| Maximum current (50 °C/55 °C) | 45 A/42.5 A | 22.5 A/21.3 A | 13.5 A/12.8 A | 8.1 A/7.7 A | 3.6 A/3.4 A | 45 A/42.5 A |
| Programming accuracy (at 25 °C ± 5 °C) | | | | | | |
| Voltage 0.06% + | 5 mV | 10 mV | 15 mV | 26 mV | 51 mV | 6 mV |
| Current 0.15% + | 60 mA | 25 mA | 13 mA | 8 mA | 4 mA | 60 mA |
| Ripple and noise from 20 Hz to 20 MHz | | | | | | |
| Voltage rms | 300 µV | 300 µV | 400 µV | 500 µV | 700 µV | 300 µV |
| peak-to-peak | 3 mV | 3 mV | 4 mV | 5 mV | 7 mV | 3 mV |
| Current rms | 25 mA | 10 mA | 5 mA | 3 mA | 2 mA | 25 mA |
| Readback accuracy at 25 °C ± 5 °C (percent of reading plus fixed) | | | | | | |
| Voltage 0.07% + | 6 mV | 15 mV | 25 mV | 40 mV | 80 mV | 7.5 mV |
| +Current 0.15% + | 67 mA | 26 mA | 15 mA | 7 mA | 3 mA | 67 mA |
| –Current 0.35% + | 100 mA | 44 mA | 24 mA | 15 mA | 7 mA | 100 mA |
| Load regulation | | | | | | |
| Voltage | 1 mV | 2 mV | 3 mV | 4 mV | 5 mV | 1 mV |
| Current | 2 mA | 1 mA | 0.5 mA | 0.5 mA | 0.5 mA | 2 mA |
| Line regulation | | | | | | |
| Voltage | 0.5 mV | 0.5 mV | 1 mV | 1 mV | 2 mV | 0.5 mV |
| Current | 2 mA | 1 mA | 0.75 mA | 0.5 mA | 0.5 mA | 2 mA |
| Transient response time | Less than 100 µs for the output voltage to recover to its previous level (within 0.1% of the voltage rating of the supply or 20 mV, whichever is greater) following any step change in load current of up to 50% of the output current rating of the supply | | | | | |

| Supplemental characteristics (Non-warranted characteristics determined by design and useful in applying the product) | 6651A | 6652A | 6653A | 6654A | 6655A | 6651A-J05 Special order option |
|--|--------------|--------------|--------------|--------------|--------------|--|
| Average programming resolution | | | | | | |
| Voltage | 2 mV | 5 mV | 10 mV | 15 mV | 30 mV | 2.5 mV |
| Current | 15 mA | 7 mA | 4 mA | 2.5 mA | 1.25 mA | 15 mA |
| OVP | 12 mV | 30 mV | 54 mV | 93 mV | 190 mV | 16 mV |
| OVP accuracy | 160 mV | 400 mV | 700 mV | 1.2 V | 2.4 V | 200 mV |

Specifications, continued

| Specifications <i>(at 0 ° to 55 °C unless otherwise specified)</i> | 6651A-J03 Special order option | 6651A-J09 Special order option | 6652A-J03 Special order option | 6653A-J04 Special order option | 6653A-J17 Special order option |
|---|---|--|--|--|--|
| Number of outputs | 1 | 1 | 1 | 1 | 1 |
| GPIB | Yes | Yes | Yes | Yes | Yes |
| Output ratings | | | | | |
| Output voltage | 6 V | 17 V/20 V | 27 V | 40 V | 30 V |
| Output current (40 °C) | 60 A | 30 A/15 A | 18.5 A | 12.5 A | 17.5 A |
| Maximum current (50 °C/55 °C) | 54 A/51 A | 27 A/25.5 A 13.5 A/12.75 A | 16.65 A/15.72 A | 11.25 A/10.6 A | 15.75 A/14.87 A |
| Programming accuracy (at 25 °C ± 5 °C) | | | | | |
| Voltage 0.06% + | 5 mV | 10 mV | 13.5 mV | 17.5 mV | 15 mV |
| Current 0.15% + | 75 mA | 36 mA | 25 mA | 13 mA | 16 mA |
| Ripple and noise from 20 Hz to 20 MHz | | | | | |
| Voltage rms | 300 µV | 300 µV | 450 µV | 1.6 mV | 400 µV |
| peak-to-peak | 3 mV | 4 mV | 4.5 mV | 5 mV | 4 mV |
| Current rms | 30 mA | 13 mA | 10 mA | 5 mA | 6 mA |
| Readback accuracy at 25 °C ± 5 °C (percent of reading plus fixed) | | | | | |
| Voltage 0.07% + | 6 mV | 15 mV | 20.5 mV | 30 mV | 25 mV |
| +Current 0.15% + | 80 mA | 40 mA | 26 mA | 15 mA | 18 mA |
| –Current 0.35% + | 150 mA | 55 mA | 44 mA | 24 mA | 28 mA |
| Load regulation | | | | | |
| Voltage | 1 mV | 2 mV | 2 mV | 3.5 mV | 3 mV |
| Current | 6.5 mA | 2 mA | 1 mA | 1 mA | 0.5 mA |
| Line regulation | | | | | |
| Voltage | 0.5 mV | 0.5 mV | 0.5 mV | 1 mV | 1 mV |
| Current | 2 mA | 2 mA | 2 mA | 0.75 mA | 0.75 mA |
| Transient response time | Less than 100 µs for the output voltage to recover to its previous level (within 0.1% of the voltage rating of the supply or 20 mV, whichever is greater) following any step change in load current of up to 50% of the output current rating of the supply | | | | |
| Supplemental characteristics <i>(Non-warranted characteristics determined by design and useful in applying the product)</i> | 6651A-J03 Special order option | 6651A-J09 Special order option | 6652A-J03 Special order option | 6653A-J04 Special order option | 6653A-J17 Special order option |
| Average programming resolution | | | | | |
| Voltage | 2 mV | 5 mV | 6.75 mV | 12 mV | 10 mV |
| Current | 18 mA | 9 mA | 7 mA | 4 mA | 5 mA |
| OVP | 12 mV | 30 mV | 30 mV | 65 mV | 54 mV |
| OVP accuracy | 160 mV | 500 mV | 400 mV | 750 mV | 700 mV |

Specifications, continued

| Specifications <i>(at 0 ° to 55 °C unless otherwise specified)</i> | 6654A-J04 Special order option | 6654A-J05 Special order option | 6654A-J12 Special order option | 6655A-J05 Special order option | Special order option |
|---|---|--|--|--|--|
| Number of outputs | 1 | 1 | 1 | 1 | 1 |
| GPIB | Yes | Yes | Yes | Yes | Yes |
| Output ratings | | | | | |
| Output voltage | 70 V | 50 V | 80 V | 150 V | 156 V |
| Output current (40 °C) | 7.5 V | 10 A | 6 A | 3.2 A | 3 A |
| Maximum current (50 °C/55 °C) | 6.75 A/6.37 A | 9 A/8.5 A | 5.4 A/5.1 A | 2.88 A/2.72 A | 2.7 A/2.55 A |
| Programming accuracy (at 25 °C ± 5 °C) | | | | | |
| Voltage 0.06% + | 30 mV | 26 mV | 35 mV | 64 mV | 71 mV |
| Current 0.15% + | 7 mA | 9 mA | 7 mA | 3.5 mA | 4 mA |
| Ripple and noise from 20 Hz to 20 MHz | | | | | |
| Voltage rms | 600 µV | 500 µV | 700 µV | 800 µV | 900 µV |
| peak-to-peak | 6 mV | 5 mV | 7 mV | 8 mV | 8 mV |
| Current rms | 5 mA | 4 mA | 3 mA | 2 mA | 3 mA |
| Readback accuracy at 25 °C ± 5 °C (percent of reading plus fixed) | | | | | |
| Voltage 0.07% + | 50 mV | 40 mV | 58 mV | 100 mV | 110 mV |
| +Current 0.15% + | 6 mA | 8 mA | 6 mA | 2.5 mA | 3 mA |
| –Current 0.35% + | 13 mA | 17 mA | 16 mA | 6.5 mA | 7.5 mA |
| Load regulation | | | | | |
| Voltage | 4 mV | 4 mV | 4 mV | 6 mV | 7 mV |
| Current | 0.5 mA | 0.5 mA | 0.5 mA | 0.5 mA | 1 mA |
| Line regulation | | | | | |
| Voltage | 1 mV | 1 mV | 4.5 mV | 2 mV | 2 mV |
| Current | 0.5 mA | 0.5 mA | 0.5 mA | 0.5 mA | 1 mA |
| Transient response time | Less than 100 µs for the output voltage to recover to its previous level (within 0.1% of the voltage rating of the supply or 20 mV, whichever is greater) following any step change in load current of up to 50% of rated current | | | | |
| Supplemental characteristics <i>(Non-warranted characteristics determined by design and useful in applying the product)</i> | 6654A-J04 Special order option | 6654A-J05 Special order option | 6654A-J12 Special order option | 6655A-J05 Special order option | 6655A-J10 Special order option |
| Average programming resolution | | | | | |
| Voltage | 17.5 mV | 15 mV | 20 mV | 37.5 mV | 39.5 mV |
| Current | 1.9 mA | 2.75 mA | 1.7 mA | 8 mA | 8 mA |
| OVP | 110 mV | 93 mV | 130 mV | 240 mV | 250 mV |
| OVP accuracy | 1.4 V | 1.2 V | 1.6 V | 3 V | 3.3 V |

Supplemental characteristics for all model numbers

DC floating voltage: Output terminals can be floated up to ± 240 VDC from chassis ground

Remote sensing: Up to half the rated output voltage can be dropped in each load lead. The drop in the load leads subtracts from the voltage available for the load.

Command processing time: Average time required for the output voltage to begin to change following receipt of digital data is 20 ms for the power supplies connected directly to the GPIB

Output programming response time: The rise and fall time (10/90% and 90/10%) of the output voltage is less than 15 ms. The output voltage change settles within 1 LSB (0.025% x rated voltage) of final value in less than 60 ms.

Down programming: An active down programmer sinks approximately 20% of the rated output current

Modulation: (Analog programming of output voltage and current)

Input signal: 0 to -5 V

Input impedance: 10 kΩ nominal

AC input:
(AC input frequency 47 to 63 Hz)

| | | | | |
|----------------|---------|---------|---------|---------|
| Voltage | 100 VAC | 120 VAC | 220 VAC | 240 VAC |
| Current | 12 A | 10 A | 5.7 A | 5.3 A |

Input power: 1,380 VA, 1,100 W at full load; 120 W at no load

GPIB interface capabilities: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, E1, and C0. IEEE-488.2 and SCPI-compatible command set.

Software driver:

- IVI-COM
- VXIplug&play

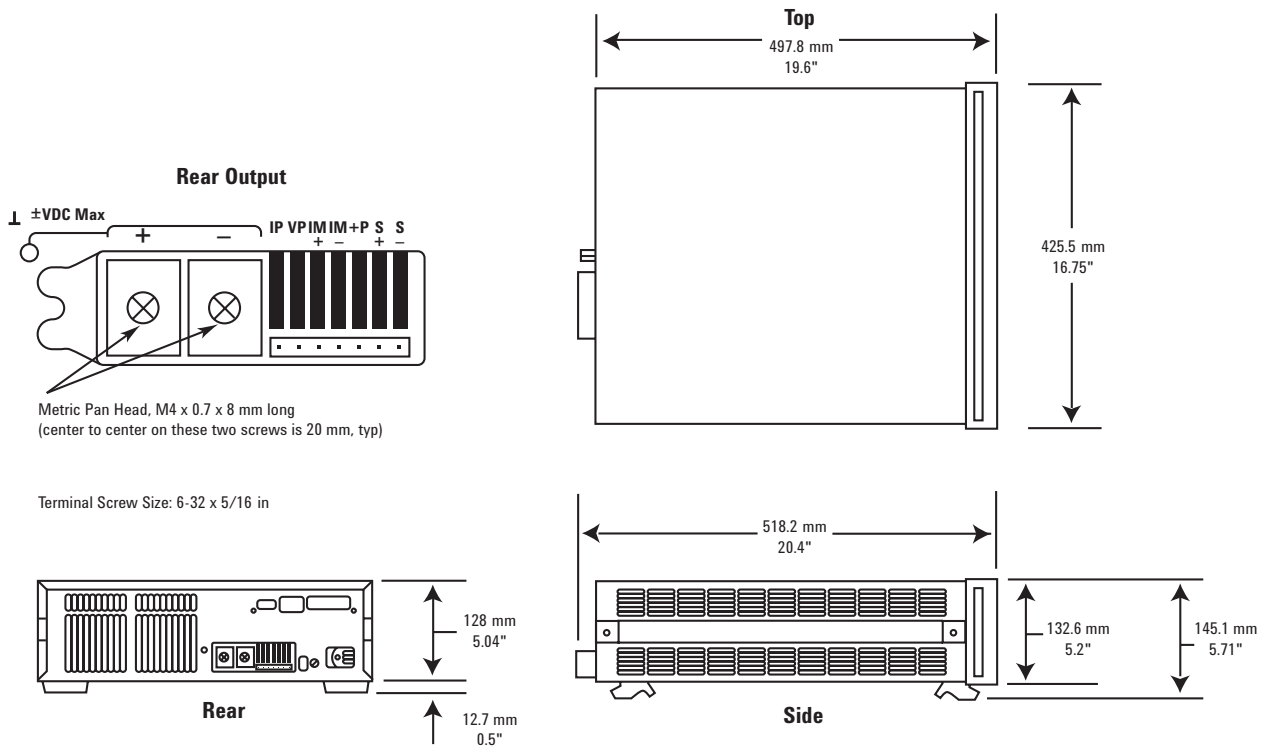
Regulatory compliance: Listed to UL 1244; conforms to IEC 61010-1.

Size:
425.5 mm W x 132.6 mm H x 497.8 mm D
(16.75 in x 5.22 in x 19.6 in)

Weight: Net, 25 kg (54 lb); shipping, 28 kg (61 lb)

Warranty: One year

Agilent models: 6651A, 6652A, 6653A, 6654A, 6655A



Ordering information

Opt 100 87 to 106 VAC, 47 to 63 Hz
Opt 120 104 to 127 VAC, 47 to 63 Hz
Opt 220 191 to 233 VAC, 47 to 63 Hz
Opt 240 209 to 250 VAC, 47 to 63 Hz

Opt 0L1 Full documentation on CD-ROM and printed user's and programming guides. CD-ROM includes user's guide, programming guide, service manual, and quick start guide
Opt 0B3 Printed service manual

Accessories

1CM003A* Rack mount flange kit
132.6 mm H (3U) – two flange brackets
1CP002A* Rack mount flange and handle kit
132.6 mm H (3U) – two brackets and front handles
E3663AC Support rails for Agilent rack cabinets
p/n 1494-0059 Accessory slide kit
p/n 1252-3698 7-pin analog plug
p/n 1252-1488 4-pin digital plug
p/n 5080-2148 Serial link cable
2 m (6.6 ft)

Application notes

10 Practical Tips You Need to Know About Your Power Products, 5965-8239E

10 Hints for Using Your Power Supply to Decrease Test Time, 5968-6359E

Understanding Linear Power Supply Operation (AN1554), 5989-2291EN

Modern Connectivity—Using USB and LAN I/O Converters (AN 1475-1)
5989-0123EN

Agilent DC Power Supplies for Base Station Testing, 5988-2386EN

* Support rails required



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