

# A

## Specifications

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Table A-1 lists the specifications of the dc source. Unless otherwise noted, specifications are warranted over the ambient temperature range of 0 to 55 °C. Specifications apply with typical cellular phone capacitive loads from 0µF to 12,000µF. Sensing is at the rear terminals of the power supply after a 30-minute warm-up period. Sense terminals are externally jumpered to their respective output terminals.

**Table A-1. Performance Specifications**

Parameter		Agilent 66111A	Agilent 66311B/D; Agilent 66309B/D output 1 only	Agilent 66309B/D output 2 only
<b>Output Ratings</b>	Voltage: Current: Peak Current:	0 – 15 V 0 – 3 A 5 A <sup>1</sup>		0 – 12 V 0 – 1.5 A 2.5 A <sup>2</sup>
<b>Programming Accuracy</b> (@ 25°C ±5°C)	Voltage: +Current:	0.05% + 10 mV 0.05% + 1.33 mA <sup>3</sup>		0.2% + 40 mV 0.2% + 4.5 mA
<b>DC Measurement Accuracy</b> (via GPIB or front panel meters with respect to actual output @ 25°C ±5°C)	Voltage: Current: <u>High Current range</u> <sup>4</sup> +20 mA to + rated I: –20 mA to – rated I: <u>Low Current range</u> –20 mA to +20 mA:	0.03% + 5 mV see below 0.2% + 9 mA 0.2% + 9 mA NA	0.03% + 5 mV see below 0.2% + 0.5 mA <sup>5</sup> 0.2% + 1.1 mA 0.1% + 2.5 µA <sup>6</sup>	0.2% + 15 mV 0.2% + 3 mA NA NA NA
<b>Ripple and Noise</b> (in the range of 20 Hz to 20 MHz with outputs ungrounded or with either terminal grounded)	Voltage (rms/p-p): Current (rms):	1 mV/6 mV <sup>7</sup> 2 mA		1 mV/6 mV <sup>7</sup> 2 mA
<b>Load Regulation</b> (change in output voltage or current for any load change within ratings)	Voltage: Current:	2 mV 0.75 mA		1.6 mV 0.375 mA
<b>Line Regulation</b> (change in output voltage or current for any line change within ratings)	Voltage: Current:	0.5 mV 0.75 mA		0.4 mV 0.25 mA
<b>Transient Response Time</b> (for the output voltage to recover to 20 mV below its final setting)		< 35 µs <sup>8</sup>		< 400 µs <sup>9</sup>

<sup>1</sup> Peak current for up to a 7 millisecond time period. Average current cannot exceed 3 A.

<sup>2</sup> Peak current for up to a 1 millisecond time period. Average current cannot exceed 1.5 A.

<sup>3</sup> 0.05% +2.3mA when programming between zero and 0.03% of full scale current.

<sup>4</sup> Agilent 66111A units do not have a low current range, the dc measurement accuracy applies from 0 amperes to the rated current.

<sup>5</sup> Applies with current detector set to DC. ACDC mode accuracy is 0.2% + 3mA for sourcing and 0.2% + 3.6 mA for sinking.

<sup>6</sup> This specification may degrade slightly when the unit is subjected to an RF field ≥3 V/meter.

<sup>7</sup> Specification is for phone capacitance greater than 6µF.

<sup>8</sup> Applies to the negative portion of the output voltage transient waveform, following a 0.1 A to 1.5 A load current change.

(Applies with unit set to High capacitance compensation range with 5 µF minimum output load capacitance.)

<sup>9</sup> Following a 0.75 A to 1.5 A load change.

## Supplemental Characteristics

Table A-2 lists the supplemental characteristics, which are not warranted but are descriptions of typical performance determined either by design or type testing.

**Table A-2. Supplemental Characteristics**

Parameter		Agilent 66111A	Agilent 66311B/D, Agilent 66309B/D output 1 only	Agilent 66309B/D output 2 only
<b>Output Programming Range</b>	Voltage: Current: OVP:	0 – 15.535 V 0 – 3.0712 A 22 V		0 – 12.25 V 0 – 1.52 A NA
<b>Average Programming Resolution</b>	Voltage: Current: OVP:	3.75 mV 0.75 mA 100 mV		14 mV 1.75 mA NA
<b>OVP Accuracy</b>		2.4 % + 240 mV		NA
<b>Average Current Measurement Resolution</b>	High Range: Low Range:	3.5 mA NA	213 $\mu$ A 0.6 $\mu$ A	55 $\mu$ A NA
<b>Maximum Current Measurement</b>		7 A		1.8A
<b>Sink Current</b>		- 2 A @ 7.5 V <sup>1</sup>		- 0.03 A @ 7.5 V
<b>Programming Accuracy Temperature Coefficient (change/C°)</b>	Voltage: Current: OVP:	0.01% + 0.5 mV 0.01% + 15 $\mu$ A 0.015% + 4 mV		0.03% + 1.5 mV 0.03% + 0.4 mA NA
<b>Readback Accuracy Temperature Coefficient (change/C°)</b>	Voltage: Current (dc): Current (acdc): Current (low range):	0.01% + 300 $\mu$ V 0.02% + 15 $\mu$ A NA NA	0.01% + 300 $\mu$ V 0.02% + 15 $\mu$ A 0.05% + 120 $\mu$ A 0.01% + 0.3 $\mu$ A	0.02% + 1.5 mV 0.02% + 0.4 mA NA NA
<b>Drift<sup>2</sup></b>	Voltage: Current: +	0.01% + 1 mV 0.01% + 30 $\mu$ A		0.03% + 3 mV 0.03% + 0.8 mA
<b>Remote Sense Capability (voltage per load lead)</b>		up to 4 V <sup>3</sup>		up to 4 V <sup>4</sup>
<b>Output Voltage Rise Time</b> <b>Output Voltage Fall Time</b>	10% to 90%: 90% to 10%:	< 200 $\mu$ s < 200 $\mu$ s		< 200 $\mu$ s < 35 ms
<b>Output Voltage Settling Time<sup>5</sup></b>	0 to rated voltage: rated voltage to 0:	0.5 ms 1 ms		NA NA
<b>Dynamic Measurement System<sup>6</sup></b>	Buffer Length: Sample Rate Range:	NA	0 – 4096 points 15.6 $\mu$ s – 31200s	NA

<sup>1</sup>The sink current decreases linearly from 2.8A @ 0 V to 1.2 A @ 15 V. Sink current does not track the programmed current.

<sup>2</sup>Following a 30 minute warm-up, the change in output over 8 hours, under constant ambient, load and line conditions.

<sup>3</sup>Add 2 mV to the load regulation for each 1 V change in the positive output lead.

<sup>4</sup>Add 3 mV to the load regulation for each 1 V change in the negative output lead.

<sup>5</sup>To settle within 1 LSB or 3.75mV of the final value for Output 1.

<sup>6</sup>For a pulse waveform, the accuracy of any individual data point in the buffer is dependent on the rise time of the pulse. For a current pulse of 1.4A with a rise time constant of 50 $\mu$ s, the error in measurement of a single data point during the pulse rise time is typically 10mA.

Table A-2. Supplemental Characteristics (continued)

Parameter		Agilent 66111A Agilent 66311B/D	Agilent 66309B/D
<b>Measurement Time</b> (includes 30 ms <sup>1</sup> data acquisition time and 20 ms data processing overhead)	voltage or current	50 ms average	
<b>Command Processing Time</b> (time for output to begin to change following receipt of digital data)		4 ms average	
<b>Savable Instrument States</b> (applies only in SCPI mode)		4 (in locations 0 to 3)	
<b>GPIB Interface Capabilities</b>	Language: Interface:	SCPI or COMPatibility <sup>2</sup> AH1, C0, DC1, DT1, E1, L4, PP0, RL1, SH1, SR1, T6	
<b>INH/FLT Characteristics</b>	Maximum ratings:  FLT Terminals:  INH Terminals:	16.5 Vdc between terminals 1 and 2; 3 and 4; and from terminals 1 or 2 to chassis ground  Low-level output current = 1.25 mA max. Low-level output voltage = 0.5 V max.  Low-level input voltage = 0.8 V max. High-level input voltage = 2 V min. Low-level input current = 1 mA Pulse width = 100 $\mu$ s min. Time delay = 4 ms typical	
<b>Digital I/O Characteristics</b>	Maximum ratings: Digital OUT Port 0,1,2 (open collector)  Digital IN Port 2: (internal pull-up)	same as INH/FLT Characteristics Output leakage @ 16V = 0.1 mA (ports 0,1) = 12.5 mA (port 2) Output leakage @ 5V = 0.1 mA (ports 0,1) = 0.25 mA (port 2) Low-level output sink current @ 0.5 V = 4 mA Low-level output sink current @ 1 V = 50 mA Low-level input current @ 0.4 V = 1.25 mA High-level input current @ 5 V = 0.25 mA Low-level input voltage = 0.8 V max. High level input voltage = 2.0 V min.	
<b>Isolation to Ground</b> (Maximum from either output terminal to chassis)		50 Vdc	
<b>Mains Input Ratings:</b> (at full load from 47–63 Hz)	100 Vac (87-106 Vac): 115 Vac (104-127 Vac): 220 Vac (191-233 Vac): 230 Vac (207-253 Vac):	1.7 A, 125 W 1.5 A, 125 W 0.8 A, 125 W 0.75A, 125 W	2 A, 170 W 1.7 A, 170 W 0.92 A, 170 W 0.85A, 170 W

<sup>1</sup>May be reduced by changing the default conditions of 2048 data points but measurement uncertainty due to noise will increase.<sup>2</sup>Compatibility language is used to program the Agilent 663xA Series power supplies. Not all Agilent 66111A/66311B capabilities are available when using the Compatibility language. Also, Compatibility language is not available for Agilent 66309B/D units.

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**Table A-2. Supplemental Characteristics (continued)**

Parameter		All Models
<b>Recommended Calibration Interval</b>	from the date the unit is put into service	1 year
<b>Regulatory Compliance</b>	Listing pending: Certified to: Conforms to: Complies with:	UL 3111-1 CSA 22.2 No. 1010.1 IEC 1010-1, EN 61010-1 EMC directive 89/336/EEC (ISM Group1 Class B)
<b>Dimensions</b> (see figure 3-1)	Height: Width: Depth:	88.1 mm (3.5in.) 212.8 mm (8.4in.) 435 mm (17.125 in.)
<b>Net weight</b>		9.07 kg (20 lbs.)
<b>Shipping weight</b>		11.1 kg (24.5 lbs.)

**Table A-3. Agilent 66311D/66309D DVM Specifications and Characteristics**

Performance Specifications (warranted from 0 to 55 °C unless otherwise noted)		
<b>DC Readback Accuracy</b> (@ 25°C ±5°C)		0.04% +5 mV
<b>AC+DC rms Readback Accuracy</b> (@ 25°C ±5°C with dc plus a sinewave input > 25mV rms)	60 Hz to 10 kHz: 45-60 Hz and 10-20 kHz:	1% +5 mV <sup>1</sup> 4 % +5 mV <sup>1</sup>
<b>Common Mode Voltage Range</b> (from either DVM input with respect to the negative output terminal of Output 1)		- 4.5 Vpk to + 25 Vpk
<b>Maximum DC Differential Voltage</b>		± 25 V peak
<b>Maximum AC Differential Voltage</b> (with a sinewave input)		10 V rms <sup>2</sup>
Supplemental Characteristics		
<b>Maximum Continuous Input Capability without damage</b> (between input terminals or from either input to chassis ground)		50 V
<b>Input Resistance</b> (from either DVM input with respect to either output terminal of Output 1)		20 MΩ
<b>Input Capacitance</b> (on either input terminal)		< 60 pF
<b>DC Common Mode Rejection Ratio</b>		> 83 dB
<b>Voltage Readback Resolution</b>	Front panel: GPIB:	1 mV < 0.2 mV
<b>Readback Temperature Coefficient</b> (change per °C)		0.002% + 0.2 mV

<sup>1</sup>+15 mV for dc plus sinewave input < 25 mV rms.

<sup>2</sup>To accept 10 Vrms sinewave input, the common mode voltage with respect to the negative terminal of output 1 must be 10 Vdc. This is required to "center" the DVM in its common mode range.

**Table A-4. Agilent 66309B/D Option 521 Characteristics**

<b>Output Impedance</b> (Output = OFF)	Output 1: Output 2:	500k ohms 200k ohms
<b>Solid State Relay Current rise time</b> (from 10% to 90% of the total output change)	Relay mode =Hot	100 microseconds
<b>Solid State Relay Current fall time</b> (from 10% to 90% of the total output change)	Relay mode =Hot	50 microseconds