

Agilent PXI Digital Multimeters

6½ Digit, High Performance

M9182A

M9183A



- 6½ digit resolution
- High throughput: up to 20,000 rdgs/sec, 50 μ s single reading interval
- DCV basic one year accuracy: 40 ppm
- Nine standard measurements: DCV, ACV, DCI, ACI, 2- and 4-wire resistance, frequency/period, capacitance, and temperature



DISCOVER the Alternatives...

... Agilent **MODULAR** Products



Agilent Technologies

OVERVIEW

Product Description

Agilent's M9182A and M9183A 6½ digit high performance PXI digital multimeters offer fast development, high throughput and trustworthy results. The M9182A provides nine built-in measurement types with all the accuracy and stability you would expect from an Agilent 6½ digit DMM. The M9183A provides the same capabilities as the M9182A, with market-leading measurement speed of up to 20,000 readings per second, additional ranges, and a DC source.

Industries and Applications

- Aerospace and defense
- Automotive electronics test
- Industrial electronics test
- Medical device test
- Semiconductor and component test



Features

- 6½ digit resolution
- Up to 20,000 readings per second, 50 µs single reading interval time (M9183A)
Up to 4,500 readings per second (M9182A)
- Basic 1 year DCV accuracy of 40 ppm, 90 day accuracy of 30 ppm
- DCV, ACV, ACV, ACI, 2- and 4-wire resistance, frequency, capacitance, and temperature
- Pulse width, duty cycle, and totalizer (M9183A)
- External trigger in and DMM out; synchronization with external multiplexers and instruments
- Advanced triggering
- Floating isolation (Cat II) to 300 Vrms
- Software drivers to support most common programming environments
- PXI form factor
- Chassis connector compatibility: PXI-1 (J-1 only), PXIe hybrid slot

Customer Values

- Measurements you can trust
- Higher throughput saves test time
- Application development in the environment of your choice reduces development time.
- Fast and easy installation and configuration
- Customer supportable calibration procedures as well as calibration services available from Agilent.

M9182A and M9183A Feature Summary

DMM	Description	Type # slots	Resolution	Maximum reading rate at 4½ digits	Voltage & current	Resistance, temperature, capacitance	Other measurements	DC source
M9182A	High performance PXI DMM	PXI x1	6½ digits	4,500 rdgs/sec	DCV, DCI, ACV, ACI	2- & 4-wire Ω, temperature, capacitance	Freq/period	n/a
M9183A	Enhanced performance PXI DMM	PXI x1	6½ digits	20,000 rdgs/sec	DCV, DCI, ACV, ACI	2- & 4-wire Ω, temperature, capacitance	Freq/period, offset compensated ohms, pulse width & duty cycle, totalizer/ event counter	± 10 V ±(1.2 µA to 12 mA)

EASY SETUP... TEST... AND MAINTENANCE

Hardware Platform

Compliance

The M9182A and M9183A 6½ digit, digital multimeters (DMMs) are PXI compliant, using either a cPCI (J1), PXI-1 (J1) or PXIe Hybrid slot. Designed to benefit from fast data interfaces, an M9182A or M9183A DMM can be integrated with other test and automation modules in a PXI, CompactPCI, or Hybrid chassis. The PXI format offers high performance in a small, rugged package. It is an ideal deployment platform for many automated test systems. A wide array of complementary PXI products are currently available. Products from Agilent include switches, multiplexers, digitizers, waveform generators, and local oscillators.

Software Platform

IO Libraries Suite

Agilent IO Libraries Suite offers fast and easy instrument connections and now extends to modular instruments. IO Libraries Suite 16.0 adds support for PXI, helping you display all of the modules in your system, whether they are PXI, PXIe, or PCIe, as well as view information about installed software. In addition, the new version allows you to more easily find the right driver and start module soft front panels directly with Agilent Connection Expert.

National Instruments IO libraries are also supported, and may be used along with Agilent IO libraries.

Drivers

Agilent's digital multimeters come complete with software drivers for Windows® XP, Windows Vista, and Windows 7. These software drivers work in the most popular test and measurement development environments including: LabVIEW and Visual Studio® (C, C++, C#, Visual Basic),

Easy software integration

Application code examples are included for LabVIEW, Visual Basic, and C—demonstrating DMM set up and basic functionality. These application code examples can be used to help you integrate the DMM module into your measurement system.

Soft front panel

Agilent soft front panel provides easy to use instrument control. The M9182A and M9183A graphical user interface guides developers through module setup so users can quickly configure the DMM.

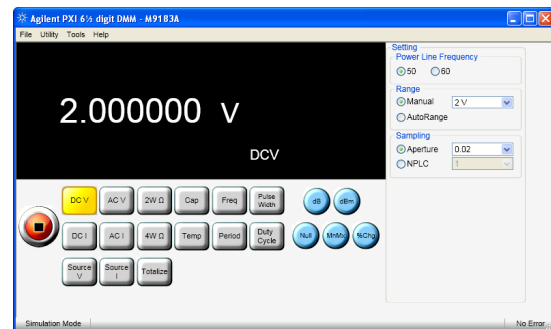


Figure 1. M9183A soft front panel

One notable feature of the soft front panel is the Driver Call Log. Available as a pull down menu item, the Driver Call Log, allows the user to see the driver calls for each button pushed. The user can then incorporate the driver calls into their application program – enabling fast and easy program development.

Calibration

Each M9182A and M9183A DMM is factory calibrated and shipped with an ISO-9002, NIST-traceable calibration certificate.

Calibration is required once per year. A documented calibration process allows you to do in-rack calibration using standard calibration sources. Alternatively, Agilent offers return to Agilent calibration services for the M9182A and M9183A DMMs.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS

M9182A & M9183A: Accuracy specifications \pm (% of reading + % of range)^{1,2}

Function	Range ³	Frequency or test current	24 hour 23 °C \pm 5 °C	90 day 23 °C \pm 5 °C	1 year 23 °C \pm 5 °C
DC Voltage	200.0000 mV		0.0030 + 0.0005	0.0040 + 0.0008	0.0050 + 0.0010
	2.000000 V		0.0020 + 0.0002	0.0030 + 0.0002	0.0040 + 0.0003
	20.00000 V		0.0040 + 0.0006	0.0050 + 0.0007	0.0070 + 0.0008
	200.0000 V		0.0030 + 0.0001	0.0040 + 0.0001	0.0050 + 0.0003
True RMS, AC voltage ^{4,5} (Fast RMS off)	200.0000 mV ⁶	10 Hz - 20 Hz	3.00 + 0.18	3.10 + 0.19	3.20 + 0.22
		20 Hz - 47 Hz	0.37 + 0.08	0.38 + 0.09	0.40 + 0.10
		47 Hz - 10 kHz	0.13 + 0.05	0.14 + 0.06	0.15 + 0.06
		10 kHz - 50 kHz	0.25 + 0.08	0.26 + 0.10	0.27 + 0.12
		50 kHz - 100 kHz	1.90 + 0.18	1.95 + 0.19	2.00 + 0.20
	2.000000 V	10 Hz - 20 Hz	3.00 + 0.10	3.10 + 0.11	3.20 + 0.13
		20 Hz - 47 Hz	0.37 + 0.07	0.38 + 0.08	0.40 + 0.09
		47 Hz - 10 kHz	0.05 + 0.05	0.06 + 0.06	0.07 + 0.06
		10 kHz - 50 kHz	0.32 + 0.06	0.33 + 0.66	0.35 + 0.08
		50 kHz - 100 kHz	1.90 + 0.08	2.00 + 0.09	2.10 + 0.10
	20.00000 V	10 Hz - 20 Hz	3.00 + 0.07	3.10 + 0.08	3.30 + 0.10
		20 Hz - 47 Hz	0.37 + 0.06	0.38 + 0.07	0.40 + 0.08
47 Hz - 10 kHz		0.06 + 0.05	0.07 + 0.06	0.07 + 0.07	
10 kHz - 50 kHz		0.18 + 0.09	0.20 + 0.11	0.22 + 0.13	
50 kHz - 100 kHz		1.30 + 0.15	1.40 + 0.18	1.50 + 0.20	
200.0000 V & 300.0000 V	10 Hz - 20 Hz	3.00 + 0.07	3.10 + 0.08	3.30 + 0.08	
	20 Hz - 47 Hz	0.43 + 0.06	0.44 + 0.07	0.45 + 0.08	
	47 Hz - 10 kHz	0.07 + 0.05	0.08 + 0.07	0.09 + 0.08	
	10 kHz - 50 kHz	0.28 + 0.07	0.30 + 0.08	0.32 + 0.10	
	50 kHz - 100 kHz	1.30 + 0.09	1.60 + 0.12	2.40 + 0.13	
True RMS, AC voltage ^{4,5} (Fast RMS on)	200.0000 mV ⁶	350 Hz - 800 Hz	0.60 + 0.08	0.65 + 0.09	0.70 + 0.10
		800 Hz - 10 kHz	0.13 + 0.05	0.14 + 0.06	0.15 + 0.06
		10 kHz - 50 kHz	0.55 + 0.08	0.60 + 0.10	0.63 + 0.12
		50 kHz - 100 kHz	5.30 + 0.18	5.40 + 0.19	5.60 + 0.20
	2.000000 V	350 Hz - 800 Hz	0.93 + 0.07	0.96 + 0.08	1.00 + 0.09
		800 Hz - 10 kHz	0.07 + 0.05	0.08 + 0.06	0.08 + 0.06
		10 kHz - 50 kHz	0.62 + 0.06	0.65 + 0.66	0.70 + 0.08
		50 kHz - 100 kHz	5.10 + 0.08	5.20 + 0.09	5.30 + 0.10
	20.00000 V	350 Hz - 800 Hz	0.93 + 0.06	0.96 + 0.07	1.00 + 0.08
		800 Hz - 10 kHz	0.07 + 0.05	0.07 + 0.06	0.07 + 0.07
		10 kHz - 50 kHz	0.31 + 0.09	0.33 + 0.11	0.35 + 0.13
		50 kHz - 100 kHz	2.00 + 0.15	2.20 + 0.18	2.40 + 0.20
200.0000 V & 300.0000 V	350 Hz - 800 Hz	1.00 + 0.06	1.10 + 0.07	1.10 + 0.08	
	800 Hz - 10 kHz	0.07 + 0.05	0.07 + 0.07	0.08 + 0.08	
	10 kHz - 50 kHz	0.34 + 0.07	0.45 + 0.08	0.50 + 0.10	
	50 kHz - 100 kHz	2.50 + 0.09	2.80 + 0.12	3.20 + 0.13	

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS, CONTINUED

M9182A & M9183A: Accuracy specifications \pm (% of reading + % of range)^{1,2}

Function	Range ³	Frequency or burden voltage	24 hour 23 °C \pm 5 °C	90 day 23 °C \pm 5 °C	1 year 23 °C \pm 5 °C
Resistance ⁷	20.00000 Ω (M9183A only)	10 mA	0.004 + 0.002	0.009 + 0.004	0.014 + 0.005
	200.0000 Ω	1 mA	0.004 + 0.002	0.010 + 0.002	0.013 + 0.003
	2.000000 kΩ	1 mA	0.003 + 0.002	0.008 + 0.002	0.012 + 0.002
	20.00000 k Ω	100 μ A	0.003 + 0.002	0.008 + 0.002	0.012 + 0.002
	200.0000 k Ω	10 μ A	0.006 + 0.002	0.010 + 0.002	0.016 + 0.003
	2.000000 M Ω	1 μ A	0.018 + 0.002	0.030 + 0.003	0.040 + 0.004
	20.00000 M Ω	100 nA	0.120 + 0.002	0.130 + 0.003	0.200 + 0.003
	200.0000 M Ω (M9183A only)	4 nA	0.800 + 0.010	1.000 + 0.015	1.300 + 0.025
DC current	200.0000 nA (M9183A only)	< 100 μ V	0.130 + 0.020	0.160 + 0.023	0.170 + 0.030
	2.000000 μ A (M9183A only)	< 100 μ V	0.050 + 0.004	0.080 + 0.003	0.210 + 0.008
	20.00000 μ A (M9183A only)	< 100 μ V	0.050 + 0.002	0.080 + 0.003	0.130 + 0.004
	200.0000 μ A (M9183A only)	< 2.5 mV	0.052 + 0.100	0.070 + 0.150	0.100 + 0.200
	2.000000 mA	< 25 mV	0.020 + 0.015	0.030 + 0.020	0.040 + 0.028
	20.00000 mA	< 250 mV	0.020 + 0.002	0.035 + 0.003	0.045 + 0.003
	200.0000 mA	< 55 mV	0.020 + 0.025	0.030 + 0.030	0.040 + 0.040
	2.000000 A	< 520 mV	0.100 + 0.003	0.150 + 0.004	0.200 + 0.005
True RMS, AC current ⁸	2.000000 mA⁹	10 Hz - 20 Hz	2.70 + 0.20	2.90 + 0.20	2.90 + 0.20
		20 Hz - 47 Hz	0.90 + 0.20	0.90 + 0.20	1.00 + 0.20
		47 Hz - 1 kHz	0.04 + 0.08	0.08 + 0.15	0.12 + 0.20
		1 kHz - 10 kHz	0.12 + 0.20	0.14 + 0.20	0.22 + 0.20
	20.00000 mA	10 Hz - 20 Hz	1.80 + 0.15	2.60 + 0.15	2.80 + 0.15
		20 Hz - 47 Hz	0.60 + 0.15	0.90 + 0.15	1.00 + 0.15
		47 Hz - 1 kHz	0.07 + 0.05	0.15 + 0.10	0.16 + 0.15
		1 kHz - 10 kHz	0.21 + 0.15	0.30 + 0.20	0.40 + 0.20
	200.0000 mA	10 Hz - 20 Hz	1.80 + 0.20	2.70 + 0.20	2.80 + 0.20
		20 Hz - 47 Hz	0.60 + 0.20	0.90 + 0.20	1.00 + 0.20
		47 Hz - 1 kHz	0.10 + 0.05	0.17 + 0.09	0.20 + 0.11
		1 kHz - 10 kHz	0.30 + 0.15	0.35 + 0.18	0.40 + 0.20
	2.000000 A	10 Hz - 20 Hz	1.80 + 0.20	2.50 + 0.23	2.70 + 0.25
		20 Hz - 47 Hz	0.66 + 0.30	0.80 + 0.30	0.90 + 0.30
		47 Hz - 1 kHz	0.30 + 0.19	0.33 + 0.19	0.35 + 0.20
		1 kHz - 10 kHz	0.40 + 0.20	0.45 + 0.23	0.50 + 0.25
Frequency or period ¹⁰	200 mV to 300 V	1 Hz - 130 Hz	0.025 + 0.002	0.025 + 0.002	0.025 + 0.002
		130 Hz - 640 Hz	0.025 + 0.003	0.025 + 0.003	0.025 + 0.003
		640 Hz - 2.5 kHz	0.030 + 0.003	0.030 + 0.003	0.030 + 0.003
		2.5 kHz - 40 kHz	0.030 + 0.003	0.030 + 0.003	0.030 + 0.003
		40 kHz - 200 kHz	0.050 + 0.004	0.050 + 0.004	0.050 + 0.004
		200 kHz - 300 kHz	0.070 + 0.002	0.070 + 0.002	0.070 + 0.002

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS, CONTINUED

Accuracy specifications continued \pm (% of reading + % of range)^{1,2}

Function	Range or resolution	Frequency or full scale reading	24 hour 23 °C \pm 5 °C	90 day 23 °C \pm 5 °C	1 year 23 °C \pm 5 °C
Duty cycle (typ) [M9183A only]	0.02 %	2 Hz - 100 Hz	0.03 +0.03	0.03 +0.03	0.03 +0.03
	0.20 %	100 Hz - 1 kHz	0.03 +0.30	0.03 +0.30	0.03 +0.30
	2.00 %	1 kHz - 10 kHz	0.03 +3.00	0.03 +3.00	0.03 +3.00
	20.0 %	10 kHz - 100 kHz	0.03 +20.0	0.03 +20.0	0.03 +20.0
Pulse width (typ) [M9183A only]	2 μ s - 1 s	.5 Hz - 100 kHz	.01 \pm 4 μ s	01 \pm 4 μ s	01 \pm 4 μ s
Capacitance ¹¹ [M9183A and M9182A]	1000.0 pF	1199.9 pF	1.00 + 0.10	1.00 + 0.10	1.00 + 0.10
	10.000 nF	11.999 nF	1.20 + 0.05	1.20 + 0.05	1.20 + 0.05
	100.00 nF	119.99 nF	1.00 + 0.10	1.00 + 0.10	1.00 + 0.10
	1.0000 μ F	1.1999 μ F	1.00 + 0.10	1.00 + 0.10	1.00 + 0.10
	10.000 μ F	11.999 μ F	1.00 + 0.10	1.00 + 0.10	1.00 + 0.10
	100.00 μ F	119.99 μ F	1.00 + 0.10	1.00 + 0.10	1.00 + 0.10
	1.0000 mF	1.1999 mF	1.20 + 0.10	1.20 + 0.10	1.20 + 0.10
	10.000 mF	11.999 mF	2.00 + 0.10	2.00 + 0.10	2.00 + 0.10

1. Specifications are for 1 hour warm up, within 1 hour self-cal, aperture \geq 0.5 sec, slow AC filter.
2. For temperatures outside the range of 23 °C \pm 5 °C, but within 0 °C to 50 °C, add 0.1 \times accuracy specification per °C.
3. 20% over range on all ranges except 300 V range, 10% over range for 300 V range.
4. Minimum input specified: 5 mV or 1% of range, whichever is larger.
5. Signal is limited to 8×10^6 Volt Hz product. For example, at 32 kHz, the highest input is 250 V.
6. For inputs from 5 mV to 10 mV, add 100 μ V to the specification.
7. Specifications are for 4-wire resistance measurements, or 2-wire using Math Null. Without Math Null, add 1 m Ω additional error to the specification.
8. Minimum input specified: 60 μ A or 1.5% of range, whichever is larger.
9. For inputs from 60 to 120 μ A, add 10 μ A to the specification.
10. Minimum amplitude greater of: 100 mV, or 5 % of range for 1 Hz to 2.5 kHz, or 25 % of range for 2.5 kHz to 300 kHz.
11. Specifications apply to input signals \geq 5% of range, for values < 500 pF add 15% of range.

Definitions for specifications

Specification (spec): Represents warranted performance of a calibrated instrument that has been stored for a minimum of two hours within the operating temperature range of 0 to 55 °C, unless otherwise stated, and after a one hour warm-up period. The specifications include measurement uncertainty. Data represented in this document are specifications unless otherwise noted.

Typical (typ): Represents characteristic performance, which 80% of the instruments manufactured will meet. This data is not warranted, does not include measurement uncertainty, and is valid only at room temperature (approximately 25 °C).

Nominal (nom): The expected mean or average performance, or an attribute whose performance is by design, such as the 50 Ω connector. This data is not warranted and is measured at room temperature (approximately 25 °C).

Measured (meas): An attribute measured during the design phase for purposes of communicating expected performance, such as amplitude drift vs. time. This data is not warranted and is measured at room temperature (approximately 25 °C).

Note: All graphs contain measured data from several units at room temperature unless otherwise noted.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS, CONTINUED

M9182A & M9183A Sensitivity (typ)

Function	Lowest Range	Sensitivity
DCV	200.0000 mV	0.1 μ V
ACV	200.0000 mV	0.1 μ V
Resistance (M9183A)	20.00000 Ω	10 $\mu\Omega$
Resistance (M9182A)	200.0000 Ω	100 $\mu\Omega$
DCI (M9183A)	200.0000 nA	0.1 pA
DCI (M9182A)	2.000000 mA	10 nA
ACI	2.000000 mA	1 nA
Capacitance	1000.0 pF	0.1 pF

M9182A & M9183A Temperature accuracy (spec)¹

Temperature Function	Type	R ₀ (Ω)	Sensitivity	Range/max temperature	1 Year 23 °C \pm 5 °C
RTD Temperature Measurement ^{2,3}	pt385	100 Ω , 200 Ω	0.01 °C	-150 to 650 °C	\pm 0.06 °C
		500 Ω , 1 k Ω	0.01 °C	-150 to 650 °C	\pm 0.03 °C
	Cu (Copper)	Less than 12 Ω	0.01 °C	-100 to 200 °C	\pm 0.18 °C at \leq 20 °C \pm 0.05 °C otherwise
		Higher than 90 Ω	0.01 °C	-100 to 200 °C	\pm 0.10 °C at \leq 20 °C \pm 0.05 °C otherwise
Thermocouple Temperature Measurement ^{4,5}	B	NA	0.01 °C	2200 °C	\pm 0.38 °C
	E	NA	0.01 °C	1200 °C	\pm 0.035 °C
	J	NA	0.01 °C	2000 °C	\pm 0.06 °C
	K	NA	0.01 °C	3000 °C	\pm 0.07 °C
	N	NA	0.01 °C	3000 °C	\pm 0.10 °C
	R	NA	0.01 °C	2700 °C	\pm 0.25 °C
	S	NA	0.01 °C	3500 °C	\pm 0.35 °C
	T	NA	0.01 °C	550 °C	\pm 0.06 °C
Thermistor ³	2.25 k Ω	NA	0.01 °C	-80 to 150 °C	\pm 0.1 °C
	5 k Ω	NA	0.01 °C	-80 to 150 °C	\pm 0.1 °C
	10 k Ω	NA	0.01 °C	-80 to 150 °C	\pm 0.1 °C

1. Specifications are for one hour warm up, within one hour self-cal, aperture \geq 0.5 sec, slow AC filter.
2. 4-wire RTD measurement, R₀ variable 10 Ω to 10 k Ω .
3. For total measurement accuracy, add temperature probe error.
4. For total measurement accuracy, add thermocouple error and cold junction compensation.
5. DMM linearization temperature range may be greater than that of the thermocouple device.

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS, CONTINUED

Source-Measure

M9183A Source DC Voltage, Measure DC Voltage (typ)

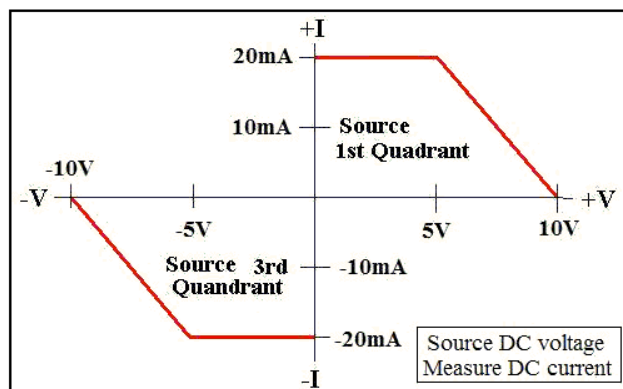
Parameter	Extended Resolution	Basic Resolution
DC voltage source (output) range	-10.000 to +10.000 V	-10.000 to +10.000 V
DC current source/sink at 5 V output	5 mA	5 mA
DAC resolution	18 bits	12 bits
DC voltage measurement accuracy 1 year, (23 °C ± 5 °C) ^{1,2,3}	0.015% ± 0.004%	1.0% ± 0.4%
Typical settling time	100 ms	1 ms
Source resistance (typ)	200 Ω	200 Ω

M9183A Source DC Voltage, Measure DC Current (typ)

DC Voltage source (output) range	-10.000 to +10.000 V
DC Current measurement range	0 to ± 20 mA
Voltage setting resolution	5 mV
Voltage setting accuracy 1 Year, (23 °C ± 5 °C) ^{1,2,3} (Spec)	1.0% ± 0.35%
Typical settling time	100 ms
DC current measurement accuracy	0.1% + 0.005%

M9183A Source DC Current, Measure DC Voltage (typ)

DC Voltage Measurement Range	0 to ± 2.0 V		
Current output	Compliance voltage	Minimum Level	Accuracy 1 year, (23 °C ± 5 °C) ^{1,2,3}
< 1.25 μA	4.2 V	10 nA	1% + 1%
< 12.5 μA	4.2 V	50 nA	1% + 1%
< 125 μA	4.2 V	100 nA	1% + 0.5%
< 1.25 mA	4.2 V	1 μA	1% + 0.5%
< 12.5 mA	1.2 V	10 μA	1% + 0.5%



1. Specifications are for one hour warm up, within one hour self-cal, slow AC filter
2. For temperatures outside the range of 23 °C ± 5 °C, but within 0 °C to 50 °C, add 0.1 × accuracy specification per °C
3. Repetitive reading at an aperture of 133 ms or higher

TECHNICAL SPECIFICATIONS AND CHARACTERISTICS, CONTINUED

Triggering Characteristics

The M9182A and M9183A have advanced triggering capabilities that exceed those found on other digital multimeters. Advanced triggering allows you to capture the signal you need in a variety of applications.

External hardware trigger

Trigger input voltage level range (at DIN 7 connector)	+3 to +15 V activates the trigger
Minimum trigger pulse width	Aperture + 50 μ s
Trigger input impedance	3 k Ω
Internal reading buffer	Circular, 80 readings
Edge	Selectable positive or negative edge

PXI bus trigger inputs

Trigger input voltage level range (via PXI backplane)	CMOS level (see PXI standard)
Minimum trigger pulse width	1/Aperture + 50 μ s
Internal reading buffer	Circular, 80 readings
Edge	Selectable positive or negative edge

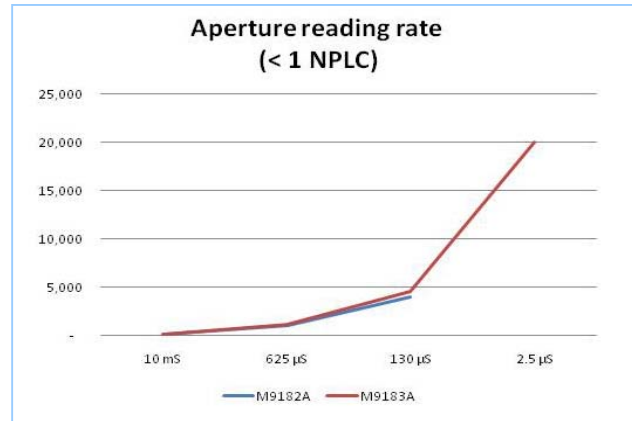
Trigger modes

Analog threshold trigger (Pre-trigger or post-trigger)	Trigger point	Selectable threshold and positive or negative edge transition
	Buffer type	Circular
	Captures	80 post-trigger readings
	Aperture range	2.5 μ s to 160 ms
	Read interval range	1/aperture to 65 ms
	Post-trigger readings	Selectable from 0 to 80
	Pre-trigger readings	Selectable from 0 to 80
Trigger delay (Default values ensure 1st reading accuracy)	Measurement delay	50 μ s to 1 s
	Resolution	1 μ s to 64 ms, 20 μ s to 1 s

Measurement Characteristics

Resolution vs. Aperture and Reading Rate for DCV, DCI, Ω

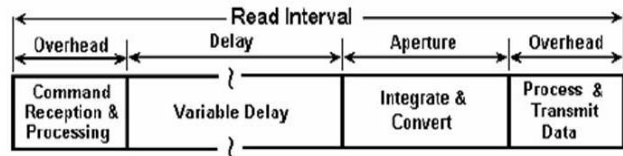
Measurement aperture	Maximum readings per second	Resolution
10 ms	98	6½ digits (22 bits)
625 μ s	1,200	5½ digits (18 bits)
130 μ s	4,500	4½ digits (14 bits)
2.5 μ s (M9183A only)	20,000	4½ digits (14 bits)



Transaction Speed

Transactional I/O speed is a single reading measurement. This is important when you are taking many single measurements with the DMM. The M9183A delivers the highest transactional measurement speed in its class. These fast readings, up to 20,000 readings per second with a read interval rate of 50 μ s, translate into higher test-system throughput and lower cost of test per unit tested.

Read interval can be programmed in μ s increments for values up to 65 ms, and in 20 μ s increments to 1 second



Time frame of a single measurement
Minimum read interval = 50 μ s (M9183A only)

System Reading and Throughput Rates

Switching ranges within a function	Aperture (A)	Range change time (ms)
DCV	$A \leq 20$ ms	$(A \times 0.2) + 15$
	$A > 20$ ms	$A + 15.6$
Resistance (2-wire or 4-wire)	$A < 33$ ms	$(A \times 0.05) + 15.5$
	$A \geq 33$ ms	$A + 13$
DCI (200 mA or 2 A to any other range)	$A \leq 40$ ms	4.2
	$A > 40$ ms	15.7
DCI (all other ranges)	All apertures	1
Capacitance	All apertures	12

Switch between functions	Aperture (A)	Function change time (ms)
DCV to resistance	$A < 16$ ms	15.6
	$A \geq 16$ ms	$A + 25$
Resistance to DCI	$A < 16.66$ ms	7.8
	16.66 ms $\leq A < 40$ ms	$A \times 0.65$
	40 ms $< A < 66.66$ ms	7.8
	$A \geq 66.66$ ms	$(A \times 0.51) + 45$
DCV to capacitance	$A < 33.33$ ms	23.4
	$A \geq 33.33$ ms	$(A \times 0.65) + 50$
Resistance to capacitance	$A \leq 33.33$ ms	23.4
	33.33 ms $< A < 80$ ms	$(A \times 2) + 35$
	80 ms $\leq A < 160$ ms	23.4
	$A \geq 160$ ms	160

Measurement Characteristics

DC Voltage

Measurement method	Delta-Sigma A/D conversion
Input resistance	200 mV, 2.0 V Ranges: >10 G Ω with typical leakage of < 50 pA; 20 V, 200 V, 300 V Ranges: 10.0 M Ω
Input isolation	330 VDC, 250 VAC from Earth Ground
Input overvoltage protection	330 VDC all ranges
DCV noise rejection	Normal mode rejection at 50, 60, or 400 Hz \pm 0.5%; > 95 dB (apertures \geq 0.160 s); CMRR (1 k Ω lead imbalance) \geq 120 dB

True RMS AC Voltage

Measurement method	AC coupled (10 Hz to 100 kHz) true RMS — measures the AC component only Analog RMS DC converter
Crest factor	Maximum crest factor of 4 at full scale, 7 at 10% of range
Input impedance	1 M Ω , in parallel with < 300 pF
Settling time	< 0.05 sec to within 0.15 of final value Fast RMS: < 0.05 sec to within 0.1% of final value
Peak input	8 x 10 ⁶ Volt Hz product (example: 250 V @ 32 kHz)
Input overvoltage protection	330 VAC all ranges
ACV noise rejection	Common mode rejection at 50 Hz or 60 Hz; 1 k Ω imbalance in either lead > 60 dB

Resistance

Measurement method	Selectable 2-wire or 4-wire. Current source referenced to LO output
Offset compensation (M9183A only)	All ranges, use with apertures > 5 ms
Maximum test voltage	240 mV for 20 Ω and 200 Ω ranges; 2.4 V for 20 k Ω to 20 M Ω ranges; 1.0 V for 200 M Ω range (M9183A only)
Maximum lead resistance (4-wire)	50 k Ω for 200 k Ω , 2.0 M Ω , and 20 M Ω ranges; 5 k Ω for 20 k Ω range 500 Ω for 200 Ω and 2 k Ω ranges
Input protection	330 V on all ranges

DC Current

Shunt resistance	10 Ω for 2 mA and 20 mA, 0.1 Ω for 200 m Ω and 2 A; Virtual zero shunt for lower current ranges (M9183A only)
Input protection	Protected with 2.5 A, 250 V fast blow fuse

True RMS AC Current

Measurement method	AC coupled true RMS measurement (measures the AC component only.) Analog RMS DC converter.
Shunt resistance	10 Ω for 2 mA and 20 mA, 0.1 Ω for 200 m Ω and 2 A; Virtual zero shunt for lower current ranges (M9183A only)
Input protection	Protected with 2.5 A, 250 V fast blow fuse

Measurement Characteristics

Frequency and Period

Measurement method Direct (conventional) counting

Input impedance 1 M Ω with < 300 pF

Sensitivity (130 Hz) .001 Hz

Pulse Width (M9183A only)

Sensitivity (2 Hz—100 Hz) 1 μ s

Totalizer (M9183A only)

Maximum count 1 x10⁹; transition selectable

Allowed rate 1 to 30,000 events per second, threshold by threshold DAC.

Capacitance

Measurement method Differential charge balance: variable currents used to stimulate dV/dt response.

Connection type 2-wire

Environmental and Physical Characteristics

Temperature range Operating -10° to 55 °C
Non-operating -40 ° to +85 °C

Relative humidity Operating to 80% at 40 °C
Storage to 95% at 40 °C

Connectors V HI, 2-wire Ω IN, DCV OUT Sheathed Banana Jack
V LO, 2-wire Ω IN, DCV OUT Sheathed Banana Jack
I HI, 4-wire Ω IN Sheathed Banana Jack
I LO, 4-wire Ω IN Sheathed Banana Jack
Sync OUT DIN 7, pin 2
External Trigger IN DIN 7, pin 7
Trigger & Sync common DIN 7, pin 4

Safety Complies with IEC 61010-1, Cat II 300 V, Pollution degree 2

EMC Complies with EN61326-1 Industrial Environment

Warm-up time One hour

Physical Characteristics

Dimensions 3U/1-slot PXI/CompactPCI standard

Weight 0.5 kg (1 lb.)

Power Dissipation:

+5 V Total power

300 mA 1.5 W max

CONFIGURATION

Hardware¹

Model	Description
M9182A	PXI 6½ digit multimeter
M9183A	PXI 6½ digit multimeter, enhanced performance
DMM units include:	Getting started guide, software drivers, user and service documentation (on CD ROM), Agilent I/O libraries

1. For the M9182A or M9183A DMM to work properly, at least one PXI chassis and one PXI controller type must be available.

Software

Model	Description
Supported Operating Systems	Microsoft Windows XP (32-bit), Microsoft Windows Vista (32/64-bit) Microsoft Windows 7 (32/64-bit)
Standard Compliant Drivers	IVI-C, IVI-COM, LabVIEW
Supported Application Development Environments (ADE)	VisualStudio (VB.NET, C#, C/C++), LabVIEW
Agilent IO Libraries	Includes: VISA Libraries, Agilent Connection Expert, IO Monitor

Calibration and Warranty

Advantage Services: Calibration and Warranty

Agilent Advantage Services is committed to your success throughout your equipment's lifetime.

Calibration

R-50C-011-3 Yearly calibration, for 3 years

R-50C-011-5 Yearly calibration, for 5 years

Warranty

Standard warranty is 1 year

R-51B-001-3C 1 year return-to-Agilent warranty extended to 3 years

R-51B-001-5C 1 year return-to-Agilent warranty extended to 5 years

Accessories

Model	Description
34138A	Test lead set

Related products

Model	Description
M9018A	18-slot PXIe chassis
M9021A	PXIe system interface
M9121A	PXI high-density matrix switch
M9131A	PXI SPDT switch, 64 channel
M9101A	PXI high-density multiplexer, 64 channels



The colorful image in our literature is a "tangram". A tangram is a game, originating in China a couple centuries ago. The word tangram can be translated into "seven boards of skill". The goal of this game is to create shapes (simple to complex) with the seven pieces that are provided. The possibilities are infinite, similar to Agilent's new line of modular products. The power of Agilent modular products lies into the different solutions you can customize with our products.

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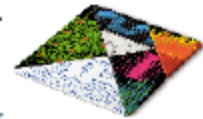
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