Specifications Sheet

Model SM2060 7½ Digit Digital PCI Multimeter
Model SMX2060 7½ Digit Digital PXI Multimeter
Model SM2064 7½ Digit High Work Load PCI Digital Multimeter
Model SMX2064 7½ Digit High Work Load PXI Digital Multimeter

July, 2008
Rev 1.40 S/W and Rev F Hardware.

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1.0 Specifications

The following specifications are based on both, verification of large number of units as well as mathematical evaluation. They should be considered under the environment specified.

To obtain the specified accuracies, allow for half an hour for the multimeter to warm up.

It is important to note that a DMM specified range is expressed as a numeric value indicating the highest absolute voltage that can be measured. The lowest value that can be detected is expressed by the corresponding resolution for the range.

1.1 DC Voltage Measurement

Input Characteristics

- **Input Resistance 240 mV, 2.4 V Ranges:** >10 GΩ, with typical leakage of 50pA
- **Input Resistance 24 V, 240 V, 330V Ranges:** 10.00 MΩ

Accuracy ± (% of reading + Volts) [1]

Range	Full Scale 7-½ Digits	Resolution	24 hours 23°C ± 1°C	90 Days 23°C ± 5°C	One Year 23°C ± 5°C
240 mV	240.00000 mV	10 ηV	0.003 + 1 μV	0.004 + 1.5 μV	0.005 + 2 μV
2.4 V	2.4000000 V	100 ηV	0.002 + 3 μV	0.0025 + 4 μV	0.003 + 5 μV
24 V	24.000000 V	1 μV	0.004 + 120 μV	0.005 + 130 μV	0.006 + 150 μV
240 V	240.00000 V	10 μV	0.003 + 250 μV	0.004 + 300 μV	0.005 + 0.5 mV
330 V	330.00000 V	10 μV	0.005 +550 μV	0.01+ 700 μV	0.015 + 0.8 mV

[1] With Aperture set to ≥ 0.5 Sec, and within one hour from Self Calibration (S-Cal).

For resolution at smaller Apertures, see the following table. Use this table for DC Volts, DC current and Resistance measurements.

Measurement Aperture SM2060, SM2064	Maximum reading rate	Resolution	
0.5 s ≤ Aperture	2 / second	7-1/2 digits	25 bits
10 ms ≤ Aperture	100 / second	6-1/2 digits	22 bits
625μs ≤ Aperture	1200 / second	5-1/2 digits	18 bits
2.5us ≤ Aperture [2]	20,000 / second [2]	4 digits	14 bits

[2] Available only with the SM2064.

DCV Noise Rejection Normal Mode Rejection, at 50, 60, or 400 Hz ± 0.5%, is better than 95 dB for apertures of 0.160s and higher. Common Mode Rejection (with 1 kΩ lead imbalance) is better than 120 dB for these conditions.

1.2 DC Current Measurement

Input Characteristics

- **Number of shunts** Five in SM2064, two in the SM2060
- **Burden Voltage** 240mV max.
- **Protected** with 2.5A Fast blow fuse

Accuracy ± (% of reading + Amps) [1]

Range	Full Scale Reading	Resolution	Max Burden Voltage	24 hours 23°C ± 5°C	90 Days 23°C ± 5°C	One Year 23°C ± 5°C
240 ηA [2]	240.0000 ηA	0.1 pA	100 μV	0.07 + 40pA	0.1 + 45pA	0.17 + 60pA
2.4 μA [2]	2.400000 μA	1 pA	100 μV	0.05 + 70pA	0.08 + 90pA	0.21 + 150pA
24 μA [2]	24.00000 μA	10 pA	100 μV	0.05 + 400pA	0.08 + 600pA	0.13 + 0.8nA
240 μA [2]	240.000 μA	10 ηA	2.5mV	0.052 + 200 ηA	0.07 + 300 ηA	0.1 + 400 ηA
2.4 mA	2.40000 mA	10 ηA	25mV	0.05 + 300 ηA	0.06 + 400 ηA	0.07 + 550 ηA
24 mA	24.0000 mA	100 ηA	250mV	0.05 + 350 ηA	0.065 + 450 ηA	0.08 + 550 ηA
240 mA	240.000 mA	1 μA	55mV	0.05 + 50 μA	0.055 + 60 μA	0.065 + 80 μA
2.4 A	2.40000 A	10 μA	520mV	0.3 + 60 μA	0.4 + 70 μA	0.45 + 90 μA

[1] With Aperture set to ≥ 0.96 Sec, and within one hour from Zero (Relative control).
[2] Available only with the SM2064.

1.3 Resistance Measurements

Input Characteristics

- **Number of Current Sources** seven in SM2064, five in the SM2060
- **Burden Voltage** 240mV or 2.4V max, depending on range.

Range	Full Scale Reading	Resolution	Test current	Maximum Test Voltage (at Full Scale)
24 Ω [1]	24.000000 Ω	1 μΩ	10 mA	240mV
240 Ω	240.00000 Ω	10 μΩ	1 mA	240mV
2.4 kΩ	2.4000000 kΩ	100 μΩ	1 mA	2.4V
24 kΩ	24.000000 kΩ	1 mΩ	100 μA	2.4V
240 kΩ	240.00000 kΩ	10 mΩ	10 μA	2.4V
2.4 MΩ	2.4000000 MΩ	100 mΩ	1 μA	2.4V
24 MΩ	24.0000 MΩ	100 Ω	100 nA	2.4V
240 MΩ[1]	240.000 MΩ	1 kΩ	4 nA	1.0V

[1] Ranges are only available in the SM2064.

1.3.1 2-wire

Accuracy ± (% of reading + Ω) [1]

Range	24 hours 23°C ± 1°C	90 Days 23°C ± 5°C	One Year 23°C ± 5°C
24 Ω	0.0038 + 1.4 mΩ [2]	0.005 + 1.6 mΩ [2]	0.008 + 2 mΩ [2]
240 Ω	0.0037 + 4.5 mΩ [2]	0.0046 + 5 mΩ [2]	0.007 + 6 mΩ [2]
2.4 kΩ	0.0023 + 28 mΩ	0.004 + 32 mΩ	0.006 + 33 mΩ
24 kΩ	0.0025 + 300 mΩ	0.004 + 330 mΩ	0.006 + 350 mΩ
240 kΩ	0.0055 + 3.2 Ω	0.006 + 4 Ω	0.007 + 5 Ω
2.4 MΩ	0.018 + 40 Ω	0.03 + 50 Ω	0.04 + 70 Ω
24 MΩ	0.12 + 400 Ω	0.13 + 500 Ω	0.2 + 600 Ω
240 MΩ	0.8 + 20 kΩ	1.0 + 30 kΩ	1.3 + 50 kΩ

[1] With Aperture set to ≥ 0.5 Sec, and within one hour from Self Calibration (S-Cal).
[2] Use of S-Cal and Relative to improve measurement floor.

1.3.2 4-wire

Accuracy ± (% of reading + Ω) [1]

Range	Maximum Lead Resistance	24 hours 23°C ± 1°C	90 Days 23°C ± 5°C	One Year 23°C ± 5°C
24 Ω	50 Ω	0.0038 + 0.7 mΩ [2]	0.005 + 0.8 mΩ [2]	0.008 + 1 mΩ [2]
240 Ω	500 Ω	0.0037 + 3 mΩ [2]	0.0046 + 4 mΩ [2]	0.007 + 5 mΩ [2]
2.4 kΩ	500 Ω	0.0023 + 28 mΩ	0.004 + 32 mΩ	0.006 + 33 mΩ
24 kΩ	5 kΩ	0.0025 + 300 mΩ	0.004 + 330 mΩ	0.006 + 350 mΩ
240 kΩ	50k Ω	0.0055 + 3.2 Ω	0.007 + 4 Ω	0.007 + 5 Ω
2.4 MΩ	50 kΩ	0.018 + 40 Ω	0.03 + 50 Ω	0.04 + 70 Ω
24 MΩ	50 kΩ	0.12 + 400 Ω	0.13 + 500 Ω	0.2 + 600 Ω

[1] With Aperture set to ≥ 0.5 Sec, and within one hour from Self Calibration (S-Cal).
[2] Use of Relative to facilitate indicated floor (adder part of spec).

1.3.3 6-wire Guarded Resistance Measurement (SM2064)

This is an in-circuit forced guard measurement method, as implemented in ICT testers. Add this typical additional error to the above specification.

Accuracy ± (% of reading + Ω)

Range	Max Guard forced current	One Year 23°C ± 5°C [1] (adder)
24 Ω	20 mA	0.3 + 4 mΩ
240 Ω	20 mA	0.003 + 20 mΩ
2.4 kΩ	20 mA	0.005 + 100 mΩ
24 kΩ	100 µA	0.03 + 1 Ω
240 kΩ	10 µA	0.35 + 10 Ω
24 MΩ	1 µA	0.85 + 1000 Ω

[1] This table should be used in conjunction with the 2-wire and 4-wire table above.

1.3.4 Extended Resistance Measurements (SM2064)

Characteristics

- **Test Voltage** Adjustable between -10V and +10V in 5mV steps

Accuracy ± (% of reading + Amps) [1]

Range	Measurement range	Resolution	Current Limit [3]	90 Days 23°C ± 5°C	One Year 23°C ± 5°C
400kΩ	1kΩ to 100MΩ	10Ω	25µA	0.2 + 50Ω	0.33 + 90Ω
4MΩ	10kΩ to 1GΩ	100Ω	2.5µA	0.3 + 350Ω	0.43 + 550Ω
40MΩ	100kΩ to 10GΩ	1kΩ	250nA	0.4 + 3kΩ	0.55 + 4.5kΩ

[1] With Aperture set to ≥ 0.5 Sec, and within one hour from Zero (Relative control).
[2] Multiply "% of reading" by 1/Voltage Source for applied voltages below 1V
[3] Limit is reached when the test current exceeds the Current Limit, or it is below 0.04% of this value.

1.4 AC Voltage Measurements

Input Characteristics

- **Input Resistance** 1 MΩ, shunted by < 300 pF, all ranges
- **Max. Crest Factor** 4 at Full Scale, increasing to 7 at Lowest Specified Voltage
- **AC coupled** Specified range: 10 Hz to 100 kHz
- **Typical Settling time** < 0.5 sec to within 0.1% of final value
- **Typical Settling time, Fast RMS** < 0.05 sec to within 0.1% of final value

1.4.1 AC Voltage True RMS Measurement

Range	Full Scale 7-½ Digits	Lowest specified Voltage	Resolution
240 mV	240.0000 mV	5 mV [1]	100 ηV
2.4 V	2.400000 V	10 mV	1 μV
24 V	24.00000 V	100 mV	10 μV
240 V	240.0000 V	1 V	100 μV
330 V	330.0000 V	2 V	100 μV

[1] Between 5 mV and 10 mV, add 100 μV additional errors to the accuracy table below.
[2] Signal is limited to $8x10^6$ Volt Hz Product. For example, the largest frequency input at 250 V is 32 kHz, or $8x10^6$ Volt x Hz.

AC Volts Accuracy with (default: Fast RMS off).

Settling time to specified accuracy is 0.5s.

Accuracy ± (% of reading + Volts) [1]

Range	Frequency	24 hours 23°C ± 1°C	90 Days 23°C ± 5°C	One Year 23°C ± 5°C
240 mV	10 Hz - 20 Hz	3.0 + 350 μV	3.1 + 380 μV	3.2 + 430 μV
	20 Hz - 47 Hz	0.37 + 150 μV	0.38 + 170 μV	0.4 + 200 μV
	47 Hz - 10 kHz	0.13 + 100 μV	0.14 + 110 μV	0.15 + 120 μV
	10 kHz - 50 kHz	0.25 + 160 μV	0.26 + 200 μV	0.27 + 230 μV
	50 kHz - 100 kHz	1.9 + 350 μV	1.95 + 370 μV	2.0 + 400 μV
2.4 V	10 Hz - 20 Hz	3.0 + 2 mV	3.1 + 2.2 mV	3.2 + 2.5 mV
	20 Hz - 47 Hz	0.37 + 1.3 mV	0.38 + 1.5 mV	0.4 + 1.7 mV
	47 Hz - 10 kHz	0.05 + 1 mV	0.055 + 1.1 mV	0.065 + 1.2 mV
	10 kHz - 50 kHz	0.32 + 1.2 mV	0.33 + 1.3 mV	0.35 + 1.5 mV
	50 kHz - 100 kHz	1.9 + 1.5 mV	2.0 + 1.7 mV	2.1 + 2 mV
24 V	10 Hz - 20 Hz	3.0 + 14 mV	3.1 + 16 mV	3.3 + 20 mV
	20 Hz - 47 Hz	0.37 + 12 mV	0.37 + 14 mV	0.4 + 16 mV
	47 Hz - 10 kHz	0.06 + 10 mV	0.065 + 11 mV	0.073 + 13 mV
	10 kHz - 50 kHz	0.18 + 18 mV	0.2 + 21 mV	0.22 + 25 mV
	50 kHz - 100 kHz	1.3 + 30 mV	1.4 + 35 mV	1.5 + 40 mV
240 V	10 Hz - 20 Hz	3.0 + 140 mV	3.1 + 160 mV	3.3 + 200 mV
	20 Hz - 47 Hz	0.37 + 120 mV	0.38 + 130 mV	0.4 + 150 mV
	47 Hz - 10 kHz	0.04 + 100 mV	0.045 + 110 mV	0.06 + 130 mV
	10 kHz - 50 kHz	0.28 + 150 mV	0.29 + 170 mV	0.30 + 200 mV
	50 kHz - 100 kHz	1.4 + 200 mV	1.5 + 240 mV	1.6 + 300 mV
330 V	10 Hz - 20 Hz	3.0 + 200 mV	3.1 + 160 mV	3.3 + 200 mV
	20 Hz - 47 Hz	0.43 + 180 mV	0.44 + 200 mV	0.45 + 250 mV
	47 Hz - 10 kHz	0.07 + 150 mV	0.08 + 200 mV	0.09 + 230 mV
	10 kHz - 50 kHz	0.28 + 200 mV	0.30 + 250 mV	0.32 + 300 mV
	50 kHz - 100 kHz	1.3 + 270 mV	2.4 + 350 mV	1.6 + 400 mV

[1] With Aperture set to ≥ 0.5 Sec

ACV Noise Rejection Common Mode rejection, for 50 Hz or 60 Hz with 1 kΩ imbalance in either lead, is better than 60 dB.

AC Volts Accuracy with Fast RMS On.

Settling time to specified accuracy is 50ms.

Accuracy ± (% of reading + Volts) [1]

Range	Frequency	24 hours 23°C ± 1°C	90 Days 23°C ± 5°C	One Year 23°C ± 5°C
240 mV	350 Hz - 800 Hz	0.6 + 150 µV	0.65 + 170 µV	0.7 + 200 µV
	800 Hz - 10 kHz	0.13 + 100 µV	0.14 + 110 µV	0.15 + 120 µV
	10 kHz - 50 kHz	0.55 + 160 µV	0.6 + 200 µV	0.63 + 230 µV
	50 kHz - 100 kHz	5.3 + 350 µV	5.4 + 370 µV	5.6 + 400 µV
2.4 V	350 Hz - 800 Hz	0.93 + 1.3 mV	0.96 + 1.5 mV	1.0 + 1.7 mV
	800 Hz - 10 kHz	0.068 + 1 mV	0.075 + 1.1 mV	0.08 + 1.2 mV
	10 kHz - 50 kHz	0.62 + 1.2 mV	0.65 + 1.3 mV	0.70 + 1.5 mV
	50 kHz - 100 kHz	5.1 + 1.5 mV	5.2 + 1.7 mV	5.3 + 2 mV
24 V	350 Hz - 800 Hz	0.93 + 12 mV	0.96 + 14 mV	1.0 + 16 mV
	800 Hz - 10 kHz	0.065 + 10 mV	0.068 + 11 mV	0.073 + 13 mV
	10 kHz - 50 kHz	0.31 + 18 mV	0.33 + 21 mV	0.35 + 25 mV
	50 kHz - 100 kHz	2.0 + 30 mV	2.2 + 35 mV	2.4 + 40 mV
240 V	350 Hz - 800 Hz	0.93 + 120 mV	0.96 + 130 mV	1.0 + 150 mV
	800 Hz - 10 kHz	0.062 + 100 mV	0.065 + 110 mV	0.08 + 130 mV
	10 kHz - 50 kHz	0.32 + 150 mV	0.4 + 170 mV	0.45 + 200 mV
	50 kHz - 100 kHz	2.5 + 200 mV	2.8 + 240 mV	3.2 + 300 mV
330 V	350 Hz - 800 Hz	1.0 + 180 mV	1.1 + 200 mV	1.1 + 250 mV
	800 Hz - 10 kHz	0.065 + 150 mV	0.07 + 200 mV	0.08 + 230 mV
	10 kHz - 50 kHz	0.34 + 200 mV	0.45 + 250 mV	0.5 + 300 mV
	50 kHz - 100 kHz	2.5 + 270 mV	2.8 + 350 mV	3.2 + 400 mV

[1] With Aperture set to ≥ 0.16 Sec

1.4.2 AC Peak-to-Peak Measurement (SM2064)

- Measures the peak-to-peak value of a repetitive waveform.

ACV Range	Lowest specified input voltage (Vp-p)	Full Scale reading (Vp-p)	Resolution	Typical Accuracy 23°C ± 5°C One Year [1]
240 mV	0.1 V	1.9 V	1 mV	0.5 ± 3 mV
2.4 V	1.0 V	16 V	10 mV	0.5 ± 40 mV
24 V	10 V	190 V	100 mV	0.5 ± 700 mV
240 V	100 V	850 V	1 V	0.55 ± 6 V

[1] Signal frequency range 30 Hz to 60 kHz.

1.4.3 AC Crest Factor Measurement (SM2064)

- Measures the crest factor (CF) of a repetitive waveform

ACV Range	Lowest specified input voltage (Vp-p)	Highest specified input voltages (Vp-p)	Resolution	Typical Accuracy 23°C ± 5°C One Year [1]
240 mV	0.1 V	1.9 V	0.01	2.2 ±0.3
2.4 V	1.0 V	16 V	0.01	2.1 ±0.1
24 V	10 V	190 V	0.01	2.0 ±0.1
240 V	100 V	700 V	0.01	2.0 ±0.1
330 V	100 V	850 V	0.01	2.0 ±0.1

[1] Crest factor measurement requires signal frequency of 30 Hz to 60 kHz.

1.4.4 AC Median Value Measurement (SM2064)

- Measures the mid-point between the positive and negative peaks of a repetitive waveform
- Used to determine the Threshold DAC setting for optimal frequency and timing measurements

ACV Range	Lowest specified input voltage (Vp-p)	Full Scale reading	Resolution	Typical Accuracy 23°C ± 5°C One Year [1]
240 mV	0.08 V	±0.95 V	1 mV	2.0% ±17 mV
2.4 V	0.80 V	±9.5 V	10 mV	3% ±160 mV
24 V	8 V	±95.0 V	100 mV	3% ±1.4 V
240 V	80 V	±350.0 V	1 V	3% ±12 V
330 V	80 V	±350.0 V	1 V	3% ±12 V

[1] Median measurements require a repetitive signal with frequency range of 30 Hz to 30 KHz.

1.5 AC Current Measurement, True RMS

Input Characteristics

- **Crest Factor** 4 at Full Scale, increasing to 10 at Lowest Specified Current
- **Burden Voltage** 240mV max.
- **Protected** with 2.5 A Fast Blow fuse

Range	Full Scale 6 1/2 Digits	Lowest Specified Current	Maximum Burden Voltage (RMS)	Resolution
2.4 mA	2.400000 mA	60 µA	25mV	1 nA
24 mA	24.00000 mA	300 µA	250mV	10 nA
240 mA	240.0000 mA	3 mA	55mV	100 nA
2.4 A	2.400000 A	30 mA	520mV	1 uA

Accuracy ± (% of reading + Amps)

Range	Frequency [1]	24 hours 23°C ± 1°C	90 Days 23°C ± 10°C	One Year 23°C ± 10°C
2.4 mA	10 Hz - 20 Hz	3.8 + 4 µA	2.7 + 4 µA	2.9 + 4 µA
	20 Hz - 47 Hz	0.9 + 4 µA	0.9 + 4 µA	1.0 + 4 µA
	47 Hz - 1 kHz	0.04 + 1.5 µA	0.08 + 3 µA	0.12 + 4 µA
	1 kHz - 10 kHz	0.12 + 4 µA	0.14 + 4 µA	0.22 + 4 µA
24 mA	10 Hz - 20 Hz	1.8 + 30 µA	2.6 + 30 µA	2.8 + 30 µA
	20 Hz - 47 Hz	0.6 + 30 µA	0.9 + 30 µA	1.0 + 30 µA
	47 Hz - 1 kHz	0.07 + 10 µA	0.15 + 20 µA	0.16 + 30 µA
	1 kHz - 10 kHz	0.21 + 30 µA	0.3 + 40 µA	0.4 + 40 µA
240 mA	10 Hz - 20 Hz	1.8 + 400 µA	2.7 + 400 µA	2.8 + 400 µA
	20 Hz - 47 Hz	0.6 + 400 µA	0.9 + 400 µA	1.0 + 400 µA
	47 Hz - 1 kHz	0.1 + 100 µA	0.17 + 180 µA	0.2 + 220 µA
	1 kHz - 10 kHz	0.3 + 300 µA	0.35 + 350 µA	0.4 + 400 µA
2.4 A	10 Hz - 20 Hz	1.8 + 4 mA	2.5 + 4.5 mA	2.7 + 5 mA
	20 Hz - 47 Hz	0.66 + 4 mA	0.8 + 6 mA	0.9 + 6 mA
	47 Hz - 1 kHz	0.3 + 3.8mA	0.33 + 3.8 mA	0.35 + 4 mA
	1 kHz - 10 kHz	0.4 + 4mA	0.45 + 4.5 mA	0.5 + 5 mA

[1] All AC Current ranges have typical measurement capability of at least 20 kHz.

1.6 Leakage Measurement (SM2064)

Characteristics

- **Burden Voltage:** < 100 µV
- **Test Voltage:** Adjustable between -10V to +10V in 5mV steps

Accuracy ± (% of reading + Amps) [1]

Range	Full Scale	Resolution	24 hours 23°C ± 5°C	90 Days 23°C ± 5°C	One Year 23°C ± 5°C
240 ηA	240.0000 ηA	0.1 pA	0.07 + 40pA	0.1 + 45pA	0.17 + 60pA
2.4 µA	2.400000 µA	1 pA	0.05 + 70pA	0.08 + 90pA	0.21 + 150pA
24 µA	24.00000 µA	10 pA	0.05 + 400pA	0.08 + 600pA	0.13 + 0.8nA

[1] With Aperture set to ≥ 0.5 Sec, and within one hour from Zero (Relative control).

1.7 RTD Temperature Measurement

- **Ro:** Variable 10 Ω to 10 kΩ
- **Measurement Method:** 4-Wire
- **Temperature units:** Selectable ^{o}C or ^{o}F

RTD Type	Ro (Ω)	Resolution	Temperature range	Temperature Accuracy 23°C ± 5°C [1] One Year
pt385, pt3911, pt3916, pt3926	100, 200 Ω	0.01°C	-150 to 650°C	±0.06°C
pt385, pt3911, pt3916, pt3926	500, 1 kΩ	0.01°C	-150 to 650°C	±0.03°C
Cu (Copper)	Less than 12 Ω	0.01°C	-100 to 200°C	±0.18°C for temperatures ≤ 20°C, ±0.05°C otherwise
Cu (Copper)	Higher than 90 Ω	0.01°C	-100 to 200°C	±0.10°C for temperatures ≤ 20°C, ±0.05°C otherwise

[1] With Aperture of 0.5s and higher, using a 4-wire RTD. Measurement accuracy does not include RTD probe error.

1.8 Thermocouple Temperature Measurement

- **Cold Junction Compensation:** By Sensor measurement or soft entry.
- **Cold Junction Temperature range:** 0 ^{o}C to 50 ^{o}C
- **Cold Junction Sensor:** Use SMX40T or SM40T Isothermal unit, or define sensor equation
- **Isothermal Block compatibility:** SM4022, SM4042, SMX4032, SM40T, SMX40T
- **Temperature units:** Selectable ^{o}C or ^{o}F

TC Type	Resolution	Maximum Temperature [2]	Temperature Accuracy 23°C ± 5°C [1] One Year
B	0.01°C	2200°C	±0.38 °C
E	0.01°C	1200°C	±0.035 °C
J	0.01°C	2000°C	±0.06 °C
K	0.01°C	3000°C	±0.07 °C
N	0.01°C	3000°C	±0.10 °C
R	0.01°C	2700°C	±0.25 °C
S	0.01°C	3500°C	±0.35 °C
T	0.01°C	550°C	±0.06 °C

[1] With Aperture of 0.5s and higher. Measurement accuracy does not include Thermocouple error.
[2] DMM Linearization temperature range may be greater than that of the Thermocouple device.

1.9 Additional Component Measurement Capability

1.9.1 Diode Characterization

- **Available Test currents** 100 ηA, 1 μA, 10 μA, 100 μA and 1 mA
- **SM2064 add variable current** of 10 ηA to 12.5 mA
- **One Year Current Source Uncertainty** 2.5% + 2η
- **One Year Voltage Measurement Uncertainty** 0.01% + 50uV
- **Voltage measurement range** 0V to 2.4V

1.9.2 Capacitance, Charge Balance Method

- **Method** Multispope Charge Balance.

Range	Full Scale Reading	Resolution	One Year 23°C ± 5°C
1,200 pF	1,199.9 pF	0.1 pF	1 ± 1 pF [2]
12 ηF	11.999 ηF	1 pF	1.2 ± 5 pF [3]
120 ηF	119.99 ηF	10 pF	1.0 [3]
1.2 µF	1.1999 µF	100 pF	1.0 [3]
12 µF	11.999 µF	1 ηF	1.0 [3]
120 µF	119.99 µF	10 ηF	1.0 [3]
1.2 mF	1.1999 mF	100 ηF	1.2 [3]
12 mF	50.000 mF	1 µF	2 [3]

[1] Within one hour of zero, using Relative control. Specified at DMM input terminals.
[2] Accuracy is specified for values higher than 5% of the selected range.
[3] For values between 200pf and 500pf the floor is 2.5pf rather than 1pf.

This Measurement is independent of set Aperture and Read Interval. If desired, the DMMSetCapsAveSamp() function may be used to control measurement parameters. It is provided means to fine tune the measurement timing for the application, trading off accuracy for speed.

Measurement time will vary as function of the set parameters, selected range and measured capacitance. The following are measurement times associated with the default parameters, as range is selected.

Range Input		SM2064 and SMX2064 models		SM2060 and SMX2060 models	
		Typical Measurement Time [1]	Typical Measurement speed (rps) [1]	Typical Measurement Time [1]	Typical Measurement speed (rps) [1]
1,200 pF	5% of Scale	19.5 ms	51.3	400ms	2.5
1,200 pF	Full Scale	52.3 ms	19.1	1.0 s	1
12 ηF	5% of Scale	70.0 ms	14.3	1.4 s	0.7
12 ηF	Full Scale	118ms	8.5	2.4 s	0.4
120 ηF	5% of Scale	8.9 ms	112.4	2.5 s	5.5
120 ηF	Full Scale	127 ms	7.9	2.5 s	0.4
1.2 µF	5% of Scale	15.6 ms	64.1	350 ms	3
1.2 µF	Full Scale	175 ms	5.7	3.5 s	5.7
12 µF	5% of Scale	14.1 ms	70.9	300 ms	0.3
12 µF	Full Scale	480 ms	2.1	9 s	0.1
120 µF	5% of Scale	17.3 ms	57.8	350 ms	3
120 µF	Full Scale	50.3 ms	19.9	1 s	1
1.2 mF	5% of Scale	52.6 ms	19.0	1 s	1
1.2 mF	Full Scale	151.5 ms	6.6	3 s	0.3
12 mF	5% of Scale	52.8 ms	18.9	1 s	1
12 mF	Full Scale	170 ms	5.9	3.5 ms	0.3

[1] Time depends on the value being measured and the amount of charge present during measurement. The 2060 models with hardware version E and higher include capacitance.

1.9.3 Capacitance, In-Circuit Method (SM2064)

- **Method** Variable frequency AC
- **Adjustable Peak Voltages Stimulus** 100mV to 5.0V
- **Parallel Load Resistance** as low as 100Ω

Accuracy ± (% of reading + Farads) [1]

Range	Full Scale 3-½ Digits	Resolution	One Year 23°C ± 5°C [2]
24 ηF	23.99 ηF	10 pF	5 ± 200 pF
240 ηF	239.9 ηF	100 pF	5 ± 1 ηF
2.4 µF	2.399 µF	1000 pF	3 ± 5 ηF
24 µF	23.99 µF	10 ηF	3 ± 50 ηF
240 µF	239.9 µF	100 ηF	5 ± 500 ηF
2.4 mF	2.399 mF	1 µF	6 ± 5 µF

[1] Within one hour of AC Caps Open Cal operation, and relative correction.
[2] Specified for values higher than 5% of the selected range with Aperture > 0.2s

1.9.4 Inductance Measurement (SM2064)

Accuracy ± (% of reading + inductance) [1]

Range	Test frequency	Full Scale 4 ½ Digits	Resolution	Accuracy 23°C ± 5°C One Year [2]
33 µH	100 kHz	33.000 µH	1 ηH	3.0% + 500 ηH
330 µH	50 kHz	330.00 µH	10 ηH	2.0% + 3 µH
3.3 mH	4 kHz	3.3000 mH	100 ηH	1.5% + 25 µH
33 mH	1.5 kHz	33.000 mH	1 µH	1.5% + 200 µH
330 mH	1 kHz	330.00 mH	10 µH	2.5 + 3 mH
3.3 H	100 Hz	3.3000 H	100 µH	3 + 35 mH

[1] Within one hour of Zero, and Open Terminal Calibration.
[2] Accuracy is specified for values greater than 5% of the selected range.

1.10 Time Measurements

1.10.1 Threshold DAC (2064)

- **The Threshold DAC is used for selecting a detection level, providing optimal frequency and time measurements even at extreme duty cycle values.**

Accuracy ± (% of setting + volts)

Selected VAC range [1]	Threshold range (DC level)	Threshold DAC resolution	Highest allowed input Vp-p	Typical one year setting uncertainty
240 mV	-1.0 V to +1.0 V	0.5 mV	1.900 V	0.2% + 4 mV
2.4 V	-10.0 V to +10.0 V	5.0 mV	19.00 V	0.2% + 40 mV
24 V	-100.0 V to 100.0 V	50 mV	190.0 V	0.2% + 0.4 V
240 V	-400 V to 400 V	500 mV	850.0 V	0.2% + 4 V

[1] This table should be used in conjunction with the AC volts section above.

1.10.2 Frequency and Period Measurements

ACV Mode

- **Input Impedance** 1 MΩ with < 300 pF
- **Ranging** Auto-Ranging (default) or Range Lock
- **Acquisition Time in Auto-Ranging mode** 0.1s to 1s
- **Acquisition Time in Range Locked mode** 10ms to 1s

Frequency Range	2 Hz - 100 Hz	100 Hz-1 kHz	1 kHz-10 kHz	10 kHz-100 kHz	100 kHz-300 kHz
Resolution	1 mHz	10 mHz	100 mHz	1 Hz	1 Hz
Uncertainty is ±0.002% of reading ± adder shown	4 mHz	20 mHz	200 mHz	2 Hz	5 Hz
Input Signal Range [1]	10% - 200% of range	10% - 200% of range	10% -200% of range	10% - 200% of range	45% -200% of range

[1] Input RMS voltage required for a valid reading. Do not exceed 330 V RMS input. For example, 10% -200% of range implies that in the 240 mV AC range, the input voltage should be in the range of 24 mV to 480 mV RMS.

- **Input Impedance** 10 Ω in the 3 mA and 30 mA ranges, 0.1 Ω in the 330 mA and 2.5 A ranges.

Frequency Range	2 Hz - 100 Hz	100 Hz-1 kHz	1 kHz-10 kHz	10 kHz-500 kHz
Resolution	1 mHz	10 mHz	100 mHz	1 Hz
Uncertainty	0.01% ±4 mHz	0.01% ±20 mHz	0.01% ±200 mHz	0.01% ±2 Hz
Input Signal Range, 2.4 mA, 240mA Ranges [1]	10% -500% of range	10% - 500% of range	10% -500% of range	10% - 500% of range
Input Signal Range, 24 mA, 2.4 A ranges	50% -100% of range	50% - 100% of range	50% - 100% of range	50% - 100% of range

[1] Input current required to give a valid reading. For example, 10% -500% of range indicates that in the 2.4 mA range, the input current should be 0.24 mA to 12.5 mA.

1.10.3 Duty Cycle Measurement (2064)

Frequency Range	2 Hz to 100 Hz	100 Hz to 1 kHz	1 kHz to 10 kHz	10 kHz to 100 kHz
Resolution	0.02%	0.2%	2%	20%
Typical Uncertainty is ±0.03% of reading ± adder shown	0.03%	0.3%	3%	20%
Full scale reading	100.00 %	100.00 %	100.00 %	100.00 %

1.10.4 Pulse Width (2064)

± (% of reading + sec)

Polarity	Frequency range	Resolution	Width range	Typical Uncertainty
Positive or negative pulse widths	2 Hz to 100 kHz	1 µs	2 µs to 1 s	0.01 +/- 4 µs

1.10.5 Totalizer (2064)

- **Active edge polarity:** Positive or negative transition
- **Maximum count:** 10^9
- **Allowed rate:** 1 to 30,000 events per second
- **Threshold:** Set Threshold DAC

1.11 Trigger Functions

1.11.1 External Hardware Trigger (at DIN-7 connector)

Trigger Input voltage level range	+3 V to +15 V activates the trigger.
Minimum Trigger Pulse Width	Aperture + 50µS when using:
	20uS when using: DMMTriggerBurst, DMMSetTrigRead, DMMSetBuffTrigRead
Minimum trigger input current	1 mA
Internal Reading Buffer	Circular; 80 or 120 readings depending on resolution.
Edge	Selectable positive or negative edge.
Isolation of trigger input	±50 V from analog DMM inputs, and from chassis earth ground.

1.11.2 PXI Bus Trigger inputs

Trigger Input voltage level range	CMOS level (see PXI standard)
Minimum Trigger Pulse Width	1/Aperture + 50µS
Internal Reading Buffer	Circular; 80 or 120 readings depending on resolution.
Edge	Selectable positive or negative edge.

1.11.3 Analog Threshold Trigger

- **Trigger point:** Selectable positive or negative transition of set threshold.
- **Buffer type:** Circular
- **Captures:** up to 120 post-trigger readings for apertures $\leq$ 625uSec.
- **Captures:** up to 80 post-trigger readings for apertures > 625uSec.
- **Aperture range:** 160ms to 625µS (to 2.5µS with SM2064)
- **Read Interval range:** 1/Aperture to 65ms
- **Post-Trigger readings:** Selectable from 0 to buffer size.
- **Pre-trigger readings:** Selectable from 0 to buffer size.
- **Triggered Sample:** Retrievable from DMM.

1.11.4 Long Trigger (SM/SMX2064 with Option 'R')

- **Trigger point:** Positive edge on selected trigger source (PXI or DIN-7)
- **Trigger Pulse Width:** Minimum 50µs
- **Samples per Trigger event:** 1 to 50,000
- **Number of Triggers:** 1 to 50,000
- **Sample to Sample delay:** 100µs to 3,600s
- **Aperture range:** 160ms to 2.5µS
- **Read Interval:** Must be set to zero

1.11.5 Delayed Hardware Trigger

This function allows time for the signal to settle after a trigger has occurred.
It allows readings to be delayed up to 65mSec with 1µSec resolution.
It allows readings to be delayed up to 1s with 2µs resolutions.

1.12 Measurement Times

1.12.1 Measurement Apertures and Read Interval

Both Aperture and The Read Interval may be set. The range of values depends on the DMM model and its mode of operation. For example, when using the internal buffer such as in External Trigger mode, the Read Interval can be set smaller than in Command/Response operation. The time involved in processing the measurement command and the post processing and transmission of the measurement constitute an overhead, which limits the minimum Read Interval to a value that is greater than the Aperture. Setting it to zero, the default, results in fastest measurement rates. The faster SM2064 has lower overhead and therefore a shorter minimum Read Interval than the SM2060. For instance, with Aperture set to 625us and Read Interval set to zero, in command/response operation the SM2060 measurement rate is about 1,090/s while that of the SM2064 is 1,370/s. This indicates overhead of about 300µs for the SM2060 and 100µs for the SM2064. Another method of setting the Aperture is by use of the DMMSetPLC(), which sets the aperture to a multiple of the power line cycle.

The SM2064 has 31 A/D apertures available, ranging from 5 Seconds to 2.5µS. The following table contains all available measurement apertures and the corresponding minimum read intervals and measurement rates.

	Power Line Rejection			Command/Response mode min. Read Interval(s) / max meas. rate(Hz)	H/W Trigger mode min. Read Interval(s) / max meas. Rate (Hz)
Aperture	60Hz	50Hz	400Hz		
5.1200s [1]	√	√	√	5.121s / 0.2	N/A
5.0666s [1]	√			5.0677s / 0.2	N/A
2.08s [1]		√	√	2.081s / 0.5	N/A
2.0s [1]	√	√	√	2.001s / 0.5	N/A
1.06666s [1]	√			1.067s / 1	N/A
960ms [1]		√	√	0.9605s / 1	N/A
533.33ms [1]	√			533.6ms / 2	N/A
480ms [1]		√	√	480.2ms / 2	N/A
266.666ms [1]	√			268ms / 4	N/A
160.0ms	√	√	√	166ms / 6	160.3 ms / 6
133.33ms	√			134ms / 8	133.5 ms / 8
80.00ms		√	√	80.4ms / 13	80.2 ms / 13
66.6667ms	√			67.2ms / 15	66.713 ms / 15
40.00ms		√	√	40.4ms / 25	40.32 ms / 24.8
33.333ms	√			33.643ms / 29.72	33.38 ms / 30
20.00ms		√	√	20.098ms / 49.76	20.33 ms / 50
16.6667ms	√			16.77ms / 59.6	16.89 ms / 59
10ms				10.094ms / 99	10.25 ms / 97
8.333ms				8.422ms / 119	8.503 ms / 115
5ms				5.109ms / 195	5.187 ms / 185
4.16667ms				4.265ms / 234	4.274 ms / 220
2.5ms				2.598ms / 385	2.614 ms / 350
2.0833ms				2.177ms / 458	2.216 ms / 410
1.25ms				1.344ms / 744	1.380 ms / 625
1.0417ms				1.133ms / 880	1.158 ms / 864
625µS				719µs / 1,390	728 µs / 1,370
520.83µS				617µs / 1,625	622 µs / 1,610
312.5µS				410µs / 2,445	414 µs / 2,445
260.42µS				355µs / 2,825	358 µs / 2,825
130.21µS				223µs / 4,475	217 µs / 4,660
2.5µS				47µs / 21,600	45 µs / 22,200

[1] Not available with any of the Triggered modes.

The SM2060 has are 30 A/D apertures available, ranging from 5 Seconds to 130uSec. The following table contains all available measurement apertures corresponding minimum read intervals and measurement rates.

	Power Line Rejection			Command/Response mode min. Read Interval(s) / max meas. rate(Hz)	H/W Trigger mode min. Read Interval(s) / max meas. Rate (Hz)
Aperture	60Hz	50Hz	400Hz		
5.1200s [1]	√	√	√	5.121s / 0.2	N/A
5.0666s [1]	√			5.0677s / 0.2	N/A
2.08s [1]		√	√	2.081s / 0.5	N/A
2.0s [1]	√	√	√	2.001s / 0.5	N/A
1.06666s [1]	√			1.067s / 1	N/A
960ms [1]		√	√	0.9605s / 1	N/A
533.33ms [1]	√			533.6ms / 2	N/A
480ms [1]		√	√	480.2ms / 2	N/A
266.666ms [1]	√			268ms / 4	N/A
160.0ms	√	√	√	166ms / 6	160.3 ms / 6
133.33ms	√			134ms / 8	133.5 ms / 8
80.00ms		√	√	80.4ms / 13	80.2 ms / 13
66.6667ms	√			67.2ms / 15	66.713 ms / 15
40.00ms		√	√	40.4ms / 25	40.32 ms / 24.8
33.333ms	√			33.7ms / 30	33.38 ms / 30
20.00ms		√	√	20.35ms / 50	20.33 ms / 50
16.6667ms	√			16.9ms / 59	16.89 ms / 59
10ms				10.36ms / 97	10.25 ms / 97
8.333ms				8.68ms / 115	8.503 ms / 115
5ms				5.36ms / 185	5.187 ms / 185
4.16667ms				4.52ms / 220	4.274 ms / 220
2.5ms				2.86ms / 350	2.614 ms / 350
2.0833ms				2.44ms / 410	2.216 ms / 410
1.25ms				1.6ms / 625	1.380 ms / 625
1.0417ms				1.39ms / 719	1.158 ms / 864
625µS				917µs / 1,090	728 µs / 1,370
520.83µS				617µs / 1,625	622 µs / 1,610
312.5µS				410µs / 2,445	414 µs / 2,445
260.42µS				355µs / 2,825	358 µs / 2,825
130.21µS				223µs / 4,475	217 µs / 4,660

[1] Not available with any of the Triggered modes.

Precise control of the measurement timing and line frequency rejection can be accomplished by controlling the Read Interval and Aperture. Line rejection is determind by the Aperture, and the duration of the measurement is controlled with Read Interval.

Read Interval can be programmed in µs increments for values up to 65ms, and in 20µs increments to 1 second.

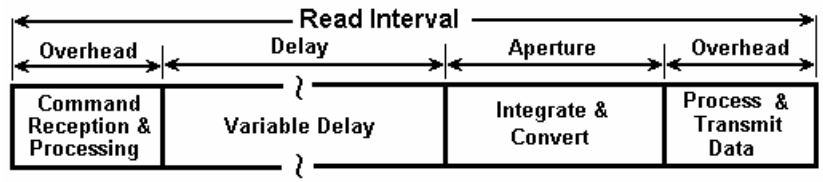

Figure 2-1: Time frame of a single measurement.

1.12.2 Range and Function Transition Times

The transition times between functions, and between ranges are important parameters. Iincluding all permutations of all functions and ranges could be extensive. therefore, the following are few of the values for the functions that are used the most. Most of these values depend on the set Aperture, and are therefore more complex to calculate. It is assumed that the Read Interval is set to 0 (default). The following numbers may vary from system to system.

Range switching within Volts DC, using DMMSetRange()

The time to switch ranges with the aperture set to 20ms or lower, is equal to 0.2 * Aperture + 15ms. For all other apertures it is equal to the Aperture + 15.6ms.

Range switching in Resistance (2-W or 4-W), using DMMSetRange()

The time to switch ranges while the set aperture is 33.3ms and higher is equals to the Aperture + 13ms. For all other apertures it is equal to 0.05 * Aperture + 15.5ms.

Switching between VDC and Resistance, using DMMSetFuncRange()

The transition time is 15.6ms for apertures smaller than 16.6ms, and is equal to the Aperture + 25ms for all other apertures.

Switching between Ohms and IDC, using DMMSetFuncRange()

For apertures of 66.66ms and higher the function switching time is equal to 45ms + 0.51 * Aperture. For Apertures of 16.66ms to 40ms it is 0.65 * Aperture. For all other apertures it is 7.8ms.

Switching between VDC and Capacitance, using DMMSetFuncRange()

For apertures smaller than 33.3ms the function switching time is 23.4ms. It is0.65 * Aperture + 50ms for all other apertures.

Switching between Ohms and Capacitance, using DMMSetFuncRange()

For apertures of 160ms and higher, the function switching time is 160ms. For Apertures of 33.33ms to 80ms it is 2 * Aperture + 35ms. For all other apertures it is 23.4ms.

Switching ranges within DC Current using DMMSetRange()

This time is 1ms if switching does not include the 240mA and 2.4A. Switching to and from these two ranges and the other ranges takes 4.2ms for apertures of 40ms and lower, and 15.7ms for all other apertures.

Switching Capacitance ranges using DMMSetRange()

This time is 12ms regardless of set aperture.

1.13 Source Functions (SMX2064)

- Isolated to 300 V DC from the Chassis
- DMM Measures output voltage while sourcing.
- Multiple SM2064 units can be placed in series or parallel to increase output Voltage or current
- Two auxiliary voltage inputs can be used to monitor UUT DC voltages while in this mode.

1.13.1 DC Voltage

Parameter	Closed Loop [1]	Open Loop
Output Voltage range	-10.000 V to +10.000 V	
Typical Current source/sink at 5V output	5 mA	5 mA
DAC resolution	18 bits	12 bits
Accuracy 23°C ± 10°C One Year	0.015% ± 350 µV	1.0% ± 35 mV
Typical settling time	3 S (rate set to 2/s)	1 ms
Typical source resistance	200 Ω	

[1] An Aperture set to 133ms or higher is required for the closed loop mode.

1.13.2 AC Voltage

The AC Voltage source has two ranges; 900 mV and 8 V. The lower range is capable of generating 30mV to 900mV RMS, while the higher range can generate 300mV to 7.2V RMS.

Parameter	Specification 18°C to 28°C One Year	
Ranges (2)	900mV and 8V	
Output Voltage, sine wave	30mV to 7.2 V RMS (0.14 to 20.0V peak-to-peak)	
Typical Current Drive at 3.5V RMS	3 mA RMS	
Frequency resolution	2 mHz	
Frequency stability	100 ppm ± 2 mHz	
SFDR (spurious free dynamic range)	60dBc	
THD (total harmonic distortion)	59dBc	
Typical source resistance	200 Ω	
Mode	**Closed Loop [1]**	**Open Loop**
Frequency range	30 Hz to 200kHz	10Hz to 200kHz
Typical settling time	4 s	100 µs
DAC resolution	17 bits	12 bits
Amplitude accuracy	ACV spec + 0.1% ± 5 mV	ACV spec + 0.8% ± 20 mV

[1] 166ms or higher Aperture is required for proper closed loop mode above 200Hz. Use higher aperture for lower frequencies.

1.13.3 DC Current

- Sensing: Selectable, at source terminals or sense inputs (remote)
- Range: 10nA to 12.5mA
- Voltage Measurement range: 0 to ±2.4V

Range	Compliance Voltage [1]	Resolution [2]	Minimum level	Accuracy 23°C ± 10°C One Year
1.25 µA	4.2 V	500 pA	10 ηA	1% + 10 ηA
12.5 µA	4.2 V	5 ηA	50 ηA	1% + 100 ηA
125 µA	4.2 V	50 ηA	100 ηA	1% + 500 ηA
1.25 mA	4.2 V	500 ηA	1 µA	1% + 5 µA
12.5 mA	1.5 V	5 µA	10 µA	1% + 50 µA

[1] Compliance voltage is the range at which the current source is linear. It does not imply a measurement range. Wile in this mode, the DMM measures the load voltage ranging from 0V to 2.4V.
[2] Resolution without Trim DAC. The use of the Trim DAC can improve the resolution by a factor of 10, but it has to be set separately since it is not calibrated.

1.13.4 Pulse Generator

- Frequency Range: 7.81Hz to 29kHz
- Resolution: 1µs
- Width control: negative and positive portions
- Amplitude range: settable 0 to ±10V
- Pulse Base level: 0V
- Burst count: 1 to 32,000 pulses or continuous.

Parameter	Range	Resolution
Positive Pulse Width	15µs to 64ms [1] 22µs to 64ms [2]	1µs
Negative Pulse Width	19µs to 64ms [1] 23µs to 64ms [2]	1µs
Number of Pulses	1 to 32,000	1
Amplitude	0V to +10V or 0V to -10V	5mV

[1] Free run mode (pulse count parameter = 0).
[2] Burst of pulses mode (pulse count parameter > 0).

1.13.5 Duty Cycle Generator

- Frequency Range: 10Hz to 10kHz
- Amplitude range: settable 0 to ±10V
- Pulse Base level: 0V

	Range	Resolution
10Hz	0.015% to 99.981%	0.001%
100Hz	0.15% to 99.81%	0.01%
1kHz	1.5% to 98.1%	0.1%
10kHz	15% to 81%	1%
Amplitude	0V to +10V or 0V to -10V	5mV

1.14 Accuracy Notes

Important: all accuracy specifications for DCV, Resistance, DCI, ACV, and ACI apply for the time periods shown in the respective specification tables. To meet these specifications, Self Calibration must be performed once a day or as indicated in the specification table. This is a simple software operation that takes a few seconds. It can be performed by calling Windows command DMMCal(), or selecting S-Cal in the control panel.

These products are capable of continuous measurement as well as data transfer rates of up to 20,000 readings per second (rps). In general, to achieve 7-1/2 Digits of resolution, the Aperture should be set to 0.5s or a higher value. 6-1/2 digit resolution requires at least 10ms Aperture. For 5-1/2 use at least 625us Aperture.

1.15 Other Specifications

Temperature Coefficient over 0°C to 50°C Range

- Less than 0.1 x accuracy specification per °C At 23C ± 5°C

Aperture (user selectable)

- 625 μs to 2s in 26 discrete values, SM2060 (approx. 0.5 to 1,400 readings per second)
- 2.5μs to 2s in 31 discrete values, SM2064 (approx. 0.5 to 20,000 readings per second)
- In Triggered modes Aperture is limited to 160ms or shorter.

Read Interval (user selectable)

- 47μs to 65ms, 1μs steps in Trigger modes, SM2064
- 730μs to 65ms, 1us steps in Trigger modes, SM2060
- 47μs to 1s, 1μs steps below 65ms, in command/response modes, SM2064
- 916μs to 1s, 1μs steps below 65ms, in command/response modes, SM2060

Hardware Interface	Single PCI slot
Overload Protection (voltage inputs)	330 VDC, 250 VAC
Isolation	330 VDC, 250 V AC from Earth Ground
Maximum Input (Volt x Hertz)	$8x10^6$ Volt x Hz normal mode input (across Voltage HI & LO). $1x10^6$ Volt x Hz Common Mode input (from Voltage HI or LO relative to Earth Ground).
Safety	Designed to IEC 1010-1, Installation Category II.

Calibration	Calibrations are performed by ***Signametrics*** inside a computer which is at about 23°C. All calibration constants are stored in a text file.
Temperature Range Operating	-10°C to 65°C
Temperature Range Storage	-40°C to 80°C
Relative Humidity Operating	to 80% at 37°C
Relative Humidity Storage	to 95% at 37°C
Operating Altitude	10,000’
Storage Altitude	50,000’
Size	SM2060, SM2064: 4.5” X 8.5” (PCI format) SMX2060, SMX2064: Single 3U PXI or cPCI slot
DMM Internal Temperature sensor accuracy	±1°C (SM2064)
Power	+5 volts, 300 mA maximum

Note: Signametrics reserves the right to make changes in materials, specifications, product functionality, or accessories without notice.

Accessories

Several accessories are available for the SM2060 series DMM's, which can be purchased directly from Signametrics, or one of its approved distributors or representatives. These are some of the accessories available:

- DMM probes SM-PRB
- DMM probe kit SM-PRK
- Deluxe probe kit SM-PRD
- Shielded SMT Tweezers Probes SM-PRSMT
- Multi Stacking Double Banana shielded cable 36" SM-CBL36 and 48" SM-CBL48
- Mini DIN for Trigger, 6-Wire Ohms and Guarding connector SM2060-CON7
- Lab View VI's library SM206X.llb (included).
- Extended 3 Year warrantee (does not include calibration).
- PCI Instrumentation Switching modules: SM4020, SM4022, SM4040, SM4042
- PXI Instrumentation Switching modules: SMX4030, SMX4032
- IVI-COM driver