

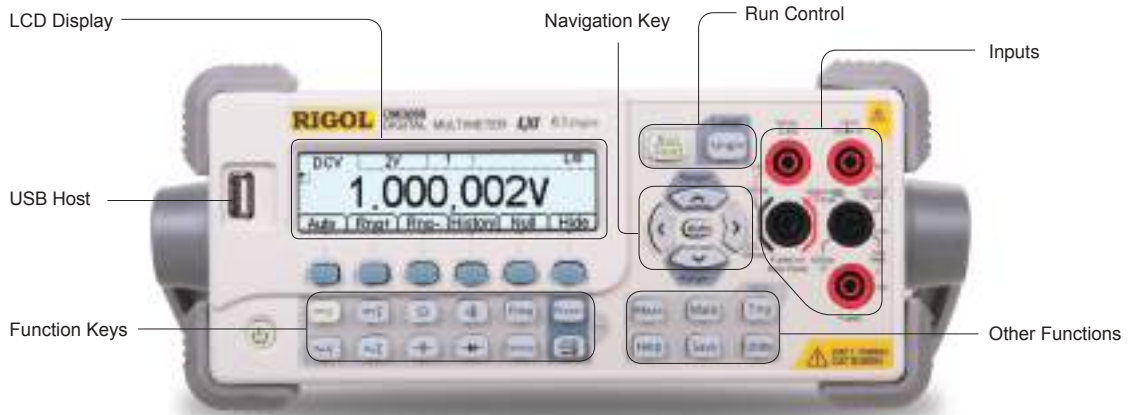


# DM3068 6½ digits Digital Multimeter

- Real 6 ½ digits readings resolution (2,200,000 Count)
- Up to 10 K rdgs/s of measurement speed and 512 K rdgs Volatile Memory
- True-RMS AC Voltage and Current measurement
- Built-in 10 groups data storage, 10 groups setup storage
- Built-in Thermcouple compensate in Cold terminal, support customized any sensor measurement and 3 types of temperature sensors: TC, RTD and THERM
- Clone or backup all the configurations within instrument into other DM3068 via U-disc
- UltraSensor software: easy, convenient and flexible to support "Any sensor" measurements
- Real time Trend and Histogram Display functions
- Standard interface: USB Device, USB Host, LAN, RS-232, GPIB, support U-disc storage
- Remote control with SCPI commands
- 256 × 64 LCD
- Support double display, waveform display, Chinese and English menu
- Push-help makes information acquire more easier
- File management (support for U-disc and local storage)

DM3068 is a digital multimeter designed with 6 ½ digits readings resolution especially fitting to the needs of high-precision, multifunction and automatic measurement. It adopts many today's new technologies to achieve high performance, abundant features in the same class. It's designed to aim at the requirements of the largest DMM market from the research, education, industrial electronics, consumer electronics and automotive industries with its innovative technology, industry leading specifications, powerful measurement functions and broad analysis capabilities.

# DM3068 6½ Digits Digital Multimeter



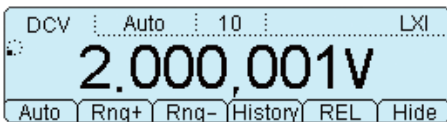
Size (W×H×D):231.6 mm×107.0 mm×290.5 mm Weight: ~3.2 kg (Without package)



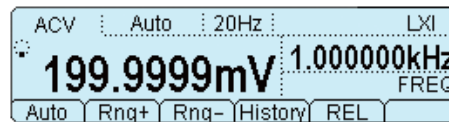
Standard interfaces: USB Device,RS-232,GPIB,LAN(LXI-C)

## ► Features and Benefits

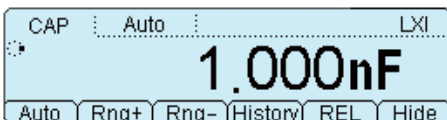
Real 6½ digits readings resolution



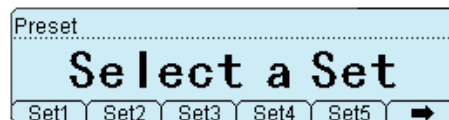
Easy to measure AC signal with double display



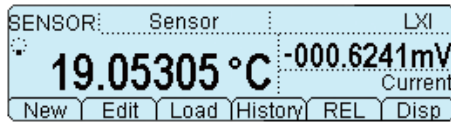
Standard Capacitor measurement function



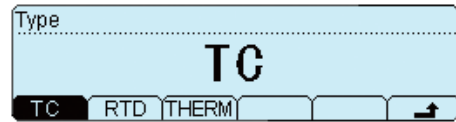
10 groups Preset function



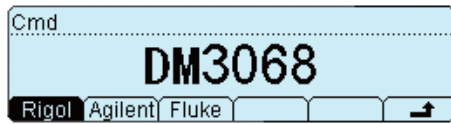
"Any sensor" function



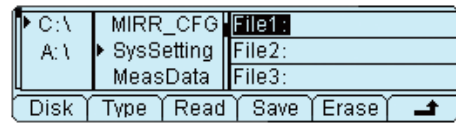
Support multiple temperature sensors



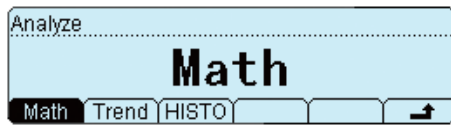
Support multiple commands



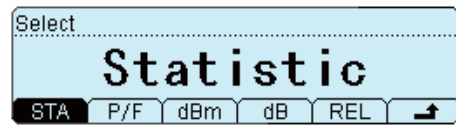
File management (support for U-disc and local storage)



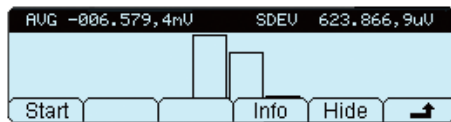
Math function



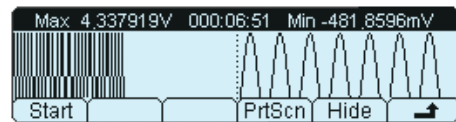
Statistic function



Histogram display



Trend display



## ► Application example

Use the histogram function searching for abnormal signal :



Min. Avg. Max.



White Noise Histogram

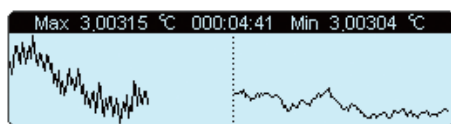


The small signal that scope couldn't see



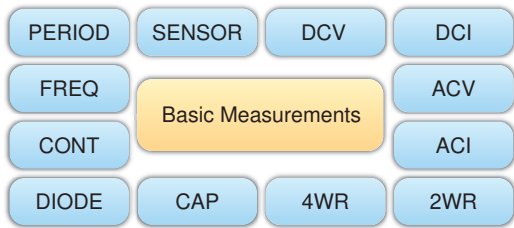
Submerged Pulse Noise Histogram

Use Trend graphics to detect temperature trends during a long time:



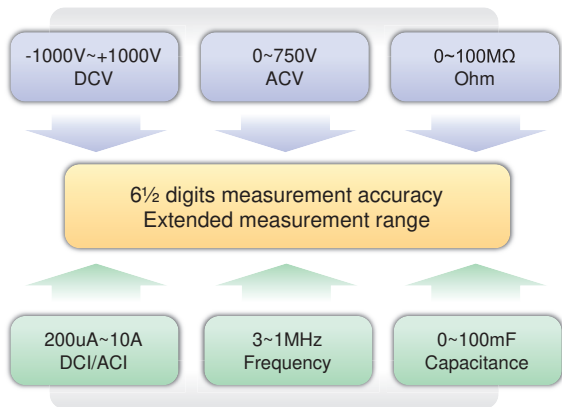
Long term trends

Abundant basic measurement functions:

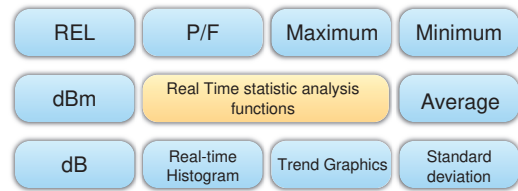


DCV Range: -1000 V ~ 1000 V  
 DCI Range: -10 A ~ 10 A  
 ACV Range(True-RMS): 0 V ~ 750 V  
 ACI Range(True-RMS): 0 A ~ 10 A  
 R Range: 0 Ω ~ 100 MΩ  
 C Range: 0 F ~ 100 mF  
 F Range: 3 Hz ~ 1 MHz

Extended Measurement Ranges



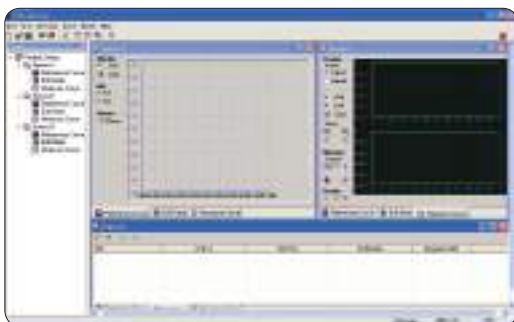
Real Time statistic analysis functions



► LXI Certificate



► UltraSensor Software for any types of electrical sensor measurements



## ► Specifications

### DC Characteristics

Accuracy Specifications:  $\pm$  ( % of reading + % of range) <sup>[1]</sup>

Function	Range <sup>[2]</sup>	Test Current or Burden Voltage	24 Hour <sup>[3]</sup> T <sub>CAL</sub> °C ±1 °C	90 Day T <sub>CAL</sub> °C ± 5 °C	1 Year T <sub>CAL</sub> °C ± 5 °C	Temperature Coefficient 0 °C to (T <sub>CAL</sub> °C - 5 °C) (T <sub>CAL</sub> °C + 5 °C) to 50 °C
DC Voltage	200.0000mV		0.0020 + 0.0020	0.0030 + 0.0025	0.0040 + 0.0025	0.0005 + 0.0005
	2.000000V		0.0015 + 0.0005	0.0020 + 0.0006	0.0035 + 0.0006	0.0005 + 0.0001
	20.00000V		0.0020 + 0.0004	0.0030 + 0.0005	0.0040 + 0.0005	0.0005 + 0.0001
	200.0000V		0.0020 + 0.0006	0.0040 + 0.0006	0.0050 + 0.0006	0.0005 + 0.0001
	1000.000V <sup>[4]</sup>		0.0020 + 0.0006	0.0040 + 0.0010	0.0055 + 0.0010	0.0005 + 0.0001
DC Current	200.0000uA	<0.03V	0.010 + 0.012	0.040 + 0.015	0.050 + 0.015	0.0020 + 0.0030
	2.000000mA	<0.25V	0.007 + 0.003	0.030 + 0.003	0.050 + 0.003	0.0020 + 0.0005
	20.00000mA	<0.07V	0.007 + 0.012	0.030 + 0.015	0.050 + 0.015	0.0020 + 0.0020
	200.0000mA	<0.7V	0.010 + 0.002	0.030 + 0.003	0.050 + 0.003	0.0020 + 0.0005
	2.000000A	<0.12V	0.050 + 0.020	0.080 + 0.020	0.100 + 0.020	0.0050 + 0.0010
	10.00000A <sup>[5]</sup>	<0.6V	0.100 + 0.010	0.120 + 0.010	0.150 + 0.010	0.0050 + 0.0020
Resistance <sup>[6]</sup>	200.0000Ω	1mA	0.0030 + 0.0030	0.008 + 0.004	0.010 + 0.004	0.0006 + 0.0005
	2.000000kΩ	1mA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0006 + 0.0001
	20.00000kΩ	100uA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0006 + 0.0001
	200.0000kΩ	10uA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0006 + 0.0001
	1.000000MΩ	2uA	0.002 + 0.001	0.010 + 0.001	0.012 + 0.001	0.0010 + 0.0002
	10.00000MΩ	200nA	0.015 + 0.001	0.030 + 0.001	0.040 + 0.001	0.0030 + 0.0004
	100.0000MΩ	200nA    10MΩ	0.300 + 0.010	0.800 + 0.010	0.800 + 0.010	0.1500 + 0.0002
Diode Test	2.0000V <sup>[7]</sup>	1mA	0.002 + 0.010	0.008 + 0.020	0.010 + 0.020	0.0010 + 0.0020
Continuity Test	2000.0Ω	1mA	0.002 + 0.010	0.008 + 0.020	0.010 + 0.020	0.0010 + 0.0020

[1] Specifications are for 90-minute warm-up and 100NPLC integration time. For integration time <100NPLC, add the appropriate "RMS Noise Adder" listed in the following table.

[2] 10% overrange on all ranges except DCV 1000V and DCI 10A range.

[3] Relative to calibration standards.

[4] For each additional volt over  $\pm$  500 V, add 0.03mV error.

[5] For continuous current > 7A DC or 7A AC RMS, 30 seconds ON and 30 seconds OFF.

[6] Specifications are for 4-wire resistance measurement or 2-wire resistance measurement using REL operation. Without REL operation, add 0.2 Ω additional error in 2-wire resistance measurement.

[7] Accuracy specifications for the voltage measured at the input terminal only. 1 mA test current is typical. Variation in the current source will create some variation in the voltage drop across a diode junction.

### Performance Versus Integration Time – 50 Hz (60 Hz) Power-line Frequency

Integration Time Number of Power line Cycles (NPLC)	Resolution <sup>[1]</sup> (ppm Range)	NMRR <sup>[2]</sup> (dB)	Readings/s <sup>[3]</sup>		RMS Noise Adder <sup>[4]</sup> (% of Range)			
			50Hz	60Hz	DCV 20V	DCV 2V 200V Resistance 2 kΩ 20 kΩ	DCV 1000 V DCI 2 mA 200 mA	DCV 200 mV Resistance 200 Ω DCI 10 A
0.006	2.7	0	10000	10000	0.0006	0.0007	0.0015	0.0040
0.02	1.6	0	2500	3000	0.0004	0.0004	0.0008	0.0025
0.06	1	0	833	1000	0.0003	0.0003	0.0006	0.0025
0.2	0.5	0	250	300	0.0001	0.0002	0.0003	0.0015
1	0.22	60	50	60	0	0.0001	0.0002	0.0004
2	0.17	60	25	30	0	0	0.0001	0.0003
10	0.08	60	5	6	0	0	0	0.0002
100	0.035	60	0.5	0.6	0	0	0	0

[1] Typical value. Resolution is defined as the typical 20V range RMS noise (using auto zero "Once").

[2] Normal mode rejection ratio for power-line frequency  $\pm$  0.1%. For power-line frequency  $\pm$  1%, subtract 20 dB. For  $\pm$  3%, subtract 30dB.

[3] Maximum rate for DCV, DCI, 2-wire resistance and 4-wire resistance functions.

[4] The basic DC accuracy specifications include RMS noise at 100 NPLC. For <100 NPLC, add "RMS Noise Adder" to the basic DC accuracy specifications.

## SFDR & SINAD<sup>[1]</sup>

Function	Range	Spurious-Free Dynamic Range (SFDR)	Signal-to-Noise-and-Distortion (SINAD)
DCV	200 mV	81	76
	2 V	79	78
	20 V	79	75
	200 V	83	80
DCI	1000 V	86	82
	200 uA	89	69
	2 mA	86	81
	20 mA	88	69
	200 mA	81	79
	2 A	69	64

[1] Typical value. -1dBFS, 1kHz single tone. 100 us aperture time, zero trigger delay, auto zero off and 4096 samples.

## Measuring Characteristics

<b>DC Voltage</b>	
Input Resistance	200 mV, 2 V, 20 V ranges: Selectable 10 MΩ or > 10 GΩ (For these ranges, input beyond ±26V are clamped through 106 kΩ (typical) 200 V and 1000 V ranges: 10 MΩ ± 1%
Input Protection	1000 V
Input Offset Current	50 pA, at 25 °C, typical
CMRR (common mode rejection ratio)	140 dB for 1 kΩ unbalance in LO lead, ± 500 VDC peak maximum
<b>Resistance</b>	
Measurement Method	Selectable 4-wire or 2-wire resistance
Open-circuit Voltage	Current source referenced to LO input Limited to < 10V
Max. Lead Resistance (4-wire)	10% of range per lead for 200 Ω, 2 kΩ ranges, 1 kΩ per lead on all other ranges
Input Protection	1000 V on all ranges
Offset Compensation	Available on 200 Ω, 2kΩ and 20 kΩ ranges
<b>DC Current</b>	
Shunt Resistor	100 Ω for 200 uA, 2 mA 1 Ω for 20 mA, 200 mA 0.01 Ω for 2 A, 10 A
Input Protection	Externally accessible 250 mA, 250 V fast blow fuse at the rear panel for 200 uA, 2 mA, 20 mA and 200 mA ranges. Internal 10 A, 250 V slow blow fuse for 2 A and 10 A ranges
<b>Continuity/Diode Test</b>	
Response Time	300 samples/sec, with audible tone
Continuity Threshold	Adjustable from 1 Ω to 2000 Ω
Autozero OFF Operation (typical value)	
Following instrument warm-up at the environment temperature ±1°C and <5 minutes, add 0.0001 % range + 2 uV for DCV and 2 mΩ for resistance.	
<b>Settling Time Considerations</b>	
Reading settling times are affected by source impedance, cable dielectric characteristics and input signal changes. The default measurement delay is selected to give first reading right for most measurements.	
<b>Measurement Considerations</b>	
Telon or other high-impedance, low-dielectric absorption wire insulation is recommended for these measurements.	

## AC Characteristics

Accuracy Specifications:  $\pm(\%$  of reading +  $\%$  of range)<sup>[1]</sup>

Function	Range <sup>[2]</sup>	Frequency Range	24 Hour <sup>[3]</sup> T <sub>CAL</sub> °C $\pm$ 1 °C	90 Day T <sub>CAL</sub> °C $\pm$ 5 °C	1 Year T <sub>CAL</sub> °C $\pm$ 5 °C	Temperature Coefficient 0 °C to (T <sub>CAL</sub> °C - 5 °C) (T <sub>CAL</sub> °C + 5 °C) to 50 °C	
True RMS AC Voltage <sup>[4]</sup>	200.0000 mV	3Hz - 5Hz	1.00 + 0.03	1.00 + 0.04	1.00 + 0.04	0.100 + 0.004	
		5Hz - 10Hz	0.35 + 0.03	0.35 + 0.04	0.35 + 0.04	0.035 + 0.004	
		10Hz - 20kHz	0.04 + 0.03	0.05 + 0.04	0.06 + 0.04	0.005 + 0.004	
		20kHz - 50kHz	0.10 + 0.05	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005	
		50kHz - 100kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008	
		100kHz - 300kHz	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.20 + 0.02	
	2.000000 V	3Hz - 5Hz	1.00 + 0.02	1.00 + 0.03	1.00 + 0.03	0.100 + 0.003	
		5Hz - 10 Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003	
		10Hz - 20kHz	0.04 + 0.02	0.05 + 0.03	0.06 + 0.03	0.005 + 0.003	
		20kHz - 50kHz	0.10 + 0.04	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005	
		50kHz - 100kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008	
		100kHz - 300kHz	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.20 + 0.02	
	20.00000 V	3Hz - 5Hz	1.00 + 0.03	1.00 + 0.04	1.00 + 0.04	0.100 + 0.004	
		5Hz - 10Hz	0.35 + 0.03	0.35 + 0.04	0.35 + 0.04	0.035 + 0.004	
		10Hz - 20kHz	0.04 + 0.04	0.07 + 0.04	0.08 + 0.04	0.008 + 0.004	
		20kHz - 50kHz	0.10 + 0.05	0.12 + 0.05	0.15 + 0.05	0.012 + 0.005	
		50kHz - 100kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008	
		100kHz - 300kHz	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.20 + 0.02	
	200.0000 V	3Hz - 5Hz	1.00 + 0.02	1.00 + 0.03	1.00 + 0.03	0.100 + 0.003	
		5Hz - 10Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003	
		10Hz - 20kHz	0.04 + 0.02	0.07 + 0.03	0.08 + 0.03	0.008 + 0.003	
		20kHz - 50kHz	0.10 + 0.04	0.12 + 0.05	0.15 + 0.05	0.012 + 0.005	
		50kHz - 100kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008	
		100kHz - 300kHz	4.0 + 0.50	4.0 + 0.50	4.0 + 0.50	0.20 + 0.02	
750.000 V <sup>[5]</sup>	3Hz - 5Hz	1.00 + 0.02	1.00 + 0.03	1.00 + 0.03	0.100 + 0.003		
	5Hz - 10Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003		
	10Hz - 20kHz	0.04 + 0.02	0.07 + 0.03	0.08 + 0.03	0.008 + 0.003		
	20kHz - 50kHz	0.10 + 0.04	0.12 + 0.05	0.15 + 0.05	0.012 + 0.005		
	50kHz - 100kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008		
	100kHz - 300kHz	4.0 + 0.50	4.0 + 0.50	4.0 + 0.50	0.20 + 0.02		
True RMS AC Current <sup>[8]</sup>	200.0000 uA	3Hz - 5Hz	1.10 + 0.06	1.10 + 0.06	1.10 + 0.06	0.200 + 0.006	
		5Hz - 10Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.100 + 0.006	
		10Hz - 5kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006	
		5kHz - 10kHz	0.35 + 0.70	0.35 + 0.70	0.35 + 0.70	0.030 + 0.006	
		2.000000 mA	3Hz - 5Hz	1.00 + 0.04	1.00 + 0.04	1.00 + 0.04	0.100 + 0.006
			5Hz - 10Hz	0.30 + 0.04	0.30 + 0.04	0.30 + 0.04	0.035 + 0.006
	10Hz - 5kHz		0.12 + 0.04	0.12 + 0.04	0.12 + 0.04	0.015 + 0.006	
	5kHz - 10kHz		0.20 + 0.25	0.20 + 0.25	0.20 + 0.25	0.030 + 0.006	
	20.00000 mA		3Hz - 5Hz	1.10 + 0.06	1.10 + 0.06	1.10 + 0.06	0.200 + 0.006
			5Hz - 10Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.100 + 0.006
		10Hz - 5kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006	
		5kHz - 10kHz	0.35 + 0.70	0.35 + 0.70	0.35 + 0.70	0.030 + 0.006	
		200.0000 mA	3Hz - 5Hz	1.00 + 0.04	1.00 + 0.04	1.00 + 0.04	0.100 + 0.006
			5Hz - 10Hz	0.30 + 0.04	0.30 + 0.04	0.30 + 0.04	0.035 + 0.006
	10Hz - 5kHz		0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.015 + 0.006	
	5kHz - 10kHz		0.20 + 0.25	0.20 + 0.25	0.20 + 0.25	0.030 + 0.006	
	2.000000 A		3Hz - 5Hz	1.10 + 0.06	1.10 + 0.06	1.10 + 0.06	0.100 + 0.006
			5Hz - 10Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.035 + 0.006
		10Hz - 5kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006	
		5kHz - 10kHz	0.35 + 0.70	0.35 + 0.70	0.35 + 0.70	0.030 + 0.006	
		10.00000 A <sup>[6]</sup>	3Hz - 5Hz	1.10 + 0.08	1.10 + 0.10	1.10 + 0.10	0.100 + 0.008
			5Hz - 10Hz	0.35 + 0.08	0.35 + 0.10	0.35 + 0.10	0.035 + 0.008
	10Hz - 5kHz		0.15 + 0.08	0.15 + 0.10	0.15 + 0.10	0.015 + 0.008	

Additional Low Frequency Errors (% of reading)				Additional Crest Factor Errors (non-sinewave) <sup>[7]</sup>	
Frequency	AC Filter			Crest Factor	Error (% of reading)
	Slow	Medium	Fast		
10Hz - 20Hz	0	0.74	--	1 - 2	0.05
20Hz - 40Hz	0	0.22	--	2 - 3	0.2
40Hz - 100Hz	0	0.06	0.73	3 - 4	0.4
100Hz - 200Hz	0	0.01	0.22	4 - 5	0.5
200Hz - 1kHz	0	0	0.18		
>1kHz	0	0	0		

[1] Specifications are for 90-minute warm-up, slow ac filter and sinewave input.

[2] 10% overrange on all ranges except ACV 750 V and ACI 10 A ranges.

[3] Relative to calibration standards.

[4] Specifications are for sinewave input >5% of range. For inputs within 1% and 5% of range and <50 kHz, add 0.1% of range additional error. For 50kHz to 100kHz, add 0.13% of range additional error.

[5] ACV 750 range limited to 8x10<sup>7</sup> Volt-Hz. For input over 300V rms, add 0.7mV error for each additional volt.

[6] For continuous current > DC 7A or AC RMS 7A, 30 seconds ON and 30 seconds OFF.

[7] For frequency below 100 Hz, the specification of slow filter is only for sinewave input.

[8] Specifications are for sinewave input >5% of range. For inputs within 1% to 5% of range, add 0.1% of range additional error. Specifications are typical values for 200uA and 2mA, 2A and 10A ranges when frequency >1kHz.

## Measuring Characteristics

True RMS AC Voltage	
Measurement Method	AC-coupled True-RMS measurement with up to 400 V DC of bias at on any range.
Crest Factor	≤ 5 at full range
Input Impedance	1MΩ ± 2% in parallel with <150pF capacitance on any range
Input Protection	750V rms on all ranges
AC Filter Bandwidth	Slow: 3 Hz - 300 kHz Medium: 20Hz - 300kHz Fast: 200 Hz - 300 kHz
CMRR (common mode rejection ratio)	70 dB, for the 1 kΩ unbalance in LO lead, < 60 Hz, ± 500 VDC peak maximum
True RMS AC Current	
Measurement Method	Direct coupled to the fuse and shunt; AC-coupled True RMS measurement (measure the AC component only).
Crest Factor	≤ 3 at full range
Max. Input	DC + AC current peak value < 300% of range. The RMS current < 10 A rms including the DC component.
Shunt Resistor	100Ω for 200uA, 2mA 1Ω for 20mA, 200mA 0.01Ω for 2A, 10A
Input Protection	Externally accessible 250mA, 250V fast blow fuse at the rear panel for 200uA, 2mA, 20mA and 200mA ranges. Internal 10A, 250 V slow blow fuse for 2A and 10A ranges.

### Settling Time Considerations

The default measurement delay is selected to give first reading right for most measurements. Make sure the RC circuit of input terminal has been fully settled (about 1s) before accurate measurement.

Applying > 300 Vrms (or > 5Arms) will cause self-heating in signal-conditioning components and these error are included in the instrument specifications. Internal temperature changes due to self-heating may cause additional error on lower ac voltage ranges. The additional error will be lower than 0.02% of reading and will generally dissipate within a few minutes.

## Frequency and Period Characteristics

Accuracy Specifications: ±(% of reading)<sup>[1][2]</sup>

Function	Range	Frequency Range	24 Hour <sup>[3]</sup> T <sub>CAL</sub> °C±1°C	90 Day T <sub>CAL</sub> °C±5°C	1 Year T <sub>CAL</sub> °C±5°C	Temperature Coefficient 0°C to (T <sub>CAL</sub> °C-5°C) (T <sub>CAL</sub> °C+5°C) to 50°C
Frequency, Period	200 mV to 750 V	3 Hz - 5 Hz	0.07	0.07	0.07	0.005
		5 Hz - 10 Hz	0.04	0.04	0.04	0.005
		10 Hz - 40 Hz	0.02	0.02	0.02	0.001
		40 Hz - 300 kHz	0.005	0.006	0.007	0.001
		300 kHz - 1 MHz	0.005	0.006	0.007	0.001

Additional Low Frequency Errors: (% of reading)

Frequency	Gate Time (Resolution)			
	1 s (0.1ppm)	0.1 s (1ppm)	0.01 s (10ppm)	0.001 s (100ppm)
3 Hz-5Hz	0	0.12	0.12	0.12
5 Hz-10Hz	0	0.17	0.17	0.17
10 Hz-40Hz	0	0.20	0.20	0.20
40 Hz-100Hz	0	0.06	0.21	0.21
100 Hz-300Hz	0	0.03	0.21	0.21
300 Hz-1 kHz	0	0.01	0.07	0.07
>1kHz	0	0	0.02	0.02

[1] Specifications are for 90 minutes warm-up, using 1s gate time.

[2] For frequency ≤ 300 kHz, the specification is the 10% to 110% of range of the AC input voltage. For frequency > 300 kHz, the specification is the 20% to 110% of range of the AC input voltage. The maximum input is limited to 750V rms or 8 × 10<sup>7</sup> Volts-Hz (whichever is less). 200 mV range is full range input or input that is larger than the full range. For 20mV to 200mV, multiply % of reading error ×10.

[3] Relative to calibration standards.

## Measuring Characteristics

Frequency and Period	
Measurement Method	Reciprocal-counting technique, AC-coupled input using the AC voltage function.
Input Impedance	1 MΩ ± 2% in parallel with < 150 pF capacitance on any range
Input Protection	750 V rms on all ranges
Measurement Considerations	All frequency counters are susceptible to error when measuring low-voltage, low-frequency signals. Shielding inputs from external noise pickup is critical for minimizing measurement errors.
Settling Time Considerations	Errors will occur when attempting to measure the frequency or period of an input following a dc offset voltage change. Make sure the RC circuit of input terminal has been fully settled (about 1s) before accurate measurement.

## Capacitance Characteristics

Accuracy Specifications: ± (% of reading + % of range)<sup>[1][2]</sup>

Function	Range <sup>[2]</sup>	Test Current	1 Year	Temperature Coefficient
Capacitance	2.000nF	200nA	T <sub>CAL</sub> °C ± 5°C 2 + 2.5	0°C to (T <sub>CAL</sub> °C - 5°C) (T <sub>CAL</sub> °C + 5°C) to 50°C 0.05+0.05
	20.00nF	2uA	1 + 0.3	0.05+0.01
	200.0nF	10uA	1 + 0.3	0.01+0.01
	2.000uF	100uA	1 + 0.3	0.01+0.01
	20.00uF	1mA	1 + 0.3	0.01+0.01
	200.0uF	1mA	1 + 0.3	0.01+0.01
	2.000mF	1mA	1 + 0.3	0.01+0.01
	20.00mF	1mA	1 + 0.3	0.01+0.01
	100.0mF	1mA	3 + 0.2	0.05+0.02

[1] Specifications are for 90 minutes warm-up and using REL operation. Additional errors may be caused by non-film capacitors.

[2] Specifications are the 1% to 110% of range on 2nF range and 10% to 110% of range on all other ranges.

## Measuring Characteristics

Capacitance Measurement	
Measurement Method	Apply constant current into the capacitance, and measure the voltage changing rate.
Connection Type	2-wire
Measurement Considerations	Since small capacitance measurements are susceptible to the external noise, shielding inputs from external noise pickup is critical for minimizing measurement errors.

## Temperature Characteristics

Accuracy Specifications<sup>[1]</sup>

Function	Probe Type	Type	Optimum Range	1 Year	Temperature Coefficient	
Temperature	RTD <sup>[2]</sup> (R0 is within 49 Ω and 2.1 kΩ)	α = 0.00385	-200°C to 660°C	T <sub>CAL</sub> °C ± 5°C 0.16°C	0°C to (T <sub>CAL</sub> °C - 5°C) (T <sub>CAL</sub> °C + 5°C) to 50°C 0.01 °C	
		α = 0.00389	-200°C to 660°C	0.17°C	0.01°C	
		α = 0.00391	-200°C to 660°C	0.14°C	0.01°C	
		α = 0.00392	-200°C to 660°C	0.15°C	0.01°C	
	Thermal Resistance		2.2 kΩ	-40°C to 150°C	0.08°C	0.002°C
			3 kΩ	-40°C to 150°C	0.08°C	0.002°C
			5 kΩ	-40°C to 150°C	0.08°C	0.002°C
			10 kΩ	-40°C to 150°C	0.08°C	0.002 °C
			30 kΩ	-40°C to 150°C	0.08°C	0.002 °C
	Thermocouple <sup>[3]</sup>		B	0°C to 1820°C	0.76°C	0.14 °C
			E	-270°C to 1000°C	0.5 °C	0.02 °C
			J	-210°C to 1200°C	0.5 °C	0.02 °C
K			-270°C to 1372°C	0.5 °C	0.03 °C	
N			-270°C to 1300°C	0.5 °C	0.04 °C	
R			-270°C to 1768.1°C	0.5 °C	0.09 °C	
S			-270°C to 1768.1°C	0.6 °C	0.11 °C	
T			-270°C to 400°C	0.5 °C	0.03 °C	

[1] Specifications are for 90 minutes warm-up. Exclusive of sensor error.

[2] Specification is for 4WR sensor measurement or 2WR measurement using REL operation.

[3] Relative to cold junction temperature, accuracy is based on ITS-90. Built-in cold junction temperature refers to the temperature inside the banana jack and its accuracy is ± 2.5 °C.

## Measuring Characteristics

Measurement Considerations	The built-in cold junction temperature tracks the temperature inside the banana jack. The change of the temperature in banana jack might cause additional error. When using the built-in cold junction compensation, connect the sensor terminal of the thermocouple to the banana jack and warm it up for more than 3 minutes to minimize the error.
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## Measurement Rate

Function	Setting	Integration Time	Readings/s 50Hz (60Hz)
DC Voltage	0.006 NPLC Integration Time	100 (100) us	10000 (10000)
DC Current	0.02 NPLC	400 (333) us	2500 (3000)
2 - wire Resistance	0.06 NPLC	1.2 (1) ms	833 (1000)
4 - wire Resistance	0.2 NPLC	4 (3.33) ms	250 (300)
	1 NPLC	20 (16.7) ms	50 (60)
	2 NPLC	40 (33.3) ms	25 (30)
	10 NPLC	200 (167) ms	5 (6)
	100 NPLC	2 (1.67) s	0.5 (0.6)
AC Voltage	3 Hz AC Filter		0.2
AC Current <sup>[2]</sup>	20 Hz		1.5
	200 Hz		10
	200 Hz		50 <sup>[3]</sup>
Frequency and Period <sup>[4]</sup>	1 s Gate Time		1
	0.1 s		10
	0.01 s		80
	0.001 s		500
Capacitance <sup>[5]</sup>			25

[1] Auto trigger, zero trigger delay, auto zero off, auto range off, math function off and external interface off.

[2] Use the default trigger delay setting.

[3] The maximum rate available when trigger delay is set to 0.

[4] 20 V range, fast filter, 1kHz input.

[5] Measure 20 nF capacitance on 20 nF range. The measurement period changes with the capacitance under test. The maximum measurement period on 100mF is 4 s (typical value).

## Other Measurement Characteristics

Triggering and Storage	
Trigger	Pre-trigger or Pos-trigger, Internal Trigger or External Trigger, Rising Edge Trigger or Falling Edge Trigger
Time Base Resolution	33.333 us, 0.01% Accuracy
Trigger Delay	0 to 3600 s available (about 33 μs step size)
Sample Timer	0 to 3600 s available (about 33 μs step size)
Internal Trigger Level Accuracy	± 1% of range
Reading Hold Sensitivity	0.01%, 0.1%, 1% or 10% of reading
Single Trigger Samples	1 to 50000
External Trigger Input	Level: 5 V TTL compatible Impedance: > 30 kΩ in parallel with 500 pF Delay: < 50 μs Jitter: < 50 μs (ACV, ACI, FREQ and PREIOD < 2ms) Polarity: selectable rising edge or falling edge Maximum Rate: 300/s Minimum Pulse Width: 2 μs
VMC Output	Level: 5 V TTL compatible Output Impedance: 100 Ω, typical Output Polarity: Falling Edge Pulse Width: about 2μs

History Record and Storage	
Nonvolatile Memory	512 k reading history data record
Non-volatile Memory	10 sets history data storage (5000 readings/group) 5 sets sensor data storage (5000 readings/group) 10 sets instrument setup storage 5 sets Anysensor setup storage Support USB flash device backup data and setting.

## General Specifications

Display	256 × 64 LCD, dual display, graphical menu, selectable Chinese or English, online help.
Power Supply	AC 100 V - 120 V, 45 Hz - 440 Hz AC 200 V - 240 V, 45 Hz - 66 Hz Detect the power-line frequency automatically at power-on, 400Hz defaults to 50Hz
Power Consumption	25 VA Max
Working Environment	Full accuracy for 0 °C to 50 °C Full accuracy to 40 °C, 80% R.H., Non-coagulation
Storage Temperature	- 40 °C to 70 °C
Operation Altitude	Up to 2000 m
Safety	IEC 61010-1; EN 61010-1; UL 61010-1; CAN/CSA-C22.2 No. 61010-1 Measurement CAT I 1000 V/CAT II 300 V Pollution Degree 2
EMC	EN 61326-1
Weight	About 3.2 kg (without package)
Dimension	(height × width × length): 107.0mm × 231.6mm × 290.5mm
Remote Interface	GPIB, 10/100 Mbit LAN, USB 2.0 Full Speed Device & Host (support USB flash device), RS-232C
Programming Language	SCPI
LXI Compatibility	LXI Class C, Version 1.2
Warm-up Time	90 minutes

## DM3068 Ordering Information

Model	Description	Order Number
Standard Accessories	DM3068 (6 ½, dual-display)	DM3068
	Power Cord conforming to the standard of the country	-
	Two Test Leads (black and red)	-
	Two Alligator Clips (black and red)	-
	USB Cable	CB-USB-150
	Four Spare Fuses (two kinds): 2 AC, 250 V, T250 mA fuses 2 AC, 250 V, T125 mA fuses	-
	Quick Guide	-
	Optional Accessories	Kelvin Test Clip
RS232 Cable		-
Rack Mount Kit		RM-DM-3

NOTE: All the standard or optional accessories can be ordered from you local RIGOL Office.

#### HEADQUARTER

**RIGOL TECHNOLOGIES, INC.**  
No.8 Keling Road, New District,Suzhou,  
JiangSu,P.R.China  
Tel:+86-400620002  
Email:info@rigol.com

#### EUROPE

**RIGOL TECHNOLOGIES EU GmbH**  
Lindbergh str. 4  
82178 Puchheim  
Germany  
Tel: 0049-89/89418950  
Email: info-europe@rigol.com

#### NORTH AMERICA

**RIGOL TECHNOLOGIES, USA INC.**  
8140 SW Nimbus Ave.  
Beaverton, OR 97008  
Tel: 877-4-**RIGOL**-1  
Fax: 877-4-**RIGOL**-1  
Email: info@rigol.com

#### JAPAN

**RIGOL TECHNOLOGIES JAPAN, LLC**  
MJ Bldg. 3F, 1-7-4 Minato, Chuou-ku,  
Tokyo, Japan 104-0043  
Tel: +81-3-6262-8932  
Fax: +81-3-6262-8933  
Email: info-japan@rigol.com

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