RIGOL

Data Sheet

DM3058/DM3058E Digital Multimeter

Product Overview

DM3058/DM3058E[1] is a digital multimeter designed with 5 ½ digits readings resolution and dual-display especially fitting to the needs of high-precision, multifunction and automatic measurement.

Applications

- Research&Development Laboratory
- Scientific Research and Education
- Detection and Maintenance
- Quality Test
- Automatic Production Test

Main Features

- Real 5½ digits readings resolution
- Up to 123 rdgs/s measurement speed
- True-RMS AC Voltage and AC Current measuring
- Quickly Save or Recall the 10 groups of Preset Configuration
- Preset 10 groups of Standard Sensor Configuration, built-in cold terminal compensation for thermocouple
- Clone the instrument configurations into other DM3058/DM3058E via USB storage device
- The first 5 ½ digit digital multimeter passing LXI Criterion in industry, which can achieve system integration easily
- With easy, convenient and flexible any sensor measurement control software: UltraSensor
- Standard configuration interface: USB Device, USB Host, LAN (only for DM3058), RS-232, GPIB (only for DM3058)
- Support remote control via commands and compatible with commands of main stream multimeters

Easy to Use Design

- 256×64 LCD
- Support double display, Chinese and English menu
- Built-in help system makes information acquisition more easier
- File management (support for U-disc and local storage)

## Powerful Measurement Functions

➢ Basic Measurement Function

- DC Voltage: 200 mV ~ 1000 V
- DC Current: 200 µA ~ 10 A
- AC Voltage: True-RMS, 200 mV ~ 750 V
- AC Current: True-RMS, 20 mA ~ 10 A
- 2-Wire, 4-Wire Resistance: 200 Ω ~ 100 MΩ
- Capacitance Measurement: 2 nF ~ 10000 µF
- Continuity Test: Range is fixed at 2 kΩ
- Diode Test: Range is fixed at 2.0 V
- Frequency Measurement: 20 Hz ~ 1 MHz
- Period Measurement: 1 µs ~ 0.05 s
- Any Sensor Measurement: Support for 6 types of sensor (DCV, DCI, Freq, 2WR, 4WR and TC)

➢ Math Function

Max, Min, Average, Standard Deviation, Pass/Fail, dBm, dB, Relative Measurement and Histogram

Note[1]: The difference between DM3058 and DM3058E is only that DM3058E doesn't support LAN and GPIB interfaces.
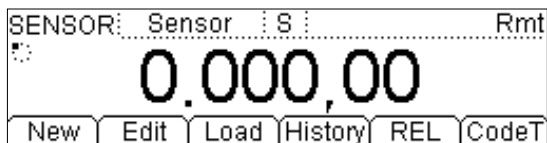
Double Display
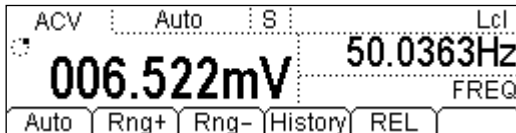
Dual-display function makes your measurements achieve maximum results with little effort. It can display two performances of a signal simultaneously instead of two multimeters or measurements in the past.

Mirror Image Configuration

All the configurations (system and sensor configuration) can be cloned into other DM3058/DM3058E on product line via USB storage device to improve work efficiency.

Preset Mode

Based on Preset Mode, the worker operation on product line could be greatly simplified. Besides, 10 groups of Preset Configuration are available to be stored and recalled.

Pass/Fail

Pass/Fail test function can prompt for signals beyond the range based on specified higher and lower limit, and make test result more obvious.
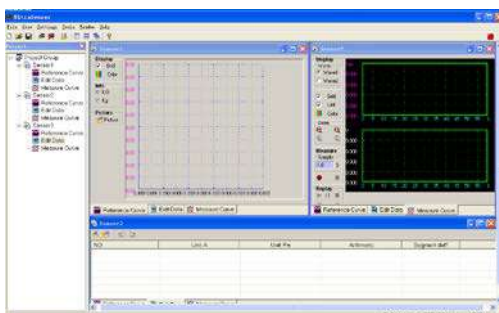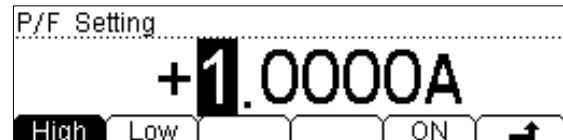
Any Sensor Measurement

Any sensor measurement is a new conception being forward to meet user's requirements. By this particular function, you can easily connect pressure sensor or flux sensor or temperature sensor.

The multimeter supports 6 kinds of sensor (DCV, DCI, Freq, 2WR, 4WR and TC). Meanwhile, there are 10 groups of standard sensor configuration preset within the instrument.

Thermocouple Cold Terminal compensation is built in the multimeter.

LXI & Web Control

DM3058 is the first 5½ digit digital multimeter passing LXI Criterion in industry that makes system integration easier.

Remote Control for DM3058 can be achieved by virtual panel from Web page in the same operation way with front panel of instrument.

Easy, Convenient and Flexible Control Software

UltraSensor Software Interface

UltraSensor is used to control any sensor. The main functions include:
- Create a project for any sensor measurement which can be download to the multimeter;
- Connect with the multimeter to achieve any sensor measurement;
- Monitor the sensor data in real time and show them in the form of figure;
- Enable to save data in the format of CSV and TXT and reference curve in the format of BMP.

Specifications

DC Characteristics

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

Function	Range[2]	Test current or Load voltage	1 Year 23℃ ± 5℃	Temperature Coefficient 0℃ - 18℃ 28℃ - 50℃
DC Voltage	200.000 mV		0.015 + 0.004	0.0015 + 0.0005
	2.00000 V		0.015 + 0.003	0.0010 + 0.0005
	20.0000 V		0.015 + 0.004	0.0020 + 0.0005
	200.000 V		0.015 + 0.003	0.0015 + 0.0005
	1000.00 V[4]		0.015 + 0.003	0.0015 + 0.0005
DC Current	200.000 μA	<8 mV	0.055 + 0.005	0.003 + 0.001
	2.00000 mA	<80 mV	0.055 + 0.005	0.002 + 0.001
	20.0000 mA	<0.05 V	0.095 + 0.020	0.008 + 0.001
	200.000 mA	<0.5 V	0.070 + 0.008	0.005 + 0.001
	2.00000 A	<0.1 V	0.170 + 0.020	0.013 + 0.001
	10.0000 A[5]	<0.3 V	0.250 + 0.010	0.008 + 0.001
Resistance[3]	200.000 Ω	1 mA	0.030 + 0.005	0.0030 + 0.0006
	2.00000 kΩ	1 mA	0.020 + 0.003	0.0030 + 0.0005
	20.0000 kΩ	100 μA	0.020 + 0.003	0.0030 + 0.0005
	200.000 kΩ	10 μA	0.020 + 0.003	0.0030 + 0.0005
	2.00000 MΩ	1 μA	0.040 + 0.004	0.0040 + 0.0005
	10.0000 MΩ	200 nA	0.250 + 0.003	0.0100 + 0.0005
	100.000 MΩ	200 nA || 10 MΩ	1.75 + 0.004	0.2000 + 0.0005
Diode Test	2.0000 V[6]	1 mA	0.05 + 0.01	0.0050 + 0.0005
Continuity Test	2000 Ω	1 mA	0.05 + 0.01	0.0050 + 0.0005

Remarks：

[1]   Specifications are for 0.5 hour warm-up, "Slow" measurement rate and calibration temperature 18℃ ~ 28℃.

[2]   20% over range on all ranges except for DCV 1000 V, ACV 750 V, DCI 10 A and ACI 10 A.

[3]   Specifications are for 4-wire measure or 2-wire measure under "REF" operation. ± 0.2 Ω of extra errors will be generated if perform 2-wire measure without "REF" operation.

[4]   Plus 0.02 mV of error per 1 V after the first ±500 VDC.

[5]   30 seconds OFF after 30 seconds ON is recommend for the continuous current that higher than DC 7 A or AC RMS 7 A.

[6]   Accuracy specifications are only for voltage measuring at input terminal. The typical value of current under measure is 1 mA. Voltage drop at the diode junction may vary with current supply.

DC Voltage	
Input Resistance	200 mV and 2 V 10 MΩ or >10 GΩ selectable (Input signals that exceed ± 2.5 V in these ranges will pass the 100 kΩ (typical) clamp resistance.) 20 V, 200 V and 1000 V 10 MΩ ± 2%
Input Bias Current	<90 pA, 25℃
Input Protection	1000 V on all ranges
CMRR (common mode rejection ratio)	120 dB (For the 1 kΩ unbalanced resistance in LO lead, maximum ± 500 VDC）
NMRR (normal mode rejection ratio)	60 dB at "slow" measurement rate 20 dB are added if open the "AC filter" (Settling time will add 0.35 s while source impedance nears zero)
Resistance	
Testing Method	4-wire resistance or 2-wire resistance optional For current source refer to LO input
Open-circuit Voltage	P/F in <8 V
Maximum Lead Resistance (4-wire resistance)	10% of ranges, on the range of 200 Ω, 1 kΩ, for each lead 1 kΩ, on all other ranges, for each lead
Input Protection	1000 V, on all ranges

DC Current	
Shunt Resistor	200 µA sampling voltage < 8 mV
	2 mA sampling voltage < 80 mV
	1 Ω for 20 mA, 200 mA
	0.01 Ω for 2 A, 10 A
Input Protection	Rear panel: accessible 10 A, 250 V fast-melt fuse
	Internal: 12 A, 250 V slow-melt fuse

Continuity / Diode Test	
Measurement Method	1 mA ± 5% constant-current source, < 8 V open-circuit voltage
Response Time	123 samples/sec, with beeper
Continuity Threshold	Adjustable between 1 Ω and 2000 Ω
Input Protection	1000 V

Setup time Attentions

The setup time about voltage measurement is influenced by source resistance and media characteristics of cable as well as input signal

AC Characteristics

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

Function	Range[2]	Frequency Range	1 Year 23℃±5℃	Temperature Coefficient 0℃ - 18℃ 28℃ - 50℃
True RMS AC Voltage[3]	200.000 mV	20 Hz – 45 Hz	1.5 + 0.10	0.01 + 0.005
		45 Hz – 20 kHz	0.2 + 0.05	0.01 + 0.005
		20 kHz – 50 kHz	1.0 + 0.05	0.01 + 0.005
		50 kHz – 100 kHz	3.0 + 0.05	0.05 + 0.010
	2.00000 V	20 Hz – 45 Hz	1.5 + 0.10	0.01 + 0.005
		45 Hz – 20 kHz	0.2 + 0.05	0.01 + 0.005
		20 kHz – 50 kHz	1.0 + 0.05	0.01 + 0.005
		50 kHz – 100 kHz	3.0 + 0.05	0.05 + 0.010
	20.0000 V	20 Hz – 45 Hz	1.5 + 0.10	0.01 + 0.005
		45 Hz – 20 kHz	0.2 + 0.05	0.01 + 0.005
		20 kHz – 50 kHz	1.0 + 0.05	0.01 + 0.005
		50 kHz – 100 kHz	3.0 + 0.05	0.05 + 0.010
	200.000 V	20 Hz – 45 Hz	1.5 + 0.10	0.01 + 0.005
		45 Hz – 20 kHz	0.2 + 0.05	0.01 + 0.005
		20 kHz – 50 kHz	1.0 + 0.05	0.01 + 0.005
		50 kHz – 100 kHz	3.0 + 0.05	0.05 + 0.010
	750.000 V	20 Hz – 45 Hz	1.5 + 0.10	0.01 + 0.005
		45 Hz – 20 kHz	0.2 + 0.05	0.01 + 0.005
		20 kHz – 50 kHz	1.0 + 0.05	0.01 + 0.005
		50 kHz – 100 kHz	3.0 + 0.05	0.05 + 0.010
True RMS AC Current[5]	20.0000 mA	20Hz – 45 Hz	1.5 + 0.10	0.015 + 0.015
		45 Hz - 2 kHz	0.50 + 0.10	0.015 + 0.006
		2 kHz -10 kHz	2.50 + 0.20	0.015 + 0.006
	200.000 mA	20 Hz - 45 Hz	1.50 + 0.10	0.015 + 0.005
		45 Hz – 2 kHz	0.30 + 0.10	0.015 + 0.005
		2 kHz - 10 kHz	2.50 + 0.20	0.015 + 0.005
	2.00000 A	20 Hz – 45 Hz	1.50 + 0.20	0.015 + 0.005
		45 Hz - 2 kHz	0.50 + 0.20	0.015 + 0.005
		2 kHz – 10 kHz	2.50 + 0.20	0.015 + 0.005
	10.0000 A[5]	20 Hz – 45 Hz	1.50 + 0.15	0.015 + 0.005
		45 Hz - 2 kHz	0.50 + 0.15	0.015 + 0.005
		2 kHz – 5 kHz	2.50 + 0.20	0.015 + 0.005

Additional wave crest factor error (not Sine)[6]	
Wave crest coefficient	Error (% range)
1 - 2	0.05
2 - 3	0.2

Remarks:
[1] Specifications are for 0.5 hour warm-up, "Slow" measure and calibration temperature 18℃ - 28℃.
[2] 20% over range on all ranges except for DCV 1000 V, ACV 750 V, DCI 10 A and ACI 10 A.

[3] Specifications are for amplitude of sine wave input >5% of range. 750 V range limited to 8×10^7 Volt-Hz. For inputs from 1% to 5% of range and <50 kHz, add 0.1% of range extra error. For 50 kHz to 100 kHz, add 0.13%.

[4] Specifications are for sine wave input >5% of range. 0.1% errors will be added when the range of input sine wave is 1% ~ 5%.

[5] 30 seconds OFF after 30 seconds ON is recommend for the continuous current that higher than DC 7 A or AC RMS 7 A.

[6] For frequency<100 Hz.

True RMS AC Voltage	
Measurement Method	AC coupled true RMS measure - up to 1000 V DC bias are permitted on every range
Wave Crest Factor	≤ 3 at full scale
Input Impedance	1 MΩ ± 2% in parallel with <100 pF on all ranges
AC Filter Bandwidth	20 Hz ~ 100 kHz
CMRR (common mode rejection ratio)	60 dB (For the 1 kΩ imbalance resistance among Lo lead and <60 Hz, maximum ±500 VDC)
True RMS AC Current	
Measurement Method	DC coupled to the fuse and shunt; AC coupled the True RMS measurement (measures the AC components only)
Wave Crest Factor	≤ 3 at full scale
Maximum Input	The DC + AC current peak value <300% of range. The RMS current including DC current is <10 A
Shunt Resistor	1 Ω for 20 mA, 200 mA 0.01 Ω for 2 A, 10 A
Input Protection	Rear panel: accessible 10 A, 250 V fast-melt fuse Internal: 12 A, 250 V slow-melt fuse
Setup Time Attentions	

Make sure that the RC return at input terminal has been in a stable state completely (higher than 1 s) before accurate measurement;

Input >300 Vrms (or >5 Arms) will cause the self heating of the signal conditioning component to generate error, this error is included in the characteristics of the instrument. Internal temperature variation results from the self heating will cause additional an error on ac range that is lower than 0.03% of readings, and it will disappear after a few minutes

Frequency and Period Characteristics

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

Function	Range	Frequency Range	1 Year 23℃±5℃	Temperature Coefficient 0℃ - 18℃ 28℃ - 50℃
Frequency/Period	200 mV – 750 V[2]	20 Hz - 2 kHz	0.01 + 0.003	0.002 + 0.001
		2 kHz - 20 kHz	0.01 + 0.003	0.002 + 0.001
		20 kHz - 200 kHz	0.01 + 0.003	0.002 + 0.001
		200 kHz - 1 MHz	0.01 + 0.006	0.002 + 0.002
	20 mA – 10 A[3]	20 Hz - 2 kHz	0.01 + 0.003	0.002 + 0.001
		2 kHz - 10 kHz	0.01 + 0.003	0.002 + 0.001

Remarks:

[1] Specifications are for 0.5 hour warm-up.

[2] Except for special marks, the AC input voltage is 15% to 120% of range when <100 kHz and 40% to 120% of range when >100 kHz. 750 V range is limited to 750 VRMS. 200 mV ranges is for full scale or higher. For inputs from 30 mV to 200 mV, multiply total % of reading error by 10.

[3] For AC input current from 15% to 120% of range except where noted. 20 mA range specifications are for full scale. For inputs from 5 mA to 20 mA, multiply total % of reading error by 10. 10 A range is for AC input current from 25% to 100% of range.

Frequency and Period	
Measurement Method: Reciprocal-counting technique, AC-coupled input, AC voltage or AC current measurement function	
Measure Attentions	
Generally, errors are leaded into all frequency counters when measuring low voltage or low frequency signal. Shielding input can extremely help to reduce measuring errors caused by exterior noise	
Setup Time Attentions	

If the variational DC components appeared in signals under measure, errors may be caused while measuring period or frequency. Please ensure that the RC loop at input terminal must be stable during exact measuring (higher than 1 sec)

Capacitance Characteristics

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

Function	Range[2]	Maximum Testing Current	1 Year 23℃±5℃	Temperature Coefficient 0℃ - 18℃ 28℃ - 50℃
Capacitance	2.000 nF	200 nA	3 + 1.0	0.08 + 0.002
	20.00 nF	200 nA	1 + 0.5	0.02 + 0.001
	200.0 nF	2 μA	1 + 0.5	0.02 + 0.001
	2.000 μF	10 μA	1 + 0.5	0.02 + 0.001
	200 μF	100 μA	1 + 0.5	0.02 + 0.001
	10000 μF	1 mA	2 + 0.5	0.02 + 0.001

Remarks:

[1] Specifications are for 0.5 hour warm-up and "REF" operation. Using of non-film capacitor may generate additional errors.

[2] Specifications are for from 1% to 120% on 2 nF range and ranges from 10% to 120% on other ranges.

Capacitance Measuring	
Measurement Method	Measure the rate of change of voltage generated during the current flowing the capacitance
Connection Type	2-wire
Input Protection	1000 V on all ranges

Measure Attentions:
Small capacitance is easily influenced by external noise and thus causes errors while measuring, shielding input can extremely help to reduce this kind of errors

Other Measuring Characteristics

Triggering and Memory		
Samples/Trigger	1 ~ 2000	
Trigger Delay	8 ms ~ 2000 ms optional	
External Trigger Input	Input Level	TTL compatible (High level when left input terminal is hanging in the air)
	Trigger Condition	Rising edge/falling edge selectable
	Input Impendence	>20 kΩ, in parallel with 400 pF, DC-coupled
	Min Pulse	500 μs
VMC Output	Electric Level	TTL compatible (input >=1 kohm loads)
	Output Polarity	straight polarity and negative polarity optional
	Input Impedance	200 ohm, typical

Arbitrary Sensor
Support for multiply types of sensor such as Thermocouple, DC Voltage, DC Current, Resistance (2-wire or 4-wire) and Frequency output; With thermocouple compensation at cold junction.
Output Polarity: straight polarity and negative polarity optional
Preset ITS-90 transform of B, E, J, K, N, R, S and T thermocouple and transform of platinum Pt100, Pt385 resistance temperature sensor

Math Functions
Pass/Fail, REL (RELative), Min/Max/Average, dBm, dB, Hold, Historgram, Standard deviation

History Records	
Volatile Memory	2000 readings of history records
Nonvolatile Memory	10 gourps of history records (2000 readings/group); 10 groups of sensor records: (1000 readings/group); 10 groups of setting records of instrument; 10 groups of setting records of arbitrary sensor; support U-disk external storage

General Specifications

Power Supply	
AC 100 V ~ 120 V	45 Hz ~ 440 Hz
AC 200 V ~ 240 V	45 Hz ~ 66 Hz
Consumption	20 VA peak value
Mechanism	
Dimension	107.0 mm×231.6 mm×290.5 mm
Weight	2.5 kg
Other Characteristics	
Display Screen	LCD display with 256×64 lattices, support for Double display, Menu display, Operating help and English/Chinese bilingual.
Operating Environment	Full accuracy from 0℃ to 50℃; 80% R.H. and 40℃, non condensing
	Storage Temperature: -20℃ ~ 70℃
	Shock and Vibration: conforming to MIL-T-28800E, III, 5 level (only for sine)
	height above sea level: up to 3000 meters
Safety	Conforming to IEC61010-1: 2001. Measure CAT I 1000 V/CAT II 600 V Class of pollution: 2
Remote Interface	GPIB (only for DM3058), 10/100Mbit LAN (only for DM3058), USB2.0 Full Speed Device & (U disc available), RS-232C
Programmer Language	RIGOL 3058 SCPI, FLUKE45, Agilent34401A
LXI Compatibility	LXI Class C, Version1.1 (only for DM3058)
Warm Up Time	30 minutes

Ordering Information

Name of Product

RIGOL DM3058/DM3058E Digital Multimeter

Standard Accessories

- A Power Cord that fits the standard of destination country
- Two Test Leads (black and red)
- Two Alligator Clips (black and red)
- An USB Data Cable
- A Backup Fuse
- A Quick Guide
- User's Guide and Application software (CD-ROM)

Optional Accessories

- Kelvin Test Clips
- RS232 Cable

Warranty

Thank you very much for choosing **RIGOL** products!

RIGOL Technologies, Inc. warrants that this product will be free from defects in materials and workmanship from the date of shipment. If a product proved defective within the respective period, **RIGOL** will provide repair or replacement as described in the complete warranty statement.

For the copy of complete warranty statement or maintenance, please contact with your nearest **RIGOL** sales and service office.

RIGOL do not provide any other warranty items except the one being provided by this summary and the warranty statement. The warranty items include but not being subjected to the hint guarantee items related to tradable characteristic and any particular purpose. **RIGOL** will not take any responsibility in cases regarding to indirect, particular and ensuing damage.

Contact Us

If you have any problem or requirement when using our products or this manual, please contact **RIGOL**.
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