DM858 Series

Digital Multimeter

Data Sheet

DSC11102-1110

Feb. 2024

DM858 Series
Digital Multimeter

Delicate Design, Full Functionality
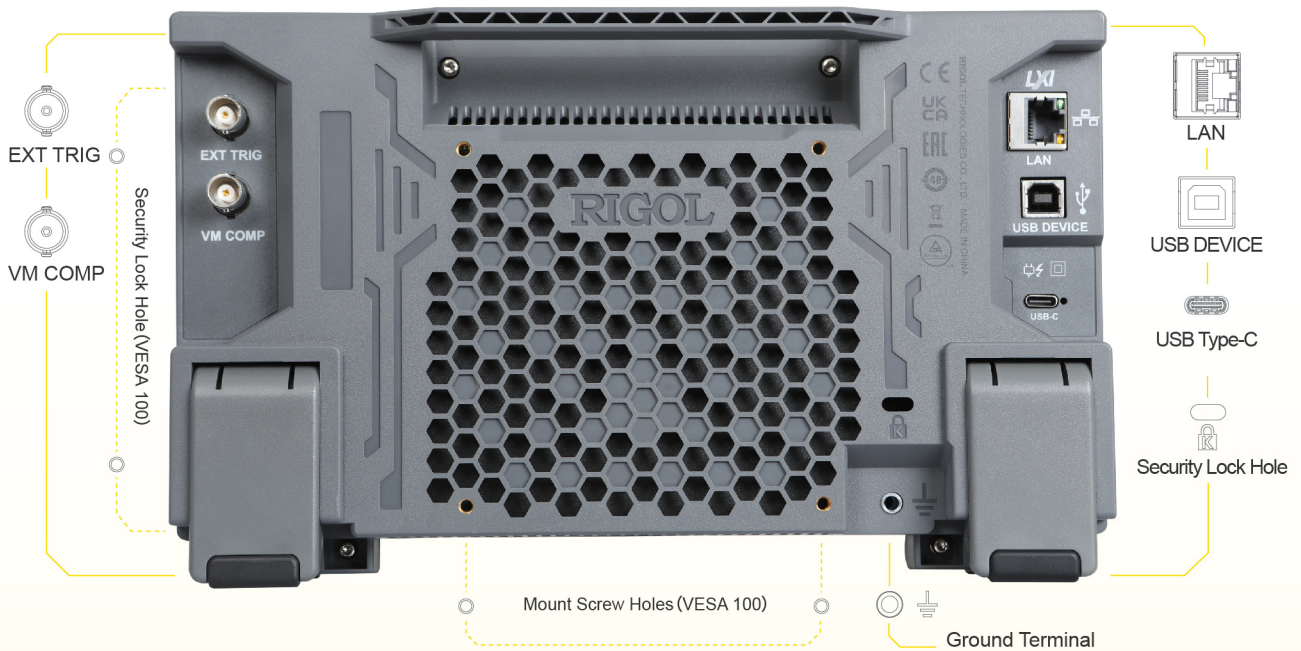
7" Color Touch Screen

USB HOST

Current Input Fuse

Signal Input Terminals

EXT TRIG

VM COMP

Security Lock Hole (VESA 100)

EXT TRIG

VM COMP

LAN

USB DEVICE

USB Type-C

Security Lock Hole

Mount Screw Holes (VESA 100)

Ground Terminal

266mm (W) * 165mm (H) * 80mm (D)

Product Features

• 5.5-Digit Resolution

This series provides two models with 5½-digit resolution and up to 125 readings/s measuring rate for high-speed tests. Its internal memory allows data logging of up to 500,000 points for recording and analyzing more data.

• Various Measurement Functions

It supports a broad range of measurements: DCV, DCI, ACV, ACI, 2-wire resistance, 4-wire resistance, frequency, period, continuity, diode, capacitance, and any sensor measurements.

Frequency Period

ACV ACI

Capacitance

DCV DCI

Continuity

Temperature

Resistance 2-wire/4-wire

Diode
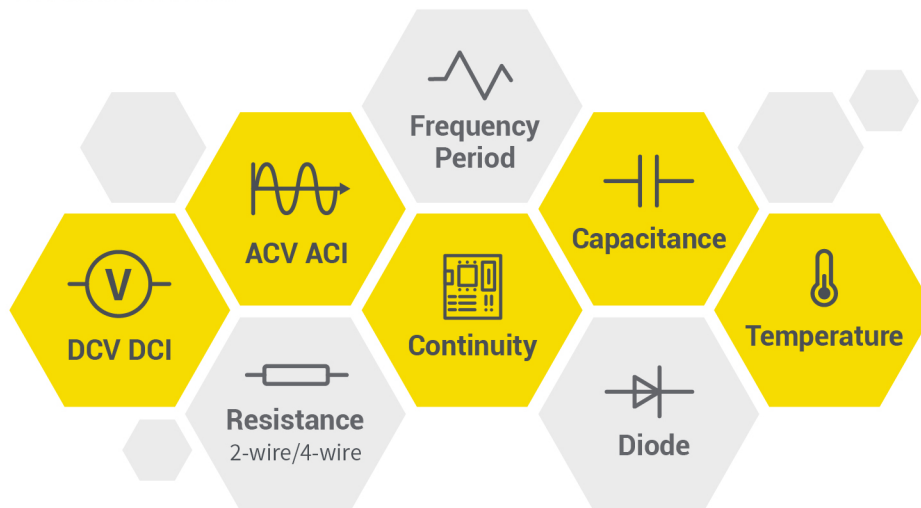
• Graphical Display

It visualizes data in a trend plot, histogram, or bar chart.

7-Inch Color Touch Screen

The 7-inch color touch screen allows you to control the instrument with simple touch-screen gestures. The dual-display measurement capability saves you from switching between measurements, making it easier to observe and analyze data.
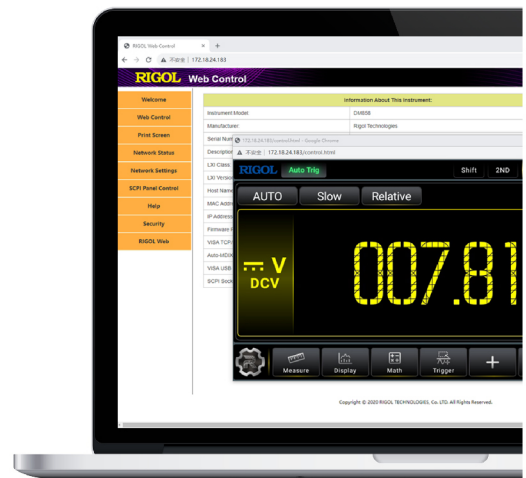
Compact in Size, Easy to Carry

With a compact size, it saves valuable space on your bench.

It can be powered by a mobile power source via its USB Type-C power interface, satisfying your test requirements in the field.
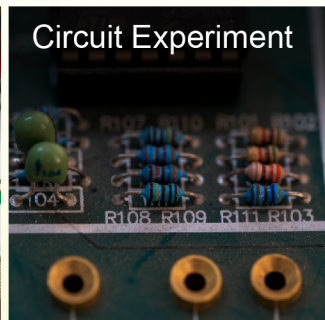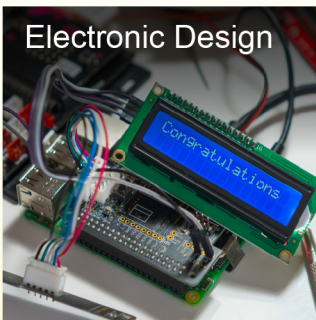
Flexible Control and Operation

It has standard USB and LAN interfaces for flexible PC connectivity and supports remote control via Web Control.

Applications

| Electronic Design | Circuit Experiment | Home Appliance Maintenance | Instrument Calibration |

Product Features

- Max. reading rate: 125 readings/s
- Up to 500,000 points logging memory to record and analyze more data
- 5½-digit reading resolution (120,000 counts)
- True-RMS AC Voltage and AC Current measuring
- Built-in 10 groups of data storage and 10 groups of setup storage
- Strong Math functions, supporting various application protocols
- 7'' color touch screen, displaying dual-measurement results concurrently
- Type-C interface for power charge; compact in size, freeing up your bench space
- Standard USB and LAN interfaces, supporting Web Control

DM858 series benchtop digital multimeter provides a highly cost-effective test tool for engineers. It features 5.5-digit resolution, max. 125 readings/s, data logging memory of 500,000 points, and 0.03% DCV accuracy (1 year). It provides 11 measurement functions for input signals, 5 Math operations, and 3 graphical display types, satisfying what most experiments and tests require of a multimeter. The 7'' touch screen allows a clear view on measurement results. Its provides USB and LAN interfaces (standard) as well as the Web Control function for you to control the instrument directly, bringing smoother interaction. It is equipped with a Type-C interface for power charge. In addition, it has a compact size and supports the attachment to a bracket, saving valuable bench space for engineers.

Specifications for Different Models

	DM858	DM858E
DCV Accuracy (1 year)	0.030%	0.060%
Reading Rate	125 readings/s	80 readings/s
No. of Points in Data Logging Memory	500,000	20,000
Max. Current Measurement Range	10 A	3 A
Max. Capacitance Measurement Range	10 mF	1 mF

Specifications

Unless otherwise noted, all the technical specifications can be guaranteed for 30-minute warm-up, slow measurement mode, and calibration temperature within 18℃ and 28℃.

DC Characteristics

Accuracy ± (% of reading + % of range)

Function	Range[1]	Test Current or Load Voltage	1 year 23℃ ± 5℃
DC Voltage (DCV)	100.000 mV	-	0.03 + 0.004 (DM858) 0.06 + 0.004 (DM858E)
	1.00000 V	-	0.03 + 0.003 (DM858) 0.06 + 0.003 (DM858E)
	10.0000 V	-	0.03 + 0.004 (DM858) 0.06 + 0.004 (DM858E)
	100.000 V	-	0.03 + 0.003 (DM858) 0.06 + 0.003 (DM858E)
	1000.00 V[2]	-	0.03 + 0.003 (DM858) 0.06 + 0.003 (DM858E)
DC Current[3] (DCI)	100.000 µA	<0.05 V	0.055 + 0.005
	1.00000 mA	<0.5 V	0.055 + 0.005
	10.0000 mA	<0.05 V	0.095 + 0.020
	100.000 mA	<0.5 V	0.070 + 0.008
	1.00000 A	<0.01 V	0.170 + 0.020
	3.00000 A (for DM858E)	<0.1 V	0.250 + 0.010
	10.0000 A (for DM858)[4]	<0.1 V	0.250 + 0.010
Resistance (R)[5]	100.000 Ω	1 mA	0.050 + 0.020
	1.00000 kΩ	100 µA	0.050 + 0.020
	10.0000 kΩ	10 µA	0.050 + 0.020
	100.000 kΩ	1 µA	0.10 + 0.05
	1.00000 MΩ	1 µA	1.00 + 0.05
	10.0000 MΩ	100 nA	1.50 + 0.05
	50.000 MΩ	10 nA	3.00 + 0.05
Diode Test	2.0000 V[6]	350 µA	0.050 + 0.15
Short-circuit Test	1000 Ω	100 µA	0.3 + 0.15

DC Voltage

Input Resistance	100 mV, 1 V: 11.2 MΩ or >10 GΩ (selectable) (Input signals that exceed ± 2.5 V in these ranges will pass the 1 MΩ (typical) clamp resistance.) 10 V, 100 V, and 1000 V: 11.2 MΩ ± 5%
Input Bias Current	<300 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, max. ±500 VDC)
NMRR (Normal Mode Rejection Ratio)	60 dB at "slow" rate

Resistance

Measurement Method	4-wire resistance or 2-wire resistance Current source referenced to LO input
Open Circuit Voltage	Limited to <5 V
Max. Lead Resistance (4-wire)	10% of range per lead for 100 Ω and 1 kΩ ranges 1 kΩ per lead on all other ranges
Input Protection	1000 V on all ranges

DC Current

Shunt Resistor	100 µA: <0.05 V 1 mA: <0.05 V 100 µA, 1 mA: 330 Ω 10 mA, 100 mA: 3.3 Ω 1 A, 3 A, 10 A: 0.008 Ω (3 A only available for DM858E and 10 A only available for DM858)
Input Protection	DM858: replaceable 10 A, 250 V fast-blow fuse on the front panel; 12 A, 1000 V fast-blow fuse internal DM858E: replaceable 3.15 A, 250 V fast-blow fuse on the front panel; 3.15 A, 1000 V fast-blow fuse internal

Short Circuit/Diode Test

Measurement Method	Short circuit test: 100 µA ± 5% constant current source, <5 V open-circuit voltage Diode test: 350 µA ± 5% constant current source, <5 V open-circuit voltage

Short Circuit/Diode Test	
Response Time	DM858: 125 samples/s; DM858E: 80 samples/s, with beeper setting
Short Circuit Resistance	Adjustable from 1 Ω to 1000 Ω
Input Protection	1000 V

Setup Time Attentions

The setup time about voltage measurement is affected by source impedance, dielectric characteristics of test cable, and input signal changes.

NOTE:

[1]: 20% over range on all ranges except DCV 1000 V, ACV 750 V, DCI 10 A, 3 A, and ACI 10 A, 3 A.

[2]: 0.02 mV additional error per 1 V over the first ±500 VDC.

[3]: For 100 µA, 1 mA, 10 mA, and 100 mA ranges, the internal current sensing resistor needs to be cooled when measuring >1 A current for more than 15 minutes.

[4]: 10 A is only available for DM858. The max. current range for DM858E is 3 A. For continuous current greater than DC 7 A or AC RMS 7 A, 30 seconds ON and 30 seconds OFF.

[5]: Specifications are for 4-wire resistance measurement or 2-wire resistance measurement using the "Relative" operation. ±0.2 Ω additional errors will be added in performing 2-wire resistance measurement without using the "Relative" operation.

[6]: The accuracy specifications are for the voltage measured at the input terminals only. The typical value of the test current is 350 µA. Variation in the current source will cause some variation in the voltage drop across a diode junction.

AC Characteristics

Accuracy ± (% of reading + % of range)

Function	Range[1]	Frequency Range	1 year 23℃ ± 5℃
True-RMS AC Voltage (ACV)[2]	100.000 mV	20 Hz to 45 Hz	1.5 + 0.2
		45 Hz to 1 kHz	0.2 + 0.1
		1 kHz to 5 kHz	1.0 + 0.1
		5 kHz to 8 kHz	3.0 + 0.1
	1.00000 V	20 Hz to 45 Hz	1.5 + 0.2
		45 Hz to 1 kHz	0.2 + 0.1
		1 kHz to 5 kHz	1.0 + 0.1
		5 kHz to 8 kHz	3.0 + 0.1
	10.0000 V	20 Hz to 45 Hz	1.5 + 0.2
		45 Hz to 1 kHz	0.2 + 0.1
		1 kHz to 5 kHz	1.0 + 0.1
		5 kHz to 8 kHz	3.0 + 0.1
	100.000 V	20 Hz to 45 Hz	1.5 + 0.2
		45 Hz to 1 kHz	0.2 + 0.1
		1 kHz to 5 kHz	1.0 + 0.1
		5 kHz to 8 kHz	3.0 + 0.1
	750.00 V	20 Hz to 45 Hz	1.5 + 0.2
		45 Hz to 1 kHz	0.2 + 0.1
		1 kHz to 5 kHz	1.0 + 0.1
		5 kHz to 8 kHz	3.0 + 0.1

Function	Range[1]	Frequency Range	1 year 23℃ ± 5℃
True-RMS AC Current (ACI)[3]	100.000 µA	20 Hz to 45 Hz	1.50 + 0.10
		45 Hz to 1 kHz	0.50 + 0.10
		1 kHz to 8 kHz	2.50 + 0.20
	1.00000 mA	20 Hz to 45 Hz	1.50 + 0.10
		45 Hz to 1 kHz	0.50 + 0.10
		1 kHz to 8 kHz	2.50 + 0.20
	10.0000 mA	20 Hz to 45 Hz	1.50 + 0.10
		45 Hz to 1 kHz	0.50 + 0.10
		1 kHz to 8 kHz	2.50 + 0.20
	100.000 mA	20 Hz to 45 Hz	1.50 + 0.10
		45 Hz to 1 kHz	0.30 + 0.10
		1 kHz to 8 kHz	2.50 + 0.20
	1.00000 A	20 Hz to 45 Hz	1.50 + 0.20
		45 Hz to 1 kHz	0.50 + 0.20
		1 kHz to 8 kHz	2.50 + 0.20
	3.00000 A (for DM858E)	20 Hz to 45 Hz	1.50 + 0.15
		45 Hz to 1 kHz	0.50 + 0.15
		1 kHz to 8 kHz	2.50 + 0.20
	10.0000 A (for DM858)[4]	20 Hz to 45 Hz	1.50 + 0.15
		45 Hz to 1 kHz	0.50 + 0.15
		1 kHz to 8 kHz	2.50 + 0.20

Additional Crest Factor Error (non-sinusoidal waveforms)[5]

Crest Factor	Error (% of range)
1 to 2	0.05
2 to 3	0.2

True RMS AC Voltage (ACV)

Measurement Method	AC-coupled True-RMS - measure the AC component of input with up to 1000 V DC bias on any range
Crest Factor	≤3 at full scale
Input Impedance	11.2 MΩ ± 5%, in parallel with <100 pF capacitance on any range
AC Filter Bandwidth	20 Hz to 8 kHz
CMRR (Common Mode Rejection Ratio)	60 dB (for the 1 kΩ imbalance resistance in LO lead and <60 Hz, max. ±500 VDC)

True RMS AC Current (ACI)

Measurement Method	Direct coupled to the fuse and shunt; AC-coupled True RMS measurement (measure the AC component)
Crest Factor	≤3 at full scale

Max. Input	DC + AC current peak value <300% of range; RMS current with DC current component: DM858: <10 A; DM858E: <3 A
Shunt Resistor	100 µA, 1 mA: 330 Ω 10 mA, 100 mA: 3.3 Ω 1 A, 3 A, 10 A: 0.008 Ω (3 A only available for DM858E and 10 A only available for DM858)
Input Protection	DM858: replaceable 10 A, 250 V fast-blow fuse on the front panel; 12 A, 1000 V fast-blow fuse internal DM858E: replaceable 3.15 A, 250 V fast-blow fuse on the front panel; 3.15 A, 1000 V fast-blow fuse internal

Setup Time Attentions

Make sure that the RC return at input terminal has been in a stable state completely (higher than 3 s) before accurate measurement.

Input >300 Vrms (or >5 Arms) will cause the self-heating of the signal conditioning component to generate error which is included in the characteristics of the instrument. Internal temperature variation due to the self-heating will cause an additional error on the lower AC range. The error is smaller than 0.03% of readings and will disappear after a few minutes.

NOTE:

[1]: 20% over range on all ranges except DCV 1000 V, ACV 750 V, DCI 10 A, 3 A, and ACI 10 A, 3 A.

[2]: Specifications are for sine-wave inputs >5% of the range. For the 750 VAC range, it is limited to 8 x 10^7 Volts-Hz. For 5 kHz to 8 kHz, add 0.13% of range additional error.

[3]: Specifications are for sine-wave inputs >5% of the range. For 100 µA, 1 mA, 10 mA, and 100 mA ranges, the internal current sensing resistor needs to be cooled if >1 A current is applied for more than 15 minutes.

[4]: 10 A is only available for DM858. The max. current range for DM858E is 3 A. For continuous current greater than DC 7 A or AC RMS 7 A, 30 seconds ON and 30 seconds OFF.

[5]: For frequency <100 Hz.

Frequency and Period Characteristics

Accuracy ± (% of reading + % of range)

Function	Range	Frequency Range	1 year 23℃ ± 5℃
Frequency/Period	100 mV to 750 V[1]	20 Hz to 2 kHz	0.01 + 0.003
		2 kHz to 20 kHz	0.01 + 0.003
		20 kHz to 50 kHz	0.01 + 0.003
		50 kHz to 100 kHz	0.01 + 0.006
	DM858: 100 µA to 10 A[2]	20 Hz to 2 kHz	0.01 + 0.003
	DM858E: 100 µA to 3 A[3]	2 kHz to 10 kHz	0.01 + 0.003

Measurement Attentions

All frequency counters are susceptible to error when measuring low-voltage, low-frequency signals. Shielding inputs is critical for minimizing measurement errors from external noise.

Setup Time Attentions

Errors will occur when attempting to measure the frequency or period of the signal with a DC offset voltage change. Make sure that the RC return at input terminal has been in a stable state completely (higher than 3 s) before accurate measurement.

NOTE:

[1]: 100 mV: the specifications are for AC input voltage of 35% to 120% of range in <20 kHz frequency; 1 V, 10 V, 100 V, 750 V: the specifications are for AC input voltage of 35% to 120% of range (750 V range is limited to 750 Vrms).

[2]: 100 µA to 10 A: the specifications are for AC input current of 20% to 120% of range (10 A range is limited to 10 Arms).

[3]: 100 µA to 3 A: the specifications are for AC input current of 20% to 120% of range (3 A range is limited to 3 Arms).

Capacitance Characteristics

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

Function	Range[2]	Max. Testing Current	1 year 23℃ ± 5℃
Capacitance	1.000 nF	200 nA	5 + 1.5
	10.00 nF	200 nA	5 + 1.5
	100.0 nF	2 µA	1 + 0.5
	1.000 µF	10 µA	1 + 0.5
	10.00 µF	10 µA	1 + 0.5
	100.0 µF	100 µA	1 + 0.5
	1.000 mF	0.5 mA	2 + 0.5
	10.00 mF (for DM858)[3]	1 mA	2 + 0.5

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

Measurement Attentions

Due to external noise, measurement errors can occur when measuring small capacitance. Shielding inputs is critical for minimizing such errors.

NOTE:

[1]: Specifications are guaranteed when the "Relative" operation is enabled. Additional errors may be caused by non-film capacitors.

[2]: Specifications are guaranteed when the capacitance range is between 10% and 120%.

[3]: 10 mF is only available for DM858. The max. measurement range for DM858E is 1 mF.

Trigger Characteristics

Trigger Characteristics	
Trigger Source	Auto, Single, External
Samples Per Single Trigger	1 to 2000
Auto Trigger Interval	Slow: 400 ms to 2000 ms Medium: 50 ms to 2000 ms Fast: 8 ms to 2000 ms (DM858); 12 ms to 2000 ms (DM858E)
Reading Hold Sensitivity	0.01%, 0.1%, 1%, or 10% of the reading

Trigger Characteristics			
External Trigger Input	Input Level	5 V TTL-compatible	
	Trigger Condition	Rising edge/falling edge/high level/low level	
	Input Impedance	>20 kΩ, in parallel with 400 pF, DC-coupled	
	Min. Pulse Width	500 μs	
VMC Out	Level	5 V TTL-compatible	
	Output Polarity	Positive/negative	
	Output Impedance	200 Ω, typical	
	Output Pulse Width	Slow: 1 ms to 399 ms	
		Medium: 1 ms to 49 ms	
		Fast: 1 ms to 7 ms (DM858); 1 ms to 11 ms (DM858E)	

Other Measurement Characteristics

Any Sensor	
Temperature Sensor	TC: B, E, J, K, N, R, S, T
	RTD: 385 (0.00385), 389 (0.00389), 391 (0.00391), 392 (0.00392) temperature coefficient
	Thermal: 2.2 kΩ, 3 kΩ, 5 kΩ, 10 kΩ, 30 kΩ resistance coefficient
User-defined Sensor	Supports DCV, DCI, 2-wire resistance, 4-wire resistance, and frequency sensors

History and Storage	
Volatile Memory	DM858: 500,000 readings
	DM858E: 20,000 readings
Non-volatile Memory	10 groups of history data storage (DM858: 500,000 readings/group; DM858E: 20,000 readings/group)
	10 groups of any sensor setup storage (DM858: 500,000 readings/group; DM858E: 20,000 readings/group)
	10 groups of instrument setting storage
	Supports USB external storage extension

Math Operation
dBm, dB, Relative, Statistics (Maximum/Minimum/Average/Standard Deviation), Limit, Histogram, Bar Chart, and Trend

General Specifications

Power Supply	
Power Interface	Type-C interface
Power Voltage	DC, 12 V, 3 A
Consumption	10 W (max.)

Mechanical Characteristics	
Dimensions	266 mm (W) x 165 mm (H) x 80 mm (D)
Weight	Package excluded: <2 kg
	Package included: <3 kg

Remote Interface	
USB Host	1 on the front panel
USB Device	1 on the rear panel
LAN Port	1 on the rear panel, 10/100 Base-T, supporting LXI-C

Others	
LCD	7-Inch color touch screen
Operating Environment	Full accuracy: 0°C to 50°C, 80% RH, 40°C, without condensation
	Storage temperature: -20℃ to 60℃
	Altitude: up to 3,000 meters
Programming Language	Standard SCPI commands
Warm-up Time	30 minutes

Warranty and Calibration Interval

Warranty and Calibration Interval	
Warranty	3 years (excluding the accessories)
Recommended Calibration Interval	12 months

Regulation Standards

Electromagnetic Compatibility	Compliant with EMC Directive (2014/30/EU), compliant with or higher than the standards specified in EN 61326-1: 2013, EN 61326-2-1:2013, EN IEC 61000-3-2:2019+A1, EN 61000-3-3:2013+A1:2019	
	CISPR 11:2009+A1 Class A	
	EN IEC 61000-3-2:2019+A1	Harmonics, Class A
	EN 61000-3-3:2013+A1:2019	Voltage flicker
	EN 61000-4-2:2009	±4.0 kV (contact discharge), ±8.0 kV (air discharge)
	EN 61000-4-3:2006+A1+A2	10 V/m (80 MHz to 1 GHz); 3 V/m (1.4 GHz to 6 GHz)
	EN 61000-4-4:2004+A1	2 kV power cord
	EN 61000-4-5:2006	1 kV (phase-to-neutral voltage); 2 kV (phase-to-earth voltage); 2 kV (neutral-to-earth voltage)
	EN 61000-4-6:2009	10 V, 0.15 MHz to 80 MHz
	EN 61000-4-11:2004	Voltage dip: 0% UT during half cycle; 0% UT during 1 cycle; 70% UT during 25 cycles Short interruption: 0% UT during 250 cycles
Safety	EN 61010-1:2010+A1:2019 IEC 61010-1:2010+A1:2016 UL 61010-1: 2012 R7.19 CAN/CSA-C22.2 NO. 61010-1-12 + GI1 + GI2 (R2017) + A1	
Vibration	Meets GB/T 6587; class 2 random Meets MIL-PRF-28800F and IEC60068-2-6; class 3 random	
Shock	Meets GB/T 6587-2012; class 2 random Meets MIL-PRF-28800F and IEC 60068- 2- 27; class 3 random (in non-operating conditions: 30 g, half sine, 11 ms duration, 3 shocks along the main axis, a total of 18 vibrations)	

Order Information and Warranty Period

Order Information

Order Information	Order No.
Model	
DM858 (5½ Digital Multimeter)	DM858
DM858E (5½ Digital Multimeter)	DM858E
Standard Accessories	
Power Adaptor Conforming to the Standard of the Destination Country	— —
Two Alligator Clips (Black and Red)	ALLIGATORCLIP-DMM
Two Digital Multimeter Test Pens (Black and Red)	LD-DM
Two Backup Fuses: DM858: AC, 250 V, F10 A DM858E: AC, 250 V, F3.15 A	— —
Optional Accessories	
Kelvin Test Clip	KELVINTESTCLIP-DMM
USB Cable (150 cm)	CB-USBA-USBB-FF-150

NOTE:

For all the mainframes, accessories, and options, please contact the local office of RIGOL.

Warranty Period

Three years for the mainframe, excluding the accessories.

Option Ordering and Installation Process
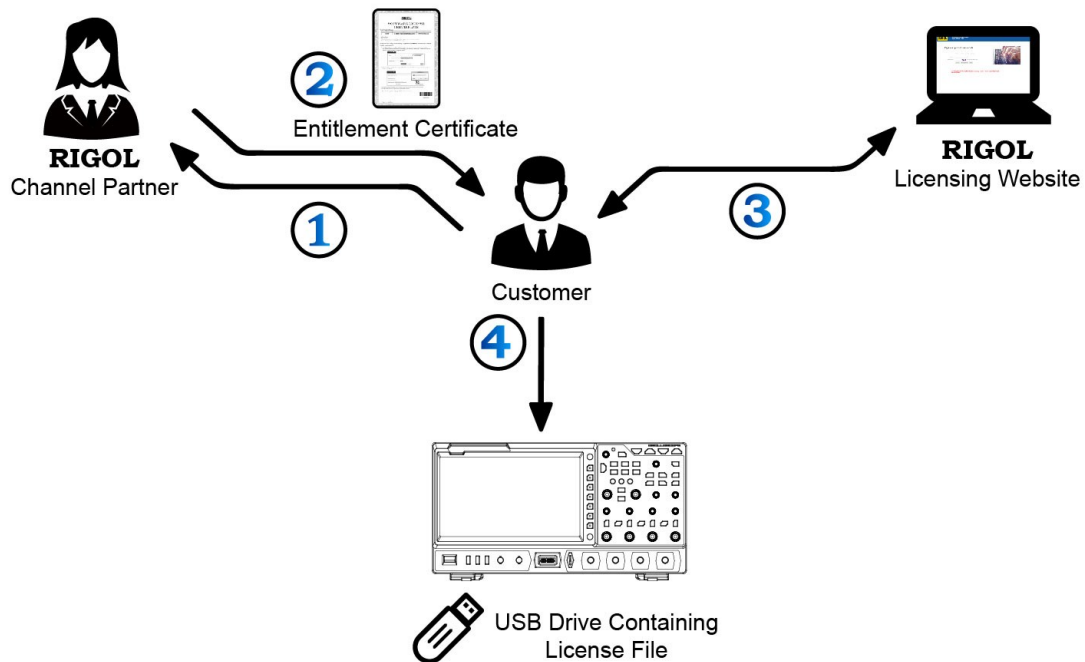
1. According to the usage requirements, please purchase the specified function options from **RIGOL Sales Personnel**, and provide the serial number of the instrument that needs to install the option.

2. After receiving the option order, the **RIGOL** factory will mail the paper software product entitlement certificate to the address provided in the order.

3. Log in to **RIGOL** official website for registration. Use the software key and instruments serial number provided in the entitlement certificate to obtain the option license code and the option license file.

4. Download the option license file to the root directory of the USB storage device, and connect the USB storage device to the instrument properly. After the USB storage device is successfully recognized, the **Option install** menu is activated. Press this menu key to start installing the option.