

# T3DMM4-5 Data Sheet

## 4.5 Digit Digital Multimeter

### Broad Measurement Range

**DC: 1000 Volts**  
**AC: 750 Volts**  
**Current: 10A**



### Tools for Improved Debugging

- **Wide range of measurements** – DC/AC voltage and Current, Resistance, Capacitance, Frequency, Period, Temperature, and more.
 ✔ **More application coverage from a single Digital multimeter.**
- **True-RMS measurements** – All AC Voltage and Current ranges give True-RMS readings.
 ✔ **Excellent accuracy regardless of the waveform shape.**
- **Advanced measurement features** – Min, Max, Average, Standard Deviation dBm/dB, Pass/fail, Histogram, Trend, Relative measurements.
 ✔ **Advanced features for today's measurement needs.**
- **Built-in cold terminal thermocouple compensation** – 4.3 inch (10.92 cm) color TFT-LCD 480 x 272 display.
 ✔ **Accurate Temperature measurements.**
- **USB Device, USB Host and LAN support**
✔ **Remote control your measurements.**

### Key Specifications

DC Voltage	600 mV to 1000 V
DC Current	600 $\mu$ A to 10 A
True RMS AC Voltage	600 mV to 750 V
True RMS AC Current	60 mA to 10 A
2/4 Wire Resistance	600 Ohms to 100 MOhms
Connectivity	USB Device, LAN
Remote Control	SCPI, LabView Driver

# PRODUCT OVERVIEW

Teledyne Test Tools T3DMM4-5 is a 4½ digit digital multimeter incorporating the latest 4.3 inch (10.92cm) dual-display technology which can be configured to show data histograms, Data fluctuation Trends, Bar Graph, Statistics or the traditional Number mode, all in an easy to use interface.

A great feature of the Teledyne Test Tools T3DMM4-5 is its ability to make highly accurate True RMS AC Voltage and Current measurements, meaning no loss of accuracy even when measuring complex voltage and current waveforms.

The T3DMM4-5 is especially well suited for the needs of the general purpose multifunctional environment, as well as supporting a full range of automatic measurements.

## Main Functions

### Basic Measurement Function

- DC Voltage: 600 mV ~ 1000 V
- DC Current: 600 µA ~ 10 A
- AC Voltage: True-RMS, 600 mV ~ 750 V
- AC Current: True-RMS, 60 mA ~ 10 A
- 2/4-Wire Resistance: 600 Ω ~ 100 MΩ
- Capacitance: 2 nF ~ 10000 µF
- Continuity Test: Range is fixed at 2 kΩ
- Diode Test: Adjustable range is 0 ~ 4 V.
- Frequency Measurement: 20 Hz ~ 500 KHz
- Period Measurement: 2 µs ~ 0.05 s
- Temperature: Support for TC and RTD sensor
- Max, Min, Average, Standard Deviation, dBm/dB, Relative Measurement, Pass/Fail Histogram, Trend Chart

### User-friendly Design

- 4.3" TFT-LCD, 480\*272
- Dual display, Chinese and English Menu
- Built-in front panel accessible help system
- File management (support for U-disc and local storage)

## Application fields

- Research Laboratory
- Development Laboratory
- Detection and Maintenance
- Calibration Laboratory
- Automatic Production Test

## Main Features

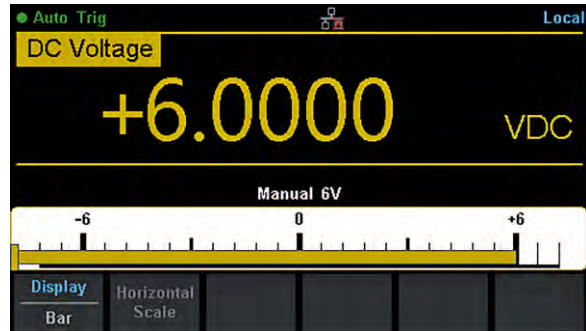
- Real 4½ digit (60000 count) readings resolution
- Up to 150 rdgs/s measurement speed
- True-RMS AC Voltage and AC Current measuring
- 1 Gb flash memory for mass storage configuration files and data files
- Built-in cold terminal compensation for thermocouple
- Standard interface: USB Device, USB Host, LAN
- USB & LAN remote interfaces support common SCPI command set. Compatible with other popular DMMs on the market.

# SPECIAL FEATURES

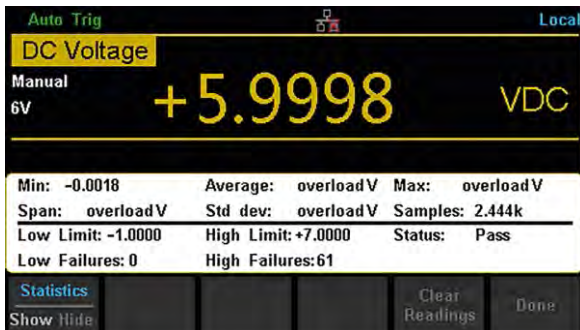
## Dual Display



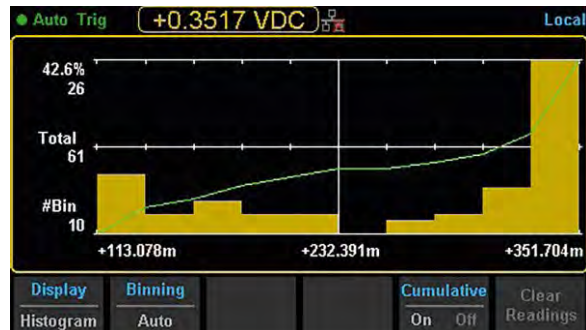
## Bar Chart



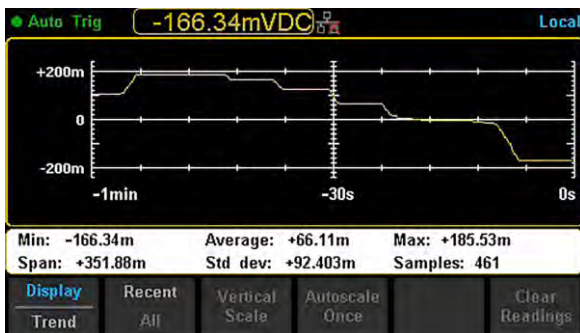
## Statistics



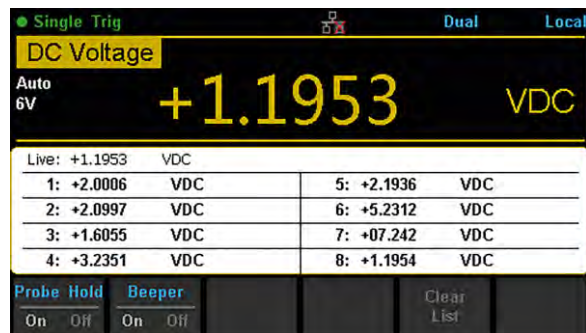
## Histogram



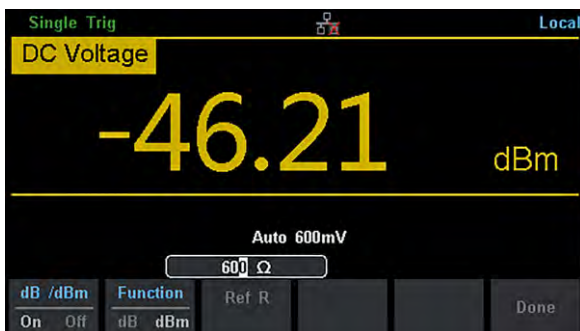
## Trend Chart



## Hold Measurement



## dBm Hold Measurement



## Interface



# SPECIFICATIONS

## DC Characteristic

Accuracy  $\pm$  (% of Reading + count)<sup>1)</sup>

Function	Range <sup>2)</sup>	Test current or Load voltage	Resolution	Accuracy (one year; 23°C $\pm$ 5°C)
DC Voltage	600 mV		0.01 mV	0.01 + 5
	6 V		0.0001 V	0.01 + 6
	60 V		0.001 V	0.02 + 4
	600 V		0.01 V	0.02 + 6
	1000 V <sup>4)</sup>		0.1 V	0.02 + 6
DC Current	600 $\mu$ A	< 33 mV	0.01 $\mu$ A	0.05 + 3
	6 mA	< 330 mV	0.0001 mA	0.05 + 3
	60 mA	< 0.05 V	0.001 mA	0.05 + 3
	600 mA	< 0.5 V	0.01 mA	0.12 + 6
	6 A	< 0.33 V	0.0001 A	0.20 + 5
	10 A <sup>5)</sup>	< 0.6 V	0.001 A	0.25 + 4
Resistance <sup>3)</sup>	600 $\Omega$	1 mA	0.01 $\Omega$	0.04 + 5
	6 K $\Omega$	1 00 $\mu$ A	0.0001 K $\Omega$	0.02 + 5
	60 K $\Omega$	10 $\mu$ A	0.001 K $\Omega$	0.02 + 5
	600 K $\Omega$	1 $\mu$ A	0.01 K $\Omega$	0.04 + 5
	6 M $\Omega$	200 nA	0.0001 M $\Omega$	0.12 + 3
	60 M $\Omega$	200 nA    10 M $\Omega$	0.001 M $\Omega$	0.85 + 3
	100 M $\Omega$	200 nA    10 M $\Omega$	0.01 M $\Omega$	1.75 + 3
Diode Test <sup>6)</sup>	0~2 V	1 mA	0.0001 V	0.05 + 3
	2~4 V	1 mA	0.0001 V	0.35 + 3
Continuity Test	2000 $\Omega$	1 mA	0.1 $\Omega$	0.05 + 3

### Remarks:

- <sup>1)</sup> Specifications are after 0.5 Hour warm-up, "Slow" measurement rate and calibration temperature 18°C ~ 28°C.
- <sup>2)</sup> 10 % over range on all ranges except for DCV 1000 V, ACV 750 V, DCI 10 A and ACI 10 A.
- <sup>3)</sup> Specifications are for 4-wire measure or 2-wire measure under "REF" operation.  $\pm$ 0.2  $\Omega$  of extra errors will be generated if perform 2-wire measure without "REF" operation.
- <sup>4)</sup> Plus 0.02 mV of error per 1 V after the first  $\pm$ 500 VDC.
- <sup>5)</sup> 30 seconds OFF after 30 seconds ON is recommend for continuous current that higher than DC 7 A or AC RMS 7 A.
- <sup>6)</sup> Accuracy specifications are only for voltage measuring at input terminal. The typical value of current under measure is 1 mA. Voltage drop at diode junction may vary with current supply. Adjustable voltage range: 0 ~ 4 V.



## AC Characteristic

Accuracy  $\pm$  (% of Reading + count)<sup>1)</sup>

Function	Range <sup>2)</sup>	Frequency Range	Resolution	Accuracy (one year; 23°C $\pm$ 5°C)
True-RMS AC Voltage <sup>3)</sup>	600 mV	20 Hz – 45 Hz	0.01 mV	2.0 + 20
		45 Hz – 100 Hz	0.01 mV	0.6 + 10
		100 Hz – 20 KHz	0.01 mV	0.2 + 10
		20 KHz – 50 KHz	0.01 mV	1.0 + 10
		50 KHz – 100 KHz	0.01 mV	3.0 + 10
	6 V	20 Hz – 45 Hz	0.0001 V	2.0 + 20
		45 Hz – 100 Hz	0.0001 V	0.6 + 10
		100 Hz – 20 KHz	0.0001 V	0.2 + 10
		20 KHz – 50 KHz	0.0001 V	1.0 + 10
		50 KHz – 100 KHz	0.0001 V	3.0 + 10
	60 V	20 Hz – 45 Hz	0.001 V	2.0 + 20
		45 Hz – 100 Hz	0.001 V	0.6 + 10
		100 Hz – 20 KHz	0.001 V	0.2 + 10
		20 KHz – 50 KHz	0.001 V	1.0 + 10
		50 KHz – 100 KHz	0.001 V	3.0 + 10
	600 V	20 Hz – 45 Hz	0.01 V	2.0 + 20
		45 Hz – 100 Hz	0.01 V	0.6 + 10
		100 Hz – 20 KHz	0.01 V	0.2 + 10
		20 KHz – 50 KHz	0.01 V	1.0 + 10
		50 KHz – 100 KHz	0.01 V	3.0 + 10
750 V	20 Hz – 45 Hz	0.01 V	2.0 + 20	
	45 Hz – 100 Hz <sup>4)</sup>	0.01 V	0.6 + 10	
	100 Hz – 20 KHz	0.01 V	0.2 + 10	
	20 KHz – 50 KHz	0.01 V	1.0 + 10	
	50 KHz – 100 KHz	0.01 V	3.0 + 10	
True-RMS AC Current <sup>5)</sup>	60 mA	20 Hz – 45 Hz	0.001 mA	2.0 + 20
		45 Hz – 2 KHz	0.001 mA	0.5 + 20
		2 KHz – 10 KHz	0.001 mA	2.5 + 30
	600 mA	20 Hz – 45 Hz	0.01 mA	2.0 + 20
		45 Hz – 2 KHz	0.01 mA	0.5 + 20
		2 KHz – 10 KHz	0.01 mA	2.5 + 30
	6 A	20 Hz – 45 Hz	0.0001 A	2.0 + 20
		45 Hz – 2 KHz	0.0001 A	0.5 + 20
		2 KHz – 10 KHz	0.0001 A	2.5 + 20
	10 A <sup>6)</sup>	20 Hz – 45 Hz	0.001 A	1.5 + 15
		45 Hz – 2 KHz	0.001 A	0.5 + 15
		2 KHz – 10 KHz	0.001 A	2.5 + 25

## Additional wave crest factor error (not Sine)<sup>7)</sup>

Wave crest coefficient	Error (% Range)
1 – 2	0.05
2 – 3	0.3

### Remarks:

<sup>1)</sup> Specifications are for 0.5 Hour warm-up, "Slow" measurement rate and calibration temperature 18°C ~ 28°C.

<sup>2)</sup> 10 % over range on all ranges except for DCV 1000 V, ACV 750 V, DCI 10 A and ACI 10 A.

<sup>3)</sup> Specifications are for amplitude of sine wave input > 5 % of range. For inputs from 1 % to 5 % of range and < 50 kHz, add 0.1 % of range as extra error. For 50 kHz to 100 kHz, add 0.1 % of range as extra error.

<sup>4)</sup> Plus 0.025 V of error per 1 V after the first  $\pm$  400 VAC.

<sup>5)</sup> Specifications are for sine wave input > 5 % of range. 0.1 % error will be added when the range of the input sine wave is 1 % to 5 %.

<sup>6)</sup> 30 seconds OFF/30 seconds ON is recommend for the continuous current higher than DC 7 A or AC RMS 7 A.

<sup>7)</sup> For input Frequency Range < 100 Hz



# SPECIFICATIONS

## Frequency and Period Characteristic

Accuracy  $\pm$  (% of Reading + count)<sup>1)</sup>

Function	Range	Frequency Range	Resolution	Accuracy (one year; 23°C $\pm$ 5°C)
Frequency/Period	600 mV to 750 V <sup>2)</sup>	20 Hz – 2 KHz		0.01 + 3
		2 KHz – 20 KHz		0.01 + 2
		20 KHz – 200 KHz		0.01 + 2
		200 KHz – 500 KHz		0.01 + 2

Remarks:

<sup>1)</sup> Specifications are for 0.5 Hour warm-up.

<sup>2)</sup> Except for exceptional levels, the AC input voltage is 5 % to 110 % of range when <100 kHz and 10 % to 110 % of range when >100 kHz. 750 V range is limited to 750 Vrms. The accuracy is 10 times % of Reading when the measurement range of AC voltage is in 600 mV range.

## Capacitance Characteristic

Accuracy  $\pm$  (% of Reading + count)<sup>1)</sup>

Function	Range <sup>2)</sup>	Max Testing Current	Resolution	Accuracy (one year; 23°C $\pm$ 5°C)
Capacitance	2 nF	10 $\mu$ A	0.001 nF	3 + 10
	20 nF	10 $\mu$ A	0.01 nF	1 + 10
	200 nF	100 $\mu$ A	0.1 nF	1 + 9
	2 $\mu$ F	100 $\mu$ A	0.001 $\mu$ F	1 + 10
	20 $\mu$ F	1 mA	0.01 $\mu$ F	1 + 10
	200 $\mu$ F	1 mA	0.1 $\mu$ F	1 + 9
	10000 $\mu$ F	1 mA	1 $\mu$ F	2 + 50

Remarks:

<sup>1)</sup> Specifications are for 0.5 Hour warm-up and "REF" operation. Using of non-film capacitor may generate additional errors.

<sup>2)</sup> Specifications are for from 1 % to 110 % on 2 nF range and ranges from 10 % to 110 % on other ranges.

## Temperature Characteristic

Accuracy  $\pm$  (% of Reading + count)<sup>1)</sup>

Function	Probe Type	Probe Model	Working Temperature Range	Accuracy (one year; 23°C $\pm$ 5°C)	Temperature coefficient 0°C ~ 18°C 28°C ~ 50°C
Temperature	RTD <sup>2)</sup>	$\alpha = 0.00385$	-200°C ~ 660°C	0.16	0.09
	TC <sup>3)</sup>	B	0°C ~ 1820°C	0.76	0.14
		E	-270°C ~ 1000°C	0.5	0.02
		J	-210°C ~ 1200°C	0.5	0.02
		K	-270°C ~ 1370°C	0.5	0.03
		N	-270°C ~ 1300°C	0.5	0.04
		R	-50°C ~ 1760°C	0.5	0.09
		S	-50°C ~ 1760°C	0.6	0.11
		T	-270°C ~ 400°C	0.5	0.03

Remarks:

<sup>1)</sup> Specifications are for 0.5 Hour warm-up, not include probe error.

<sup>2)</sup> Specifications are for 4-wire measure or 2-wire measure under "REF" operation.

<sup>3)</sup> Built-in cold terminal compensation for thermocouple, accuracy is  $\pm 2^\circ\text{C}$ .

# MEASURING METHOD AND OTHER CHARACTERISTICS

## DC Voltage

Input Resistance	600 mV 10 M $\Omega$ or 10 G $\Omega$ selectable 6 V, 60 V, 600 V and 1000 V Range 10 M $\Omega$ $\pm$ 2 %
Input Bias Current	< 90 pA, 25 °C
Input Protection	1000 V on all ranges
CMRR	120 dB (For the 1 K $\Omega$ unbalanced resistance in LO lead, max $\pm$ 500 VDC)
NMRR	60 dB at "slow" measurement rate

## Resistance

Testing Method	4-wire resistance or 2-wire resistance selectable
Input Protection	1000 V on all ranges

## DC Current

Shunt Resistor	600 $\mu$ A sampling voltage < 33 mV
	6 mA sampling voltage < 0.33 V
	1 $\Omega$ for 60 mA, 1 $\Omega$ for 600 mA
	0.01 $\Omega$ for 6 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 $\pm$ 5 % constant-current source or open-circuit voltage
Beeper	yes
Continuity Threshold	Adjustable
Input Protection	1000 V

## 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	$\leq$ 3 at full scale
Input Impedance	1 M $\Omega$ $\pm$ 2 % in parallel with < 100 pF on all ranges
AC Filter Bandwidth	20 Hz ~ 100 KHz
CMRR	60 dB (For the 1 K $\Omega$ imbalance resistance among Lo lead and < 60 Hz, Max $\pm$ 500 VDC)

## True-RMS AC Current

Measurement Method	DC Coupled to the fuse and shunt; AC Coupled True-RMS measurement (measures the AC components only)
Wave Crest Factor	$\leq$ 3 at full scale
Max Input	< 10 A (include DC component)
Shunt Resistor	1 $\Omega$ for 60 mA, 600 mA; 0.01 $\Omega$ for 6 A, 10 A
Input Protection	Rear panel: accessible 10 A, 250 V fast-melt fuse Internal: 12 A, 250 V slow-melt fuse

## Frequency/Period

Measurement Method	Reciprocal-counting technique, AC Coupled input, AC voltage or AC current measurement function
Additional Errors	Percentage Error increases in all frequency counters when measuring low voltage or low frequency signal.

## Capacitance Measuring

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

# MEASURING METHOD AND OTHER CHARACTERISTICS

## Temperature Measuring

Measurement Method	Support for TC and RTD types of sensor
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## Trigger and Memory

Samples/Trigger	1 ~ 10000	
Trigger Delay	6 ms ~ 10000 ms optional	
External Trigger Input	Input Level	TTL compatible (High level when left input terminal is Disconnected)
	Trigger Condition	Rising and Falling selectable
	Input Impedance	≥ 20 KΩ//400 pF, DC-coupled
VMC	Level	TTL compatible
	Output Polarity	Straight and negative optional
	Output Impedance	200 Ω, typical

## History Records

Volatile Memory	10 K reading of history records
Nonvolatile Memory	1 Gb Nand Flash, Mass storage configuration for files and data files, Support U-disk external storage

## Math Functions

Min/Max/Average, dBm, dB, Pass/Fail, Relative, Standard deviation, Hold, histogram, Trend chart, Bar chart
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## General Specifications

<b>Power Supply</b>	
AC 100 V ~ 120 V	45 Hz ~ 66 Hz
AC 200 V ~ 240 V	45 Hz ~ 66 Hz
Consumption	20 VA max
<b>Mechanism</b>	
Dimension	293.75 mm × 260.27 mm × 107.21 mm
Weight	3.76 Kg
<b>Other Characteristics</b>	
Display Screen	4.3" TFT-LCD with a resolution of 480*272
Operating Environment	Full accuracy from 0°C to 50°C, 80% RH and 40°C, non condensing
	Storage Temperature: -20°C -70°C
	Shock and Vibration: conforming to MIL-T-28800E, 5 level (only for sine)
	Height above sea level: up to 3000 meters
electromagnetic compatibility	Conforming to EMC (2004/108/EC) and EN 61326-1:2013
Safety	Conforming to EN61010-1:2010 and low voltage instructions (2006/95/EC)
Remote Interface	10/100 Mbit LAN, USB2.0 Full Speed Device and Host
Programmer Language	Standard SCPI, compatible with commands of main stream multimeters
Warm Up Time	30 minutes



## Ordering information

<b>Product Name</b>	<b>Teledyne Test Tools T3DMM4-5 Digital Multimeter</b>
<b>Model</b>	<b>T3DMM4-5</b>
<b>Standard Accessories</b>	Two Test Leads, Two Alligator Clips
	A USB Cable
	A Quick Start
	A Guarantee Card
	Power Cord