

Accurately Measure and Visualize Ultra-Low Current Drain Levels

Determine the current drain of the components such as the microcontroller (MCU) in your low-power, battery-operated product as well as the product's total current draw. In addition, profile the current drain in all of the product's operating states from its sleep mode to its transmit mode. Using the enhanced accurate DC current function, the DMM7510 can measure a 1 A sleep mode current with 1 pA resolution and with 0.375 nA tolerance. Furthermore, using the digitizing current function, the DMM7510 can capture the current wave shapes as the product transitions from sleep mode to transmit mode.



Capture the current drain from all the operating states – sleep mode to active transmit mode – of a component or a product with the DMM7510's digitizing function. Focus in on characteristics of the wave shapes with the touchscreen pinch and zoom features.

Make Demanding Measurements with Confidence

The DMM7510's design makes the most of Keithley's low level measurement expertise. Features like the low noise input stage and the 32-bit A-to-D converter allow this instrument to deliver DC accuracies typically only found in metrology-grade instrumentation but at about half the price of those solutions. The DMM7510's 100 mV, 10 Ω , and 10 A ranges deliver the sensitivity needed to

Five-inch touchscreen displays more

Online HELP is just a button press away

Store test results and screen images quickly via the USB 2.0 memory port

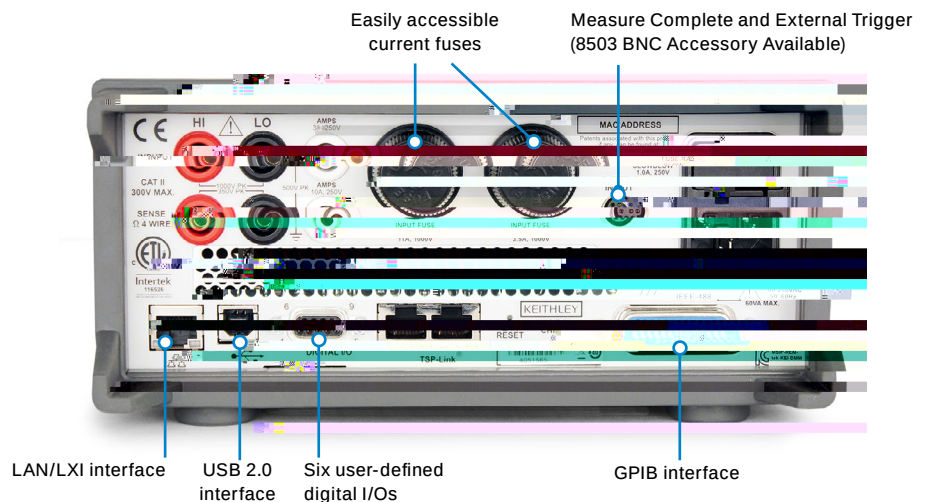
Lower swipe screen speeds access to often-used features



Designed for Higher Testing Productivity

In addition to its advanced touchscreen, the DMM7510's front panel offers a variety of features that enhance its speed, user-friendliness, and learnability, including a USB 2.0 memory port, a HELP key, a rotary navigation/control knob, and front/rear input selector button. All front-panel buttons are backlit to enhance visibility.

The rear panel of the DMM7510 provides connections and controls that simplify configuring multi-instrument test solutions, including input connectors, remote control interfaces (GPIB, USB 2.0 and LX/Ethernet), a D-sub 9-pin digital I/O port (for internal/external trigger signals and handler control), and TSP-Link jacks for connecting to other TSP-enabled instruments.



Flexible System Integration and Programming

To offer users maximum programming
flexibility and simplify configuring
multi-instrument test systems,
the DMM7510 includes Keithley's
powerful Test Script Processor (TSP)
system and SCP programming
mode. The embedded scripting
capability allows running powerful
test scripts directly on the instrument,
without the need for a host computer.

System integration is simplified by the use of the TSP, which allows test scripts to be written in a high-level language (such as C or Pascal) and then compiled into a binary format that can be loaded onto the instrument. This allows test scripts to be written once and then used on any instrument that supports the TSP. The TSP also allows test scripts to be written in a high-level language (such as C or Pascal) and then compiled into a binary format that can be loaded onto the instrument. This allows test scripts to be written once and then used on any instrument that supports the TSP.

Specification Conditions

This document contains specifications and supplemental information for the DMM7510 7-Digit Graphical Sampling Multimeter instrument. Specifications are the standards against which the DMM7510 is tested. Upon leaving the factory, the Model DMM7510 meets these specifications. Supplemental and typical values are nonwarranted, applied at 23 °C (73 °F), and are provided solely as useful information. Measurement accuracies are specified at the DMM7510 terminals under these conditions:

Examples: 10 V at 0.006 PLC: 1.2 (from Accuracy table) + 11 (additional peak noise uncertainty) = 12.2 ppm of range.
10 V at 1 PLC: 1.2 + 0 = 1.2 ppm of range.

NPLC	Digits	100 mV	1 V	10 V	100 V	1000 V
5	7	0.5	0.08	0.06	0.3	0.06
1	7	0.5	0.09	0.07	0.4	0.07
0.2 ⁸	6	2 (10)	0.2 (1.6)	0.1 (1.1)	1.1 (9.4)	0.1 (1)
0.2	6	2 (12)	0.2 (1.6)	0.1 (1)	1.1 (8.9)	0.2 (1.1)
0.06	5	3 (17)	0.4 (2.7)	0.3 (2.1)	3 (17)	0.3 (2.4)
0.006	4	6 (42)	3 (18)	1 (11)	20 (100)	3 (18)
0.0005	3	30 (220)	20 (150)	20 (130)	120 (690)	20 (150)

DC Accuracy

Range	Accuracy ±(ppm of reading + ppm of range)				
	24 Hour T _{CAL} 1 °C	90 Day T _{CAL} 5 °C	1 Year T _{CAL} 5 °C	2 Year T _{CAL} 5 °C	Temperature Coefficient ⁹
100.00000 mV	6 + 14	12 + 14	18 + 14	29 + 14	0.1 + 2.5
1.0000000 V	4 + 1.5	9 + 3	15 + 3	26 + 3	0.1 + 0.5
10.00000 V	2 + 1.0	9 + 1.8	14 + 1.8	22 + 1.8	0.1 + 0.05

DC Accuracy

For input signals ≥1% of the range, ratio accuracy = [(V_{PUT} ppm of reading + V_{PUT} ppm of range * (V_{PUT} range/V_{PUT} input)) + (V_{SENSE} ppm of reading + V_{SENSE} ppm of range * (V_{SENSE} range/V_{SENSE} input))].

DC Accuracy

ADC Linearity	1.0 ppm of reading + 1.0 ppm of range.
Input Impedance	100 mV to 10 V Ranges: Selectable >10 GΩ <400 pF (auto) or 10 MΩ 1% (10 MΩ). 100 V to 1000 V Ranges: 10 MΩ 1%.

Input B370ran944014 (B3 (n)-13.6 (g + F(n8.2 (n)-ao)-1.3 (412 398.09 Tw -342J/T10 1 ntjEMC /T11 1 Tf0 Tc 0 Tw 8.864 0 Td[1]6.6 (0)-28.4 (0 m)26.2 (V

C   

For DC voltage and 1kΩ unbalanced in LO terminal; AC CVRR is 70 dB.

NPLC	5	1	0.2	≤ 0.2
Line S nc	On	On	On	Off
CVRR	140 dB	140 dB	120 dB	80 dB

Resistance

E          

4- O (≤10 Ω) O C 28

Range ²⁰	2-wire	Offset Compensation Off	Offset Compensation On
		4-wire	4-wire
1 Ω	↙	9.2 V	9.5 V
10 Ω	9.2 V	9.2 V	9.5 V
100 Ω, 1 kΩ	14.0 V	14.2 V	14.3 V
10 kΩ	9.5 V	9.5 V	0.0 V
100 kΩ, 1 MΩ	12.7 V	14.3 V	0.0 V (100 kΩ range only)
10 MΩ to 1 GΩ	6.9 V	6.9 V	↙

4- O (≤10 Ω) O C 28

RMS Noise (additional peak noise uncertainty)²¹

Applies to ppm of range.

Peak noise uncertainty is included in DC specifications for ≥1 PLC.

Add peak noise uncertainty to measurements for <1 PLC.

Examples

1 kΩ at 0.006 PLC: 3 (from Accurac table) + 26 (additional peak noise uncertainty) = 29 ppm of range.

1 kΩ at 1 PLC: 3 + 0 = 3 ppm of range.

NPLC	Digits	sn0 1	70 025Si3it-4.3 (s)	TJ0 Tc 0 6.653.447d(n0 1	70 025Si3i)-S04.3 (s)	TJ0 Tc 0 6.653.447d(n0 1

Examples: 10 Ω at 0.2 PLC: 80 (from Accuracy table) + 230 (additional peak noise uncertainty) = 310 ppm of range.
10 Ω at 1 PLC: 80 + 0 = 80 ppm of range.

NPLC	Digits	1 Ω	10 Ω	100 Ω	1 kΩ	10 kΩ
5	7	10	11	6	5	0.9
1	7	9	9	7	7	0.8
0.2 ³⁷	6	30 (130)	30 (120)	30 (120)	30 (120)	3 (16)
0.2	6	60 (220)	60 (230)	50 (190)	50 (190)	9 (35)
0.06	5	70 (350)	70 (350)	50 (290)	50 (280)	20 (90)
0.006	4	130 (750)	120 (830)	110 (700)	100 (690)	20 (110)
0.0005	3	520 (3550)	530 (3520)	530 (3380)	500 (3370)	100 (670)

DC Current

Maximum 4-Wire Ohms Lead Resistance	0.5 Ω per lead for 1 Ω range. 10% of range per lead for 10 Ω to 100 Ω ranges. 50 Ω per lead for 1 kΩ to 10 kΩ ranges.
Input Current Limit	For signals greater than 20 mV, current limited, 13 mA typical.
Offset Compensation	Selectable on 1 Ω to 10 kΩ ranges.
Autozero Off Error	For 1°C and ≤10 minutes, add 8 ppm of reading.

DC Current

DC Current Accuracy

Range ³⁸	Resolution	Maximum Burden Voltage	Accuracy ±(ppm of reading + ppm of range)				
			24 Hour T _{CAL} ±1°C ³⁹	90 Day T _{CAL} ±5°C	1 Year T _{CAL} ±5°C	2 Year T _{CAL} ±5°C	Temperature Coefficient ⁴⁰
10.000000 A	1 pA	15 mV	30 + 30	75 + 30	75 + 30	75 + 30	0.15 + 0.1
100.00000 A	10 pA	15 mV	20 + 5	60 + 9	60 + 9	60 + 9	0.15 + 0.1
1.0000000 mA	100 pA	15 mV	30 + 5	60 + 9	60 + 9	60 + 9	0.15 + 0.1

Capacitance

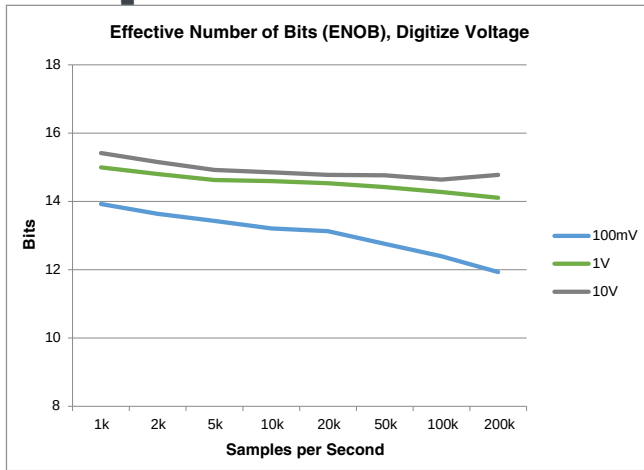
Accuracies specified for additional cable and stray capacitance properly compensated with the Rel function.

A

C 61, 62, 63							
AC DC C							
Range	Analog Bandwidth (-3dB)	Maximum Flatness Error 3 Hz to 20 kHz ⁶⁴	THD 20 kHz Signal (-1dB FS) ⁶⁵	DC-coupled Settling Time (0.5%)	AC-coupled Filter FAST Settling Time (0.5%)	AC-coupled Filter SLOW Settling Time (0.5%)	AC Coupling Low Frequency (-3dB) point ⁶⁶
100.000 mV	600 kHz	0.015 dB	0.04 %	5 s	80 ms	2.3 s	1 Hz
1.00000 V	600 kHz	0.01 dB	0.03 %	6 s	80 ms	2.5 s	1 Hz
10.0000 V	600 kHz	0.01 dB	0.01 %	4 s	80 ms	2.5 s	1 Hz
DC C							

DC-C Effective Number of Bits (ENOB), Digitize Voltage

70



Digitize Current

DC A

71

C

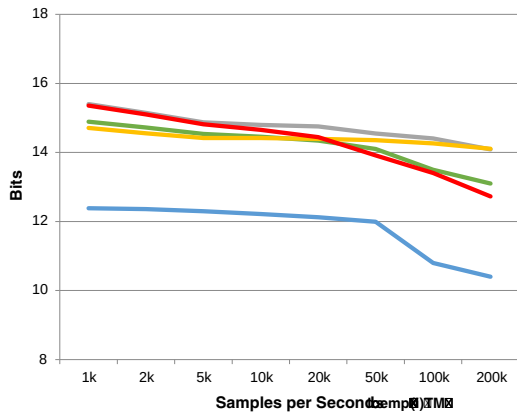
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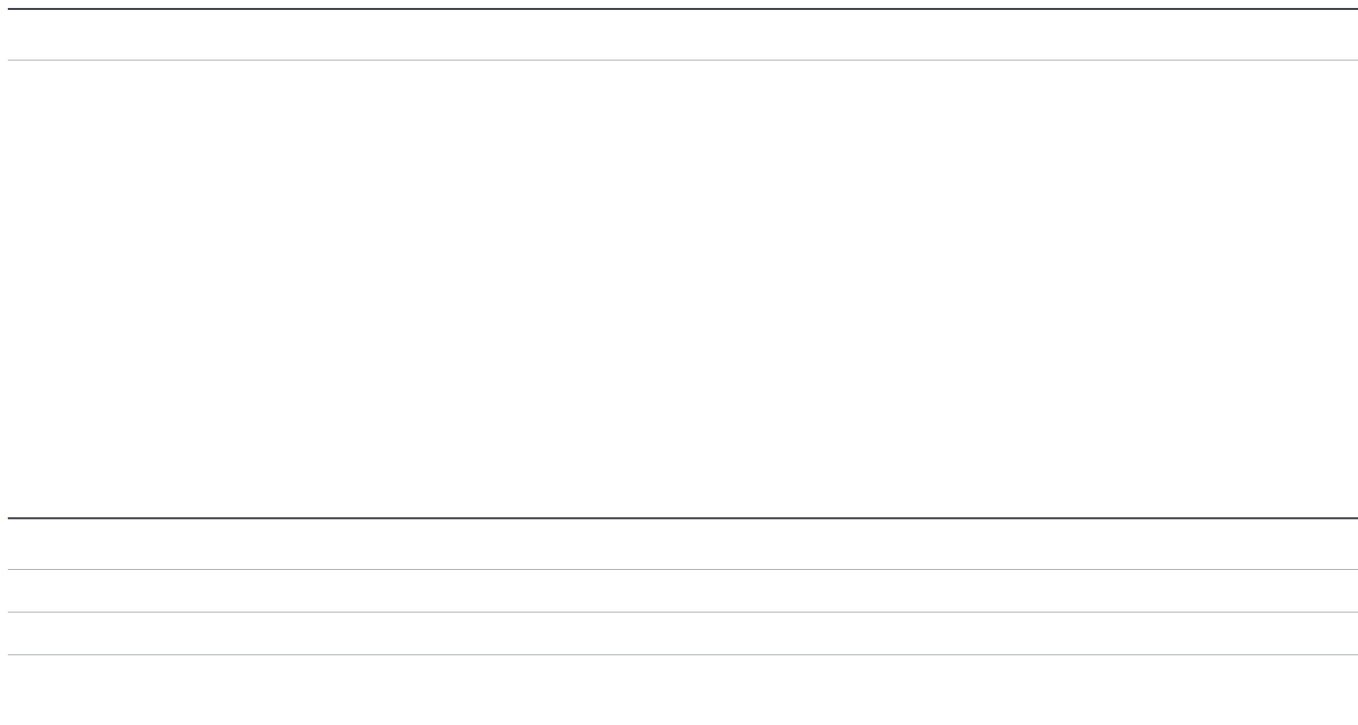
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Range ⁷²	Maximum Flatness Error 3 Hz to 20 kHz	Analog Bandwidth (-3dB)	Total Harmonic Distortion (THD) 20 kHz Signal (-1dB Fo.1 (a)-290.4Dth5di1.5 (Tc 0 Tw 6.4155.754()Tj0.009 Tc -0.03	

Effective Number of Bits (ENOB), dB





89		
Threshold Range	Threshold Resolution	Accuracy ±(% of reading) 2 Year, T _{CAL} ±5°C
100 mV to 700 V	0.05%	1.0%

Measurement Method	Reciprocal counting technique.
Aperture	10 ms to 273 ms; default is 10 ms.

90, 91, 92, 93									
NPLC	Digits	Functions: DC Voltage (10 V), 2-wire Ohms (≤10 kΩ), DC Current (1 mA)		Functions: 4-wire ohms (≤1 kΩ), 4-wire/3-wire RTD		Functions: Thermistor		Functions: Dry Circuit (≤1 kΩ)	
		Measurements Into Buffer	Measurements Into Computer	Measurements Into Buffer	Measurements Into Computer	Measurements Into Buffer	Measurements Into Computer	Measurements Into Buffer	Measurements Into Computer
1	7	59.8 (49.8)	58 (48)	29 (24)	28 (24)	57 (48)	57 (48)	27 (23)	26 (22)
0.2	6	295 (240)	250 (210)	128 (109)	119 (100)	230 (200)	230 (200)	100 (89)	96 (85)
0.06	5	965 (810)	950 (800)	310 (280)	315 (280)	900 (750)	900 (750)	190 (180)	190 (180)
0.006	4	7500 (6700)	7300 (6500)	750 (730)	740 (720)	6800 (6000)	6800 (6000)	295 (290)	295 (290)
0.0005	3	26000 (26000)	24000 (24000)	860 (860)	860 (860)	18000 (18000)	18000 (18000)	310 (310)	310 (310)

Detector Bandwidth (Hz)	Digits	Functions: ACV, ACI	
		Measurements Into Buffer	Measurements Into Computer
3	6	0.5 (0.5)	0.5 (0.5)
30	6	3.3 (3.3)	3.3 (3.3)
300 ⁹⁴	6	59.8 (49.8)	55 (46)
300 ⁹⁴	3	26200 (26200)	24500 (24500)

Sampling Rate	Digits	Resolution	Measurements Into Computer ⁹³
10 kS/s	5	18	9700
20 kS/s	4	16	19000
50 kS/s	4	16	44400
100 kS/s	4	15	80000
1 MS/s	3	12	108000

NO. E.

89. Threshold range is voltage V_{VS} and threshold level voltage peak. Specified with 1kV square wave. 100V and 700V threshold ranges guaranteed by design.

90. Reading speeds for auto zero off, fixed range, autodelta off. Offset compensation off and open lead detector off where applicable.

91. Buffer measurements: For <0.2 PLC, multisample, single buffer transfer binary reading only.

92. PC measurements: For 1 and 0.2 PLC single reading and single transfer to computer (USB).

93. Reading rates using factor default operating conditions and autorange off, autodelta off. Speeds include measurement and data transfer out of the USB. ≥1000 readings with binary transfer over USB.

94. For bandwidth 300V, auto zero off, 6 digits at 1 PLC, 3 digits at 0.0005 PLC.

System Performance, Typical

[illegible]

A	Trigger Characteristics	Voltage Input	Current Input
Input	100 mV to 1000 V	10 A to 10 A	
Resolution	0.05%	0.05%	
Basic Accuracy ($T_{ACAL} = 5^{\circ}\text{C}$) ^{101, 102}	1%	1%	

	Digital I/O	External
Positive Logic	800 ns + 40 ns jitter	930 ns + 40 ns jitter
Negative Logic	800 ns + 40 ns jitter	840 ns + 40 ns jitter

 F	 M	()
Window Filter Size	0 to 10% of reading, where 0 averages all readings.	
Memory	Up to 27.5 million timestamped readings with the compact buffer style, with additional memory available using an external USB flash drive.	
Maximum Internal Memory (Buffer)	27.5 million readings with the compact buffer style (6 -digit without formatting), 11 million readings with the standard or full buffer style.	

General Instrument Specifications

[illegible]

Vibration	L-PRF-28800F Class 3, Random.
Warm-up	90 minutes to rated accuracy.
Input Signal Connections	Front and rear safety banana jacks.
Cooling	Forced air, fixed speed.
Dimensions	Without handle and bumpers: 88 mm high 213 mm wide 410 mm deep (3.46 in. 8.39 in. 16.13 in.). With handle and bumpers (bench configuration): 106 mm high 255 mm wide 425 mm deep (4.18 in. 10.05 in. 16.75 in.).
Shipping weight (with bumpers and handle)	4.08 kg (9.0 lb.).
Shipping weight (without bumpers and handle)	3.63 kg (8.0 lb.).
Digital I/O:	
Connector	9-pin female D.
5V Power Supply Pin	Limited to 500 mA at > 4 V (solidstate fuse protected).
Lines	Six input/output, user-defined, for digital I/O or triggering.
Input Signal Levels:	0.7 V (maximum logic low) 3.7 V (minimum logic high).
Input Voltage Limits:	-0.25 V (absolute minimum) +5.25 V (absolute maximum).
Maximum Source Current	+2.0 mA at >2.7 V (per pin).
Maximum Sink Current	-50 mA at 0.7 V (per pin, solid-state fuse protected).
Handler	User-defined start of test, end of test, four categories bits
Math Functions	Rel, dB, Limit Test, Percentage, 1/x, and mX + b.
Remote Interface:	
LAN	RJ-45 connector, 10/100BT; Virtual Front Panel.
IP Configuration	Static or DHCP.
GPIO	IEEE-488.1 compliant. Supports IEEE-488.2 common commands and status model topology.
USB Device (rear panel, type B)	2.0 full speed, USB 2.0 compliant.
USB Host (front panel, type A)	USB 2.0, support for flash drives, FAT 32.
LXI Compliance	LXI version 1.4 Core 2011.
Language	Embedded Test Script Processor (TSP) accessible from an host interface; responds to high-speed test scripts comprised of remote commands and statements (for example, branching, looping, math); able to execute high-speed test scripts stored in memory without host intervention; also SCP. (default command set).
Accessories Supplied	Product Information CD-ROM, DV7510 Quick Start Guide, Kickstart Software Quick Start Guide, power cord, 1 m USB cable (type A to type B), 3 m LAN cable, and 1756 Standard Test Lead Kit.
Accessories Available	(Calibration / Data / ISO 17025), software .NET/SA drivers for Microsoft Visual Basic, Visual C/C++, LabVIEW, 84 (s)-13.4 (2 (t S)-14.216 ()-11.5 (t)-116 (r)-1920u)-15.1mnts s c11.9 (u).8 ()23117.8()2)-8.27 (a)-17.8 (r) b6 (u)0.5 (a)-417 (a)TJ/Span/ActualTextREF0009>BDC 104 (99 Td ()TJEMC /T11 1 Tf0 Tc 0 Tw 6..3 (76 Td (F13.3 (d -17.2 (v)-1.3 (e)-19.2 (n)-8.9 (i)-13

Supplied Accessories

1756	Test Leads
USB-B-1	USB Cable, Type A to Type B, 1 m (3.3 ft)
CA-180-3A	TSP-Link/Ethernet Cable Documentation CD
	DVW75

4299-8	Single Fixed Rack Mount Kit
4299-9	Dual Fixed Rack Mount Kit
4299-10	Dual Fixed Rack Mount Kit. Mount One DMM7510 and One Series 26xxB Instrument
4299-11	Dual Fixed Rack Mount Kit. Mount One DMM7510 and One Instrument from Series 2400, Series 2000, etc.
4299-12	Dual Fixed Rack Mount Kit. Mount One DMM7510 and One Keithley Instrument.
DMM7510-BenchKit	Ears and Handle for DMM7510-NFP-RACK and DMM7510-RACK Models

Available Services

DMM7510-EW	1 Year Factor Warranty Extended to 2 Years from Date of Shipment
DMM7510-3Y-EW	1 Year Factor Warranty Extended to 3 Years from Date of Shipment
DMM7510-5Y-EW	1 Year Factor Warranty Extended to 5 Years from Date of Shipment
DMM7510-NFP-EW	1 Year Factor Warranty Extended to 2 Years from Date of Shipment
DMM7510-NFP-3Y-EW	1 Year Factor Warranty Extended to 3 Years from Date of Shipment
DMM7510-NFP-5Y-EW	1 Year Factor Warranty Extended to 5 Years from Date of Shipment

C/DMM7510-3Y-17025	Keithley Care 3 Year ISO-17025 Calibration Plan
C/DMM7510-3Y-DATA	Keithley Care 3 Year Calibration w/Data Plan
C/DMM7510-3Y-STD	Keithley Care 3 Year Std Calibration Plan
C/DMM7510-5Y-17025	Keithley Care 5 Year ISO-17025 Calibration Plan
C/DMM7510-5Y-DATA	Keithley Care 5 Year Calibration w/Data Plan
C/DMM7510-5Y-STD	Keithley Care 5 Year Std Calibration Plan
C/DMM7510-NFP-3Y-17025	Keithley Care 3 Year ISO-17025 Calibration Plan
C/DMM7510-NFP-3Y-DATA	Keithley Care 3 Year Calibration w/Data Plan
C/DMM7510-NFP-3Y-STD	Keithley Care 3 Year Std Calibration Plan
C/DMM7510-NFP-5Y-17025	Keithley Care 5 Year ISO-17025 Calibration Plan
C/DMM7510-NFP-5Y-DATA	Keithley Care 5 Year Calibration w/Data Plan
C/DMM7510-NFP-5Y-STD	Keithley Care 5 Year Std Calibration Plan
C/NEW DATA	Calibration Data for New Units
C/NEW DATA ISO	ISO-17025 Calibration Data for New Units

Ordering Information

DMM7510	7 -Digit Graphical Sampling Multimeter
DMM7510-NFP	7 -Digit Graphical Sampling Multimeter, with No Front Panel
DMM7510-RACK	7 -Digit Graphical Sampling Multimeter, with No Handle
DMM7510-NFP-RACK	7 -Digit Graphical Sampling Multimeter, with No Front Panel and No Handle

Warranty Information

Warranty Summary	This section summarizes the warranties of the DMM7510. For complete warranty information, refer to the DMM7510 Reference Manual. Any portion of the product that is not manufactured by Keithley is not covered by this warranty and Keithley will have no duty to enforce any other manufacturer's warranties.
Hardware Warranty	Keithley Instruments, Inc. warrants the Keithley manufactured portion of the hardware for a period of one year from defects in materials or workmanship; provided that such defect has not been caused by use of the Keithley hardware which is not in accordance with the hardware instructions. The warranty does not apply upon any modification of Keithley hardware made by the customer or operation of the hardware outside the environmental specifications.
Software Warranty	Keithley warrants for the Keithley produced portion of the software or firmware will conform in all material respects with the published specifications for a period of ninety (90) days; provided the software is used on the product for which it is intended in accordance with the software instructions. Keithley does not warrant that operation of the software will be uninterrupted or error-free, or that the software will be adequate for the customer's intended application. The warranty does not apply upon any modification of the software made by the customer.

Contact Information:
Australia*